

Luminary 1A Notes (Not a Complete Set)

General

- General 1.2.1 The following program sequences may cause problems:
If P3X-P47-P40, P41, or P42 - The P3X computations may be overwritten. Recovery: Repeat P3X and then P40, P41, or P42.
- 1.2.7 Depending upon initial gimbal angles, the VECPOINT routine may result in large desired rotations about the pointing vector when the pointing vector must be rotated through about 180° (an example of this would be in P40, P41, or P42). If the +X axis were about 180° away from the desired thrust vector, the V50N18 may display a large change in yaw desired. Recovery: If the computed attitude is desired then simply proceed with the maneuver. If it is not, then manually maneuver in pitch and have the solution recomputed after some 20-to-30 degrees by keying PRO on V50N18.
- 1.4.2 If a V37EXXE is used when the radar is being read during P20 or the self-test routines (R04 or R77), a 520 alarm may occur. The mark that was taken is not used. Recovery: ERROR RESET and continue.
- 1.4.6 An incorrect state vector update may occur, if there is a restart (hardware or software) during the trunnion or shaft incorporations of P20 or P22. (LNY-61)
Recognition: PROG Alarm or Restart Lt Noun 49 display occurs when it shouldn't (this may or may not happen).
Avoidance: 1) none for a hardware restart. 2) Do not select another program via V37 while P20 is incorporated a mark. Recovery: If the N49 occurs, key in recycle to reject the mark.
- 1.7.2 In order to avoid excitation of the CSM-docked bending mode and possible damage to the docking tunnel, +X translation exceeding 10 seconds with jet 10 should be avoided and small steady ACA deflections with fine fine stick scaling ($4^\circ/\text{sec}$) should be used in the ATT HOLD mode. Recognition: Perceiving a surprising increase in RCS jet activity and seeing a sinusoidal motion on the rate needles and the FDAI error needles (between 2 and 4 cps).
- 1.7.5 A CALCMANU maneuver rate in excess of $0.5^\circ/\text{sec}$ should not be used in the CSM-docked configuration.

- 3.1.1 There are seven priority displays in LUMINARY which ignore any response for two seconds:

V06N49 in R22
V50N18 in P20 or P25
V05N09 in P20 (Alarm codes 501, 503, 514, 525, 526, 527)
V06N05 in P20
V16N80 in P20
V05N09 in P22 (Alarm codes 501, 503, 514, 525, 526, 530)
V05N09 in R12 (Alarm code 523)

- 3.7.1 Restarts will terminate automatic attitude maneuvers. Recognition: Restart light or program alarm (software restart) light on with V50N18 flashing. Recovery: PRO to V50N18 that returns to DSKY after restart.

- 1.7.12 Do not use V90E (request R36 the rendezvous out-of-plane display) during Average G. R36 uses the permanent state (which during ascent would be the \bar{R} and \bar{V} on the lunar surface) and since that state was not an orbital state an acceleration overflow in integration will occur, causing a 430 P00D00 alarm. *only down P12*

- before P20*
P00 1.2.1 Do not select V92 during P00. Recognition: 1) 07 appears in program light; 2) the DAP is turned off for 10 seconds; 3) the W-matrix will be zero or overwritten; 4) flashing V06N41. Recovery: Select P00 via V37E00E, key V93.

- P20 1.2.6 Do not select P20 in the update mode and permit mark processing prior to completion of P65, P66 or P67. The W-matrix initialization will destroy the E-memory descent targets. It is understood that the P63 update (P27) will include a V95 to preclude P20 updating

- just V95 after P20*
P25 1.2.9 Indeterminate program behavior may occur if R04 or R77 (V63 or V78, respectively) is run simultaneously with P25. (LNY-66) Avoidance: Do not enter V63 or V78 with P25 running. *just in G4N P25 Dint*

- P40 1.7.7 If a flashing V97N40 (engine fail) occurs during the trimming phase of a P40 burn, then an attempt to relight the DPS by keying an ENTER to the flashing V97N40 and a PROCEED to the flashing V99N40 may cause the engine to throttle up within a few seconds of the new ignition. (LNY-63) Avoidance: Start the burn in MANUAL and manually throttle up. ENTER to the flashing V97N40 and PROCEED to the flashing V99N40. Then after sufficient trimming time, return the throttle control switch to the AUTO position. *PDI+12*

- P5X 1.6.1 In all P5X's the permissible values of R1 of N70 and/or N71 are 0-508 for the star code. Anything else will cause indeterminate program transfer. Recovery: Confer with

ground to determine possible erasable memory damage
(ground uplink may be required).

P57

1.6.4

In P57 a bad alignment will result in the following cases: Option 2; If the star code is for Sun, Earth for both sightings. If first body sighted is a star and the second body is the Sun, Earth. Option 3; If the star code is for the Sun, Earth. (LNY-74) Avoidance: Option 2; If sighting on Star and Sun or Earth, specify Sun or Earth first. Option 3; Use Planet code (00) and key in Sun or Earth vectors.

1.6.5

In P57, if gyro torquing is attempted (proceed on V06N93) while IMU compensation routines are torquing the gyros, a 1210 alarm will occur (LNY-68). Recognition: 1210 alarm and a restart after the PROCEED on V06N93 in P57. Recovery: Repeat P57.

P63

1.7.8

If a restart (hardware or software) occurs during the trimming phase of P63, the LGC will fail to throttle the DPS to FTP and the landing guidance equations will not be put into operation. (LNY-64) Recovery: Manually force the throttle to FTP at nominal FTP time (or earlier) and then key in V21N01E 01252E 02462E. Then wait a few seconds and reduce manual throttle to 10%.

1.7.9

If the LGC does not receive indication of the LR antenna's having reached position 2 (hover) after the LGC command to reposition, priority alarm 523 is displayed. It is intended that the crew be able to terminate R12 on this display by keying V32E and continue the landing, since the state vector should have been satisfactorily updated by this time. But, the V32E instead of terminating R12 simply puts R12 in the no update mode. Furthermore, there is another check in R12 for the LR position 2 discrete. If the position 2 discrete is not present, R12 turns on the program alarm light and stores alarm code 511. 511 is not a priority alarm but it does turn on the program alarm light every 2 seconds (LNY-72). Recognition: Program alarm light after V32E response to 523 priority alarm. Recovery: Set FLAGWORD 11 to 40000 by V21N01E 00107E 40000E.

1.7.10

If the response to V06N61 (P63) is V32E, control will be passed to the engine fail routine as if there had been an ENTER response to a flashing V97NXX. The display will change to flashing V99N61 asking for engine ignition enable and Average G will not be turned on. (LNY-73) Avoidance: Do not recycle on the V06N61 display in P63.

1.7.13

In P63, grossly bad initial conditions or targets can cause the landing ignition algorithm to terminate abnormally, i.e., instead of the V06N61 flashing display after the ignition algorithm, a static V06N63 will appear. This would occur upon initial entry into P63. Recovery: State vector update and/or target update and then re-

select P63.

P66

1.7.11 P66 (ROD program) is selected automatically by the LGC when the attitude control switch has been placed in ATTITUDE HOLD and the ROD switch has input a net change in descent rate over the last sampling cycle. Once P66 is selected the attitude control switch should not be returned to the AUTO position. Program control will remain in P66 but the quadratic guidance equations will be restarted causing use of unnecessary computer time. Avoidance: Do not return the attitude control switch to AUTO after selection of P66.

P70

1.6.1 The powered flight RR designate routine (R29) will not continue tracking during a switch from P70 to P71 but instead will again designate and then begin to track.

R03

1.7.1 Do not load a zero or negative number in R1 or R2 of N48 (DPS pitch or roll trim) (SDN-124). Recognition: 1204 alarm with V37 flash. Recovery: Recall present program and R03.

V83

1.5.2 Range rate display in V83 may degrade considerably at ranges less than 0.3 to 0.5 NM depending on navigation accuracy.

*P 40 * 63
don't do R03
load max DB
prior to
P63
will have a with DB
P00 1200 alarm with our
look like fault but don't
update outer loop*

Colossus 2A Notes (Not A Complete Set)

General

1.2.4 The following program sequences will cause problems:

- a) P3X - P7X - P40 or P41
P3X - P17 - P40 or P41
P3X - P23 - P40 or P41

Problem: P3X computations are overwritten. Recovery procedure: Redo P3X and then P40 or P41.

- b) 1. P40/P41 - P27 - P52
2. P27 - P40/P41 - P52

Problem: P27 and P40/P41 overwrite preferred alignment computation.

Recovery procedure: 1. Redo P40/P41 up to V50N18, then reselect P52. 2. Reload preferred REFSMMAT from ground.

1.2.6 Depending upon initial gimbal angles, the VECPOINT routine may result in large computed rotations about the pointing vector when the pointing vector must be rotated through about 180° (an example of this would be in P40 or P41. If the +X axis were about 180° away from the thrust vector, the V50N18 may display a large change in outer gimbal angle.)

Recovery procedure: If the computed attitude is acceptable then simply proceed with the maneuver. If it is not, then manually maneuver in pitch and have the solution recomputed after some 20-to-30 degrees by keying PRO on V50N18 while not in CMC and AUTO.

1.7.8 There is an extremely low probability of a CDU transient occurring anytime which will change the CDU readings by 11 1/4 degrees. This probability can further be reduced by not changing ordeal switches or ATT SET switch to IMU on the main panel.

P22 1.4.1 Taking marks on a landmark in the vicinity of the horizon and identifying the landmark as an unknown landmark, may cause either of the following to occur:

- a) Alarm 1302 (square root abort), termination of P22, and return to P00. Recovery Procedure: Reselect P22.
- b) overflow in the initialization of the landmark portion of the W-matrix, resulting in erroneous navigation calculations. Recognition of this effect is difficult. Recovery procedure (if recognized): Reject update on $\Delta R \Delta V$ display. Avoidance procedure: Do not use unknown landmark option of P22 for landmarks near the horizon.

- P30 1.1.4 If P30 is used to estimate perilune during translunar coast load 0.2 ft/sec into R2 of N81.
- P37 3.5.1 P37 is not restart protected. If a restart occurs, P37 has to be reselected.
- V82 1.2.9 V82 may give erroneous results during translunar/ transearth coast phases since its computations are based on two body conic equations.
- 1.7.7 The TFF display in V82 may be incorrect if the return trajectory is hyperbolic. Recognition: Noun 73, R2736339 ft/sec.
- V83, 85 1.4.2 The range and range rate displays (in R31 and R34) may degrade considerably at ranges below 0.3-0.5 NM depending on marking schedules and resultant AGC navigation accuracy.
- 1.5.5 V83 and V85 displays will be meaningless at altitudes greater than 425 NM for both earth and moon if these verbs are exercised during periods of precision state vector integration.
To use verbs: V96, V83E or V85E, PRO, V37E00E
- V96E 1.4.1 V96 could leave the other state vector and the W-matrix out of phase if requested during any permanent state vector updates, P00, P20, P22, P23, and P76, and Average G.

V23 Key V93 between colib
mark. and first P23 data
mark to propagate the
W-matrix.