Date 22 August 1969

Sub with mission support plan

Bernard Swarbrick
David Bland

# MIT/IL SOFTWARE DEVELOPMENT PLAN

# FOR

# LUMINARY 1B LGC PROGRAM

# (FINAL ISSUE)

George W Cherry 8/26/69

Luminary Project Manager's Signature — Date

Dr. H. Martin 8/26/69

Director Mission Development Approval — Date

This plan consists of 45 pages.

Date 22 August 1969

# PREFACE

The Luminary 1B LGC Program is being prepared to support a manned Lunar or Earth Orbital LM flight of a Block II G&N System.

TABLE OF CONTENTS

# SECTION I

# PROGRAM DEVELOPMENT STATUS

LUMINARY 1B Program Development Status Date 8/22/69

| Item No. | Description | Note | Predicted Date | Original Target | Actual Date | Required Dates | Scheduled Rev. Date | Resp. |
|---|---|---|---|---|---|---|---|---|
| 1 | Level 2/3 test plan Preliminary | | | | 6/18/69 | | | |
| 2 | Level 2/3 testing Final | | 7/29/69 | 7/29/69 | 8/5/69 | | | |
| | Start | | 6/5/69 | 6/5/69 | 6/5/69 | | | |
| | Completion | | 8/12/69 | 7/15/69 | 8/12/69 | | | |
| 3 | Level 4 test plan | | | | | | | |
| | PRELIMINARY | | 7/8/69 | 7/8/69 | 7/8/69 | | | |
| | FINAL | | 7/11/69 | 7/11/69 | 7/11/69 | | | |
| 4 | Level 4 testing | | | | | | | |
| | Start | | 7/16/69 | 7/16/69 | 7/14/69 | | | |
| | Completion | | 8/12/69 | 8/12/69 | 8/12/69 | Released on Rev 116 to Rope Manufacture | | |
| 5 | GSOP Publication dates | | | | | | | |
| | Section 1 (Change pages) | | No changes necessary | | | | | |
| | 2 (Change pages) | | 8/28/69 | 8/1/69 | | | | |
| | 3 (Change pages) | | 8/28/69 | 8/12/69 | | | | |
| | 4 (Complete publication) | | 8/19/69 | 8/1/69 | 8/22/69 | | | |
| | 5 (Complete publication) | | 8/12/69 | 8/1/69 | 8/15/69 | | | |
| 6 | MIT Documentation | | | | | | | |
| | Luminary Flowchart Completion | | 10/15/69 | 10/15/69 | | | | |

# SECTION II

# GUIDANCE SOFTWARE OPERATIONAL PLAN STATUS

LUMINARY 1B — PCR STATUS REPORT — Date 8/22/69

| PCR | DESCRIPTION | Originator/ Date | MIT IMPACT | NASA/SCB DIRECTION | PCS | Approved Schedule Impact and Remarks |
|---|---|---|---|---|---|---|
| 773.2 | Fix constants for Planetary Inertial Subroutine. | Reber 5/13/69 | No Slip | Implement and provide detailed evaluation. | | |
| 776.2 | Improved R2 model timing. | Engel 5/15/69 | No Slip | Implement and provide detailed evaluation. | | |
| 779 | Leave Track Enable set when R29 is terminated. | Volante 5/20/69 | No Slip | Implement and provide detailed evaluation. | | |
| 780 | Provide pure RR Range, Range rate and time lag during P20, P22, and P25. | Cherry 5/19/69 | Storage - 20 words | Implement and provide detailed evaluation. | | |
| 781.2 | PIPA Bias Compensation scale. | Edmonds 5/19/69 | Storage - 5 words | Implement and provide detailed evaluation. | | |
| 791.2 | Do not allow a PROCEED Response to V21, V22, V23. | Copps 5/23/69 | No Slip | Implement and provide detailed evaluation. | | |
| 797.2 | Cause Key Release to Blank DSKY if no display waiting. | Copps 5/23/69 | | Disapproved | | Not to be implemente because of difficult caused on KSC testin |
| 798.2 | Reset GLOKFAIL in Roo. | Copps 5/23/69 | No Slip | Implement and provide detailed evaluation. | | |

LUMINARY 1B — PCR STATUS REPORT

Date 8/22/69

| PCR | DESCRIPTION | Originator/ Date | MIT IMPACT | NASA/SCB DIRECTION | PCS | Approved Schedule Impact and Remarks |
|---|---|---|---|---|---|---|
| 801.2 | Make BAILOUT alarms start with 3XXXX and POODOO alarms start with 2XXXX. | Copps 5/23/69 | No Slip | Implement and provide detailed evaluation. | | |
| 802.2 | Save alarm data after "Error Reset". | Copps 5/23/69 | No Slip | Implement and provide detailed evaluation. | | |
| 805 | Don't allow V66 on the surface. | Kernan 5/28/69 | Storage - 4 words | Implement and provide detailed evaluation. | | |
| 806.2 | Allow N07 to address output channels. | Kernan 5/28/69 | | Disapproved | | Not being incorporated because of schedule impact. |
| 807.2 | Add present time to P21. | Kernan 5/28/69 | No Slip | Implement and provide detailed evaluation. | | |
| 812.2 | Resetting and Setting of the External ΔV flag. | Copps 6/2/69 | No Slip | Implement and provide detailed evaluation. | | |
| 814 (Rev) | Reduce keystrokes required to check and approve LR data. | Hamilton 6/2/69 | No Slip | Implement and provide detailed evaluation. | | |
| 816 | Modify R03 to permit astronaut setting of 1° deadband. | Cherry 6/4/69 | No Slip | Implement and provide detailed evaluation. | | |
| 817 | Eliminate Undesirable LR position alarms from R12. | Cherry 6/4/69 | No Slip | Implement and provide detailed evaluation. | | Fixes Anomaly LNY 80 |

LUMINARY 1B PCR STATUS REPORT

Date 8/22/69

| PCR | DESCRIPTION | Originator/ Date | MIT IMPACT | NASA/SCB DIRECTION | PCS | Approved Schedule Impact and Remarks |
|---|---|---|---|---|---|---|
| 318 | Permit rejection of Individual Measurement incorporations in P20. | Cherry 6/4/69 | No Slip | Implement and provide detailed evaluation. | | |
| 320 | Eliminate lighting of ALT light when low scale discrete is absent. | Cherry 6/4/69 | No Slip | Implement and provide detailed evaluation. | | |
| 323 | Delete P31 from Luminary 1B. | Greene 6/11/69 | Storage - Saves 60 Words | Implement and provide detailed evaluation. | | |
| 325.2 | Display option 3 in P52/P54. | Copps 6/13/69 | No Slip | Implement and provide detailed evaluation. | | |
| 326.2 | Reverse P76 Display. | Copps 6/13/69 | No Slip | Implement and provide detailed evaluation | | |
| 308.2 | Limit range display in V83. | Kernan 5/28/69 | | Disapproved | | |
| 277 | Affixed DUMPCNT | FSB 5/13/69 | No Slip | Implement and provide detailed evaluation. | | |
| 279 | Variable Insertion Computation | FCD/FDB 6/6/69 | Storage - 80 words | Implement and provide detailed eval. | | |
| 327 | Add ZDOTD to ascent descent downlist | Schulenburg 6/18/69 | No Slip | Implement and provide detailed eval. | | |
| 331.2 | Lambert Overflow protection | Robertson 6/19/69 | No Slip | Implement and provide detailed eval. | | |
| 330 | Supplementary ASTEER modification | Robertson 6/19/69 | Storage - Save 4 words | Implement and provide detailed eval. | | |

* PCN

LUMINARY 1B —— PCR STATUS REPORT

Date 8/22/69

| PCR | DESCRIPTION | Originator/ Date | MIT IMPACT | NASA/SCB DIRECTION | PCS | Approved Schedule Impact and Remarks |
|---|---|---|---|---|---|---|
| 832.2 | Define Actual Restrictions on Running R05. | Cherry 7/7/69 | No Slip | Implement and provide detailed eval. | | |
| 838 | Prevent RCS Jet on Lunar Surface | Cherry 7/14/69 | Storage - ≈0 | Implement and provide detailed eval. | | Fixes Anomaly LNY 8 |
| 839 | R12 and LR Repositioning Routine Imrovements | Cherry 7/11/69 | Storage - Saves ≈ 20 words | Implement and provide detailed eval. | | |
| 840 | Reduce Oscillation in P64/65 | Cherry 7/14/69 | No Slip | Implement and provide detailed eval. | | Fixes Anomaly LNY 7 |
| 841 | PGNCS Derived Vehicle Attitude Rates on FDAI Error Needle | Cherry 7/14/69 | Storage - 13 words | Implement and provide detailed eval. | | |
| 842 | Mod. of Criteria used to determine DAP phase plan parabola intercept | R.Goss 7/8/69 | Storage - 1 word | Oral Approval 8/1/69 | | Fixes Anomaly LNY78 |
| 844 | Deletion of P38/78 & P39/79 | G.Cherry 7/16/69 | No Slip | Implement and provide detailed eval. | | Approved as part of PCR 279. |
| 845 | Do not turn on R29 during P70/71 | G.Cherry 7/16/69 | Storage - Save 2 words | Implement and provide detailed eval. | | Approved as part of PCR 279. |
| 280.2 | Constants for Planetary Inertial Orientation(1970) | MPAD 6/25/69 | | Disapproved. | | Superceded by PCR 773.2. |

LUMINARY 1B PCR STATUS REPORT Date 8/22/69

| PCR | DESCRIPTION | Originator/ Date | MIT IMPACT | NASA/SCB DIRECTION | PCS | Approved Schedule Impact and Remarks |
|---|---|---|---|---|---|---|
| 281 | Constants for LOSSEM | MPAD 6/25/69 | | Disapproved. | | Superceded by PCR 773.2. |
| 846 | More accurate DELTAT Tailoff for P70 | G.Cherry 7/22/69 | | Pending | | MSC to provide data |
| 847 | Eliminate Possible Lockout of Pitch-over from P12, P70, P71 | G. Cherry 7/22/69 | Save 6 words | Oral approval 7/22/69 | | |
| 848 | PreventRR ECDU's from stealing LGC Memory Cycles | G.Cherry 7/22/69 | Storage - ≈ 8 words | Implement and provide detailed eval. | | |
| 284 | VGTIG's on C/A Downlist | C.D. Sykes 7/31/69 | No Slip | Implement and provide detailed eval. | | |
| 853 | Restrict V35 to P00 | B. McCoy 7/31/69 | Storage - Saves 10 words | Oral Approval 8/1/69 | | Approved for Colossu on PCN 748. |
| 854 | Provide a Flexible Method for Crew to Modify RLS | G. Cherry 8/4/69 | | Approved by C. Kraft 7/31/69 | | |
| 855 | Begin Reading LR Velocity as soon as Velocity Data Good Appears | G. Cherry 8/4/69 | | Oral Approval 8/1/69 | | |

LUMINARY 1B — PCR STATUS REPORT — Date 8/22/69

| PCR | DESCRIPTION | Originator/ Date | MIT IMPACT | NASA/SCB DIRECTION | PCS | Approved Schedule Impact and Remarks |
|---|---|---|---|---|---|---|
| 856 | Change 1502/1206 from POODOO's to BAILOUTS | B. McCoy 8/5/69 | | Oral Approval 8/6/69 | | |

LUM ARY 1B GSOP CHANGES AVAILABE FOR REVI Date 22/69

| PCR | DESCRIPTION | Section 1 | | | Section 2 | | | Section 3 | | | Section 4 | | | Section 5 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Req | Pred | Act | Req | Pred | Act | Req | Pred | Act | Req | Pred | Act | Req | Pred | Act |
| 773.2 | Fix constant for Planetary Inertial Subroutine. | | | | | | | | | | | | | | | 8/5 |
| 776.2 | Improved R2 model timing. | | | | | | | | | | | | | 8/1 | 8/1 | 8/5 |
| 779 | Leave Track Enable set when R29 is terminated. | | | | | | | | | | 7/7 | 8/1 | 8/12 | | | |
| 780 | Provide pure RR Range, Range rate and time lag during P20, P22, and P25. | | | | | | | | | | 7/7 | 8/1 | 8/12 | 8/1 | 8/1 | 8/5 |
| 791.2 | Do not allow a PROCEED Response to V21, V22, V23. | | | | | | | | | | 7/18 | 8/1 | 8/12 | | | |
| 798.2 | Reset GLOKFAIL in Roo. | | | | | | | | | | 7/18 | 8/1 | 8/12 | | | |
| 801.2 | Make BAILOUT alarms start with 3XXXX and POODOO alarms start with 2XXXX. | | | | | | | | | | 7/18 | 8/1 | 8/12 | | | |
| 802.2 | Save alarm data after "Error Reset". | | | | | 8/22 | 8/21 | | | | 7/18 | 8/1 | 8/12 | | | |
| 805 | Don't allow V66 on the surface. | | | | | | | | | | 7/18 | 8/1 | 8/12 | | | |

LUMINARY 1B GSOP CHANGES AVAILABLE FOR REV

Date 8/22/69

| PCR | DESCRIPTION | Section 1 | | | Section 2 | | | Section 3 | | | Section 4 | | | Section 5 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Req | Pred | Act | Req | Pred | Act | Req | Pred | Act | Req | Pred | Act | Req | Pred | Act |
| 807.2 | Add present time to P21. | | | | | | | | | | 7/18 | 8/1 | 8/12 | | | |
| 812.2 | Resetting and Setting of the External ΔV flag. | | | | | | | | | | 7/18 | 8/1 | 8/12 | | | |
| 814 (Rev) | Reduce keystrokes required to check and approve LR data. | | | | | | | | | | 7/7 | 8/1 | 8/12 | | | |
| 816 | Modify R03 to permit astronaut setting of 1 deadband. | | | | | 8/22 | 8/21 | | 8/15 | 8/21 | 7/18 | 8/1 | 8/12 | | | |
| 817 | Eliminate Undesirable LR position alarms from R12. | | | | | | | | | | 7/7 | 8/1 | 8/12 | 8/1 | 8/1 | 8/5 |
| 818 | Permit rejection of Individual Measurement incorporations in P20. | | | | | | | | | | 7/7 | 8/1 | 8/12 | 8/1 | 8/1 | 8/5 |
| 820 | Eliminate lighting of ALT light when low scale discrete is absent. | | | | | | | | | | 7/7 | 8/1 | 8/12 | 8/1 | 8/1 | 8/5 |
| 823 | Delete P31 from Luminary 1B. | | | | | 8/22 | 8/21 | | | | 7/18 | 8/1 | 8/12 | 8/1 | 8/1 | 8/5 |
| 825.2 | Display option 3 in P52/ P54. | | | | | | | | | | 8/1 | 8/1 | 8/12 | | | |
| 826.2 | Reverse P76 Display. | | | | | | | | | | 8/1 | 8/1 | 8/12 | | | |
| 277 | Affixed DUMPCNT | | | | | 8/22 | 8/21 | | | | | | | | | |
| 279 | Variable insertion computation | | | | | 8/22 | 8/21 | | | | | | | 8/1 | 8/1 | 8/5 |

LUMMARY 1B GSOP CHANGES AVAILABLE FOR REVI[illegible] Date [illegible]/22/69

| PCR | DESCRIPTION | Section 1 | | | Section 2 | | | Section 3 | | | Section 4 | | | Section 5 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Req | Pred | Act | Req | Pred | Act | Req | Pred | Act | Req | Pred | Act | Req | Pred | Act |
| 827 | Add ZDOTD to ascent/ Descent downlist | | | | | 8/22 | 8/21 | | | | | | | | | |
| 831.2 | Lambert Overflow Protection | | | | | | | | | | | | | 8/1 | 8/1 | 8/5 |
| 830 | Supplementary ASTEER modification | | | | | | | | | | | | | 8/1 | 8/1 | 8/5 |
| 832.2 | Remove Restriction of Running R05 only in POO | | | | | | | | | | 8/1 | 8/1 | 8/12 | | | |
| 838 | Prevent RCS JET firings on Lunar Surface | | | | | | | | | | 8/1 | 8/1 | 8/12 | | | |
| 839 | R12 and LR reposition routine Improvements | | | | | 8/22 | 8/21 | | | | 8/1 | 8/1 | 8/12 | 8/1 | 8/1 | 8/5 |
| 840 | Reduce Attitude Oscillations in P64/65 | | | | | | | | | | 8/1 | 8/1 | 8/12 | | | |
| 841 | PGNCS Derived Vehicle Attitude Rate onFDAI Error Needles | | | | | 8/22 | 8/21 | | 8/15 | 8/21 | 8/1 | 8/1 | 8/12 | | | |
| 844 | Deletion of P38/78 and P39/79 | | | | | 8/22 | 8/21 | | | | 8/1 | 8/1 | 8/12 | 8/1 | 8/1 | 8/5 |
| 845 | Do not turn on R29 during P70/71 | | | | | | | | | | 8/1 | 8/1 | 8/12 | | | |
| 847 | Eliminate Possible Lock-out of Pitch-over from P12, P70/71 | | | | | | | | | | 8/1 | 8/1 | 8/12 | 8/1 | 8/1 | 8/5 |

LUMINARY 1B GSOP CHANGES AVAILABLE FOR REVIEW

DATE 8/22/69

| PCR | DESCRIPTION | SECTION 1 | | | SECTION 2 | | | SECTION 3 | | | SECTION 4 | | | SECTION 5 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Req | Pred | Act | Req | Pred | Act | Req | Pred | Act | Req | Pred | Act | Req | Pred | Act |
| 842 | Mod. of Criteria used to determine DAP phase plane parabola intercepts. | | | | | | | | 8/15 | 8/21 | | | | | | |
| 848 | Prevent RR ECDU's from stealing LGC memory cycles. | NO CHANGE TO GSOP | | | | | | | | | | | | | | |
| 284 | VGTIG's on C/A Downlist. | | | | | 8/22 | 8/21 | | | | | | | | | |
| 853 | Restrict V35 to POO. | | | | | | | | | | | 9/5 | | | | |
| 854 | Provide a Flexible Method for Crew to Modify RLS. | | | | | | | | | | | 9/5 | | | | |
| 855 | Begin Reading LR Velocity Data Good Appears. | | | | | 9/5 | | | | | | 9/5 | | | 9/5 | |
| 856 | Change 1502/1206 from POODOO's to BAILOUTS | | | | | | | | | | | 9/5 | | | | |

# SECTION III

# LEVEL 2 AND 3 TESTING

| ANOM/ PCR/ ACB | TEST DESCRIPTION | RESPONSIBLE ENGINEER |
|---|---|---|
| | LANDING | |
| LNY 58 | Attempt V78 during Hybrid Landing Simulation. Observe operator error light. | D. Moore |
| LNY 64 | Cause engine fail during 10% and observe no throttle up at ZOOMTIME. | P. Adler |
| LNY 72 | Hybrid Simulation, place LR in POS 1 after HIGATE note 523 alarm, V32 response, note one 511 alarm instead of one every two secs. | D. Moore |
| LNY 73 | Do recycle on N61 in Hybrid Test - observe reappearance of N61. | P. Adler |
| LNY 76 | Hybrid Landing Simulation; notice 1 sec. flashing frequency of N60. | D. Moore |
| LNY 88 | Force restart during position job and note R12 is still running and LR repositions to desired position. | D. Moore |
| PCR 814 (REV) | Key V57E, obtain V06N68 flash; when acceptable delta H (R3) appears, proceed, obtain V50N18; key proceed to return to previous (P63, P64, P65, P66 & P67) displays. | D. Moore |
| PCR 817 | Hybrid Landing Simulation has capability of making the 511, 522 and 523 alarm situation (possible in 1A) in 1B, 522 not noticed. Place LR in POS 2 (or repositioning) before HIGATE and reposition after HIGATE. When 523 occurs, key V34E; observe no 511 alarm and that R12 is turned off at V34E to 523 alarm. | D. Moore |
| PCR 820 | Hybrid Landing Simulation; remove LO scale discrete; note no ALT light. | D. Moore |
| PCR 838 | 1. Hybrid Simulation; at P68 check MINIMP flag to see bit setting.<br>2. At TIG in various programs check MINIMP flag to see bit reset.<br>3. Hybrid Simulation; notice attitude error needles zeroing when proceed to N60. | D. Moore |

| ANOM/ PCR/ ACB | TEST DESCRIPTION | RESPONSIBLE ENGINEER |
|---|---|---|
| PCR 839 | Hybrid Simulation; note LR using POS 2 transformation even if POS 2 discrete has not appeared after HIGATE; from Hybrid edit, checking of LPOS2FLG (FLGWRD 11). | D. Moore |
| PCR 840 | In P63 observe deadband not equal 0.3° deadband. Check bits 4 & 5 (DAPBOOLS) for 0.3° and 1° setting. Observe 0.3° deadband in P64. | D. Moore |
| PCR 848 | Visual Inspection | D. Eyles |
| PCR 854 | Visual Inspection | D. Eyles |
| PCR 855 | Observe that Velocity Data Bad Light on DSKY comes on when average G is on. | B. McCoy |
| | ABORTS and ASCENTS | |
| LNY 62 | Test consists of obtaining basic trace of a portion of a P70 simulation which explicitly shows the DAP deadband being set to one degree (Digital Simulation). | W. Bernikowich |
| PCR 779 | P12 run with POO selected at insertion. Verify from simulator output that track enable is still set. | P. Volante |
| PCR 279 | This test consists of four (4) separate tests, the PCR changed P70 and P71 so that the horizontal velocity at injection was continuously computed every two (2) seconds. All four runs will be edited to show relevant computations.<br>a. P70 run from early in descent (Digital Simulation)<br>b. P70 run from the middle of descent (Digital Simulation)<br>c. P71 run from the middle of descent (Digital Simulation)<br>d. Test of P70 followed by a P71 (Hybrid Simulation) | C. Schulenberg |

| ANOM/ PCR/ ACB | TEST DESCRIPTION | RESPONSIBLE ENGINEER |
|---|---|---|
| PCR 827 | Test by obtaining a downlink edit of test no. 3.17a (Digital Simulation). | C. Schulenberg |
| PCR 845 | Visual Inspection | L. Berman |
| PCR 847 | Visual Inspection | L. Berman |
| | NAVIGATION | |
| LNY 61 | P20 run with R31; force restart during shaft and trunnion incorporations. Navigations edit output and trace to verify correct incorporation. | P. Volante |
| LNY 66 | Anomaly closed with PCR 780. | J. Stoppelman |
| LNY 71 | Test run with ITRACE of predesignate area to demonstrate that XR1, used by orbital integration, was undisturbed. | V. Dunbar |
| LNY 81 | Move antenna out of limits so that a reposition will be called for. Then do V41N72 during reposition and observe a designate to proper angles after reposition. | P. Volante |
| LNY 87 | P22 run; check simulator output to verify that no display comes up after radar lock-on. | P. Volante |
| PCR 780 | P20 - call P20<br>A. After PRO to V50N72, key V16N78<br>1. Observe 3 samples of data prior to computer activity light on solid, which indicates R22 processing. | B. McCoy |

| ANOM/ PCR/ ACB | TEST DESCRIPTION | RESPONSIBLE ENGINEER |
|---|---|---|
| PCR 780 (cont'd.) | 2. Observe 7 samples of data after computer activity light out, which indicates R22 finished processing.<br>B. After PRO to V50N18 in P25<br>1. Observe no tracker fail lamp without radar lock on.<br>2. Observe samples every seven seconds with radar lock on.<br>C. Assure that R04 still works. | B. McCoy |
| PCR 818 | P20 run with RMAX, VMAX set to zero; observe V32, V33 and V34 responses made to V06N49 display. | P. Volante |
| PCR 826.2 | Earth centered state vectors to be established for the 2 vehicles and P76 will be called. A time of ignition will be entered in response to the V06N33 display and a delta $\overline{V}$ will be entered in response to the V06N84. | T. Crocker |
| LNY 91 | In P20 - lock on manually, then switch to LGC mode - observe that both CDU fail discrete and CDU zero discrete is present and no 515 alarm | P. Volante |
| | POWERED FLIGHT | |
| LNY 63 | Cause engine fail during 10% and observe no throttle up at ZOOMTIME. | P. Adler |
| PCR 830 | Do Lambert ITRACE to verify counter was set to 20. | P. Adler |
| PCN 831.2 | Twenty-nine (29) bench tests of the Lambert Routine will be run, and the results will be compared by means of a Lambert MAC edit against the MAC Lambert program in KWK conics which has been the standard for several years. Twenty-eight (28) of the bench tests will cover a wide range of transfer angles and eccentricities and initial and terminal radius vectors. The one other case will be the | W. Robertson |

| ANOM/ PCR/ ACB | TEST DESCRIPTION | RESPONSIBLE ENGINEER |
|---|---|---|
| | precise input of the only known case ever to have caused the problem for which PCN 831.2 is the fix. | |
| PCR 284 | Load VGTIG with 3XXXX - select P00 - observe octal down list has 3XXXX in sight down list. | B. McCoy |
| | ALIGNMENTS | |
| LNY 68 | Test to be done in System Test Lab and the Hybrid Simulator. The test requires that IMU compensation be pulsing gyros when N22 or N93 are answered. The test involves loading the GCOMP registers with larger values on the N22 or N93 display, waiting for IMU compensation to start, then answering the display with a proceed. | D. Millard |
| LNY 74 | Two digital tests to be run.<br>P57 AT-2 to REFSMMAT use a star and the sun<br>P57 AT-3 to Landing Site using the sun | D. Millard |
| PCR 825.2 | Key V37E52E and observe 3 appear in Register 3 of first display. | D. Millard |
| | DAP | |
| LNY 69 | Patch in correction on rollback of powered ascent run in which anomaly was observed to verify that anomaly has been repaired without degrading performance. | |

| ANOM/ PCR/ ACB | TEST DESCRIPTION | RESPONSIBLE ENGINEER |
|---|---|---|
| PCR 816 | In ascent coasting flight with $5^{\circ}$ DB specified:<br>1. Initiate limit cycle with pulse from RHC in manual rate command/attitude hold mode<br>2. Observe limit cycle amplitude to verify selection of $5^{\circ}$ DB by program<br>3. Specify $1^{\circ}$ DB via R03 (V48) and observe subsequent limit cycle amplitude to verify selection of $1^{\circ}$ DB by program<br>4. Specify $0.3^{\circ}$ DB via R03 and observe subsequent limit cycle amplitude to verify selection of $0.3^{\circ}$ DB by program | G. Kalan |
| PCR 841 | In ascent coasting flight:<br>1. Initiate $1^{\circ}$/sec rates about the P, Q, and R axes using RHC in manual rate command/attitude hold mode.<br>2. Select DAP derived rate display via V60 and verify rate display coding by observing attitude error needle input.<br>3. Terminate manual rate commands to allow normal attitude hold mode limit cycling.<br>4. Select V61 and observe attitude error needle inputs to verify that mode I display works properly.<br>5. Select V62 and observe attitude error needle inputs to verify that mode II display work properly. | G. Kalan |
| PCR 842 | Patch in correction on rollback of powered ascent run in which anomaly LNY 78 was observed to verify that anomaly has been repaired without degrading performance. | G. Kalan |
| | TARGETTING | |
| PCR 812.2 | Observe setting of XDELFLG after N81 display but before N42 display. | P. White |

| ANOM/ PCR/ ACB | TEST DESCRIPTION | RESPONSIBLE ENGINEER |
|---|---|---|
| PCR 823 | Check to see opp error when P31 is killed. | P. Adler |
| PCR 844 | Hybrid Simulation; attempt entry to P38, P39, P78 and P79 by V37E38E, V37E39E, V37E78E and V37E79E; resulting in reception of operator error light signifying non-existence of said programs. | D. Moore |
| | MISCELLANEOUS | |
| LNY 67 | Visual Inspection | P. Rye |
| PCR 773.2 | Visual Inspection | J. Stoppelman |
| PCR 776.2 | Start simulation in orbit with precision integration on. Run for about 160 seconds with no other computer activity. Using R2 Model, edit, observe and evaluate the integration process, and compare the results with the output of identical tests done on Colossus. Repeat this sequence using the six cases, both lunar and earth orbit, used in the Colossus tests. | M. Albert |
| PCR 781.2 | Test to be conducted in System Tests lab to verify change of maximum PIPA Bias from 2.28 cm/sec$^2$ to 9 cm/ sec$^2$ using an erasable program. | E. Grace |
| PCR 791.2 | Observe PRO rejected when verb lights contain V21, V22 & V23 and accepted when verb lights contain V20 or V24. | J. Vella |

| ANOM/ PCR/ ACB | TEST DESCRIPTION | RESPONSIBLE ENGINEER |
|---|---|---|
| PCR 798.2 | Verify by a trace that if GLOKFAIL is set before V37 it is reset after V37 is selected. | E. Hughes |
| PCR 801.2 | Visual Inspection | P. Rye |
| PCR 802.2 | With APSFLG set, select P40 four (4) times; do an error reset and select P40 four (4) times again in order to get alarm 1706. Verify by a trace that FAILREG +2 always contains the most recent alarm and bit 15 is not longer set for the 4th alarm. | E. Hughes |
| PCR 805 | Verify the operator error when V66 is selected with SURFFLAG set. | E. Hughes |
| PCR 807.2 | Two (2) tests will be run. In each test, P21 is called to compute values for earth-centered state vectors and the "this vehicle" option is employed. In test "a" the initial (present) time is accepted and in test "b" the initial (present) time is rejected in favor of one requested by a V25 response to the V06N34 display. In both tests a second computation will be requested via recycle on the V06N43, to provide a second set of data for the earlier time plus 10 minutes. | T. Crocker |
| PCR 277 | Digital test of V74 with trace. | E. Denniston |
| PCR 832.2 | Call R05 during P63 and obtain antenna angles display; reset REFSMMAT flag and show that RDS is still callable. | T. Crocker |
| PCR 853 | Attempt V35 during all possible major mode - observe opperator error. | B. McCoy |
| LNY 89 | Assure that LM State Vector time tag is "large". Select P00 set present time of LGC to zero; call P27 with V71 - wait until computer activity light goes on. Verify via V16N38 that state vector is not being integrated backward. | B. McCoy |
| PCR 856 | Visual Inspection | B. McCoy |
| ACB 43 | Tested during Level 4 Runs | D. Eyles/ L. Berman |

| ANOM/ PCR/ ACB | TEST DESCRIPTION | RESPONSIBLE ENGINEER |
|---|---|---|
| ACB 44 | Tested during Level 4 Runs | C. Schulenberg |
| ACB L1 | Tested during Level 4 Runs | D. Moore |
| ACB L2 | Tested during Level 4 Runs | D. Eyles |
| ACB L3 | Make the Special test of erasable for R3 in Noun 49 unshared. | P. Volante/ J. Stoppelman |

LUMINARY 1B PROGRAM DEVELOPMENT STATUS DATE 8/22/69

| PCR/ Anom/ ACBs | DESCRIPTION | LEVEL 2 AND LEVEL 3 TESTING | | | | | | | | | RESPONSIBLE ENGINEER |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | START | | | COMPLETE | | | RESULTS EVALUATED | | | |
| | | REQ | PRED | ACT | REQ | PRED | ACT | REQ | PRED | ACT | |
| | Landing | | | | | | | | | | |
| LNY 58 | It is possible to enter a program which uses the RR or LR while R12 is reading the LR. | | 7/2 | 7/2 | 7/15 | 7/15 | 7/11 | 7/18 | 7/18 | 7/11 | |
| LNY 64 | Restart occurring in P63. | | 6/24 | 6/24 | 7/15 | 7/1 | 7/1 | 7/3 | 7/3 | 7/3 | |
| LNY 72 | Program alarm light every two seconds after V32E to 523 alarm. | | 7/2 | 7/3 | 7/15 | 8/12 | 8/12 | 7/18 | 8/12 | 8/12 | |
| LNY 73 | Bug in recycle option to N61 in P63. | | 6/24 | 6/24 | 7/15 | 7/1 | 7/1 | 7/3 | 7/15 | 7/15 | |
| LNY 76 | N60 Made to be HCALC1 (ALTRATE) | | 6/24 | 6/24 | 7/15 | 7/7 | 7/7 | 7/18 | 7/7 | 7/7 | |
| LNY 88 | Landing Radar Repositioning routine is not restart protected. | | 7/28 | 7/28 | 7/31 | 7/31 | 7/31 | 7/31 | 7/31 | 7/31 | |
| 814 (REV) | Reduce keystrokes required to check and approve LR data. | 7/1 | 7/10 | 7/10 | 7/15 | 7/15 | 7/14 | 7/18 | 7/18 | 7/14 | |
| 817 | Eliminate undesirable LR position alarms from R12. | | 7/7 | 7/9 | 7/15 | 7/20 | 7/14 | 7/23 | 7/23 | 7/14 | |
| 820 | Eliminate lighting of ALT light when low scale discrete is absent. | | 7/2 | 7/9 | 7/15 | 7/15 | 7/14 | 7/18 | 7/18 | 7/14 | |
| 838 | Prevent RCS jet firings on lunar surface. | | 7/10 | 7/10 | 7/14 | 7/14 | 7/14 | 7/23 | 7/23 | 7/23 | |
| 839 | R12 and LR Repositioning Routine Improvements. | | 7/28 | 7/28 | 7/31 | 8/12 | 8/12 | 7/31 | 8/12 | 8/12 | |

LUMINARY 1B PROGRAM DEVELOPMENT STATUS Date 8/22/69

| PCR/ Anom/ ACBs | DESCRIPTION | LEVEL 2 AND LEVEL 3 TESTING | | | | | | | | | RESPONSIBLE ENGINEER |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | START | | | COMPLETE | | | RESULTS EVAL | | | |
| | | Req | Pred | Act | Req | Pred | Act | Req | Pred | Act | |
| 840 | Reduce Oscillation in P64/P65. | | 7/10 | 7/10 | 7/10 | 7/10 | 7/14 | 7/14 | 7/14 | 7/14. | |
| 848 | Prevent RR ECDU's from stealing LGC Memory Cycles. | | 7/28 | 7/28 | 7/31 | 7/31 | 8/7 | 7/31 | 7/31 | 8/7 | |
| 854 | Provide a Flexible Method for crew to Modify RLS. | | 8/5 | 8/5 | 8/12 | 8/7 | 8/7 | 8/12 | 8/7 | 8/7 | |
| 855 | Begin Reading LR Velocity as soon as Velocity Data Good Appears. | | 8/5 | 8/6 | 8/12 | 8/6 | 8/6 | 8/12 | 8/6 | 8/6 | |
| LNY 90 | If an engine fail occurs between TIG and throttle up, the flashing V97N63 display will be overwritten by the static V06N63 display. | | 8/5 | 8/5 | 8/12 | 8/7 | 8/7 | 8/12 | 8/7 | 8/7 | |

LUMINARY 1B PROGRAM DEVELOPMENT STATUS DATE 8/22/69

| PCR/ Anom/ ACBs | DESCRIPTION | LEVEL 2 AND LEVEL 3 TESTING | | | | | | | | | RESPONSIBLE ENGINEER |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | START | | | COMPLETE | | | RESULTS EVALUATED | | | |
| | | REQ | PRED | ACT | REQ | PRED | ACT | REQ | PRED | ACT | |
| | **Navigation** | | | | | | | | | | |
| LNY 61 | If a restart occurs during the trunnion or shaft incorporations of P20 Rendezvous Navigation, an incorrect State Vector Update can occur. | | 6/5 | 6/5 | 7/15 | 6/20 | 6/20 | 7/3 | 7/10 | 7/14 | |
| LNY 66 | R04 Erasable Conflict w/R65. | | FIXED BY PCR 780 | | | | | | | | |
| LNY 71 | In P22 Lunar Surface Navigation the RR predesignate routine stores into an erasable used by orbital integration. | | 6/5 | 6/5 | 7/15 | 6/20 | 6/20 | 7/3 | 7/3 | 7/14 | |
| LNY 81 | Eliminate erasables shared between Radar Tasks and jobs. | | 7/28 | 7/31 | 7/31 | 7/31 | 7/31 | 7/31 | 7/31 | 7/31 | |
| LNY 87 | In P22 the flashing V50N72 is displayed following radar lock on in R21. | | 7/10 | 7/25 | 7/15 | 7/31 | 8/8 | 7/18 | 7/31 | 8/8 | |
| 780 | Provide pure RR Range, Range rate and time lag during P20, P22, and P25. | | 7/7 | 7/7 | 7/15 | 7/15 | 7/10 | 7/18 | 7/18 | 7/10 | |
| 818 | Permit rejection of Individual Measurement incorporations in P20. | 7/7 | 7/10 | 7/10 | 7/15 | 7/20 | 7/15 | 7/23 | 7/23 | 7/15 | |
| 826.2 | Reverse P76 Display. | | 7/10 | 7/16 | 7/15 | 7/15 | 7/16 | 7/15 | 7/15 | 7/16 | |
| LNY 91 | CDU Fail program alarm is given in P20. | | 8/5 | 8/5 | 8/12 | 8/6 | 8/6 | 8/12 | 8/6 | 8/6 | |

LUMINARY 1B PROGRAM DEVELOPMENT STATUS Date 8/22/69

| PCR/ Anom/ ACBs | DESCRIPTION | LEVEL 2 AND LEVEL 3 TESTING | | | | | | | | | RESPONSIBLE ENGINEER |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | START | | | COMPLETE | | | RESULTS EVAL | | | |
| | | Req | Pred | Act | Req | Pred | Act | Req | Pred | Act | |
| | **Abort and Ascent** | | | | | | | | | | |
| LNY 62 | Abort programs do not alter current autopilot deadband. | 6/25 | 7/10 | 7/10 | 7/15 | 7/15 | 7/10 | 7/18 | 7/15 | 7/14 | |
| 779 | Leave Track Enable set when R29 is terminated. | 7/7 | 7/9 | 7/23 | 7/15 | 8/12 | —— | 7/18 | 8/12 | —— | |
| 279 | Variable Insertion Computation. | | 6/24 | 6/24 | 7/15 | 7/15 | 7/7 | 7/18 | 7/18 | 7/14 | |
| 827 | Add ZDOTD to ascent descent downlist. | | 6/24 | 6/24 | 7/15 | 7/31 | 7/31 | 7/18 | 7/31 | 7/31 | |
| 845 | Do not turn on R29 during P70/71. | | 8/5 | 8/5 | 8/12 | 8/8 | 8/8 | 8/12 | 8/8 | 8/11 | |
| 847 | Eliminate Possible Lock-out of Pitch-over from P12, P70, 71. | | 7/28 | 7/28 | 7/31 | 7/31 | 8/8 | 7/31 | 7/31 | 8/10 | |
| | **Powered Flight** | | | | | | | | | | |
| LNY 63 | DPS Engine failure in P40. | | 6/24 | 6/24 | 7/15 | 7/15 | 7/10 | 7/18 | 7/31 | 8/11 | |
| 830 | Supplementary ASTEER modification. | | 6/24 | 6/24 | 7/15 | 7/31 | 8/11 | 7/18 | 7/31 | 8/11 | |
| 831.2 | Lambert Overflow protection. | | 7/24 | 7/24 | 7/31 | 7/28 | 7/31 | 7/31 | 7/31 | 7/31 | |
| 284 | VGTIG's on C/A Downlist. | | 8/5 | 8/5 | 8/12 | 8/12 | 8/12 | 8/12 | 8/12 | 8/12 | |
| | **Alignments** | | | | | | | | | | |
| LNY 68 | P57 IMU compensation conflict. | 7/1 | 7/10 | 7/28 | 7/15 | 7/31 | 7/31 | 7/18 | 7/31 | 7/31 | |
| LNY 74 | Erasable conflict when LOCSAM, i.e., LSPOS. | | 6/5 | 6/5 | 7/15 | 6/20 | 6/20 | 7/3 | 7/10 | 6/29 | |
| 825.2 | Display option 3 in P52/P54. | | 7/10 | 7/28 | 7/15 | 7/31 | 7/31 | 7/15 | 7/31 | 7/31 | |
| | **DAP** | | | | | | | | | | |
| LNY 69 | Eliminate coding error causing downward jet firing. | | 6/25 | 6/25 | 7/15 | 7/15 | 7/15 | 7/15 | 7/15 | 7/15 | |

LUMINARY 1B PROGRAM DEVELOPMENT STATUS — DATE 8/22/69

| PCR/ Anom/ ACBs | DESCRIPTION | LEVEL 2 AND LEVEL 3 TESTING | | | | | | | | | RESPONSIBLE ENGINEER |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | START | | | COMPLETE | | | RESULTS EVALUATED | | | |
| | | REQ | PRED | ACT | REQ | PRED | ACT | REQ | PRED | ACT | |
| 816 | Modify R03 to permit astronaut setting of 1°-deadband. | | 7/1 | 7/1 | 7/15 | 7/15 | 7/15 | 7/15 | 7/15 | 7/15 | |
| 841 | PGNCS Derived Vehicle Attitude Rates on FDAI Error Needles. | | 7/28 | 7/31 | 7/31 | 7/31 | 7/31 | 7/31 | 7/31 | 7/31 | |
| 842 | Modification of Criteria used to determine DAP phase plane parabola intercept. | | 8/7 | 8/7 | 8/12 | 8/8 | 8/8 | 8/12 | 8/8 | 8/8 | |
| | Targetting | | | | | | | | | | |
| 812.2 | Resetting and Setting of the External ΔV flag. | 7/1 | 7/10 | 7/14 | 7/15 | 7/15 | 7/14 | 7/18 | 7/18 | 7/14 | |
| 823 | Delete P31 from Luminary 1B. | | 6/24 | 6/24 | 7/15 | 7/1 | 7/1 | 7/3 | 7/3 | 7/1 | |
| 844 | Deletion of P38/78 and P39/79. | | 6/24 | 6/24 | 7/15 | 7/1 | 7/1 | 7/3 | 7/3 | 7/1 | |
| | Miscellaneous | | | | | | | | | | |
| LNY 67 | Make ATTSTALL 1210 into BAILOUT instead of POODOO. | | 6/25 | 7/7 | 7/15 | 7/2 | 7/8 | 7/5 | 7/5 | 7/8 | |
| 773.2 | Fix constants for Planetary Inertial Subroutine. | | 8/5 | 8/5 | 8/12 | 8/5 | 8/5 | 8/12 | 8/5 | 8/5 | |
| 776.2 | Improved R2 Model timing. | | 6/25 | 5/28 | 7/15 | 7/15 | 6/7 | 7/18 | 7/18 | 6/7 | |
| 781.2 | PIPA Bias Compensation Scale. | 7/1 | 7/9 | 7/16 | 7/15 | 7/28 | 7/28 | 7/15 | 7/31 | 7/31 | |
| 791.2 | Do not allow a PROCEED Response to V21, V22, V23.. | | 6/25 | 6/25 | 7/15 | 7/28 | 7/28 | 7/15 | 7/31 | 7/28 | |

LUMINARY 1B PROGRAM DEVELOPMENT STATUS DATE 8/22/69

| PCR/ Anom/ ACBs | DESCRIPTION | LEVEL 2 AND LEVEL 3 TESTING | | | | | | | | | RESPONSIBLE ENGINEER |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | START | | | COMPLETE | | | RESULTS EVALUATED | | | |
| | | REQ | PRED | ACT | REQ | PRED | ACT | REQ | PRED | ACT | |
| 798.2 | Reset GLOKFAIL in R00. | | 6/25 | 6/25 | 7/15 | 7/10 | 7/3 | 7/13 | 7/13 | 7/3 | |
| 801.2 | Make BAILOUT alarms start with 3XXXX and POODOO alarms start with 2XXXX. | | 6/25 | 6/25 | 7/15 | 7/1 | 7/1 | 7/3 | 7/3 | 7/1 | |
| 802.2 | Save alarm data after "Error Reset". | | 6/25 | 6/25 | 7/15 | 7/10 | 7/3 | 7/13 | 7/13 | 7/14 | |
| 805 | Don't allow V66 on the surface. | | 6/25 | 6/25 | 7/15 | 7/10 | 7/3 | 7/13 | 7/13 | 7/17 | |
| 807.2 | Add present time to P21. | | 6/25 | 6/25 | 7/15 | 7/10 | 7/1 | 7/13 | 7/13 | 7/14 | |
| 277 | Affixed DUMPCNT. | | 6/24 | 6/24 | 7/15 | 7/10 | 7/23 | 7/15 | 7/15 | 7/23 | |
| 832.2 | Define Actual Restrictions on Running R05. | | 7/28 | 7/28 | 7/31 | 7/31 | 7/31 | 7/31 | 7/31 | 7/31 | |
| 853 | Restrict V35 to P00. | | 8/5 | 8/5 | 8/12 | 8/5 | 8/5 | 8/12 | 8/5 | 8/5 | |
| ---* | Provide CH13STAL Coding. | | 7/10 | 7/10 | 8/12 | 8/12 | 8/11 | 8/12 | 8/12 | 8/11 | |
| 856 | Change 1502/1206 from POODOO's to BAILOUTS. | | 8/5 | 8/10 | 8/12 | 8/11 | 8/11 | 8/12 | 8/11 | 8/11 | |
| LNY-89 | State Vector was integrated backwards while in P00, P27. | | 8/5 | 8/5 | 8/12 | 8/5 | 8/5 | 8/12 | 8/5 | 8/5 | |
| ACB 43 | Change the Displays at the end of descent and ascent guidance to be "non-R" type displays. | | LEVEL 4 TESTED | | | | | | | | |
| ACB 44 | Change the call to ZATTEROR in the ascent guidance to a call to the STOPRATE routine. | | LEVEL 4 TESTED | | | | | | | | |

* Directed by G. Low NASA/MSC CCB

LUMINARY 1B PROGRAM DEVELOPMENT STATUS Date 8/22/69

| PCR/ Anom/ ACBs | DESCRIPTION | LEVEL 2 AND LEVEL 3 TESTING | | | | | | | | | RESPONSIBLE ENGINEER |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | START | | | COMPLETE | | | RESULTS EVAL | | | |
| | | Req | Pred | Act | Req | Pred | Act | Req | Pred | Act | |
| ACB L1 | Fix R13 for check if in P66 before check for mode control in AUTO. | | LEVEL 4 TESTED | | | | | | | | |
| ACB L2 | Remove guidance phase switching logic from guidance loop called in the landing ignition algorithm. | | LEVEL 4 TESTED | | | | | | | | |
| ACB L3 | Make the Special test erasable for R3 in Noun 49 unshared. | | LEVEL 4 TESTED | | | | | | | | |

# SECTION IV

# LEVEL 4 TESTING

LUMINARY 1B LEVEL 4 TEST DESCRIPTION AND STATUS DATE 8/22/69

| TEST NO. | DESCRIPTION | RESPONSIBLE ENGINEER | START | | | COMPLETION | | | DOCUMENTATION | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Req. | Pred. | Act. | Req. | Pred. | Act. | Req. | Pred. | Act. |
| 4.1A | RENDEZVOUS: NOMINAL - LM ACTIVE (P00, P52, P20, P42, P30, P41, P33, P41, P34, P41, P35 P41, P35, P41) | P. White | | | 7/14 | 8/12 | 8/5 | 8/10 | 8/12 | 8/11 | 8/12 |
| 4.1B | RENDEZVOUS: NOMINAL - CSM ACTIVE (P25, P52, P20, P72, P76, P73, P25 - R36, P76, P20, P73, P76, P74, P76, P75, P76, P75, P76) | P. White | | | 7/14 | 8/12 | 8/5 | 8/10 | 8/12 | 8/11 | 8/12 |
| 4.2A | ASCENT & ABORT: Ascent (normal liftoff) (continuance from area 4) (P12, P20 < 400 min., P32) | L. Berman | | | 7/14 | 8/12 | 8/5 | 8/11 | 8/12 | 8/11 | 8/12 |
| 4.2B | ASCENT & ABORT: Aborts from Descent 1. (P6x, P70(early), P20, P32) 2. (P6x, P71(late), P20, P32) 3. (P6x, P70, P71, P20) | L. Berman | | 7/31 | 7/31 | 8/12 | 8/12 | 8/12 | | 8/12 | 8/12 |
| 4.2C | ASCENT & ABORT: Aborts from Surface (Quick liftoff) (Continuance from area 3) (P68, P00, P12, P20) | L. Berman | | 7/31 | 7/31 | 8/12 | 8/12 | 8/12 | | 8/12 | 8/12 |
| 4.3A | LANDINGS: DOI (P00, P20, P30, P40, P52, P40, P00) | D. Eyles | | | 7/14 | 8/12 | 8/5 | 8/10 | 8/12 | 8/11 | 8/11 |
| 4.3B | LANDINGS: PDI (P00, P63, P64, P65, P66 at 120 ft. & redesignation, P68) | D. Eyles | | | 7/14 | 8/12 | 7/31 | 8/10 | 8/12 | 8/11 | 8/12 |
| 4.3C | LANDINGS: PDI (P00, P63, P64, P66 at 500 ft., P67 at 125 ft., P68) | D. Eyles | | | 7/14 | 8/12 | 7/31 | 8/10 | 8/12 | 8/11 | 8/12 |
| 4.3D | LANDINGS: PDI (P00, P63, P64, P66at500ft., P67at500ft., | D. Eyles | | | 7/14 | 8/12 | 7/31 | 8/10 | 8/12 | 8/11 | 8/12 |

LUMINARY 1B LEVEL 4 TEST DESCRIPTION AND STATUS DATE 8/22/69

| TEST NO. | DESCRIPTION | RESPONSIBLE ENGINEER | START | | | COMPLETION | | | DOCUMENTATION | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Req. | Pred. | Act. | Req. | Pred. | Act. | Req. | Pred. | Act. |
| L4.4A | LUNAR SURFACE: (P68, P12(without liftoff), P57(AT-1 to Refsmmat), P57(AT-2 to Refsmmat), P57(AT-3 to Refsmmat), P12) | D. Millard | | 7/31 | 7/31 | 8/12 | 8/7 | 8/11 | 8/12 | 8/12 | 8/12 |
| L4.4B | LUNAR SURFACE: (P68, P22(update mode), P57 (AT-3 to Refsmmat), P22(no update), P57(AT-3 to Landing Site at Liftoff), P12) | D. Millard | | 7/31 | 7/31 | 8/12 | 8/7 | 8/11 | 8/12 | 8/12 | 8/12 |
| L4.5A | MISCELLANEOUS: Restart Test Programs in powered flight alignments and navigation. | B. McCoy | | 7/28 | 7/28 | 8/12 | 8/7 | 8/12 | 8/12 | 8/12 | 8/12 |
| L4.5B | MISCELLANEOUS: Extended Verb usage during powered flight, alignments and navigation. | B. McCoy | | 7/28 | 7/28 | 8/12 | 8/7 | 8/12 | 8/12 | 8/12 | 8/1 |

# SECTION V

# STG TESTING

LUMINARY IB VEL 3 DATE 22/69

| Number | Title | Engineer | Test Complete | | | Document Approved | | |
|---|---|---|---|---|---|---|---|---|
| | | | Req. | Pred. | Act. | Req. | Pred. | Act. |
| 1 | Test of New PIPA Bias Compensation | Grace | 8/12 | | 7/23 | | 8/8 | 8/12 |
| 2 | Test of C13STA11 | Sheridan | 8/12 | 8/8 | 8/8 | | 8/15 | 8/12 |
| 3 | Test of New RR CDU Zero | Reedy | 8/12 | 8/8 | 8/8 | | 8/15 | 8/12 |

LEVEL V SYSTEM TEST LAB TESTING OF LUMINARY 1B — DATE 8/22/69

| Test | Title | Engineer | Test Complete Req. | Test Complete Pred. | Test Complete Act. | Document Approved Req. | Document Approved Pred. | Document Approved Act. |
|---|---|---|---|---|---|---|---|---|
| ICP.4 | Polarity & Scaling Test for Accelerometers | Sheridan | | 9/12 | | | 9/26 | |
| ALM1.1 | Alarm Code Test | Sheridan | | 9/12 | | | 9/26 | |
| RP5.1 | Anti Max Limit & Remode | Reedy | | 9/5 | | | 9/19 | |
| RP5.2 | LR + RR data R04 | Reedy | | 8/29 | | | 9/12 | |
| RP5.3 | P20 Options | Reedy | | 9/5 | | | 9/19 | |
| RP5.4 | Operations of Lunar Surface Prog. P22 | Reedy | | 9/12 | | | 9/26 | |
| RP5.5 | R29 Test | Reedy | | 9/5 | | | 9/19 | |
| RP5.6 | R77 Test | Reedy | | 9/5 | | | 9/19 | |
| IP.1 | LGC/CMC Clock Synch. (R33) Including V55 | St. Amand | | 9/5 | | | 9/19 | |
| IP.2 | AGS Initialization Prog. | St. Amand | | 9/5 | | | 9/19 | |
| IOP.1 | Nominal Turn On | Grace | | 8/29 | | | 9/12 | |
| IOP.2 | Turn On with Failures Test | Grace | | 8/29 | | | 9/12 | |
| IOP.3 | Gimbal Lock Protection Test | Grace | | 8/29 | | | 9/12 | |
| IOP.4 | Cage Test | Grace | | 8/29 | | | 9/12 | |
| IOP.5 | IMU Error Monitor Test | Grace | | 8/29 | | | 9/12 | |
| AAP.1 | P51-IMU Orientation Determination | St. Amand | | 9/5 | | | 9/19 | |
| AAP.2 | P-51 Options Case | St. Amand | | 9/5 | | | 9/19 | |

This schedule to be transferred to Mission H Plan.

V-2

LEVEL V SYSTEM TEST LAB TESTING OF LUMINARY 1B DATE 9/22/69

| Test | Title | Engineer | Test Complete | | | Document Approved | | |
|---|---|---|---|---|---|---|---|---|
| | | | Req. | Pred. | Act. | Req. | Pred. | Act. |
| AAP.3 | P52-IMU Realign Prog(2). | St. Amand | | 9/5 | | | 9/19 | |
| AAP.4 | P52-Options Case | St. Amand | | 9/12 | | | 9/26 | |
| AAP.5 | AOT Bias Calibration Test | St. Amand | | 9/12 | | | 9/26 | |
| AAP.6 | P57-Lunar Surface Align | St. Amand | | 9/12 | | | 9/26 | |
| SEV.1 | Verb 40 Zero IMU-CDU | Grace | | 8/29 | | | 9/12 | |
| SEV.2 | Verb 41 Coarse Align IMU | Grace | | 8/29 | | | 9/12 | |
| SEV.3 | Verb 42 IMU to Inertial Mode | Grace | | 8/29 | | | 9/12 | |
| SEV.4 | Verb 43 Load IMU Error Needles | Grace | | 8/29 | | | 9/12 | |
| ICP.1 | Free Fall Bias Comp. Test | Sheridan | | 9/12 | | | 9/26 | |
| ICP.2 | Thrusting & Comp. Test | Sheridan | | 9/12 | | | 9/26 | |
| ICP.3 | Gyro Drift & Acceler. Comp. Test | Sheridan | | 9/12 | | | 9/26 | |

This schedule to be transferred to Mission H Plan.

MEMORY PROGRAM PREPARATION AND TESTING FOR LUMINARY 1B — Date 8/22/69

| E-MEMORY PROGRAMS | | | Engineer | First Program Assemble (1) | | | Good Digital Sim (1) | | | Level V STG Test Doc | | | With K-Start Tape Good STG Lab (2) Level 5 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Req | Pred | Act | Req | Pred | Act | Req(5) | Pred | Act | Req | Pred | Act |
| IMU Performance Test | STP 2 | | Grace | 8/15 | 8/15 | 8/15 | 8/15 | 8/30 | | 10/1 | 9/15 | | 8/23 | 8/23 | |
| IRIG SF | STP 3 | | Grace | 8/15 | 8/15 | 8/15 | 8/15 | 8/30 | | 10/1 | 9/15 | | 8/23 | 8/23 | |
| Self Test | STP 4 | | Estabrook | 8/15 | 8/30 | | 8/15 | 8/30 | | 10/1 | 9/15 | | 8/30 | 8/30 | |
| AGS Align | STP 5 | Digit Lab | St. Amand | 8/15 | 8/30 | | 8/15 | 8/30 | | 10/1 | 9/15 | | 8/30 | 8/30 | |

(1) With current version of LUMINARY

(2) With version of LUMINARY released for manufacture.

This schedule to be transferred to Mission H Plan.

# SECTION VI

# LUMINARY FLOWCHART STATUS

LUMINARY 1B FLOW CHART SCHEDULE DATE 8/22/69

| ITEM NO. | DESCRIPTION | RESPONSIBILITY | FIRST RELEASE | | |
|---|---|---|---|---|---|
| | | | Required | Predicted | Actual |
| P00 | LGC Idling | Danforth | | 10/15/69 | |
| P20 | Rendezvous Navigation | Danforth | | 9/30/69 | |
| P25 | Preferred Tracking Attitude | Danforth | | 9/30/69 | |
| P32/72 | Co-elliptic Sequence Initiation (CSI) | Hubbard | | 9/15/69 | |
| P38/78 | Stable Orbit Rendezvous (SOR) | Hubbard | | 9/30/69 | |
| P39/79 | Stable Orbit Midcourse (SOM) | Hubbard | | 9/30/69 | |
| P40 | DPS Thrusting | Danforth | | 6/30/69 | 6/20/69 |
| P42 | APS Thrusting | Danforth | | 6/30/69 | 6/5/69 |
| P47 | Thrust Monitor | Danforth | | 8/29/69 | |
| P51 | IMU Orientation Determination | Sorant | | 10/15/69 | |
| P52 | IMU Align | Sorant | | 10/15/69 | |
| R00 | Final Automatic Request Terminate | Danforth | | 9/30/69 | |
| P63 P67 | Landing Programs | Danforth | | 9/30/69 | |
| R03 | DAP Data Load | Entes | | 10/15/69 | |
| R04 | RR/LR Self Test | Danforth | | 9/30/69 | |
| R31 | Rendezvous Parameter Display | Danforth | | 6/30/69 | 6/27/69 |
| R40 | DPS/APS Thrust Fail | Danforth | | 9/30/69 | |
| R47 | AGS Initialization | Danforth | | 7/30/69 | 8/8/69 |
| R56 | Terminate Tracking | Danforth | | 9/30/69 | |
| P12 | Powered Ascent | Sorant | | 9/15/69 | |
| P70 P71 | Aborts | Sorant | | 9/15/69 | |
| | This schedule to be transferred to Mission H Plan. | | | | |

# SECTION VII

# LUMINARY ANOMALY STATUS

ANSI:

LUMINARY 1B ANOMALY STATUS REPORT DATE 8/22/69

| MSC NO. | DESCRIPTION | Originator/ Date/ Control No. | RECOMMENDED DISPOSITION (Date Submitted to NASA) | NASA DIRECTION/ DATE | CLOSING ACTION TAKEN/ DATE |
|---|---|---|---|---|---|
| L-1B-01 | Selection of P22 before the CSM has entered Mode 2 Radar Coverage can result in an erroneous 530 Alarm. | MIT 8/19/69 | Work-around in LUMINARY 1B; fix in LUMINARY 1C. 8/25/69 | | |
| L-1B-02 | R29 will not achieve RR lockon. | MIT 8/20/69 | Work-around in LUMINARY 1B; fix in LUMINARY 1C. 8/25/69 | | |
| L-1B-03 | During powered ascent, for a period of two seconds, the quantity COEFFR, computed in the 1/ACCS program, can be incorrectly determined to an extremely small (essentially zero) value. | MIT 8/26/69 | Work-around in LUMINARY 1B; fix in subsequent release. 8/26/69 | | |

THIS SCHEDULE TO BE TRANSFERRED TO MISSION H PLAN.