

Comments on Revised Optics Computations in Luminary 195

- References: (a) Revision 195 of AGC Program Luminary, dated 30 November 1970.
 (b) "Star Vector Determination for PCR 1044," dated 8 August 1970, distributed at SCB Meeting #40, 13 August 1970.

A number of changes in the optics processing logic from that employed in Apollo 14 are reflected in the program of reference (a). Since many of these are defined in reference (b), the changes are summarized using reference (b) as a baseline. Most of the changes from reference (b) are presumably intentional; one which may not be is the doubling of the iteration loop convergence tolerance (sheet 2 below).

One area not documented in reference (b) is the application of the ROD inputs to do what seems to be intended as a "backup mark" function. There are several items in this area which ought to be subjected to a "design review" scrutiny. Also, all ROD inputs are treated as positive (presumably this will be fixed!!!).

PCR 333 specified that "Recognize ROD inputs as being valid only during Average G". For the sake of the backup mark function, this requirement has been somewhat modified:

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 a) The RODCOUNT erasable memory cell is incremented/decremented for an interrupt if ROD bits non-zero. During Average-G, of course, this is what was specified by the PCR. The incrementing is also done if Average-G is off, however. This has the effect of incrementing the RDOTMSAV cell (pages RNAV-21/22) by 2^{14} radar least increments and the N49FLAG cell by 1 (signed in each case, of course), page RNAV-18 to RNAV-19. The same time sharing is reflected in the Apollo 14 program, however, so may be considered, perhaps, as "allowable" (note that LPD "PITFALL" inputs are locked out, however, unless functional). VO6N49 response via ROD at best is "unexpected".

b) If average-G is off, then a check is made to see if mark inputs legal (bit 12 of MARKSTAT zero, but MARKSTAT itself non-zero). If not, the 112_s alarm (mark/mark reject not accepted) is generated. This new definition of the alarm was not authorized. Bit 12 setting used previously to ignore inputs.

c) If the check of (b) is passed, then the logic sequence for channel 16 processing is joined after the check for the mark reject input. As a result, failure of the ROD switch to "on" will prevent the use of the mark reject button. This seems in direct conflict with the PCR 333 requirement, as defined by the Mr. Nobles committee discussions.

d) P52 can, and P57 will, process ROD inputs as equivalent to mark X/Y inputs. This is desirable in the event of a broken mark button package, but it would seem desirable if some sort of mark reject capability, perhaps via an extended verb as in CSM, were also to be supplied. No such mechanism was located successfully in the program of reference (a), nor is any documentation on this ROD application recalled.

The following changes, mainly oriented towards display effects, have been made to the material of reference (b):

1. On page 2, the initial guess of θ for the inflight option (FLT59FIG = 1) involves a considerably more elaborate formulation.
2. On sheet 1 (upper right), or Fig. 2, in 2nd box the counter initialization to 10 is now done to 16 instead.

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3. On sheet 2, tolerance in upper right is double that quoted (the cosine number is compared to the constant indicated, but cosine believed to have scale factor B1, not B0).

4. On 3rd sheet, R51 resets FLT59FIG to 0 before the display; the PRO response therefore leaves it alone.

5. On the 2nd "sheet 2" (upper right numbering), "GETDAT", in next to last box an entrance to "PLANET", giving a possible N88 display, is made if FLT59FIG = 1. The quantity obtained is used for the computation mentioned in #1. Displays on this page missing a "PRO" indication.

6. On "sheet 3" (GETMKS), the quantities zeroed in top box are the same as those loaded in bottom right (with program tags XCOUNT and YCOUNT respectively).

7. On "sheet 4" (MARKCHEX) check of SURFFLAG in middle should also include check of FLT59FIG (as shown in the R51 figure). At bottom right, the ENTR response goes to "GETDAT", not "GETMKS".

8. On "sheet 5", if an ROD input is found the "DESCBITS" routine does the following:

TS = 1

If bit 7 of channel 16 = 1, set TS = -1 (NOTE: coding does not do this,
RODCOUNT = RODCOUNT + TS since effect of CCS order not
recognized properly)

If bit 5(AVEGFLAG) of FLAGWRD7 = 1, Resume

If MARKSTAT \neq 0:

If bit 12 of MARKSTAT = 0:

Proceed to "CHKWHAT" (7th box of middle column, WHATMARK check)

Perform "ALARM" (pattern 112_g)

Resume

In addition, if bit 12 of MARKSTAT is found set in middle column, the 112_g alarm, not operator error as indicated, is generated (a change from present Apollo 14 program, where merely ignores the input completely).

9. On "sheet 7", in 4th from last box a VPRO to the V2xN79 also causes the VO6N79 to appear (hence if have several readings of the same value, don't have to rekey them); as is conventional, a data enter to the VO6N79 will cause the display to be generated again.