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LUMINARY Memo #151

To: Distribution
From: Dana Densmore
Date: 19 May 1970
Subject: LUMINARY Revisions 155-158

The following changes were incorporated into Revisions 155-158:

- 1) (PCR 1027) An extended verb and a flag for turning the terrain model off were implemented.
 - a) A new flag was defined, NOTERFLG (bit 11, flag 1). When set, the terrain model is inhibited; when clear, permitted. The flag is cleared to enable the terrain model at the start of P63. The flag is set to inhibit the terrain model at the start of P66. The flag is checked each guidance pass in Servicer (every 2 seconds) before the terrain model coding is entered at TERIN. If the flag is set the program branches to TEREND. NOTERFLG is also cleared on a Fresh Start.
 - b) A new extended verb, V68, was defined to turn off the terrain model. It sets NOTERFLG. V68 (TEROFF) was put at the end of V58, which kills the whole radar. LROFF (V58) falls into TEROFF.
- 2) (PCR 307) Changes were made to the lunar surface align downlist to provide detent code (AOTCODE), CURSOR, SPIRAL, and AOT mark time (TSIGHT). CURSOR and SPIRAL went into words 99a and 99b, TSIGHT into word 100, and AOTCODE in word 90.
- 3) (ACB L-7) The MARKRUPT routine, changed by this ACB in a clean-up attempt, turned up a bug due to a CCS which on a certain branch left an unexpected decremented accumulator. It was changed again to use a BZMF with a slightly different construction at a cost of one word in F7.

4) (PCR 1029)

- a) The TLOSS indicators SERVDURN and DUMLOOPS were moved from E3 to E2 (unswitched) so that it would be unnecessary to set the EBANK in Dummyjob and Servicer.
- b) SERVDURN and DUMLOOPS were put on the Luminary downlists in the following locations:
 - Orbital Maneuvers list: word 67
 - Coast and Align list: word 75
 - Rendezvous and Prethrust list: word 25
 - Descent/Ascent list: word 13
 - AGS Initialization and Update list: word 67
- c) The EBANK settings before the references to DUMLOOPS in Dummyjob and SERVDURN in Servicer were removed.

5) (PCR 942)

- a) The implementation of this PCR allowed HCALC not to be sign agreed if the upper order half was zero. This was corrected and a word was saved by making use of the fact that HCALC was already in MPAC from RVBOTH.
- b) A missing TC INTPRET was put in just before POSUP so that it will be done before falling into interpretive coding on a CCS.
- c) HLROFF was moved from E5 to E7 so as to be in the right EBANK for Servicer. It now shares with MKTIME.

6) (PCR 314) Desired thrust (FC) and its associated state vector time were snapshotted for the descent/ascent downlist.

- a) Under INHINT, FC is loaded and then PIPTIME is stored into GTCTIME.
- b) FC and GTCTIME were put on the downlist as a snapshot, words 5 and 6.
- c) GTCTIME was defined in erasable as a double precision quantity sharing with TANGNB in E7.

- 7) (ACB L-24) Four erasables were moved to another location in the bank (E7), replacing dummies for them there. Other erasables which had been sharing with the dummies were changed to share with the real quantities.

<u>before moving</u>	<u>after moving</u>	<u>sharing</u>
1443 ZERLINA	1644 AZINCR1	VDGVERT
1444 ELVIRA	1645 ELINCR1	VDGVERT +1
1445 AZINCR1	1646 ZERLINA	NIGNLOOP
1446 ELINCR1	1647 ELVIRA	NGUIDSUB

ZERLINA thru ELINCR1 formerly overlay RTARG thru RTARG +3. E7, 1644 thru 1647 was formerly ELIDUMMY, AZIDUMMY, ZERDUMMY, and ELVDUMMY.

- 8) (ACB L-23) Seven unused shared erasables were deleted from the erasable assignments log section. These unreferenced erasables were in E2 (unswitched).

Deleted were:

1257	W, IND1	B(1)
1537	VACX	I(2)
1541	VACY	I(2)
1543	VACZ	I(2)

- 9) Comments in erasable assignments for unswitched erasable, E3, and E7 were corrected and updated.
- 10) Tags naming the first location of the Luminary downlists were changed to be more comprehensible. Entries in DNTABLE (GENADRS of the downlists) had to be changed to the new spellings, and some of the mnenonics equated to DNLSTCODs also changed.
- 11) (PCR 306) DVTOTAL was put on the Descent/Ascent downlist as word 78. Word 78 was formerly FC (guidance thrust command); FC was moved to word 5a by PCR 314 (see item 6).

12) (PCR 315.2)

- a) Channel 77 was to have been zeroed on a Fresh Start. The original implementation of the PCR would have zeroed it on a restart as well as Fresh Start. This was corrected.
- b) Channel 77 was to have been zeroed after the proceed on a state vector update. The original implementation of the PCR zeroed it on all block updates. It was changed to do the zeroing in the INTWAKEU section of integration initialization. That section was rewritten at this time, saving three words by exiting to the known return rather than saving it, resulting in no cost for the addition of the zeroing. The zeroing in the update program was deleted (saving three words).

13) (PCR 287) Coding to implement this PCR was changed to prevent a misleading N54 display in P22 when the range rate is increasing. N54 will now not be displayed if range rate is increasing; instead a V56 will be performed to terminate tracking and do a software restart. If nothing else is going a flashing V37 will be put up (GOTOPOOH).

14) (L-1C-06) The ENGINOF1 call was moved from SEUDOPOO to the point at which it is determined that Servicer is on. This way ullage will be terminated immediately if it is going rather than waiting until after Average G is stopped.

15) (L-1C-08) A change was made in the DAP to correct an anomaly in its performance after a restart while in the manual rate command mode. For a description of the anomaly see the Anomaly Report. The fix involved setting OURRCFLG in DAPBOOLS after completing the initialization of manual rate command mode instead of during the initialization; and calling ZATTEROR to set desired CDUs to actual CDUs on each Q and R axis pass in either phase of the manual rate command mode rather than just the direct rate phase.

LUMINARY GSOP

GSOP sections to be checked with respect to the changes described:

Section 2: Items 1, 2, 4, 6, 11, 12

Section 3: Item 15

Section 4: Items 1, 13, 14

Section 5: Items 1, 13