## Questionable Items in Luminary 130 (H2) Program

## Reference: Revision 130 of AGC Program Luminary by NASA 2021112-081, 18:29 Nov. 4. 1969, received 13 November 1969 (IM program for H2 mission)

Based on a review of the referenced program, the following questionable items have been encountered which may not be of general knowledge:

1. As presumably authorized by PCR 882 ("Replace VHORIZ with something better"), the Rl of N6O display now is of the quantity FORVEL, which is loaded at line 0296 on page 897 of the listing. At this point in the listing, it is in "output bit units", scaled Bl4. The conversion factor is the constant VELCONV (used on page 897 at line 0292). The value of the constant, line 0121 on page 42 of the listing, is octal 22316<sub>8</sub>(decimal 9422), with scale factor Bl0. This value, in turn, seems to correspond to:

 $100 \times (1/0.3048) \times (1/0.5571) \times 2^{-10}$ 

where first term converts from centi-seconds to seconds, second converts from meters to feet, third is reciprocal of least increment to the display (i.e. a least increment of 0.5571 fps/bit), and fourth is scale factor. Consequently, it is concluded that the least increment of the quantity FORVEL is 0.5571 fps.

Page 312 line 1863 specifies for noun 60 a NNTYPTAB value of  $6052l_8$ . This means the scale factor for Rl should be the one specified by the least significant five bits ( $2l_8$  or  $17_{10}$ ). For output, this constant may be found at line 2334 on page 315, and is equal to:

5.517 E-5 B14

This constant (since no additional scaling after multiplication is used) would serve to convert a quantity with a least increment of 0.5517 fps to a display scale of XXXX.X fps. A suitably compatible (although unlikely to be used) value for scaling an input is at line 2234 on page 314, giving storage at 0.5517 fps/bit.

In order to compensate for the value of VELCONV, it appears that the DSKY output scaling constant should be 5.571 E-5 Bl4. The effect of the transposition of the last two digits means that the display on the DSKY would be about 1% low (presumably not of serious concern since, although the least increment on the DSKY is 0.1 fps, the least increment of the data is over five times coarser).

2. Because of the method used to implement PCR 882, the Rl display will <u>not</u> be updated unless the "display inertial data" input bit indicates that the RlO computations are desired (as contrasted with the display on the cross-pointers which can also be obtained from other sources). Consequently, the function of this bit has now been extended beyond that of controlling only the cross-pointer display, and an option to compare the PGNCS DSKY display with another source is <u>not</u> available for Rl of N60.