Massachusetts Institute of Technology
Instrumentation Laboratory
Cambridge. Massachusetts

LUMINARY Memo #40

To: Distribution

From: C. Schulenberg

Date: 5 September 1968

Subject: LUMINARY Revisions 39-43

Major Changes Incorporated into Revision 39

1) The RADAREAD subroutine was modified so as to skip all data storing and checking logic when used by R77. This prevents R77 from causing program alarms and tracker fail lightings if the radar data is bad.

2) A new flagbit, R77FLAG, was defined in order to indicate to the RADAREAD routine (see item #1) that R77 is the user.

3) The Landing Radar Spurious Return Test R77 was added to LUMINARY in response to PCR 229. Verb 78 starts the test and verb 79 stops it.

4) The priority of Verb 55 (R33) was reduced from 30 (Pinball priority) to 7 in order to solve a restart problem.

5) R30 was modified to check to see if either HAPO or HPER was in excess of 9999.9 NM, and if such was the case, to limit the displayed value to 9999.9 NM.

6) PCR 216 was implemented in R12. This causes R14 (LR repositioning routine) to be called at HIGATE rather than 12 seconds before.

7) A slight modification was made to S40.9 which virtually eliminates the possibility of an alarm 1407 (increasing VG alarm) even when several Lambert calls have been missed due to restarts or other causes.

8) The orbital-plane-change coding of P22 was corrected.

9) An error was corrected in the V83 (R31) coding. V83 was calling V83CALL instead of R31CALL.

Major Changes Incorporated into Revision 40

1) R21 was modified so as to compute the line-of-sight vector valid for 1 second ahead of current time.

2) R22 was better restart protected in order to fix Sundance anomaly Y67.

3) The usage of MANUFLAG was eliminated from R24.

4) The scaling of the RR range-rate incorporation was made variable in order to improve accuracy. This had to be done differently in LUMINARY than in Sundance. This recoding answers Sundance anomaly Y60.

5) PCR 471 was implemented (Revision of RR REMODE Release Angles).

6) Coding was added to P68 to set the DAP deadband to 5 degrees, as per GSOP.

7) The coding in AOTMARK which called NBSM was redone so that TRG*NBSM could be used. This eliminated the last usage of the NBSM routine from LUMINARY.

8) Further corrections were made to P22's orbital-plane-change routine.

9) A minor program bug was corrected in the KEPLER routine. See CONIC SUBROUTINES CORRECTIONS Memo #9 for details.

10) PCR 486 was implemented (New option code noun for extended verbs).

11) A bug was fixed in P70 and P71. Due to some incorrect coding R12 was not being terminated.

12) Sundance anomaly Y69 was fixed (incorrect meters-to-feet scale factor in R47).

Major Changes Incorporated into Revision 42

Note: Revision 42 was made because several important changes did not get into revision 41 during the assembly process. Revision 42 is the main assembly.

1) A programming error was corrected in the R12 coding responsible for blinking the two new DSKY lights - the effect of the bug was that the lights were never lit.

2) The checking logic for P70 and P71 was moved closer to the start of the V37 coding.

3) A bug was fixed in P71.

4) A bug was fixed in P31. P31 was mistakenly using TPASS4 for input rather than DELLT4.

5) The P12, P70 and P71 targetting logic was modified to use the same exhaust velocity values that the mass-monitor uses in SERVICER.

6) PCR 536 was implemented (P70, P71 selection via V37).

7) The Pinball calls to BAILOUT with alarm codes 1501 and 1206 were changed to POODOO calls.

8) The zeroing of DISPDEX was removed from the P40AUTO subroutine. This resolved a P70 and P71 engine-fail problem.

9) All of the "TC BALLANGS" instructions were changed to BANKCALLS.

10) PCR 489 was implemented in P57 (By-pass R54 and Noun 93 during Initial Alignment).

11) The routine NBSM was deleted since it was no longer being used.

12) A missing instruction was added to P25 in order to initialize R65CNTR.

13) The engine-fail V97 display was corrected so as to use REFLASHR rather than GOFLASHR.

14) The resetting of FLUNDISP was moved from TIG-5 to IGNITION. This prevents display conflicts in P63 and P12 following an ENTER response to a V97 (engine-fail).

Major Changes Incorporated into Revision 43

1) The executive call to R31CALL (set up by V83) was changed from a FINDVAC to a NOVAC thus reducing the likelihood of getting a 1201 abort.

2) A bug was fixed in the R60 coding which was introduced in Rev. 42 (item #9).

3) FC and PIF were made SPARES on the Orbital Maneuvers list since they are unused and uninitialized at this time. PIF was replaced by PSEUDO55 on the Ascent-Descent downlink list since it accurately represents DECA commands whereas PIF does not.

4) The P40 throttle-up task (set up for TIG + ZOOMTIME) was recoded so that it no longer calls P63's throttle-control routine but performs the throttling function itself. P70 has always used its own routine. This eases erasable overlay conflicts between the P40's and the P60's.

5) The initialization of PIF was deleted from ENGINOFF (see item #3 and #4).

6) The priority of the post-engineoff display and nulling job of P12, P70 and P71 was reduced to 17 (lower than Servicer's prio 20) in order to eliminate an infrequent display conflict.

7) A coding error was corrected in P52's coarse gyro-torquing logic.

8) A new noun (75) was defined for V85 as part of the implementation of PCR 99.2.

9) PCR 99.2 was implemented. Verb 85 now provides a DSKY display of RR position in mode II.

10) Alarm codes 1700 and 1701 were deleted since R12 no longer uses them.

11) A clearing of the UPDATE flag was added before, and a setting of the flag was added after, the computation of T(FINAL) in P38 and P78. This fixes a problem occasioned by the fact that P20 shares erasables with the TIME-THETA routine. In addition, the storage of TINT into DSPTEM1 was made safer.

Available Erasables in LUMINARY Revision 43

Unswitched	21
E3	8
E4	6
E5	2
E6	6
E7	20

Summary of Assemblies

Revision	Status	Word Count
39	3 cusses	34752
40	3 cusses	34803
41	GOOD (Use Rev. 42)	34809
42	1 cuss	34798
43	1 cuss	34868

Statistical Summary for Revisions 39-43

1)	Number of modification forms	74
2)	Changes for storage reduction	3
3)	Changes for execution time reduction	0
4)	Developmental changes	11
5)	Mandatory changes	16
7)	Total fixed memory change	+139

PCR's Implemented in Revisions 39-43

PCR	Revision #
1) 229	39
2) 216	39
3) 471	40
4) 486	40
5) 536	42
6) 489	42
7) 99.2	43
8) 490.2	40

PCR's Still to be Implemented

1) PCR 140 Incorporated Uprated Manual RCAH Mode for LM DAP
2) PCR 507.2 Termination of Integration
3) PCR 531.2 Add 1 minute in R63 extrapolation

SUNDANCE Anomalies Corrected in Revisions 39-43

Rev. 40 - Y67, Y60, Y69

SUNDANCE Anomalies Still Under Consideration

Y4, Y12, Y16, Y46, Y56, Y59, Y66