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LUMINARY Memo #28

To: Distribution

From: C. Schulenberg

Date: 14 May 1968

Subject: LUMINARY Revisions 12-16.

Major Changes Incorporated into Revision 12

1) R40 (Engine Fail Routine) was updated to correspond to the GSOP and to PCN 89.
2) Coding was added to GOPROG3 (executed by both hardware and software restarts) to clear the DIDFLAG for R10. This would force R10 to re-initialize itself if it was in progress at the time. This was necessary because a restart removes the DISPLAY INERTIAL DATA outbit.
3) A P65-P66-P67 testing program was deleted.
4) Restart protection was added to R11 both for the routine itself and for the FINDVACS that it sets up when starting P70 or P71. 1.7SPOT and 4.3SPOT were added to the Restart Tables for this purpose.
5) NORMLIZE was rewritten in order to increase the accuracy of the state vector transformation from reference to stable-member coordinates.
6) R10 was shortened by recoding the forward and lateral velocity limit-monitor as a loop.
7) The P70-P71 lead-in was rewritten in order to allow R11 (Abort Discretes Monitor) to survive the subsequent ENEMA.
8) The Ascent Guidance was changed in order to inhibit P71 when the DPS engine has been turned off.
9) A coding error was corrected in the Autopilot.
10) P00 was modified to update only the CSM state vectors when the LM is on the lunar surface.

11) An error was corrected in the P20s.

12) Some cusses were fixed in P57.

13) P57 was connected to the V37 tables. P10 and P11 were disconnected.

14) Accumulated changes were inserted in the S-band antenna routine (R05).

15) R60 was updated to conform to Section 4 of the GSOP.

16) The AGS Initialization Routine was brought up to date with SUNDANCE.

17) R32 was fixed so that the NOUPFLAG is cleared at the termination of the routine only in COLOSSUS.

18) UNITW was deleted from erasable memory.

19) P10 related coding was deleted from P32 and P72.

20) An error was corrected in the V80 and V81 coding.

21) Minor corrections were made to the Update Program.

22) Initvel was corrected to copy RTARG1 back into RTARG at termination.

23) Erasables for noun 99 were temporarily defined (WWPOS and WWVEL).

24) Fresh Start was modified to initialize RATEINDX for a 5 deg/sec. Kalcmanu maneuver rate.

25) V61 was modified to check RADCADR before proceeding.

Major Changes Incorporated into Revision 13

1) The R11 restart protection was further improved.

2) Coding errors were corrected in R40.

3) The restart protection of the P70-P71 lead-in was improved. A ZATTEROR was also added in accordance with the GSOP.

4) The call to FLATOUT in P70 was replaced by coding that accomplished the same thing. FLATOUT's erasables were clobbering P70's.

5) 4.27SPOT and 4.31SPOT were added to the RESTART TABLES for restart protection of P70 and P71.

6) P63 was modified to make use of the subroutine GUIDINIT, which initializes WM and /LAND/, and to use PIPTIME1 instead of PIPTIME in the IGNITION ALGORITHM.

7) The P10 and P11 erasables were deleted from E7.

8) P10 and P11 were deleted.

9) R12 was updated to correspond to the GSOP and to PCR #118. An accompanying change to SETTRKF was postponed since not enough FIXED-FIXED memory was available.

10) Various changes were made to BURNBABY in conjunction with the V99 paste. In particular the ENTER response to the V99 was connected up for P12, P70, and P71.

11) GOMANUR was modified to eliminate the use of a VAC area.

12) The setting-up of R11 in BURNBABY was restart protected.

13) The descriptions of several flagbits were updated. In addition, the erasables LRLCTR, LRRCTR, LRMCTR, and LRSCTR were added for R12 (See #9).

14) A coding change was made to the GTS to simply change the commanded directions of the gimbals without first turning the drives off.

15) P30 was recoded so it would function in both earth and lunar environments.

16) An error was corrected in the V48 routine. (LMS note #2, MIT anomaly #3 - SUNDANCE 290).

17) P10-P11 related logic was removed from P57.

18) A serious bug was corrected in the Trim Gimbal Control System. The SR register was being used without being properly restored.

19) Some unnecessary coding was deleted from R11.

20) The new ALARM and ABORT routines were incorporated. All "TC ABORT"s were replaced by calls either to POODOO or BAILOUT. Both of these issue a program alarm but POODOO goes to GOTOPOOH with all phases inactive while BAILOUT does a software restart.

21) A RELINT was added to INTPRET.

22) R12 was fixed to call QUICTRIG with a BANKCALL rather than a USPRCADR.

23) Restart protection for the Descent Guidance was switched from group 2 to group 3 to avoid conflicts with some group 2 phase changes at AVGEND.

24) Verbs 57 and 58 were added for communication with R12. Verb 57 allows Landing Radar updates while Verb 58 prohibits them. Verb 97 was also hooked up to the extended verb fan for R40.

25) The Proceed and V32 display responses were exchanged on the 611 alarm (no TIG for given elevation angle).

26) GOMARK3R was added to the Display Interface Routines for use by V48.

Major Changes Incorporated into Revision 14

1) Cusses were corrected in Erasables, P70 and P71, Servicer, BURNBABY, P63, R11, Throttle Control and GOMANUR.
2) Several P10 and P11 erasables that had been deleted from Rev. 13 were temporarily redefined to prevent cusses since they were referenced by the Pinball Noun Tables.
3) A bug was fixed in QUICTRIG.
4) DATACALL and USEPRET were deleted.
5) Some leftover coding was deleted from the extended verb area.

Major Changes Incorporated into Revision 16

1) A scaling error was fixed in the DALTRATE computation for R10.
2) P70 and P71 were modified to clear IDLEFLAG in case either abort had been initiated during an ENGFAIL (R40) sequence.
3) Fresh Start was corrected to initialize LRSTAT to octal 40000 instead of 77777.
4) An INHINT was added to ENEMA.

Statistical Summary for Revisions 12-16

1)	Number of modification changes	94
2)	Number of DAP changes	3
3)	Changes for storage reduction	4
4)	Changes for execution time reduction	0
5)	Developmental changes	28
6)	Non-program changes	14
7)	Mandatory changes	48
8)	Total fixed memory change	-381

Health Table

Revision	Status	Comment	Tapes
12	BAD	Bank overflow (Bank 36)	None
13	BAD	Bank overflow (Fixed-Fixed)	None
14	HOPELESS	Bank overflow (Fixed-Fixed)	None
15	BAD	Wrong SKIPPER Revision	None
16	GOOD		Hybrid and LMS