

MISSION TECHNIQUES MEMO #28B

TO: Distribution  
FROM: Malcolm W. Johnston  
DATE: April 23, 1969  
SUBJECT: "G" Descent

1. An early, post PDI, landing radar check might be accomplished as follows: Monitor the N68 display of LGC vs LR altitude for 10-20 seconds for consistent differences, then monitor the tapemeter display of altitude (slant range multiplied by a constant) while alternately rotating the S/C left and right via x-axis override. The altitude indications should vary as a function of the rotating angle. (Rotations should be less than  $5^{\circ}$  in magnitude to avoid breaking lock and they must be executed prior to 30k altitude). The same goal (gaining confidence in the LR by observing it doing something "smart") could be obtained by noting the altitude fluctuations as the S/C passes over pre-mapped discontinuities (craters etc.). If such a test appeals to the crew etc., detailed procedures should be written and then reviewed by cognizant radar personnel.

2. What are the procedures and cues associated with the PGNCS movement of the landing radar from position 1 to position 2 near hi gate?

Ans. The PGNCS presently uses a common cue ( $T_{GO}=60$  secs.) to switch from P63 to P64 and to execute the LR repositioning. If the LGC does not receive indication of successful repositioning, an alarm code (523) will appear. Three options are available to the crew at this time: Proceed, which will cause the LGC to recheck the LR position (the crew could back-up the LGC repositioning command at this time - or earlier - manually, though they should not do this prior to the switch from P63 to P64 as it will cause a program alarm); V32E, which will allow continuation of the landing, but without R12 (i. e., the LR data); V34E, which will terminate the PGNCS landing and put the LGC in R00. A PGNCS abort (P70 or P71) can

be initiated from this point, though an abort or abort stage, instead of the V34E, would be more straight forward.

An Enter could not replace the V34E or V32E above (suggested for crew simplification) as it is an illegal response here!

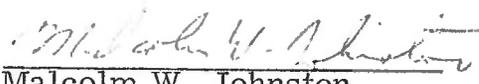
3. PDI thrust fail will be backed up by direct thrust on (LGC has already commanded ullage on, so failure at PDI is most probably downstream from the LGC). A proceed response to the thrust fail indication will merely cause the LGC to re-check the acceleration threshold. If satisfied (via direct thrust on), the alarm will disappear and PGNCs descent may continue.

4. How is the initial time estimate for the initiation of powered descent obtained?

Ans. The engine on time is initially estimated by subtracting a fixed time of powered descent (GUIDURN - which assumes zero hover time) from the nominal predicted landing time. The latter must be uplinked by the RTCC. Iteration then determines the exact PDI time. Section 5 of the GSOP has been updated to reflect the above. If the RTCC estimate of landing time is liable to be grossly in error (like  $\pm 100$  to 200 secs) it should be biased early by an amount equal to the uncertainty.

5. Presently the RTCC is calculating RLS directly from the landing site Lat, Lon, and Alt. -- No adjustments, biases etc., are understood to be required! Right?

Ans. Right!

  
Malcolm W. Johnston