

Orbit Operations Checklist

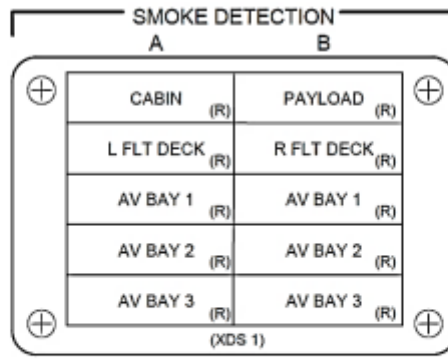
**Mission Operations Directorate
Flight Design and Dynamics Division
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National Aeronautics and
Space Administration

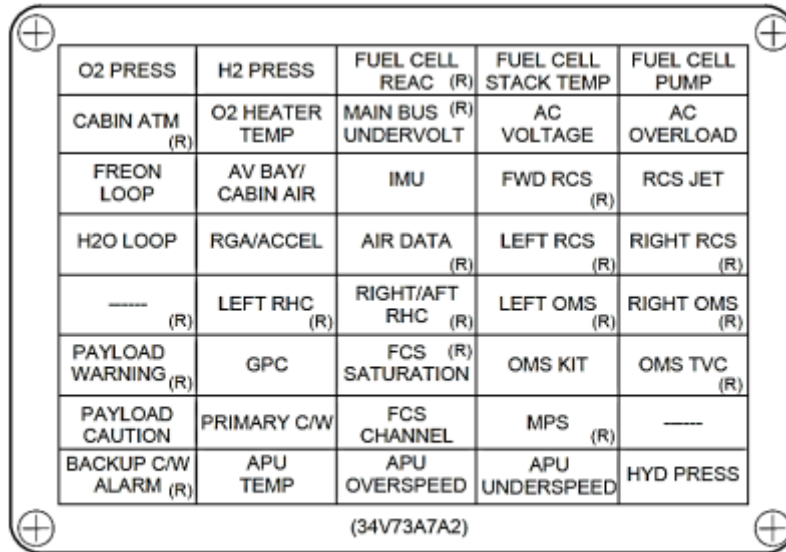
Lyndon B. Johnson Space Center
Houston, Texas



LAMP TEST



CW PANEL



FORWARD STATION

06/08 ANNUN LAMP TEST – L, hold

$\sqrt{78}$ lights – illuminated:

O1 CAM Its (25)

F2 MSTR ALARM (1)
Aerodynamic controls (7)
DRAG CHUTE (2)

F3	NWS FAIL (1)	
	DRAG CHUTE (1)	
L1	FIRE SUPPR AV BAY (3)	
	SMOKE DETN (10)	
F6	LDG GEAR (2)	
	ABORT (1)	
	RCS CMD (3)	
	RANGE SAFE ARM (1)	
F7	SM ALERT (1)	
	C/W panel – partial (20)	
O6/O8	ANNUN LAMP TEST	– R, hold
	√61 lights – illuminated:	
F4	MSTR ALARM (1)	
	Aerodynamic controls (7)	
	DRAG CHUTE (1)	
F3	ANTISKID FAIL (1)	
	DRAG CHUTE (2)	
F8	LDG GEAR (2)	
F7	MN ENG STAT (3)	
	C/W panel – partial (20)	
C3	DAP PANEL (24)	

MIDDECK (Verified by second crewmember)

O6/O8	ANNUN LAMP TEST	– L, hold
MO29J	√MIC KEY light – illuminated	
O6/O8	ANNUN LAMP TEST	– R, hold
	√5 lights – illuminated:	
MO52J	MSTR ALARM light (1)	
MO51F	RCRS CNTLR 1 (2)	
	RCRS CNTLR 2 (2)	

AFT STATION

A6U	ANNUN LAMP TEST	– L, hold
	√25 lights – illuminated:	
	DAP PANEL (24)	
A2	MIC KEY (1)	
A6U	ANNUN LAMP TEST	– R, hold
	√28 lights – illuminated:	
A7U	MSTR ALARM (1)	
	VID IN (13)	
	VID OUT (8)	
	CAMR CMD ALC (3)	
	CAMR CMD GAMMA (3)	

ON ORBIT FCS CHECKOUT

1.FCS C/O PREP

C2 Set EVENT TIMER to 00:00, count UP

2.APU PRESTART

R2	BLR N2 SPLY X	– ON
	√BLR PWR (three)	– ON
	√BLR CNTLR/HTR (three)	– B
	√APU FU TK VLV (three)	– CL
	√APU SPEED SEL (three)	– NORM
	√APU OPER (three)	– OFF
	HYD MN PUMP PRESS X	– LO
	APU CNTLR PWR X	– ON

3.APU START

R2	APU FU TK VLV X	– OP
	√APU/HYD RDY X tb	– gray

00:00 Start EVENT TIMER

R2	APU OPER X	– START/RUN
HYD/APU	√HYD PRESS ind X	– LOW green
R2	√APU/HYD RDY X tb	– bp
	HYD MN PUMP PRESS X	– NORM
HYD/APU	√HYD PRESS ind X	– HI green

4.FCS CHECKOUT

C3	√FCS CH 1,2,3,4	– AUTO
MDU1	SPI DSPLY	
CRT1	GNC OPS 801 PRO (FCS/DED DIS C/O)	

FCS C/OUT STRT, ITEM10 EXEC (*)

√FLT CTRLS MOVEMENT (EL,RDR,SPDBK)

on CRT1 and MDU1 DSPLY's

FCS C/OUT STOP, ITEM11 EXEC (*)

5.APU SHUTDOWN

When GO for APU SHUTDN:

R2	BLR N2 SPLY X	– OFF
	BLR PWR (three)	– OFF
	APU OPER X	– OFF
	APU FU TK VLV X	– CL
	√Shutdn (hyd press < 200)	
	APU CNTLR PWR X	– OFF

ON-ORBIT OMS BURN

1. OMS BURN PREP

If OPS 2:

CRT1 GNC SPEC 20 PRO (DAP CONFIG)
 √DAP Config A1,B1
 GNC OPS 201 PRO (UNIV PTG)
 CNCL – ITEM 21 EXEC
 GNC OPS 202 PRO (ORBIT MNVR EXEC)
CRT2 GNC SYS SUMM 2

If OPS 3:

CRT1 GNC OPS 302 PRO (DEORB MNVR EXEC)
CRT3 BFS, GNC SYS SUMM 2
 OMS/MPS √OMS PRESS He TK L,R > 1500 psia

2. LOAD TGT DATA

√Targets, OMS TARGETS

LOAD – ITEM 22 EXEC

TIMER – ITEM 23 EXEC

C3 DAP: If OPS 2, B/AUTO/VERN

If OPS 3, AUTO

CRT1 MNVR – ITEM 27 EXEC (*)

3. PERFORM OMS BURN

CRT1 $\sqrt{\text{ENG SEL}}$

C3 $\sqrt{\text{DAP AUTO (PASS)/DISC}}$

TIG-4 F6/F8 ADI RATE (two) – MED (1 deg/sec)

FLT CNTLR PWR (two) – ON

Perform ON ORBIT OMS BURN Cue Card

ON ORBIT OMS BURN

CRT1 1.LOAD TGT DATA
GNC OPS 202 PRO (ORBIT MNVR EXEC)

TV ROLL

If Posi Heads Up – ITEM 5 + 0 EXEC

If Posi Heads Dwn – ITEM 5 + 180 EXEC

Trim Load (*1 eng)

P – ITEM 6 = + 0.4 *(+ 0.4)

LY – ITEM 7 = - 5.7 *(+ 5.2)

RY – ITEM 8 = + 5.7 *(- 5.2)

CRT1 2.PERFORM OMS BURN
C3 √ENG SEL
 √DAP AUTO (PASS)/DISC

TIG-4 F6/F8 ADI RATE (two) – MED (1 deg/sec)
 FLT CNTLR PWR (two) – ON
 √DAP – AUTO(PASS)/DISC
 √GMBL TRIM

TIG-2 C3 SEL OMS ENG(s) – ARM PRESS (√P VLVs OP)
 If P VLV CL: Aff OMS ENG – OFF
TIG-00:15 CRT1 EXEC

00:00 TIG: start watch (√Pc, ΔVTOT, ENG VLVs)

CUTOFF

+00:02 C3 OMS ENG(s) – OFF

F6/F8 FLT CNTLR PWR (two) – OFF

CRT IF OPS 2

DAP: B/INRTL/VERN

CRT GNC OPS 201 PRO (√DAP)

RCS HOT FIRE TEST

1.CONFIGURE FOR JET TEST

C3 DAP: A1/INRTL/VERN

2. PERFORM RCS JET TEST

Wait 3 sec between pulses

Monitor ADI rates to verify jet on or jet fail

C3 DAP TRANS: PULSE/PULSE/PULSE

DAP: A/FREE/PRI

F6/F8 ADI RATE – MED

FLT CNTLR PWR – ON

Perform following pulse sequence twice:

F5 THC: +X, 1 PULSE (fires jets R1A,L1A)
 -X, 1 PULSE (fires jets F1F,F2F)
 +Z, 1 PULSE (fires jets F1U,R1U,L1U)
 +Y, 1 PULSE (fires jets F1L,L1L)
 -Y, 1 PULSE (fires jets F2R,R1R)

Perform following pulse sequence twice:

THC: +Z, 1 PULSE (fires jets F2U,L2U,R2U)
 -Z, 1 PULSE (fires jets F1D,F2D,L2D,R2D)
 +Y, 1 PULSE (fires jets F1L,L2L)
 -Y, 1 PULSE (fires jets F2R,R2R)

Perform following pulse sequence twice:

THC: +X, 1 PULSE (fires jets L3A,R3A)
 -X, 1 PULSE (fires jet F3F)
 -Z, 1 PULSE (fires jets F3D,F4D,L3D,R3D)
 +Y, 1 PULSE (fires jets F3L,L3L)
 -Y, 1 PULSE (fires jets F4R,R3R)

Perform following pulse sequence twice:

THC: +Z, 1 PULSE (fires jets F3U,L4U,R4U)
 -Z, 1 PULSE (fires jets F3D,F4D,L4D,R4D)
 +Y, 1 PULSE (fires jets F3L,L4L)
 -Y, 1 PULSE (fires jets F4R,R4R)

C3 DAP: A/INRTL/VERN

F6/F8 FLT CTRL PWR – OFF

FREE DRIFT

AUTO MNVR TO ATTITUDE

C3 Change DAP A,B to A3,B3

DAP: B3/AUTO/VERN(ALT)

CRT1 GNC OPS 201 PRO (UNIV PTG)

TGT ID – ITEM 8 + 2 EXEC

BODY VECT – ITEM 14 + 5 EXEC

Load Body Vector P,Y,OM (per table below)

GRAVITY GRADIENT BODY VECTORS

		ATT ID	EXEC DATA			BODY RATES (± 0.002)		
		ATT ID	P	Y	OM	R	P	Y
+ PLBD X L V	NORTH	A	357.51	0.97	249.18	0.002	0.024	-0.062
	SOUTH	B	357.51	359.23	110.91	-0.002	0.024	0.062
- PLBD X L V	NORTH	C	177.51	0.77	69.09	0.002	-0.024	-0.062
	SOUTH	D	177.51	359.03	290.82	-0.002	-0.024	0.062

CRT1 TRK – ITEM 19 EXEC (CUR-*)

$\sqrt{\text{ERR TOT}}$, ITEM 23 – (*)

ESTABLISH FREE DRIFT

F6,F8 $\sqrt{\text{Att mnvr complete}}$

ADI ATT

– LVLH

If VERN jets available:

C3 DAP: A3/AUTO/VERN
DAP: FREE

If VERN jets not available:

C3 DAP: A3/AUTO/ALT

Wait 30 sec

When $-0.01 < \text{Roll Rate} < 0.01$, then:

C3 DAP: FREE

Rcd MET ____/____ ____:____ ____:____

F6,F8 ADI ATT – as reqd

Reconfig to FLIGHT PLAN DAP

DAP: INRTL

CCTV PWRUP

R14	CAMR/PTU (five)	– IN
	CAMR/HTR (five)	– IN
	ILLUM/PTU HTR (five)	– IN
	CONTR UNIT (three)	– IN
	MON 1	– IN
	MON 2	– IN
A7U	TV PWR CONTR UNIT	– MN A/B
	TV CAMR PWR (five)	– ON
A3	PWR (two)	– ON/OFF

PRCS PTC

MNVR TO PTC ATTITUDE

C3 DAP: A1/AUTO/ALT

CRT1 GNC OPS 201 PRO (UNIV PTG)

 TGT ID – ITEM 8 + 4 EXEC

 BODY VECT – ITEM 14 + 5 EXEC

 P – ITEM 15 + 2 7 0 EXEC

 Y – ITEM 16 + 0 EXEC

 OM – ITEM 17 + 2 7 0 EXEC

 TRK – ITEM 19 EXEC (CUR-*)

INITIATE PTC ROTATION

CRT1 GNC SPEC 20 PRO (DAP CONFIG)
 Change DAP A to A2
 GNC OPS 201 PRO (UNIV PTG)
 BODY VECT – ITEM 14 +1 EXEC
 ROT – ITEM 20 EXEC (CUR-*)

TERMINATE PTC ROTATION

 GNC OPS 201 PRO (UNIV PTG)
 CNCL – ITEM 21 EXEC
 Reconfig to FLIGHT PLAN DAP

VRCS PTC

MNVR TO PTC ATTITUDE

C3 DAP: A1/AUTO/VERN
CRT GNC OPS 201 PRO (UNIV PTG)
 TGT ID – ITEM 8 + 4 EXEC
 BODY VECT – ITEM 14 + 5 EXEC
 P – ITEM 15 + 2 7 0 EXEC
 Y – ITEM 16 + 0 EXEC
 OM – ITEM 17 + 2 7 0 EXEC
 TRK – ITEM 19 EXEC (CUR-*)

INITIATE PTC ROTATION

When in attitude:

CRT1 GNC OPS 201 PRO (UNIV PTG)
 BODY VECT – ITEM 14 +1 EXEC
 ROT – ITEM 20 EXEC (CUR-*)

When rates have stabilized (~60 sec):

GNC SPEC 20 PRO (DAP CONFIG)

Change DAP A to A2

TERMINATE PTC ROTATION

GNC SPEC 20 PRO (DAP CONFIG)

Change DAP A to A1

When rates have stabilized (~60 sec):

CRT1 GNC OPS 201 PRO (UNIV PTG)
 CNCL – ITEM 21 EXEC

When rates have damped:

Reconfig to FLIGHT PLAN DAP

ON ORBIT +X RCS BURN

1. LOAD TGT DATA AND MNVR TO BURN ATT

C3 DAP: A/AUTO/ALT (B/ALT as reqd)

CRT1 GNC OPS 201 PRO (UNIV PTG)
 CNCL – ITEM 21 EXEC
 GNC OPS 202 PRO (ORBIT MNVR EXEC)
 √RCS SEL, ITEM 4 – (*)

CRT2 GNC SYS SUMM
 If onboard computed burn:

CRT1 Enter or verify TGT DATA
 LOAD – ITEM 22 EXEC
 TIMER – ITEM 23 EXEC
 √BURN DATA
 MNVR – ITEM 27 EXEC (*)

2. BURN EXEC

TIG-3:00 F6(F8) ADI ERR – MED
 ADI RATE – HI
 ADI ATT – INRTL
 √ADI ATT, then:
 ATT – REF
 REF pb – push
 F6(F8) FLT CNTLR PWR – ON

TIG-0:30 C3 DAP TRANS: NORM/PULSE/PULSE
TIG DAP: A1/INRTL/PRI
 If VGO Z is neg Z,X,Y seq;
 Otherwise X,Y,Z seq
 THC Trim VGOs < 0.2 fps

3. POST BURN RECONFIG

F6(F8) FLT CNTLR PWR – OFF

C3 DAP: A/AUTO/ALT (B/AUTO/ALT as reqd)
DAP TRANS: PULSE/PULSE/PULSE

CRT1 GNC OPS 201 PRO (UNIV PTG)
When in attitude:
C3 DAP: A/AUTO/VERN(ALT)

ON ORBIT MULTI-AXIS RCS BURN

1. EXECUTE MULTI-AXIS BURN

C3 DAP: B1/AUTO/VERN(PRI)
CRT1 GNC OPS 202 PRO (ORBIT MNVR EXEC)
CRT2 GNC SYS SUMM

CRT1 Enter or verify TGT DATA
LOAD – ITEM 22 EXEC
TIMER – ITEM 23 EXEC
√BURN DATA

TIG-3:00 F6(F8) FLT CTRL PWR – ON

TIG-0:30 C3 DAP TRANS: as reqd
TIG DAP: A1/AUTO/PRI (B1/AUTO/PRI)
If VGO Z neg:
Z,X,Y THC sequence
If VGO Z not neg:
X,Y,Z THC sequence
THC: Trim VGOs < 0.2 fps

2. POST BURN RECONFIG

F6(F8) FLT CTRL PWR – OFF
GNC OPS 201 PRO (UNIV PTG)
C3 DAP: A/AUTO/ VERN

SEP MANUEVER

1. SET UP AFT STATION

A6U $\sqrt{\text{SENSE -Z}}$

DAP: A1/INRTL/PRI

DAP TRANS: as reqd

FLT CNTLR PWR – ON

2. OBTAIN VISUAL CONTACT THRU OVHD WINDOW

A6U DAP ROT: as reqd
RHC: as reqd
When adequate visual contact obtained,
DAP ROT: DISC/DISC/DISC

3. NULL CLOSING RATE

THC: +Z (out)

As reqd to null closing rate

4. PERFORM RR ACQ (if desired)

A1U KU MODE – RDR PASSIVE

KU RADAR OUTPUT

– LO

KU sel

– AUTO

TRK

KU CNTL

– PNL

Slew antenna to target

KU SEARCH

– SEARCH

(tb-gray)

If no lock-on within 1 min,

repeat SEARCH as convenient

5. OBTAIN ~1 FPS OPENING RATE

A6U DAP TRANS:NORM/NORM/NORM

If Norm Z sep desired:

DAP: no LO Z

THC: +Z (out) for 3 sec

If LO Z sep desired (MCC call):

DAP: LO Z

THC: +Z (out) for 25 sec

6. PERFORM OUT-OF-PLANE MNVR

CRT GNC OPS 201 PRO (UNIV PTG)
 CNCL – ITEM 21 EXEC

GNC OPS 202 PRO (ORBIT MNVR EXEC)

GNC ORBIT MNVR EXEC

RCS SEL – ITEM 4 EXEC (*)

If time critical,

Set TIG to current time +2.00

If not time critical,

Set TIG to current time +22.00

TGT PEG 7 ΔV_x – ITEM 19 +0 EXEC

ΔV_y – ITEM 20 +2 EXEC

ΔV_z – ITEM 21 +0 EXEC

LOAD – ITEM 22 EXEC

TIMER – ITEM 23 EXEC

$\sqrt{VGO Z} \geq 0$; if $VGO Z < 0$

TGT PEG 7 ΔV_y – ITEM 20 -2 EXEC

LOAD – ITEM 22 EXEC

TIMER – ITEM 23 EXEC

$\sqrt{VGO Z} \geq 0$

Do NOT MNVR to BURN ATT

A6U √DAP: no LO Z

At TIG, deflect THC to null VGOs

7. PERFORM FINAL SEP

CRT

GNC OPS 202 PRO (ORBIT MNVR EXEC)

✓RCS SEL – ITEM 4 (*)

If ΔV_Y (block 6) +2:

TV ROLL – ITEM 5 +2 7 0 EXEC

If ΔV_Y (block 6) -2:

TV ROLL – ITEM 5 +0 9 0 EXEC

Set TIG to TIG from step 6 +15:00

TGT PEG 7

ΔV_x – ITEM 19 +3 EXEC

ΔV_y – ITEM 20 +0 EXEC

ΔV_z – ITEM 21 +0 EXEC

LOAD – ITEM 22 EXEC

TIMER – ITEM 23 EXEC

A6U DAP: B1/AUTO/PRI

At TIG-8:00, MNVR – ITEM 27 EXEC (*)

At TIG, deflect THC to null VGOs

FLT CNTLR PWR – OFF

8. MNVR TO MINIMUM DRAG ATTITUDE (-ZLV/-XVV)

A6U DAP: A/AUTO/VERN
CRT GNC OPS 201 PRO (UNIV PTG)
 √TGT ID: 2
 BODY VECT: 3
 OM: 0
 START TRK – ITEM 19 EXEC (CUR-*)

RMS ON-ORBIT INITIALIZATION

1.RMS SHOULDER BRACE RELEASE

A8L	RMS SEL	– PORT
	√SAFING tb	– gray
	SHLDR BRACE REL	– PORT
	(hold2 sec following tb-gray)	
	RMS SEL	– OFF

2. CONFIGURE POWER

R13L	PL BAY MECH PWR SYS (two)	– ON
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7. PORT MPM DEPLOY

A8L	PORT RMS	– DPY (tb-DPY)
(68 sec max)		
	PORT RMS	– OFF

8. STBD MPM DEPLOY

A8L	If Starboard MPM installed:	
	STBD RMS	– DPY (tb-DPY)
(68 sec max)		
	STBD RMS	– OFF

9. RECONFIGURE POWER

R13L	PL BAY MECH PWR SYS (two)	– OFF
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RMS PWRUP

1. PLB LTS, CCTV ACT

A7U PL BAY FLOOD (six) – as reqd

Perform ACTIVATION, OPERATIONS (TV Cue Card) for desired camrs

Perform ILLUMINATOR OPS (TV Cue Card) as reqd

√Physical integrity of arm, EE, blankets

√PORT RMS HTR (two) – AUTO

2. RMS SEL (IDLE MODE)

A8U √MODE – not DIRECT

A8L RMS SEL – PORT (MA, SM ALERT)

√SAFING tb – gray

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-1282	-108	-445	0	0	0	0
	SY	SP	EP	WP	WY	WR	
√	0.0	0.0	0.0	0.0	0.0	0.0	

R13L PL BAY MECH PWR SYS (two) – ON

3. PORT MPM DEPLOY

If MPM stowed:

(68 sec max)	PORT RMS	– DPY (tb-DPY)
	PORT RMS	– OFF

A6U DAP: VERN(FREE)

(18 sec max)	A8L PORT RMS RETEN LAT	– REL (tb-REL)
	PORT RMS RETEN LAT	– OFF

4.. RECONFIGURE POWER

R13L	PL BAY MECH PWR SYS (two)	– OFF
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5. ARM UNCRADLE

A8U RATE – as reqd (VERN
within 10 ft)

PARAM – JOINT ANGLE

BRAKES – **√OFF (tb-OFF)**

MODE – SINGLE,

ENTER

SINGLE DR to PRE-CRADLE position (within 1°):

	SY	SP	EP	WP	WY	WR	
Cradle	0.0	0.0	0.0	0.0	0.0	0.0	
1: WP +				+5.0			
2: EP +			+1.0				
3: SP +		+25.0					
4: EP –			-25.0				
Pre-cradle	0.0	+25.0	-25.0	+5.0	0.0	0.0	
	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-1261	-146	-551	5	2	0	0

BRAKES – ON (tb-ON)
DAP: as reqd

RMS PWRDWN

A8L RMS PWR – OFF

F6 FLT CTRL PWR – ON



ORBIT OPS CHECKLIST	STS ALL
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BACK COVER