(2) M. HAMILTON

T/DL PROGRAM CHANGE ROUTING SLIP

PCR/PCN # SL003
ANOMALY # _____
ADR # _____

☐ COLOSSUS 3 ☐ LUMINARY 1E
☐ COLOSSUS __ ☐ LUMINARY __
☑ SKYLARK __

☐ MIT Approved PCN ☒ NASA Approved PCR ☐ NASA Approved Software Anomaly
☐ MIT Approved ADR ☐ NASA Approved PCN ☐ MIT Approved Software Anomaly

A. Coding

☑ Begin coding immediately — Carl Beals

ACTION: _____

Program Supervisor's Approval: Margaret Hamilton

○ Do not code until new GSOP material has been approved by the MIT Mission Design Review Board (MDRB) and distributed.

B. GSOP Preparation

☑ Prepare GSOP revisions for MDRB consideration — J. KLAWENIK/E. OLSSON

ACTION: _____

☐ Technical Committee Meeting not required.

☐ Technical Committee Meeting(s) held on _____
Attendees:

C. KSC Testing and Checkout

○ Review for possible impact on KSC testing and checkout ACTION: _____

D. Other Programs Affected

○ Review for corresponding changes in _____

ACTION: _____

Special Instructions

Project Manager [signature]
Date 1/28/71

APOLLO SPACECRAFT SOFTWARE CONFIGURATION CONTROL BOARD PROGRAM CHANGE REQUEST

NUMBER (Completed by FSB): SL003

1.0 COMPLETED BY ORIGINATOR

1.1 ORIGINATOR	DATE	1.2 ORGANIZATION	APPROVAL	DATE
R. O. Nobles	2/25/70	MPAD	R O Nobles	2/25/70

1.3 EFFECTIVITY: AAP

1.4 TITLE OF CHANGE: Improved Short Burn Logic

1.5 REASON(S) FOR CHANGE:
Make the CSM short burn logic less sensitive to the dispersion in the performance of the SPS engine.

1.6 DESCRIPTION OF CHANGE:
See attached flow chart

2.0 SOFTWARE CONTROL BOARD OR FLIGHT SOFTWARE BRANCH DECISION FOR VISIBILITY IMPACT ESTIMATE BY MIT

2.1 ☐ APPROVED ☐ DISAPPROVED

2.2 REMARKS:

2.3 SOFTWARE CONTROL BOARD OR FLIGHT SOFTWARE BRANCH SIGN OFF

DATE

3.0 MIT VISIBILITY IMPACT EVALUATION:

3.1 SCHEDULE IMPACT

3.2 IMPACT OF PROVIDING DETAILED EVALUATION

3.3 STORAGE IMPACT

3.4 REMARKS:

3.5 MIT COORDINATOR

DATE

4.0 SOFTWARE CONTROL BOARD ACTION

4.1 ☒ IMPLEMENT AND PROVIDE DETAILED CHANGE EVAL. ☐ PROVIDE DETAILED CHANGE EVALUATION ☐ DISAPPROVED

4.2 REMARKS

4.3 SOFTWARE CONTROL BOARD SIGN OFF

DATE 3/4/70

5.0 MIT DETAILED PROGRAM CHANGE EVALUATION

5.1 MIT COORDINATOR

DATE

5.2 MIT EVALUATION

6.0 SOFTWARE CONTROL BOARD DECISION ON MIT DETAILED PROGRAM CHANGE EVALUATION

6.1 ☐ START OR CONTINUE IMPLEMENTATION ☐ DISAPPROVED OR STOP IMPLEMENTATION

6.2 REMARKS:

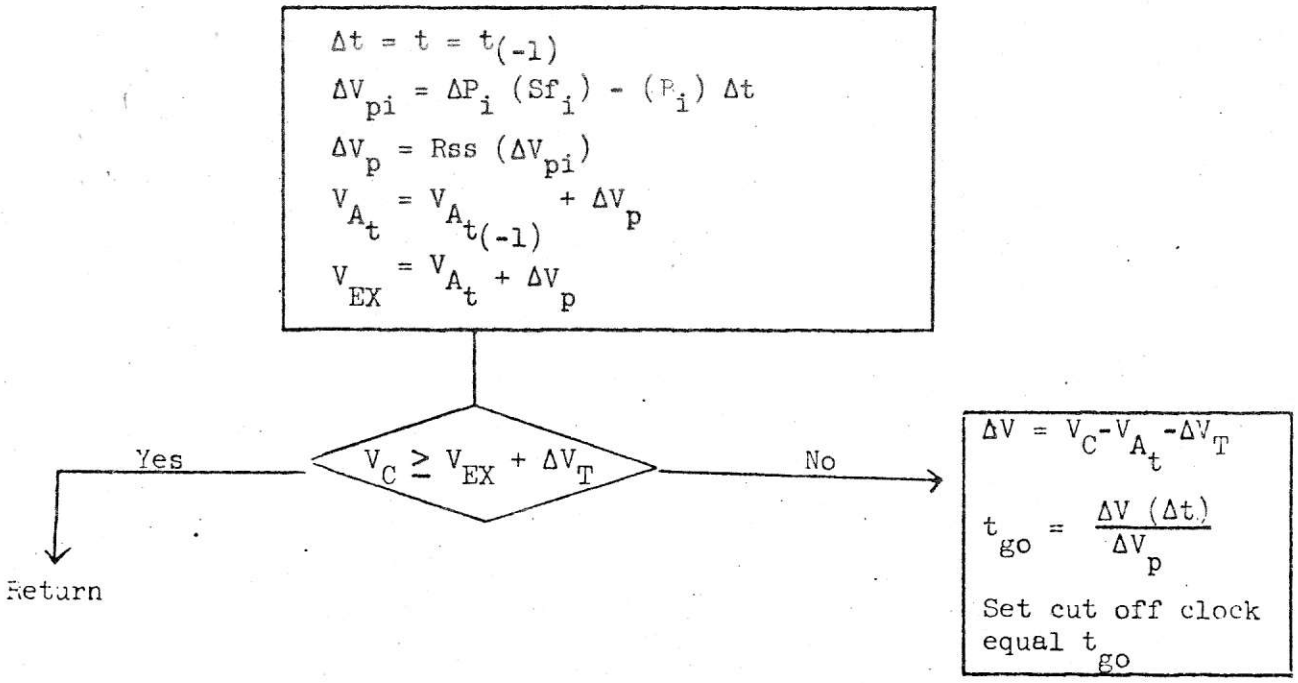
6.3 SOFTWARE CONTROL BOARD SIGN OFF

DATE

MSC Form 288 (Jul 68)

Figure 1

Proposed SPS Short Burn Logic



where:

ΔP_i = X, Y, Z accelerometer pulses

B_i, Sf_i = X, Y, Z accelerometer bias and scale factor

V_C = targeted velocity, Rss (external ΔV targets)

V_{A_t} = thrust velocity magnitude

V_{EX} = thrust velocity extrapolated ahead

Δt = computer computational cycle (0.1 sec)

ΔV_T = expected tail off velocity (preburn calculation)

$$\Delta V_T = \frac{F}{M - \dot{M} T_{go}} (\Delta T)$$

ΔT = single bore tail off constant

M = vehicle mass at burn initiation

$\dot{M}$ = SPS mass flow rate

F = SPS thrust

T_{go} = SPS burn duration (preburn calculation)

$$T_{go} = \frac{V_C (M)}{F + \frac{V_C (\dot{M})}{2}}$$