FM/C.R. Huss 6-193

Panels CMS

OPTIONAL FORM NO. 10
MAY 1962 EDITION
GSA FPMR (41 CFR) 101-11.6

UNITED STATES GOVERNMENT

Memorandum

NASA Manned Spacecraft Center

TO : See list below

DATE: June 9, 1969
69-FM-T-88

FROM : FM/Deputy Chief

SUBJECT: June 5th Apollo Spacecraft Software Configuration Control Board (ASSCCB) meeting

On June 5 we had another nice ASSCCB meeting. A large number of rather small changes were approved to make the job of the crew and ground controllers somewhat easier - good things to do, but by no means mandatory for a lunar landing mission. There were a couple of changes, though, which I thought were quite significant. This memo is to bring them to your attention.

PCR 815 - This PCR changes the command module digital autopilot to provide a convenient way of setting up automatic GNCS attitude control for the cislunar passive thermal control and for orbit rate torquing around the moon.

PCR 780 - This PCR will provide a means of reading out raw rendezvous radar range and range rate data on the DSKY while in the rendezvous navigation program P22. This request has been made several times in the past but was always turned down due to schedule problems. It really is a good improvement. Furthermore, it takes care of the problem which occurred on F when the first readout of range rate by P22, after turning on the rendezvous radar, gave us a gigantic ΔR, ΔV alarm.

The externally targeted Lambert prethrust program (P31) is being dropped from LUMINARY since we never use it and we need the storage to make all the other changes.

One thing I recommend somebody look into is the possibility of using the landing radar data in the PGNCS navigation even if the antenna position is unknown or it is known to be wrong. Currently the antenna position alarm locks out the data, although it is not clear that using it would not be a good thing to do. Clark Hackler (G&CD) has proposed this in the past but it has never been thoroughly investigated.

Another suggestion which George Cherry made to me was the possibility of including known terrain slope in the PGNCS processing of the landing radar data. He points out that a simple program change could be made to compensate the landing radar altitude measurement for a known difference in lunar radius under the approach trajectory from that of the landing site.

INDEXING DATA

DATE	OPR	#	T	PGM	SUBJECT	SIGNATOR	LOC
06-09-69	MSC	69-FM-T-88	M	APO	(ASSCCB)	TINDALL	071-11

Do you people feel this is worthwhile, or even feasible?

Howard W. Tindall, Jr.

Enclosures 2
PCR's 815 and 780

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FM:HWT:js

APOLLO SPACECRAFT SOFTWARE CONFIGURATION CONTROL BOARD PROGRAM CHANGE REQUEST

NUMBER (Completed by FSB): 780

1.0 COMPLETED BY ORIGINATOR

1.1 ORIGINATOR	DATE	1.2 ORGANIZATION	APPROVAL	DATE
G.W. CHERRY	6/2/69	MIT/IL	George W. Cherry	

1.3 EFFECTIVITY: LUMINARY 1B

1.4 TITLE OF CHANGE: Provide Pure RR Range, Range Rate, and Time Tag during P20, P22, and P25.

1.5 REASON(S) FOR CHANGE:

(1) To provide a means of reading RR range rate in P22 to determine the time of zenith of the CSM (when range rate changes sign). This was requested during G crew training by astronauts Armstrong and Aldrin. (See following page.)

1.6 DESCRIPTION OF CHANGE:

Provide that R22 will place the RR pure range and range rate measurements into erasables which can be displayed by V16N78E. In addition, since R22 only reads the radar once per minute, provide that R65 (fine Z-axis track routine) will also read...

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: about 20 words

3.4 REMARKS:

3.5 MIT COORDINATOR: George W. Cherry

DATE

4.0 SOFTWARE CONTROL BOARD ACTION

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

4.2 REMARKS: ok.

4.3 SOFTWARE CONTROL BOARD SIGN OFF

DATE

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

PROGRAM CHANGE REQUEST NO.	PREPARED BY	DATE	ORGANIZATION
780	G.W. CHERRY	6/2/69	MIT/IL

CONTINUATION SECTION: (Refer to Block Number and Title on Program Change Request form.)

1.5 Reasons(s) for Change, cont'd.

(2) To provide a backup to and more readable display than the tape meters in P20 and P25 for:

a. Comparison of RR range and range rate with LGC state vector,
b. Comparison of RR data with CSM VHF data,
c. Obtaining RR data for navigation update of AGS,
d. Obtaining RR data for backup charts.

This was requested by astronauts Conrad and Scott.

1.6 Description of Change, cont'd.

...the RR and place the pure range and range rate measurements into the erasables which can be displayed by V16N78E. Since R65 is done once every 7 - 8 seconds, this provision will yield new values of range and range rate in N78 about once every 7 - 8 seconds. Also, provide that the TFI being computed in targeting programs P30 and P31 - P35 be displayed in component 3 of N78 to provide a time tag for the pure radar data.

Some of the operational features of the implementation will be:

a. Noun 78 will be used (same noun as R04) if erasable allocations so permit; otherwise, Noun 53 will be used. New scaling will be:

R1	XXX.XX	N. miles
R2	XXXX.X	FPS
R3	XXBXX	MIN/SEC

which represents a change in range rate to make it more compatible with other nouns.

b. Callable by V16 or V06.
c. If data good is not present turn on tracker fail light but no other alarms.
d. R04 cannot be called during P20 and P25 when these programs are reading the rendezvous radar.

APOLLO SPACECRAFT SOFTWARE CONFIGURATION CONTROL BOARD
DATA AMPLIFICATION SHEET

PROGRAM CHANGE REQUEST NO.	PREPARED BY	DATE	ORGANIZATION
780	G.W. CHERRY	6/2/69	MIT/IL

CONTINUATION SECTION: *(Refer to Block Number and Title on Program Change Request form.)*

REMARKS:

It was noted in Apollo 11 that the first reading of the RR following its turn-on resulted in a maximum reading from the RR shift register being shifted into the LGC. This is characteristic of the RR hardware. This reading resulted in a FLV06N49 to which the astronaut responded with a V32E to reject the bad mark. In implementing this PCR, we will arrange to have R61/R65 read the RR once before R22 so that the first R22 reading of the radar will not result in a bad reading.

APOLLO SPACECRAFT SOFTWARE CONFIGURATION CONTROL BOARD PROGRAM CHANGE REQUEST

NUMBER (Completed by FSB): 815

1.0 COMPLETED BY ORIGINATOR

1.1 ORIGINATOR	DATE	1.2 ORGANIZATION	APPROVAL	DATE
S. COPPS	6/3/69	MIT/IL		

1.3 EFFECTIVITY	1.4 TITLE OF CHANGE
COLOSSUS 2C	Digital Autopilot Barbecue Mode Routine.

1.5 REASON(S) FOR CHANGE

To provide astronaut means of performing PTC and orb. rate.

1.6 DESCRIPTION OF CHANGE

(See Data Amplification Sheet)

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

25 – 30 words

3.4 REMARKS:

3.5 MIT COORDINATOR

Stephen L. Copps

DATE

6/3/69

4.0 SOFTWARE CONTROL BOARD ACTION

4.1 ☐ IMPLEMENT AND PROVIDE DETAILED CHANGE EVAL. ☐ PROVIDE DETAILED CHANGE EVALUATION ☐ DIS-APPROVED

4.2 REMARKS

Runs with PTP etc.

4.3 SOFTWARE CONTROL BOARD SIGN OFF

DATE

5.0 MIT DETAILED PROGRAM CHANGE EVALUATION

5.1 MIT COORDINATOR

5.2 MIT EVALUATION

DATE

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

APOLLO SPACECRAFT SOFTWARE CONFIGURATION CONTROL BOARD
DATA AMPLIFICATION SHEET

PROGRAM CHANGE REQUEST NO.	PREPARED BY	DATE	ORGANIZATION
815	S. COPPS	6/3/69	MIT/IL

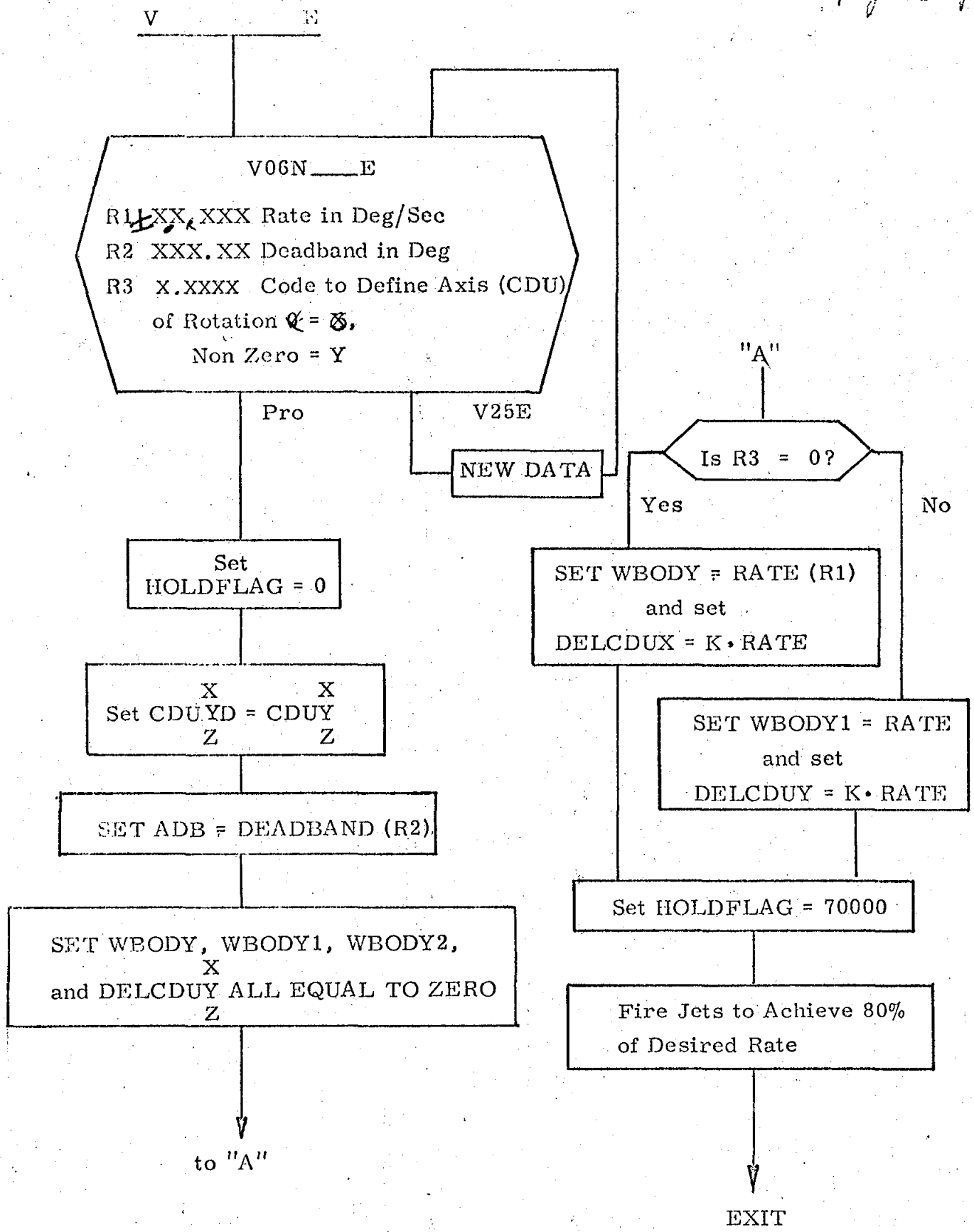
AMPLIFICATION SECTION: (Refer to Block Number and Title on Program Change Request form.)

1.6 Description of Change:

Purpose: To provide the astronaut the capability of having the DAP maintain a controlled rate about the X or Y principal control axis.

Assumptions: If rotation is to be about the Y control axis, the X CDU must be set to approximately 7.25 degrees and Z CDU to approximately zero in order to align the Y control axis with the Y CDU.

REMARKS:


V E
V06N E
R1 ±XX.XXX Rate in Deg/Sec
R2 XXX.XX Deadband in Deg
R3 X.XXXX Code to Define Axis (CDU)
of Rotation ∅ = ∅,
Non Zero = Y
Pro
V25E
NEW DATA
"A"
Is R3 = 0?
Yes
No
Set HOLDFLAG = 0
SET WBODY = RATE (R1)
and set
DELCDUX = K • RATE
X X
Set CDUYD = CDUY
Z Z
SET WBODY1 = RATE
and set
DELCDUY = K • RATE
SET ADB = DEADBAND (R2)
Set HOLDFLAG = 70000
SET WBODY, WBODY1, WBODY2,
X
and DELCDUY ALL EQUAL TO ZERO
Z
Fire Jets to Achieve 80%
of Desired Rate
to "A"
EXIT