PDRS OPS CHECKLIST

STS 8

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RMS POWERUP

RMS POWERUP

(Assumes RMS in TEMP MONTR)

1 PLB LTS, CCTV ACT

A7 PL BAY FLOOD - as reqd

Perform TV ACT, VTR ACT, TV/VTR/DAC Cue Card

TV CAMR PWR as reqd - ON

✓Physical integrity of arm, EE, blankets

2 RMS SEL (IDLE MODE)

✓BRAKES - ON (tb-ON)
✓RMS SEL - OFF
✓PWR - PRI

CRT SM 94 PORS CONTROL
✓I/O ON, ITEM 5 - (*)
✓ENA, ITEM 9,11 - (*)

RMS SEL - PORT (if cradled, MA, C/W RCH LIM lt-on (SP,EP), SINGULAR lt-on (EP))

✓SAFING tb - gray

3 DEPLOY/RELEASE ARM

R13L PL BAY MECH PWR SYS (two) - ON
PORT RMS - DPY (tb-DPY) (34 sec max), then
- OFF

PORT RMS RETEN LAT - REL (tb-REL)
(8 sec max), then
- OFF

R13L PL BAY MECH PWR SYS (two) - OFF

4 ARM UNCRADLE

PARAM sel - JOINT ANGLE
BRAKES - OFF (tb-OFF)
Until clear of MPMs:
RATE sw - VERN (RATE MIN tb-on)
MODE - SINGLE, ENTER

SINGLE DR to approx:

	SY	SP	EP	WP	WY	WR
1	0	0	0	+5	0	0
2			+1			
3		+25				
4			-25			

BRAKES - ON (tb-ON)

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RMS CHECKOUT

RMS CHECKOUT

(Required only on first RMS deployment)

RMS C/O

1 PANEL LIGHTING TEST

PARAM sel - TEST (MA) (30 sec max)
✓IND 1,2,3 - +8.8.8.8
✓All pnl A8 lts - on

2 TV CAMERA CHECKOUT

TV CAMR PWR A,B,C,D,RMS - ON
✓Each camera for proper operation
TV CAMR PWR as reqd - OFF

3 JOINT DRIVE TEST

PARAM sel - JOINT ANGLE
BRAKES - OFF (tb-OFF)
MODE - SINGLE, ENTER

SINGLE DR to approx:

	SY	SP	EP	WP	WY	WR
1	0	+25	-25	+5	0	0
2				-45		
3					-15	

SY, WR - each joint in turn
SINGLE DR - '+/-'

✓Motion visually for correct phasing

BRAKES - ON (tb-ON)

4 EE CHECKOUT

A7 CCTV - MON 2 - B
Adjust Camera B to view inside of EE

BRAKES - OFF (tb-OFF)
MODE - SINGLE, ENTER
EE MODE - MAN

EE CAPTURE sw - depress (hold until CLOSE tb-gray) (3 sec max)

red on VTR

EE MAN CONTR - RIGID (hold until RIGID tb-gray) (20 sec max)

EE MAN CONTR - DERIGID (hold until DERIGID tb-gray) (5 sec max)

EE RELEASE sw - depress (hold until OPEN tb-gray) (3 sec max)

EE MAN CONTR - DERIGID (hold until EXTEND tb-gray) (20 sec max)

EE MODE - AUTO
EE CAPTURE sw - depress (mom)

EE MODE - OFF
BRAKES - ON (tb-ON)

5 B/U DRIVE AND PAYLOAD RELEASE TEST

✓B/U PL REL - OFF
RMS SEL - OFF

RMS PWR - B/U
SEL - PORT

B/U PL REL - ON
✓Visually snares open and lying in grooves
B/U PL REL - OFF ··

B/U JOINT - each joint in turn
DR - '+/-'
✓Motion visually for correct phasing

6 RECONFIGURE TO PRIMARY POWER

RMS SEL - OFF
PWR - PRI (MA)

CRT SM 94 PORS CONTROL
I/O ON - ITEM 5 EXEC

RMS SEL - PORT
SAFING - CANCEL (tb-gray)

7 AUTO RELEASE CHECK

EE MODE - MAN
EE CAPTURE sw - depress (hold until CLOSE tb-gray) (3 sec max)

EE MAN CONTR - RIGID (hold until RIGID tb-gray) (20 sec max)

EE MODE - AUTO
EE RELEASE sw - depress (mom) (after - 20 sec)

EE MODE - OFF ·· VTR- STop

8 HAND CONTROLLER CHECK

BRAKES - OFF (tb-OFF)
MODE - TEST, ENTER

RHC, THC - each axis in turn, deflect hand controller hard over
✓There is no arm movement, actual rates are zero. Commanded rates: THC - ✓rate meter, RHC - ✓SPEC 96 - proportional to deflection

BRAKES - ON (tb-ON)

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RMS
PWRDN

RMS POWERDOWN

ALL VEH/BAS

RMS POWERDOWN

RMS PWRDN

1 ARM CRADLE

PRE-CRADLE Ref: (0, 25, -25, +5, 0, 0)

X	Y	Z	P	Y	R
-I261	-I46	-551	5	2	0

NOTE

C/W SINGULAR lt - on (MA) (EP = -7.6)
REACH LIM lt - on (MA) (EP = -2.4)
(SP = +2.6)
When S/W STOP tb - bp (EP = -0.4)
Then MODE - SINGLE, ENTER

BRAKES - OFF (tb-OFF)
When near MPMs:
RATE sw - VERN
MODE - SINGLE, ENTER

SINGLE DR to:

	SY	SP	EP	WP	WY	WR
1	0	+25	-25	+5	0	0
2			+1 (MA)			
3		0(MA)				
4			0			
5				0		

✓PORT RMS R-F-L tb (three) - gray
BRAKES - ON (tb-ON)

2 LATCH/STOW ARM

R13L PL BAY MECH PWR SYS (two) - ON

✓PORT RMS R-F-L tb (three) - gray

PORT RMS RETEN LAT - LAT (tb-LAT)
(8 sec max)
- OFF

PORT RMS - STOW (tb-STO) (34 sec max)
- OFF

R13L PL BAY MECH PWR SYS (two) - OFF

3 CCTV, PLB LTS DEACT

PLB FLOOD (six) - OFF, as reqd
Perform TV DEACT, VTR DEACT, TV/VTR/DAC Cue Card
CAMERA PWR (five) - OFF, as reqd

4 RMS TEMP MON

✓BRAKES - ON (tb-ON)

RMS SEL - OFF
✓RMS PWR - PRI

CRT |SM 94 PORS CONTROL|
✓I/O ON - ITEM 5(*)

PARAM sel - PORT TEMP
JOINT - CRIT TEMP

NOTE
Steps 5,6 performed only if RMS to be completely POWERED DOWN WITHOUT HTRS

5 RMS POWERDOWN

RMS PWR - OFF
PORT RMS HTR - OFF

6 ORBITER/PORS AC POWERDOWN

MA73C:F cb AC1 RMS PRI ΦA - op
cb AC2 RMS B/U ΦA - op

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ACTIVATE TEMP MONITOR

ACTIVATE TEMP MONITOR

017 ✓MEC (two) - OFF

CRT |SM GPC MEMORY|
✓LAUNCH 1, ITEM 16 assigned to SM GPC

✓RMS SEL - OFF
✓RMS PWR - OFF

RMS PWR - PRI (MA)

CRT |SM 94 PDRS CONTROL| (MA, GPC DATA lt-on, if calling SPEC 94 for first time)
I/O ON - ITEM 5 EXEC

SAFING - CANCEL (tb-bp) (✓GPC DATA lt-off)

TEMP MONITOR

PARAM sel - PORT TEMP
JOINT - CRIT TEMP

Record any out of limit temps

CONTINGENCY OPERATIONS

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RMS JETTISON (may include PL)

NOTE

For RMS JETTISON procedure (5-2 thru 5-11), CDR activities are now on even numbered pages and PLT activities on odd numbered pages

NOTE

Jettison between sunrise and noon if possible

CDR AUTO MNVR TO -XLV

CRT |GNC UNIV PTG|
✓START TIME at least 15 min prior to sunrise
✓TGT ID +2
BODY VECT +2
OM +0
Initiate TRK

A6U DAP: A/AUTO/VERN

014, 015, 016 ✓RJD DRIVER (nine) - ON

A6U FLT CNTLR PWR - ON
EVENT TIMER MODE - UP
CNTL - STOP
TIMER - RESET

A7U ✓Lighting - as reqd

When in attitude, then

CRT |GNC 33 REL NAV|
AVG G ON - ITEM 1 EXEC (*)

When PLT confirms CCTVs configured to monitor jettison, then proceed to 5-8

PLT

POWER UP RMS PYROS

✓BRAKES - ON (tb-ON)

A14 ✓PYRO PORT RMS (five) - SAFE

✓RMS LAT - SAFE

ML86B cb MNB PYRO JETT SYS A PORT RMS - cl

cb MNC PYRO JETT SYS B PORT RMS - cl

IF MPM FAIL (Latches go with RMS)

R13L ✓PL BAY MECH PWR SYS (two) - OFF

✓PORT RMS RETEN LAT tb - LAT

A14 RMS LAT - DEADFACE

✓PORT RMS RETEN LAT tb - bp

PYRO PORT RMS ARM - GUILLOTINE

Wait 1 sec, then

PYRO PORT RMS LAT (three) - GUILLOTINE

- SAFE

ARM - JETT

Wait 1 sec, then

PYRO PORT RMS LAT (three) - JETT

- SAFE

or

ARM - SAFE

PARAM sel - JOINT ANGLE

BRAKES - OFF (tb-OFF)

MODE - SINGLE, ENTER

Drive to:

	SY	SP	EP	WP	WY	WR
1	0	+45	0	0	0	0
2	-45		-45			

BRAKES - ON (tb-ON)

Go to POWER DOWN MRL AND RMS, 5-7

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PLT

IF MRL FAIL (Latches stay with MPM)

R13L PL BAY MECH PWR SYS (two) - ON

A8 PORT RMS RETEN LAT - REL (tb-REL)

- OFF

R13L PL BAY MECH PWR SYS (two) - OFF

PARAM sel - JOINT ANGLE

BRAKES - OFF (tb-OFF)

MODE - SINGLE, ENTER

Drive to:

SY	SP	EP	WP	WY	WR
-45	+45	-45	0	0	0

BRAKES - ON (tb-ON)

Go to POWER DOWN MRL AND RMS, 5-7

IF EE FAIL TO RELEASE (PL goes with RMS)

PARAM sel - JOINT ANGLE

BRAKES - OFF (tb-OFF)

MODE - SINGLE, ENTER

Drive to:

SY	SP	EP	WP	WY	WR
-45	+45	-45	0	0	0

BRAKES - ON (tb-ON)

Go to POWER DOWN MRL AND RMS, 5-7

IF JOINT DRIVE FAIL (PL goes with RMS if still grappled)

Consult MCC for mode capability and joint configuration for jettison

PARAM sel - JOINT ANGLE

MODE - _____

Drive to:

SY	SP	EP	WP	WY	WR

BRAKES - ON (tb-ON)

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POWER DOWN MRL AND RMS

R13L ✓PL BAY MECH PWR SYS (two) - OFF
A14 RMS LAT - DEADFACE
A8 ✓PORT RMS RETEN LAT tb - bp
✓LAT - OFF
PORT RMS HTR - OFF
RMS SEL - OFF
PWR - OFF

GUILLOTINE WIRES AT SHOULDER

A14 PYRO PORT RMS ARM - GUILLOTINE
Wait 1 sec, then
PYRO PORT RMS SHLDR - GUILLOTINE
- SAFE
ARM - SAFE

CONFIGURE CCTVs TO MONITOR JETTISON

A7U CCTV MON 1 - A
2 - B
POINT B CCTV AT RMS SHOULDER JOINT
Put new tape in VTR

CDR **JETTISON**

SUNRISE
A6U

DAMP RATES
DAP ROT: DISC/DISC/DISC
TRANS: PULSE/PULSE/NORM
If VERN jets avail
| DAP: A/MAN/VERN
If VERN jets not avail
DAP: B/MAN/NORM
Wait until rates damped, then
DAP: A/MAN/NORM
✓SENSE - as reqd

NOTE
After JETT, initiate opening rate ASAP. Minimize other THC/RHC inputs

START TIMER
EVENT TIMER CNTL - START

JETT+
0:01

WHEN JETTISON COMPLETE, TRANSLATE AWAY
THC +Z, 2 sec (1 ft/sec)
(-X sense: THC dn)
(-Z sense: THC out)

2:00

SECOND SEP BURN
SENSE - as reqd
THC +Z, 2 sec (1 ft/sec)
(-X sense: THC dn)
(-Z sense: THC out)

Maintain visual contact with RMS in OVHD window using RHC

When RMS no longer visible, then

PLT **JETTISON**
SUNRISE

When rates damped, then
VTR - PLAY/RCD/RUN

When Timer started, then
A14 PYRO PORT RMS ARM - JETT
Wait 1 sec, then
JETT PYRO PORT RMS SHLDR - JETT **

Maintain RMS in B CCTV

CDR CLEANUP

CRT |GNC 33 REL NAV|
AVG G ON - ITEM 1 EXEC (no *)
(Turns AVG G off)
|GNC UNIV PTG|
✓START TIME in past
✓TGT ID +2
BODY VECT +3
✓OM +0
Initiate TRK

A6U DAP: A/AUTO/VERN

014, ✓All primary RJD DRIVER (eight) - as reqd
015,
016

A7U ✓Lighting - as reqd

PLT CLEANUP
VTR - STOP

A14 RMS LAT - SAFE
PYRO PORT RMS SHLDR - SAFE
ARM - SAFE

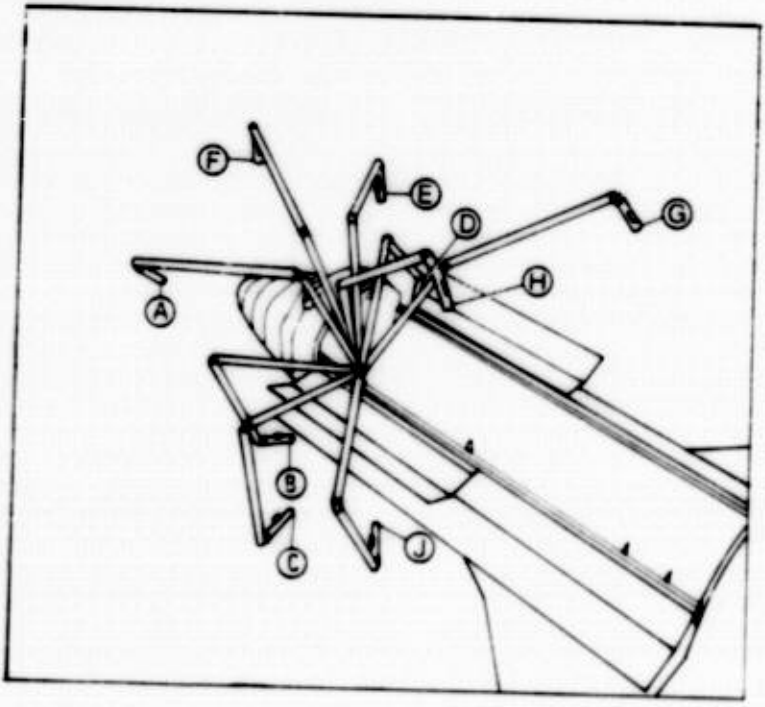
ML86B cb MNB PYRO JETT SYS A PORT RMS - op
cb MNC PYRO JETT SYS B PORT RMS - op

EXTERIOR SURVEYS

.....If no MPM fail.....
. R13L PL BAY MECH PWR SYS (two) - ON .
. A8 PORT RMS - STOW (tb-STO) .
. - OFF .
. R13L PL BAY MECH PWR SYS (two) - OFF .
.....

EXTERIOR SURVEYS' ARM CONFIGURATIONS

EXTERIOR SURVEYS



EXTERIOR SURVEY (CONFIGURATION A)

(Port side. Orbiter nose)

SETUP

CRT

GNC UNIV PTG
TGT ID +2 (earth)
BODY VECT +5
P +0 } -Y_{LV}
Y +270 }
OM ____ - per MCC

A6

DAP: A1/AUTO/VERN
Initiate TRK

A7

CCTV - MON 1 - B
- MON 2 - RMS/Wrist (ZOOM OUT)
- VTR RCD - RMS/Wrist
ALC, GAMMA - NORM

R11(OV099)
L12(OV102)

VTR - ✓Tape

PARAM sel - JOINT ANGLE
BRAKES - OFF (tb-OFF)
MODE - SINGLE, ENTER

SINGLE DR to: Tol: ±1 deg

	SY	SP	EP	WP	WY	WR
1	90	45	-10	-100	20	140
2		81				
3			-80			
4	152					

BRAKES - ON (tb-ON)

ALL VEH/BAS 1

SURVEY
BRAKES - OFF (tb-OFF)
MODE - SINGLE, ENTER
A7 Adjust ALC, GAMMA, as reqd
RMS SPOT PORT - ON, as reqd
R11(OV099) VTR pb - PLAY,RCD
L12(OV102)
SINGLE DR to:

	SY	SP	EP	WP	WY	WR
1	152	81	-80	-110	20	140
2				-100		

BRAKES - ON (tb-ON)
R11(OV099) VTR pb - STOP
L12(OV102)

RECONFIGURE
BRAKES - OFF (tb-OFF)
MODE - SINGLE, ENTER

If continuing exterior survey

SINGLE DR to:

		SY	SP	EP	WP	WY	WR
or	1	90	81	-80	-100	20	140

BRAKES - ON (tb-ON)
Go to next survey configuration

If survey finished

SINGLE DR to:

	SY	SP	EP	WP	WY	WR
1	0	81	-80	-100	20	140
2		45				
3			-30			

BRAKES - ON (tb-ON)
A7 RMS SPOT PORT - OFF

Mnvr back to attitude per CAP

EXTERIOR SURVEYS (CONFIGURATION B,C)

(Orbiter underbody, landing gear)

SETUP

CRT

|SM 94 PDRS CONTROL|
✓SOFT STOP, ITEM 7 - ENA
✓AUTO BRAKE, ITEM 9 - ENA

|GNC UNIV PTG|
TGT ID +2 (earth)
BODY VECT +5
P +270 } $+Z_{LV}$
Y +0 }
OM |_____| - per MCC

A6

DAP: A1/AUTO/VERN
Initiate TRK

A7

CCTV - MON 1 - B
- MON 2 - RMS/Wrist
- VTR RCD - RMS/Wrist
ALC, GAMMA - NORM

R11(OV099)
L12(OV102)

VTR - ✓Tape

RATE sw - VERN
PARAM sel - JOINT ANGLE
BRAKES - OFF (tb-OFF)
MODE - SINGLE, ENTER

SINGLE DR to: Tol: ±1 deg

	SY	SP	EP	WP	WY	WR
1	0	45	-10	110	90(MA)	0
2	145					
3		30				

BRAKES - ON (tb-ON)

L9,R10, O5,O9, A13,M042F

A11 AUD A/A - RCV (IF SINGLE USED) **

SURVEY

CAUTION
UHF XMIT MUST BE INHIBITED IF SINGLE MODE

A7 Adjust ALC, GAMMA, as reqd
RMS SPOT PORT - ON, as reqd
R11(0V099) VTR pb - PLAY,RCD
L12(0V102)

BRAKES - OFF (tb-OFF)
MODE - SINGLE, ENTER

SINGLE DR to: Tol: ±1 deg

	SY	SP	EP	WP	WY	WR
1	145	10	-10	110	90	0
2			-100			
3						180
4				-110		
5					30	
6				-105		
7					50	
8					-15	
9				-100		
10					-45	
11			-10			
12		30				
13	90					
14			-105			
15				-105		
16					45	
17					-90(MA)	

BRAKES - ON (tb-ON)
R11(0V099) VTR pb - STOP
L12(0V102)

RECONFIGURE
BRAKES - OFF (tb-OFF)
MODE - SINGLE, ENTER

If continuing exterior survey

SINGLE DR to:

	SY	SP	EP	WP	WY	WR
1	90	30	-10	-105	-90	180
2		45				

or

BRAKES - ON (tb-ON)

REENABLE UHF TRANSMITTER
ATT AUD A/A - T/R ··

L9,R10,
05,09,
A13,M042F

Go to next survey configuration

If survey finished

SINGLE DR to:

	SY	SP	EP	WP	WY	WR
1	90	30	-10	-105	-90	180
2		45				
3	0					

BRAKES - ON (tb-ON)

REENABLE UHF TRANSMITTER
ATT AUD A/A - T/R ··

L9,R10,
05,09,
A13,M042F

A7 RMS SPOT PORT - OFF

Mnvr back to attitude per CAP

EXTERIOR SURVEY (CONFIGURATION D)

(Stbd side, wing leading edge)

SETUP

CRT — |SM 94 PDRS CONTROL|
✓SOFT STOP, ITEM 7 - ENA
✓AUTO BRAKE, ITEM 9 - ENA

TGT ID +2 (earth)
BODY VECT +5
P +0 | $+Y_{LV}$
Y +90 |
OM |____| - per MCC

A6 — DAP: A1/AUTO/VERN
Initiate TRK

A7 — CCTV - MON 1 - A
- MON 2 - RMS/Wrist (ZOOM OUT)
- VTR RCD - RMS/Wrist
ALC, GAMMA - NORM

R11(OV099) L12(OV102) — VTR - ✓Tape

RATE sw - VERN
PARAM sel - JOINT ANGLE
BRAKES - OFF (tb-OFF)
MODE - SINGLE, ENTER

SINGLE DR to: Tol: ±1 deg

	SY	SP	EP	WP	WY	WR
1	-90	30	-30	-110	60	180
2	-120					
3			-78			
4		12				

BRAKES - ON (tb-ON)

SURVEY
BRAKES - OFF (tb-OFF)
MODE - SINGLE, ENTER
A7 Adjust ALC, GAMMA, as reqd
RMS SPOT PORT - ON, as reqd
R11(OV099) VTR pb - PLAY,RCD
L12(OV102)

SINGLE DR to:

	SY	SP	EP	WP	WY	WR
1	-120	12	-78	-110	-75(MA)	180

BRAKES - ON (tb-ON)
R11(OV099) VTR pb - STOP
L12(OV102)

RECONFIGURE
BRAKES - OFF (tb-OFF)
MODE - SINGLE, ENTER
If continuing exterior survey

SINGLE DR to:

		SY	SP	EP	WP	WY	WR
or	1	-120	30	-78	-110	-75	180
	2			-30			
	3	-90					

BRAKES - ON (tb-ON)
Go to next survey configuration

If survey finished

SINGLE DR to:

	SY	SP	EP	WP	WY	WR
1	-120	30	-78	-110	-75	180
2			-30			
3	0					

BRAKES - ON (tb-ON)
A7 RMS SPOT PORT - OFF

Mnvr back to attitude per CAP

EXTERIOR SURVEY (CONFIGURATION E)

(Stbd side, nose)

SETUP

CRT

GNC UNIV PTG	
TGT ID	+2 (earth)
BODY VECT	+5
P	+0
Y	+90
OM	____ - per MCC

$+Y_{LV}$

A6

DAP: A1/AUTO/VERN
Initiate TRK

A7

CCTV - MON 1 - C
- MON 2 - RMS/Wrist (ZOOM OUT)
- VTR RCD - RMS/Wrist
ALC, GAMMA - NORM

R11(OV099)
L12(OV102)

VTR - ✓Tape
PARAM sel - JOINT ANGLE
BRAKES - OFF (tb-OFF)
MODE - SINGLE, ENTER

SINGLE DR to: Tol: ±1 deg

	SY	SP	EP	WP	WY	WR
1	-90	45	-30	-110	0	-140
2	-127					
3			-68			
4		43				

BRAKES - ON (tb-ON)

SURVEY
BRAKES - OFF (tb-OFF)
MODE - SINGLE, ENTER
A7 Adjust ALC, GAMMA, as reqd
RMS SPOT PORT - ON, as reqd
R11(OV099) VTR pb - PLAY,RCD
L12(OV102)
SINGLE DR to:

	SY	SP	EP	WP	WY	WR
1	-127	43	-68	-110	-45	-140

BRAKES - ON (tb-ON)
R11(OV099) VTR pb - STOP
L12(OV102)
RECONFIGURE
BRAKES - OFF (tb-OFF)
MODE - SINGLE, ENTER
If continuing exterior survey

SINGLE DR to:

		SY	SP	EP	WP	WY	WR
or	1	-127	43	-30	-110	-45	180
	2		30				
	3	-90					

BRAKES - ON (tb-ON)
Go to next survey configuration

If survey finished

SINGLE DR to:

	SY	SP	EP	WP	WY	WR
1	-127	43	-30	-110	-45	180
2		30				
3	0					

BRAKES - ON (tb-ON)
A7 RMS SPOT PORT - OFF

Mnvr back to attitude per CAP

EXTERIOR SURVEY (CONFIGURATION F)

(Top side, nose - ovhd windows)

SETUP

CRT
GNC UNIV PTG
TGT ID +2 (earth)
BODY VECT +3 (-Z)
OM [ ] - per MCC

A6
DAP: A1/AUTO/VERN
Initiate TRK

A7
CCTV - MON 1 - B
- MON 2 - RMS/Wrist (ZOOM OUT)
- VTR RCD - RMS/Wrist
ALC, GAMMA - NORM

R11(OV099) VTR - ✓Tape
L12(OV102)

PARAM sel - JOINT ANGLE
BRAKES - OFF (tb-OFF)
MODE - SINGLE, ENTER

SINGLE DR to: Tol: ±1 deg

	SY	SP	EP	WP	WY	WR
1	-90	30	-30	-98	-13	-151
2		94				
3			-100			
4	-134					

BRAKES - ON (tb-ON)

SURVEY

BRAKES - OFF (tb-OFF)
MODE - ORB UNL, ENTER
A7 Adjust ALC, GAMMA, as reqd
RMS SPOT PORT - ON, as reqd
R11(OV099) VTR pb - PLAY,RCD
L12(OV102)
Translate +X (THC OUT) to X = -300, then return to X = -500

BRAKES - ON (tb-ON)
R11(OV099) VTR pb - STOP
L12(OV102)

RECONFIGURE

BRAKES - OFF (tb-OFF)
MODE - SINGLE, ENTER
If continuing exterior survey

SINGLE DR to:

	SY	SP	EP	WP	WY	WR
or 1	-90	94	-100	-98	-13	151
2			-30			
3		30				

BRAKES - ON (tb-ON)
Go to next survey configuration

If survey finished

SINGLE DR to:

	SY	SP	EP	WP	WY	WR
1	0	94	-100	-98	-13	151
2			-30			
3		30				

BRAKES - ON (tb-ON)
A7 RMS SPOT PORT - OFF

Mnvr back to attitude per CAP

EXTERIOR SURVEYS
CONFIGURATION G (STBD), H (PORT)
(Top views: Config G-STBD wing; Config H-port wing)

SETUP

CRT
|GNC UNIV PTG|
TGT ID +2 (earth)
BODY VECT +3 (-Z)
OM |_____| - per MCC

A6
DAP: A1/AUTO/VERN
Initiate TRK

A7
CCTV - MON 1 - C
- MON 2 - RMS/Wrist (zoom out)
- VTR RCD - RMS/Wrist
ALC, GAMMA - NORM

R11(OV099)
L12(OV102)
VTR - ✓Tape

PARAM sel - JOINT ANGLE
BRAKES - OFF (tb-OFF)
MODE - SINGLE, ENTER

If Configuration G
SINGLE DR to:

or

	SY (X)	SP (Y)	EP (Z)	WP (P)	WY (Y)	WR (R)
IC	-60	45	-45	-75	35	60
REF	(-950)	(220)	(-700)	(310)	(350)	(0)

If Configuration H
SINGLE DR to:

	SY (X)	SP (Y)	EP (Z)	WP (P)	WY (Y)	WR (R)
IC	0	94	-40	-102	17	10
REF	(-950)	(-250)	(-800)	(300)	(0)	(0)

BRAKES - ON (tb-ON)

SURVEY

A7 Adjust ALC, GAMMA, as reqd
RMS SPOT PORT - ON, as reqd
R11(OV099) VTR pb - PLAY,RCD
L12(OV102)
BRAKES - OFF (tb-OFF)

If evaluating stbd wing (G)
MODE - END EFF, ENTER
Mnvr to scan stbd wing surface

If evaluating port wing (H)
MODE - ORB UNL, ENTER

Mnvr to approx:

X	Y	Z	P	Y	R
-950	-250	-800	300	0	0

then,
MODE - END EFF, ENTER
Mnvr to scan port wing surface

BRAKES - ON (tb-ON)
R11(OV099) VTR pb - STOP
L12(OV102)

RECONFIGURE

If continuing exterior survey
Go to next survey configuration

If survey finished

A7 RMS SPOT PORT - OFF

Mnvr back to attitude per CAP

EXTERIOR SURVEY (CONFIGURATION J)

(Orbiter underbody, vent doors)

SETUP

CRT

SM 94 PORS CONTROL

✓SOFT STOP, ITEM 7 - ENA
✓AUTO BRAKE, ITEM 9 - ENA

TGT ID +2 (earth)
BODY VECT +5
P +270 } $+Z_{LV}$
Y +0 }
OM ____ - per MCC

A6

DAP: A1/AUTO/VERN
Initiate TRK

IF RADIATORS UNSTOWED

SINGLE RAD OPS

(Requires opening MA73C: C&D MCA LOGIC PWR AC cbs)

	STBD RAD cbs	PORT RAD cbs
STOW:	AC1MID3	AC1MID1
	AC3MID2	AC3MID4
LATCH:	AC1MID3	AC1MID1
	AC2MID2	AC2MID4
	AC3MID2	AC3MID4

R13L

✓RAD LAT CNTL SYS (two) - OFF (tb-REL)
✓CNTL SYS (two) - OFF (tb-DPY)
PL BAY MECH PWR SYS (two) - ON
RAD CNTL SYS (two) - STOW (concurrently)
✓STBD tb - DPY
✓PORT tb - bp -40 sec, STOW
SYS (two) - OFF

RAD LAT CNTL SYS (two) - LAT(concurrently).
✓STBD tb - REL
✓PORT tb - bp -25 sec, LAT
SYS (two) - OFF
PL BAY MECH PWR SYS (two) - OFF

A7 CCTV - MON 1 - B
- MON 2 - RMS/Wrist (ZOOM OUT)
- VTR RCD - RMS/Wrist
ALC, GAMMA - NORM

R11(OV099) VTR - ✓Tape
L12(OV102)

PARAM sel - JOINT ANGLE
BRAKES - OFF (tb-OFF)
MODE - SINGLE, ENTER

SINGLE DR to:

	SY	SP	EP	WP	WY	WR
1	90	45	-10	-112	0	180
2	55					
3		5				

L9,R10, OF,09, A12,M042F A11 AUD A/A - RCV (IF SINGLE MODE USED) **

SURVEY

CAUTION
UHF XMIT must be INHIBITED

CAUTION
PORT RADIATOR must be stowed

BRAKES - OFF (tb-OFF)
MODE - SINGLE, ENTER

A7 Adjust ALC, GAMMA, as reqd
RMS SPOT PORT - ON, as reqd

R11(OV099) VTR pb - PLAY,RCD
L12(OV102)

SINGLE DR to:

	SY	SP	EP	WP	WY	WR
1	55	5	-100	-112	0	180
2					-105(MA)	
3				114		
4					-45	
5						30
6					-90(MA)	

BRAKES - ON (tb-ON)

R11(OV099) VTR pb - STOP
L12(OV102)

RECONFIGURE

BRAKES - OFF (tb-OFF)
MODE - SINGLE, ENTER

SINGLE DR to:

	SY	SP	EP	WP	WY	WR
1	55	45	-100	-114	-90	30
2			-30			

REENABLE UHF TRANSMITTER

L9,R10, ATT AUD A/A - T/R ..
O5,O9,
A13,M042F

IF RADIATOR DEPLOY REQD

UNLATCH/DEPLOY PORT RAD

SINGLE RAD OPS
(Requires opening MA73C: C&D MCA LOGIC PWR AC cbs)

	STBD RAD cbs	PORT RAD cbs
STOW:	AC1MID3	AC1MID1
	AC3MID2	AC3MID4
LATCH:	AC1MID3	AC1MID1
	AC2MID2	AC2MID4
	AC3MID2	AC3MID4

.R13L
- ✓RAD LAT CNTL SYS (two) - OFF
- ✓CNTL SYS (two) - OFF
- PL BAY MECH PWR SYS(two) - ON
- RAD LAT CNTL SYS (two) - REL (concurrently)
  - ✓STBD tb - REL
  - ✓PORT tb - bp -25 sec, REL
  - SYS (two) - OFF
- RAD CNTL SYS (two) - DPY (concurrently)
  - ✓STBD tb - DPY
  - ✓PORT tb - bp -40 sec, DPY
  - SYS (two) - OFF
- PL BAY MECH PWR SYS (two) - OFF

.MA73C:C&D cb MCA LOGIC PWR (five) - cl

BRAKES - OFF (tb-OFF)
MODE - SINGLE, ENTER

If continuing exterior survey
SINGLE DR to:

	SY	SP	EP	WP	WY	WR
or 1	55	45	-10	114	-90	30

BRAKES - ON (tb-ON)

- Go to next survey configuration

If survey finished

SINGLE DR to:

	SY	SP	EP	MP	MY	MR
1	55	45	-10	114	-90	30
2	0					

BRAKES - ON (tb-ON)

A7 RMS SPOT PORT - OFF

Mnvr back to attitude per CAP

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MPM FAILURE

A8L
R13L
A7

✓PORT RMS - OFF
✓PL BAY MECH PWR SYS (two) - OFF
PLB FLOOD (six) - OFF, as reqd
CAMERA PWR (five) - OFF, as reqd

✓BRAKES - ON (tb-ON)
RMS sel - OFF
✓RMS PWR - PRI

RMS/EVA

CRT

SM 94 PDRS CONTROL
✓I70 ON, ITEM 5 - (*)

PARAM sel - PORT TEMP
JOINT - CRIT TEMP

MRL FAILURE

R13L ✓PL BAY MECH PWR SYS (two) - ON
✓PORT RMS RETEN LAT - OFF
- STOW (tb-STO) (34 sec norm)
- OFF

* If tb does not respond *
* ✓|SM 94 PDRS CONTROL| *
*
* RMS STO/DPLY *
*
* SHLD 1 1 0 0 *
*
* If CRT reads as above, proceed *

PL BAY MECH PWR SYS (two) - OFF

A7 PLB FLOOD (six) - OFF, as reqd
CAMERA PWR (five) - OFF, as reqd

✓BRAKES - ON (tb-ON)
RMS sel - OFF
✓RMS PWR - PRI

CRT |SM 94 PDRS CONTROL|
✓I70 ON, ITEM 5 - (*)

PARAM sel - PORT TEMP
JOINT - CRIT TEMP

✓BRAKES - ON (tb-ON)
MODE - DIRECT (lt-on)
Configure arm per following options using DIRECT MODE

IF FAILED JOINT IS FROZEN,
CONFIGURE GOOD JOINTS:

SY	SP	EP	WP	WY	WR
0°	+25°	-25°	0°	0°	0°

NOTE
These are desired joint locations. If shoulder or elbow joint fails, arm should be placed in a position over the port longeron and clear of the Orbiter if possible

IF FAILED JOINT IS FREE,
If wrist joint free, configure good joints:

SY	SP	EP	WP	WY	WR
0°	+25°	-25°	0°	0°	0°

If EP free:

SY	SP	EP	WP	WY	WR
0°	140°	FREE	0°	0°	0°

If SP free:

SY	SP	EP	WP	WY	WR
-90°	FREE	-10°	0°	0°	0°

If SY free:

SY	SP	EP	WP	WY	WR
FREE	90°	-10°	0°	0°	0°

NOTE

These configurations allow free joint to move its full travel limits without contacting Orbiter structure

A7

PLB FLOOD (six) - OFF, as reqd
CAMERA PWR (five) - OFF, as reqd

✓BRAKES - ON (tb-ON)
RMS sel - OFF
✓RMS PWR - PRI

CRT

SM 94 PDRS CONTROL
✓170 ON, ITEM 5 - (*)

PARAM sel - PORT TEMP
JOINT - CRIT TEMP

BACKUP TECH

BACKDRIVE TECHNIQUE - JOINT FREE

SP - FAILED

1 PARAM sel - JOINT ANGLE
JOINT - SP
Record SP angle _____

2 ✓BRAKES - ON (tb-ON)
MODE - DIRECT (lt-on)
DIRECT DR - EP to safe configuration to drive arm in SY
DIRECT DR SY - +75°
EP - -(2 x SP) or max of -90°
WP - 0°
WY - 0°
WR - 0°

BACKDR TECH

CRT 3 SM 94 PDRS CONTROL
AUTO BRAKES INH - ITEM 10 EXEC

4 JOINT - EP
BRAKES - OFF (tb-OFF)
MODE - SINGLE, ENTER
RATE sw - COARSE (RATE MIN tb-OFF)
SINGLE DR - (+)
After 2 sec,
BRAKES - ON (while still holding SINGLE DR sw)
SINGLE DR sw - release
JOINT - SP (Compare SP angle to original value)

NOTE
When EP = -8°, reconfigure EP

✓BRAKES - ON (tb-ON)
MODE - DIRECT (lt-on)
DIRECT DR EP - -(2 x SP)

Repeat step 4 until SP = 2-5°

5 ✓BRAKES - ON (tb-ON)
MODE - DIRECT (lt-on)

> **CAUTION**
> Use CCTV to monitor proximity of arm and Orbiter

DIRECT DR EP - +1°
WP - +10°
WY - 0°
WR - 0°
SY - 0°
EP - -2°

6 JOINT - EP
BRAKES - OFF (tb-OFF)
MODE - SINGLE, ENTER
SINGLE DR - (+)
After 1/2 sec,
BRAKES - ON (while still holding SINGLE DR sw)
SINGLE DR sw - release
JOINT - SP (Note SP angle)

> **NOTE**
> When EP - +1°, reconfigure EP

✓BRAKES - ON (tb-ON)
MODE - DIRECT (lt-on)
DIRECT DR EP - (-) as far that is safe

Repeat step 6 until
PORT RMS R-F-L FWD tb - gray

7 ✓BRAKES - OFF (tb-OFF)
MODE - SINGLE, ENTER
RATE sw - VERN (RATE MIN tb-ON)
SINGLE DR EP - 0°
WP - 0°
✓PORT RMS R-F-L tb (three) - gray
BRAKES - ON (tb-ON)

8 Go to RMS PWRDN, steps 2,4

EP - FAILED

1 PARAM sel - JOINT ANGLE
JOINT - EP
Record EP angle _____

2 ✓BRAKES - ON (tb-ON)
MODE - DIRECT (lt-on)
DIRECT DR SP - -(2 x EP) or max of +130°
SY - 0°
WP - +5°
WY - 0°
WR - 0°

CRT 3 SM 94 PDRS CONTROL
AUTO BRAKES INH - ITEM 10 EXEC

4 JOINT - SP
BRAKES - OFF (tb-OFF)
MODE - SINGLE, ENTER
RATE sw - COARSE (RATE MIN tb-OFF)
SINGLE DR - (-)
After 4 sec,
BRAKES - ON (while still holding SINGLE DR sw)
SINGLE DR sw - release
JOINT - EP (Note EP angle)

NOTE
When SP < -(EP), reconfigure SP

✓BRAKES - ON (tb-ON)
MODE - DIRECT (lt-on)
DIRECT DR SP - -(2 x EP)

Repeat step 4 until EP -1°

5 JOINT - SP
BRAKES - OFF (tb-OFF)
MODE - SINGLE, ENTER
SINGLE DR - (-)

After 1/2 sec,
BRAKES - ON (while still holding SINGLE DR sw)
SINGLE DR sw - release
JOINT - EP (Note EP angle)

Repeat step 5 until EP = 0^{0} $\pm 0.1^{0}$

6 ✓BRAKES - OFF (tb-OFF)
MODE - SINGLE, ENTER
RATE sw - VERN (RATE MIN tb-ON)
SINGLE DR SP - 0^{0}
WP - 0^{0}
✓PORT RMS R-F-L tb (three) - gray
BRAKES - ON (tb-ON)

7 Go to RMS PWRDN, steps 2,4

WP - FAILED

1 PARAM sel - JOINT ANGLE
JOINT - WP
Record WP angle _____

2 ✓BRAKES - ON (tb-ON)
MODE - DIRECT (lt-on)
DIRECT DR SP - +90°
EP - -90°
SY - 0°
WY - 0°
WR - +19.5°

CRT 3 SM 94 PDRS CONTROL
AUTO BRAKES INH - ITEM 10 EXEC

4a If WP < 0:
JOINT - WP
BRAKES - OFF (tb-OFF)
MODE - END EFF, ENTER
RATE sw - COARSE (RATE MIN tb-OFF)
or THC - UP (1/3 to 1/2 deflection) (hold)
When RATE METER (ACTUAL RATE) hesitates,
THC - down (full deflection) (hold)
When WP (DIGITAL DISPLAY #3) is constant,
Remove THC command slowly

4b If WP > 0:
JOINT - WP
BRAKES - OFF (tb-OFF)
MODE - END EFF, ENTER
RATE sw - COARSE (RATE MIN tb-OFF)
THC - down (1/3 to 1/2 deflection) (hold)
When RATE METER (ACTUAL RATE) hesitates,
THC - up (full deflection) (hold)
When WP (DIGITAL DISPLAY #3) is constant,
Remove THC command slowly

NOTE

If SP > 120° or < 60°, reconfigure

✓BRAKES - ON (tb-ON)
MODE - DIRECT (lt-on)
DIRECT DR SP - +90°
EP - -90°
SY - 0°
WY - 0°
WR - +19.5°

NOTE

Use vernier rates when WP < 2°

Repeat step 4 until WP = 0° ±0.1°

5 ✓BRAKES - OFF (tb-OFF)
MODE - SINGLE, ENTER
RATE sw - VERN (RATE MIN tb-ON)
SINGLE DR EP - +1°
SP - +10°
SY - 0°
WY - 0°
WR - 0°
SP - 0°
EP - 0°

✓PORT RMS R-F-L tb (three) - gray

6 Go to RMS PWRDN, steps 2,4

WY - FAILED

1 PARAM sel - JOINT ANGLE
JOINT - WY
Record WY angle _____

2 ✓BRAKES - ON (tb-ON)
MODE - DIRECT (lt-on)
DIRECT DR SP - +90°
EP - -90°
SY - 0°
WP - 0°
WR - +19.5°

CRT 3 SM 94 PDRS CONTROL
AUTO BRAKES INH - ITEM 10 EXEC

4a If WY < 0:
JOINT - WY
BRAKES - OFF (tb-OFF)
MODE - END EFF, ENTER
RATE sw - COARSE (RATE MIN tb-OFF)
or THC - RIGHT (1/3 to 1/2 deflection)(hold)
When RATE METER (ACTUAL RATE) hesitates,
THC - LEFT (full deflection) (hold)
When WY (DIGITAL DISPLAY #3) is constant,
Remove THC command slowly

4b If WY > 0:
JOINT - WY
BRAKES - OFF (tb-OFF)
MODE - END EFF, ENTER
RATE sw - COARSE (RATE MIN tb-OFF)
THC - left (1/3 to 1/2 deflection) (hold)
When RATE METER (ACTUAL RATE) hesitates,
THC - right (full deflection) (hold)
When WY (DIGITAL DISPLAY #3) is constant,
Remove THC command slowly

NOTE

If SP > 120° or < 60°, reconfigure

✓BRAKES - ON (tb-ON)
MODE - DIRECT (lt-on)
DIRECT DR SP - +90°
EP - -90°
SY - 0°
WP - 0°
WR - +19.5°

NOTE

Use vernier rates when WY < 2°

Repeat step 4 until WY = 0° ±0.1°

5 ✓BRAKES - OFF (tb-OFF)
MODE - SINGLE, ENTER
RATE sw - VERN (RATE MIN tb-ON)
SINGLE DR EP - +1°
SP - +10°
SY - 0°
WR - 0°
WP - +5°
SP - 0°
EP - 0°
WP - 0°

✓PORT RMS R-F-L tb (three) - gray

6 Go to RMS PWRDN, steps 2,4

BACKUP CRADLE

BACKUP CRADLE

1 ARM CRADLE

✓BRAKES - ON (tb-ON)

RMS SEL - OFF
RMS PWR - B/U
RMS SEL - PORT

Drive arm to approx:

SY	SP	EP	WP	WY	WR
0	+25	+1	+5	0	0

(WR = 0 when wrist camera aligned w/Z -axis)

Drive SP to get FWD R-F-L, then
Drive EP to get MID R-F-L, then
Drive WP to get AFT R-F-L

2 RECONFIGURE TO PRIMARY POWER (TEMP MONITOR)

RMS SEL - OFF
RMS PWR - PRI (MA)

BACKUP CRADLE

CRT

SM 94 PDRS CONTROL
I/O ON - ITEM 5 EXEC

SAFING - CANCEL (tb-bp)

Go to RMS PWRDN, step 2 LATCH/STOW ARM

INADVERTENT RELEASE

INADV

A6U

BACKOFF
DAP: A/MAN/NORM
DAP ROT: DISC/DISC/DISC
DAP TRANS: NORM/NORM/NORM
✓SENSE - -X
THC +Z (dn) 2 sec (1 FPS)
Maintain visual contact through ovhd/aft window with THC ±X, ±Y as reqd until out-of-plane burn performed

MANEUVER OUT OF PLANE

|GNC UNIV PTG|
STOP - ITEM 21 EXEC
GNC, OPS 202 PRO
|GNC ORBIT MNVR EXEC|
RCS SEL - ITEM 4 EXEC (*)
Set TIG to current time +2:00
TGT PEG 7 ΔV_x - ITEM 19 +0 EXEC
ΔV_y - ITEM 20 +$\underline{2}$ EXEC
ΔV_z - ITEM 21 +$\underline{0}$ EXEC
LOAD - ITEM 22 EXEC
TIMER - ITEM 23 EXEC
✓VGO Z $\geq$ 0; if VGO Z < 0, then

* TGT PEG 7 ΔV_y - ITEM 20 -$\underline{2}$ EXEC *
* LOAD - ITEM 22 EXEC *
* TIMER - ITEM 23 EXEC *
* ✓VGO Z $\geq$ 0 *

DO NOT MNVR to BURN ATT
At TIG deflect THC to null VGOs

INADV PL REL

PERFORM FINAL SEP MNVR

✓RCS SEL - ITEM 4 (*)

TV ROLL - ITEM 5 +1 8 0 EXEC

Set TIG to last TIG +20:00

TGT PEG 7 ΔV_x - ITEM 19 +5 EXEC

ΔV_y - ITEM 20 +0 EXEC

ΔV_z - ITEM 21 +0 EXEC

LOAD - ITEM 22 EXEC

TIMER - ITEM 23 EXEC

DAP: A/AUTO/NORM

At TIG -8:00; MNVR - ITEM 27 EXEC (*)

At TIG deflect THC to null VGOs

MNVR TO MINIMUM DRAG ATTITUDE (-ZLV)

DAP: A/AUTO/VERN

GNC, OPS 201 PRO

|GNC UNIV PTG|

✓TGT ID - 2

BODY VECT - 3

OM - 180

START TRK - ITEM 19 EXEC (CUR *)

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PL JETTISON (RMS or - PL cannot be berthed)

NOTE

For PL JETTISON procedure (5-50 thru 5-55), CDR activities are now on even numbered pages and PLT activities on odd numbered pages

NOTE

Jettison between sunrise and noon if possible

CDR AUTO MNVR TO -XLV

CRT GNC UNIV PTG
✓STARY TIME at least 15 min prior to sunrise
✓TGT ID +2
BODY VECT +2
[illegible] +0
Initiate TRK

A6U DAP: A/AUTO/VERN

014, 015, 016 ✓RJD DRIVER (nine) - ON

A6U FLT CNTLR PWR - ON
EVENT TIMER MODE - UP
CNTL - STOP
TIMER - RESET

A7U ✓Lighting - as reqd

When in attitude, then

CRT GNC 33 REL NAV
AVG G ON - ITEM 1 EXEC (•)

When PLT confirms CCTVs configured to monitor jettison, then proceed to 5-52

PL JETT

PLT

MNVR PL FOR JETTISON
Maneuver PL/RMS to optimum deploy attitude |

BRAKES - ON (tb-ON)

CONFIGURE CCTVs TO MONITOR PL JETTISON

A7U CCTV MON 1 - A
2 - B

Point CCTVs at EE

CDR **JETTISON**

SUNRISE
A6U

DAMP RATES
DAP ROT: DISC/DISC/DISC
TRANS: PULSE/PULSE/NORM

If VERN jets avail
| DAP: A/MAN/VERN
If VERN jets not avail
DAP: B/MAN/NORM

WAIT UNTIL RATES DAMPED, THEN FREE DRIFT
DAP ROT: PULSE/PULSE/PULSE
DAP: A/MAN/NORM
✓SENSE - as reqd

NOTE
After JETT, initiate opening rate ASAP. Minimize other THC/RHC inputs

JETT+
0:01

WHEN RMS PILOT CONFIRMS JETTISON COMPLETE,
TRANSLATE AWAY
EVENT TIMER CNTL - START
THC +Z, 2 sec (1 ft/sec)
(-X sense: THC dn)
(-Z sense: THC out)
DAP ROT: DISC/DISC/DISC

2:00

SECOND SEP BURN
SENSE - as reqd
THC +Z, 2 sec (1 ft/sec)
(-X sense: THC dn)
(-Z sense: THC out)

Maintain visual contact with PL in OVHD window using RHC

When PL no longer visible, then

When Orbiter is in free drift, then
BRAKES - OFF (tb-OFF)
MODE - END EFF, ENTER
During next step, as soon as OPEN tb-gray
Maneuver: -X$_{EE}$ (out), clear fixture
EE MODE - AUTO
EE RELEASE sw - depress (mom)
JETT After -18 sec (max)

CDR CLEANUP

CRT |GNC 33 REL NAV|
AVG G ON - ITEM 1 EXEC (no *)
(Turns AVG G off)
|GNC UNIV PTG|
✓START TIME in past
✓TGT ID +2
BODY VECT +3
✓OM +0
Initiate TRK

A6U DAP: A/AUTO/VERN

014, ✓All primary RJD DRIVER (eight) - as reqd
015,
016

A7U ✓Lighting - as reqd

PLT

CLEANUP
EE MODE - OFF
BRAKES - ON (tb-ON)

WHEN ORBITER PILOT CONFIRMS VERNIERS IN USE,
Stow arm via RMS POWERDOWN, steps 1-5

NOTE

For PL JETTISON procedure (5-56 thru 5-61), CDR activities are now on even numbered pages and PLT activities on odd numbered pages

NOTE

Jettison between sunrise and noon if possible

CDR AUTO MNVR TO -XLV

CRT |GNC UNIV PTG|
✓START TIME at least 15 min prior to sunrise
✓TGT ID +2
BODY VECT +2
OM +0
Initiate TRK

A6U DAP: A/AUTO/VERN

014, ✓RJD DRIVER (nine) - ON
015,
016

A6U FLT CNTLR PWR - ON
EVENT TIMER MODE - UP
CNTL - STOP
TIMER - RESET

A7U ✓Lighting - as reqd

When in attitude, then

CRT |GNC 33 REL NAV|
AVG G ON - ITEM 1 EXEC (*)

When PLT confirms CCTVs configured to monitor jettison, then proceed to 5-58

PLT

MNVR PL FOR JETTISON

Consult MCC for mode capability and joint configuration for PL jettison, also mode and joints to be used to back off grapple fixture after EE release, 5-59

PARAM sel - JOINT ANGLE

MODE - _____

Drive to:

	SY	SP	EP	WP	WY	WR

✓BRAKES - ON (tb-ON)

CONFIGURE CCTVs TO MONITOR PL JETTISON

A7U CCTV MON 1 - A
2 - B

Point CCTVs at EE

CDR **JETTISON**

SUNRISE DAMP RATES

A6U DAP ROT: DISC/DISC/DISC
TRANS: PULSE/PULSE/NORM

If VERN jets avail
| DAP: A/MAN/VERN
If VERN jets not avail
DAP: B/MAN/NORM

WAIT UNTIL RATES DAMPED, THEN FREE DRIFT
DAP ROT: PULSE/PULSE/PULSE
DAP: A/MAN/NORM
✓SENSE - as reqd

NOTE
After JETT, initiate opening rate ASAP. Minimize other THC/RHC inputs

JETT+ WHEN RMS PILOT CONFIRMS JETTISON COMPLETE,
0:01 TRANSLATE AWAY
EVENT TIMER CNTL - START
THC +Z, 2 sec (1 ft/sec)
(-X sense: THC dn)
(-Z sense: THC out)
DAP ROT: DISC/DISC/DISC

2:00 SECOND SEP BURN
SENSE - as reqd
THC +Z, 2 sec (1 ft/sec)
(-X sense: THC dn)
(-Z sense: THC out)

Maintain visual contact with PL in OVHD window using RHC

When PL no longer visible, then

PLT **JETTISON**

SUNRISE

When Orbiter is in free drift, then
BRAKES - OFF (tb-OFF)
EE MAN CONTR - DERIGID (hold until DERIGID tb-gray) (5 sec max)

EE RELEASE sw - depress (hold until OPEN tb-gray) (3 sec max)

JETT

Per MCC
MODE - _____
Joints to be driven to clear grapple fixture

_____

_____

_____

EE MAN CONTR - DERIGID (hold until EXTEND tb-gray) (20 sec max)

CDR CLEANUP

CRT |GNC 33 REL NAV|
AVG G ON - ITEM 1 EXEC (no *)
(Turns AVG G off)
|GNC UNIV PTG|
✓START TIME in past
✓TGT ID +2
BODY VECT +3
✓OM +0
Initiate TRK

A6U DAP: A/AUTO/VERN

014, ✓All primary RJD DRIVER (eight) - as reqd
015,
016

A7U ✓Lighting - as reqd

PLT

CLEANUP
EE MODE - OFF
BRAKES - ON (tb-ON)

WHEN ORBITER PILOT CONFIRMS VERNIERS IN USE
Stow arm via BACKDRIVE TECHNIQUE - JOINT FREE,5-35

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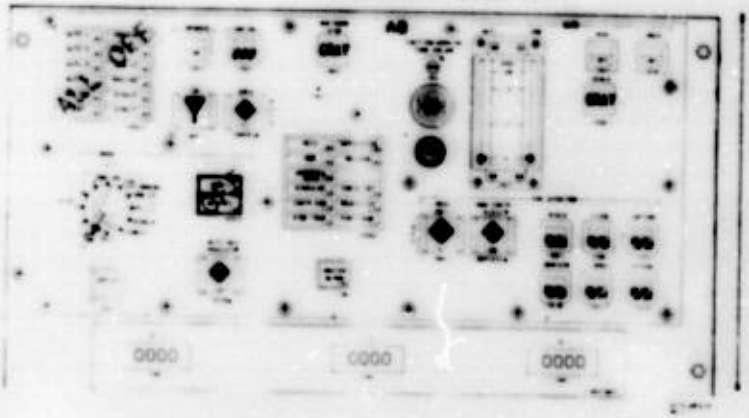
REFERENCE DATA

D&C STATUS

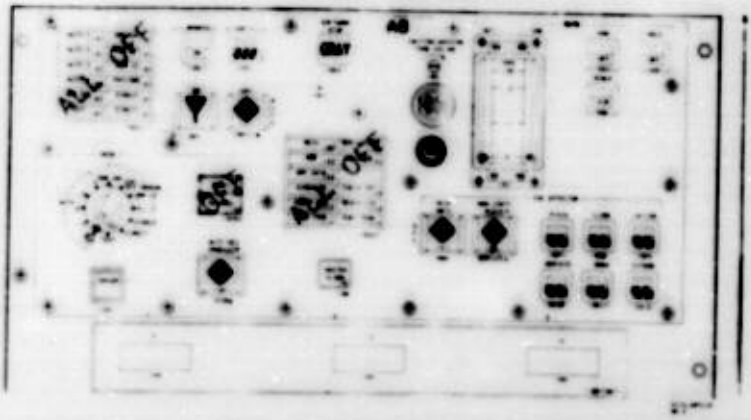
1 SUSPEND MODE

RMS PWR - PRI
RMS SEL - OFF
I/O OFF - ITEM 6 *



2 TEMP MODE

RMS PWR - PRI
RMS SEL - OFF
I/O ON - ITEM 5 *



REF DATA

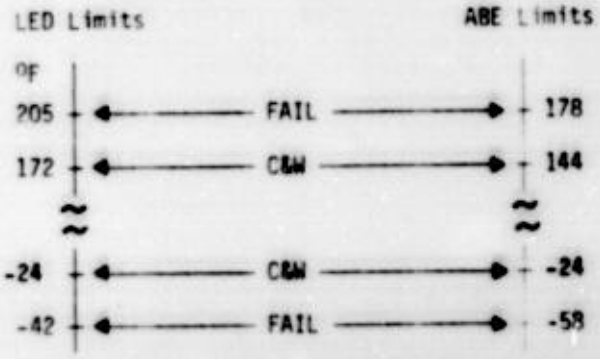
TEMPERATURE DATA

NOTE

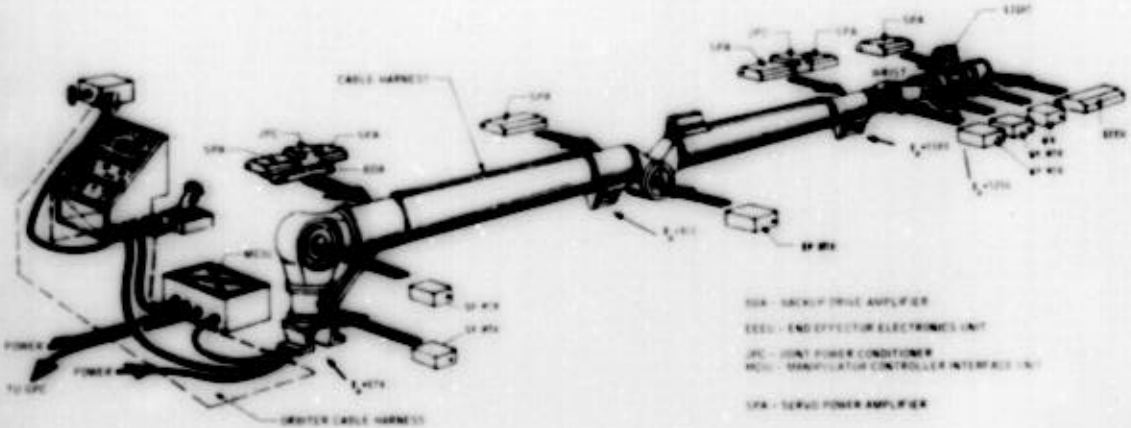
To read temperatures:
PARAM sel - PORT TEMP
JOINT sel - as desired (see below)
'LED' temps measured at joints
'ABE' temps measured at electronics

JOINT SW SEL	IND #1 TEMP °F	IND #2 TEMP °F	IND #3 JOINT ID
SY	SY LED	SP,SY ABE	101
SP	SP LED	SP,SY ABE	102
EP	EP LED	EP ABE	103
WP	WP LED	WP,WY ABE	104
WY	WY LED	WP,WY ABE	105
WR	WR LED	WR ABE	106
EE	EE LED	EE ABE	107

TEMPERATURE LIMITS

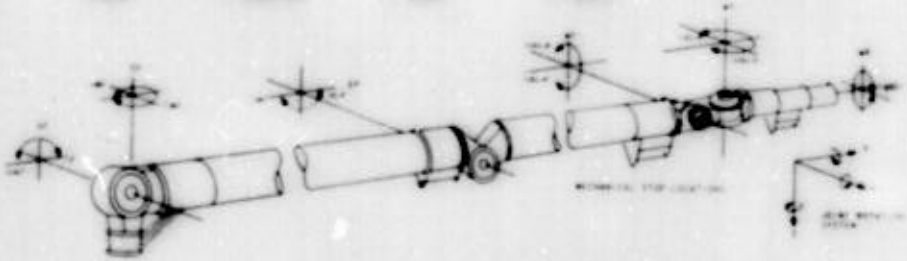


RMS ELECTRICAL COMPONENTS



JOINT TRAVEL LIMIT LOCATIONS

JOINT	REACH LIMIT LOCATION	SOFT STOP LOCATION	MECHANICAL STOP LOCATION	SINGULARITY LOCATION
SHOULDER YAW	+ 175.4° - 175.4°	+ 177.4° - 177.4°	+ 180° - 180°	
SHOULDER PITCH	+ 2.6° + 140.4°	+ 0.6° + 142.4°	- 2° + 145°	
ELBOW PITCH	- 2.4° - 155.6°	- 0.4° - 157.6°	+ 2.4° - 161°	-7.6
WRIST PITCH	- 114.4° + 114.4°	- 116.4° + 116.4°	- 121.4° + 121.4°	
WRIST YAW	- 114.6° + 114.6°	- 116.6° + 116.6°	- 121.3° + 121.3°	-75/-105 +75/+105
WRIST ROLL	- 440.0° + 440.0°	- 442° + 442°	- 447° + 447°	



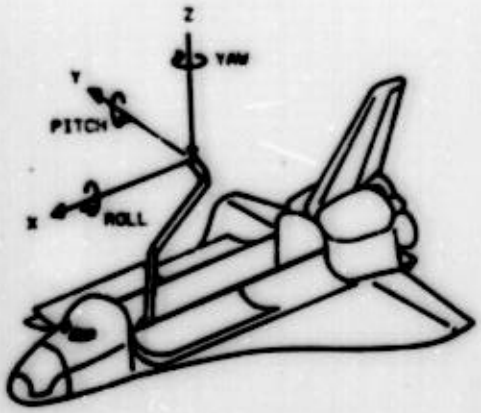
WRIST ROLL RANGE

SPEC 94 WR RANGE X ITEM 26	WR JOINT ANGLE
1	$-450 \leq \phi < -360$
2	$-360 \leq \phi < -180$
3	$-180 \leq \phi < 0$
4	$0 \leq \phi < 180$
5	$180 \leq \phi < 360$
6	$360 \leq \phi < 450$

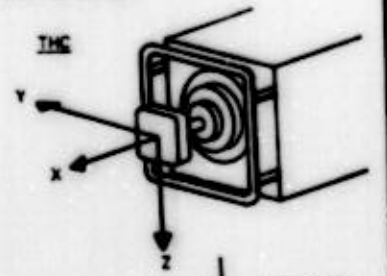
SINGULARITY ANNUNCIATION

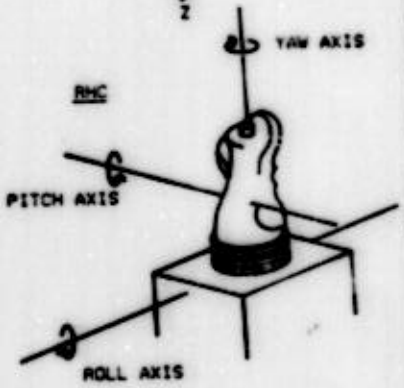
1. When the wrist yaw joint is within 3 feet of a line drawn through the shoulder yaw axis
2. When wrist yaw joint is $\pm$75 deg to $\pm$105 deg
3. When elbow joint is less than 7.6 deg

ORBITER UNLOADED MODE PHASING



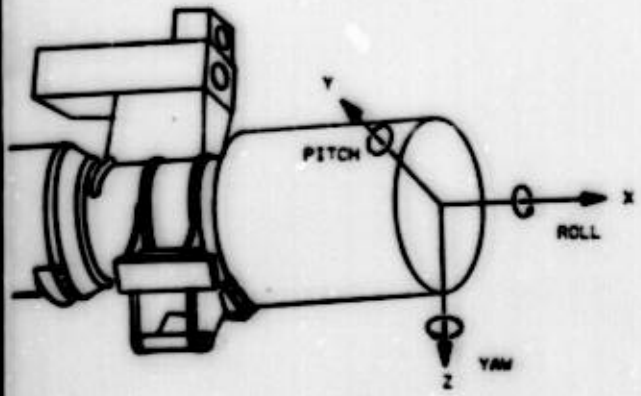
ORBITER UNLOADED MODE



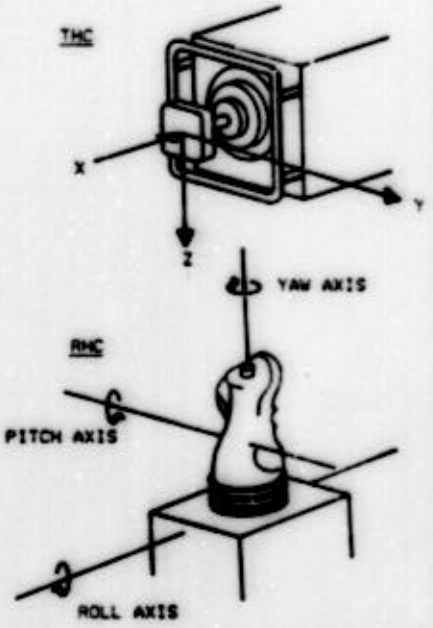


ALL VEH/BAS

END EFFECTOR MODE PHASING

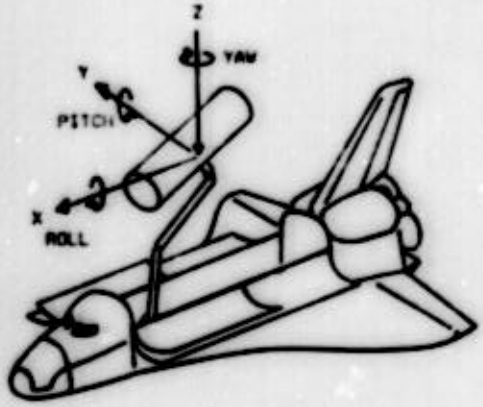


END EFFECTOR MODE

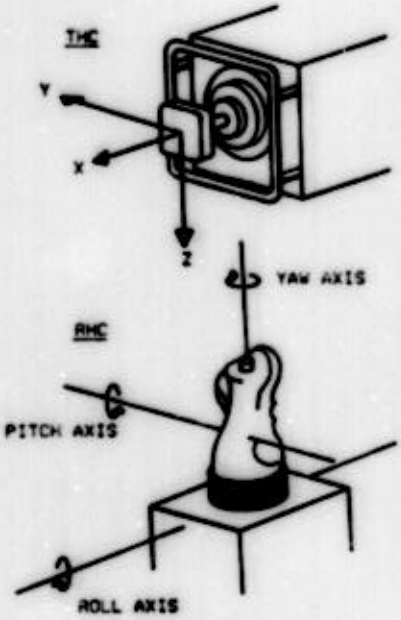


ALL VEH/BAS

ORBITER LOADED MODE PHASING

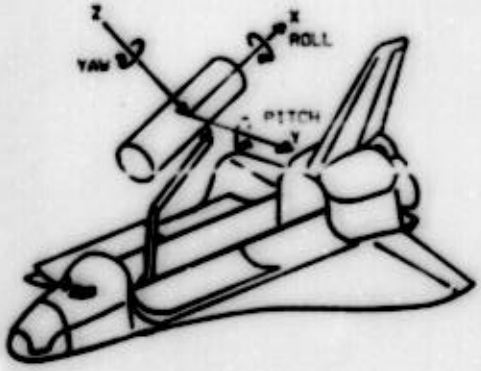


ORBITER LOADED MODE

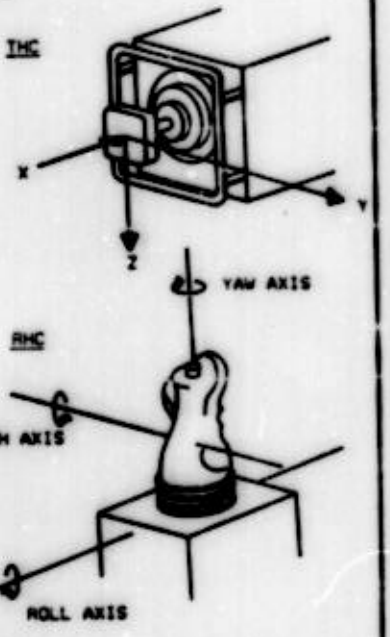


ALL VEH/BAS

PAYLOAD MODE PHASING



PAYLOAD MODE



MPM/MRL MOTOR CONTROL

RMS LATCHES	MTR 1			MTR 2		
	AC/MCA	CNTL	MDM	AC/MCA	CNTL	MDM
FWD	2/MID 2	AB1	OA2	3/MID 4	CA1	OA2
MID	1/MID 1	AB1	OF4	2/MID 4	CA1	OA1
AFT	3/MID 2	CA1	OA3	1/MID 3	AB1	OF1

MPM	MTR 1			MTR 2		
	AC/MCA	CNTL	MDM	AC/MCA	CNTL	MDM
SHLD	3/MID 4	CA2	OA2	2/MID 2	BC1	OA2

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RMS/PRCS INTERACTION..... FS 4-1

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SCHEDULING OVERVIEW - NOMINAL

SCHEDULING OVERVIEW - NOMINAL

FLIGHT DAY 3 - GRAPPLE FIXTURE 2

ACTIVITY	DURATION (MIN)	MET (of start of activity)
GF 2		
RMS POWERUP	10	002/00:00
NOMINAL UNBERTH	20	/00:10
RMS/FCS TEST	35	/00:30
RMS/PRCS INTERACTION	55	/01:05
MEAL	60	/02:00
RMS/PRCS INTERACTION (CONT)	20	/03:00
LSS VIBRATION DAMPING	60	/03:20
AUTO MODE EVALUATION	25	/04:20
NOMINAL BERTH	25	/04:45
DIRECT DRIVE UNBERTH	25	/05:10
CONTROL SYSTEM EVAL	65	/05:35
DIRECT DRIVE BERTH	40	/06:40
RMS POWERDOWN	10	/07:20
		/07:30 (END)

SCHEDULING OVERVIEW - NOMINAL (CONT)

FLIGHT DAY 4 - GRAPPLE FIXTURE 5

ACTIVITY	DURATION (MIN)	MET (of start of activity)
GF 5		
RMS POWERUP	10	003/02:15
NOMINAL UNBERTH	20	/02:25
RMS/FCS - SIMULATED LDEF DEPLOY	45	/02:45
CONTROL SYSTEM EVAL	65	/03:30
RMS/PRCS INTERACTION	75	/04:35
ORBITER/RMS DYNAMIC INTERACTION	20	/05:50
AUTO MODE EVALUATION	25	/06:10
NOMINAL BERTH	25	/06:35
RMS POWERDOWN	10	/07:00
		/07:10 (END)

SHOPPING LIST

These activities are not scheduled in the CAP. An attempt will be made to schedule these activities in real time if conditions permit.

ACTIVITY	DURATION (MIN)
DIRECT DRIVE UNBERTH - GF 5	25
DIRECT DRIVE BERTH - GF 5	40
AUTO MODE EVALUATION - UNLOADED	20

NOMINAL

NOMINAL UNBERTH

NOMINAL UNBERTH

NOMINAL UNBERTH

1 GRAPPLE PFTA GF 2 [GF 5]
GF 5 - Priority (1)

A7 CCTV - MDN 2 - RMS/Wrist (zoom out) **
✓Target overlay attached

R11 VTR - ✓Tape,audio

Config DAP: A9/AUTO/VERN

CRT |SM 94 PDRS CONTROL|
PL ID - ITEM 3 +2 [5] EXEC

If unberthing to occur in darkness,
disregard 16mm Camr ops

Take Spotmeter reading of white (sunlit)
PFTA/RMS

BRAKES - OFF (tb-OFF)
MODE - ORB UNL, ENTER
Mnvr to grapple fixture
X = -1108 GF 2
X = -919 GF 5

When grapple fixture in view,
W9 16mm Camr - on (for ~1 min)
EE MODE - AUTO
MODE - END EFF, ENTER
Mnvr to grapple envelope
EE CAPTURE sw - depress (mom)

✓ (23 sec max)

EE MODE - OFF **
BRAKES - ON (tb-ON)
W9 16mm Camr - off

Record POS/ATT and JOINT ANGLES

2 TRUNNION RELEASE/UNBERTH

A7 CCTV - VTR RCD - MUX B&C, Alt with D, document unberth

R11 VTR pb - PLAY,RCD

R13 PL BAY MECH PWR SYS (two) - ON

A6

PL RETEN PL SEL - 1
LOGIC PWR SYS (two) - ON

Note any single motor times (> 30 sec)

A6

PL RETEN LAT 1,4 - REL (tb-REL), 60 sec max
- OFF
LAT 2,3 - REL (tb-REL), 60 sec max
- OFF
LAT 5 - REL (tb-REL), 60 sec max
- OFF
PL SEL - MDN
LOGIC PWR SYS (two) - OFF

R13 PL BAY MECH PWR SYS (two) - OFF

DAP ROT: PULSE/PULSE/PULSE
DAP: A9/MAN/VERN

✓Exposure w/Spotmeter

RATE sw - VERN (RATE MIN tb-ON), until clear guides
BRAKES - OFF (tb-OFF)
MODE - ORB LD, ENTER

W9 16mm Camr - on (for ~2 min, until bottom of PFTA visible)

Mnvr PFTA to Z = -600
BRAKES - ON (tb-ON)

R11 VTR pb - STOP

W9 16mm Camr - off

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RMS/FCS TESTS

if poss., let MCC know we're starting (ACIP CMD)

RMS/FCS TEST (Grapple Fixture 2)

1 SET UP IC - Priority ①

✓DAP: A9/AUTO/VERN, if desired

CRT

SM 94 PDRS CONTROL

PL ID - ITEM 3 - 3
PL INIT ID - ITEM 24 - 3

DAP ROT: PULSE/PULSE/PULSE
DAP: A9/MAN/VERN

OPR CMD to CONFIG A

-938, -7, -660, 0, 45, 0 GF 2

SY	SP	EP	WP	WY	WR
-35.2	102.5	-93.8	-65.5	5.5	3.1

BRAKES - ON (tb-ON)

A7

✓MADS RCDR PWR - PCM/WB ENA
WB/ACIP PCM - ON

2 LOADED ARM MOTION/ACTIVE VRCS ATTITUDE HOLD TEST - Priority (1)

	1	2	3	4
✓RATE sw - COARSE				
Config DAP: BXX/LVLH/VERN	B7	B7	B8	B8
DAP ROT: DISC/DISC/DISC				
Pause until within DB				
BRAKES - OFF (tb-OFF) MODE - ORB LD, ENTER				
Input 20 sec	THC UP	THC LT	THC UP	THC LT
Pause 60 sec				
OPR CMD to IC				
Pause 60 sec				
Check complete	—	—	—	—

When test complete,
BRAKES - ON (tb-ON)

3 I-LOAD SENSITIVITY TEST - Priority ②

✓DAP: A9/AUTO/VERN, if desired

CRT SM 94 PDRS CONTROL

✓PL ID, ITEM 3 - 3

✓PL INIT ID, ITEM 24 - 3

DAP ROT: PULSE/PULSE/PULSE

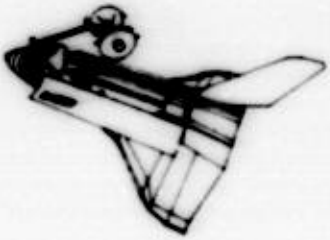
DAP: A9/MAN/VERN

OPR CMD to CONFIG A

-938, -7, -660, 0, 45, 0 GF 2

SY	SP	EP	WP	WY	WR
-35.2	102.5	-93.8	-65.5	5.5	3.1

BRAKES - ON (tb-ON)



A7 ✓MADS WB/ACIP PCM - ON
014:E, ✓cb AFT DDU (two) - cl
016:E

A6 SENSE - -X ..
FLT CNTLR PWR - ON

	1	2	3
(defaults to UNLD POR) ✓BRAKES - OFF (tb-OFF) —MODE - END EFF, ENTER			
Config DAP: BXX/MAN/VERN	B9	B10	B11
DAP ROT: DISC/DISC/DISC			
Pause until stable			
DAP ROT: PULSE/PULSE/PULSE			
Fire -P (TAIL DN), wait 5 sec then, +Y (TAIL RT), wait 5 sec then, -R (PORT WING UP), wait 5 sec then,			
DAP ROT: DISC/DISC/DISC (simo)			
Pause 2 min			
Check complete	—	—	—

When test complete,
BRAKES - ON (tb-ON)
A6 FLT CNTLR PWR - OFF
A7 MADS WB/ACIP PCM - CMD
tell mcc test complete

RMS/FCS TEST
SIMULATED LDEF DEPLOY
(Grapple Fixture 5 only)

Priority (1)

1 SET UP IC

✓DAP: A9/AUTO/VERN, if desired

CRT

SM 94 PDRS CONTROL

PL ID - ITEM 3 - 4
PL INIT ID - ITEM 24 - 4

DAP ROT: PULSE/PULSE/PULSE
DAP: A9/MAN/VERN

OPR CMD to CONFIG A

-995, +50, -580, 305, 330, 325 GF 5

SY	SP	EP	WP	WY	WR
-35.2	102.5	-93.8	-65.5	5.5	3.1

BRAKES - ON (tb-ON)

2 SETUP FOR 3-AXIS MNVR TEST

Change DAP B to B14

CRT

|GNC UNIV PTG|
TGT ID - 2
BODY VECT - 5
P - 35
Y - 10
OM - 170

DAP: B14/AUTO/VERN
Initiate TRK

When mnvr complete,

3 MNVR ORBITER TO 45° NOSE DOWN (YPOP)

|GNC UNIV PTG|
✓TGT ID - 2
BODY VECT - 5
P - 45
Y - 0
OM - 180

DAP: B14/AUTO/VERN
Initiate TRK

When in attitude,
DAP ROT: DISC/DISC/DISC
DAP: B14/LVLH/VERN

4 MNVR RMS TO LDEF CONFIG

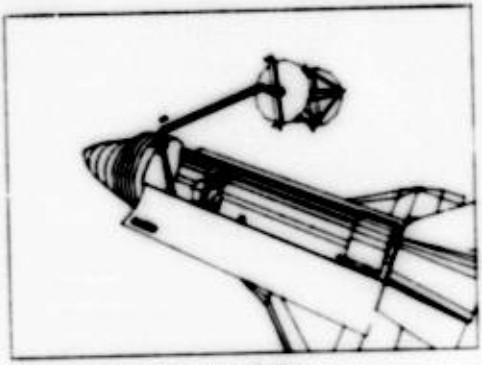
✓DAP ROT: DISC/DISC/DISC **
Config DAP: B15/LVLH/VERN

CRT |SM 94 PDRS CONTROL|
PL ID - ITEM 3 - 4
PL INIT ID - ITEM 24 - 4

OPR CMD to 'LDEF' position

-968, +203, -687, 296, 300, 176 GF 5

-41.8 83.8 -71.6 -61.9 -20.6 -131.4
✓BRAKES - OFF (tb-OFF) - position hold



When arm mnvr complete,
✓DAP ROT: DISC/DISC/DISC
Config DAP: B16/LVLH/VERN

5 ROT PULSE INPUTS

O14:E, O16:E, A6

✓cb AFT DDU (two) - cl

SENSE - -X ··
FLT CNTLR PWR - ON

(defaults to UNLD POR)

	1	2	3
BRAKES - OFF MODE - END EFF, ENTER			
Config DAP: BXX/LVLH/VERN	B17	B18	B19
DAP ROT: DISC/DISC/DISC			
Pause 2 min			
DAP ROT: PULSE/PULSE/PULSE			
Fire -P (TAIL DN), wait 10 sec then, +Y (TAIL RT), wait 10 sec then, -R (PORT WING UP), wait 10 sec then,			
DAP ROT: DISC/DISC/DISC (simo)			
Pause 2 min			
Check complete	—	—	—

After last step,
BRAKES - ON, (tb-ON)

A6 FLT CNTLR PWR - OFF

CONTINUED NEXT PAGE

6 RE-ESTABLISH NOMINAL ATTITUDE

✓DAP A set to A9

GNC UNIV PTG
✓START TIME - (in past)
✓TGT ID - 2
BODY VECT - 3
OM - 180
DAP: A9/AUTO/VERN
Initiate TRK

CONTROL SYSTEM EVALUATION

CONTROL SYSTEM EVALUATION

CNTL SYS EVAL

1 MANUAL AUGMENTED (CONFIG A)

SETUP

✓DAP: A9/AUTO/VERN, if desired

CRT |SM 94 PDRS CONTROL|
PL ID - ITEM 3 +3 [4] EXEC
PL INIT ID - ITEM 24 +3 [4] EXEC

DAP ROT: PULSE/PULSE/PULSE
DAP: A9/MAN/VERN

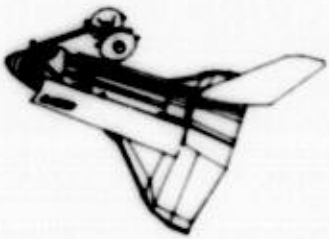
OPR CMD to IC

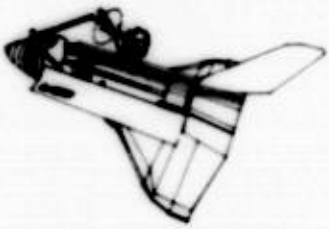
-938,	-7,	-660,	0,	45,	0	GF 2
-995,	+50,	-580,	305,	330,	325	GF 5

SY	SP	EP	WP	WY	WR
-35.2	102.5	-93.8	-65.5	5.5	3.1

BRAKES - ON (tb-ON)

A7 CCTV - VTR RCD - D, zoom in on EE
R11 VTR - ✓Tape





GF 2 - Priority ②
GF 5 - Priority ①

TEST

VTR pb - PLAY, RCD	1	2	3	4
RATE sw - COARSE BRAKES - OFF (tb-OFF) MODE - ORB LD, ENTER				
INPUT 15 sec, then STOP arm while cmd in	THC DN, BRAKES	THC LT, RELEASE INPUT	THC IN, SAFING	RHC +YAW BRAKES
PAUSE 60 sec, then VTR pb - STOP				
Reconfigure:	BRAKES - OFF		SAFING - CANCEL	NOT REQD
OPR CMD to IC (steps 1,2,3 only)				
BRAKES - ON(tb-ON)				X
Check complete	___	___	___	___

2 SINGLE JOINT (CONFIG A)

SETUP

✓DAP: A9/AUTO/VERN, if desired

CRT |SM 94 PDRS CONTROL|
✓PL ID, ITEM 3 - 3 [4]
✓PL INIT ID, ITEM 24 - 3 [4]

DAP ROT: PULSE/PULSE/PULSE
DAP: A9/MAN/VERN

OPR CMD to IC

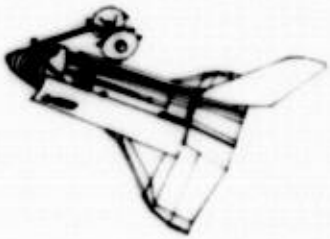
-938, -7, -660, 0, 45, 0 GF 2

-995, +50 -580, 305, 330, 325 GF 5

SY	SP	EP	WP	WY	WR
-35.2	102.5	-93.8	-65.5	5.5	3.1

BRAKES - ON (tb-ON)

A7 CCTV - VTR RCD - D, zoom in on EE
R11 VTR - ✓Tape



GF 2 - Priority ②
GF 5 - Priority ①

TEST

		1	2	3	4
	✓RATE sw - COARSE				
R11	VTR pb - PLAY,RCD				
	BRAKES -	OFF	OFF	OFF	ON
	MODE -	SING	SING	SING	DIR
	JOINT sel	SP	WY	WR	SP
	DRIVE '+' 15 sec, then	◄--	BRAKES ON	--►	REL CMD
	PAUSE 60 sec, then				
R11	VTR pb - STOP				
	Reconfigure:				
	BRAKES - OFF (tb-OFF)				
	RETURN to IC (OPR CMD or SINGLE) (steps 1,2,3 only)				NOT REQD
	BRAKES - ON (tb-ON)				
	Check complete	___	___	___	___

When test complete,
✓BRAKES - ON (tb-ON)
MODE - MAN AUG or SINGLE
- (take out of DIRECT)

3 MANUAL AUGMENTED (CONFIG D)

SETUP

✓DAP: A9/AUTO/VERN, if desired

CRT | SM 94 PDRS CONTROL |
✓PL ID, ITEM 3 - 3 [4]
✓PL INIT ID, ITEM 24 - 3 [4]

DAP ROT: PULSE/PULSE/PULSE
DAP: A9/MAN/VERN

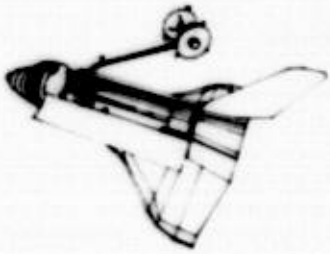
OPR CMD to IC

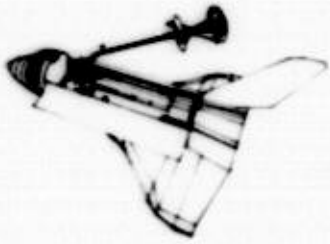
-1183, +226, -681	8, 53, 47	GF 2
-1272, +294, -697	10, 323, 1	GF 5

SY	SP	EP	WP	WY	WR
-38	34	-38	0	0	0

BRAKES - ON (tb-ON)

A7 CCTV - VTR RCD - B, zoom in on EE
R11 VTR - ✓Tape





GF 2 - Priority ②
GF 5 - Priority ②

TEST	1	2
VTR pb - PLAY,RCD RATE sw - COARSE BRAKES - OFF (tb-OFF) MODE - ORB LD, ENTER INPUT THC UP 15 sec, then STOP arm while cmd in PAUSE 60 sec, then VTR pb - STOP Reconfigure:	SAFING - SAFE (tb-bp) SAFING - CANCEL (tb-gray) OPR CMD to IC BRAKES - ON (tb-ON)	BRAKES - ON (tb-ON)
Check complete	____	____

4 SINGLE JOINT (CONFIG C)

SETUP

✓DAP: A9/AUTO/VERN, if desired

CRT
SM 94 PDRS CONTROL
✓PL ID, ITEM 3 - 3 [4]
✓PL INIT ID, ITEM 24 - 3 [4]

DAP ROT: PULSE/PULSE/PULSE
DAP: A9/MAN/VERN

ORB LD or SINGLE to IC (monitor clearances)

-1322, -181, -650, 1, 275, 212 GF 2

-1431, -190, -677, 14, 5, 359 GF 5

SY	SP	EP	WP	WY	GF 2 WR	GF 5 WR
0	25	-10	0	0	180	0

BRAKES - ON (tb-ON)

A7 CCTV - VTR RCD - C, zoom in on EE
R11 VTR - ✓Tape

TEST {SINGLE - Priority ①
DIRECT - Priority ①

RATE sw - COARSE
JOINT - SP

R11 VTR pb - PLAY,RCD

BRAKES - OFF (tb-OFF)
MODE - SINGLE, ENTER

SINGLE DR '+' 15 sec, then
While cmd in: SAFING - SAFE (tb-bp)

Pause 60 sec
R11 VTR pb - STOP
RATE sw - VERN (RATE min tb-ON) ··
SAFING - CANCEL (tb-gray)
SINGLE DR to IC:

					GF 2	GF 5
SY	SP	EP	WP	WY	WR	WR
0	25	-10	0	0	180	0

BRAKES - ON (tb-ON)
MODE - DIRECT (lt-on)
JOINT - SP

R11 VTR pb - PLAY,RCD

DIRECT DR '+' 30 sec, then
RELEASE input

leave CMD in, expect slow response

Pause 60 sec
R11 VTR pb - STOP

✓BRAKES - ON (tb-ON)
MODE - MAN AUG or SINGLE
- (take out of DIRECT)

RATE sw - COARSE (as reqd)

CONTINUED NEXT PAGE

Reconfigure - GF 2 ONLY:
BRAKES - OFF (tb-OFF)
MODE - ORB LD, ENTER
Drive to X = -1120, then
Y = 0
MODE - SINGLE, ENTER
Drive WR = +60
BRAKES - ON (tb-ON)

RMS/PRCS INTERACTION

1 SETUP (CONFIG E) - Priority ①

✓DAP: A9/AUTO/VERN, if desired

CRT |SM 94 PDRS CONTROL|
PL ID - ITEM 3 +3 [4]
PL INIT ID - ITEM 24 +3 [4]

DAP TRANS: PULSE/PULSE/PULSE
DAP ROT: PULSE/PULSE/PULSE
DAP: A9/MAN/VERN

Before OPR CMD,
MODE - SINGLE, ENTER
Drive SY = 0

OPR CMD to IC

RMS/PRCS

	-754,	-333,	-1080,	217,	65,	264 GF 2
	-774,	**-370,**	**-1185,**	**79,**	**19,**	**344 GF 5**

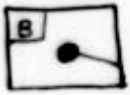
SY	SP	EP	WP	WY	WR
0	90	-10	0	0	0

BRAKES - ON (tb-ON)

A7 CCTV - VTR RCD - B, zoom in on EE
R11 VTR - ✓Tape

O14:E, ✓cb AFT DDU (two) - cl
O16:E
O16 ASA 4 - ON
A6 SENSE - -X ..
FLT CNTLR PWR - ON

Change DAP B to B12

		Priority	①	①
		TEST (CONFIG E)	1	2
		✓BRAKES - ON (tb-ON)		
		DAP ROT: PULSE/PULSE/PULSE		
		DAP: B12/MAN/NORM		
R11		VTR pb - PLAY,RCD		
		Fire 1st pulse	+P TAIL UP	-R PORT WING UP
		Pause 2 min, then		
		Fire 2nd pulse	-P TAIL DN	+R PORT WING DN
		Pause 2 min, then		
R11		VTR pb - STOP		
		✓RMS IC (0,90,-10,0,0,0)		NOT REQD
		DAP: B12/MAN/VERN DAP ROT: DISC/DISC/DISC (damp rates) Check complete	—	—

2 SETUP (CONFIG B) (Priority - See FS 4-6)

CRT

SM 94 PDRS CONTROL
✓PL ID, ITEM 3 - 3 [4]
✓PL INIT ID, ITEM 24 - 3 [4]

DAP ROT: PULSE/PULSE/PULSE
✓DAP: B12/MAN/VERN

If coming from config E
MODE - SINGLE, ENTER
DRIVE SY = -90

OPR CMD to IC

-680,	-263,	-1105,	357,	20,	145	GF 2
-680,	**-281,**	**-1217,**	**90,**	**9,**	**70**	GF 5

SY	SP	EP	WP	WY	WR
-90	90	-10	0	0	0

BRAKES - ON (tb-ON)

A7 CCTV - VTR RCD - B, zoom in on EE
R11 VTR - ✓Tape

014:E, ✓cb AFT DDU (two) - cl
016:E
016 ✓ASA 4 - ON
A6 ✓SENSE - -X ..
✓FLT CNTLR PWR - ON

TEST (CONFIG B)

	1	2	3	4	5	6
BRAKES	ON		OFF		OFF	
SAFING	CANCEL		SAFE		CANCEL	
MODE	--		--		SINGLE	
DAP ROT: PULSE/PULSE/PULSE						
DAP: B12/MAN/NORM						
VTR pb - PLAY,RCD						
Fire 1st pulse	+P TAIL UP	+R PORT WING DN	+P TAIL UP	+R PORT WING DN	+P TAIL UP	-R PORT WING UP
Pause 2 min						
Fire 2nd pulse	-P TAIL DN	-R PORT WING UP	-P TAIL DN	-R PORT WING UP	-P TAIL DN	+R PORT WING DN
Pause 2 min						
VTR pb - STOP						
✓RMS IC (-90,90,-10,0,0,0)						NOT REQD
DAP: B12/MAN/VERN						
DAP ROT: DISC/DISC/DISC (damp rates)						
Check complete	—	—	—	—	—	—

CONTINUED NEXT PAGE

After last step,
BRAKES - ON (tb-ON)
A6 FLT CNTLR PWR - OFF
O16 ASA 4 - OFF

NOTE

GF 2

Test	1	2	3	4	5	6
Priority	2	2	3	2	3	2

GF 5

Test	1	2	3	4	5	6
Priority	1	1	3	2	3	2

LSS VIBRATION DAMPING TEST

LSS TEST

LSS VIBRATION DAMPING TEST
(Grapple Fixture 2 only)

1 SETUP (CONFIG B)

✓DAP: A9/AUTO/VERN, if desired

CRT

SM 94 PDRS CONTROL
PL ID - ITEM 3 +3 EXEC
PL INIT ID - ITEM 24 +3 EXEC

DAP TRANS: PULSE/PULSE/PULSE
DAP ROT: PULSE/PULSE/PULSE
DAP: A9/MAN/VERN

OPR CMD to IC

-680, -263, -1105, 357, 20, 145 GF 2

SY	SP	EP	WP	WY	WR
-90	90	-10	0	0	0

BRAKES - ON (tb-ON)

A7 CCTV - VTR RCD - B, zoom in on EE
R11 VTR - ✓Tape

014:E, ✓cb AFT DDU (two) - cl
016:E
016 ASA 4 - ON
A6 SENSE - -X ··
FLT CNTLR PWR - ON

Change DAP B to B13

Priority ① ① ② ③

TEST (CONFIG B)

	1	2	3	4
BRAKES	OFF	OFF	OFF	ON
SAFING	CANCEL	CANCEL	SAFE	CANCEL
MODE	SINGLE	SINGLE	--	--
DAP ROT: PULSE/PULSE/PULSE				
DAP: B13/MAN/NORM				
R11 VTR pb - PLAY,RCD				
Fire pulse	-R PORT WING UP	+R PORT WING DN	+R PORT WING DN	-R PORT WING UP
Pause 2 min, then				
R11 VTR pb - STOP				
✓RMS IC (-90,90,-10,0,0,0)				NOT REQD
DAMP RATES AFTER TESTS 2,4 ONLY				
DAP: B13/MAN/VERN				
DAP ROT: DISC/DISC/DISC	N/A	____	N/A	____
Check complete	____	____	____	____

After last step,
A6 FLT CNTLR PWR - OFF

2 SETUP (CONFIG J)

CRT

|SM 94 PDRS CONTROL|
✓PL ID, ITEM 3 - 3
✓PL INIT ID, ITEM 24 - 3

DAP ROT: PULSE/PULSE/PULSE
✓DAP: B13/MAN/VERN

Before OPR CMD,
MODE - SINGLE, ENTER
Drive EP = -50
WR = +25

OPR CMD to IC

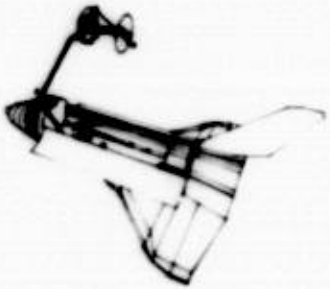
-713, +153, -863, 180, 0, 45 GF 2

SY	SP	EP	WP	WY	WR
-82.6	94.0	-72.7	-41.0	-7.0	197.5

BRAKES - ON (tb-ON)

A7
R11

CCTV - VTR RCD - B, zoom in on EE
VTR - ✓Tape



014:E, ✓cb AFT DDU (two) - cl
016:E
016 ✓ASA 4 - ON
A6 ✓SENSE - -X ..
FLT CNTLR PWR - ON

Priority (1) (1) (2) (3)

TEST (CONFIG J)

	1	2	3	4
BRAKES	OFF	OFF	OFF	ON
SAFING	CANCEL	CANCEL	SAFE	CANCEL
MODE	SINGLE	SINGLE	--	--
DAP ROT: PULSE/PULSE/PULSE				
DAP: B13/MAN/NORM				
R11 VTR pb - PLAY,RCD				
Fire pulse	-R PORT WING UP	+R PORT WING DN	+R PORT WING DN	-R PORT WING UP
Pause 2 min, then				
R11 VTR pb - STOP				
✓RMS IC (-82.6,94.0,-72.7,-41.0,-7.0,197.5)				NOT REQD
DAMP RATES AFTER TESTS 2,4 ONLY				
DAP: B13/MAN/VERN				
DAP ROT: DISC/DISC/DISC N/A		____	N/A	____
Check complete	____	____	____	____

After last step,
A6 FLT CNTLR PWR - OFF
016 ASA 4 - OFF

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ORBITER/RMS DYNAMIC INTERACTION

ORB/RMS DYN INT

ORBITER/RMS DYNAMIC INTERACTION if poss., let MCC know when starting
(Grapple Fixture 5 only)
Priority ②

✓DAP: A9/AUTO/VERN, if desired

CRT SM 94 PDRS CONTROL
PL ID - ITEM 3 +4 EXEC
PL INIT ID - ITEM 24 +4 EXEC

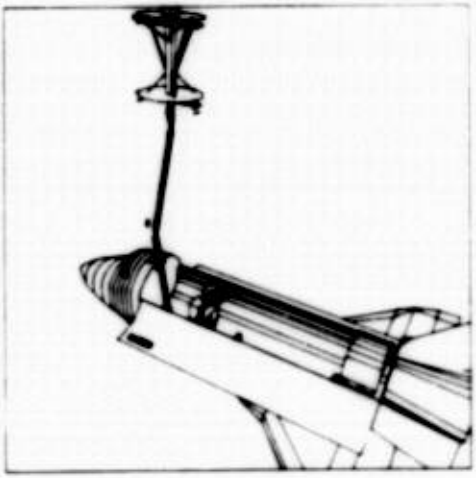
DAP ROT: PULSE/PULSE/PULSE
DAP: A9/MAN/VERN

OPR CMD to IC

-608, +38, -1187, 91, 357, 90 GF 5

BRAKES - ON (tb-ON)

SY	SP	EP	WP	WY	WR
-103.2	75.3	-40.0	32.7	1.4	7.5



ORBIT/RMS DYN INT

A7 ✓MADS RCDR PWR - PCM/WB ENA
WB/ACIP PCM - ON

BRAKES - OFF (tb-OFF)
MODE - ORB LD, ENTER
RATE sw - COARSE

THC IN for 15 sec, release input
Pause 30 sec

THC LEFT for 15 sec, release input
Pause 30 sec

BRAKES - ON (tb-ON)

A7 MADS WB/ACIP PCM - CMD

tell MCC when through.

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AUTO MODE EVALUATION (UNLOADED & LOADED)

AUTO

AUTO SEQUENCE - LOADED & UNLOADED

AUTO MODE

LOADED & UNLOADED AUTO SEQUENCE
GF 2,GF 5 - Priority (1)
UNLD - Priority (3)

NOTE
Characters in boxes refer to unloaded auto sequence. For unloaded auto sequence, disregard 16mm Camera ops

A7 CCTV - document auto sequence
R11 VTR - ✓Tape

✓DAP: A9/AUTO/VERN, if desired

CRT |SM 94 PDRS CONTROL|
PL ID - ITEM 3 +2 [5] | 0 | EXEC
PL INIT ID - ITEM 24 +2 [5] | 0 | EXEC

DAP ROT: PULSE/PULSE/PULSE
DAP: A9/MAN/VERN

*GF2 - If coming from CONFIG J
Drive SY = -60 and WR = +130
before OPR CMD

Monitor direction of WR during OPR CMD
(✓WR = -37.8 at INITIAL PT)

OPR CMD to pt 1, PL ID 2 [5] | 0 |

-802,	-9,	-699,	0,	0,	0	GF 2
-892,	**+7,**	**-683,**	**270,**	**315,**	**270**	**GF 5**
-892,	**-64,**	**-754,**	**270,**	**315,**	**271**	**UNLD**

CONTINUED NEXT PAGE

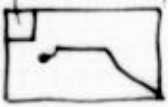
SY	SP	EP	WP	WY	WR
-29.6	+96.2	-77.7	-95.3	-22.0	-37.8

BRAKES - ON (tb-ON)

CRT

SM 94 PDRS CONTROL
PL ID - ITEM 3 +1 EXEC
PL INIT ID - ITEM 24 +1 EXEC
AUTO MODE - ITEM 13 +1 EXEC

as desired



R11

VTR pb - PLAY,RCD
BRAKES - OFF (tb-OFF)
MODE - AUTO 1, ENTER (✓READY lt-on)

---

pt 1 -892, 0, -690, 0, 0, 0 (INITIAL)

AUTO SEQ - PRO (✓IN PROG lt-on) 1:50
✓Moves: UP

---

pt 2 -892, 0, -750, 0, 0, 0 (PAUSE)

AUTO SEQ - PRO (✓IN PROG lt-on) 1:50
✓Rotation only

---

pt 3 -892, 0, -750, 0, 0, 45 (PAUSE)

AUTO SEQ - PRO (✓IN PROG lt-on) 4:40
✓Moves: FWD, STBD, UP

---

pt 4 -792, +100, -850, 270, 0, 45 (PAUSE)

✓Exposure w/Spotmeter 4:00
W9 16mm Camr - on (for ~2 min) during RMS motion (next step)

AUTO SEQ - PRO (✓IN PROG lt-on)
✓Moves: AFT, PORT, UP thru FLYBY

pt 5	-892, 0, -900, 0, 0, 45	(FLYBY)

then,
✓Moves: DOWN thru FLYBY

pt 6	-892, 0, -750, 0, 0, 45	3.00 (FLYBY)

then,
✓Rotation only

pt 7	-892, 0, -750, 0, 0, 0	(FLYBY)

then, 2 00
✓Moves: DOWN

pt 8	-892, 0, -690, 0, 0, 0	(FINAL)

✓AUTO SEQ lts - off
Pause 30 sec, then

R11 VTR pb - STOP
BRAKES - ON (tb-ON)
W9 16mm Camr - off

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NOMINAL BERTH

NOMINAL BERTH
GF 5 - Priority ①

1 SETUP

A7 CCTV - VTR RCD - MUX B&C, Alt with D
document berth

R11 VTR - ✓Tape, audio
✓DAP: A9/AUTO/VERN, if desired

CRT SM 94 PDRS CONTROL
✓PL ID, ITEM 3 - 2 [5]
✓PL INIT ID, ITEM 24 - 2 [5]

DAP ROT: PULSE/PULSE/PULSE
DAP: A9/MAN/VERN

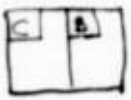
Mnvr to above berthed position

-1018, 0, -600, 0, 0, 0

BRAKES - ON (tb-ON)

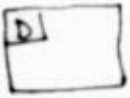
2 BERTH/LATCH PFTA

R11 VTR pb - PLAY,RCD
RATE sw - VERN (RATE MIN tb-ON), near guides
BRAKES - OFF (tb-OFF)
MODE - ORB LD, ENTER



A6 PL RETEN PL SEL - 1
✓Exposure w/Spotmeter

W9 16mm Camr - on (till end of film)
Berth PFTA
✓PL RETEN RDY 1,2,3,4 tb - gray



....IF NEXT ACTIVITY IS DIRECT DRIVE UNBERTH....
.
. BRAKES - ON (tb-ON)
. Go to DIR DR UNBERTH, Step 3, UNBERTH PFTA .
.....

NOMINAL BERTH

R13 PL BAY MECH PWR SYS (two) - ON
A6 PL RETEN LOGIC PWR SYS (two) - ON
Note any single motor times (> 30 sec)
PL RETEN LAT 5 - LAT (tb-LAT), 60 sec max
- OFF
✓RDY 1,2,3,4,5 (five) tb - gray
LAT 1,4 - LAT (tb-LAT), 60 sec max
- OFF
LAT 2,3 - LAT (tb-LAT), 60 sec max
- OFF
PL SEL - MON
LOGIC PWR SYS (two) - OFF
R13 PL BAY MECH PWR SYS (two) - OFF
R11 VTR pb - STOP
W9 16mm Camr - off

3 RELEASE PFTA
A7 CCTV - MON 2 - RMS/Wrist (zoom out)

EE MODE - AUTO
RATE sw - VERN (RATE min tb-ON)

BRAKES - OFF (tb-OFF)
MODE - END EFF, ENTER

When OPEN tb - grav, mnvr arm away from grapple fixture
EE RELEASE sw - depress (mom)

✓ ▮▮▮ ▮▮▮ ▮▮▮ (23 sec max)

Mnvr arm clear of Orbiter, payload

BRAKES - ON (tb-ON)
EE MODE - OFF

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DIR. DR

DIRECT DRIVE UNBERTH

DIR DR UNBERTH

DIRECT DRIVE UNBERTH

GF 2 - Priority ①

GF 5 - Priority ②

1 GRAPPLE PFTA GF 2 [5]

A7 CCTV - MON 2 - RMS/Wrist (zoom out) ••
✓Target overlay attached to MON 2

R11 VTR - ✓Tape, audio

✓DAP: A9/AUTO/VERN

CRT |SM 94 PDRS CONTROL|
PL ID - ITEM 3 +2 [5] EXEC

BRAKES - OFF (tb-OFF)
MODE - ORB UNL, ENTER
Mnvr to grapple fixture
X = -1108 GF 2
X = -919 GF 5

When grapple fixture in view,
EE MODE - AUTO
MODE - END EFF, ENTER
Mnvr to grapple envelope
EE CAPTURE sw - depress (mom)

✓ (23 sec max)

▮▮▮ ▮▮▮ ▮▮▮

EE MODE - OFF ••
BRAKES - ON (tb-ON)

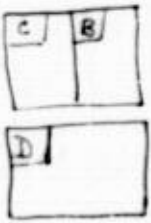
Record POS/ATT and JOINT ANGLES

2 TRUNNION RELEASE

A7 CCTV - VTR RCD - MUX B&C, Alt with D
document unberth

R11 VTR pb - PLAY,RCD

R13 PL BAY MECH PWR SYS (two) - ON
A6 PL RETEN PL SEL - 1
LOGIC PWR SYS (two) - ON



Note any single motor times (> 30 sec)
PL RETEN LAT 1,4 - REL (tb-REL), 60 sec max
- OFF
LAT 2,3 - REL (tb-REL), 60 sec max
- OFF
LAT 5 - REL (tb-REL), 60 sec max
- OFF
PL SEL - MON
LOGIC PWR SYS (two) - OFF

R13 PL BAY MECH PWR SYS (two) - OFF

3 UNBERTH PFTA

DAP ROT: PULSE/PULSE/PULSE
DAP: A9/MAN/VERN

✓BRAKES - ON (tb-ON)
MODE - DIRECT (lt-on)

Mnvr PFTA to -5 ft above guides,
using the control scheme below

Desired PL Motion	GF 2 Input	GF 5 Input
$+X_{ORB}$	-WP	-EP
$+Y_{ORB}$	-SY	-SY
$-Z_{ORB}$	+SP,+EP	+SP
$-P_{ORB}$	-WP	-WP
$+Y_{ORB}$	+WR	+WY
$+R_{ORB}$	-WY	+WR

When PFTA is 5 ft above guides,

.....IF NEXT ACTIVITY IS DIRECT DRIVE BERTH.....
.
. BRAKES - OFF (tb-OFF) .
. MODE - ORB LD, ENTER .
. Input position/attitude deltas .
. BRAKES - ON (tb-ON) .
. Go to DIR DR BERTH, Step 2 BERTH/LATCH PFTA .
.....

BRAKES - OFF (tb-OFF)
MODE - ORB LD, ENTER
Mnvr to Z = -600
BRAKES - ON (tb-ON)

R11 VTR pb - STOP

DIR DR
BERTH

DIRECT DRIVE BERTH

DIRECT DRIVE BERTH
GF 2 - Priority ①
GF 5 - Priority ②

DIR DK BERTH

1 SETUP

A7 CCTV - VTR RCD - MUX B&C, Alt with D, ELBOW | document berth

R11 VTR - ✓Tape, audio

✓DAP: A9/AUTO/VERN

CRT |SM 94 PDRS CONTROL|
✓PL ID, ITEM 3 - 2 [5]
✓PL INIT ID, ITEM 24 - 2 [5]

DAP ROT: PULSE/PULSE/PULSE
DAP: A9/MAN/VERN

OPR CMD to above berthed position

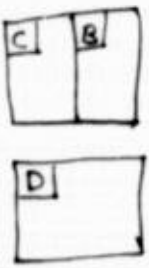
-1018, 0, -600, 0, 0, 0,

Mnvr to approx 5 ft above guides (Z = -485)

BRAKES - OFF (tb-OFF)
MODE - ORB LD, ENTER
Input position/attitude deltas
BRAKES - ON (tb-ON)

2 BERTH/LATCH PFTA

VTR pb - PLAY,RCD
A6 PL RETEN PL SEL - 1
MODE - DIRECT (lt-on)



Berth PFTA using the control scheme below

Desired PL Motion	GF 2 Input	GF 5 Input
$-X_{ORB}$	+WP	+EP
$-Y_{ORB}$	+SY	+SY
$+Z_{ORB}$	-SP,-EP	-SP
$+P_{ORB}$	+WP	+WP
$-Y_{ORB}$	-WR	-WY
$+R_{ORB}$	-WY	+WR

A6 ✓PL RETEN RDY 1,2,3,4 (~~five~~ four) tb - gray
BRAKES - OFF (tb-OFF)
MODE - TEST, ENTER

R13 PL BAY MECH PWR SYS (two) - ON
A6 PL RETEN LOGIC PWR SYS (two) - ON

Note any single motor times (> 30 sec)
PL RETEN LAT 5 - LAT (tb-LAT), 60 sec max
- OFF
✓RDY 1,2,3,4,5 tb - gray
LAT 1,4 - LAT (tb-LAT), 60 sec max
- OFF
LAT 2,3 - LAT (tb-LAT), 60 sec max
- OFF
PL SEL - MDN
LOGIC PWR SYS (two) - OFF

R13 PL BAY MECH PWR SYS (two) - OFF
BRAKES - ON (tb-ON)
R11 VTR pb - STOP

3 RELEASE PFTA

CCTV - MON 2 - RMS/Wrist (zoom out)

EE MODE - AUTO
RATE sw - VERN (RATE min tb-ON)

BRAKES - OFF (tb-OFF)
MODE - END EFF, ENTER

When OPEN tb - gray, mnvr away from grapple fixture
EE RELEASE sw - depress (mom)

✓ [redacted] (23 sec max)

Mnvr arm clear of Orbiter, payload
BRAKES - ON (tb-ON)
EE MODE - OFF

OFF-NOMINAL OPERATIONS

PFTA GRAPPLE FIXTURE 2 BACKOFF - SINGLE JOINT

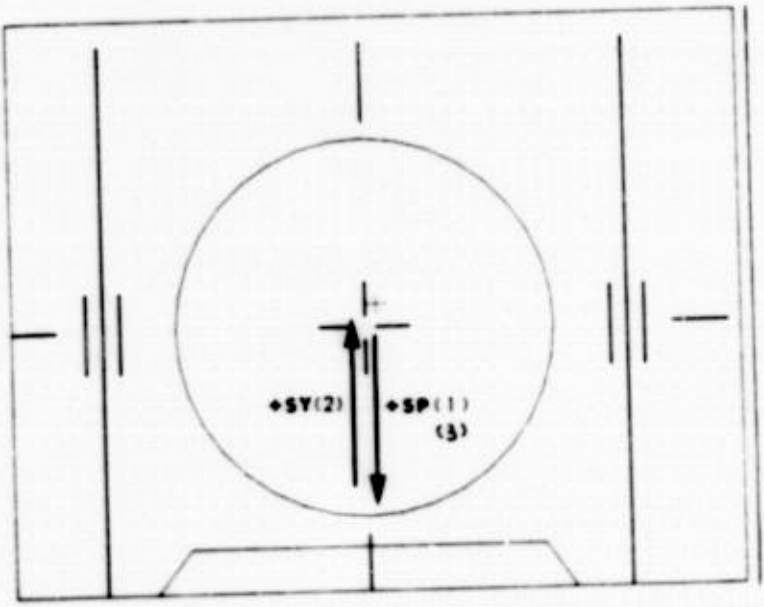
(Motion of target on CCTV monitor)

✓OPEN tb - gray

A7 CCTV - MON 2 - RMS/Wrist (ZOOM OUT) **

Drive joints in order indicated until end effector is clear of grapple fixture

OFF-NOMINAL



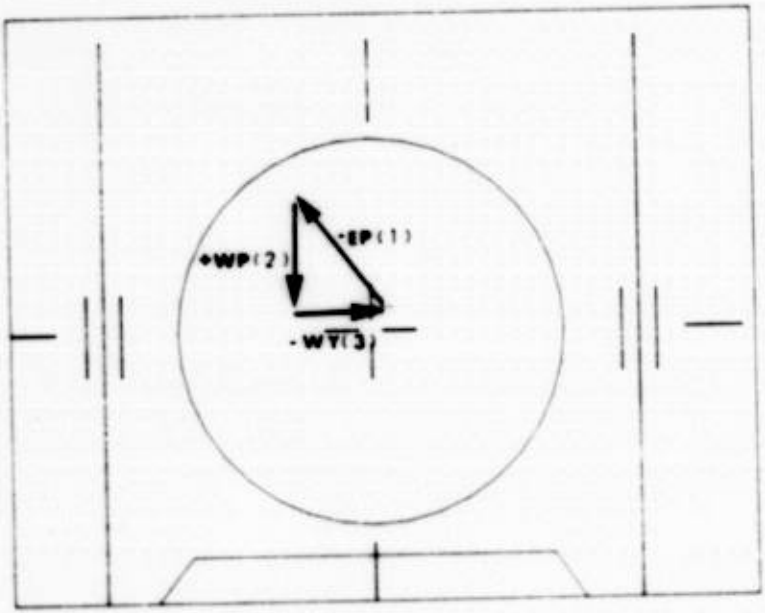
PFTA GRAPPLE FIXTURE 5 BACKOFF - SINGLE JOINT

(Motion of target on CCTV monitor)

✓OPEN tb - gray

A7 CCTV - MON 2 - RMS/Wrist (ZOOM OUT) ''

Drive joints in order indicated until end effector is clear of grapple fixture



POSITIONS/ATTITUDES FOR BACKED OFF* END EFFECTOR

GF 2 PL ID 0					
X = -1108	Y = -66	Z = -465	P = 270	Y = 315	R = 271
SY = -3.0	SP = 47.9	EP = -72.0	WP = -64.4	WY = -25.5	WR = -66.6

GF 5 PL ID 0					
X = -902	Y = 0	Z = -400	P = 0	Y = 0	R = 1
SY = -27.5	SP = 53.9	EP = -141.6	WP = 87.7	WY = 27.5	WR = .5

* End effector is backed off 16 in. from rigidized position

HIGH PRIORITY MENU

The order of tests listed below represents the relative priority.
OPR CMD to IC is not verified for this sequence.

GF 5

1 NOMINAL UNBERTH, FS 1-1 (20 min)

2 RMS/PRCS INTERACTION (40 min)
Step 1, SETUP (CONFIG E), FS 4-2 thru FS 4-3
TEST (CONFIG E), FS 4-3
Step 2, SETUP (CONFIG B), FS 4-4 thru FS 4-5
TEST (CONFIG B), TEST # 1,2 ONLY, FS 4-5

3 CONTROL SYSTEM EVALUATION (35 min)
Step 1, SINGLE JOINT (CONFIG C), FS 3-8 thru FS 3-9
Step 2, SINGLE JOINT (CONFIG A), FS 3-4
TEST # 1,2,4 ONLY, FS 3-5

4 RMS/FCS TESTS (25 min)
Step 1, MNVR RMS TO LDEF CONFIG, FS 2-8
Step 2, ROT PULSE INPUTS, FS 2-9

5 NOMINAL BERTH, FS 8-1 (25 min)

GF 2

6 DIRECT DRIVE UNBERTH, FS 9-1 (25 min)

If time permits, proceed with the following tests.
Else at RMS POWERDOWN minus 40 min,
Go to DIRECT DRIVE BERTH

7 RMS/PRCS INTERACTION (20 min)
Step 1, SETUP (CONFIG E), FS 4-2 thru FS 4-3
TEST (CONFIG E), FS 4-3

CONTINUED NEXT PAGE

8 CONTROL SYSTEM EVALUATION (20 min)
Step 4, SINGLE JOINT (CONFIG C), FS 3-8 thru FS 3-10

9 RMS/FCS TESTS (30 min)
Step 1, SETUP IC, FS 2-2
Step 2, LOADED ARM MOTION, TEST # 2,4 ONLY, FS 2-3
Step 3, I-LOAD SENSITIVITY TEST FS 2-4 thru FS 2-5

10 DIRECT DRIVE BERTH, FS 10-2 (40 min)

34D DEPLOY MENU (FD 3 ONLY)

GF 2

1 NOMINAL UNBERTH, FS 1-1

2 RMS/FCS TESTS, FS 2-1

3 RMS/PRCS INTERACTION *
Step 1, SETUP (CONFIG E), FS 4-2 thru FS 4-3
TEST (CONFIG E), FS 4-3
Step 2, SETUP (CONFIG B), FS 4-4 thru FS 4-5
TEST (CONFIG B),
TEST # 1,2,4,6 ONLY, FS 4-5

4 LSS VIBRATION DAMPING TEST *
Step 1, SETUP (CONFIG B), FS 5-2 thru FS 5-3
TEST (CONFIG B), TEST # 1,2 ONLY, FS 5-3
Step 2, SETUP (CONFIG J), FS 5-4 thru FS 5-5
TEST (CONFIG J), TEST # 1,2 ONLY, FS 5-5

5 AUTO MODE EVALUATION - LOADED, FS 7-1

6 NOMINAL BERTH, FS 8-1

7 DIRECT DRIVE UNBERTH, FS 9-1

8 DIRECT DRIVE BERTH, FS 10-1

CNTL SYS EVAL
Step 4, Single joint (config C)
FS 3-8 thru 3-10

Delete CONTROL SYSTEM EVALUATION
Delete AUTO MODE EVALUATION - UNLOADED

***35D DEPLOY MENU (FD 3 ONLY)**

GF 2

Perform above menu, except
3 RMS/PRCS INTERACTION
Step 2, TEST (CONFIG B)
TEST 1,2 ONLY, FS 4-5
4 LSS VIBRATION DAMPING TEST - DELETE

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RMS/PFTA BERTHED CONFIGURATION DATA

PAYLOAD ID	POSITION			ATTITUDE			JOINT ANGLES					
	X	Y	Z	P	Y	R	SY	SP	EP	WP	WY	WR
2	-1018	0	-400	0	0	0	-4.0	46.4	-72.8	-61.7	-25.5	-65.6
3	-1108	0	-400	0	0	0	-4.0	46.4	-72.8	-61.7	-25.5	-65.6
4	-1108	0	-400	0	0	0	-25.4	53.5	-138.4	85.0	25.4	0.5
5	-1018	0	-400	0	0	0	-25.4	53.5	-138.4	85.0	25.4	0.5
0 (GF 2)	-1108	-54	-454	270	315	271	-4.0	46.4	-72.8	-61.7	-25.5	-65.6
0 (GF 5)	-919	0	-400	0	0	1	-25.4	53.5	-138.4	85.0	25.4	0.5

PFTA POR/RMS JOINT ANGLES FOR COMMON VALIDATION RUNS

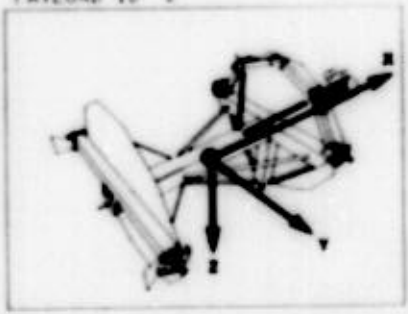
CONFIGURATION	PAYLOAD ID	POSITION			ATTITUDE			JOINT ANGLES					
		X	Y	Z	P	Y	R	SY	SP	EP	WP	WY	WR
A	2	-874	57	-660	0	45	0	-35.2	102.5	-93.8	-65.5	5.5	3.1
	3	-938	-7	-660	0	45	0						
	4	-995	50	-580	305	330	325						
	5	-949	4	-644	305	330	325						
B	2	-594	-232	-1110	357	20	145	-90.0	90.0	-10.0	0.0	0.0	0.0
	3	-680	-263	-1105	357	20	145						
	4	-680	-281	-1217	90	9	70						
	5	-680	-266	-1127	90	9	70						
C	2	-1314	-271	-650	1	275	212	0.0	25.0	-10.0	0.0	0.0	180.0
	3	-1322	-181	-650	1	275	212						
	4	-1431	-190	-677	14	5	179						
	5	-1344	-182	-655	14	5	179						

PFTA POR/RMS JOINT ANGLES FOR COMMON VALIDATIONS RUNS (CONT)

CONFIGURATION	PAYLOAD ID	POSITION			ATTITUDE			JOINT ANGLES					
		X	Y	Z	P	Y	R	SY	SP	EP	WP	WY	WR
D	2	-1129	298	-674	8	53	47	-38.0	34.0	-38.0	0.0	0.0	0.0
	3	-1183	226	-681	8	53	47						
	4	-1272	294	-697	10	323	1						
	5	-1201	240	-684	10	323	1						
E	2	-785	-251	-1104	217	65	264	0.0	90.0	-10.0	0.0	0.0	0.0
	3	-754	-333	-1080	217	65	264						
	4	-774	-370	-1185	79	19	344						
	5	-758	-340	-1101	79	19	344						
J	2	-804	153	-863	180	0	45	-82.6	94.0	-72.7	-41.0	-7.0	197.5
	3	-713	153	-863	180	0	45						
	4	-713	266	-862	0	270	180						
	5	-713	175	-863	0	270	180						

PFTA COORDINATE SYSTEMS

PAYLOAD ID 2



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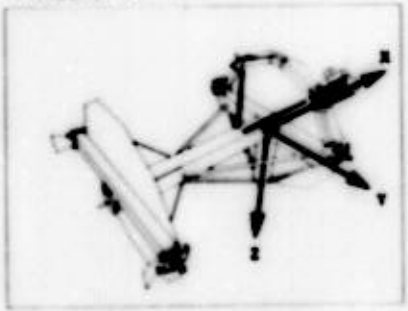

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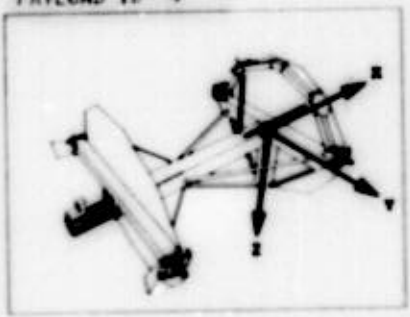

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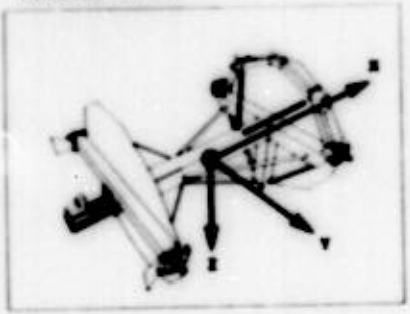

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