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Colossus Memo # 232 , Luminary Memo # 125

TO: Distribution

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SUBJECT Work-around for P32 bomb-outs due to insufficient post-CSI or post-CDH pericenter (Alarm codes 601 and 602, respectively)

P32 was designed to give an alarm if post-CSI or post-CDH pericenters are computed to be less than 85 nm. or 35K ft. around the earth and moon, respectively. Some future rendezvous abort flight paths may necessarily cause pericenters less than the minimum specified, and yet, perhaps, still within safe limits.

Should a 601 or 602 alarm come up, it might be easier to try to stretch out the rendezvous by increasing t_{IG} (TPI), and N (R1 of N55), or have the other vehicle do the maneuver. Lengthening the duration of the rendezvous will usually raise a bad pericenter somewhat; if the other vehicle does the maneuver, no bad pericenter will result, although the logic of P32 might put the other vehicle too high at TPI, resulting in a 600 alarm. If these methods do not work, or are undesirable, a work-around does exist that will allow P32 to run to completion, despite the alarm. This work-around, however, has some problems associated with it.

First, the work-around:

1. Conditions that might give rise to 601 or 602, among others, are not tested until after P32 has converged on a solution. This is the fact that allows the work-around to exist at all.
2. When alarm conditions are discovered, P32 is in interpretive coding which must, for all practical purposes, be bypassed.
3. The solution is an Executive Call at the next piece of basic coding, namely, at P32/P72F + 5, CAF V06N75. The Executive Call must be a FINDVAC job, as a restart will occur if NOVAC is tried.

Problems:

1. More than likely, an alarm will be encountered in an initial pass, when it is still desirable to take marks. This Executive Call bypasses the interpretive coding that sets UPDATFLG. Therefore, if the astronaut wishes to have any marks incorporated

he must set said flag via V25 N07 (procedure, below) after each recycle, before any marks are taken.

2. The Executive Call also bypasses the interpretive coding that calculates the minutes portion of $\Delta T(\text{CSI}/\text{CDH})$ and $\Delta T(\text{CDH}/\text{TPI}) \bmod 60$. Therefore, if either of those quantities exceeds 60, PINBALL will display 59b59. This may be confusing.
3. Conceivably, it might be nice to know just how bad the offending pericenter really is. This is possible via a display request through the DSKY. (See example and table below.) The display can be compared with a table to determine approximately how small the pericenter is.
4. This work-around bypasses tests for alarm codes 603 and 604 (insufficient time between CSI and CDH, and between CDH and TPI), and, if 601 is the one that came up, then 602 is also bypassed. Therefore, if either pericenter is low, $\Delta T(\text{CSI}/\text{CDH})$ and $\Delta T(\text{CDH}/\text{TPI})$ will not be checked. If the post-CSI pericenter is low, the post-CDH pericenter is not checked. It is, then, the astronaut's responsibility to ensure that those 2 or 3 quantities fall within safe limits.

EXAMPLES: Acknowledgements to P. Rye and J. Vella for developing procedures.
(Absolute addresses below apply for Rev. 72 of COMANCHE)

1. Procedure for setting UPDATFLG

V25 N07 E
75E
100E
1E

2. Executive Call for work-around

V25 N26 E
13001 E
03414 E
10004 E
V 30 E

3. Examine value of pericenter

a. Post-CSI value (Erasable location POSTCSI)

V07 N01 E
3457 E

b. Post-CDH value (Erasable location POSTCDH)

V07 N01 E
3471 E

TABLE for determining approximate value of pericenters

The quantities in this table were determined by multiplying 35K, 34K, etc., by 0.3048, and dividing by 536870912 (i. e., 2^{29})

Pericenter	Displayed Value
35,000 feet	00001 98707
34,000 feet	00001 93030
33,000 feet	00001 87352
32,000 feet	00001 81675
31,000 feet	00001 75998
30,000 feet	00001 70320
29,000 feet	00001 64643
28,000 feet	00001 58966
27,000 feet	00001 53288