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LUMINARY Memo #74

To: Distribution
From: P. Adler
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Subject: Response to V99 and V97 in LUMINARY 1 (Rev. 69)

As in SUNDANCE and early versions of COLOSSUS (see COLOSSUS memo #139 and DANCE memo #92) responses to V99 (or V97) in the burn programs can cause difficulties.

If the response to the V99N40 display takes place between the start of a CLOKJOB and its ENDOFJOB, a window of about 5 ms every second, some strange results will occur. These results depend on (1) the type of response made to the display and (2) the order in which the display JOBS are executed.

CLOKJOB comes every second and sets up a display each time. The new display always replaces the old display.

After a response (which is made during a CLOKJOB), two JOBS of equal JOB priority (27) are ready to become active. They are

- 1) the old CLOKJOB display which has just been awakened by the response (i. e. the response to V99N40 display).
- 2) the new CLOKJOB display at MAKEPLAY set up by a GOFLASHR CALL (also a V99N40 display).

The executive will treat each of these JOBS with equal priority according to their order in the VAC list. The JOB with the highest VACNUSE location will be treated as the JOB with the highest priority.

Therefore each job has a 50% probability of being executed first.

The matrix below shows what happens. Row 1 shows the results if JOB 1 is executed first. Row 2 shows the results if JOB 2 is executed first. The third row shows what should happen if there were no anomaly. The 3 columns in the matrix show the responses to the display.

The above is also the case for V97N40 displays.

	PROCEED	ENTER	TERMINATE
V99	<p>Response JOB first</p> <p>V99N40 remains flashing for up to 1 second after response.</p>	<p>1502 ABORT - alarm light on V37 flashing CLOKTASK off AVERAGE G still on No guidance Any extended verb activity lost</p>	<p>V99N40 flashing continues CLOKTASK off AVERAGE G and guidance still going</p>
	<p>Display JOB first</p> <p>V99N40 remains flashing for up to 1 second after response.</p>	<p>1502 ABORT - alarm light on V37 flashing CLOKTASK off AVERAGE G still on No guidance Any extended verb activity lost</p>	<p>1502 ABORT - alarm light on V37 flashing CLOKTASK off AVERAGE G still on No guidance Any extended verb activity lost</p>
	<p>Normal Conditions</p> <p>V06N40 non-flashing</p>	<p>V16N40 flashing</p>	<p>V37 flashing</p>
	<p>Response JOB first</p> <p>V97N40 remains flashing for up to 1 second after response.</p>	<p>V99N40 flashing</p>	<p>V97N40 flashing continues CLOKTASK off AVERAGE G still on</p>
V97	<p>Display JOB first</p> <p>V97N40 remains flashing for up to 1 second after response.</p>	<p>V99N40 flashing</p>	<p>1502 ABORT - alarm light on V37 flashing CLOKTASK off AVERAGE G still on No guidance Any extended verb activity lost</p>
	<p>Normal Conditions</p> <p>V06N40 non-flashing</p>	<p>V99N40 flashing</p>	<p>V37 flashing</p>

Susceptability: 5 ms every 1 second.

Action: Repeat response; reselect program if desired following abort.

V99 - PROCEED - Either JOB first

- 1) The V99N40 flashing display was redisplayed since the JOB call had been made to set up this display before the response got in to indicate that no more V99N40 displays were desired.
- 2) The PRO response to V99N40 did get in and executed everything normally. This included the resetting of DISPDEX to get back the V06N40 as well as starting up ignition.
- 3) As soon as CLOKJOB is called again (1 second later) the leftover V99N40 display will be replaced by the V06N40 non flash display. (The V06N40 non-flashing display in CLOKJOB is a REGODSP display, which allows it to replace a normal flashing display.)
- 4) If the ASTRONAUT should try to respond (with another PROCEED) to the new V99N40 display before the V06N40 came up there should be no problem for 2 reasons:
 - A. He would have to respond in less than a second to get the response in.
 - B. If the response did get in the Proceed logic would only partially be re-executed since restart logic in this area prevents a double start up of ignition.

V97 - PROCEED - Either JOB first

Same as V99 - PROCEED. Substitute V97N40 for V99N40 displays.

V99 - ENTER - Either JOB first

- 1) The ENTER response sets DISPDEX positive which terminates CLOKTASK and sets up a JOB at PRIO12 to display V16N40 using GOFLASHR.
- 2) Since the JOB to do the V16N40 has a lower priority than either JOB 1 or JOB 2, it will wait until both are done.

- 3) The MAKEPLAY JOB, coming either first or second redisplay V99N40 since it had been set up to do this before DISPDEX was set positive.
- 4) When the V16N40 finally is executed, it causes a 1502 ABORT since it is not allowed to replace a normal flashing display (the V99N40). In LUMINARY this ABORT causes a POODOO, which, since SERVICER is running, turns into a partial BAILOUT. The effect of this is to terminate CLOKTASK and disconnect guidance. AVERAGE G is still going.
- 5) The display will be a flashing V37; the alarm light will be on and 1502 will be in FAILREG.

V97 - ENTER - Either JOB first

No abnormal behaviour for this situation.

V99 - TERMINATE - JOB 1 first

- 1) The Terminate response which got in first set DISPDEX positive killing CLOKTASK and went to GOTOPOOH with the result of V37 flashing.
- 2) The MAKEPLAY JOB now puts up the V99N40, which, since the REFLASH bit is set in the LINUS call, is allowed to replace a normal flashing display such as the flashing V37. If a PROCEED was now made, the burn would proceed but without the V06N40 display. If an engine fail occurs subsequently, CLOKTASK will be restarted and normal engine-fail displays will come up. ENTER and TERMINATE responses give normal results.

V97 - TERMINATE - JOB 1 first

Same as V99 - TERMINATE - JOB 1 first. Substitute V97N40 for V99N40. PROCEED and ENTER responses to this display produce

a blank DSKY; for PROCEED the engine is left alone, for ENTER an "ENGINE OFF" is performed. TERMINATE gives normal results.

V99 - TERMINATE - JOB 2 first

- 1) The V99N40 flashing display was redisplayed since the JOB call had been made to set up this display before the response got in to indicate that no more V99N40 displays were desired.
- 2) The terminate response to the V99N40 display did get in even though the V99N40 was redisplayed. The terminate goes to GOTOPOOH which sets up a flashing V37 display but results in a 1502 ABORT since the V37 display conflicts with the leftover V99N40 display.
- 3) In LUMINARY this ABORT causes a POODOO which turns into a partial BAILOUT. See V99 - ENTER, 4 and 5.

V97 - TERMINATE - JOB 2 first

Same as V99 - TERMINATE - JOB 2 first. Substitute V97N40 for V99N40.

If any strange behaviour results from a response to V99N40, the following recovery procedures are suggested:

- 1) Repeat the response that was originally made
BUT...
- 2) Terminate is always acceptable.
- 3) Enter is allowable except following a Proceed.
- 4) Proceed should only be done following a Proceed.
- 5) In case of 1502 Abort program may be reselected as desired.