

Massachusetts Institute of Technology
C. S. Draper Laboratory
Cambridge, Massachusetts

LUMINARY PROJECT Memo # 24

TO: Internal Luminary Memo Distribution
FROM: R. A. Larson *RAL*
DATE: 24 November 1971
SUBJECT: Apollo 16 Task

We have received a list of procedures that involve non-GSOP described alteration of the LGC erasable memory (which includes all EMP's) from MSC-FSB which must be reviewed, verified and documented. These procedures presently exist in various forms - VIZ Checklist, Garman's console book, astronaut's hip pocket, etc.

I would like to set up a task force to review all this. We will meet Tuesday, at 9:30 AM in the second floor classroom. I am attaching the FSB list and also a copy of the checklist items involved for members of the task force.

LEP - TASK FORCE

23B

M. Hamilton
P. Rye
D. Densmoore
D. Millard
P. Volante
D. Eyles
D. Moore
N. Barnett
B. McCoy
J. Reed
C. Schulenberg
J. Kernan

23C

P. Weissman
C. Work

23D

I. Johnson
S. Drake
J. Dunbar

23P

K. Green

23S

R. Lones
D. Sheridan

See you all Tuesday!

1-15 ✓

3XXXX—Generates Software Restart
2XXXX—Abort Code, Program Goes To R00 (F 37)

NOTE: All 2XXXX Codes (If AVE-G Is On) Leave
AVE-G On But Discontinue Guidance. Also
If 2XXXX Code Is Generated While An Ext.
Verb (With Displays) Is Active, The Code
Will ~~As~~ ^{Act} As 3XXXX.

P - Procedure Caused Alarm	Alarms For V05N09
I - Input Data Caused Alarm	R1 First Alarm After RSET
H - Hardware Caused Alarm	R2 Second Alarm After RSET
	R3 Most Recent Alarm

GENERAL SYSTEMS CHECKOUT

- 1 Go To P00 By One Of The Following:
 - a. V37E 00E
 - b. V96E
 - c. V36E (NO DAP Lt - On For 11 Sec)
Wait 11 sec, Then
V96E
 - d. Force A Hardware Restart By Simultaneously
Pressing RSET And MARK REJECT Until Prog
Register Blanks (Possible PROG Alarm 00115)
Wait 11 sec, Then
V37E 00E
Notify MSFN Then V74E (42 sec)
(If (c) or (d) Performed: V21 NOTE, 3000E, 2324E
Sets HIACENT Back To Pad Value)
- 2 Perform State Vector Checks:
V82 (Both Options)
V83
P21
- 3 Check REFSMMAT Validity:
P52 (Check Auto Optics Positioning)
- 4 Perform LGC Self Test If Time Permits
- 5 If Steps 2 Or 3 Not Nominal, Perform P27 Update;
Otherwise Continue

DATE 7/12/77
6/21/77

P06 - P27

PGNS T/O,LR,RR TEST
RCS INHIB,LPD BIAS

1-60 ✓

4 F 16 54 V83E
R, RDOT, THETA (.01nm,.1fps,.01°)
(If AGS) 277R (THETA) 0-360P (.01°)
MODE - HOLD/FAST
SLEW - To THETA
MODE - OPR/SLOW
PRO

PIPA BIAS CHECK

1 DET - Zero
Rates <.1°/sec With No Thruster Firing

2 V25N21E, E, E, E/DET - START

3 V06E
06 21 XYZ PIPA COUNTS (+XXXXX.)

4 At T+80sec - ENTR
T+80sec (X)R1 ____ (Y)R2 ____ (Z)R3 ____

5 Calculate X,Y,Z Bias:
Take Last 3 Digits Of Displayed
Bias And Add 2 Zeroes

X _____
Y _____
Z _____

6 V06N01E, 1452E (Review X Bias) E
1454E (Review Y Bias) E
1456E (Review Z Bias)

7 V21N01E
F 21 01 LOAD 1452E(Calc X BIAS)E,E
1454E(Calc Y BIAS)E,E
1456E(Calc Z BIAS)E
Same Sign As In Measured Bias of
Step 4

DATE 3/29/71

1-65 ✓

15

V41N72E
N73 R1 +00000
R2 +28300
N12 R2 00002
V16N72E

16

CB(11) PGNS: RNDZ RDR - Open
AC BUS A: RNDZ RDR - Open
V44E
Notify CSM To Enable Thruster B3 If Docked

RR BIAS INITIAL

1

V24N01E
1700E
E, E
V24N01E
1702E
E, E
V93E

LGC THRUSTER INHIBIT/RE-ENABLE

1

V25N07E
(VERTICAL JET) 1257E
(HORIZONTAL JET) 1260E
XXXE (See Codes Below)

A1U - 100E	B4U - 1E
B1D - 200E	A4D - 2E
A1F - 4E	B4F - 2E
B1L - 200E	A4R - 100E
B2U - 20E	A3U - 4E
A2D - 40E	B3D - 10E
A2A - 10E	B3A - 1E
B2L - 20E	A3R - 40E

2

CAUTION

Affected Quad Pair(s) Must Be
Enabled Before Next Step
1E (To Re-enable, 0E This Step)

3

V48E,PRO,V34E

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1-66 ✓

CREW DEFINED DOCKED DB

1 V21N01E
3011E
(DB = 5.0°) 44E
(DB = 1.4°) 200E

LPD BIAS LOAD

1 V21 N01E, 3373E
(AZBIAS - Octal) ENTR.
2 ENTR, 1353E
(ELBIAS - Octal) ENTR

ALTERNATE LPD BIAS LOAD

1 V21 N03E, (ADD) E
ADD = 3373 For AZBIAS
= 1353 For ELBIAS
2 Load New Value: (ie + XXX.XXE)
New Value (AZBIAS) = $-0.46 + 1.3 (\Delta Az)$
(+ ΔAz =LPD is Right of L.S.)
(ELBIAS) = $+0.18 + \Delta Elev$
(+ $\Delta Elev$ =LPD is Above L.S.)
3 To Verify New Value:
V06 N03E, (ADD) E, Verify R1

RMAX LOAD TO MINUS ONE

1 V21 N01E
2004E (RMAX)
77776E (Sets RMAX To -1 Which Forces N49
For All MARKS)

RMAX/VMAX LOAD TO PAD VALUES

1 V24N01E
2004E (RMAX)
23E (Sets RMAX To 2,000 ft)
1E (Sets VMAX To 2 fps)

DATE 6/21/71

1-75 ✓

LM OR CSM S.V. READOUT

- 1 V83E
- 2 After integration: V05N01E

CSM S.V.

2130E

E,2133E

E,2171E

E,2174E

E,2112E

PRO

LM S.V.

2160E

E,2163E

E,2103E

E,2106E

E,2112E

PRO

DATE 3/29/71

- 3 Transmit S.V. & Time Tag To CSM

LM OR CSM S.V. LOADING

- 1 V37E00E
V71E
21E
1501E
(CSM S.V.) 00002E, Plus Xmitted Pad
(LM S.V.) 77775E, Plus Xmitted Pad
V33E

IGC Computer Subsystem (001-099)

MIT

LEP 001	Cause a software restart via V31 SOURCE: PCR 1154.2, console book MIT CONTACT: STATUS: 4.0 approval	EMP 100 N. BRODQ
LEP 002	EMP to backup failed DSKY key SOURCE: PCR 1155, console book, LUM memo 224 MIT CONTACT: STATUS: 4.0 approval	EMP 100 C. SCHULEN
LEP 003	EMP for N79 detent overwrite SOURCE: PCR 1177, console book, Chklst P. 1-40 MIT CONTACT: STATUS: 4.0 approval	EMP 100 D. MILLAR
LEP 004	State vector readout for transfer to CMC SOURCE: Chklst P. 1-75 MIT CONTACT: STATUS:	D ²
LEP 005	V36 recovery SOURCE: MIT CONTACT: STATUS:	TF
LEP 006	General Systems Checkout SOURCE: Chklst P. 1-15 MIT CONTACT: STATUS:	TF
LEP 007	IGC thruster inhibit/re-enable SOURCE: Chklst P. 1-65 MIT CONTACT: STATUS:	P.W T
LEP 008	Crew defined docked deadband SOURCE: Chklst P. 1-66 MIT CONTACT: STATUS:	P.W TF
LEP 009	LPD bias load/alternate bias load SOURCE: Chklst P. 1-66 MIT CONTACT: STATUS:	PV TF
LEP 010	RMAX/VMAX loading to force all N49's SOURCE: Chklst P. 1-66 MIT CONTACT: STATUS:	D ² TF

IGC IMU Subsystem (101-199)

LEP 101	IGC operation with the IMU cage discrete failed on SOURCE: Pending LUMINARY memo MIT CONTACT STATUS: SCB action item	TF
LEP 102	IGC operation with ISS turn-on discrete failure SOURCE: Pending LUMINARY memo MIT CONTACT: STATUS:	TF
LEP 103	IGC operation with the IMU operate discrete failed off SOURCE: Pending LUMINARY memo MIT CONTACT: STATUS: SCB action item	TF
LEP 104	EMP for inhibiting THRUPT coarse alignment of the IMU SOURCE: PCR 1165.2 MIT CONTACT: STATUS: 4.0 approval	EMP- TF
LEP 105	Rapid IMU realign SOURCE: Chklst P. 3-1 MIT CONTACT: STATUS:	TF
LEP 106	EMP for P20 operation with IMU off SOURCE: PCR 1175, console book MIT CONTACT: STATUS: 4.0 approval	EMP-10 P. VOLANT
LEP 107	Ascent with failed CDU SOURCE: PCR 355 MIT CONTACT: STATUS:	10
LEP 108	EMP for performing descent with failed CDU's SOURCE: PCR 1158 MIT CONTACT: STATUS: 4.0 approval	EMP-103
LEP 109	EMP for IMU orientation determination (P51, P57) with a failed CDU SOURCE: PCR 1167.2 MIT CONTACT: STATUS: 4.0 approval	EMP-
LEP 110	EMP for IMU realignment (P52, P57) with failed CDU SOURCE: PCR 1166.2 MIT CONTACT: STATUS: 4.0 approval	EMP-

LEP 111

P40, P41, P42 with failed CDU

EMP

SOURCE:

MIT CONTACT:

STATUS:

LEP 112

PIPA bias measurement and loading

TF

SOURCE: Chklist P. 1-60

MIT CONTACT:

STATUS:

LEP 113

Enable V40 N20E in apparent gimbal lock

?

SOURCE:

MIT CONTACT:

STATUS:

LEP 114

Onboard computation of NBDX

SOURCE:

MIT CONTACT:

STATUS:

LGC Radar Subsystems (201-299)

LEP 201

EMP for displaying raw LR H and Hdot on the DSKY
SOURCE: PCR 1178
MIT CONTACT:
STATUS: 4.0 approval

EMP 1.
D EVLE

LEP 202

Radar bias determination/initialization
SOURCE: Consoel book, chklst P. 4-8 and P. 1-65
MIT CONTACT:
STATUS:

TI

LEP 203

RR CDU failure workarounds
SOURCE:
MIT CONTACT:
STATUS:

?

LGC Propulsion Subsystems (301-399)

LEP 301

EMP for guided RCS translational maneuvers (P99)
SOURCE: PCR 1156, console book, LUM memo 211
MIT CONTACT:
STATUS: 4.0 approval

EMP - 99
D. MOORE

LEP 302

EMP for P47 with DPS/GTS (gimbal trim system)
SOURCE: PCR 1174, console book
MIT CONTACT:
STATUS: 4.0 approval

EMP 101
P. WEISSMAN