Space Shuttle Program
FLIGHT DATA FILE

JSC–48065–93

IUS Deploy Checklist

STS–93

AXAF

Mission Operations Directorate
Operations Division

Final
October 5, 1998

National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas

IUS DEPLOY CHECKLIST STS–93	FINAL (Oct 5, 1998)

PCN–2 (Jun 28, 1999) Sheet 1 of 1

List of Implemented Change Requests (482s)**:**

IUS–641	IUS–645	MULTI–1434A
IUS–643A	IUS–646	
IUS–644	IUS–642	

Incorporate the following**:**

1**.** Replace v thru x

2**.** Replace 1–5 thru 1–10

3**.** Replace 2–1 thru 2–6

4**.** Replace 4–3 thru 4–6

5**.** Replace 6–7 thru 6–10

6**.** Replace 7–1 & 7–2, 7–13 & 7–14, 7–17 thru 7–20, 7–23 & 7–24, 7–31 & 7–32

7**.** Replace 8–15 & 8–16

8**.** Replace CC 9–7 & CC 9–8

Prepared by: _____
Book Manager

Approved by: _____ _____
Lead, Cargo Operations Support Group Chief, Cargo Integration and Operations Branch

Encl**:** 42 pages

File this PCN immediately behind the front cover as a permanent record

MISSION OPERATIONS DIRECTORATE

IUS DEPLOY CHECKLIST
STS–93

FINAL
October 5, 1998

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Incorporates the following:
482#: IUS–631

AREAS OF TECHNICAL RESPONSIBILITY

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Payload Abbreviations and Acronyms

ACT	Actuator (IUS ASE)
act	actual or activation
AFTA	Aft Frame Tilt Actuator
AMU	Attitude Match Update
ASE	Airborne Support Equipment (IUS)
AXAF	Advanced X–ray Astrophysics Facility
bp	barberpole (OFF indicator)
cb	circuit breaker
CIU	Communications Interface Unit (IUS ASE)
CL	Clear Text and Locked (TLM in sync at CIU)
GMT	Greenwich Mean Time
gray	ON indicator
GSE	Ground Support Equipment
IMU	Inertial Measurement Unit
IUS	Inertial Upper Stage
MNVR	Maneuver
mom	momentary
MS	Mission Specialist
NIS	Navigation Initialization Status
nL	No Lock (TLM not in sync at CIU)
pb	pushbutton
PCP	Power Control Panel (IUS ASE)
PI	Payload Interrogator
PLBD	Payload Bay Door
PRLA	Payload Retention Latch Actuator
PYRO	Pyrotechnics
RF	Radio Frequency
RTS	Remote Tracking Station (AFSCN)
S/C	Spacecraft
SRM	Solid Rocket Motor
STDN	Space Tracking & Data Network
SV	State Vector
sw	switch
tb	talkback
TIG	Time of Ignition
tw	thumbwheel
UMB	Umbilical
VCC	Vehicle/Variable Command Count
XFER	Transfer

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LIST OF EFFECTIVE PAGES

FINAL	10/05/98
PCN–1	04/01/99
PCN–2	06/28/99

***** – Omit from flight book

***** – Omit from flight book

IUS DEPLOY CUE CARDS

CONTENTS PAGE

I

PADS

ORBITAL MANEUVER PAD FOR _____

OMS BOTH 1
L 2
R 3
RCS SEL 4
+X
–X
MULTI–AXIS

TV ROLL 5

TRIM LOAD
P 6 ( ) .
LY 7 ( ) .
RY 8 ( ) .

WT 9

TIG 10 / : : .

TGT PEG 7
ΔVX 19 ( ) .
ΔVY 20 ( ) .
ΔVZ 21 ( ) .

BURN ATT
R 24
P 25
Y 26

ΔVTOT .
TGO :
VGO X ( ) .
VGO Y ( ) .
VGO Z ( ) .

HA HP
TGT ( )

NOTES

OMS GMBL CK:
PRE POST–BURN
L PRI
L SEC
R PRI
R SEC

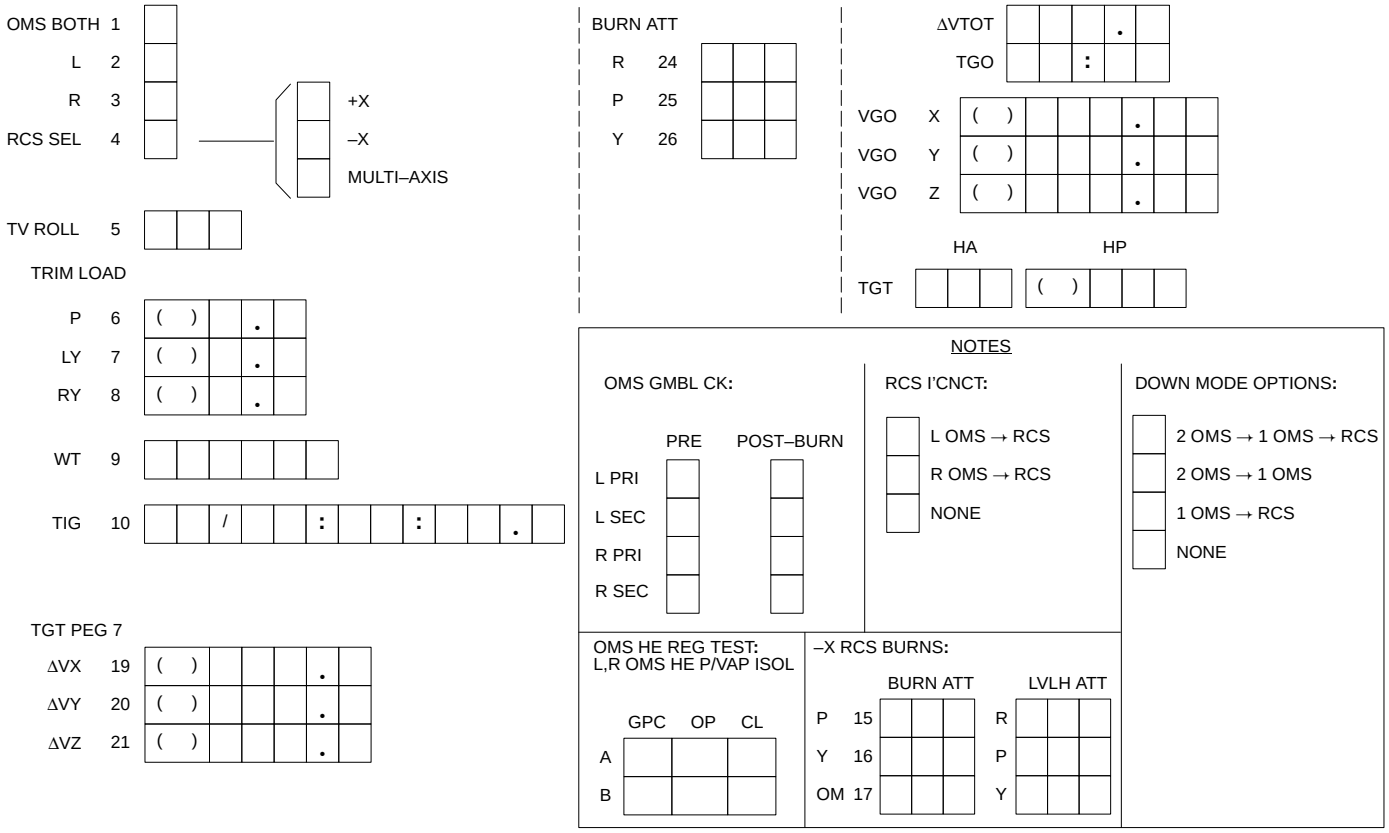
RCS I'CNCT:
L OMS → RCS
R OMS → RCS
NONE

DOWN MODE OPTIONS:
2 OMS → 1 OMS → RCS
2 OMS → 1 OMS
1 OMS → RCS
NONE

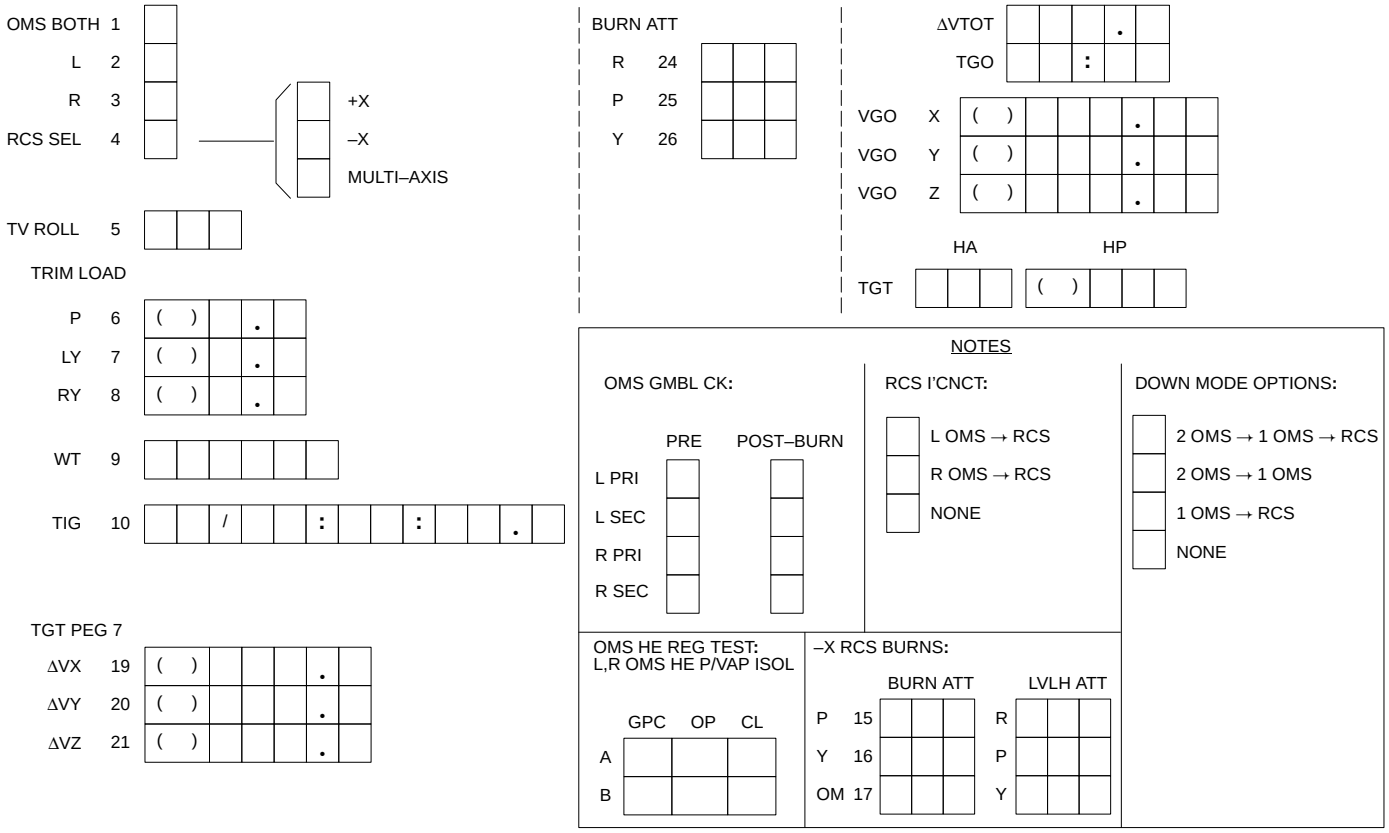
OMS HE REG TEST:
L,R OMS HE P/VAP ISOL
GPC OP CL
A
B

–X RCS BURNS:
BURN ATT LVLH ATT
P 15 R
Y 16 P
OM 17 Y

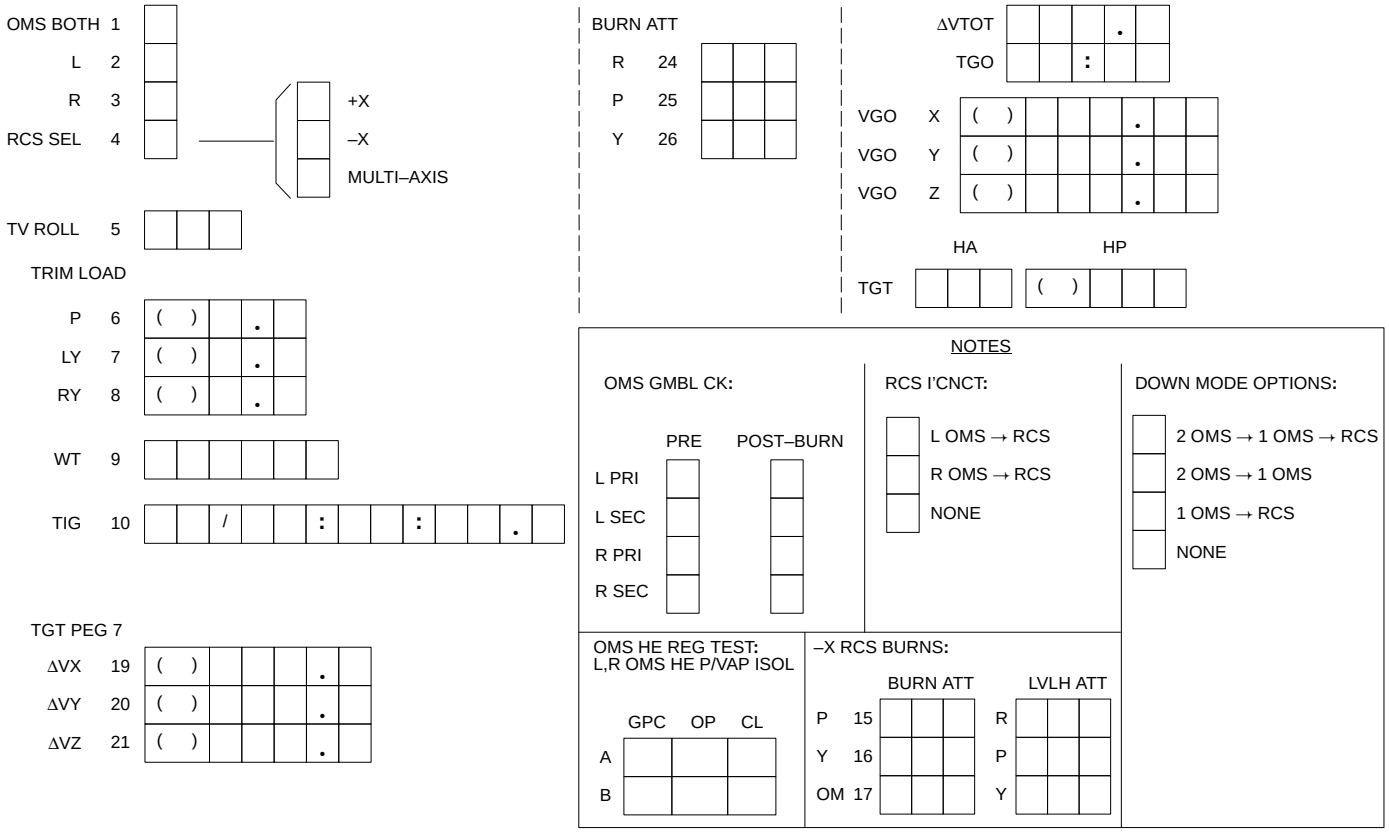
ORBITAL MANEUVER PAD FOR _____



ORBITAL MANEUVER PAD FOR _____



ORBITAL MANEUVER PAD FOR _____



IUS DEPLOY PAD
INJ ORBIT 6

	PLANNED	ACTUAL
MNVR TO DEPLOY (4–3)	TGT ID 4	
	BV 5	
	P 237.1	□□□.□
	Y 0.0	
	OM 090.0	□□□.□
INITIATE TRK	0/05:00:00	___/___:___:___
DEPLOY TIME	0/07:17:28	□/□□:□□:□□
DEPLOY WINDOW	8:42	___:___
BETA		□

	PLANNED	ACTUAL
MNVR WINDOW PROT (6–7)	TGT ID 1	
	BV 5	
	P 320.0	
	Y 0.0	
	OM 001.8	□□□.□
INITIATE TRK	DEPLOY + 45	

IUS DEPLOY PAD
INJ ORBIT 7

	PLANNED	ACTUAL
MNVR TO DEPLOY (4–3)	TGT ID 4	
	BV 5	
	P 237.2	☐☐☐.☐
	Y 0.0	
	OM 090.0	☐☐☐.☐
INITIATE TRK	0/06:45:00	___/___:___:___
DEPLOY TIME	0/08:47:33	☐/☐☐:☐☐:☐☐
DEPLOY WINDOW	8:42	___:___
BETA		☐

	PLANNED	ACTUAL
MNVR WINDOW PROT (6–7)	TGT ID 1	
	BV 5	
	P 320.0	
	Y 0.0	
	OM 001.8	☐☐☐.☐
INITIATE TRK	DEPLOY + 45	

IUS DEPLOY PAD
INJ ORBIT 20

		PLANNED	ACTUAL
MNVR TO DEPLOY (4–3)	TGT ID	4	
	BV	5	
	P	238.8	☐☐☐.☐
	Y	0.0	
	OM	090.0	☐☐☐.☐
INITIATE TRK		0/20:22:00	___/___:___:___
DEPLOY TIME		0/22:18:20	☐/☐☐:☐☐:☐☐
DEPLOY WINDOW		8:42	___:___
BETA			☐

- -

		PLANNED	ACTUAL
MNVR WINDOW PROT (6–7)	TGT ID	1	
	BV	5	
	P	320.0	
	Y	0.0	
	OM	001.8	☐☐☐.☐
INITIATE TRK		DEPLOY + 45	

IUS DEPLOY PAD
INJ ORBIT 21

	PLANNED	ACTUAL
MNVR TO DEPLOY (4–3)	TGT ID 4	
	BV 5	
	P 238.9	☐☐☐.☐
	Y 0.0	
	OM 090.0	☐☐☐.☐
INITIATE TRK	0/21:45:00	___/___:___:___
DEPLOY TIME	0/23:48:26	☐/☐☐:☐☐:☐☐
DEPLOY WINDOW	8:42	___:___
BETA		☐

	PLANNED	ACTUAL
MNVR WINDOW PROT (6–7)	TGT ID 1	
	BV 5	
	P 320.0	
	Y 0.0	
	OM 001.8	☐☐☐.☐
INITIATE TRK	DEPLOY + 45	

IUS DEPLOY PAD
INJ ORBIT 22

	PLANNED	ACTUAL
MNVR TO DEPLOY (4–3)	TGT ID 4	
	BV 5	
	P 239.0	☐☐☐ . ☐
	Y 0.0	
	OM 090.0	☐☐☐ . ☐
INITIATE TRK	0/23:45:00	____/____:____:____
DEPLOY TIME	1/01:18:31	☐/☐☐:☐☐:☐☐
DEPLOY WINDOW	8:42	____:____
BETA		☐

	PLANNED	ACTUAL
MNVR WINDOW PROT (6–7)	TGT ID 1	
	BV 5	
	P 320.0	
	Y 0.0	
	OM 001.8	☐☐☐ . ☐
INITIATE TRK	DEPLOY + 45	

POST INSERTION OPS

AXAF POWER UP

POST INSERTION

M 1. ACTIVATE PCP

MS1 L10

✓cb PNL PWR PRI,ALT (two) – op
✓All tbs – bp
cb PNL PWR PRI,ALT (two) – cl
✓MATRIX STATUS PRI,ALT tb – bp

> **CAUTION**
> Do not use panel mode when MATRIX STATUS ind gray and no PCP switch actions being made. Use other side if possible. If both sides gray, ✓MCC

* If PYRO BUS PRI(ALT) tb – gray or *
* IUS DPY ENA PRI(ALT) tb – gray, *
* perform 1.4a SUPER ZIP SAFETY *
* (PL SYS, IUS/AXAF MALS) *

☐ 2. POWER UP AXAF

Notify MCC when performing following switch action

S/C REG PWR PRI(ALT) – ON (mom)
✓PRI,ALT tb (two) – gray

Record MET ____/____:____:____

MS3

SM 200 IUS

✓COUNTER counting 1–4
S/C POWER
✓BUS VOLTS: 31.0–33.0
✓AMPS: 0–5

* If S/C BUS VOLTS < 22.0 or AMPS *
* > 5.0 or NO TLM, skip step 3 and *
* perform REMOVE AXAF RF *
* INHIBITS, then AXAF COMM ACT *
* Else, continue procedure *

CAUTION
Do not perform step 3 until step 2 verified via S200 or ground TLM

☐ 3. FLOAT IUS S/C BATTS ON LINE

MS1 L10 IUS S/C BATT PRI(ALT) – STAGE 1 ON (mom)
✓PRI,ALT tb (two) – gray

MS3 CRT S/C POWER
✓SOURCE – ENB1
✓BUS VOLTS: 31.0–33.0
✓AMPS: 0–5

* If S/C BUS VOLTS < 22.0 or AMPS > 5.0 *
MS1 L10 * or no TLM: *
* IUS S/C BATT PRI(ALT) – STAGE I & *
* II OFF (mom) *
* ✓IUS S/C BATT PRI(ALT) tb (two) – bp *
* Perform REMOVE AXAF RF *
* INHIBITS, then AXAF COMM ACT *
* If S/C BUS VOLTS > 35.0: *
* Complete step 3 *
* S/C REG PWR PRI(ALT) – OFF (mom) *
* ✓PRI(ALT) tb (two) – bp *
* If S/C BUS VOLTS between 22.0 and *
* 35.0 inclusive, continue procedure *

MS1 L10 IUS S/C PWR PRI(ALT) – ON (mom)
✓PRI,ALT tb (two) – gray

MS3 CRT S/C POWER
✓SOURCE – STG1

Record MET____/____:____:____

AXAF COMM ACT

1. PSP/PDI SETUP

MS3 A1L S–BD PL PWR SYS – 1(2)
✓SEL – PSP
✓PSP CMD OUTPUT – PL UMB
CNTL – PNL,CMD

SM 62 PCMMU/PL COMM

I/O RESET PSP 1(2) – ITEM 6(7) EXEC (*)
PCM – ITEM 5 EXEC (*)

Notify MCC to xmit AXAF PSP cmd load, continue procedure

✓PDI config:

DECOM	INPUT	FMT	FDA ENA	PAYLOAD
1(2)	2	8(18)		AXAF 2K
5–FPM		503(504) if IUS 64K 502(501) if IUS 16K		

MS1 L11 ✓PL LK – HDLN

2. PI SETUP

A1L S–BD PL ANT POLAR–R CIRC
XMTR PWR – LO
CH SEL INTRG 1,2 tw (six):
401,401
MOD – OFF
PWR SEL – BOTH
PSP CMD OUTPUT – INTRG
CNTL – PNL

S–BD PL FREQ SWEEP – ON
(for 45 sec)
MOD – ON
CNTL – CMD

Notify MCC, Orbiter PL Comm Setup complete

NOTE

OCC will cmd AXAF avionics on (5–10 min). MCC will enable PDI decom 1 FDA

* If comm act no joy, expect following: *
* On MCC GO: *
A1L * S–BD PL CNTL – PNL *
* MOD – OFF *
* FREQ SWEEP – ON *
* (for 45 sec) *
* MOD – ON *
* CNTL – CMD *
* If still no joy, expect following: *
* On MCC GO: *
* Expect 'S62 BCE BYP PSP' msg *
* S–BD PL CNTL – PNL *
* PWR SYS – 2(1) *
* SM 62 PCMMU/PL COMM *
* PSP I/O RESET – ITEM 7(6) EXEC (*) *
A1L * S–BD PL MOD – OFF *
* FREQ SWEEP – ON *
* (for 45 sec) *
* MOD – ON *
* CNTL – CMD *

PCP/CIU/SSP ACT AND C/O

1. CIU PANEL CONFIG

MS1 L11U
- ✓MODE – CLEAR
- ✓PWR – STBY

L11L
- ✓PWR – ON
- ✓LTG (two) – VAR, as reqd
- ✓DNLK (three) – TLM
- ✓PL LK – HDLN 64 KBPS
- CMD SOURCE – PNL
- ✓PL SEL – 1
- ✓VCC–OCTAL ind – CL

* If VCC–OCTAL nL, continue; auto thermal shutdown may have occurred

- ✓All ind lts on CIU & CIU AUX PNL off

* If either MDM ERR lt – on,
CMD GEN CLEAR pb – push
Verify lt off and continue

* If same MDM ERR lt illuminates again, continue and notify MCC

2. CIU C/O

L11L
- CMD SEL tw (two) – 00
- GEN ENTER pb – push (hold)
- ✓WORD ind – 88888
- ✓VCC–OCTAL ind – 88
- ✓All ind lts on CIU & CIU AUX PNL on
- CMD GEN ENTER pb – release
- ✓All ind lts on CIU AUX PNL off
- CMD GEN CLEAR pb – push
- ✓WORD ind – blank
- ✓VCC–OCTAL ind – CL

NOTE

If IUS had auto thermal shutdown VCC–OCTAL will indicate nL

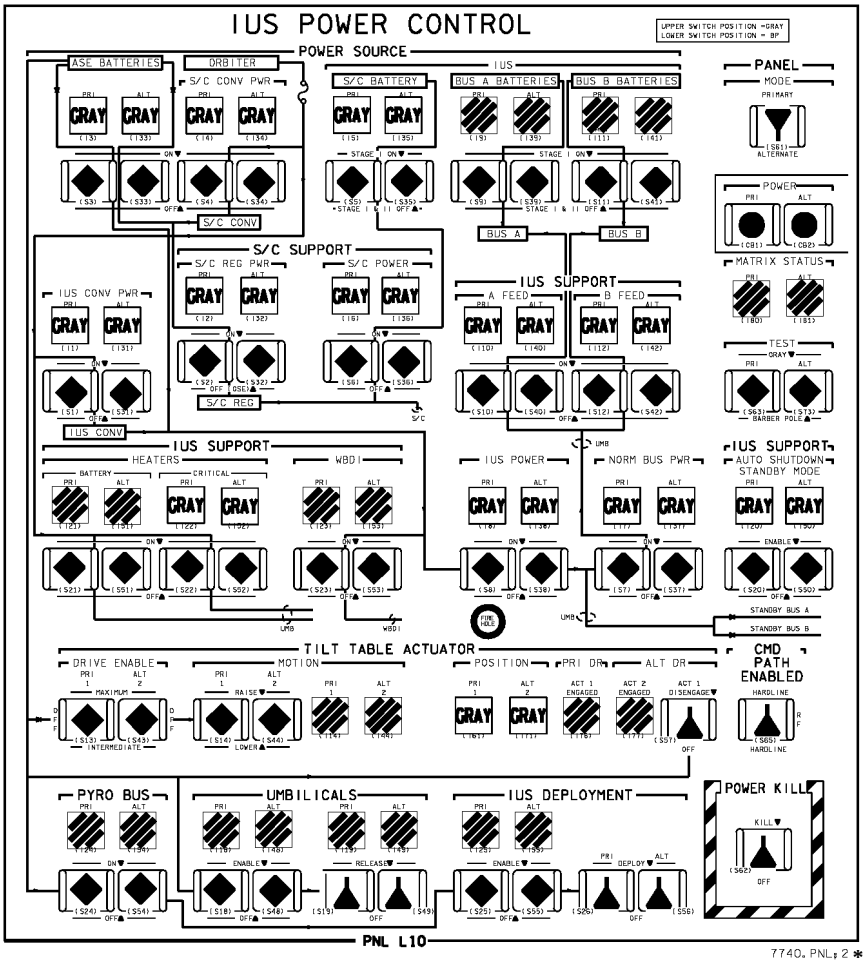
- ✓All ind lts on CIU & CIU AUX PNL off

3. DISPLAY IUS SAFETY STATUS

* If VCC–OCTAL [nL], SAFETY STATUS *
* cannot be displayed, go to step 4 *

MS1 L11L CMD SEL tw (two) – 01
GEN ENTER pb – push
Record CMD WORD ind [3_ _ _ _]
(NOM = [30000])

* If CMD WORD ind not 30000, *
* perform 1.3 IUS SAFETY *
* (PL SYS, IUS/AXAF MALS) *


IUS POWER CONTROL
UPPER SWITCH POSITION = GRAY
LOWER SWITCH POSITION = BP
POWER SOURCE
ASE BATTERIES
ORBITER
S/C CONV PWR
S/C BATTERY
IUS
BUS A BATTERIES
BUS B BATTERIES
PANEL
MODE
PRIMARY
ALTERNATE
POWER
S/C CONV
BUS A
BUS B
S/C SUPPORT
S/C REG PWR
S/C POWER
S/C REG
IUS SUPPORT
A FEED
B FEED
IUS CONV PWR
IUS CONV
MATRIX STATUS
TEST
GRAY
BARBER POLE
IUS SUPPORT
HEATERS
BATTERY
CRITICAL
WBDI
IUS POWER
NORM BUS PWR
IUS SUPPORT
AUTO SHUTDOWN
STANDBY MODE
STANDBY BUS A
STANDBY BUS B
UMB
WBDI
FUNC MODE
TILT TABLE ACTUATOR
DRIVE ENABLE
MAXIMUM
INTERMEDIATE
MOTION
RAISE
LOWER
POSITION
PRI DR
ALT DR
ACT 1 ENGAGED
ACT 2 ENGAGED
ACT 1 DISENGAGE
OFF
CMD PATH ENABLED
HARDLINE
PYRO BUS
UMBILICALS
ENABLE
RELEASE
IUS DEPLOYMENT
DEPLOY
POWER KILL
KILL
OFF
PNL L10
7740. PNL: 2 *

4. PCP C/O

✓PCP config as shown, 2–8

* If status not correct during *
* PNL TEST, attempt second time, *
* then continue *

Expect: 'S200 PCP PYRO ON' msg
'S200 PCP DEPLOY ENA' msg

MS1 L10

PNL TEST PRI – GRAY (hold)
✓All PRI tbs – gray
PNL TEST PRI – BP (hold)
✓MATRIX STATUS PRI tb – gray
✓TILT TBL POS PRI tb – gray
✓All other PRI tbs – bp
PNL MODE – ALT
TEST ALT – GRAY (hold)
✓All ALT tbs – gray
PNL TEST ALT – BP (hold)
✓MATRIX STATUS ALT tb – gray
✓TILT TBL POS ALT tb – gray
✓All other ALT tbs – bp
PNL MODE – PRI

* If auto thermal shutdn has occurred *
* (NORM BUS PWR PRI,ALT (two) *
* tb–bp), then perform RECOVERY *
* FROM PWRDN (CONT OPS). *
* Notify MCC *

5. IUS BATT AND AFTA HTR ACT

IUS HTRS BATT PRI(ALT) – ON (mom)
✓PRI,ALT tb (two) – gray

☐ 6. SSP C/O AND ENABLE IUS ANT

✓PLBDs – op

L12 cb IUS SW PWR – cl

ANT TB PWR – cl

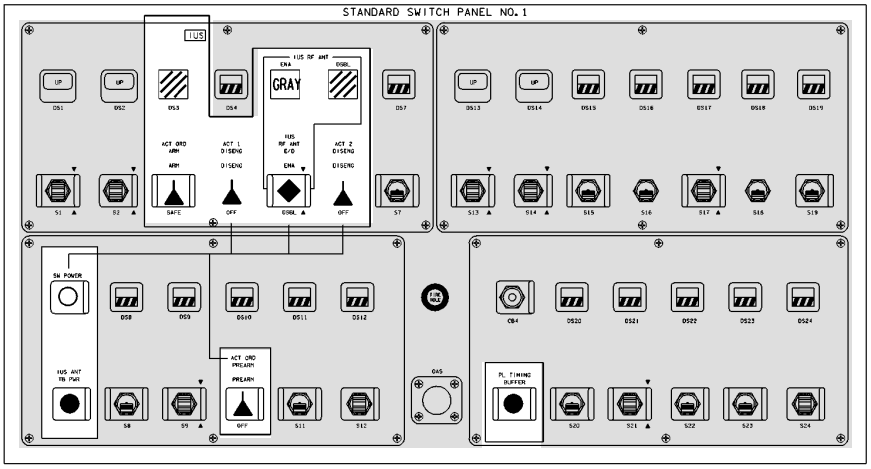
IUS RF ANT E/D – ENA (mom)

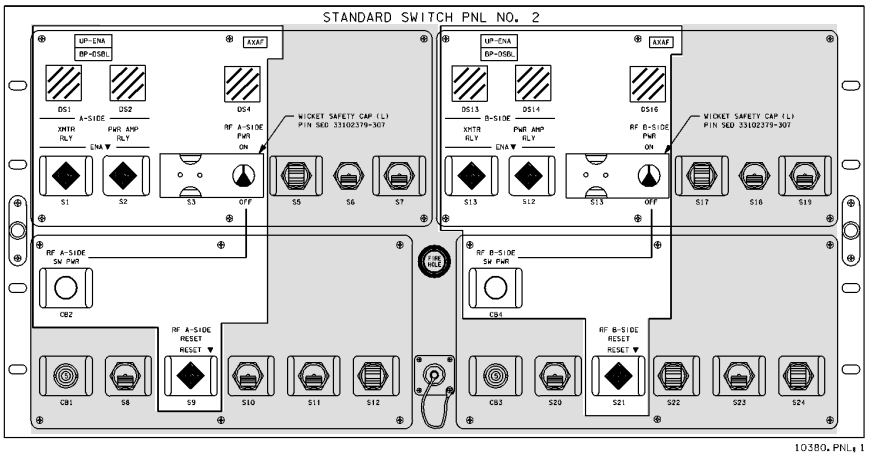
✓ENA tb – gray

✓DSBL tb – bp

cb IUS SW PWR – op

✓SSPs as shown:





IUS AND AXAF SPECS C/O

1. IUS SPEC 200 C/O

MS3

SM 200 IUS

COMP STAT	A	B
✓TLM ID	*	
✓IN CNTL	*	

✓CMD REP – 0AE140(012010)
✓DATA RATE – 64
✓COUNTER counting 1–4

RF CONFIG	A
✓SIG STR	< 0.8
✓CMD MOD	*
✓ANTENNA	UPR
✓RF POWER	0.0

IUS POWER	A	B
✓SOURCE	ASE	ASE
AV BUS		
✓VOLTS	30.5–31.5	30.5–31.5
✓AMPS	8.4–14.4	8.4–14.4
✓UTIL V	0.0	0.0

* If AV BUS VOLTS A,B (two) < 30.0, *
* perform IUS SSR–3 ORBITER *
* POWER LOSS TO IUS/AXAF *
* (PL SYS, IUS/AXAF MALS) *

SAFETY		
✓MSN PHASE: 3		
✓ORD BUS V	0	0

✓All other parameters blank

2. AXAF SPEC 205 C/O

SM 205 AXAF

✓VCDU counting 0–255

RF CONFIG	A	B
✓PA RF PWR	23.8	18.7
✓TEMP	40–80	40–80
✓XMTR RF PWR	46.8	29.6
✓TEMP	40–80	40–80
✓RCVR LOCK	at least one – blank	

INHIBITS

✓all – blank

PROP TANK P	
✓MUP	330–360
✓HE	4200–4400
✓FUEL	40–80
✓OX	45–60

TEMPS

ISIM

✓1,2,3,4,5,6	≥10
✓7	≥–10

TELESCOPE	
✓1,2,3,4	>45

NOTE

Line temp 5 not wetted
so no thermal concern

LINE	
✓1,2,3,4,6	>47

✓MUP	>47
✓PCM	>90
✓FFP	>47
✓OX/HE	>47

3. DISABLE IUS AUTO SHUTDOWN

MS1 L10 IUS AUTO SHUTDN PRI(ALT) – OFF (mom)

✓PRI,ALT tb (two) – bp

EARLY CHECKS

IUS PRE–DEPLOY C/O

1. PRECHECKS

MS3 Camr setup: IUS PRE–DEPLOY C/O

SM 200 IUS	
RF CONFIG	A
✓CMD MOD	*
✓ANTENNA	UPR

* If ANTENNA shows LWR, *
* ✓MCC *

EARLY CHECKS

MS1 L10 ✓CMD PATH ENA – HDLN

L11 ✓PL LK – HDLN 64 KBPS

2. XFER IUS TO INT PWR

On MCC GO:

MS1 L10 ✓ASE BATT PRI,ALT tb (two) – gray
IUS CONV PWR PRI(ALT) – OFF (mom)
✓PRI,ALT tb (two) – bp

MS3 CRT

IUS POWER	A	B
AV BUS		
✓VOLTS	28.0–29.3	28.0–29.3

CAUTION
After STAGE I ON, allow 40 sec before further switch action

MS1 L10 IUS BUS A BATT PRI(ALT) – STAGE I ON (mom)
✓PRI,ALT tb (two) – gray

Record MET____/____:____:____

✓IUS A FEED PRI,ALT tb (two) – bp (after 40 sec)
IUS BUS B BATT PRI(ALT) – STAGE I ON (mom)
✓PRI,ALT tb (two) – gray
✓B FEED PRI,ALT tb (two) – bp (after 40 sec)

MS3	CRT	IUS POWER	A	B
		✓SOURCE	STG1	STG1
		AV BUS		
		✓VOLTS	28.0–31.0	28.0–31.0
		✓AMPS	9.0–17.0	9.0–17.0
		✓UTIL V	30.0–38.0	30.0–38.0

3. PRE–DEPLOY CHECK
On MCC GO:

MS3 VTR – RCD

MS1 L11 Send CIU CMD 35, OH720
✓CMD WORD ind – 13 within 5 sec

* If not 13 within 5 sec, resend cmd *
* If same results, PL SEL–3, resend cmd *
* Since CMD WORD ind not valid in PL *
* SEL–3: *
* SM 200 IUS *
* ✓CMD REP = 0D7201 within 5 sec *
* If not, PL SEL–1 *
* PCP CMD PATH ENA – RF *
* Resend CIU CMD 35 *
* ✓MCC *
* At MCC GO, complete steps 3, 4, 5 *

After 1:50 in PL SEL–1 (2:40 in PL SEL–3),
✓CMD WORD ind – 00

* Other indications XX *
*
*
* 1 Test in progress *
* 0 Test complete *
*
*

XX:
- 0 Both comp OK
- 1 Comp A failed
- 2 Comp B failed
- 3 Both comp failed

Record CMD WORD ind __ __

CAUTION
Do not send any CIU CMDS for at least 60 sec after check complete

MS3	CRT	COMP STAT	A	B
		✓IN CNTL	*	
		✓A FAILED		
		✓B FAILED		
		✓RF POWER	> 3.3	

* If one or both computers failed, cont *

MS3 VTR – STOP
A7U PL BAY FLOODS – OFF

4. XFER IUS TO ORBITER PWR

MS1 L10 IUS CONV PWR PRI(ALT) – ON (mom)
✓PRI,ALT tb (two) – gray

A FEED PRI(ALT) – ON (mom)
✓PRI,ALT tb (two) – gray
BUS A BATT PRI(ALT) – STAGE I & II OFF (mom)
✓BUS A BATT PRI,ALT tb (two) – bp

B FEED PRI(ALT) – ON (mom)
✓PRI,ALT tb (two) – gray
BUS B BATT PRI(ALT) – STAGE I & II OFF (mom)
✓BUS B BATT PRI,ALT tb (two) – bp

Record MET ____/____:____:____

MS3	CRT	IUS POWER	A	B
		✓SOURCE	ASE	ASE
		AV BUS		
		✓VOLTS	30.5–31.5	30.5–31.5
		✓AMPS	11.9–17.9	8.4–14.4
		✓UTIL V	0.0	0.0

* If AV BUS VOLTS A,B (two) < 30.0, *
* perform IUS SSR–3 ORBITER *
* POWER LOSS TO IUS/AXAF *
* (PL SYS, IUS/AXAF MALS) *

Notify MCC, IUS PDCO complete

5. VERIFY THROUGHPUT CMD CAPABILITY

MS1 L11 CMD SOURCE – MDM

✓PL LK – HDLN 64 KBPS

✓VCC–OCTAL ind – CL

L10 ✓CMD PATH ENA – HDLN

Notify MCC, configured for throughput cmding

When MCC reports POCC cmding complete,

L11 CMD SOURCE – PNL

M ACTUATOR ENGAGEMENT

MS3 A7U PL BAY FLOODS – as reqd

MS1 L10 TILT TBL DR ENA PRI(ALT) – INTERM
MOTION PRI(ALT) – RAISE
(hold until MOTION PRI(ALT) tb–gray or 3 sec max, start watch)

* If MOTION tb stays bp, perform 1.1a *
* NO MOTION ON RAISE COMMAND *
* DURING ACTUATOR ENGAGE *
* (PL SYS, IUS/AXAF MALS) *

✓TILT TBL POS PRI(ALT) tb – bp

When TILT TBL PRI(ALT) DR ENGAGED tb – gray:
✓TILT TBL MOTION PRI(ALT) tb – bp
(PRI ~1:50, ALT ~1:30)

Record time ____:____

* If PRI DR ENGAGED tb still bp *
* after 3:20 sec, *
* TILT TBL DR ENA – OFF, *
* perform 1.1b ACTUATOR *
* LOCK PIN FAILS TO ENGAGE *
* (PL SYS, IUS/AXAF MALS) *

TILT TBL DR ENA PRI(ALT) – OFF

REMOVE AXAF RF INHIBITS

NOTE
Perform no earlier than
PLBD opening +30 min

On MCC GO:

* If tb not as expected, continue and *
* notify MCC when finished *

A SIDE:

MS1 L12
cb RF A–SIDE SW PWR – cl
RF A–SIDE PWR – ON (tb–gray)

A–SIDE XMTR RLY – ENA (mom)
(tb–UP)
PWR AMP RLY – ENA (mom)
(tb–UP)

RF A–SIDE PWR – OFF (tb–bp)
cb RF A–SIDE SW PWR – op

B SIDE:

cb RF B–SIDE SW PWR – cl
RF B–SIDE PWR – ON (tb–gray)

B–SIDE XMTR RLY – ENA (mom)
(tb–UP)
PWR AMP RLY – ENA (mom)
(tb–UP)

RF B–SIDE PWR – OFF (tb–bp)
cb RF B–SIDE SW PWR – op

Notify MCC, AXAF RF INH removed

AXAF RF CHECK (UPPER ANT)

NOTE
SM 205 AXAF RF indications

	YES	NO
PA ON	*	blank
XMTR ON	blank	*
RCVR LOCK	blank	*

1. CONFIG FOR AXAF RF TLM

NOTE
OCC will cmd AXAF xmtr and PA on

On MCC GO:

MS3 A1U
SIG strength sel – S–BD PL
Verify S/S > 1.43 volts

SM 205 AXAF
✓PA ON A – *
✓XMTR ON A – blank

SM 62 PCMMU/PL COMM
✓PSP SYNC BIT – YES
✓FRAME – YES

* If PSP SYNC BIT or FRAME – NO, *
* go to 2.5a, PSP BIT OR FRAME *
* SYNC LOCK FAIL (MAL, COMM) *

PDI:
SEL DECOM – ITEM 9 +1(2) EXEC
INPUT – ITEM 12 +6 EXEC
LOAD – ITEM 13 EXEC
Expect 'S62 PDI DECOM FAIL' msg

✓PDI config:

DECOM	INPUT	FMT	FDA ENA	PAYLOAD
1(2) 5–FPM	6	8(18) 503(504) if IUS 64K 502(501) if IUS 16K	*	AXAF 2K

NOTE
OCC will verify AXAF RF TLM

2. RESTORE AXAF HDLN TLM
On MCC GO:

PDI:

MS3 CRT
SEL DECOM – ITEM 9 +1(2) EXEC
INPUT – ITEM 12 +2 EXEC
LOAD – ITEM 13 EXEC
Expect 'S62 PDI DECOM FAIL' msg

✓PDI config:

DECOM	INPUT	FMT	FDA ENA	PAYLOAD
1(2) 5–FPM	2	8(18) 503(504) if IUS 64K 502(501) if IUS 16K	*	AXAF 2K

Notify MCC, AXAF upper RF check complete

NOTE
OCC will cmd AXAF xmtr and PA off

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LATE CHECKS

TRANSFER SV

On MCC GO:

MS3 — SM 200 IUS
NAV SV/ATT XFER – ITEM 1 EXEC (*)
✓RF CONFIG CMD MOD – A (*)

MS1 L11 ✓MDM ERR GPC lt – off

* If MDM ERR GPC lt on *
* CMD GEN CLEAR pb – push *
* *
* If MDM ERR GPC lt still on, *
MS3 CRT * NAV SV/ATT XFER – ITEM 1 *
* EXEC (no *) *
MS1 L11 * CMD GEN CLEAR pb – push *
MS3 CRT * NAV SV/ATT XFER – ITEM 1 *
* EXEC (*) *
MS1 L11 * CMD GEN CLEAR pb – push *
* *
* If MDM ERR GPC lt still on, perform *
* 1.2a RECOVERY FROM MDM *
* ERROR GPC/UPLINK LT (PL SYS, *
* IUS/AXAF MALS) *

LATE CHECKS

Send CIU CMD 21, 1A000
If in 64 KBPS,
✓CMD WORD ind – 4X within 5 sec

MS3 CRT ✓NAV SV ACCEPT – (*)

* If SV XFER unsuccessful, resend CIU *
* CMD 21. If still unsuccessful, *
* perform 1.2c CIU COMMAND *
* FAILURE (PL SYS, IUS/AXAF *
* MALS). If unable to transfer SV, *
* discontinue mal and set up for *
* IUS THROUGHPUT CMDING *
* (CONT OPS) *

Record MET ____/____:____:____

NAV SV/ATT XFER – ITEM 1 EXEC (no *)

M MNVR TO DEPLOY ATTITUDE

CDR F6 ADI – as reqd

GNC UNIV PTG
TRK OPTION:
TGT ID +4
BODY VECTOR +5
P +237.1 _ _ _ . _
Y + 0.0 _ _ _ . _
OM +090.0 _ _ _ . _

✓DAP: A1/AUTO/VERN(ALT)
✓DAP TRANS: NORM/NORM/NORM, LO Z

(____/____:____:____) Initiate TRK

F7 ✓FLT CNTLR PWR – OFF

☐ TILT TABLE ELEVATION TO 29°

MS3 A7U PL BAY FLOODS – as reqd

Camr setup: PRLA RELEASE

M 1. PRLA RELEASE
When in attitude,
GNC 20 DAP CONFIG
Config DAP A to A9
PLT ✓DAP: A9/AUTO/VERN(ALT)

* If VERN failure, *
* DAP: FREE *

CAUTION
TILT TBL DR ENA must be INTERM or MAX prior to opening PRLAs

MS3 VTR – RCD

MS1 L10 TILT TBL DR ENA PRI(ALT) – INTERM

MS3 A6U ✓PL RETEN LAT (five) – OFF

✓PL SEL – 1
✓RDY 1,2,3 tb (three) – gray
✓LAT 1,2,3 tb (three) – LAT
SM 97 PL RETENTION
✓RDY–FOR–LAT 1,2,3 (six) – 1
✓LAT 1,2,3 (six) – 1
✓REL 1,2,3 (six) – 0

* If any rel msw shows '1,' expect *
* single motor time (60 sec) *

A6U PL RETEN LOGIC PWR SYS 1,2 (two) – ON
BAY MECH PWR SYS 1,2 (two) – ON

Note single motor times (>30 sec)

PL RETEN LAT 1,2 (two) – REL
(tb–LAT,bp)

MS1 L10 ✓TILT TBL MOTION PRI(ALT) tb – gray (mom)

After approx 30 sec (60 sec max):

MS3 A6U ✓PL RETEN LAT 1,2 (two) tb – OFF
✓1,2 tb (two) – REL
✓RDY 1,2 (two) tb – bp
LOGIC PWR SYS 1,2 (two) – OFF
R13L BAY MECH PWR SYS 1,2 (two) – OFF

M 2. RAISE TO 29°

Camr setup: RAISE TO 29°

* If Tilt Table rates high, *
* TILT TBL MOTION PRI(ALT) – *
* LOWER (hold) *
* When motion stops, *
* TILT TBL DR ENA PRI(ALT) – *
* OFF *
* ✓MCC *

MS1 L10 TILT TBL MOTION PRI(ALT) – RAISE (start watch)

* If POS ALT(PRI) tb – gray, hold *
* motion sw until POS ALT(PRI) *
* tb – bp *
* *
* If MOTION PRI(ALT) tb – bp, hold *
* motion sw 3 sec max *
* *
* If motion not stopped by 31°, *
* TILT TBL MOTION PRI(ALT) – *
* OFF (tb–bp) *

At 29° (PRI ~3:38, ALT ~3:58):
✓TILT TBL POS PRI(ALT) tb – gray
✓MOTION PRI(ALT) tb – bp

Record Time ____:____

Record MET ____/____:____:____

* If MOTION PRI(ALT) *
* tb – bp before POS tb – gray *
* and no PL motion observed, *
* perform 1.1c TILT TABLE *
* FAILS TO ELEVATE (PL SYS, *
* IUS/AXAF MALS) *

L10 TILT TBL DR ENA PRI(ALT) – OFF

MS3 CCTV Visually inspect raised assembly

VTR – STOP

PLT GNC 20 DAP CONFIG

Config DAP A to A10

* If VERN failure, *
* DAP: A/AUTO/ALT, LO Z *

Notify MCC, Tilt Table at 29°

AXAF RF CHECK (LWR ANT)

1. CONFIG FOR AXAF RF TLM

NOTE
OCC will cmd AXAF xmtr and PA on

On MCC GO:

MS3 A1U
SIG strength sel – S–BD PL
Verify S/S > 1.43 volts

SM 205 AXAF
✓PA ON B – *
✓XMTR ON B – blank

SM 62 PCMMU/PL COMM
✓PSP SYNC BIT – YES
✓FRAME – YES

* If PSP SYNC BIT or FRAME – NO, *
* go to 2.5a PSP BIT OR FRAME *
* SYNC LOCK FAIL (MAL, COMM) *

PDI:
SEL DECOM – ITEM 9 +1(2) EXEC
INPUT – ITEM 12 +6 EXEC
LOAD – ITEM 13 EXEC
Expect 'S62 PDI DECOM FAIL' msg

✓PDI config:

DECOM	INPUT	FMT	FDA ENA	PAYLOAD
1(2) 5–FPM	6	8(18) 503(504) if IUS 64K 502(501) if IUS 16K	*	AXAF 2K

NOTE
OCC will verify AXAF RF TLM

2. RESTORE AXAF HDLN TLM
On MCC GO:

PDI:

MS3 CRT

SEL DECOM – ITEM 9 +1(2) EXEC
INPUT – ITEM 12 +2 EXEC
LOAD – ITEM 13 EXEC
Expect 'S62 PDI DECOM FAIL' msg

✓PDI config:

DECOM	INPUT	FMT	FDA ENA	PAYLOAD
1(2) 5–FPM	2	8(18) 503(504) if IUS 64K 502(501) if IUS 16K	*	AXAF 2K

Notify MCC, AXAF lower RF check complete

NOTE
OCC will cmd AXAF xmtr and PA off

TRANSFER SV

On MCC GO:

MS3 SM 200 IUS
NAV SV/ATT XFER – ITEM 1 EXEC (*)
✓RF CONFIG CMD MOD – A (*)

MS1 L11 ✓MDM ERR GPC lt – off

* If MDM ERR GPC lt on, *
* CMD GEN CLEAR pb – push *
* *
* If MDM ERR GPC lt still on, *
CRT * NAV SV/ATT XFER – ITEM 1 *
* EXEC (no *) *
L11 * CMD GEN CLEAR pb – push *
CRT * NAV SV/ATT XFER – ITEM 1 *
* EXEC (*) *
L11 * CMD GEN CLEAR pb – push *
* *
* If MDM ERR GPC lt still on, perform *
* 1.2a RECOVERY FROM MDM *
* ERROR GPC/UPLINK LT (PL SYS, *
* IUS/AXAF MALS) *

Send CIU CMD 21, 1A000
If in 64 KBPS,
✓CMD WORD ind – 4X within 5 sec

MS3 CRT ✓NAV SV ACCEPT – (*)

* If SV XFER unsuccessful, resend CIU *
* CMD 21. If still unsuccessful, perform *
* 1.2c CIU COMMAND FAILURE *
* (PL SYS, IUS/AXAF MALS). If unable *
* to transfer SV, discontinue mal and set *
* up for IUS THROUGHPUT CMDING *
* (CONT OPS) *

Record MET ____/____:____:____

NAV SV/ATT XFER – ITEM 1 EXEC (no *)

☐ IUS/PI LOCK

On MCC GO:

1. PI SETUP

A1R S–BD FM PWR – OFF
CNTL – PNL,CMD

MS3 A1L ✓S–BD PL CNTL – CMD
✓ANT POLAR – R CIRC
XMTR PWR – MED
CH SEL INTRG 1,2 tw (six): 906,906
✓FREQ SWEEP – OFF
✓MOD – ON
✓PWR SYS – 1(2)
✓SEL – BOTH
✓PSP CMD OUTPUT – INTRG
CNTL – PNL,CMD

A1U ✓SIG STRENGTH SEL – S–BD PL

MS1 L12U ✓IUS RF ANT ENA tb – gray
✓DSBL tb – bp

2. PI LOCK

MS1 Perform XFER 64 → 16 RF (Cue Card)

* If IUS SSR–2 IUS/ORBITER RF *
* ACQUISITION (PL SYS, *
* IUS/AXAF MALS) was performed *
* and if PI PHASE LOCK still NO, *
* ✓PL LK – HDLN 16 KBPS *

MS3

SM 200 IUS

RF CONFIG	A
✓SIG STR	> –1.5
✓CAR LOCK	*
✓CMD MOD	*
✓RF POWER	>3.3

A1L

* If IUS CAR LOCK and/or CMD *
* MOD not indicated, perform *
* IUS SSR–2 IUS/ORBITER *
* RF ACQUISITION, step 6 *
* (PL SYS, IUS/AXAF MALS) *
* If IUS CAR LOCK and/or CMD *
* MOD still NO, ✓CMD PATH *
* ENABLE – HDLN *

Notify MCC, IUS/PI lock complete

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DEPLOY OPS

☐ DEPLOY COUNTDOWN

MS3 A7U ✓PL BAY FLOODS – as reqd

Camr setup: UMBILICAL RELEASE

1. VERIFY PI LOCKED TO IUS

SM 62 PCMMU/PL COMM

✓PL INTRG PHASE LOCK – YES

SM 200 IUS

✓RF CONFIG CMD MOD – A *

PLT SM 2 TIME

F7 ✓CRT and Event Timers counting

MS3 A4 down to DEPLOY time

☐ 2. ENABLE RNDZ NAV

PLT GNC 33 REL NAV

RNDZ NAV ENA – ITEM 1 EXEC (*)

SV SEL – ITEM 4 EXEC (FLTR)

CDR Move to Aft Flight Station. Steps 8–11 can be simo with MS ops

DEPLOY OPS

MM:SS

–20:00> ☐ 3. XFER IUS TO INT PWR

MS1 L10 ✓ASE BATT PRI,ALT tb (two) – gray

IUS CONV PWR PRI(ALT) – OFF (mom)

✓PRI,ALT tb (two) – bp

MS3 SM 200 IUS

IUS POWER	A	B
✓AV BUS VOLTS	28.0–29.3/ 28.0–29.3	

MS1 L10 IUS BUS A BATT PRI(ALT) – STAGE I ON (mom)
✓PRI,ALT tb (two) – gray

Record MET ____/____:____:____

✓IUS A FEED PRI,ALT tb (two) – bp (after 40 sec)
BUS B BATT PRI(ALT) – STAGE I ON (mom)
✓PRI,ALT tb (two) – gray
✓B FEED PRI,ALT tb (two) – bp (after 40 sec)

MS3 CRT IUS POWER A B
✓SOURCE STG1/STG1
AV BUS
✓VOLTS 28.0–31.0/28.0–31.0
✓AMPS 12.6–20.6/9.0–18.0
✓UTIL V 30.0–38.0/30.0–38.0
S/C POWER
✓SOURCE – STG1

MS1 L10 ✓IUS S/C BATT PRI, ALT tb (two) – gray

☐ 4. <u>DEADFACE UMBILICALS</u>

MS1 L10 IUS HTRS BATT PRI(ALT) – OFF (mom)
✓PRI,ALT tb (two) – bp
CRITICAL PRI(ALT) – OFF (mom)
✓PRI,ALT tb (two) – bp
PWR PRI(ALT) – OFF (mom)
✓PRI,ALT tb (two) – bp
S/C REG PWR PRI(ALT) – OFF(GSE) (mom)
✓PRI,ALT tb (two) – bp

5. FINAL PAYLOAD CHECKS

CAUTION
✓MCC for other indications. Do not deploy IUS until it is determined that a healthy avionics string exists

MS3

SM 200 IUS

COMP STAT	A	B
✓IN CNTL	*	
✓A FAILED		
✓B FAILED		

RF CONFIG	A
✓CMD MOD	*

IUS POWER	A	B
✓SOURCE	STG1/STG1	
AV BUS		
✓VOLTS	28.0–31.0/28.0–31.0	
✓AMPS	12.2–20.6/13.1–18.3	
✓UTIL V	30.0–38.0/30.0–38.0	

✓S/C POWER SOURCE – STG–1
✓BUS VOLTS: 28.0–34.0
✓AMPS: 3.5–57.1

MS1 L10 ✓IUS BUS A,B BATT PRI,ALT tb (four) – gray
✓S/C BATT PRI,ALT tb (two) – gray
✓PWR PRI,ALT tb (two) – gray
✓CMD PATH ENA – RF

L11 ✓SAFETY STATUS: 30000

L12 ✓IUS RF ANT ENA tb – gray

For changes in above indications following umbilical release, refer to IUS GO/NO–GO (Cue Card)

MS3 VTR – RCD
CRT ✓COUNTER counting

M 6. RELEASE UMBILICALS
On MCC GO for deploy:

MS1 L11 ✓PL LK – RF 16 KBPS

L10 UMB ENA PRI(ALT) – ENA (mom)
✓PRI,ALT tb (two) – gray

Expect 'S62 PDI DECOM FAIL'

UMB REL PRI(ALT) – REL (mom)
✓PRI,ALT tb (two) – gray
✓IUS BATTS PRI,ALT tb (four) – bp
✓S/C BATT PRI,ALT tb (two) – bp
✓PWR PRI,ALT tb (two) – bp

MS3 SM 200 IUS
✓UMB SEP A(*),B(*)

CDR CCTV Visually verify umb plugs released

* If umbilical boom or plugs do not *
* release, reattempt in ALT, then *
* continue regardless of umbilical *
* boom/plug release status *

MS1 L10 UMB ENA PRI(ALT) – OFF (mom)
✓PRI,ALT tb (two) – bp

M 7. RAISE TO 58°
MS3 Camr setup: RAISE TO 58°

CAUTION
If umbilical boom not released, expect AFTA to stall at 50° (PRI ~2:38, ALT ~2:18). If it does, wave off 1 rev. Notify MCC and go to UMBILICAL BOOM SEP FAIL (CONT OPS)

* If VERN failure, *
* DAP: FREE *

∗ If Tilt Table rates high, ∗
∗ TILT TBL MOTION PRI(ALT) – ∗
∗ LOWER (hold) ∗
∗ When motion stops, ∗
∗ TILT TBL DR ENA PRI(ALT) – ∗
∗ OFF ∗
∗ ✓MCC ∗

MS1 L10 TILT TBL DR ENA PRI(ALT) – MAX
MOTION PRI(ALT) – RAISE (hold until MOTION PRI(ALT) tb–gray or 3 sec max, start watch)
✓TILT TBL POS PRI(ALT) tb – bp

∗ If MOTION PRI(ALT) tb – bp ∗
∗ before 42° and no PL motion ∗
∗ observed, perform 1.1c TILT ∗
∗ TABLE FAILS TO ELEVATE ∗
∗ (PL SYS, IUS/AXAF MALS) ∗
∗ If motion stops between 42° ∗
∗ and 58°, deploy on time ∗

At 58° (PRI ~3:25, ALT ~3:08 (crew stop)):
TILT TBL DR ENA PRI(ALT) – OFF
✓POS PRI(ALT) tb – gray (bp)
✓MOTION PRI(ALT) tb – bp

Record time ____:____

Record MET ____/____:____:____

CDR CCTV Visually verify IUS at 58°

MS3 VTR – STOP

Camr setup: DEPLOY

PLT

GNC 20 DAP CONFIG
Config DAP A to A11

* If VERN failure, *
* DAP: A11/AUTO/ALT, LO Z *

M 8. OMS SEP BURN PREP

PLT

GNC, OPS 202 PRO
GNC ORBIT MNVR EXEC

Load SEP BURN TGT DATA per Burn Pad
LOAD – ITEM 22 EXEC

✓Solution per Burn Pad
Do not mnvr

GNC, OPS 201 PRO
GNC UNIV PTG

M 9. –X BACKOFF MNVR PREP

–1:30

* If VERN failure, *

CRT

* ✓ATT ERR ≤ 3.0° (all axes) *

CDR A6

✓SENSE – (–X)
ADI ATT – REF
ATT REF pb – PUSH
✓ADI – 0,0,0
ADI RATE – LOW

GNC 25 RM ORBIT
SW RM INH – ITEM 16 EXEC (*)

O14:E,
O15:E,
O16:E

✓cb DDU (six) – cl

A6U

FLT CNTLR PWR – ON

CRT

SW RM INH – ITEM 16 EXEC (no *)

W10

Visually verify AFTA not uncoupled

∗ If primary AFTA uncoupled, ∗
∗ perform ENGAGE ALT AFTA ∗
∗ (CONT OPS) ∗

☐ 10. XFER ORB SV TO TGT

GNC 33 REL NAV

ORB TO TGT – ITEM 10 EXEC

✓NAV RNG, $\dot{R}$,Y,$\dot{Y}$ ~0

MS3 Camr setup: DEPLOY

VTR – RCD

M 11. ORBITER TO FREE DRIFT

PLT GNC UNIV PTG

✓Orbiter rates:

Elv ang	Rates
≥ 42°	≤ .09 deg/sec (pitch)
	≤ .15 deg/sec (roll,yaw)
> 45°	≤ .13 deg/sec (all axes)

–01:00

CDR DAP: B1/FREE/PRI

DAP TRANS: NORM/NORM/NORM, no LO Z

[M] DEPLOY IUS

MS1 L10 ✓IUS DPY ENA PRI(ALT) tb – bp

* If ENA tb – gray, do not *
* continue until deploy MET *

Expect: 'S200 PCP PYRO ON'
'S200 PCP DEPLOY ENA'

PYRO BUS PRI(ALT) – ON (mom)
✓PRI(ALT) tb – gray
IUS DPY ENA PRI(ALT) – ENA (mom)
✓PRI(ALT) tb – gray

MM:SS
00:00> IUS DPY PRI(ALT) – DPY (mom)
00:15 Expect 'S200 MSN PHASE'

Record MET ____/____:____:____
(actual deploy time)

MS3 W10/CCTV Visually verify deployment

* If failure to deploy after 2nd *
* attempt with PCP in PRI MODE, *
* continue procedure thru *
* PYRO BUS – OFF, *
* PNL MODE – ALT, *
* repeat DEPLOY IUS procedure *
* *
* If no joy in ALT mode, go to *
* DEPLOY WAVEOFF (CONT *
* OPS) *
* ✓MCC *

MS1 L10

IUS DPY ENA PRI(ALT) – OFF (mom)
✓PRI,ALT tb (two) – bp
PYRO BUS PRI(ALT) – OFF (mom)
✓PRI,ALT tb (two) – bp

* If SM ALERT 'S62 PDI DECOM FAIL' msg received at deploy, verify IUS/PI link by SPEC 62, SPEC 200, and CIU display *

A1L

* If no lock after 30 sec, perform IUS SSR–2 IUS/ORBITER RF ACQUISITION (PL SYS, IUS/AXAF MALS) *

+01:00>
CDR

AFT THC –X (in), 8 sec (2.2 FPS)
monitor pitch ~.8°/sec (tail up)

DAP TRANS: NORM/NORM/NORM,
LO Z

When P = 70° on REF BALL,
DAP: B1/INRTL/PRI

* If unable to attain ΔVX ≥ 1.0 FPS *
* (pitch ~.4°/sec; tail up) with *
* FRCS, then *
* DAP TRANS: *
* NORM/NORM/NORM, LO Z *
* DAP: INRTL *
* *
* At D + 5:00, *
* DAP: FREE *
* AFT THC +X (out) 14 sec (4 FPS) *
* monitor pitch ~.3°/sec (tail up) *
* *
* When IUS line of sight near orbiter *
* tail, *
* DAP: INRTL *

A6U FLT CNTLR PWR – OFF

MS3 When IUS deploy recording complete, VTR – STOP

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POST–DEPLOY OPS

LOWER TILT TABLE TO –6°

1. REACTIVATE ASE HTRS

MS1 L10 IUS HTRS BATT PRI(ALT) – ON (mom)
✓PRI,ALT tb (two) – gray

2. LOWER TILT TABLE TO –6°

MS3 Camr setup: TILT TABLE LOWER TO –6°
VTR – RCD

* If Tilt Table rates high, *
* TILT TBL MOTION PRI(ALT) – *
* RAISE (hold) *
* When motion stops, *
* TILT TBL DR ENA PRI(ALT) – *
* OFF *
* ✓MCC *

MS1 L10 TILT TBL DR ENA PRI(ALT) – MAX
MOTION PRI(ALT) – LOWER
(hold until MOTION PRI(ALT) tb–gray or 3 sec max, start watch)

✓TILT TBL POS PRI,ALT tb (two) – bp

At –6° (PRI ~7:49, ALT ~7:52),
✓TILT TBL POS PRI,ALT tb (two) – gray

* If both POS tb are bp when motion *
* stops, perform 1.1d FAILURE TO *
* LOCK EMPTY TILT TABLE AT –6 *
* DEG POSITION (PL SYS, *
* IUS/AXAF MALS) *

✓TILT TBL MOTION PRI(ALT) tb – bp

Record Time ____:____

Record MET ____/____:____:____

CCTV Visually verify Tilt Table at –6°

L10 TILT TBL DR ENA PRI(ALT) – OFF

MS3 VTR – STOP

Notify MCC, Tilt Table stowed

POST–DPY OPS

M SEP MNVR

M 1. OMS BURN PREP

CDR GNC UNIV PTG

CNCL – ITEM 21 EXEC

GNC, OPS 202 PRO

GNC ORBIT MNVR EXEC

PLT GNC SYS SUMM 2

M 2. OMS BURN PRECHECKS

F7 ✓OMS PRESS He TK L,R > 640 psia

✓N2 TK L,R > 564 psia

> WARNING
> If OMS N2 PRESS out–of–limits on either side, do nominal ΔV burn on good engine. If both OMS have N2 PRESS out–of–limits, do minimum ΔV +X RCS burn. Perform AFT RCS SEP MNVR (CONT OPS)

M 3. LOAD OMS TGT AND BURN DATA

CRT ✓BURN DATA per Burn Pad

* If actual deploy time more than 1 min late, change TIG to actual deploy time + 15 min *

LOAD – ITEM 22 EXEC

TIMER – ITEM 23 EXEC

DAP: B1/AUTO/PRI

✓DAP TRANS: NORM/NORM/NORM, LO Z

CDR CRT

+07:00> MNVR – ITEM 27 EXEC (*)

(+02:30)

CAUTION
If Tilt Table will not be at –6° by OMS TIG, then stop Tilt Table motion and perform 1 ENG OMS burn. After OMS burn, continue Tilt Table lowering

+10:15 Expect: 'S200 TIME EVENT COLA' msg
'S200 TIME EVENT ROWA' msg

4. OMS BURN EXEC
M (When in attitude load current time + 5 min and exec burn)

TIG–4 If Xfeed Burn:
L(R) OMS TK ISOL (two) – OP (tb–OP)
R(L) OMS TK ISOL (two) – CL (tb–CL)
L,R OMS XFEED (four) – OP (tb–OP)
If straight feed:
✓L,R OMS TK ISOL (four) – OP (tb–OP)

✓DAP: B1/AUTO/PRI
DAP TRANS: NORM/NORM/NORM, no LO Z

Perform OMS 2/ORBIT OMS BURN (Cue Card)

* If TIG slip or unable to accomplish MIN SEP: *
* Determine min delta V reqd using new TIG: *
*

	MIN SEP 10 fps	TIG SLIP 15 fps	MASTER SAFE
TIG relative to nom dpy +	15	31	39

*
* Repeat step 3 for new TIG & targets from SEP *
* BURN PAD (CONT OPS) *
*
* If new TIG indicates 'MASTER SAFE' or unable to *
* accomplish min delta V reqd: *
* Xmit Master Safe & RCS ENA: *
* Send CIU CMD 77, 03PH1 *
* Send CIU CMD 52, 05121 *
* ✓CMD WORD ind – 1_100 *
* Notify MCC *
* Perform IUS SSR–1 RECOVERY FROM *
* MASTER SAFE 9 (PL SYS, IUS/AXAF *
* MALS) *

M 5. POST OMS BURN RECONFIG

PLT F7/F8 FLT CNTLR PWR (two) – OFF

O14:E, O15:E, O16:E ✓cb DDU (six) – as reqd

O8 L,R OMS He PRESS/VAP ISOL (four) – CL
✓XFEED (four) – CL (tb–CL)
✓TK ISOL (four) – OP (tb–OP)

+16:00 6. CYCLIC SV XFER TO IUS

MS3 A1L S–BD PL CNTL – PNL
XMTR PWR – HIGH
SM 200 IUS
NAV SV/ATT XFER – ITEM 1 EXEC (*)

MS1 L11 ✓MDM ERR GPC lt – off

	* If MDM ERR GPC lt – on: *
	* CMD GEN CLEAR pb – push *
	* *
	* If MDM ERR GPC lt still on: *
CRT	* NAV SV/ATT XFER – ITEM 1 *
	* EXEC (no *) *
L11	* CMD GEN CLEAR pb – push *
CRT	* NAV SV/ATT XFER – ITEM 1 *
	* EXEC (*) *
L11	* CMD GEN CLEAR pb – push *
	* *
	* If MDM ERR GPC lt still on, *
	* perform 1.2a RECOVERY FROM *
	* MDM ERROR GPC/UPLINK LT *
	* (PL SYS, IUS/AXAF MALS) *

Send CIU CMD 36, 1A000
No CIU CMD feedback (✓CMD REP–1A0000 and CMD WORD ind – blank)

NOTE

Any CIU CLEAR pb operation will terminate SV XFER. Reinitiate with CIU CMD 36

7. MNVR TO IUS VIEWING ATTITUDE

CDR GNC, OPS 201 PRO

GNC UNIV PTG

TRK OPTION:

TGT ID	+1
BODY VECTOR	+3
OM	+0.0

✓DAP: B1/AUTO/PRI
Initiate TRK

When mnvr complete,
DAP: B1/AUTO/VERN(PRI)

NOTE

Final IUS/PI loss of lock may occur when in window protect attitude

A1L

* If lock lost prior to start of MNVR, wait for PI to reacquire
* If no lock after 30 sec, perform IUS SSR–2 IUS/ORBITER RF ACQUISITION (PL SYS, IUS/AXAF MALS)

M 8. MNVR TO PROTECT ATTITUDE

CDR

GNC UNIV PTG

TRK OPTION:

TGT ID +1
BODY VECTOR +5
P +320.0 _ _ _._
Y + 0.0 _ _ _._
OM +001.8 _ _ _._

MM:SS
+45:00>
(ASAP after SEP burn)

DAP: B1/AUTO/PRI
Initiate TRK

+46:15

Possible: 'S200 ORD BUS ON A' msg
'S200 ORD BUS ON B' msg
'S200 ORD BUS VOLTS A' msg
'S200 ORD RLY CLOS A' msg
'S200 ORD RLY CLOS B' msg

When MNVR complete,
DAP: B1/AUTO/VERN(PRI)

SRM–1 IGN

_____:_____ (nom dpy + 60 min)
DAP: B1/INRTL/VERN(PRI)

Maintain orbiter attitude for at least 10 min after IUS SRM–1 ignition

9. DESELECT RNDZ NAV

CDR UNIV PTG

CNCL – ITEM 21 EXEC

GNC 33 REL NAV

RNDZ NAV ENA – ITEM 1 EXEC (no *)

10. TURN OFF PI/PSP

Expect: 'S62 BCE BYP PSP' msg

MS3 A1L ✓S–BD PL CNTL – PNL

PWR SYS – OFF

CNTL – CMD

SM 200 IUS

NAV SV/ATT XFER – ITEM 1 EXEC (no *)

CLOSEOUT

CAUTION
To prevent Tilt Table damage during reentry, Tilt Table must be locked at –6° or AFTA must stay connected

MS3 Camr setup: ACTUATOR DISENGAGE

VTR – RCD

1. PRI ACT DISENGAGE (if engaged)

MS1 L10 PNL MODE – ALT
TILT TBL ACT 1 – DISENG (mom)

MS3 CCTV ✓PRI ACT tilted up

* If not disengaged, use pin pusher: *
MS1 L12 * cb IUS SW PWR – cl *
* ACT ORD PREARM – PREARM *
* ARM – ARM (tb–gray) *
* 1 DISENG – DISENG *
L10 * ✓TILT TBL PRI ACT 1 ENGAGED *
* tb – bp *
L12 * ACT 1 DISENG – OFF *
* ORD ARM – SAFE (tb–bp) *
* PREARM – OFF *
* cb IUS SW PWR – op *

L10 PNL MODE – PRI

MS3 VTR – STOP
A7U PL BAY FLOODS – OFF

2. ALT ACT DISENGAGE (if engaged)

MS1 L12 cb IUS SW PWR – cl
ACT ORD PREARM – PREARM
ARM – ARM (tb–gray)
2 DISENG – DISENG

CCTV ✓ALT AFTA tilted up

L12 ACT 2 DISENG – OFF
ORD ARM – SAFE (tb–bp)
PREARM – OFF
cb IUS SW PWR – op
MS3 VTR – STOP
A7U PL BAY FLOODS – OFF

3. REMOVE CIU PWR

MS1 L11 CIU PWR – OFF

4. REMOVE PCP PWR

L10 ORB S/C CONV PWR PRI(ALT) – OFF (mom)
✓PRI,ALT tb (two) – bp
ASE BATT PRI(ALT) – OFF (mom)
✓PRI,ALT tb (two) – bp
cb PNL PWR PRI,ALT (two) – op
✓All PCP tbs – bp

PLT R1 PL AUX – OFF

5. CLOSE PRLAs

A6U ✓PL RETEN LAT (five) – OFF
✓PL SEL – 1
✓LAT 1,2 tb (two) – REL

SM 97 PL RETENTION

✓RDY–FOR–LAT 1,2 (four) – '0'
✓LAT 1,2 (four) – '0'
✓REL 1,2 (four) – '1'

* If any LAT msw shows '1,' expect *
* single motor time (60 sec) *

A6U PL RETEN LOGIC PWR SYS 1,2 (two) – ON
R13L BAY MECH PWR SYS 1,2 (two) – ON

Note any single motor times (>30 sec)

A6U PL RETEN LAT 1,2 (two) – LAT (tb–LAT), 60 sec max
PL RETEN LAT 1,2 (two) – OFF
LOGIC PWR SYS 1,2 (two) – OFF
R13L BAY MECH PWR SYS 1,2 (two) – OFF

Notify MCC, CLOSEOUT complete

CONTINGENCY OPS

I

CONT OPS

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IUS EMERGENCY DEPLOY

Perform activities in sequence:

[M] = MANDATORY items: Must be successfully completed for deploy

[ ] = Items which enhance mission capabilities: Attempt and press

An '*' next to any item indicates CDR/PLT activities that can be performed SIMO with MS activities

- [M] ACTIVATE PCP, 2–2
- [ ] POWER UP AXAF, 2–2 (mission success)
- [ ] FLOAT IUS S/C BATTS ON LINE, 2–3 (mission success)
- [ ] AXAF COMM ACT, 2–4 (mission success)
- [ ] SSP C/O AND ENABLE IUS ANT, 2–10
- [M] **ACTUATOR ENGAGEMENT**, 3–6

- [M] PRLA RELEASE, 4–4
- [M] RAISE TO 29°, 4–5
- [ ] IUS XMTR ON (CIU CMD 33) [12C11] – CIU COMMAND DEFINITION (Cue Card)
- [ ] IUS TO 16 KBPS (CIU CMD 37) [12H11] – CIU COMMAND DEFINITION (Cue Card)

* [M] **MNVR TO DEPLOY ATTITUDE**, 4–3 (simo with other ops if on VRCS)

* [ ] ENABLE RNDZ NAV, 5–2

- [ ] XFER IUS TO INT PWR, 5–2 (mission success)
- [ ] DEADFACE UMBILICALS, 5–3
- [M] RELEASE UMBILICALS, 5–5
- [M] RAISE TO 58° (min: 42°), 5–5

* [M] OMS SEP BURN PREP, 5–7

* [M] –X BACKOFF MNVR PREP, 5–7

* [ ] XFER ORB SV TO TGT, 5–8

- [M] ORBITER TO FREE DRIFT, 5–8

- [M] **DEPLOY IUS**, 5–9
- [ ] **IUS/PI LOCK**, 4–11

- [M] OMS BURN PREP, 6–3
- [M] OMS BURN PRECHECKS, 6–3

IUS EMERGENCY DEPLOY (Cont)

M LOAD OMS TGT AND BURN DATA
(mnvr at D + 2:30), 6–3
M OMS BURN EXEC (when in Att), 6–4
M POST OMS BURN RECONFIG, 6–5
M MNVR TO PROTECT ATTITUDE, 6–7

DEPLOY WAVEOFF

1. Maintain deploy attitude,

CDR DAP: A/AUTO/VERN(ALT,LO Z)

2. If umbilicals attached, transfer IUS/AXAF to orbiter pwr:

MS1 L10 IUS CONV PWR PRI(ALT) – ON (mom)
✓PRI,ALT tb (two) – gray
PWR PRI(ALT) – ON (mom)
✓PRI,ALT tb (two) – gray
A FEED PRI(ALT) – ON (mom)
✓PRI,ALT tb (two) – gray
BUS A BATT PRI(ALT) – STAGE I & II OFF (mom)
✓PRI,ALT tb (two) – bp
B FEED PRI(ALT) – ON (mom)
✓PRI,ALT tb (two) – gray
BUS B BATT PRI(ALT) – STAGE I & II OFF (mom)
✓BUS B BATT PRI,ALT tb (two) – bp

Record MET ____/____:____:____

MS3 SM 200 IUS

IUS POWER	A	B
✓SOURCE	ASE/ASE	
AV BUS		
✓VOLTS	30.5–31.5/30.5–31.5	
✓AMPS	11.9–17.9/8.4–14.4	
✓UTIL V	0.0/0.0	

MS1 L10 S/C REG PWR PRI(ALT) – ON (mom)
✓PRI,ALT tb (two) – gray

Record MET ____/____:____:____

MS3 CRT ✓S/C POWER SOURCE – STG1
✓BUS VOLTS: 31.0–33.0
✓AMPS: 3.6–51.6

Notify MCC of pwr transfer times

3. REACTIVATE ASE HEATERS

MS1 L10 IUS HTRS BATT PRI(ALT) – ON (mom)
✓PRI,ALT tb (two) – gray
CRITICAL PRI(ALT) – ON (mom)
✓PRI,ALT tb (two) – gray

IUS COARSE ATTITUDE ALIGNMENT

CDR ✓DAP A set to A1 or A9
DAP: A/INRTL/VERN(PRI)

GNC UNIV PTG
✓Rates ≤ 0.01 deg/sec (VERN)
≤ 0.1 deg/sec (PRI)

MS3 SM 200 IUS
NAV SV/ATT XFER – ITEM 1 EXEC (*)
RF CONFIG A
✓CMD MOD – *

MS1 L11 ✓MDM ERR GPC lt – off

* If MDM ERR GPC lt on: *
* CMD GEN CLEAR pb – push *
* *
* If MDM ERR GPC lt still on: *
CRT * NAV SV/ATT XFER – ITEM 1 EXEC *
* (no *) *
L11 * CMD GEN CLEAR pb – push *
CRT * NAV SV/ATT XFER – ITEM 1 EXEC *
* (*) *
L11 * CMD GEN CLEAR pb – push *
* *
* If MDM ERR GPC lt still on, perform *
* 1.2a RECOVERY FROM MDM ERROR *
* GPC/UPLINK LT (PL SYS, IUS/AXAF *
* MALS) *

Send CIU CMD 10, 1C001
If in 64 KBPS, then
✓CMD WORD ind – XX within 5 sec
X1 – Successful
X0 – Unsuccessful

MS3 CRT ✓NAV ATT ACCEPT – (*)
Record MET ____/____:____:____

NAV SV/ATT XFER – ITEM 1 EXEC (no *)

CDR DAP: A/AUTO/VERN(PRI)

Notify MCC of time of Coarse Align

MANUAL PWRDN

NOTE
Both IUS STBY buses will remain on

Expect ‘S62 PDI DECOM FAIL’ msg

1. If IUS on internal pwr:

MS1 L10

IUS BUS
A BATT PRI(ALT) – STAGE I & II OFF (mom)
✓PRI,ALT tb (two) – bp
B BATT PRI(ALT) – STAGE I & II OFF (mom)
✓PRI,ALT tb (two) – bp

Record MET ____/____:____:____

If IUS on orbiter pwr:
IUS NORM BUS PWR PRI(ALT) – OFF (mom)
✓PRI,ALT tb (two) – bp

Record MET ____/____:____:____

2. Notify MCC of pwrdn times

RECOVERY FROM PWRDN

✓PLBDs – op

MS1 L10 IUS AUTO SHUTDN PRI(ALT) – OFF (mom)
✓PRI,ALT tb (two) – bp

B FEED PRI(ALT) – OFF (mom)
✓PRI,ALT (two) tb – bp

* TIME CRITICAL *

Turn B FEED – ON within 2 sec of NORM BUS PWR – ON

IUS NORM BUS PWR PRI(ALT) – ON (mom)
B FEED PRI(ALT) – ON (mom)
✓NORM BUS PWR PRI,ALT tb (two) – gray
✓B FEED PRI,ALT tb (two) – gray

Record MET ____/____:____:____

L11 ✓VCC–OCTAL ind – CL

✓PL LK – HDLN 64 KBPS

CDR ✓DAP A set to A1 or A9
DAP: A/INRTL/VERN(PRI)

GNC UNIV PTG
✓Rates ≤ 0.01 deg/sec (VERN)
≤ 0.1 deg/sec (PRI)

MS1 L12 ✓cb PL TIMING BUFF – cl

MS3 SM 200 IUS
NAV SV/ATT XFER – ITEM 1 EXEC (*)

RF CONFIG A
✓CMD MOD – *

MS1 L11 ✓MDM ERR GPC lt – off

* If MDM ERR GPC lt on: *
* CMD GEN CLEAR pb – push *
* *
* If MDM ERR GPC lt still on: *
CRT * NAV SV/ATT XFER – ITEM 1 EXEC *
* (no *) *
L11 * CMD GEN CLEAR pb – push *
CRT * NAV SV/ATT XFER – ITEM 1 EXEC *
* (*) *
L11 * CMD GEN CLEAR pb – push *
* *
* If MDM ERR GPC lt still on, go to 1.2a *
* RECOVERY FROM MDM ERROR *
* GPC/UPLINK LT (PL SYS, IUS AXAF *
* MALS) *

COARSE ATTITUDE XFER:

Send CIU CMD 10, [1C001]
✓CMD WORD ind – [XX] within 5 sec
X0 – Unsuccessful
X1 – Successful

MS3 CRT ✓NAV ATT ACCEPT – (*)
Record MET ____/____:____:____

SV TRANSFER:

MS1 L11 Send CIU CMD 21, [1A000]
✓CMD WORD ind – [XX] within 5 sec
41 – Successful
All other ind
unsuccessful

MS3 CRT ✓NAV SV ACCEPT – (*)
Record MET ____/____:____:____

NAV SV/ATT XFER – ITEM 1 EXEC (no *)

MS1 L11 REM HTRS ON:
Send CIU CMD 22, [0P279]
✓CMD WORD ind – [3]

CDR DAP: A/AUTO/VERN(PRI)

MS1 Complete PCP/CIU/SSP ACT AND C/O
(POST INSERTION)

IUS PWR KILL

WARNING
PWR KILL should be used only for mission abort or emergencies where crew safety is in jeopardy. AXAF structure will become unsafe. ✓MCC for proper orbiter attitude for AXAF propellant lines

If IUS umbilical attached:

Expect: 'S62 PDI DECOM FAIL' msg

MS1 L10 PWR KILL – KILL (mom)

✓PCP config as shown on next page

* If responses not as expected, *
* PNL MODE – ALT and repeat *
* procedure *

If IUS umbilical released:

CAUTION
Sending CMDs 50 and 51 with umb released and IUS in MSN PHASE 3 irrevocably disables IUS. No pwrup will be possible. IUS will not respond to this cmd post–dpy (MSN PHASE 5)

MS1 L10 ✓CMD PATH ENA – RF
L11 ✓PL LK – RF 16 KBPS

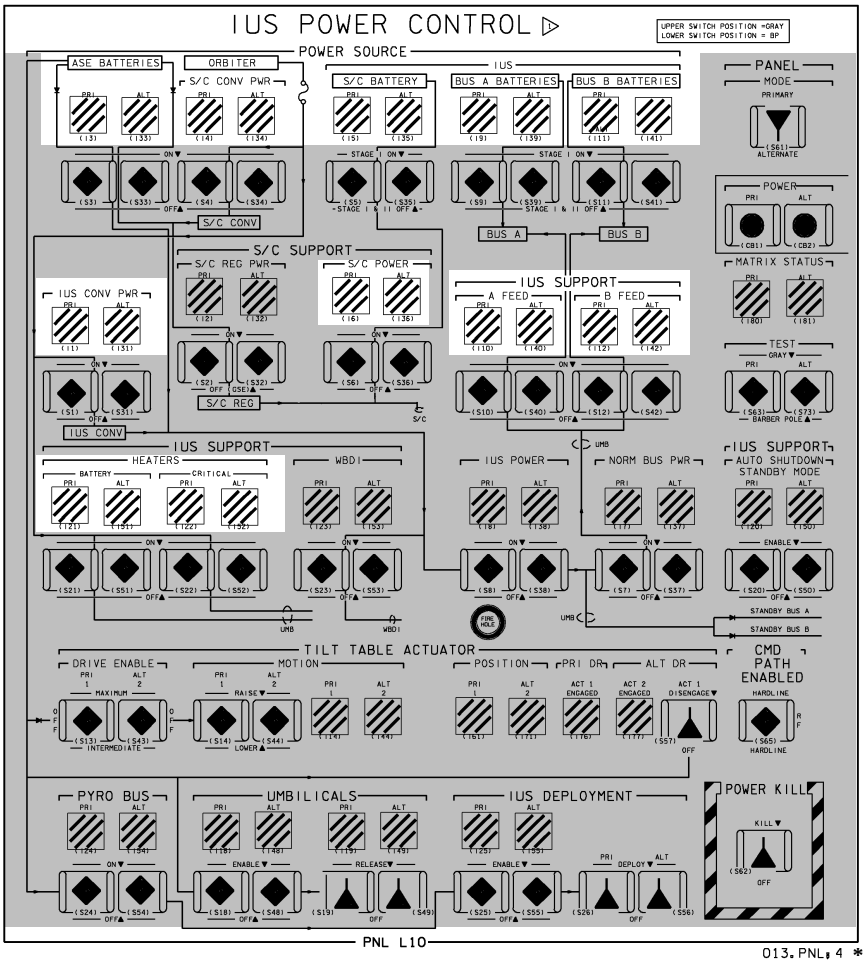
Send CIU CMD 50, 02PP9
No CIU CMD feedback

Expect 'S62 PDI DECOM FAIL'

Send CIU CMD 51, 02229
No CIU CMD feedback

CMD SOURCE – T–O UMB(A), PNL
✓VCC–OCTAL ind – nL

* If responses not as expected, *
* perform 1.2c CIU CMD *
* FAILURE (PL SYS, IUS/AXAF *
* MALS) *


IUS POWER CONTROL
UPPER SWITCH POSITION =GRAY
LOWER SWITCH POSITION = BP
POWER SOURCE
ASE BATTERIES
ORBITER
S/C CONV PWR
S/C BATTERY
IUS
BUS A BATTERIES
BUS B BATTERIES
PANEL
MODE
PRIMARY
ALTERNATE
POWER
MATRIX STATUS
TEST
GRAY
BARBER POLE
S/C CONV
BUS A
BUS B
S/C SUPPORT
S/C REG PWR
S/C POWER
S/C REG
IUS CONV PWR
IUS CONV
IUS SUPPORT
A FEED
B FEED
HEATERS
BATTERY
CRITICAL
WBDI
IUS POWER
NORM BUS PWR
AUTO SHUTDOWN
STANDBY MODE
UMB
FIRE HOLE
STANDBY BUS A
STANDBY BUS B
TILT TABLE ACTUATOR
DRIVE ENABLE
MOTION
POSITION
PRI DR
ALT DR
MAXIMUM
INTERMEDIATE
RAISE
LOWER
ACT 1 ENGAGED
ACT 2 ENGAGED
ACT 1 DISENGAGE
CMD PATH ENABLED
HARDLINE
PYRO BUS
UMBILICALS
IUS DEPLOYMENT
ENABLE
RELEASE
DEPLOY
POWER KILL
KILL
PNL L10
013.PNL;4 **

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RESTOW IUS (UMBILICAL ATTACHED)

1. IUS TO ORBITER POWER

If IUS/AXAF on orbiter pwr:

Go to step 2

If IUS on internal pwr:

MS1 L10

✓ASE BATT PRI,ALT tb (two) – gray
IUS PWR PRI(ALT) – ON (mom)
✓PRI,ALT tb (two) – gray
HTRS BATT PRI(ALT) – ON (mom)
✓PRI,ALT tb (two) – gray
CRITICAL PRI(ALT) – ON (mom)
✓PRI,ALT tb (two) – gray
✓NORM BUS PWR PRI,ALT tb (two) – gray
CONV PWR PRI(ALT) – ON (mom)
✓PRI,ALT tb (two) – gray
A FEED PRI(ALT) – ON (mom)
✓PRI,ALT tb (two) – gray
BUS A BATT PRI(ALT) – STAGE I & II OFF (mom)
✓BUS A BATT PRI,ALT tb (two) – bp
B FEED PRI(ALT) – ON (mom)
✓PRI,ALT tb (two) – gray
BUS B BATT PRI(ALT) – STAGE I & II OFF (mom)
✓BUS B BATT PRI,ALT tb (two) – bp

Record MET ____/____:____:____

MS3

SM 200 IUS

IUS POWER	A	B
✓SOURCE	ASE	ASE
AV BUS		
✓VOLTS	30.5–31.5	30.5–31.5
✓AMPS	11.9–17.9	8.4–14.4
✓UTIL V	0.0	0.0

MS1 L10

If AXAF solely on IUS battery pwr:

✓ORB S/C CONV PWR PRI,ALT tb (two) – gray
S/C REG PWR PRI(ALT) – ON
✓PRI,ALT tb (two) – gray

Record MET ____/____:____:____

MS3 CRT ✓S/C POWER SOURCE – STG1
✓BUS VOLTS: 31.0–33.0
✓AMPS: 3.6–51.6

Notify MCC of pwr transfer times

2. IUS XMTR OFF

L10 ✓CMD PATH ENA – HDLN
L11 ✓PL LK – HDLN 16(64) KBPS

Send CIU CMD 34, 12P11
No CIU CMD feedback (✓CMD REP–12E110)

MS3 SM 200 IUS
✓RF CONFIG RF POWER: 0.0

Notify MCC, IUS XMTR OFF

3. CAMERA PREP

MS3 A7U PL BAY FLOODS – as reqd

Camr setup: LOWER TILT TABLE TO –6°

4. LOWER TILT TABLE TO 0°

* If VERN failure, *
* DAP: FREE *

MS3 VTR – RCD

* If Tilt Table rates high, *
* TILT TBL MOTION PRI(ALT) – *
* RAISE (hold) *
* When PL motion stops, *
* TILT TBL DR ENA PRI(ALT) – *
* OFF *
* ✓MCC *

A6U ✓PL RETEN LAT 1,2 tb (two) – REL

MS1 L10 TILT TBL DR ENA PRI(ALT) – MAX
MOTION PRI(ALT) – LOWER
(hold until
tb–gray or
3 sec max,
start watch)
✓TILT TBL POS PRI(ALT) tb – bp

At 0° (from 29°: PRI ~3:38, ALT ~3:58),
✓TILT TBL POS PRI,ALT tb (two) – gray
✓MOTION PRI(ALT) tb – bp

Record Time ____:____

* If MOTION PRI(ALT) tb – bp prior *
* to 0° or POS tb – bp at 0°, *
* perform 1.1e PAYLOAD FAILS TO *
* RESTOW (PL SYS, IUS/AXAF *
* MALS) *

CCTV Visually verify Tilt Table at 0°
Config DAP A to A9

5. ENGAGE PRLAs

CAUTION
TILT TBL ACT DR ENA must be INTERM or MAX prior to closing PRLAs

* If TILT TBL POS tb – bp, hold *
* MOTION – LOWER while latching *
* PRLAs until TILT TBL POS tb – gray *

MS3 A6U ✓PL RETEN LAT (five) – OFF
✓PL SEL – 1
SM 97 PL RETENTION
✓LAT 1,2 (four) – '0'
✓RET 1,2 (four) – '1'

* If any LAT msw shows '1', expect *
* single motor time (60 sec) *

	A6U	PL RETEN LOGIC PWR SYS 1,2 (two) – ON
	R13L	PL BAY MECH PWR SYS 1,2 (two) – ON
		Note single motor times (>30 sec)
	A6U	PL RETEN LAT 1,2 (two) – LAT (tb–bp)
MS1	L10	✓TILT TBL MOTION PRI(ALT) tb – gray (mom)
		After ~30 sec (60 sec max):
MS3	A6U	✓PL RETEN LAT 1,2 tb (two) – OFF
		✓RDY 1,2 tb (two) – gray
		✓LAT 1,2 (two) – LAT
		PL RETEN LOGIC PWR SYS 1,2 (two) – OFF
	R13L	PL BAY MECH PWR SYS 1,2 (two) – OFF
MS1	L10	TILT TBL DR ENA PRI(ALT) – OFF
	PLT	GNC 20 DAP CONFIG
		Config DAP A to A1
		✓DAP: A/AUTO/VERN(ALT)
		DAP TRANS: NORM/NORM/NORM, no LO Z
MS3		VTR – STOP
	A7U	PL BAY FLOODS – OFF

6. IUS TO 64 KBPS

MS1	L11	✓PL LK – HDLN 64 KBPS
		If IUS TLM rate 16 KBPS, perform XFER 16 → 64 HDLN (Cue Card)

7. DESELECT RNDZ NAV

CDR		GNC UNIV PTG
		CNCL – ITEM 21 EXEC
		GNC 33 REL NAV
		RNDZ NAV ENA – ITEM 1 EXEC (no *)

CAUTION
Do NOT disengage AFTA or perform CLOSEOUT until Deorbit Prep

8. PREP FOR ACTUATOR DISENGAGE

On MCC GO:

MS1 L10 ✓cb PNL PWR PRI,ALT (two) – cl

MS3 Camr setup: ACTUATOR DISENGAGE

A7U PL BAY FLOODS – as reqd
VTR – RCD

9. PRI ACT DISENGAGE (if engaged)

MS1 L10 PNL MODE – ALT
TILT TBL ACT 1 – DISENG (mom)

CCTV ✓PRI ACT tilted up

L12 * If not disengaged, use pin pusher: *
* cb IUS SW PWR – cl *
* ACT ORD PREARM – PREARM *
* ARM – ARM (tb–gray) *
* 1 DISENG – DISENG *

L10 * ✓TILT TBL PRI ACT 1 ENGAGED *
* tb – bp *

L12 * ACT 1 DISENG – OFF *
* ORD ARM – SAFE (tb–bp) *
* PREARM – OFF *
* cb IUS SW PWR – op *

L10 PNL MODE – PRI

MS3 VTR – STOP

A7U PL BAY FLOODS – OFF

10. ALT ACT DISENGAGE (if engaged)

MS1 L12 cb IUS SW PWR – cl
ACT ORD PREARM – PREARM
ARM – ARM (tb–gray)
2 DISENG – DISENG

CCTV ✓ALT AFTA tilted up

L12 ACT 2 DISENG – OFF
ORD ARM – SAFE (tb–bp)
PREARM – OFF
cb IUS SW PWR – op

MS3 VTR – STOP

A7U PL BAY FLOODS – OFF

11. INITIAL CLOSEOUT

MS1 Perform RESTORE AXAF RF INHIBITS, 7−33

L10 IUS HTRS BATT PRI(ALT) – OFF (mom)
✓PRI,ALT tb (two) – bp
✓CRITICAL PRI,ALT (two) tb – gray

Expect: 'S62 PDI DECOM FAIL' msg

IUS A FEED PRI(ALT) – OFF (mom)
✓PRI,ALT tb (two) – bp
B FEED PRI(ALT) – OFF (mom)
✓PRI,ALT tb (two) – bp

12. FINAL CLOSEOUT

✓PLBD closed before proceeding
IUS S/C BATT PRI(ALT) – STAGE 1&2 OFF (mom)
✓PRI,ALT tb (two) – bp
S/C PWR PRI(ALT) – OFF (mom)
✓PRI,ALT tb (two) – bp
REG PWR PRI(ALT) – OFF (GSE) (mom)
✓PRI,ALT tb (two) – bp
CONV PWR PRI(ALT) – OFF (mom)
✓PRI,ALT tb (two) – bp
ASE BATT PRI(ALT) – OFF (mom)
✓PRI,ALT tb (two) – bp
IUS NORM BUS PWR PRI(ALT) – OFF (mom)
✓PRI,ALT tb (two) – bp

cb PNL PWR PRI,ALT (two) – op
✓All PCP tbs – bp

L11 CIU PWR – OFF

PLT R1 PL AUX – OFF

RESTOW IUS (UMBILICAL RELEASED)

1. IUS (PI) SETUP

MS3 A1L S–BD FM PWR – OFF
CNTL – PNL,CMD

PI SETUP:
S–BD PL CNTL – CMD
✓XMTR PWR – MED
✓CH SEL INTRG 1,2 tw(six): 906,906
✓MOD – ON
✓PWR SEL – BOTH
CNTL – PNL

SM 62 PCMMU/PL COMM
✓PL INTRG PHASE LOCK – YES
✓PL SIG STR > 1.43

SM 200 IUS

RF CONFIG	A
✓SIG STR	> 1.5
✓CAR LOCK	*
✓CMD MOD	*
✓RF POWER	> 3.3

A1L * If PI PHASE LOCK or IUS CAR LOCK not indicated, perform IUS SSR–2 IUS/ORBITER RF ACQUISITION (PL SYS, IUS/AXAF MALS) *

2. CAMERA PREP

A7U PL BAY FLOODS – as reqd

Camr setup: LOWER TILT TABLE TO –6°

3. REACTIVATE ASE HTRS

MS1 L10 IUS HTRS BATT PRI(ALT) – ON (mom)
✓PRI,ALT tb (two) – gray

4. LOWER TILT TABLE TO 0°

* If VERN failure, *
* DAP: FREE *

MS3 VTR – RCD

* If Tilt Table rates high, *
* TILT TBL MOTION PRI(ALT) – *
* RAISE (hold) *
* When PL motion stops, *
* TILT TBL DR ENA PRI(ALT) – *
* OFF *
* ✓MCC *

A6U ✓PL RETEN LAT 1,2 tb (two) – REL
MS1 L10 TILT TBL DR ENA PRI(ALT) – MAX
MOTION PRI(ALT) – LOWER
(hold until tb–gray
or 3 sec max,
start watch)
✓TILT TBL POS PRI(ALT) tb – bp

When past 29°, config DAP A to A10

At 0° (from 29°: PRI ~3:38, ALT ~3:58)
(from 58°: PRI ~7:03, ALT ~7:06):
✓TILT TBL POS PRI,ALT tb (two) – gray

✓TILT TBL MOTION PRI(ALT) tb – bp

Record time ____:____

* If MOTION PRI(ALT) tb – bp prior *
* to 0° or POS tb – bp at 0°, *
* perform 1.1e PAYLOAD FAILS *
* TO RESTOW (PL SYS, IUS/AXAF *
* MALS) *

CCTV Visually verify Tilt Table at 0°

Config DAP A to A9

5. ENGAGE PRLAs

CAUTION
TILT TBL ACT DR ENA must be INTERM or MAX prior to closing PRLAs

∗ If TILT TBL POS tb – bp, hold ∗
∗ MOTION – LOWER while latching ∗
∗ PRLAs until TILT TBL POS tb – gray ∗

MS3 A6U ✓PL RETEN LAT (five) – OFF
✓PL SEL – 1
SM 97 PL RETENTION
✓LAT 1,2 (four) – '0'
✓RET 1,2 (four) – '1'

∗ If any LAT msw shows '1', expect ∗
∗ single motor time (60 sec) ∗

A6U PL RETEN LOGIC PWR SYS 1,2 (two) – ON
R13L BAY MECH PWR SYS 1,2 (two) – ON

Note single motor times (>30 sec)

A6U PL RETEN LAT 1,2 (two) – LAT (tb–bp)

MS1 L10 ✓TILT TBL MOTION PRI(ALT) tb – gray (mom)

After ~30 sec (60 sec max):
MS3 A6U ✓PL RETEN LAT 1,2 tb (two) – OFF
✓RDY 1,2 tb (two) – gray
✓LAT 1,2 (two) – LAT
LOGIC PWR SYS 1,2 (two) – OFF
R13L BAY MECH PWR SYS 1,2 (two) – OFF
MS1 L10 TILT TBL DR ENA PRI(ALT) – OFF

PLT GNC 20 DAP CONFIG
Config DAP A to A1

✓DAP: A/AUTO/VERN(ALT)
DAP TRANS: NORM/NORM/NORM, no LO Z

MS3 VTR – STOP

A7U PL BAY FLOODS – OFF

6. DESELECT RNDZ NAV

CDR GNC UNIV PTG

CNCL – ITEM 21 EXEC

GNC 33 REL NAV

RNDZ NAV ENA – ITEM 1 EXEC (no *)

* If Super * Zip cable will be installed, *
* perform SUPER * ZIP EVA CABLE *
* (EVA, CABLE INSTALL) *

CAUTION
Do NOT disengage AFTA or perform CLOSEOUT until Deorbit Prep

UMBILICAL BOOM SEP FAIL

1. Maintain deploy attitude:

CDR DAP: A/AUTO/VERN(ALT,LO Z)

2. Visually verify BOTH umbilical plugs have separated. If not, ✓MCC

3. HTR RECONFIG

MS1 L10 IUS HTRS BATT PRI(ALT) – ON
✓PRI,ALT tb (two) – gray

4. LOWER TILT TABLE 2°

* If VERN failure, *
* DAP: FREE *

WARNING
Do NOT lower Tilt Table < 45°

TILT TBL DR ENA PRI(ALT) – INTERM
MOTION PRI(ALT) – LOWER (hold until MOTION PRI(ALT) tb–gray or 3 sec max, start watch)

10 sec after MOTION tb – gray,
TILT TBL DR ENA PRI(ALT) – OFF

MS3 VTR – STOP
Camr setup: DEPLOY

* If VERN failure, *
* DAP: A/AUTO/ALT, LO Z *

5. ENABLE DEPLOY CIRCUITRY
Perform IUS–DEPLOY ENABLE CIRCUITRY RECOVERY (PL SYS, IFM)

Notify MCC when complete

> WARNING
> Do NOT deploy if rates > 0.05°/sec

Return to OMS SEP BURN PREP (DEPLOY OPS), step 8

LOSS OF COMM

NOTE

Proceed with this procedure only if no joy on COMM LOST (Mult Pnls) (ORB PKT, COMM)

1. CONFIG CIU/IUS FOR 64 KBPS
   Perform XFER 16 → 64 HDLN (Cue Card)

2. CONFIG IUS RF DNLK

MS1 L12 ✓IUS RF ANT ENA tb – gray
✓DSBL tb – bp

L11 ✓PL LK – HDLN 64 KBPS

L10 ✓CMD PATH ENA – HDLN

If IUS DNLK OFF:

L11 Send CIU CMD 33, 12C11
No CIU CMD feedback (✓CMD REP–12B110)

IUS TLM VIA PSP

1. IUS SETUP and IUS TLM to 16K

MS1 L11 If CIU CMD OK:
- If DNLK OFF:
  - Send CIU CMD 33, 12C11
  - No CIU CMD feedback
- If IUS in 64K:
  - XFER 64 → 16 HDLN (Cue Card)
- If IUS in RF 16K:
  - PL LK – HDLN 16 KBPS

If NO CIU CMD:

MS3 A1L ✓S–BD PL CNTL – CMD
PWR SEL – PSP
CNTL – PNL,CMD

MS1 L10 CMD PATH ENA – RF

L11 ✓PL LK – HDLN 16 KBPS

Notify MCC & proceed – CSTC will cmd IUS DNLK on and 64 → 16 (if reqd)

2. IUS PDI/PSP SETUP

MS3 SM 62 PCMMU/PL COMM

SEL DECOM – ITEM 9 +4(3) EXEC
INPUT – ITEM 12 +6 EXEC
LOAD – ITEM 13 EXEC

✓PDI config:

DECOM	INPUT	FMT	FDA ENA	PAYLOAD
4(3) 5–FPM	6	5(15)↑ 502(501)	*	IUS 16K

✓I/O RESET PSP 1(2) – ITEM 6(7) EXEC(*)

Notify MCC to XMIT IUS PSP CMD LOAD

3. PI SETUP

MS3 A1R S–BD FM PWR – OFF
CNTL – PNL,CMD

A1L ✓S–BD PL CNTL – CMD
PWR SEL – BOTH

If CIU CMD OK:
S–BD PL CH SEL INTRG 1,2 tw (six):
906,906
MOD – ON
If NO CIU CMD:
S–BD PL CH SEL INTRG 1,2 tw (six):
261,261
MOD – OFF
XMTR PWR – LO

At MCC GO:
S–BD PL CNTL – PNL,CMD
✓S/S > 1.43

CRT ✓PSP SYNC BIT – YES
✓FRAME – YES

* If PSP SYNC BIT or FRAME – NO, *
* perform 2.5a PSP BIT AND/OR FRAME *
* SYNC LOCK FAIL (MAL, COMM) *

✓No '↑' on PDI DECOM 4(3)

4. CMD PATH CONFIG
If no CIU CMD:
MS1 L10 At RTS AOS: CMD PATH ENA – RF
At RTS LOS: CMD PATH ENA –
HDLN
If CIU CMD OK:
CMD PATH ENA – as reqd during
cmding
– HDLN when not
cmding

If RTS cmding desired:
MS3 A1L ✓S–BD PL CNTL – CMD
CH SEL INTRG 1,2 tw (six):
261,261
MOD – OFF
XMTR PWR – LO

At RTS AOS:
S–BD PL CNTL – PNL,CMD

MS1 L10 CMD PATH ENA – RF

NOTE
May receive 'S62 PDI DECOM FAIL' msg at RTS AOS due to Doppler Shift. PI will reacquire with no action

At RTS LOS:
CMD PATH ENA – HDLN

MS3 A1L ✓S–BD PL CNTL – CMD
CH SEL INTRG 1,2 tw (six): 906,906
MOD – ON
XMTR PWR – MED
CNTL – PNL,CMD

CIU CMD VIA RF WHILE IUS TLM VIA PSP (if reqd)

NOTE
TLM will be lost while
PL LK – RF 16 KBPS selected

Expect 'S62 PDI DECOM FAIL' msg

MS1 L11 PL LK – RF 16 KBPS
L10 CMD PATH ENA – RF

L11 Send CMD via CIU

PL LK – HDLN 16 KBPS

RTS CMDING SETUP

MS1 L11 1. ✓PL LK – HDLN 16(64) KBPS
L12 ✓IUS RF ANT ENA tb – gray
✓DSBL tb – bp

2. If PI set up for IUS:
S–BD PL CNTL – CMD
MS3 A1U PWR SEL – PSP
CNTL – PNL,CMD

3. If IUS DNLK off,
MS1 L10 ✓CMD PATH ENA – HDLN

L11 Send CIU CMD 33, 12C11
No CIU CMD feedback (✓CMD REP–12B110)

MS3 SM 200 IUS
✓RF POWER: > 3.3

MS1 L10 4. ✓CMD PATH ENA – RF

Notify MCC, RTS CMDING SETUP complete

IUS THROUGHPUT CMDING

MS1 L11 CMD SOURCE – MDM
✓PL LK – HDLN 64(16) KBPS (RF 16 KBPS)

✓VCC–OCTAL ind – CL

L10 ✓CMD PATH ENA – HDLN(RF)

Notify MCC, configured for throughput cmding

When MCC reports POCC cmding complete,
L11 CMD SOURCE – PNL

ENGAGE ALT AFTA

If primary AFTA uncoupled, engage alternate:

MS1 L10 PNL MODE – ALT
TILT TBL DR ENA ALT – INTERM
MOTION ALT – RAISE (hold until tb–gray or 3 sec max, start watch)

At 29° (5:28), when POS tb – gray and MOTION tb – bp:
TILT TBL DR ENA ALT – OFF
– MAX
MOTION ALT – RAISE (hold until tb–gray or 3 sec max, start watch)

At 58° (~3:08) when motion tb – bp:
✓TILT TBL ALT ACT ENGAGED tb – gray
DR ENA ALT – OFF

PNL MODE – PRI

Return to DEPLOY COUNTDOWN, step 10 (DEPLOY OPS)

IUS OVERNIGHT CONFIG

If reqd, perform XFER 16 → 64 (Cue Card)

MS1 L10 ✓CMD PATH ENA – HDLN

L11 CMD SOURCE – MDM

Go to AXAF COMM ACT (POST INSERTION OPS)

ASE CRU TEST

1. PRECHECKS

MS1 L10
✓IUS CONV PWR PRI,ALT tb (two) – gray
✓S/C CONV PWR PRI,ALT tb (two) – gray
✓IUS S/C BATT PRI,ALT tb (two) – gray
✓PWR PRI,ALT tb (two) – gray

MS3
SM 200 IUS

IUS POWER	A	B
AV BUS ✓VOLTS	30.5–31.5	30.5–31.5

* If AV BUS VOLTS less than 30.5, *
* ✓MCC *

Perform following steps with little delay as possible

2. ASE CRU TEST

MS1 L10
ASE BATT PRI(ALT) – OFF (mom)
✓PRI,ALT tb (two) – bp

MS3 CRT
SC POWER
✓BUS VOLTS: 31.0–33.0

If S/C BUS VOLTS 31.0–33.0:

MS1 L10
ASE BATT PRI(ALT) – ON (mom)
✓PRI,ALT tb (two) – gray

* If S/C BUS VOLTS not 31.0–33.0: *
* S/C REG PWR PRI(ALT) – OFF (mom) *
* ✓S/C REG PRI,ALT tb (two) – bp *
* ASE BATT PRI(ALT) – ON (mom) *
* ✓PRI,ALT tb (two) – gray *

NOTE
If S/C BUS VOLTS less than 31.0, burn opportunities available are Rev 6 and 7 only

MS3 CRT

IUS POWER	A	B
AV BUS ✓VOLTS	30.5–31.5	30.5–31.5

Notify MCC, ASE CRU test complete

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RESTORE AXAF RF INHIBITS

MS1 L12

A SIDE:
cb RF A–SIDE SW PWR – cl
RF A–SIDE PWR – ON (tb–UP)

RF A–SIDE RESET – RESET (mom)
✓A–SIDE XMTR RLY tb – bp
✓PWR AMP RLY tb – bp

RF A–SIDE PWR – OFF (tb–bp)
cb RF A–SIDE SW PWR – op

B SIDE:
cb RF B–SIDE SW PWR – cl
RF B–SIDE PWR – ON (tb–UP)

RF B–SIDE RESET – RESET (mom)
✓B–SIDE XMTR RLY tb – bp
✓PWR AMP RLY tb – bp

RF B–SIDE PWR – OFF (tb–bp)
cb RF B–SIDE SW PWR – op

ORB

LOSS OF FRCS DEPLOY

ORB

Make following changes to nominal deploy procedures:

1. Verify fwd manf closed:
   GNC 23 RCS
   ✓FWD MANF 1,2,3,4,5 STAT OVRD – CL

O16 ✓RJD L5/F5/R5 DRIVER – OFF

NOTE
All DAPs will default to TAIL only

2. No VERN or LO Z DAP capability exists
   Select ALT and NORM Z for all DAP callouts

3. Raise(lower) Tilt Table in Free Drift

4. Post deploy, remain in Free Drift until actual deploy + 1:00, then:
   DAP: B1/INRTL/PRI

5. At actual deploy + 5:00, go to Free Drift, then:
   AFT THC +X(out) 14 sec (4 fps) monitor +pitch (tail up) ~.3°/sec
   When IUS near orbiter tail,
   DAP: B1/INRTL/PRI

[M] FRCS SEP MNVR

NOTE

Procedure replaces step 1, OMS BURN PREP, thru step 5, POST OMS BURN RECONFIG, of SEP MNVR (POST–DPY OPS)

[M] 1. FRCS BURN PREP

O14:F, O15:F, O16:F — ✓Primary RJD DRIVER (eight) – ON

O14:E, O15:E, O16:E — ✓cb DDU (six) – cl

[M] 2. FWD RCS SYSTEM CHECK

O3 — ✓FWD RCS OX,FU PRESS > 190 psia

✓He PRESS > 456 psia

O8 — ✓FWD RCS He PRESS A(B) – GPC (tb–OP)

✓B(A) – CL (tb–CL)

[M] 3. MNVR TO BURN ATTITUDE

CNCL – ITEM 21 EXEC

[GNC UNIV PTG]

TRK OPTION:

TGT ID +2

BODY VECTOR +5

	+Beta	–Beta
P	+190.0	+191.0
Y	+287.0	+ 73.0
OM	+270.0	+ 90.0

DAP: B1/AUTO/PRI

✓DAP TRANS: NORM/NORM/NORM, LO Z

+07:00> Initiate TRK
M (+02:30)
+10:15 Expect: 'S200 TIME EVENT COLA' msg
'S200 TIME EVENT ROWA' msg

M 4. LOAD SEP TGT DATA
GNC, OPS 202 PRO

GNC ORBIT MNVR EXEC
Enter or verify MIN SEP TGT DATA per
SEP BURN PAD, 7–42

* If actual deploy time more than 1 min late, change TIG to actual deploy time + 15 min *

LOAD – ITEM 22 EXEC
TIMER – ITEM 23 EXEC

Perform burn in current Att;
ignore computed Att

* If TIG slip or unable to accomplish MIN SEP: *
* DAP: LVLH *
* GNC, OPS 201 PRO *
* DAP: AUTO *
* Determine min delta V reqd using new TIG: *

	MIN SEP 10 fps	TIG SLIP 15 fps	MASTER SAFE
TIG relative to nom dpy +	15	31	39

* Repeat step 4 for new TIG, and targets from SEP BURN PAD, 7–42 *

* If new TIG indicates 'MASTER SAFE' or unable to accomplish min delta V reqd: *
* Xmit Master Safe and RCS ENA: *
* Send CIU CMD 77, 03PH1 *
* Send CIU CMD 52, 05121 *
* ✓CMD WORD ind – 1_100 *
* Notify MCC *
* Perform IUS SSR–1 RECOVERY FROM MASTER SAFE 9 (PL SYS, IUS/AXAF MALS) *

5. FRCS BURN EXEC

M (When in attitude load current time + 5 min & Exec Burn)

TIG–3:00

ADI ERROR – MED
RATE – MED
ATT – LVLH
✓ATT

	+Beta	–Beta
R	+ 90.0	+270.0
P	+163.0	+163.0
Y	+350.0	+ 10.0

F7,F8

FLT CNTLR PWR (two) – ON
DAP TRANS: NORM/PULSE/PULSE, no LO Z

TIG–0:30>

DAP: B1/INRTL/PRI
ADI ATT – REF
ATT REF pb – push
✓VGOs per SEP BURN PAD, 7–42

TIG

THC: Trim VGOs (< 0.2 fps)

M 6. POST BURN RECONFIG

F7,F8

FLT CNTLR PWR (two) – OFF
GNC, OPS 201 PRO

GNC UNIV PTG
CNCL – ITEM 21 EXEC
DAP: B1/AUTO/PRI

O14:E, O15:E, O16:E

✓cb DDU (six) – as reqd

Return to SEP MNVR, step 6 (POST–DPY OPS)

AFT RCS SEP MNVR

NOTE

Procedure replaces step 1, OMS BURN PREP, thru step 5, POST OMS BURN RECONFIG, of SEP MNVR (POST–DPY OPS)

M 1. AFT RCS BURN PREP

CDR: GNC UNIV PTG

CNCL – ITEM 21 EXEC

GNC, OPS 202 PRO

PLT: 1: GNC ORBIT MNVR EXEC

2: GNC SYS SUMM 2

M 2. AFT RCS/OMS SYSTEM CHECK

If I'CNCT: L(R) OMS to RCS

CDR F7: ✓OMS PRESS He TK P L,R > 1500 psia

O3: ✓L,R OMS OX,FU PRESS > 234 psia

DAP: FREE

O7: AFT L,R RCS TK ISOL (six) – CL (tb–CL)

XFEED (four) – OP (tb–OP)

O8: ✓L,R OMS He PRESS VAP/ISOL (four) – CL

✓TK ISOL A,B (four) – OP (tb–OP)

✓XFEED A (two) – CL (tb–CL)

✓XFEED B – OP (tb–OP)

DAP: as reqd

GNC 23 RCS

OMS PRESS ENA, L(R) OMS – ITEM 5(6) EXEC

If no I'CNCT:

O3: ✓L,R RCS OX,FU PRESS > 190 psia

✓He PRESS > 456 psia

O7: ✓AFT L,R RCS He PRESS A(B) (two) – GPC (tb–OP)

✓AFT L,R RCS He PRESS B(A) (two) – CL (tb–CL)

✓AFT L,R RCS TK ISOL (six) – OP
(tb–OP)
✓XFEED (four) – CL
(tb–CL)

M 3. LOAD TGT DATA AND MNVR

O14:F, O15:F, O16:F ✓Primary RJD DRIVER (eight) – ON

CRT1 ✓BURN DATA per Burn Pad

* If actual deploy time more than *
* 1 min late, change TIG to *
* actual deploy time + 15 min *

LOAD – ITEM 22 EXEC
TIMER – ITEM 23 EXEC

DAP: B1/AUTO/PRI
✓DAP TRANS: NORM/NORM/NORM, LO Z

CDR CRT
+07:00> MNVR – ITEM 27 EXEC (*)
M (+02:30)

+10:15 Expect: 'S200 TIME EVENT COLA' msg
'S200 TIME EVENT ROWA' msg

4. AFT RCS BURN EXEC

M (When in attitude, load current time + 5 min and Exec Burn)

F7,F8 FLT CNTLR PWR (two) – ON

O14:E, O15:E, O16:E ✓cb DDU (six) – cl

TIG–3:00 ADI ERROR – MED
RATE – MED
ATT – INRTL

DAP: B1/INRTL/PRI
DAP TRANS: NORM/NORM/NORM,
no LO Z

IF I'CNCT

TIG –2:00 L(R) OMS He PRESS/VAP ISOL A – OP

✓BURN ATT then,
F6 ADI ATT – REF
ATT REF pb – push

* If TIG slip or unable to accomplish MIN SEP: *
*
* Determine min delta V reqd using new TIG: *

	MIN SEP 10 fps	TIG SLIP 15 fps	MASTER SAFE
TIG relative to nom dpy + 15	31	39	

*
* Repeat step 3 for new TIG, and targets from SEP *
* BURN PAD, 7–42 *
*
* If new TIG indicates 'MASTER SAFE' or unable *
* to accomplish min delta V reqd: *
* Xmit Master Safe & RCS ENA: *
* Send CIU CMD 77, 03PH1 *
* Send CIU CMD 52, 05121 *
* ✓CMD WORD ind – 1_100 *
* Notify MCC *
* Perform IUS SSR–1 RECOVERY FROM *
* MASTER SAFE 9 (PL SYS, IUS/AXAF_MALS) *

At TIG, deflect THC (+X), null VGOs

F6 ✓ATT ERR ± 3°

(Cutoff)> Release THC
DAP TRANS: PULSE/PULSE/PULSE
Trim all axes residuals < 0.2 fps

M 5. POST RCS BURN RECONFIG
GNC, OPS 201 PRO

F7,F8 FLT CNTLR PWR (two) – OFF

O14:E, O15:E, O16:E cb DDU (six) – as reqd

IF I'CNCT RETURN

DAP: FREE

GNC 23 RCS
OMS PRESS ENA, OFF – ITEM 7 EXEC

O8 L,R OMS XFEED (four) – CL (tb–CL)
He PRESS/VAP ISOL A – CL

O7 AFT L,R RCS
✓He PRESS A(B) (two) – GPC (tb–OP)
✓B(A) (two) – CL (tb–CL)
XFEED (four) – CL (tb–CL)
TK ISOL (six) – OP (tb–OP)

DAP: B1/AUTO/PRI

Return to SEP MNVR (POST DPY OPS), step 6

SEP BURN PAD			FRCS	AFT RCS
ALL BURNS	*TGT DATA*	**RCS SEL 4** **5 TV ROLL** **9 WT** **10 TIG**	* N/A 210000 D + 15	* { 90 (+BETA) 270 (–BETA) 210000 D + 15
MIN SEP	*TGT DATA*	**TGT PEG 7** **19 VX** **20 VY** **21 VZ**	 +0009.7 +000.0 +002.6	 +0009.7 +000.0 +002.6
	BURN DATA	**VGO X** **VGO Y** **VGO Z**	–0009.88 +000.0 +001.81	+0009.9 +000.0 +001.9
NOM SEP	*TGT DATA*	**TGT PEG 7** **19 VX** **20 VY** **21 VZ**	 +0029.9 +000.0 +008.0	 +0029.9 +000.0 +008.0
	BURN DATA	**VGO X** **VGO Y** **VGO Z**	–0030.45 +000.0 +005.57	+0030.4 +000.0 +005.9
TIG SLIP	*TGT DATA*	**TGT PEG 7** **19 VX** **20 VY** **21 VZ**	 +0014.5 +000.0 +003.9	 +0014.5 +000.0 +003.9
	BURN DATA	**VGO X** **VGO Y** **VGO Z**	–0014.77 +000.0 +003.9	+0014.7 +000.0 +002.8

IUS REVISIT

PET (H:M) MNVR

0:00 1. SEP, ΔVTOT ~31 fps
(ACTUAL TIG ____/____:____:____)
Set PET timer to zero counting up from TIG
✓DAP: B1/AUTO/VERN(PRI)

1:31 2. Perform NSR1 BURN, ON–ORBIT OMS BURN
(ORB OPS, OMS)
ΔVTOT ~31 fps, 2 OMS thruster

1:41 3. At MCC GO: Perform NC BURN, ON–ORBIT
RCS BURN (ORB OPS, RCS)
ΔVTOT ~19 fps, +X thruster

3:11 4. Perform NSR2 BURN, ON–ORBIT RCS BURN
(ORB OPS, RCS)
ΔVTOT ~19 fps, –X thruster

DAP: B/AUTO/PRI

3:21 5. Perform SEP2 BURN, ON–ORBIT RCS BURN
(ORB OPS, RCS)
ΔVTOT ~5 fps, +X thruster, then:

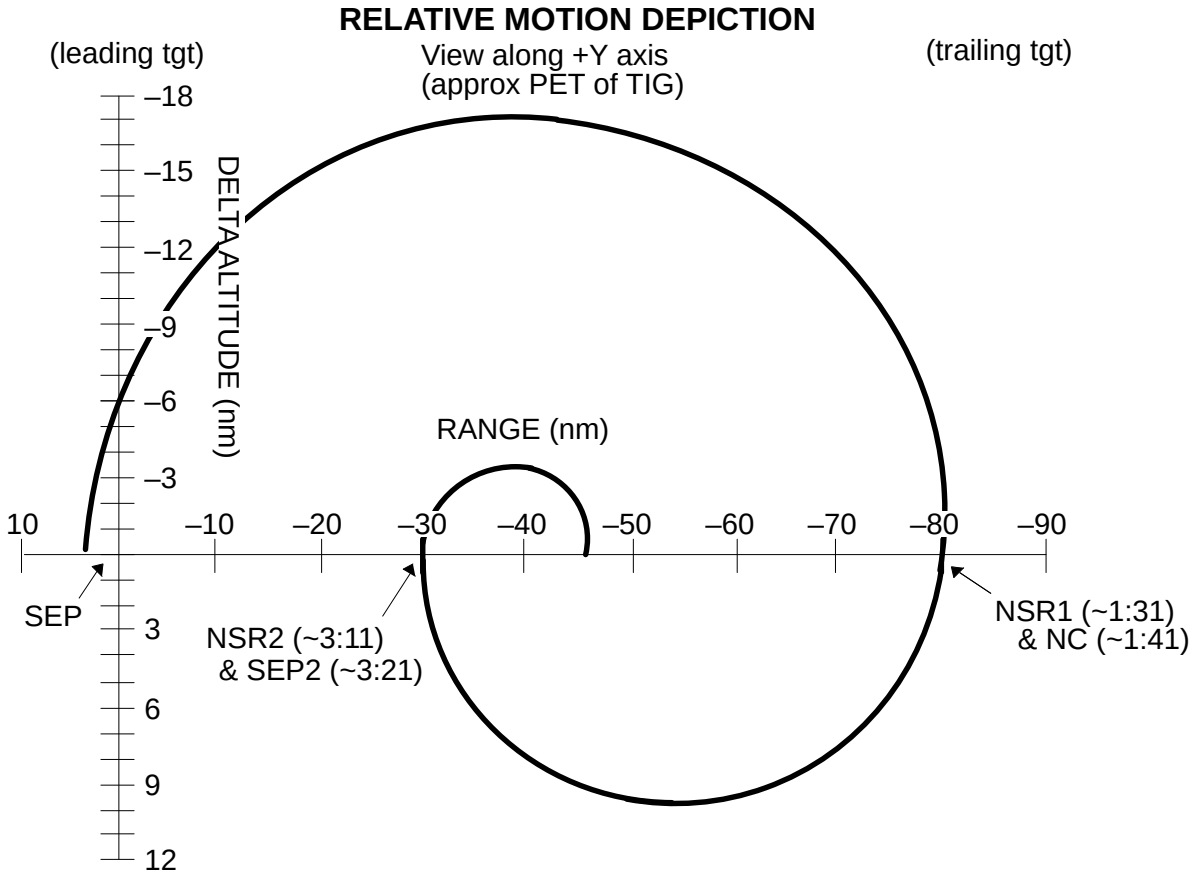
6. ESTABLISH –Z TGT TRACK
GNC UNIV PTG
TRK OPTION:
TGT ID +1
BODY VECTOR +3
OM +_ _ 0.0

✓DAP: B/AUTO/PRI
Initiate TRK

When mnvr complete,
DAP: A/AUTO/VERN

7. Perform IUS/PI LOCK (LATE CHECKS), then

Send SSR–1 RECOVERY FROM MASTER
SAFE cmds as directed by MCC (PL SYS,
IUS/AXAF MALS)


RELATIVE MOTION DEPICTION
(leading tgt)
View along +Y axis
(approx PET of TIG)
(trailing tgt)
–18
–15
–12
–9
–6
–3
DELTA ALTITUDE (nm)
RANGE (nm)
10
–10
–20
–30
–40
–50
–60
–70
–80
–90
SEP
3
6
9
12
NSR2 (~3:11)
& SEP2 (~3:21)
NSR1 (~1:31)
& NC (~1:41)

AMU/IMU SEQUENCE

Notify MCC 30 sec prior to and at each data take

1. MNVR TO AMU ATT 1
   GNC UNIV PTG
   MNVR OPTION:
   R _____
   P _____
   Y _____

   DAP: B1/AUTO/PRI

   Initiate MNVR

2. DESELECT IMU
   GNC 21 IMU ALIGN
   ✓MCC for IMU to deselect _____

3. AMU DATA TAKE #1
   When in attitude and AOS,
   DAP: B1/AUTO/VERN(PRI)

   GNC UNIV PTG
   ✓Rates ≤ 0.02 deg/sec (VERN)
   ≤ 0.1 deg/sec (PRI)

   DAP: FREE

   Record MET ____/____:____:____

   Wait 30 sec, then proceed

4. MNVR TO AMU ATT 2

F6 ADI – as reqd

CRT MNVR OPTION:
R _____
P _____
Y _____

DAP: B1/AUTO/PRI

Initiate MNVR

5. AMU DATA TAKE #2

When in attitude and AOS,
DAP: B1/AUTO/VERN(PRI)

GNC UNIV PTG

CRT ✓Rates ≤ 0.02 deg/sec (VERN)
≤ 0.1 deg/sec (PRI)

DAP: FREE

Record MET ____/____:____:____

Wait 30 sec, then proceed

6. MNVR TO AMU ATT 3

MNVR OPTION:
R _____
P _____
Y _____

DAP: B1/AUTO/PRI

Initiate MNVR

7. AMU DATA TAKE #3
When in attitude and AOS,
DAP: B1/AUTO/VERN(PRI)

GNC UNIV PTG

✓Rates ≤ 0.02 deg/sec (VERN)
≤ 0.1 deg/sec (PRI)

DAP: FREE

Record MET ____/____:____:____

Wait 30 sec, then proceed

8. PERFORM IMU ALIGN
DAP: A1/AUTO/VERN(PRI)

STAR PAIR (___)

Perform IMU ALIGN – S TRK (ORB OPS, GNC) for all IMUs, then continue

9. AMU DATA TAKE #4

✓Still in AMU attitude #3 and AOS

DAP: A1/AUTO/VERN(PRI)

GNC UNIV PTG

CRT ✓Rates ≤ 0.02 deg/sec (VERN)
≤ 0.1 deg/sec (PRI)

DAP: FREE

Record MET ____/____:____:____

Wait 30 sec, then proceed

DAP: A1/AUTO/VERN(PRI)

10. RESELECT IMU
GNC 21 IMU ALIGN
Reselect Deselected IMU

This Page Intentionally Blank

REF DATA

HALF HERTZ PARAMETERS IN 16K

SM 200 IUS

RF CONFIG A
CAR LOCK see table
CMD MOD see table

RF POWER see table

SAFETY
ISL VLV OP 2 see table

CAR LOCK	B always *	lock = *	no lock = flashing
	B always blank	lock = flashing	no lock = blank

CMD MOD	B always *	mod = *	no mod = flashing
	B always blank	mod = flashing	no mod = blank

RF POWER	A side / _____

ISL VLV OP	1 always blank	closed = blank	open = flashing
	1 always ↓	closed = flashing	open = ↓

IUS RTS COMMANDS AND COMMAND REPLICAS

Memory Load (Both Comp)	012010	64 kbps TLM Rate	122110
Memory Load (Comp B)	014010	Dnlk On B	127110
Memory Load (Comp A)	018010	Dnlk On A	12B110
Memory Dump (Com A)	01C000	16 kbps TLM Rate	12D110
Memory Dump (Comp B)	01E010	Downlink Off	12E000*
		*12E110 if cmd sent from CIU	
Encryptor On A	021D90	A Encryptor to A and B to B	131790
Avionics Stg I Batt Off	022290	Cmd Link A to B and B to A	132B90
Encryptor On B	024D90	A TLM to A and B to B	137B90
Encryptor Off A	028D90	A Encryptor to B and B to A	138790
Encryptor Off B	02DD90	Cmd Link A to A and B to B	13BB90
S/C Bus Stg I Batt Off	02EE90	A TLM to B and B to A	13EB90
Master Safe	03ED10	Medium Gain Ant Out	14E480
RCS Sys Enable	051210	Execute Task # XXX	15XXX0
Deleted (CIU CMD 53)	068210		
Ena Ord Inhibit Reset	074200	20 Watt Amp Off A	161890
Ord Inhibit Reset	08D200	Xmtr Off A	162890
		Xmtr On A	164890
RF Switch to Ant 2A & 1B	091410	20 Watt Amp On A	167190
RF Switch to Ant 1A & 1B	097810	20 Watt Amp Off B	168890
RF Switch to Ant 2A & 2B	098410	Xmtr Off B	16B890
RF Switch to Ant 1A & 2B	09E810	Xmtr On B	16D890
Ranging On	0A1810	20 Watt Amp On B	16E190
Earth Center TSM	0A2D10		
Orbiter Pointing TSM	0A7D10	S/C Discrete 8	190030
Ranging Off	0A8810	S/C Discrete 7	190050
Ground Station TSM	0ABD10	S/C Discrete 6	190090
Flight Ready	0AE140	S/C Discrete 5	190110
Predeployment C/O	0D7200	S/C Discrete 4	190210
Reset to Prelaunch	0E1700	S/C Discrete 3	190410
REM Htrs On	0E2790	S/C Discrete 2	190810
RCS Htrs On	0E4790	S/C Discrete 1	191010
Inhibit/Reset OK A	0E7B00		
REM Htrs Off	0EB790	State Vector Uplink	1A0000
RCS Htrs Off	0ED790	Attitude Uplink	1B0010
Inhibit/Reset OK B	0EEB00		
Medium Gain Ant In	0F7480	Xpndr to Coho	1C1490
		Xmtr 1.7 Carrier On	1C2490
Nav Mode #1	100000	Xmtr 1.024 Carrier On	1C4490
Nav Mode #2	100030	Xpndr to Non–Coho	1C8490
Nav Mode #3	100050	Xmtr 1.7 Carrier Off	1CB490
Nav Mode #4	100060	Xmtr 1.024 Carrier Off	1CD490
Nav Mode #5	100090		
Nav Mode #6	1000A0	SV From Comp A to B	1D0010
Nav Mode #7	1000C0	SV From Comp B to A	1D0020
Nav Mode #8	1000F0	Att From Comp A to B	1E0010
Nav Mode #9	100110	Att From Comp B to A	1E0020

IUS RTS COMMANDS AND COMMAND REPLICAS (Cont)

Nav Mode #10	100120	Ground Ops 6	3XXXX0
Nav Mode #11	100140		
Nav Mode #12	100170	Rly Mtrx Cmd M116 Extd EEC Dsbl	382010
Nav Mode #13	100180	Rly Mtrx Cmd M10/M8 TVC Pwr Off	382010
Nav Mode #14	1001B0	Rly Mtrx Cmd M104 AV ASE Pwr Off	396010
Nav Mode #15	1001D0	Rly Mtrx Cmd M109 SC ASE Pwr Off	3BF810
Nav Mode #16	1001E0	Rly Mtrx Cmd M112 SC Stg2 Bat Off	3BF810

PRE–DEPLOY CHECKOUT SEQUENCE OF EVENTS

Cues*	Time (m:ss)	Event
A TLM—0D7200—13	0:00	PDCO in progress
RF PWR – > 2.3	0:06	IUS XMTR On
U•D•R•L•	0:32	Begin Stg I–A TVC Motion
B in CNTL	0:47	Reconfig to B side
B TLM—0D7201	0:52	Switch to B–Side TLM
U•D•R•L•	1:22	Begin Stg I–B TVC Motion
A in CNTL	1:37	Reinitialize SCU A
A TLM—0D7200—12	1:42	Switch to A–Side TLM
00	1:42	PDCO complete
	2:27	Reinitialize SCU B

* Cues found on SPEC 200, CIU WORD ind, or CCTV

CIU ENTRY

CIU COMMAND TRANSMISSION

L11
- ✓VCC–OCTAL ind – [CL]
- CMD SEL tw (two) – XX
- GEN ENTER pb – push
- ✓WORD ind – [XXXXX]
- GEN SEND pb – push
- ✓WORD ind – [blank] or CMD feedback
- ✓VCC–OCTAL ind – [XX]

CIU SHIFT MODE COMMANDING

MS3		SM 200 IUS
		✓SHIFT MODE – blank
		Record NISBITS _____
MS1	L11	Send CIU CMD 14, 10011
MS3	CRT	✓NISBITS: 75
		✓SHIFT MODE – BTH
MS1	L11	Send CIU CMD xx,
		(see table, CMD WORD)
MS3	CRT	✓NISBITS – XX
		(see table, NISBITS IND 1)
MS1	L11	Send CIU CMD 15, 10012
MS3	CRT	✓NISBITS – XX
		(see table, NISBITS IND 2)
		✓SHIFT MODE – blank
MS1	L11L	Send CIU CMD 15, 10012
MS3	CRT	✓NISBITS – as recorded above

CIU CMD	TITLE	CMD WORD	NISBITS IND 1	NISBITS IND 2
23	105 NM PARK ORBIT	19101	41	01
24	130 NM PARK ORBIT	19081	42	02
25	150 NM PARK ORBIT	19041	43	03
41	RCS HTRS ON – TEST CMD	0P479	4C	0C

NIS BIT DEFINITION

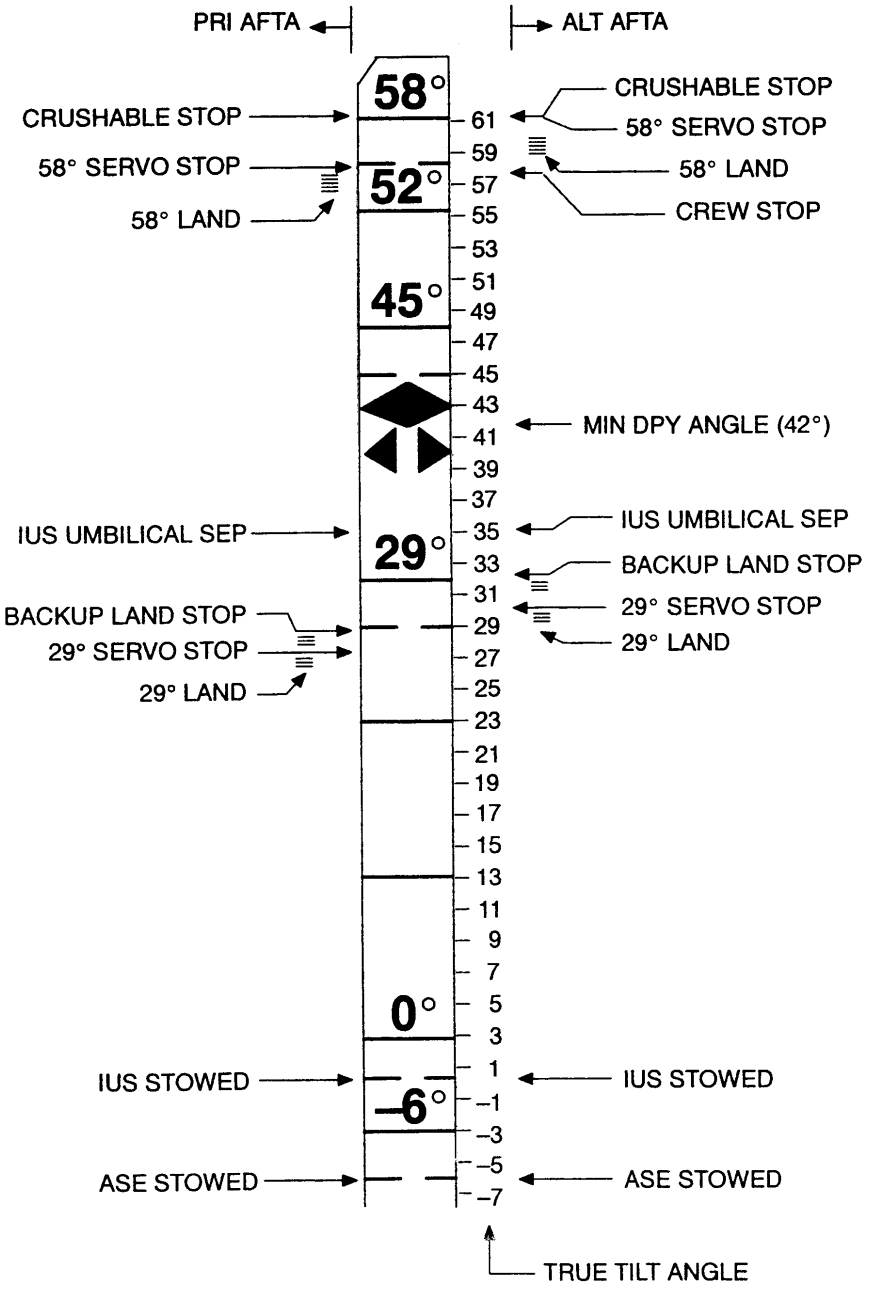
IN RESPONSE TO CMD 10 (COARSE ALIGN)
X0 → X0: Coarse align unsuccessful
X0 → X1: Coarse align successful
X1 → X0: Coarse align unsuccessful
X1 → X1: Coarse align successful if cmd received by computer. CMD REP must be 1B0010 or 1B0011

Left status digit will be 0 (no SV update) or 4 (successful SV update)

IN RESPONSE TO CMD 21 (STATE VECTOR XFER)
0X → 0X: SV update unsuccessful
0X → 4X: SV update successful
4X → 0X: SV update unsuccessful
4X → 4X: SV update successful if cmd received by computer. CMD REP must be 1A0000 or 1A0001

Right status digit will be
0 (no coarse align) or 1 (successful coarse align)

PROTRACTOR TILT INDICATION



DAP CONFIGS

DAP configs called out in this checklist are as shown below:

	A1	A9	A10	A11	B1
PRI					
ROT RATE	0.2000	0.1000	0.1000	0.1000	0.5000
ATT DB	5.00	3.00	3.00	3.00	3.00
RATE DB	0.20	0.20	0.20	0.20	0.20
ROT PLS	0.10	0.05	0.05	0.05	0.04
COMP	.000	.000	.000	.000	.000
P OPTION	ALL	TAIL	TAIL	TAIL	ALL
Y OPTION	ALL	TAIL	TAIL	TAIL	ALL
TRAN PLS	0.10	0.25	0.25	0.25	0.10
ALT					
RATE DB	0.200	0.10	0.10	0.10	0.200
JET OPT	ALL	TAIL	TAIL	TAIL	ALL
# JETS	2	2	2	2	2
ON TIME	0.08	0.08	0.08	0.08	0.08
DELAY	0.00	10.00	10.00	10.00	0.00
VERN					
ROT RATE	0.2000	0.2000	0.2000	0.2000	0.2000
ATT DB	1.000	1.000	1.000	1.000	1.000
RATE DB	.020	0.010	0.010	0.010	.020
ROT PLS	0.010	0.010	0.010	0.010	0.002
COMP	.000	.000	.000	.000	.000
CNTL ACC	0	1	2	3	0
PURPOSE	NOMINAL	IUS @ 0 deg.	IUS @ 29 deg.	IUS @ 58 deg.	NOM OMS & RCS BURNS

CIU COMMAND DEFINITION

TW SET	CMD WD DISPL	CMD NAME	NOTES	CMD FEEDBACK	CMD REP
00	88888	LAMP TEST			
01	CMD FEEDBACK	SAFETY STATUS		3 x x x x SRM 1 S&A – ARM SRM 2 S&A – ARM ORD BUS – ON RCS ISOL VLV – ENA 0 – NO LOST INHIBITS 1 – A INHIBIT 2 – B INHIBIT 3 – A&B INHIBITS	
02 – 07	00000	SPARES	NOT EXECUTABLE	NONE	
10	1C001	ORB ATTITUDE	COARSE ALIGN (NOT VALID POST–DEPLOY)	NIS BIT	1B0010
11	10000	NAV MODE 1	STBY WITHOUT FDI RST	NONE	100000
12	1000F	NAV MODE 7	NAV FLT	NONE	1000C0
13	1000U	NAV MODE 8	STBY WITH FDI RST	NONE	1000F0
14	10011	ENTER SHIFT MODE		75	100110
15	10012	EXIT SHIFT MODE		SHIFT MODE CMD ID	100120
20	10018	NAV MODE 13	NOT USED	NONE	100180

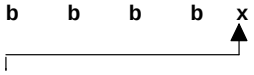
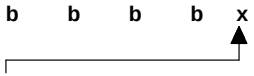
CIU COMMAND DEFINITION (Cont)

*INDICATES SHIFT MODE COMMAND

TW SET	CMD WD DISPL	CMD NAME	NOTES	CMD FEEDBACK	CMD REP
21	1A000	ORB STATE VECTOR	ONE SHOT XFER OF ORB SV TO IUS	NIS BIT	1A0000
22	OP279	REM HTRS ON		_ _ _ _ x REM HTRS 0 – A&B OFF 1 – A ON 2 – B ON 3 – A&B ON	0E2790
23	19101	S/C DISC 1	AXAF SAFETY INHIBIT REMOVAL #2–1	b b b b x 0 – NO CMD FROM PDU A OR B 1 – CMD FROM PDU A ONLY 2 – CMD FROM PDU B ONLY 3 – CMD FROM PDU A & B (shifted s/c DISC cmds will show 0)	191010
		*PO – 1	105 NM PARK ORBIT		
24	19081	S/C DISC 2	AXAF SAFETY INHIBIT REMOVAL #2–2		190810
		*PO – 2	130 NM PARK ORBIT		
25	19041	S/C DISC 3	AFAX A–SIDE RF INH REMOVAL		190410
		*PO – 3	150 NM PARK ORBIT		

CIU COMMAND DEFINITION (Cont)

***INDICATES SHIFT MODE COMMAND**

TW SET	CMD WD DISPL	CMD NAME	NOTES	CMD FEEDBACK	CMD REP
26	19021	S/C DISC 4	NOT USED	 0 – NO CMD FROM PDU A OR B 1 – CMD FROM PDU A ONLY 2 – CMD FROM PDU B ONLY 3 – CMD FROM PDU A & B (shifted s/c DISC cmds will show 0)	190210
27	19011	S/C DISC 5	AXAF SOLAR ARRAY DEPLOY ENA		190110
30	19009	S/C DISC 6	AXAF LGA DEPLOY INITIATION	 0 – NO CMD FROM PDU A OR B 1 – CMD FROM PDU A ONLY 2 – CMD FROM PDU B ONLY 3 – CMD FROM PDU A & B	190090
31	19005	S/C DISC 7	AXAF B–SIDE RF INH REMOVAL		190050
32	19003	S/C DISC 8	NOT USED		190030
33	12C11	DOWNLINK ON A	IUS XMTR ON	NONE	12B110
34	12P11	DOWNLINK OFF	IUS XMTR OFF CMD REP – 12E000 IF RTS CMD	NONE	12E110

CIU COMMAND DEFINITION (Cont)

***INDICATES SHIFT MODE COMMAND**

TW SET	CMD WD DISPL	CMD NAME	NOTES	CMD FEEDBACK	CMD REP
35	OH720	START PRE–DEPLOY C/O	NOT VALID POST–DEPLOY	_ _ _ x x TEST STATUS ↑ ↑ SIDE STATUS 0 – COMPLETE 1 – IN PROGRESS 0 – A&B OK 1 – B OK 2 – A OK 3 – A&B NOT OK	0D7200
36	1A000	ORBITER STATE VECTOR	CYCLIC (ONCE/MIN) XFER OF ORB SV TO IUS	NONE	1A0000
37	12H11	TLM 16 KBPS		NONE	12D110
40	12211	TLM 64 KBPS		NONE	122110
41	OP479	RCS HTRS ON	CREW TEST CMD	NONE	0E4790
		*RCS HTRS ON	CREW TEST CMD		
42	12711	DOWNLINK ON B	IUS XMTR B ON	NONE	127110
43	OPH79	RCS HTRS OFF		NONE	0ED790
44	0PC79	REM HTRS OFF		NONE	0EB790
45	0A2H1	GEO CENTER ANT SW	NOT VALID PRE–DEPLOY	NONE	0A2D10

CIU COMMAND DEFINITION (Cont)

***INDICATES SHIFT MODE COMMAND**

TW SET	CMD WD DISPL	CMD NAME	NOTES	CMD FEEDBACK	CMD REP
46	0ACH1	GROUND STA ANT SW	NOT VALID PRE–DEPLOY	NONE	0ABD10
47	0A7H1	ORB ANT SW	NOT VALID PRE–DEPLOY	NONE	0A7D10
50	02PP9	S/C STAGE 1 BATT OFF	PWR KILL CMDS NOT EXECUTABLE IF IUS IS IN MISSION PHASE 5	NONE	02EE90
51	02229	AV STAGE 1 BATT OFF		NONE	022290
52	05121	RCS SYS ENA	RECOVERY FROM MASTER SAFE NOT EXECUTABLE UNLESS: a. Mission Phase 5 b. CMD 77 sent post–deploy	x _ X X X ORD INH RESET ENABLE ORD INH RESET RCS SYSTEM ENABLE MASTER SAFE REC'D 0 – FALSE 1 – TRUE	051210
54	07420	ENABLE ORD INH RESET			074200
55	08H20	ORD INHIBIT RESET			08D200
77	03PH1	MASTER SAFE	IUS MSN PHASE 3 FEEDBACK TO CMD 77 IS 0_000		03ED10
53	06821	NONE	NOT EXECUTABLE	NONE	068210
56 – 76	00000	SPARES	NOT EXECUTABLE	NONE	

GO/NO–GO CRITERIA
(Post Umbilical Release Through Sep Burn)

FAILURE	GO/ABT
IUS	
AVIONICS • COMP A(B) FAILED – (*) • COMP A and B FAILED – (*) • UMB SEP A(B) – blank	 GO ABT GO ①
TT&C • CIU lost • TLM LINK lost • CMD LINK lost	 GO ABT GO

SAFETY
• SUPERZIP: 2 of 3 INH lost
• Confirmed RCS firing
• MSN PHASE 5 pre–dpy
• > 1 INH lost to:
  • SRM 1/2 FIRE ⑤
  • SC or STG SEP ⑥
	
	GO ②
	MS/EMER DPY ③
	MS/ABT ④
	
	MAL, 1.3a
	EMER DPY

AXAF NONE	

① Providing B(A) side in cntl, A(B) fail, and UMB SEP B(A) – (*)

② Do not restow

③ Perform SSR–1 post deploy

④ If Master Safe does not work, and SCU EVENT on same side, EMER DPY

⑤ 2 of 3 lost: ORD BUS A(B); SRM 1 or 2 UNSAFE A(B); FIRE RL CL A(B)

⑥ 2 of 3 lost: ORD BUS A or B; STG or SC SEP ENA A or B; MSN PHASE 5 and SCU EVENT A(B)

FAILURE	GO/ABT
ORBITER	
OMS/RCS • 1 OMS ENGINE ↓ • 2 DEORBIT SYS ↓ • OMS PROP TK LK • OMS INLET LINE LK • OMS He TK LK (< 39% OMS QTY) • FRCS ↓ • RCS LK (FWD or AFT)	 GO ⑦ GO ⑧ EMER DPY ⑨ GO ⑧ GO GO ⑩ GO ⑪
DPS • 1 GNC ↓ or RS SPLIT • PF1 ↓ or SM ↓	 GO ⑫ GO
GNC • IMU DILEMMA • 1 THC ↓	 GO GO ⑬
COMM • PDI/PI ↓	 GO

NOTE: Confirm responses with MCC if time/comm coverage permits

⑦ MIN SEP: 10 FPS (due to increased deorbit redline)

⑧ FRCS MIN SEP: 10 FPS

⑨ If tank fail capability:
EMER DPY, MIN SEP from leaking sys (if no MIN SEP – MS/RCS ENA), mnvr OOP & burn to depletion
If no tank fail capability:
EMER DPY, MS/RCS ENA, perigee adjust
If PA burn > 57 FPS, mnvr to view att and complete IUS SSR–1

⑩ Perform LOSS OF FRCS DEPLOY (CONT OPS)

⑪ Go when leak isolated. If non–isolatable:
EMER DPY, nom sep from leaking sys, mnvr OOP & burn to depletion (Prop LK) or max blowdown (He LK)

⑫ If after deploy –2 min, and freeze–dried G2 available:
Restring to single G2 and deploy
After deploy, establish redundant G2 for sep mnvr
Otherwise,
Establish redundant G2 before deploy

⑬ If RCS primary means of sep:
2 THC contacts reqd in sep axis
If RCS secondary means of sep:
1 THC contact reqd in sep axis

PRE–DEPLOY TIMELINE

MM:SS

☐ AXAF POWER UP
____/____:____:____

☐ FLOAT IUS S/C BATTS ON LINE
____/____:____:____

☐ Check deploy time
____/____:____:____

☐ Set CRT Timer

☐ TRANSFER SV
____/____:____:____

☐ MNVR TO DEPLOY ATT
A9/A/V (____/____:____:____)

☐ PRLA RELEASE

☐ Tilt Table to 29°
(PRI ~3:38, ALT ~3:58)
(____:____)

With PRLAs released:
- No OMS
- Verns
- ALT LO Z: 3°db, 0.1°/sec
- Free drift or verns for Tilt Table elevation

☐ Deploy Pad, Sep Burn Pad Update

☐ ASE CRU TEST

☐ IUS/PI LOCK

☐ ENABLE RNDZ NAV

–20:00> ☐ IUS to int pwr
____/____:____:____

☐ DEADFACE UMBILICALS

☐ Go for deploy

☐ RELEASE UMBILICALS
(NO–GO this rev if no umbilical pull attempted by deploy time)

TILT TABLE

ANGLE	RATE
≥ 42°	≤ .09 deg/sec (pitch)
	≤ .15 deg/sec (roll,yaw)
> 45°	≤ .13 deg/sec (all axes)

Wave off
Maintain Deploy Attitude

☐ OMS SEP BURN PREP

☐ RAISE TO 58° (PRI ~3:25, ALT ~3:08 (crew stop)) ____:____

☐ –X BACKOFF MNVR PREP

–01:00 ☐ XFER ORB SV to TGT

☐ Free drift/UNIV PTG ✓rates

B1/F/P
NO LO Z

0:00> ☐ Deploy ____/____:____:____

☐ Event Timer counting up from deploy

POST–DEPLOY TIMELINE

MM:SS	ACTUAL DPY CLOCK	NOM DPY CLOCK	MM:SS
0:00> ☐	Deploy ____/____:____:____	No FWD RCS –X 0:00 < ☐ Deploy ☐ Free drift 5:00 ☐ +X 4 fps (14 sec) when clear: + pitch (tail up) ~0.3°/sec	
☐	✓PI Link		
1:00> ☐	2,2 fps –X trans (8 sec) ~1°/sec pitch (tail up)		
☐	React ASE htrs		
☐	Lower Tilt Table	Last deploy time for burn this orbit	☐ 7:23
☐	Load sep burn data	CLOCKS EVENT: FWD AD, AFT ND; CRT: SM ND, GNC TSB	
7:00> ☐	Begin mnvr to sep burn att		
7:00 ☐	Last chance for Tilt Table lower before OMS		
☐	OMS prep		
☐	NO LO Z (Trans: NORM/NORM/NORM)		
☐	If Tilt Table not stowed, 1 OMS SEP		
15:00 ☐	OMS sep burn ____/____:____:____	Latest sep (>15 fps) to achieve safe dist at SRM–1	
16:00 ☐	SV XFER to IUS		☐ 39:00
45:00 ☐	Mnvr to viewing att		
☐	Mnvr to window protect att		
☐	Loss of IUS data	Inertial Attitude Hold	☐
☐	PI off	SRM–1 ignition	☐
46:00 ☐	Last chance to Master Safe	CLOSEOUT	☐

CUE CARD CONFIGURATION

HOOK VELCRO

CUE CARD CONFIG

XFER 64 → 16

TRANSFER IUS TLM RATE TO 16 KBPS RF (HDLN)

MS1 L10 **1.** ✓CMD PATH ENA – HDLN
L11 ✓PL LK – HDLN 64 KBPS

✓VCC–OCTAL ind – CL
✓CMD SOURCE – PNL

Expect 'S62 PDI DECOM FAIL'

Send CIU CMD 37, 12H11
No CIU CMD feedback

✓VCC–OCTAL ind – nL within 4 sec

PL LK – HDLN 16 KBPS
✓VCC–OCTAL ind – CL within 4 sec

2. If HDLN link desired, go to step 3

If RF link desired**:**
MS3 SM 62 PCMMU/PL COMM

✓PHASE LOCK – YES

* If PHASE LOCK – NO, then *
A1U * ✓PI setup *
L12U * ✓IUS RF ANT ENA tb – gray *
* ✓DSBL tb – bp *
L11 * Send CIU CMD 33, 12C11 *
* No CIU CMD feedback *
* *
* If PHASE LOCK still NO, perform *
* IUS SSR–2 IUS/ORBITER RF *
* ACQUISITION, steps 3 thru 5 *
* (PL SYS, IUS/AXAF MALS) *

Expect 'S62 PDI DECOM FAIL'

MS1 L11 PL LK – RF 16 KBPS
✓VCC–OCTAL ind – CL within 5 min

L10 CMD PATH ENA – RF

MS3 CRT **3.** Change TFL from 183(204) to 184(205)
Change FPM from 503(504) to 502(501)

(reduced copy)

TOP
BACK OF 'XFER 64 → 16'

HOOK VELCRO

XFER 16 → 64

TRANSFER IUS TLM RATE TO 64 KBPS

MS1 L10 1. ✓CMD PATH ENA – RF(HDLN)
L11 ✓PL LK – RF(HDLN)

✓VCC–OCTAL ind – CL
✓CMD SOURCE – PNL

Expect 'S62 PDI DECOM FAIL' msg

Send CIU CMD 40, 12211
No CIU CMD feedback

✓VCC–OCTAL ind – nL within 8 sec

2. PL LK – HDLN 64 KBPS

✓VCC–OCTAL ind – CL

L10 CMD PATH ENA – HDLN(RF)

MS3 3. SM 62 PCMMU/PL COMM
Change TFL from 184(205) to 183(204)
Change FPM from 502(501) to 503(504)

HOOK VELCRO

CIU COMMAND DEFINITION

HOOK VELCRO

***INDICATES SHIFT MODE COMMAND**

TW SET	CMD WD DISPL	CMD NAME	NOTES	CMD FEEDBACK	CMD REP
00	88888	LAMP TEST			
01	CMD FEEDBACK	SAFETY STATUS		3 x x x x SRM 1 S&A – ARM SRM 2 S&A – ARM ORD BUS – ON RCS ISOL VLV – ENA 0 – NO LOST INHIBITS 1 – A INHIBIT 2 – B INHIBIT 3 – A&B INHIBITS	
02 – 07	00000	SPARES	NOT EXECUTABLE	NONE	
10	1C001	ORB ATTITUDE	COARSE ALIGN (NOT VALID POST–DEPLOY)	NIS BIT	1B0010
11	10000	NAV MODE 1	STBY WITHOUT FDI RST	NONE	100000
12	1000F	NAV MODE 7	NAV FLT	NONE	1000C0
13	1000U	NAV MODE 8	STBY WITH FDI RST	NONE	1000F0
14	10011	ENTER SHIFT MODE		75	100110
15	10012	EXIT SHIFT MODE		SHIFT MODE CMD ID	100120
20	10018	NAV MODE 13	NOT USED	NONE	100180
21	1A000	ORB STATE VECTOR	ONE SHOT XFER OF ORB SV TO IUS	NIS BIT	1A0000
22	OP279	REM HTRS ON		_ _ _ _ x REM HTRS 0 – A&B OFF 1 – A ON 2 – B ON 3 – A&B ON	0E2790
23	19101	S/C DISC 1	AXAF SAFETY INHIBIT REMOVAL #2–1	b b b b x 0 – NO CMD FROM PDU A OR B 1 – CMD FROM PDU A ONLY 2 – CMD FROM PDU B ONLY 3 – CMD FROM PDU A & B (shifted s/c DISC cmds will show 0)	191010
		*PO – 1	105 NM PARK ORBIT		
24	19081	S/C DISC 2	AXAF SAFETY INHIBIT REMOVAL #2–2		190810
		*PO – 2	130 NM PARK ORBIT		
25	19041	S/C DISC 3	AXAF A–SIDE RF INH REMOVAL		190410
		*PO – 3	150 NM PARK ORBIT		
26	19021	S/C DISC 4	NOT USED		
27	19011	S/C DISC 5	AXAF SOLAR ARRAY DEPLOY ENA	b b b b x 0 – NO CMD FROM PDU A OR B 1 – CMD FROM PDU A ONLY 2 – CMD FROM PDU B ONLY 3 – CMD FROM PDU A & B (shifted s/c DISC cmds will show 0)	190110

(reduced copy)

TOP
BACK OF 'CIU COMMAND DEFINITION'

HOOK VELCRO

CIU COMMAND DEFINITION (Cont)

HOOK VELCRO

***INDICATES SHIFT MODE COMMAND**

TW SET	CMD WD DISPL	CMD NAME	NOTES	CMD FEEDBACK	CMD REP
30	19009	S/C DISC 6	AXAF LGA DEPLOY INITIATION	b b b b x 0 – NO CMD FROM PDU A OR B 1 – CMD FROM PDU A ONLY 2 – CMD FROM PDU B ONLY 3 – CMD FROM PDU A & B	190090
31	19005	S/C DISC 7	AXAF B–SIDE RF INH REMOVAL		190050
32	19003	S/C DISC 8	NOT USED		190030
33	12C11	DOWNLINK ON A	IUS XMTR ON	NONE	12B110
34	12P11	DOWNLINK OFF	IUS XMTR OFF CMD REP – 12E000 IF RTS CMD	NONE	12E110
35	OH720	START PRE–DEPLOY C/O	NOT VALID POST–DEPLOY	_ _ _ x x TEST STATUS 0 – COMPLETE 1 – IN PROGRESS SIDE STATUS 0 – A&B OK 1 – B OK 2 – A OK 3 – A&B NOT OK	0D7200
36	1A000	ORBITER STATE VECTOR	CYCLIC (ONCE/MIN) XFER OF ORB SV TO IUS	NONE	1A0000
37	12H11	TLM 16 KBPS		NONE	12D110
40	12211	TLM 64 KBPS		NONE	122110
41	OP479	RCS HTRS ON	CREW TEST CMD	NONE	0E4790
		*RCS HTRS ON	CREW TEST CMD		
42	12711	DOWNLINK ON B	IUS XMTR B ON	NONE	127110
43	OPH79	RCS HTRS OFF		NONE	0ED790
44	0PC79	REM HTRS OFF		NONE	0EB790
45	0A2H1	GEO CENTER ANT SW	NOT VALID PRE–DEPLOY	NONE	0A2D10
46	0ACH1	GROUND STA ANT SW	NOT VALID PRE–DEPLOY	NONE	0ABD10
47	0A7H1	ORB ANT SW	NOT VALID PRE–DEPLOY	NONE	0A7D10
50	02PP9	S/C STAGE 1 BATT OFF	PWR KILL CMDS NOT EXECUTABLE IF IUS IS IN MISSION PHASE 5	NONE	02EE90
51	02229	AV STAGE 1 BATT OFF		NONE	022290
52	05121	RCS SYS ENA	RECOVERY FROM MASTER SAFE NOT EXECUTABLE UNLESS: a. Mission Phase 5 b. CMD 77 sent post–deploy	x _ X X X ORD INH RESET ENABLE ORD INH RESET RCS SYSTEM ENABLE MASTER SAFE REC'D 0 – FALSE 1 – TRUE	051210
54	07420	ENABLE ORD INH RESET			074200
55	08H20	ORD INHIBIT RESET			08D200
77	03PH1	MASTER SAFE	IUS MSN PHASE 3 FEEDBACK TO CMD 77 IS 0_000		03ED10
53	06821	NONE	NOT EXECUTABLE	NONE	068210
56 – 76	00000	SPARES	NOT EXECUTABLE	NONE	

IUS DPY–2b/93/O/C

(reduced copy)

IUS EMERGENCY DEPLOY

Perform activities in sequence:

[M] = MANDATORY items: Must be successfully completed for deploy

[ ] = Items which enhance mission capabilities: Attempt and press

An '*' next to any item indicates CDR/PLT activities that can be performed SIMO with MS activities

[M] ACTIVATE PCP, 2–2
[ ] POWER UP AXAF, 2–2
(mission success)
[ ] FLOAT IUS S/C BATTS ON LINE, 2–3
(mission success)
[ ] AXAF COMM ACT, 2–4
(mission success)
[ ] SSP C/O AND ENABLE IUS ANT, 2–10
[M] **ACTUATOR ENGAGEMENT**, 3–6

[M] PRLA RELEASE, 4–4
[M] RAISE TO 29°, 4–5
[ ] IUS XMTR/PA ON (CIU CMD 33) [12C11] , CIU CMD cue card
[ ] IUS TO 16 KBPS (CIU CMD 37) [12H11] , CIU CMD cue card

*[M] **MNVR TO DEPLOY ATTITUDE**, 4–3
(simo with other ops if on VRCS)
*[ ] ENABLE RNDZ NAV, 5–2

[ ] XFER IUS TO INT PWR, 5–2
(mission success)
[ ] DEADFACE UMBILICALS, 5–3
[M] RELEASE UMBILICALS, 5–5
[M] RAISE TO 58° (min: 42°), 5–5

*[M] OMS SEP BURN PREP, 5–7
*[M] –X BACKOFF MNVR PREP, 5–7
*[ ] XFER ORB SV TO TGT, 5–8
[M] ORBITER TO FREE DRIFT, 5–8

[M] **DEPLOY IUS**, 5–9
[ ] **IUS/PI LOCK**, 4–11

[M] OMS BURN PREP, 6–3
[M] OMS BURN PRECHECKS, 6–3
[M] LOAD OMS TGT AND BURN DATA (mnvr at D + 2:30), 6–3
[M] OMS BURN EXEC (when in Att), 6–4
[M] POST OMS BURN RECONFIG, 6–5
[M] MNVR TO PROTECT ATTITUDE, 6–7

TOP
BACK OF ‘IUS EMERGENCY DEPLOY’

HOOK VELCRO

IUS DPY–3b/93/O/A

(reduced copy)

FAB USE ONLY CC 9–7 IUS DPY/93/FIN

GO/NO–GO CRITERIA
(POST UMBILICAL RELEASE THROUGH SEP BURN)

FAILURE	GO/ABT
IUS	
AVIONICS	
• COMP A(B) FAILED – (*)	GO
• COMP A and B FAILED – (*)	ABT
• UMB SEP A(B) – blank	GO ①
TT&C	
• CIU lost	GO
• TLM LINK lost	ABT
• CMD LINK lost	GO
SAFETY	
• SUPERZIP: 2 of 3 INH lost	GO ②
• Confirmed RCS firing	MS/EMER DPY ③
• MSN PHASE 5 pre–dpy	MS/ABT ④
• > 1 INH lost to:	
• SRM 1/2 FIRE ⑤	MAL, 1.3a
• SC or STG SEP ⑥	EMER DPY
AXAF	
NONE	

FAILURE	GO/ABT
ORBITER	
OMS/RCS	
• 1 OMS ENGINE ↓	GO ⑦
• 2 DEORBIT SYS ↓	GO ⑧
• OMS PROP TK LK	EMER DPY ⑨
• OMS INLET LINE LK	GO ⑧
• OMS He TK LK (< 39% OMS QTY)	GO
• FRCS ↓	GO ⑩
• RCS LK (FWD or AFT)	GO ⑪
DPS	
• 1 GNC ↓ or RS SPLIT	GO ⑫
• PF1 ↓ or SM ↓	GO
GNC	
• IMU DILEMMA	GO
• 1 THC ↓	GO ⑬
COMM	
• PDI/PI ↓	GO

NOTE: Confirm responses with MCC if time/comm coverage permits

① Providing B(A) side in cntl, A(B) fail, and UMB SEP B(A) – (*)

② Do not restow

③ Perform SSR–1 post deploy

④ If Master Safe does not work, and SCU EVENT on the same side, EMER DPY

⑤ 2 of 3 lost: ORD BUS A(B); SRM 1 or 2 UNSAFE A(B); FIRE RL CL A(B)

⑥ 2 of 3 lost: ORD BUS A or B; STG or SC SEP ENA A or B; MSN PHASE 5 and SCU EVENT A(B)

⑦ MIN SEP: 10 FPS (due to increased deorbit redline)

⑧ FRCS MIN SEP: 10 FPS

⑨ If tank fail capability:
DPY, MIN SEP from leaking sys (if no MIN SEP – MS/RCS ENA), mnvr OOP & burn to depletion
If no tank fail capability:
EMER DPY, MS/RCS ENA, perigee adjust
If PA burn > 57 FPS, mnvr to view att and complete IUS SSR–1

⑩ Perform LOSS OF FRCS DEPLOY (CONT OPS)

⑪ Go when leak isolated. If non–isolatable:
EMER DPY, nom sep from leaking sys, mnvr OOP & burn to depletion (Prop LK) or max blowdown (He LK)

⑫ If after deploy –2 min, and freeze–dried G2 available:
Restring to single G2 and deploy
After deploy, establish redundant G2 for sep mnvr
Otherwise,
Establish redundant G2 before deploy

⑬ If RCS primary means of sep:
2 THC contacts reqd in sep axis
If RCS secondary means of sep:
1 THC contact reqd in sep axis

FAB USE ONLY

(reduced copy)

CC 9–9

IUS DPY/93/FIN

HOOK VELCRO

TOP
BACK OF 'GO/NO–GO CRITERIA'

HOOK VELCRO

IUS DPY–4b/93/O/A

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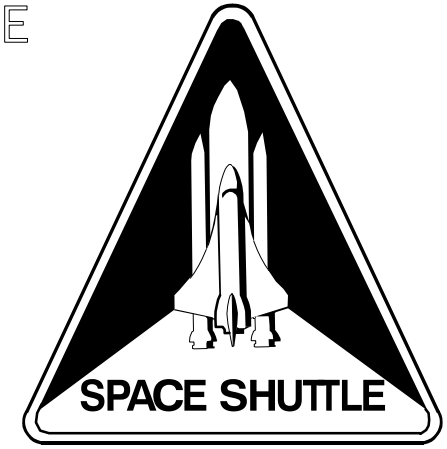
Space Shuttle Program
FLIGHT DATA FILE

JSC–48065–93
FINAL



IUS DEPLOY CHECKLIST

STS
93

Flight Cover (trim bottom to expose tabs)