

MIT/CSDL PRESENTATION FOR THE  
MISSION "J-1" APOLLO 15  
FLIGHT SOFTWARE READINESS REVIEW  
HELD AT NASA/MSC ON 17 June 1971

LM PROGRAM

SUMMARY OF LUMINARY 1E DEVELOPMENT

Establishment of a LUMINARY 1E Assembly . . . . .	9/21/70
Release of LUMINARY 1E for Rope Manufacture	
Rev 210 . . . . .	3/22/71
FACI Meeting . . . . .	3/3/71
FREEZE 202	12/23/70
Completion of Mission "J-1" Level 6 Performance Testing . . . . .	6/16/71
Completion of Mission "J-1" Level 6 Procedural Testing . . . . .	To be completed 6/30/71.
Completion of Mission "J-1" RTCC Testing . . . . .	5/8/71*
Completion of Mission "J-1" STG Testing . . . . .	4/22/71
Total Number of PCR/PCNs Accomplished in the LUMINARY 1E Release . . . . .	46
Total Number of Anomalies Fixed in the LUMINARY 1E (Rev 210) . . . . .	<del>21</del> 20

\*Uplink Tests

LUMINARY IE PCR/PCNs IMPLEMENTED

					XXX.XX NM
					XXX X.X f/s
317.2	Rescaling Nouns Containing Range and Range Rate			49 54 78 90	SAME
				N49 R1 N78 R2	
319	A-Priori Terrain ( <u>ΔH on Downlist</u> )			TRUDELH	
324	PGNCS/AGS RR Data Transfer				
333	Change Recognition of ROD Inputs			ROD : P AVEG ONLY	
334	Change DSKY Descent/Ascent Nouns			N94 N77 V57 LRINH	
Rev 1		N63 ΔH H	N68 R HORIZ TGP	V6X H	T60 V6Y VI
335	Remove Alignment Option from P63				
336	Allow Extended Verbs During P20 Maneuvers			0618 is out of R60	
Rev1					
338	Change LPD Scaling to 1.0° In All Directions			was 1/2° RNG 2° XRNG	
339	Have P20 F50 72 Display Update			1/3 SEC UPDATE	
340	LATVAL Polarity Change				
341	Landing Radar Reasonability Test			.25 VICE .125 ALTITUDE	
343	Disapproval of PCR 340				
347	Mod. to Code Word for PGNCS/AGS Data Transfer			PCR 324	
348	New Target -ΔV Program			P77	



LUMINARY 1E PCR/PCNs IMPLEMENTED

- 1044\* Re-design of R53-R57 **DON MILLARD**
- 1059\* Have Major Mode Changes Set Up a 1/ACCS **L-1D-10**
- 1066 Display N81 On All Passes in P34/74 and P35/75 **MINKEY CHANGE**
- 1070\* GSOP Change for FDAI Needle Initialization Fix (L-1D-10)  
**01**
- 1079 ALMCADR in the Telemetry
- 1082.2 Update Fixed Constants for 1971-1972 Ephemeris Year
- 1088 Inhibit Program Change During Critical 10.56 Seconds After IMU CDU Zero
- 1091 Priority Display Light on DSKY **OFF by PRO, V32E, V33E, V34E, V36E, V56E, V37E X X E or H/S RESTORE**
- 1093 Eliminate 481 Day TEPHEM Limitation **994 DAYS → 2 YR 8 MO → MAR 74**
- 1095\* Avoid Incomplete Close-out of Manual Rate Command Mode (L-1D-07)
- 1097.2 V30, V31 Operator Error Lockout
- 1100 Delete Setting of NODOFLAG in R47 **ALLOWED, ONLY SELECTION OF POO IF RESTART**
- 1107 Backup of Abort bits Chan 30 Bits 1 and 4
- 1109 Backup of Off (1) Failures of Auto-Throt. Chan 30 Bit 6

LUMINARY 1E PCR/PCNs IMPLEMENTED

- 1110 Backup for Failure of Inertial Data Bit Chan 30 Bit 6
- 1111 Backup Failure of Auto-pilot Mode & AGS/PGNS Select Switch Chan 30 Bits 10, 13 & 14 WITHDRAWN
- 1117.2 Addition to P00D00 Logic IF AVE 6 ON STOP GUID → BAILOUT
- 1121 Replace Acceleration Est. with RCS Inhibit Flags on non-powered Downlist CHAN 5, 6 MASK
- 1124\* Flag Resetting in P00D00 Aborts L-10-15
- 1126\* Set NOTHROTFLAG for DPS Impulse Burns L-10-14 MAKE SEC 2, 3, 4 WITH 4
- 1127\* Change to Downlist for ~~IMU Pulse~~ CHAN BRUP
- 1129\* Update Mass Dependent Calculations in 1/ACCS 1190 MASS Δ  
NO CHANGE SS
- 1132 Correction to PCR 1117.2
- 1133\* Revision to Descent Mass Limits LO DESCNT (DESCENT ALONE)
- 1134 Revision of PCR 1111 NO DXP LT
- 1137 Correct Constant for Ascent Guidance L-10-16
- 1141\* Initialize FLRCS in P12 ENT ON V99 (P12) WILL TGT INS  
BASED ON RCS THRUST
- 1143\* Section 3 Rev 6 GSOP Changes
- 1145 Section 4 Rev 9 GSOP Changes

\* PCNs

LUMINARY 1E PCR/PCNs IMPLEMENTED

- 1147\* Clarification of the Implementation of PCR 334 REV 1 "Change Descent/Ascent Nouns."
- 1148\* Add FRSTIME Flag Definition to Section 2 GSOP L-10-17
- 1149\* Section 2 Rev 11 GSOP Changes

\*PCNs



ANOMALIES FIXED IN LUMINARY 1E

- L-1D-01 "NEEDLER" Initialization Never Takes Place Following DAP Turn-on if IMU Error Counters (CH 12 B06) are Enabled
- L-1D-02 Core Set Overflow (31202) Alarm will result from a Bad Return Pulse Torquing
- L-1D-03 Velocity Update During Descent (P63 & 64) Fail the Reasonableness Test Shortly After LR Lock-on
- L-1D-04 P25 will not control Spacecraft altitude if range to CSM is greater than 566 N. M.
- L-1D-05 Certain verb routines should not be requested if P20 or P22 is running (L-34)
- L-1D-06 "DVTOTAL" incremented twice in one SERVICER Cycle
- L-1D-07 Manual rate control mode improper termination (PCR 1095)
- L-1D-08 Padload "LRWH" Shares Erasable memory location with RM of P20 (L-34)
- L-1D-10 Major Mode Changes that Leave the DAP with Improper Data
- L-1D-11  $W_B$  is mis-scaled by a factor of 2
- L-1D-12 Selection of V41N72 while an RR reposition or remode is in progress results in incorrect operation of V41N72

REPLACEMENT  
OF 1D

## ANOMALIES FIXED IN LUMINARY 1E

- L-1D-14 Set Flagword 5 Bit 12 for Impulsive Burns
- L-1D-15 Reset RNDVZFLG (P25FLAG) in P00D00 Sequence (PCN 1124)
- L-1D-16 Fixed Memory Constant VINJNOM is 5509.3 fps instead of 5509.5 fps
- L-1D-17 Flashing V37 which Terminate P22 when the Range is greater than 400 N. M and the Range-Rate is Positive may not occur
- L-1D-18 R21 & R24 do not clear Designate Flag when it finds the LOS outside Mode II limits in P22
- L-1D-19 Restarts in P20/25 may erroneously display V50N16 on DSKY
- L-1D-20 Erroneous clearing of REINTFLG by BAILOUT Logic
- L-1D-21 An RR antenna reposition initiated by R25 just after starting P20 or P22 can cause P20/P22 to loop
- L-1D-23 A yaw transient of about 5 degrees at the end of P64 can occur
- L-1D-25 Exiting P63, P40 or P42 with a V37 between AVEGON time of auto-ullage initiate may not kill the waitlist call to initiate ullage



## LUMINARY 1E PERFORMANCE TESTING

The Initial Conditions listed below apply to all the tests and any special initial conditions will be indicated in the particular test

- 1)  $1\sigma$  IMU, Radar, State Vector Errors
- 2) Normal Astronaut Interface from Apollo 15 Data File
- 3) Apollo 15 Operation Trajectory
- 4) Apollo 15 Erasable Load
- 5) 71/72 Ephemeris
- 6) O T-LOSS
- 7) LM-10 Vehicle

LUMINARY 1E  
PERFORMANCE TESTING

RENDEZVOUS

6.1.1 Short Rendezvous - program sequence: P00, P20, P34, P42, P35, P41, P35  
P41, P00, P47, P00

Initial Condition: (1) 10% T-Loss during powered flights

6.2.0 ABORTS from DESCENT

- .1 Abort at 33Kft. - program sequence: P00, P63, P70, P00, P20, P32.
- .2 Abort at 7Kft. - Abort Stage at DPS depletion - Program sequence:  
P00, P63, P64, P70, P71, P00, P20, P32.
- .3 Abort Stage after Touchdown - program sequence: P00, P63, P64, P66, P71,  
P00, P20, P32.

Initial Conditions: (1) Terrain Profile (+1<sup>0</sup>) errors  
(2) 10% T-Loss  
(3) CHANBKUP Abort Discrete Set

LUMINARY 1E  
PERFORMANCE TESTING

6.3.0 LUNAR SURFACE OPERATIONS

- .1 Lunar Surface Alignments - program sequence: P68, P00, P12, P57 (Recycle gravity determination) V41N72, P57 (planet and Star), P57 (2 stars), V47, P06, P00, P57 (1 star), V64, V63, P22, V48, P57 (1 star), V47, V48, V82, P12 (to TIG-5), P00.

- 6.3.1.1 Inflight Alignments - program sequence: P00, P52 (using P57 sighting), P52 (2 stars), P52 (sun and planet), P00.

Initial Condition : (1)  $3\sigma$  IMU

- .2 Ascent from Lunar Surface - program sequence: P68, P00, P12, P00, P20, P34, P00

Initial Conditions: (1) YAW LM  $40^\circ$  after the pitch maneuver occurs; Targeting for 1 N.M. out-of-plane.

*AT 13.5 MI OOP  
-.2, -1, +1.5*

6.4.0 LANDING ON LUNAR SURFACE

- .1 Complete Automatic Landing program sequence: P00, P63, P64, P66, P00,  
NOUN 69: -6865/417/380 ft at PDI-10  
NOUN 69: 653/-608 ft at PDI+5

Initial Conditions: (1) Terrain Profile ( $+1^\circ$ ) errors  
(2) CHANBKUP Abort Discrete Set

- 6.4.2.0 Redesignations and Att. - Hold - P66 Landing - program sequence:  
P00, P63, P64, P66 (at 700 ft.), P00.

- 2.1 NOUN 69: 10K/5K ft; ACA None
- 2.2 NOUN 69: 20K/20Kft; ACA: 2(-EL), 2(+AZ)
- 2.3 NOUN 69: none, ACA: 2(+EL), 2(-AZ)

Initial Conditions: (1) Terrain Profile ( $+1^\circ$ ) errors  
(2) NOUN 69: 20K/20Kft; 10% T-Loss  
(3) CHANBKUP Abort Discrete Set

*PULSE OUT  
ABORT DIS NOT FAILED*



6.2.2 DOCKED 9x9

NOT DONE IN L...  
BUTT DONE IN 3-

LUMINARY 1E  
PERFORMANCE TESTING

SPECIAL TESTS

6.5.1 LM RCS Deorbit Burn - program sequence: P00, P30, V96, P99, P00

6.5.3 Abort Stage after Touchdown - program sequence: P00, P63, P64, P66, P71, P00, P20, P32

- Initial Conditions:
- (1) Terrain Profile (+1<sup>0</sup>) errors
  - (2) 10% T-LOSS
  - (3) CHANBKUP Auto Throttle Discrete Set

6.5.4 Lunar Landing - P66 Landing - Program Sequence: P00, P63, P66, P68, P00

- Initial Conditions:
- (1) Terrain Profile (+1<sup>0</sup>) errors
  - (2) 10% T-LOSS
  - (3) CHANBKUP Auto Throttle Discrete Set

10K 5K at PD1+5  
11° PITCH ATT  
OPEN

6.5.5 Docked DPS Plane Change Burn - program sequence: P00, P30, P40, P00

- Initial Conditions:
- (1) State Vector, TIG,  $\Delta V$
  - (2) CG and Mass

6.5.6 Docked DPS TEI Burn - program sequence: P00, P30, P40, P00

- Initial Conditions:
- (1) State Vector, TIG,  $\Delta V$
  - (2) CG and Mass

OUT OF GAS

→ DAP EVALUATION LUM# 221

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LUMINARY Development Note #87

TO: Distribution  
FROM: Nyles Barnert  
DATE: June 14, 1971  
SUBJECT: Probability of Lost DOWNRUPTS in LUMINARY 1E.

The following summarizes the results of an investigation into the causes of downrupt losses that occurred in certain level 6 digital tests at 10% TLOSS.



Lost downrupts have been observed during digital simulations of Luminary 1E during landing phases with 10% TLOSS. The following is the result of the analysis of the 10% TLOSS case done as part of the investigation into this phenomenon.

During the landing phase, R10 and the DAP are synchronized with each other as shown in the accompanying figure. This pattern is repeated every 0.5 seconds. R10 alternates between two phases; the first lasts 9.7 ms, the second, 6.3 ms. The DAP also has two phases lasting 5.0ms and 3.8 ms. (Note that for Luminary 1D, the DAP timing was 4.3 ms and 4.2 ms.)

As can be seen from the figure, the R10/DAP interrupts are widely spaced except at two points, A and B. At point A, the concurrence of R10 and the DAP can cause the downrupt program to be locked out for between 10.1 ms and 11.3 ms (For Luminary 1D, this is 10.5 ms and 10.6 ms) At point B, the total interrupt time is from 13.5 ms and 14.7 ms (13.9 ms and 14.0 ms for Luminary 1D). The interval between the two interrupts is approximately 4 ms.

Super-imposed on these interrupts is T4RUPT, which cycles every 120 ms. T4RUPT lasts between 1.7 ms and 5.2 ms, depending on which of the four passes it follows (Luminary 1D timing is between 1.7 ms and 5.0 ms). The coincidence of T4RUPT with the interrupts of Point A can only lead to a lockout of up to 16.5 ms, not enough to cause lost downrupts. At point B, however, the large T4RUPT passes can eliminate the window between the interrupts and can cause a total time in interrupt of up to 19.9 ms (19.0 ms in Luminary 1D). Any delay in the start of this interrupt sequence, due to the underlying job being INHINTed, a KEYRUPT, or WAITLIST task for a monitor display refresh, etc., can cause the total lock-out time to exceed 20 ms. In this case, if a DOWNRUPT request occurs just at the beginning of the lockout, a second request will occur before the lockout ends, leading to a DOWNRUPT lost. (For Luminary 1D, since the extra delay needed is at least 1.0 ms, no downrupts will normally be lost.)

There is another event which can also lead to problems. SERVICER and the guidance loop call the subroutine FINDCDUW. During a 7.4 ms portion of FINDCDUW, the SERVICER job is in INHINT while critical registers are being updated. The occurrence of this INHINTed area just prior to the interrupts at points A and B can cause a further lock-out of the Downrupt Program. At point A the lockout time can increase to 18.7 ms, not enough



to cause problems unless T4RUPT also occurs during the interval. At point B, the lockout will be between 20.9 ms and 22.1 ms (21.3 ms and 21.4 ms for Luminary 1D), so that a potential Downrupt loss problem exists. Since the INHINTed portion of SERVICER is part of a job, the time of its occurrence depends on many factors: whether Altitude and/or Velocity updating is being done, whether higher priority jobs (e. g. IMU compensation) are running, etc.

All in all, it appears that there is a 12% probability that T4RUPT will cause a 19.9 ms lockout, and a 1% probability that FINDCDUW will cause an excessive lockout. The probability of a lost downrupt in these cases depends on the phasing of the DOWNRUPT request, but the overall probability is probably less than 1%.



FIND CDROW

$$\begin{array}{r} 7.4 \\ + \\ 11.3 \\ \hline 18.7 \end{array}$$

TH

$$\begin{array}{r} 5.2 \\ + \\ 11.3 \\ \hline 16.5 \end{array}$$

RIO

6.3



5

3.8

9.7



5

6.3ms



3.8ms



9.7ms



11.5ms



DAP

$$\frac{10.1}{11.3}$$

↑  
A

.2

SECONDS

.3

.4

$$\frac{13.5}{14.7}$$

↑  
B

.5

20ms

1%

12%

$$\begin{array}{r} 7.4 \\ 14.7 \\ \hline 22.1 \end{array}$$

$$\begin{array}{r} 7.4 \\ 13.5 \\ \hline 20.9 \\ 1.2 \end{array}$$

$$\begin{array}{r} + \\ 14.7 \\ \hline 19.9 \\ + \\ .2 \\ \hline 20.1 \end{array}$$

5.4



LUMINARY 1E  
SYSTEM TEST LAB TESTING

Extended Verbs

IMU Operational Program

IMU Performance Test

P57 Changes (PCR 1044)

Radar Changes

IRIG Torque

Sum Uplink

Channel 77 Restart Monitor

Input Channel Backup (PCR's 1107, 1109, 1110, 1111)

PGNS-AGS Data Transfer (PCR 324)

Super Key Release Light (PCR 1091)

P52 Changes (PCR 1044) (R57)

Check for coarse align before attempting gyro torquing

Results documented in MIT/DL STG Memo 1645



LUMINARY 1E  
MISSION PROCEDURAL TESTING

In all of the following, the initial conditions were taken from MSC Internal Note No. 71-FM-141. Apollo 15 (Mission J-1) Operational Trajectory Simulator Data Package. The procedures were taken from the Apollo 15 LM Timeline Book (April 5, 1971) incorporating Change A of the LM Timeline Book (May 3, 1971), the Lunar Surface Checklist (May 10, 1971) and the LM Data Card Book (April 21, 1971). All verification runs should be performed with and without T-Loss.

~~1.0.0 DEORBITS using erasable burn program.~~

1.0.1 Earth orbit deorbit with full DPS stage from Earth orbit prior to TLI. Program flow: P30-P99

1.0.2 Lunar orbit deorbit with post docking weight APS stage. Program flow: P30-P99

2.0.0 INFLIGHT ALIGNMENTS.

2.0.1 P52 fine alignment prior to PDI. This test simulates the IMU alignment at 102:50 and the P63 Ignition Algorithm Test. Included in the IMU alignment is a P52 Opt 3 spiral/cursor alignment without torquing, a P52 Opt 3 Mark X/Mark Y alignment with torquing and a COAS calibration. Program flow: P52-P63.

DONE  
LM 8

Luminary 1E Mission Procedural Testing, Cont.

~~POPE~~  
~~EM8~~

- 3.0.0 LUNAR LANDINGS. All of the landing simulations start from PDI - 5 min and terminate post P68. Program flow: P63-P64-P66-P68
- 3.0.1 Nominal auto landing with no perturbations.
- 3.0.2 Nominal landing utilizing ROD and/or manual throttle with mode control in both ATT HOLD and AUTO
- 3.0.3 Auto landing with V21 N69 at PDI +2 min and V22N69 at PDI +5 min.
- 3.0.4 Auto landing with ACA redesignations
- 3.0.5 Auto landing with V68 (terminate lunar terrain model) prior to V57
- 3.0.6 Landing with V68, V21 and V22 N69, ACA redesignations and ROD and/or manual throttle

- 2800  
- 6400  
H → 275 at 16K



## Luminary 1E Mission Procedural Testing, Cont.

3.1.0 ~~ABORTS from LUNAR LANDING.~~ All abort simulations start from PDI-5 min and terminate after Rendezvous Radar lock on and P32 calculation of next apsidal crossing. All abort testing done with bit 1 of CHANBKUP set.

3.1.1 Abort from 33,000 ft. Program flow: P63-P70-P20-P32

3.1.2 Abort from 7,000 ft. Abort stage at DPS full depletion. Program flow: P63-P64-P70-P71-P20-P32

3.1.3 Abort stage at 7,000 ft. Program flow: P63-P64-P71-P20-P32

3.1.4 Abort stage from surface. Program flow: P63-P64-P66-P71-P20-P32

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### 3.2.0 LUNAR SURFACE ACTIVITIES

3.2.1 P57 Testing. This test simulates the alignments that are made prior to LGC powerdown and includes a P57 opt 3 technique 1 alignment and 2 P57 opt 3 technique 2 alignments. (A P57 opt 4 technique 3 alignment is included in the ascent test 4.0.1).  
Program flow: P57-P00-P57

3.2.2 P22 Testing. This test simulates the P22 tracking scheduled for 169:30 GET Program Flow: P68-P22-P00

Luminary 1E Mission Procedural Testing, Cont.

4.0.0 ASCENT

4.0.1 Nominal ascent thru insertion. Includes a P57 opt 4 technique 3 normally done prior to ascent. Program flow: P68-P57-P12-P00

4.1.0 DIRECT RENDEZVOUS

4.1.1 Ascent thru rendezvous. Simulation starts prior to ascent and include a P57 opt 4 technique 3 done prior to ascent. Program flow: P68-P57-P12-P00-P20-P34-P42 -P35-P41-P35-P41-P00

611 ALARM

4.1.2 Post insertion thru rendezvous. Simulation starts insertion +1 min. Program flow: P20-P34-P42-P35-P41-P35-P41-P00

4.2.0 COELLIPTIC SEQUENCE RENDEZVOUS

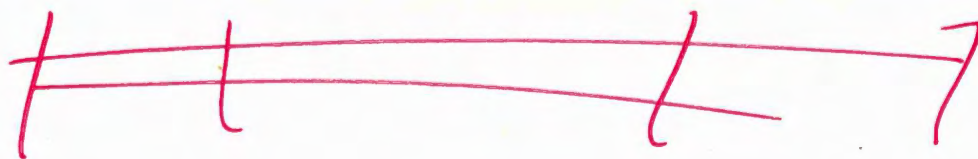
4.2.1 Abort or abort stage at PDI +7 min. thru rendezvous. It was necessary to start this simulation from an abort case as a nominal bailout pad was not provided. A P52 opt 3 alignment is included in this simulation. Program flow: P63-P71-P00-P52-P20-P32-P41-P33-P30-P41-P33-P42-P34-P41-P35-P41-P35-P41-P00



Luminary 1E Mission Procedural Testing, Cont.

- 5.0.0 DOCKED DPS BURN. All simulations start in lunar orbit and simulate the TEI burn. Program flow: P30-P40-P00
- 5.0.1 Full CSM, full LM
- 5.0.2 Partial CSM (post LOI weight), full LM
- 5.0.2 Empty CSM, full LM

SLIDE



INTERIM RPT  
1E MPV

TABLE I. NUMBER OF TESTS COMPLETED

JILMV Test	No. of Runs	T-LOSS
1.0.1 Earth Orbit Deorbit	0 <sup>a</sup>	NO
1.0.2 Lunar Orbit Deorbit	0	NO
2.0.1 Inflight Alignments	2	YES
3.0.1 Nominal Auto Landing	2 <sup>b</sup>	YES
3.0.2 Nominal Landing with ROD	1 <sup>b</sup>	YES
3.0.3 Auto Landing with V2I and V22 N69	1 <sup>b</sup>	YES
3.0.4 Auto Landing with ACA Redesignations	1 <sup>b</sup>	YES
3.0.5 Auto Landing with V68	1	NO
3.0.6 Landing with V68, N69, ACA, and ROD	0	NO
3.1.1 Abort from 33,000 ft.	1 <sup>b</sup>	NO
3.1.2 Abort from 7000 ft.	1 <sup>b</sup>	NO
3.1.3 Abort Stage from 7000 ft.	1 <sup>b</sup>	NO
3.1.4 Abort Stage from Surface	1	NO
3.2.1 P57 Testing	2	YES
3.2.2 P22 Testing	0	NO
4.0.1 Nominal Ascent	3	YES
4.1.1 Ascent thru Direct Rendezvous	2	YES
4.1.2 Insertion thru Direct Rendezvous	2	YES
4.2.1 Coelliptic Sequence Rendezvous	2	YES
5.0.1 Docked DPS Burn, Full CSM	0	NO
5.0.2 Docked DPS Burn, Partial CSM	0	NO
5.0.3 Docked DPS Burn, Empty CSM	0	NO

a Run on Luminary 209 with LM 8 vehicle simulation

b Additional runs on Luminary 209 with LM 8 vehicle simulation



ANOMALIES EXISTING IN LUMINARY 1E

(REVISION 210)

ANOMALY	DESCRIPTION	DISPOSITION	
SS	L-1D-22	A hardware or software restart during a RR TURNON sequence may result in an incorrect setting of the mode flag (ANTENFLG)	Program Note
			HOH IMPACT
SS	L-1D-24	P70 or P71 selection prior to P12 leaves P12 with at least 3 flags abnormally set	Program Note
			P70 71 FLG VARIABLE INS TGT
NEW	L-1E-01	If P22 is selected when range to CSM is > 400 NM and closing, then V37 will not flash when ranges > 400 NM and range rate is positive	Program Note
			Δ LEVEL 3 TFS
SS	L-1E-02 Rev 1	Exiting P63, P40, or P42 with a V37 approximately 50 microseconds before ullage on will result in ullage coming on and not being terminated, with Average-G integration not running	Program Note
			Δ TRW A-201
LUM 69 #10	L-1E-03	A V34E response to the flashing V06N60 display in P66 may result in a 31502 bailout alarm	Program Note
			HYBRID SIM
69	L-1E-04	P22 Lunar Surface Navigation initializes the W-Matrix when the mark counter is zero, instead of checking the RENDFLAG. Hence W-Matrix is initialized each time P22 is selected	Program Note
			TRW A-201

ANOMALIES EXISTING IN LUMINARY 1E

(REVISION 210)

ANOMALY	DESCRIPTION	DISPOSITION	
NEW L-1E-05 Rev 1	If an engine fail occurs in P70 or P71, and an ENTER response is made to the FLV97, <u>N63</u> will be displayed with FLV99, instead of N94, N94 will be restored at TIG after the V99 display is answered	Program Note	TRW A-201
69 L-1E-06	A V78 during P63 N62 display prior to AVG-G results in Program Alarm 31201 and clobbers the LM Velocity Vector	Program Note	LMS
33 L-1E-07	An inadvertent PROCEED on the V16N80 display in P20 caused the program to get lost	Program Note	LMS
69 L-1E-08	DAP interrupt could occur in the middle of the ZATTEROR zeroing sequence or STOPRATE	No Further Action	EYEBALL COM 33
69 L-1E-09	Unintentional software interlock between V97 and the ascent guidance engine-off control logic and conflict in use of TTOGO cell between CLOCKJOB and the ascent guidance equations	Program Note	EYEBALL

LR SPUR TEST R77 FLG

EREC OVR FLO NO VAC AREAS

DATA IND OMEGA

R1 - 11111 THEN PRO



LUMINARY 1E  
DOCUMENT REVIEW

I LM Flight Data File

LM Timeline Book, dated 4/ 5 /71, received 4/27/71.  
Update, dated 5/3/71, received 5/19/71.  
Update dated 5/14/71, received 6/2/71.

LM Data Card Book, dated 4/21/71, received 5/10/71.

LM System Activation Checklist, dated 4/ 5 /71, received 4/26/71.  
Update dated 5/4/71, received 5/19/71.  
Update dated 5/11/71, received 5/18/71.

LM G&N Dictionary, dated 3/29/71, received 4/16/71.

LM Contingency Checklist, dated 4/5/71, received 4/26/71.  
Update dated 5/26/71, received 5/28/71.

LM Lunar Surface Checklist, dated 3/15/71, received 4/5/71.  
Update dated 5/10/71, received 6/2/71.

LM Systems Data, dated 4/21/71, received 6/2/71.

LM Malfunction Procedure, dated 4/12/71, received 5/4/71.  
Update dated, 5/14/71, received 6/1/71.

II. Crew Procedures Documents Vol. 1 dated 4/1/71 received 5/28/71.  
Vol. 2 dated 4/1/71 received 4/22/71.

Comments to the above listed documents are being transmitted via telecon to NASA/MSC (CF22, CF34) as they develop.

CONCLUSION

BASED ON THE PRECEDING DATA,  
MIT/CSD LABORATORY RECOMMENDS  
THE USE OF LUMINARY 1E  
(Rev 210) FOR MISSION "J-1"