NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

APOLLO 17

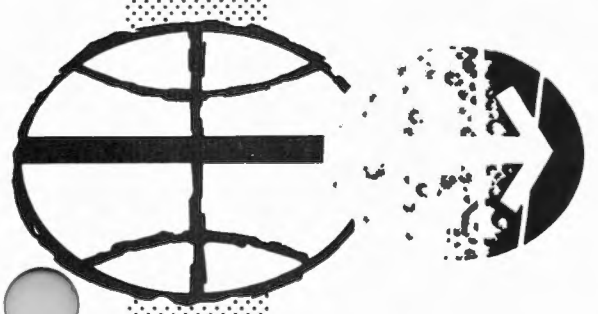
ALL LAUNCH DATES

CHANGE A

CSM G&C CHECKLIST

PREPARED BY

FLIGHT PROCEDURES BRANCH
CREW PROCEDURES DIVISION



MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

NOVEMBER 10, 1972

APOLLO 17

CSM G&C CHECKLIST

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G&C CHECKLIST

LIST OF EFFECTIVE PAGES

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*Current change

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5-5	8/30/72	8-1	8/30/72
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5-9	8/30/72	8-5	8/30/72

*Current change

LIST OF EFFECTIVE PAGES (CONT)

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*8-9	11/10/72
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9-2	8/30/72
9-3	8/30/72

*Current change

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CONTENTS

DATE 8/30/72

CONTENTS (CONT)

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CONTENTS (CONT)

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00120 Optics torque has been requested
but optics have not been zeroed
since last FRESH START or RESTART
OPTICS ZERO - OFF then ZERO (15 sec).

00121 In 0.05 sec following mark, an ICDU
changed by more than 0.033°
Repeat MK.

(m)00205 PIPA saturated
Use SCS control (G&N 12).

00206 The IMU zero routine has been
entered with both the GMBL LOCK
lt and NO ATT lt on
Coarse align to 0,0,0 Reselect V40E

(m)00207 ISS turn-on request not present for
90 sec
Redo IMU turn on (G&N 12).

(m)00210 The IMU is not operating
Redo IMU turn on. If alarm recurs,
perform fresh start (V36E).
Consult STDN. (G&N 12).

(m)00211 Coarse align error
If P51(3)/52(4) in progress record gyro
torquing angles and perform fine align
check in P52(4).
Otherwise, see G/1-24. (G&N 12).

(m)00212 PIPA fail, but PIPA is not being used
PIPA check (G&N 6/7).

(m)00213 IMU not operating with turn-on request
See 00210

00214 Program using IMU when turned OFF
See 00210 or exit program.

(m)00217 IMU coarse align or pulse torque
difficulty has occurred
If code 211 also, perform
211 cure only
Reinitiate current program.
If alarm recurs, terminate use of
ISS (G&N 12).

00220 IMU orientation unknown
Align or if aligned set REFSMMAT flag.

00401 Desired middle gimbal angle is excessive
Call N22 - maneuver if MGA < 85° or
realign IMU.

00402 Second MINKEY pulse torque must be done

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00404 Target out of view (90 deg test)
(G/3-6,3-11,6-3,7-16)

00405 Acceptable star pair is not available
(G/6-3,6-6)

00406 Rend navigation not operating
Select P20 (opt. 0 or 4) or continue.

00421 W-matrix overflow
Notify STDN but continue.
W-matrix automatically reinitialized at next mark.

00600 No solution on first iteration in P31 or P32/72
(G/4-6,4-8)

00601 Post CSI Perigee/lune alt <85nm/ 5.8nm
(G/4-6,4-8)

00602 Post CDH Perigee/lune alt <85nm/ 5.8nm
(G/4-6,4-8)

00603 Time from TIG (CSI) to TIG (CDH) <10 min
(G/4-6,4-8)

00604 Time from TIG (CDH) to TIG (TPI) <10 min
(G/4-6,4-8)

00605 Number of iterations exceeds loop maximum
(G/4-6,4-8,4-15,4-16)

00606 ΔV (CSI) has been >1000 fps for last two iterations
(G/4-6,4-8)

00611 No TIG for given ELEV angle
(G/4-10,4-12)

00612 State vector in wrong sphere of influence at TIG
(G/4-15)

00613 Reentry angle out of limits
(G/4-16)

(m)00777 ISS warning caused by PIPA fail
(G&N 6).

01102 CMC self test error
(G/2-3)

(m)01105 Downlink too fast
Rset. If alarm recurs DOWNLINK FAILURE.
(G&N 12).

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G
2-5

SCS ATTITUDE REFERENCE COMPARISON

CMC - on
IMU - on
SCS - operating
If SIVB SEPARATED: Damp vehicle rates

1 Key V16 N20E (present IMU angs)

2 FDAI SELECT - 1
FDAI SOURCE - ATT SET
ATT SET - GDC
ATT SET dials - null FDAI 1 error needles
Key VERB when nulled (freeze display)
Record from DSKY:
R____°, P____°, Y____°
Record ATT SET dials:
R____°, P____°, Y____°

EMS ΔV TEST & NULL BIAS CHECK

EMS MODE - STBY
EMS FUNC - ΔV SET/VHF RNG
SET ΔV ind to 1586.8 fps
EMS MODE - NORMAL
EMS FUNC - ΔV TEST
SPS THRUST Lt - on/off (10 sec)
ΔV ind. stops at -0.1 to -41.5
EMS MODE - STBY
EMS FUNC - ΔV SET/VHF RNG
SET ΔV ind to - 100.0 fps
CMC MODE - FREE (Until meas complete)
or BMAG MODE (3) - RATE 2
EMS FUNC - ΔV (wait 5 sec)
Start DET
00:00 EMS MODE - NORM
01:40 EMS MODE - STBY
If ΔV <1 fps, do not bias
If ΔV >1 fps but <10 fps, bias if desired
If ΔV >10 fps, EMS is NO-GO
Bias check is invalidated by EMS FUNC - OFF

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SPS GIMBAL DRIVE TEST (EMP 522)

CMC - ON
DAP - LOADED

1 TVC Prep
- Logic 2/3 pwr - on
- Sig Cond/Dr Bias (2) - AC1
- FDAI/GPI pwr - 1
- TVC Servo pwr 1 - AC1/MNA
- SC CONT - CMC
- SCS TVC (2) - Rate Cmd
- Mn Bus Tie (2) - on
- Gmbl Mot P1,Y1 - Start/On
- LV/SPS IND - GPI
- TVC Gmbl Dr (2) - 1

2 V25 N1 E
3044E, 1E, E, E

3 V25 N26E
1E
2366E
40066E

4 V31E
- Monitor GPI Response
- 00, 20, -20, 00, 02, -02, 00, Trim

5 TERMINATE
- V25 N26E
- E,E,E, (R1, R2, R3 Blank)
- Gmbl Mot (2) - OFF
- TVC Servo pwr 1 - OFF
- Mn Bus Tie (2) - OFF

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3-15

MK BUTTON FAILED OPEN (EMP 505)

May be used with P20,22,23,24,51 & 52

1 V25 N26E
1E
2165E
16067E

2 When ready to mark:
Key V31
Use ENTR to mark (must be LEB DSKY)
Use MK REJ to reject

Notes: As long as 31 remains in verb window, ENTR may be used to mark. This will be true in e.g. P24 unless MK REJ. In general MK REJ will place 51 in verb windows. V31 must then be rekeyed.

3 TERMINATE
V25 N26E
E,E,E (R1,R2,R3 Blank)

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MANUAL RANGE INPUT (EMP 515)

1 AUTO UPDATE
V37E 00E
UPTLM (2) - ACCEPT
UPLINK ACTY lt - on
STDN will uplink EMP 515 (p.G/3-17)
UPLINK ACTY lt - out
UPTLM (MDC) - BLOCK
*DO NOT CALL P27, P40, P41, *
P52/54 (opt. 2 or 4) or P52
*for Minkey plane change *

2 V88E

3 V5 N26E, Verify:
R1 26001
R2 00306
R3 70067

4 When last mark incorp (N45 R1 increments),
V21 N2E
3703E
+XXX.XXE (future value range $\leq$ 163.83 nmi.)
or
-(327.67-XXX.XX)E (future value range
> 163.83 nmi)

5 V30 (DO NOT ENTR)

6 When actual range = future value range
Key Entr
repeat, to 4

7 TERMINATE:
V25 N26E
E,E,E (R1,R2,R3 Blank)

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4-1

P30 EXTERNAL ΔV

If uplinked REFSMMAT, do P52 (OPT 1) before P30

1		V37E 30E
	F 06 33	TIG (hrs,min,.01sec)
		Load desired TIG
		PRO
2	F 06 81	ΔV XYZ(LV) (.1fps)
		Load desired ΔV's (Do not use all 0's)
		PRO
3	F 06 42	HA,HP,ΔV(REQ) (.1nm,.1nm,.1fps)
		Set ΔV Counter
		PRO
4	F 16 45	MARKS,TFI,MGA (marks,min-sec,.01°)
		(MGA Set to -00002 IF REFSMMAT FLAG NOT SET)
		Set DET
		PRO
5	F 37	

PRETHRUST
(P30's & 70's)

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4-2

MINKEY SEQUENCER

PRETHRUST
(P30's & 70's)

31.1 ΔV mag. <7 fps, perform P41 (CMC begins at step 4)
ΔV mag. ≥7 fps, perform P40 (CMC begins at step 4)

31.2 Perform P76

31.3 Go to P32, step 2

32.1 ΔV mag. <7 fps, perform P41 (CMC begins at step 4)
ΔV mag. ≥7 fps, perform P40 (CMC begins at step 4)

32.2 Perform P76

32.3 R1 of N55 (P32) < 4, Go to P36, step 2
= 4, Go to P31, step 2
> 4, Go to P32, step 2

36.1 If ΔV mag. = 0, go to 36.2

52 in MM lights
F 06 22 New ICDU angles (.01°)
(RECOMP) MNVR; V32E
(ACCEPT) PRO

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F 50 25 00020 MINKEY PULSE TORQUE
Align GDC to Roll: 90 or 270
Pitch: 0 or 180
Yaw: 0

(TORQUE) LIMIT CYCLE - ON
ATT DB - MIN
RATE - LOW
BMAG MODE (3) - ATT 1/RATE 2
SC CONT - SCS
PRO
(16 20 during torque)
Torque complete:
ΔV <7 fps - P41 (step 4)
ΔV ≥7 fps - P40 (step 4)

(BYPASS) ENTR
Perform P41 (step 4)

36.2 Perform P76

36.3 If pulse torque not done, go to P33 step 2.

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36.4 If desired: Manually MNVR back to original GDC att.
If all gimbal angle changes for mnvr back to rend. att < 10°, go to 36.5

F 50 18 Request MNVR to RPY angles (.01°)
(ACCEPT) SC CONT - CMC
CMC MODE - AUTO
PRO
(REJECT) ENTR to 36.5

06 18 MNVR in progress (.01°)
MNVR complete, to 36.5

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36.5 52 in MM lights

F 06 22 New ICDU angles (.01°)
(RECOMP) MNVR; V32E
(ACCEPT) PRO

F 50 25 00020 MINKEY PULSE TORQUE
SC CONT - SCS
BMAG MODE (3) - ATT 1/RATE 2
PRO
(16 20 during torque)

Torque complete: BMAG MODE (3) - RATE 2
Go to P33, Step 2

33.1 ΔV mag. <7 fps, perform P41 (CMC begins at step 4)
ΔV mag ≥ 7 fps, perform P40 (CMC begins at step 4)

33.2 Perform P76

33.3 Go to P34, step 2

34.1 ΔV mag. <7 fps, perform P41 (CMC begins at step 4)
ΔV mag. ≥ 7 fps, perform P40 (CMC begins at step 4)

34.2 Perform P76

34.3 Go to P35, step 2

35.1 ΔV mag <7 fps, perform P41 (CMC begins at step 4)
ΔV mag. ≥7 fps, perform P40 (CMC begins at step 4)

35.2 Perform P76

35.3 MCC2 complete, go to P79 step 2
MCC2 not complete, go to P35, step 2

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2 (If req'd. mnvr <10°, to 3)
F 50 18 Request MNVR to RPY angles (.01°)
(ACCEPT) SC CONT - CMC
CMC MODE - AUTO
PRO
(REJECT) ENTR to 3

06 18 MNVR in progress (.01°)
When MNVR complete: MINKEY to 3
Non - MINKEY to 2

3 F 16 45 MARKS,TFI,-00001 (marks,min-sec)
(RECYCLE) V32E
(FINAL PASS) TERM MARKS
PRO

4 F 06 81 ΔV XYZ(LV)TPM (.1fps)
PRO (If recycle - to 3)

5 F 16 45 MARKS,TFI,MGA (marks,min-sec,.01°)
(MGA SET TO -00002 IF NO
REFSMFLG or If P75)
PRO (If MINKEY, to Sequencer 35.1)

6 F 37
P75 - Transmit Mnvr Parameters To LM

To change ATIGINC:
V24N1E
2021E

6 min: 00002E
06240E

10 min: 00003E
25140E

3 min: 00001E
03120E

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P79 RNDZ FINAL PROGRAM

1		V37E 79E
2		(All gimbal angle errors <10°, to 3)
	F 50 18	Request MNVR to RPY angles (.01°) (X-axis track)
		SC CONT - CMC CMC MODE - AUTO PRO
	06 18	MNVR in progress (.01°) When MNVR complete: to 3
3	F 16 54	RANGE,RANGE RATE,THETA(.01nm,.1fps,.01°) (Ext. vbs. locked out) PRO
4	F 37	

P37 RETURN TO EARTH PGM
(LONG CONTROL CANNOT BE DONE WHEN TIME TO ENTRY IS <4 HRS: Lunar return only)

Perform the following once:
V1N1E
3012E
Verify R1 = 01457 (1075 nm)

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1		V37E 37E
	F 06 33	TIG (hrs,min,.01sec) Load desired TIG PRO
2	F 06 60	BLANK,ΔV DESIRED, GAMMA EI DESIRED (fps,.01°) Load desired ΔV: PAD ΔV IF ON TLC 0. IF ON TEC Load R3=0 (Good if VEI > 31 K fps) PRO

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With active P20 opt. 2, the following MODES of suspension or termination have the effect shown

MODE	DB Centered	DB Source	Rates Nulled
V56E		DAP (R03)	X
V37E00E		DAP (R03)	X
SC CONT-SCS	X	SCS (Return to CMC re-establishes N79 db)	X (Return to CMC re-establishes N79 rate)
CMC MODE-HOLD	Not proper HOLD func. RHC deflection rec-commended for HOLD	N79	(Jet firings pos-sible)
CMC MODE-FREE/AUTO	X	N79	
RHC deflection	X	Unchanged	X
V46E	X	N79	
V48E, PRO		DAP (R03)	

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G
8-6

JET MONITOR (EMP 523)

CMC MODE - AUTO or HOLD
SC CONT - CMC
RCS DAP - ON
P20 Opt 1,2, or 5 Selected

1 AUTO UPDATE

UPTLM (2) - ACCEPT
UPLINK ACTY lt - ON
STDN WILL UPLINK EMP 523 (p.G/8-7)
UPLINK ACTY lt - OUT
UPTLM (MDC) - BLOCK
*Do not call other CMC *
programs (V37EXXE) or take
*VHF marks. Do not call *
*EMP 523 during P23, P24, *
*or Ave-G. *

2 V5 N26E, verify
R1 00001
R2 00605
R3 00006

3 V31E

4 V16 N45E
R1 XXBYY verify XX incrementing
Poss MASTER ALARM/ISS WARN
*V25 N7E *
*11E *
*1E *
*E *
*RESET MASTER ALARM *

5 TERMINATE
V37E XXE
or TERMINATE in P20
V37E 30E
V37E 20E

6 V25N26E
E, E, E (R1, R2, R3 Blank)

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EMP 523
JET MONITOR

PURP			V	7	1			V	7	1			V		
GET			:	:				:	:				:	:	
304	01	INDEX			2	4	INDEX			2	1	INDEX			
305	02	0	0	6	0	4	0	0	6	2	6				
306	03	0	0	0	0	0	1	0	0	0	0				
307	04	3	0	0	0	7	0	0	6	4	0				
310	05	5	4	7	7	1	0	0	6	3	2				
311	06	0	5	4	0	2	0	0	6	3	2				
312	07	0	5	0	1	5	1	0	6	4	5				
313	10	7	7	7	7	7	0	0	6	2	0				
314	11	3	0	0	0	7	2	4	7	7	1				
315	12	5	4	6	0	4	0	5	2	5	5				
316	13	4	1	6	5	5	0	0	1	4	4				
317	14	6	0	6	4	4	0	0	6	1	4				
320	15	5	4	0	0	1	3	4	7	7	0				
321	16	3	4	7	6	7	0	0	0	0	6				
322	17	5	4	6	4	5	0	5	0	1	1				
323	20	5	0	6	4	5	0	0	6	3	4				
324	21	1	1	5	6	7	7	7	6	4	3				
325	22	0	0	6	2	5									
326	23	0	0	6	3	2									
327	24	6	0	0	0	1									

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ICDU-TRANSIENT MONITOR (EMP 526)
(Awake Period Use)
P00 or P20 Opt 2 or 5 Selected

1 AUTO UPDATE
UPTLM (2) - ACCEPT
UPLINK ACTY lt - ON
STDN WILL UPLINK EMP 526
UPLINK ACTY lt - OUT
UPTLM (MDC) - BLOCK
Do not call MINKEY, P20 (Opt 0 or 4),
*P22, P23, P31, P32, P33, P36, or *
*CMC Self-check *

2 V5 N26E, verify
R1 00001
R2 01517
R3 00005

3 V31E

4 V16 N45E
R1 XXBYY verify XX incrementing
*Poss MASTER ALARM/ISS WARNING *
OPR ERR lt - ON (ICDU TRANSIENT)
*Key RSET (OPR ERR lt - OFF) *
*V40E *
*V1 N10E, 11E, Read R1 *
* 4 or 5 in A = ICDU Z *
* 4 or 5 in B = ICDU Y *
* 2 or 3 in B = ICDU X *
* 6 or 7 in B = ICDU X&Y *
*V25 N7E, 11E, 46001E, E *
*RESET MASTER ALARM *

5 TERMINATE or TERMINATE in P20
V74E V74E
V37EXXE V37E30E, V37E20E

6 V25 N26E
E,E,E (R1, R2, R3 Blank)

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JET AND ICDU-TRANSIENT MONITOR (EMP 528)
(Sleep Period Use)

EMP 526 Has Been Uplinked
CMC MODE - AUTO or HOLD
SC CONT - CMC
RCS DAP - ON
P20 Opt 2 or 5 Selected

1 AUTO UPDATE
UPTLM (2) - ACCEPT
UPLINK ACTY lt - on
STDN WILL UPLINK EMP 528
UPLINK ACTY lt - OUT
UPTLM (MDC) - BLOCK
Do not call MINKEY, P20 (Opt 0 or 4),
*P22, P23, P31, P32, P33, P36, or *
*CMC Self-check *

2 V5 N26E, verify
R1 00001
R2 01522
R3 00005

3 V31E

4 V16 N45E
R1 XXBYY verify XX incrementing
*Poss MASTER ALARM/ISS WARNING *
OPR ERR lt - OFF (JET-ON FAILURE)
*OPR ERR lt - ON (ICDU TRANSIENT) *
* Key RSET (OPR ERR lt - OFF *
* V40E *
* V1 N10E, 11E, Read R1 *
* 4 or 5 in A = ICDU Z *
* 4 or 5 in B = ICDU Y *
* 2 or 3 in B = ICDU X *
* 6 or 7 in B = ICDU X&Y *
*V25 N7E, 11E, 46001E, E *
*RESET MASTER ALARM *

5 TERMINATE or TERMINATE in P20
V74E V74E
V37E XXE V37E30E, V37E20E

6 V25 N26E
E,E,E (R1, R2, R3 Blank)

DATE 11/10/72

DATE