NA

MIT/IL SOFTWARE ANOMALY REPORT

MIT REPORT NO.	LNY-45
PROGRAM	LUMINARY
PROGRAM REVISION	69

1 ORIGINATOR:	1.2 ORGANIZATION:	1.3 DATE:	1.4 ORIGINATOR CONTROL NO.
R. A. Harwood	TRW	3/26/69	A-174-F-01

1.5 DESCRIPTION OF ANOMALY:

An error due to truncation in the computation of engine cutoff time during long burns can cause burn residuals of up to 0.64 fps. This is caused by a shift right 10 instruction at program location TGOCALC+16_{10}. After this operation the intermediate result in MPAC is scaled at B19 with unit of meters/centisecond. Recommended action is to change the SR 10D at TGOCALC+16_{10} to a SR 7D and rescale the constant -FOURDT from -800 B-18 to -800 B-21. This would reduce the maximum residual due to truncation to about 0.08 fps.

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1.6 DESCRIPTION OF RUN:

Visual inspection.

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- MIT ANALYSIS -

2.1 CAUSE:

See 1.5

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2.2 RECOGNITION:

None

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2.3 MISSION EFFECT:

See 1.5

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2.4 AVOIDANCE PROCEDURE:

None

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2.5 RECOVERY PROCEDURE:

None

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2.6 PROGRAM CORRECTION: While it is true that the proposed change does reduce the truncation in the TGO calculations, it should also be noted that it also reduces the maximum value of TGO to about 17 minutes (due to divide overflow).

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2.7 RECOMMENDED DISPOSITION (Fix, Work-around, etc):

None

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2.8 RECOMMENDED RE-TESTING:

None

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2.9 MIT/IL SIGNATURE:	2.10 DATE:
George Cherry J.K.	4-22-69

3.1 NASA DIRECTION:

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4.1 CLOSING ACTION TAKEN:

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3.2 NASA/MSC SIGNATURE:	3.3 ORGANIZATION	3.4 DATE:	4.2 SIGNATURE:	4.3 ORGANIZATION:	4.4 DATE:

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2.6 Program Correction, cont'd.

In long burns with a heavy vehicle, and especially before 'DPS throttle-up' TGO can easily be larger than 17 minutes. The effect of the overflow limiting would be to display a more or less constant TGO of 17 minutes without counting down until the actual value of TGO became less than the maximum. Nonetheless, a fix to this anomaly should be contemplated for future programs, possibly by using normalization which would overcome the overflow problem. However, the increase in accuracy does not seem to warrant changing the current programs.