

PDRS Operations Checklist

STS-114 Flight Supplement

**Mission Operations Directorate
EVA, Robotics, & Crew Systems
Operations Division**

**Final
June 17, 2005**

National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas




MISSION OPERATIONS DIRECTORATE


**PDRS OPERATIONS CHECKLIST
STS-114 FLIGHT SUPPLEMENT**

FINAL
June 17, 2005

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Incorporates the following:			
482#:	PDRS-0988A	PDRS-0995A	PDRS-1002A
	PDRS-0989A	PDRS-0996A	PDRS-1003
	PDRS-0990A	PDRS-0997A	PDRS-1004A
	PDRS-0991A	PDRS-0998	PDRS-1005
	PDRS-0992A	PDRS-0999A	PDRS-1006
	PDRS-0993A	PDRS-1000	
	PDRS-0994A	PDRS-1001A	

AREAS OF TECHNICAL RESPONSIBILITY

Book Manager	DX22/D. Melendrez	281-483-0621
RMS Procedures	DX22/D. Melendrez	281-483-0621
	DX22/L. Hammond	281-483-0348
	DX22/J. Reisman	281-483-0839
	DX22/R. Pritchard	281-483-2642
	DX22/Q. Harp	281-483-1757
	DX22/F. Jurgens	281-244-5448
	DX22/M. Wright	281-483-4798
	DX22/S. Freier	281-483-7529
	DX22/K. Rafalik	281-483-4325
RMS Training	DX25/J. Sugar	281-244-8598
RMS Analysis	DX24/M. A. Austin	281-483-2964
	DX24/E. Bennett	281-244-1107
P/TV	DX34/D. Williams	281-244-7882

PDRS OPERATIONS CHECKLIST
 STS-114 FLIGHT SUPPLEMENT

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* – Omit from flight book

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NOMINAL

VERIFY UPLINKS

1. CHECK PL ID 1

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

√	SY	SP	EP	WP	WY	WR	
	0.0	+25.0	-25.0	+5.0	0.0	0.0	
√	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-1279	-151	-553	95	359	328	1

2. CHECK PL ID 2

SM 94 PDRS CONTROL
 PL ID - ITEM 3 +2 EXEC
 INIT ID - ITEM 24 +2 EXEC

√	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-1243	-143	-869	95	359	358	2

3. CHECK AUTOSEQUENCES 2 AND 3 START POINTS

SM 94 PDRS CONTROL
 AUTO 1 - ITEM 13 +2 EXEC

BRAKES - OFF (tb-OFF)
 MODE - AUTO 1, ENTER

SM 94 PDRS CONTROL
 √START PT, ITEM 17: 47
 AUTO 1 - ITEM 13 +3 EXEC

MODE - AUTO 1, ENTER

SM 94 PDRS CONTROL
 √START PT, ITEM 17: 53

BRAKES - ON (tb-ON)

4. CHECK PL ID 3

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

√	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-1216	-141	-1141	95	359	358	3

5. CHECK AUTOSEQUENCES 1, 4, AND 7 START POINTS

SM 94 PDRS CONTROL
 AUTO 1 - ITEM 13 +1 EXEC

BRAKES - OFF (tb-OFF)
 MODE - AUTO 1, ENTER

SM 94 PDRS CONTROL
 √START PT, ITEM 17: 1

AUTO 1 – ITEM 13 +4 EXEC

MODE – AUTO 1, ENTER

SM 94 PDRS CONTROL

√START PT, ITEM 17: 58
AUTO 1 – ITEM 13 +7 EXEC

MODE – AUTO 1, ENTER

SM 94 PDRS CONTROL

√START PT, ITEM 17: 119

BRAKES – ON (tb-ON)

6. CHECK PL ID 4

SM 94 PDRS CONTROL

PL ID – ITEM 3 +4 EXEC
INIT ID – ITEM 24 +4 EXEC

X	Y	Z	PITCH	YAW	ROLL	PL ID
-1214	-141	-1112	167	88	108	4

7. CHECK PL ID 5

SM 94 PDRS CONTROL

PL ID – ITEM 3 +5 EXEC
INIT ID – ITEM 24 +5 EXEC

X	Y	Z	PITCH	YAW	ROLL	PL ID
-1261	-146	-551	5	2	0	5

8. CHECK AUTOSEQUENCES 5 AND 6 START POINTS

SM 94 PDRS CONTROL

AUTO 1 – ITEM 13 +5 EXEC

BRAKES – OFF (tb-OFF)
MODE – AUTO 1, ENTER

SM 94 PDRS CONTROL

√START PT, ITEM 17: 111
AUTO 1 – ITEM 13 +6 EXEC

MODE – AUTO 1, ENTER

SM 94 PDRS CONTROL

√START PT, ITEM 17: 115

BRAKES – ON (tb-ON)

9. RESET TO PL ID 0

PL ID – ITEM 3 +0 EXEC
INIT ID – ITEM 24 +0 EXEC

X	Y	Z	PITCH	YAW	ROLL	PL ID
-1261	-146	-551	5	2	0	0

OBSS UNBERTH

WARNING
For UNDOCKED ops only

NOTE

Stbd MPMs assumed deployed

1. SETUP

SM 94 PDRS CONTROL

√PL ID, ITEM 3: 0

√INIT ID, ITEM 24: 0

If flight specific DAPs have not been loaded:

Load DAP A14 with permanent edits per STS-114 DAP A

CONFIGURATIONS (ORB OPS FS, DAP TABLES). This may be worked in parallel with the following steps 2-4

RHC

2. MNVR TO OBSS PRE-GRAPPLE

RATE – as reqd (VERN within 10 ft)

BRAKES – OFF (tb-OFF)

MODE – ORB UNL, ENTER

If first RMS ops for the mission:

Perform manual PLB survey, en route to OBSS PRE-GRAPPLE position

Mnvr to OBSS PRE-GRAPPLE posn:

X	Y	Z	PITCH	YAW	ROLL	PL ID
-680	+96	-513	270	350	1	0
SY	SP	EP	WP	WY	WR	
-90.0	+87.6	-129.5	-57.5	0.0	+110.4	

BRAKES – ON (tb-ON)

CAUTION
SPEE power must be applied within 90 min
to prevent sensor package damage

STBD RMS HTR A,B (two) – OFF

A6U

EVENT TIMER MODE – UP

CNTL – START

R12(OBSS) √SPEE PWR – OFF

3. OBSS GRAPPLE

A7U

CCTV – config for grapple

– install PDRS TARGET OVERLAY FOR CTVM

– RMS WRIST, ZOOM: 34.0 HFOV

FOCUS: 5 ft

Maintain eyepoint ~18 in when using grapple overlay

A6U

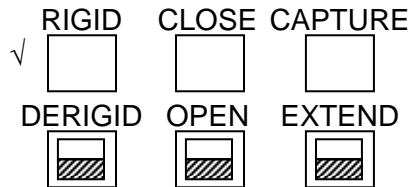
DAP: VERN(FREE)

RHC RATE – VERN (RATE MIN tb-ON)
 BRAKES – OFF (tb-OFF)
 MODE – END EFF, ENTER

Mnvr to grapple envelope

CAUTION
 Monitor EE tb timing to prevent EE motor burnout

EE MODE – AUTO
 CAPTURE – depress (mom)



CRITICAL TIMES (28 sec total)

CAPTURE tb – gray, then
 CLOSE tb – gray, 3 sec max, then
 RIGID tb – gray, 25 sec max

EE MODE – OFF
 BRAKES – ON (tb-ON)

SM 94 PDRS CONTROL

PL ID – ITEM 3 +1 EXEC
 INIT ID – ITEM 24 +1 EXEC

Record POSN/ATT and Joint Angles:

	X	Y	Z	PITCH	YAW	ROLL	PL ID
Expected	-680	+105	-436	0	0	341	1
	SY	SP	EP	WP	WY	WR	
Expected	-90.0	+76.5	-134.6	-40.9	0.0	+110.0	

Review GENERIC END EFFECTOR CUE CARD – SHUTTLE NOT DOCKED OPS

4. CONFIGURE POWER
 MA73C:C cb MCA PWR AC3 3Φ MID 2 – op
 √AC2 3Φ MID 2 – op
 :D √AC3 3Φ MID 4 – op
- R13L PL BAY MECH PWR SYS (two) – ON

5. STBD MRL RELEASE
 Config DAP A to A14

SM 94 PDRS CONTROL

RMS STBD – ITEM 2 EXEC (*)
 √STBD AFT, MID, FWD REL (six) = 0

NOTE

Expect single motor drive time for MRL release

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

If motor drive time > 18 sec, √MCC

SM 94 PDRS CONTROL

RMS PORT – ITEM 1 EXEC (*)

R13L 6. RECONFIGURE POWER
PL BAY MECH PWR SYS (two) – OFF

MA73C:C cb MCA PWR AC3 3Φ MID 2 – cl
√AC2 3Φ MID 2 – op
:D √AC3 3Φ MID 4 – op

Record joint angles:

SY	SP	EP	WP	WY	WR

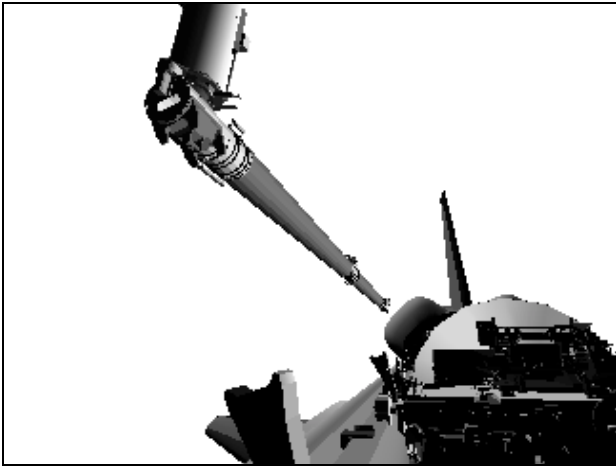
A7U 7. MNVR TO OBSS HOVER
CCTV – config for unberth

RHC √RATE – VERN (RATE MIN tb-ON)
BRAKES – OFF (tb-OFF)
MODE – PL, ENTER

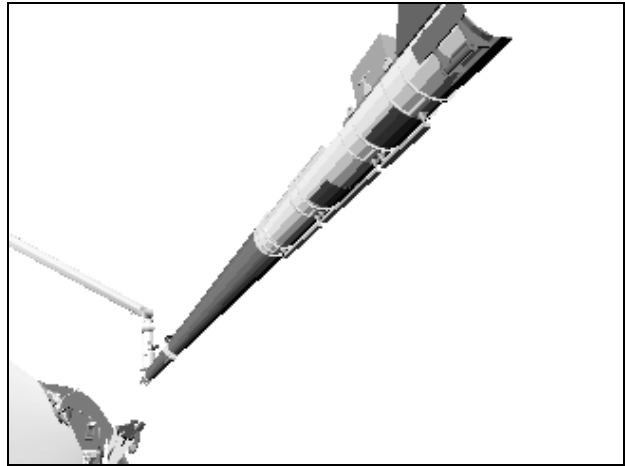
Mnvr OBSS up (-Z) to OBSS HOVER, Z = -496

X	Y	Z	PITCH	YAW	ROLL	PL ID
-680	+126	-496	0	0	341	1
SY	SP	EP	WP	WY	WR	
-90.0	+79.8	-123.1	-55.7	0.0	+110.0	

BRAKES – ON (tb-ON)
MODE – not DIRECT



CCTV D (-15,15)



CCTV C (25,25)

A6U If Verns failed, DAP: AUTO/ALT

In the following P/TV procedure, start 15 min timer upon applying SPEE power and inform MCC when timer is started:

Perform ACTIVATION (LDR/ITVC Cue Card, PHOTO/TV)

Verify APCU 1 Deact complete, then:

Perform APCU ACTIVATION (SODF: ASSY OPS, APCU), APCU 2 only

Perform LCC ACTIVATION (LCS Cue Card, PHOTO/TV)

- A7U
8. RESET PTU
VIDEO OUT MON2 pb – push
IN PL2(VPU) pb – push

CAMR CMD PAN/TILT – HI RATE (LO within 10°)

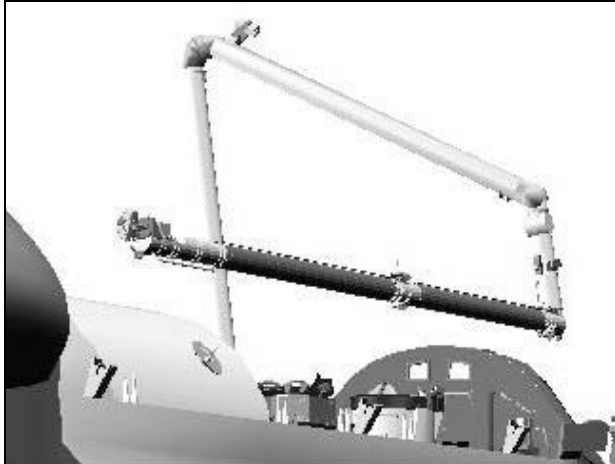
PAN – L (to hard stop)

TILT – UP (to hard stop)

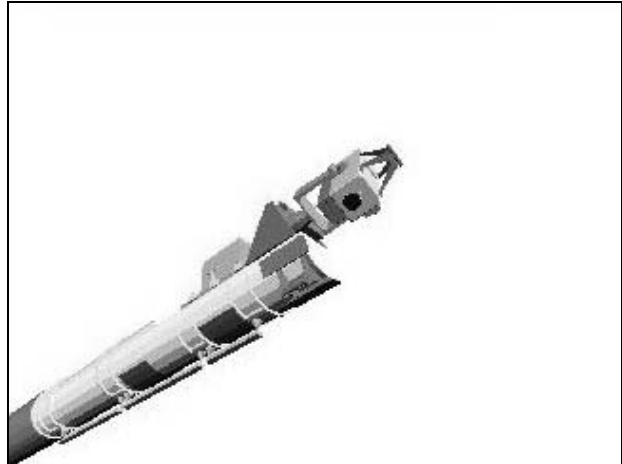
PAN/TILT – RESET

PAN: +103 (right)

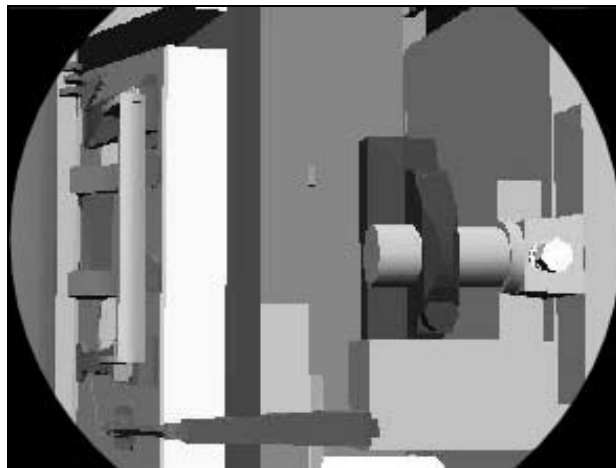
TILT: -260 (down)



BIRD'S EYE



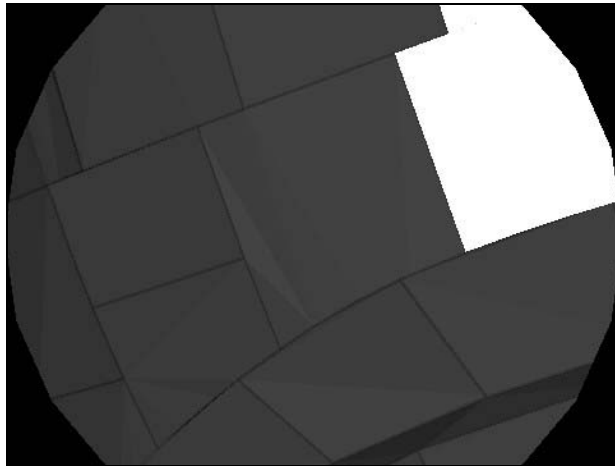
CCTV C (50,50)



LDRI (103,-260)

If LDRI calibration view of STBD sill presents unacceptable specular reflections,

A7U PAN: +110 (right)
TILT: -220 (up)



LDRI (110,-220)

9. LDRI CALIBRATION

Verify 15 min SPEE power timer expired

√VIDEO OUT MON2 pb – push
IN – as desired (not PL2)
OUT MUX 1 L pb – push (MIDDECK It on)

a. Mode 3

LDRI MODE 3 pb – push (LDRI video)

L10(VTR) REC pb – push, hold
PLAY pb – push, simo (red ●)

Record for 30 sec

STOP pb – push (no red ●)

b. Mode 4

A7U LDRI MODE 4 pb – push (brighter LDRI video)

L10(VTR) REC pb – push, hold
PLAY pb – push, simo (red ●)

Record for 30 sec

STOP pb – push (no red ●)

c. Mode 5

A7U LDRI MODE 5 pb – push (flickering LDRI video)

L10(VTR) REC pb – push, hold
PLAY pb – push, simo (red ●)

Record for 30 sec

STOP pb – push (no red ●)

- A7U d. Mode 6
 LDRI MODE 6 pb – push (brighter flickering LDRI video)
- L10(VTR) REC pb – push, hold
 PLAY pb – push, simo (red ●)
- Record for 30 sec
- STOP pb – push (no red ●)

10. PROCEED TO FLAT FIELDS
On MCC GO, go to OBSS ITVC/LDRI FLAT FIELDS

OBSS ITVC/LDRI FLAT FIELDS

WARNING
For UNDOCKED ops only

NOTE

Assumed starting posn is OBSS Hover. Flat Field imagery is used to characterize sensor response. Daylight is required

1. SETUP

SM 94 PDRS CONTROL

PL ID – ITEM 3 +2 EXEC
INIT ID – ITEM 24 +2 EXEC

A7U √VIDEO OUT DTV pb – push (PL2 lt on)
 OUT MON2 pb – push
 IN PL2(VPU) pb – push

√PAN: +103
√TILT: -260

VIDEO IN – as desired (not PL2)

2. MNVR TO FLAT FIELD START POSN

RHC RATE – as reqd (VERN within 10 ft)
 BRAKES – OFF (tb-OFF)
 MODE – ORB LD, ENTER

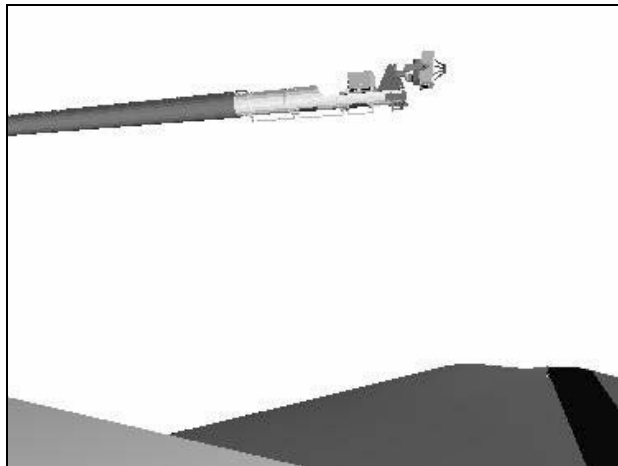
Mnvr to FLAT FIELD START posn:

X	Y	Z	PITCH	YAW	ROLL	PL ID
-1001	+303	-501	0	0	24	2
-1273	+300	-505	0	0	24	3
SY	SP	EP	WP	WY	WR	
-89.6	+44.5	-84.6	-45.4	0.0	+109.6	

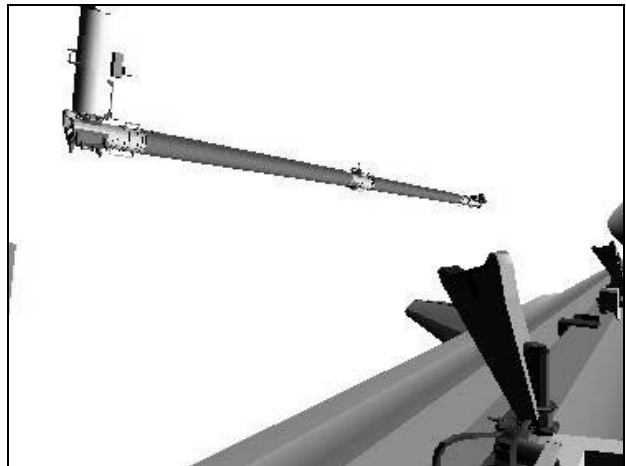
BRAKES – ON (tb-ON)

SM 94 PDRS CONTROL

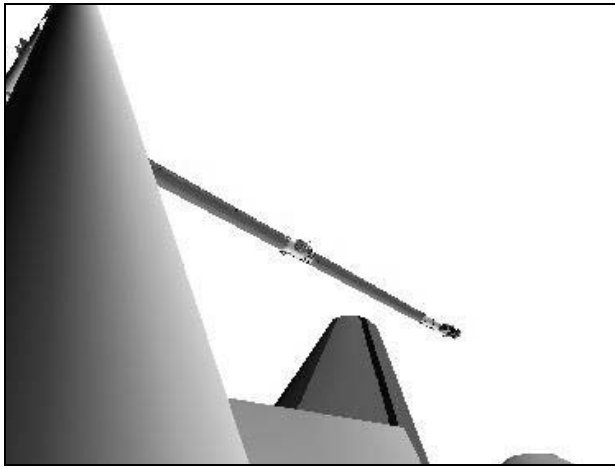
PL ID – ITEM 3 +3 EXEC
INIT ID – ITEM 24 +3 EXEC



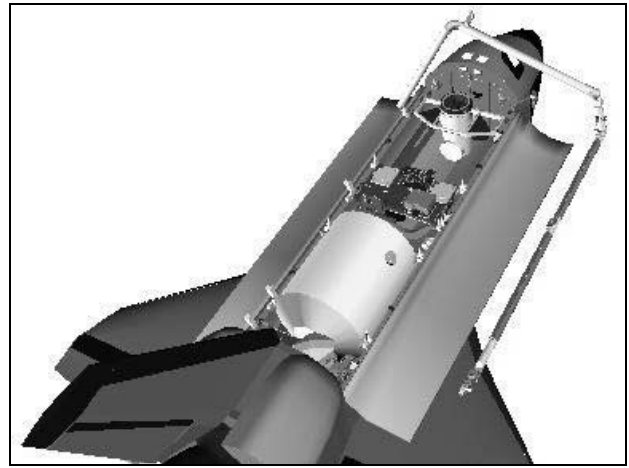
CCTV C (70,-5)



CCTV D (-40,0)



ELBOW (25,-35)



BIRD'S EYE

3. FLAT FIELDS

a. ITVC (Black Stretch)

A7U VIDEO OUT MUX 1 L pb – push (MIDDECK lt on)
 LDRI MODE 1 pb – push (ITVC video)
 VIDEO OUT MON2 pb – push (PL2 lt on)

ALC pb – push
 PEAK pb – push
 LT LEVEL pb – push
 DAY pb – push
 LT LEVEL pb – push (all MENU lts off)
 AP COR ON pb – push (lt on)
 FOCUS – NEAR (to stop)
 ZOOM: 10.0 HFOV

L10(VTR) REC pb – push, hold
 PLAY pb – push, simo (red ●)

RHC RATE – VERN (RATE MIN tb-ON)
 BRAKES – OFF (tb-OFF)
 MODE – ORB LD, ENTER

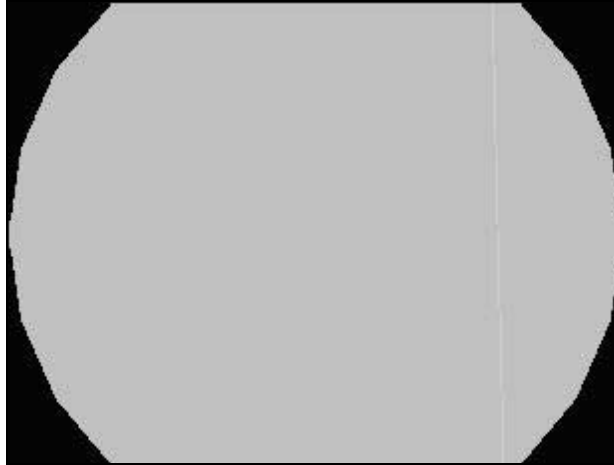
THC Mnvr X to -1261 (pull)

b. ITVC (no Black Stretch)

A7U GAM BLK STR pb – push (lt off)

THC Mnvr X to -1273 (push)

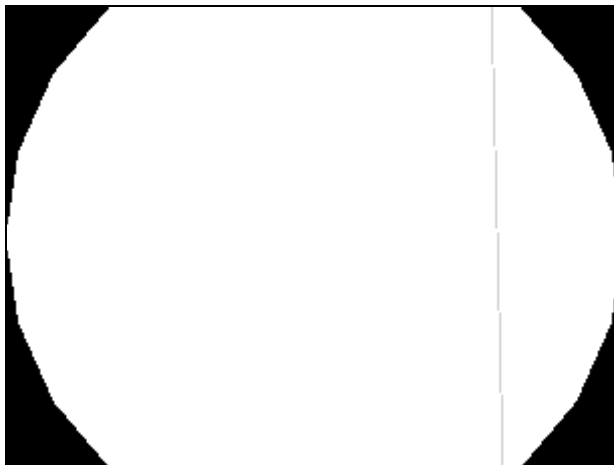
- A7U
- c. LDRI Mode 5 (3-D, no Black Stretch)
 AP COR ON pb – push (lt off)
 GAM BLK STR pb – push (lt on)
 ALC pb – push
 AVG pb – push
- VIDEO OUT MUX 1 L pb – push (MIDDECK lt on)
 LDRI MODE 5 pb – push (flickering LDRI video)



LDRI (103,-260)

THC Mnvr X to -1261 (pull)

- A7U
- d. LDRI Mode 6 (3-D, Black Stretch)
 LDRI MODE 6 pb – push (brighter flickering LDRI video)



LDRI (103,-260)

THC Mnvr X to -1273 (push)

BRAKES – ON (tb-ON)

L10(VTR) STOP pb – push (no red ●)

OBSS BERTH

WARNING
For UNDOCKED ops only

NOTE

Stbd MPMs assumed deployed

- A7U 1. SETUP
CCTV – config for berth

SM 94 PDRS CONTROL

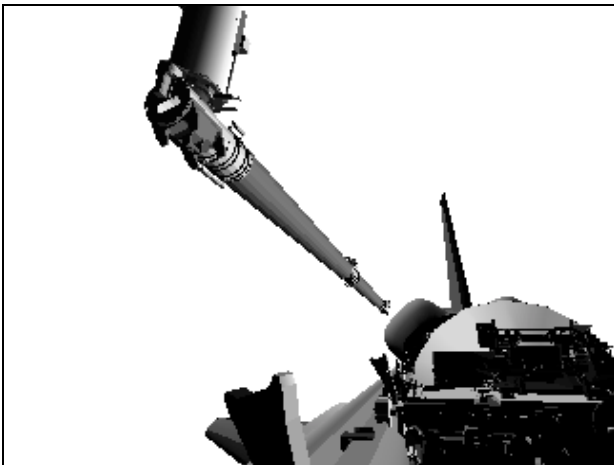
PL ID – ITEM 3 +1 EXEC
INIT ID – ITEM 24 +1 EXEC

2. OBSS HOVER

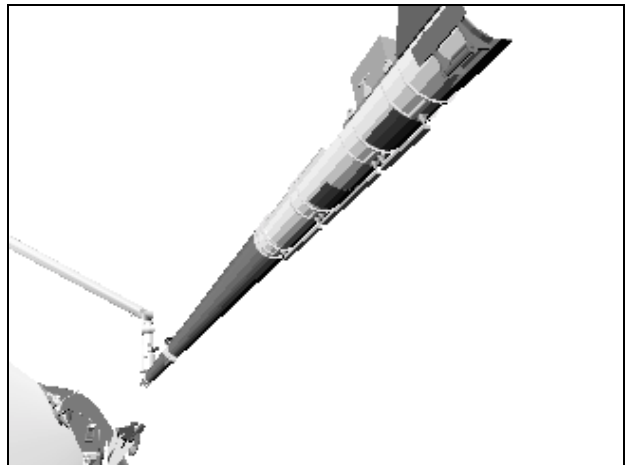
Verify mnvr to OBSS HOVER posn complete:

X	Y	Z	PITCH	YAW	ROLL	PL ID
-680	+126	-496	0	0	341	1
SY	SP	EP	WP	WY	WR	
-90.0	+79.8	-123.1	-55.7	0.0	+110.0	

√STBD RMS HTR A,B (two) – OFF



CCTV D (-15,15)

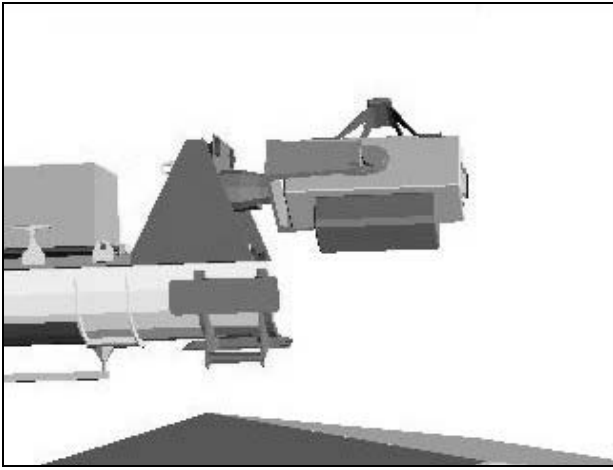


CCTV C (25,25)

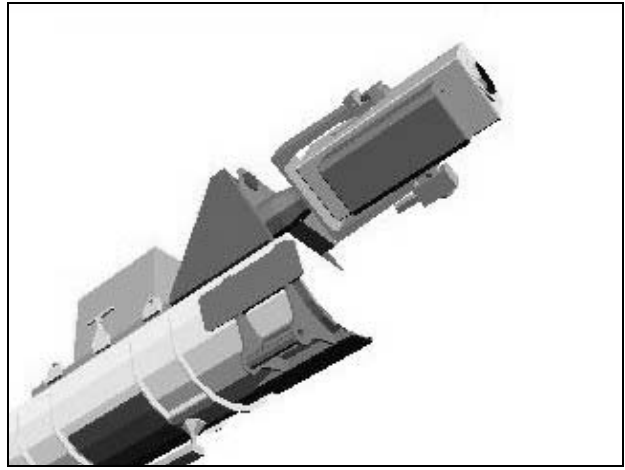
- A7U 3. STOW PTU
VIDEO OUT MON2 pb – push
IN PL2(VPU) pb – push

CAMR CMD PAN/TILT – HI RATE (LO within 10°)

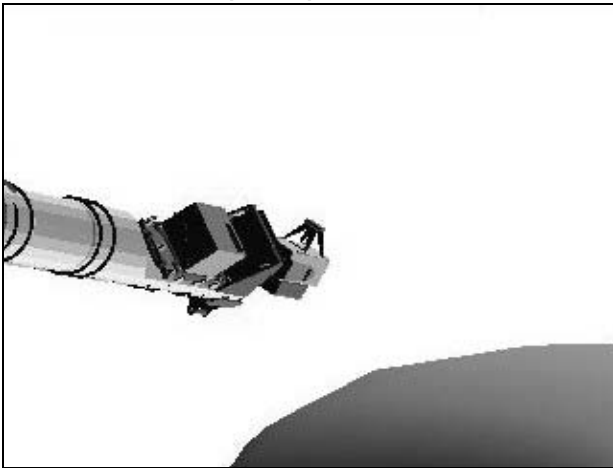
PAN – L (to hard stop)
TILT – UP (to hard stop)
PAN/TILT – RESET
PAN: +108 (right)
TILT: -175 (down)



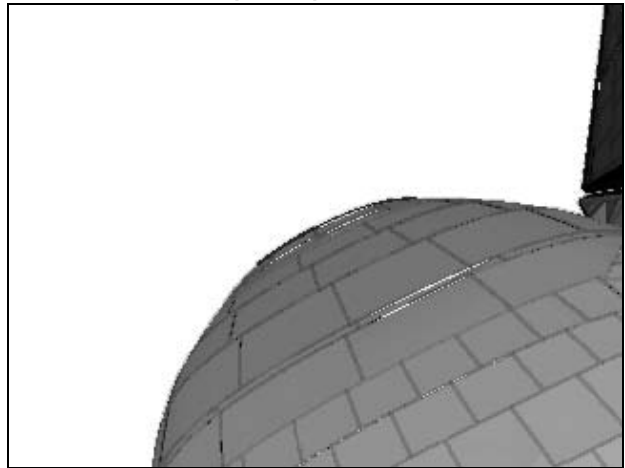
CCTV B (82,16) HFOV: 15.0



CCTV C (50,50) HFOV: 40.0



ELBOW (52,-45) HFOV: 9.8 (full-in)



OBSS ITVC (108,-175) HFOV: 53.8 (full-out)

Perform LCC DEACTIVATION (LCS Cue Card, PHOTO/TV), steps 1 and 2

CAUTION

STBD RMS HTR power must be applied within 90 min to prevent sensor package damage

Perform DEACTIVATION (LDRI/ITVC Cue Card, PHOTO/TV)

Perform APCU DEACTIVATION (SODF: ASSY OPS, APCU), APCU 2 only

4. OBSS BERTH

SM 94 PDRS CONTROL

RMS STBD – ITEM 2 EXEC (*)

A6U

DAP: VERN(FREE)

RHC

RATE – VERN (RATE MIN tb-ON)

BRAKES – OFF (tb-OFF)

MODE – PL, ENTER

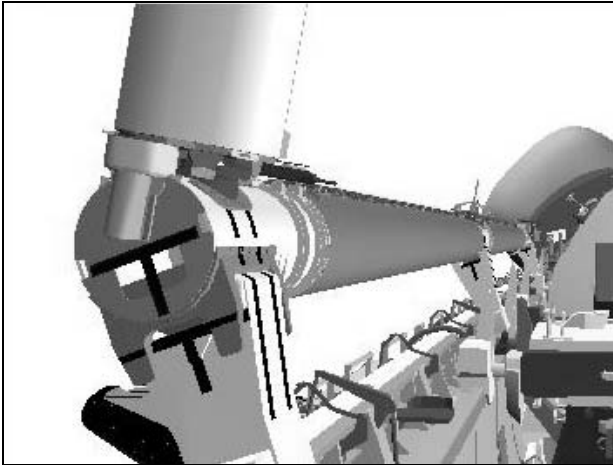
NOTE

Refer to table in OBSS UNBERTH, step 3 for POSN/ATT at GRAPPLE to fill in table below

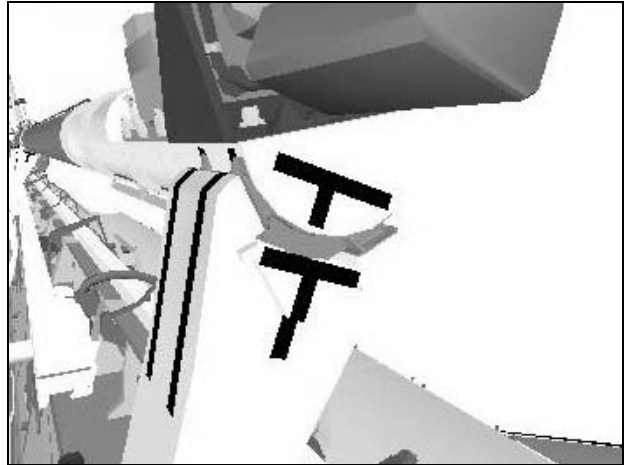
Mnvr OBSS down (+Z) to OBSS BERTH:

	X	Y	Z	PITCH	YAW	ROLL	PL ID
							1
Expected	-680	+105	-436	0	0	341	1
	SY	SP	EP	WP	WY	WR	
Expected	-90.0	+76.5	-134.6	-40.9	0.0	+110.0	

√STBD R-F-L tb (three) – gray



CCTV D (-15,0) HFOV: 35.0



CCTV C (30,-10) HFOV: 60.0



ELBOW (-7,-12) HFOV: 15.0

5. CONFIGURE POWER

MA73C:C cb MCA PWR AC3 3Φ MID 2 – op
 √AC2 3Φ MID 2 – op
 √AC3 3Φ MID 4 – op
 :D

R13L PL BAY MECH PWR SYS (two) – ON

6. STBD MRL LATCH
RATE – COARSE (RATE MIN tb-OFF)

SM 94 PDRS CONTROL

√STBD AFT, MID, FWD LAT (six) = 0

AUTO BRAKE INH – ITEM 10 EXEC (*)

NOTE

Expect single motor drive time for MRL latching

STBD RMS RETEN LAT – LAT (tb-LAT) (18 sec max)
– OFF

If motor drive time > 18 sec, √MCC

MODE – TEST, ENTER
Wait 5 sec

BRAKES – ON (tb-ON)

SM 94 PDRS CONTROL

RMS PORT – ITEM 1 EXEC (*)
AUTO BRAKE ENA – ITEM 9 EXEC (*)

Config DAP A to A1

A6U DAP: A1/AUTO/VERN(ALT)

- R13L 7. RECONFIGURE POWER
PL BAY MECH PWR SYS (two) – OFF

MA73C:C cb MCA PWR AC3 3Φ MID 2 – cl
√AC2 3Φ MID 2 – op
:D √AC3 3Φ MID 4 – op

- A7U 8. OBSS UNGRAPPLE
CCTV – config for ungrapple
– RMS WRIST, ZOOM: 34.0 HFOV
FOCUS: 5 ft

SM 94 PDRS CONTROL

PL ID – ITEM 3 +0 EXEC
INIT ID – ITEM 24 +0 EXEC

RHC RATE – VERN (RATE MIN tb-ON)

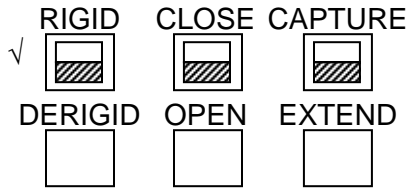
BRAKES – OFF (tb-OFF)
MODE – END EFF, ENTER

A6U DAP: VERN(FREE)

CAUTION
Monitor EE tb timing to prevent EE motor burnout

EE MODE – AUTO
RELEASE sw – REL (mom)

When OPEN tb – gray, mnvr arm clear of grapple pin



CRITICAL TIMES (28 sec total)
DERIGID tb – gray, 5 sec max, then
OPEN tb – gray, 3 sec max, then
EXTEND tb – gray, 20 sec max

EE MODE – OFF

- * If manual release reqd: *
- * EE MODE – MAN *
- * MAN CONTR – DERIGID (hold until DERIGID tb-gray, 5 sec max) *
- * RELEASE sw – depress (hold until OPEN tb-gray, 3 sec max) *
- * Mnvr arm clear of grapple pin, then: *
- * EE MAN CONTR – DERIGID (hold until EXTEND tb-gray, 20 sec max) *
- * MODE – OFF *

STBD RMS HTR A,B (two) – AUTO

A6U

EVENT TIMER CNTL – STOP

DAP: A1/AUTO/VERN(ALT)

Mnvr to OBSS PRE-GRAPPLE posn:

X	Y	Z	PITCH	YAW	ROLL	PL ID
-680	+96	-513	270	350	1	0
SY	SP	EP	WP	WY	WR	
-90.0	+87.6	-129.5	-57.5	0.0	+110.4	

BRAKES – ON (tb-ON)

If planning to run SRMS EE CAM CREW CABIN SURVEY >>

9. ARM PRE-CRADLE

SM 94 PDRS CONTROL

√PL ID, ITEM 3: 0

√INIT ID, ITEM 24: 0

RATE – as reqd (VERN within 10 ft)

BRAKES – OFF (tb-OFF)

MODE – as desired

Mnvr to PRE-CRADLE posn:

	SY	SP	EP	WP	WY	WR	
OBSS	-90.0	+87.6	-129.5	-57.5	0.0	+110.4	
PRE-GRAPPLE				+5.0			
1: WP +							
2: WR -						0.0	
3: EP +			-25.0				
4: SY +	0.0						
5: SP -		+25.0					
PRE-CRADLE	0.0	+25.0	-25.0	+5.0	0.0	0.0	
	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-1261	-146	-551	5	2	0	0

BRAKES – ON (tb-ON)

MODE – not DIRECT

PARAM – PORT TEMP

JOINT – CRIT TEMP

R13L PL BAY MECH PWR SYS (two) – ON

4. STBD MRL RELEASE

SM 94 PDRS CONTROL

RMS STBD – ITEM 2 EXEC (*)
√STBD AFT, MID, FWD REL (six) = 0

NOTE

Expect single motor drive time for MRL release

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

If motor drive time > 18 sec, √MCC

SM 94 PDRS CONTROL

√STBD AFT, MID, FWD REL (six) = 1

R13L 5. RECONFIGURE POWER
PL BAY MECH PWR SYS (two) – OFF

MA73C:C cb MCA PWR AC3 3Φ MID 2 – cl
√AC2 3Φ MID 2 – op
:D √AC3 3Φ MID 4 – op

Give SSRMS Operator GO for OBSS Unberth
Monitor RFL Status

After OBSS Unberth,

SM 94 PDRS CONTROL

RMS PORT – ITEM 1 EXEC (*)

A7U 6. SETUP FOR GRAPPLE
CCTV – config for grapple
– install PDRS TARGET OVERLAY FOR CTVM
– RMS WRIST, ZOOM: 34.0 HFOV
FOCUS: 5 ft

Maintain eyepoint approx 18 in when using grapple overlay

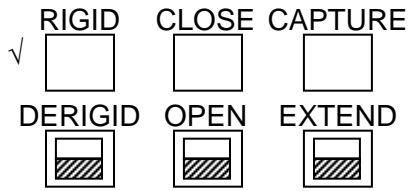
R12(OBSS) √SPEE PWR – OFF

RHC 7. OBSS GRAPPLE AT HANDOFF POSN
On SSRMS Operator GO for SRMS OBSS Grapple,
RATE – VERN (RATE MIN tb-ON)
BRAKES – OFF (tb-OFF)
MODE – END EFF, ENTER

Mnvr to grapple envelope

CAUTION
Monitor EE tb timing to prevent EE motor burnout

EE MODE – AUTO
CAPTURE sw – depress (mom)



CRITICAL TIMES (28 sec total)
CAPTURE tb – gray, then
CLOSE tb – gray, 3 sec max, then
RIGID tb – gray, 25 sec max

EE MODE – OFF

MODE – TEST, ENTER
Wait 5 sec

BRAKES – ON (tb-ON)

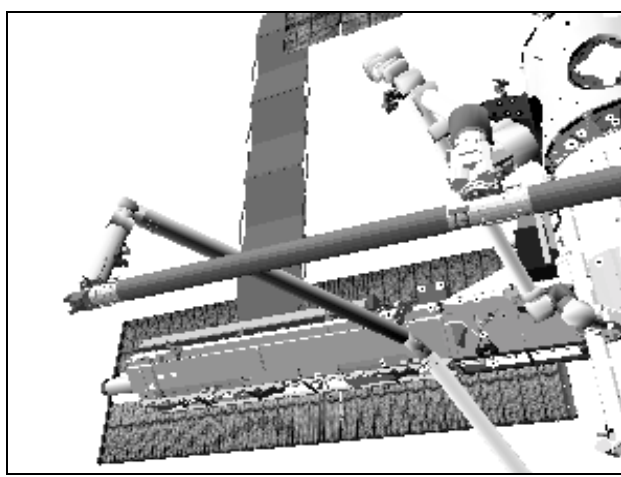
SM 94 PDRS CONTROL

 PL ID – ITEM 3 +2 EXEC
 INIT ID – ITEM 24 +2 EXEC

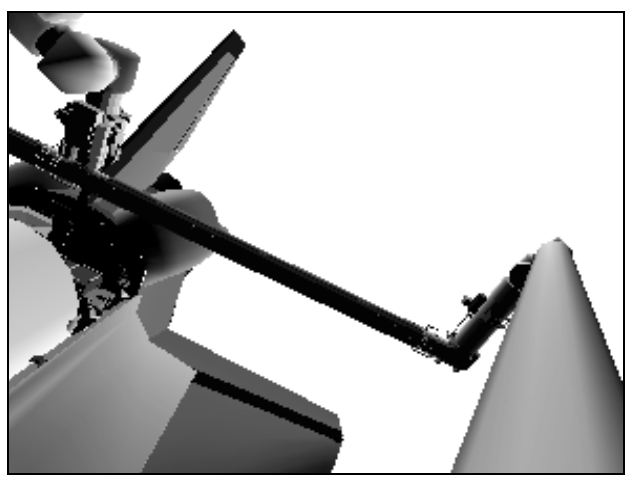
Expected OBSS GRAPPLE AT HANDOFF posn:

	X	Y	Z	PITCH	YAW	ROLL	PL ID
✓	-1031	-44	-610	284	270	270	2
	SY	SP	EP	WP	WY	WR	
✓	+25.8	+66.3	-49.0	-85.9	+10.7	-100.7	

* display singularity



CCTV B (-25,25)



ELBOW (-30,-5)

R12(OBSS) RSC PWR – OFF, ON

Perform ACTIVATION (LDRI/ITVC Cue Card, PHOTO/TV)

Verify APCU 1 Deact complete, then:
Perform APCU ACTIVATION (SODF: ASSY OPS, APCU), APCU 2 only

Perform LCC ACTIVATION (LCS Cue Card, PHOTO/TV)

Perform LCC DEACTIVATION (LCS Cue Card, PHOTO/TV), steps 1 and 2

Give SSRMS Operator GO for OBSS Ungrapple

Review GENERIC END EFFECTOR CUE CARD – ISS/SHUTTLE DOCKED OPS

8. MNVR TO OBSS CMG R&R VIEWING

RHC

On SSRMS Operator GO for mnvr to OBSS CMG R&R VIEWING posn,

RATE – as reqd (VERN within 10 ft)

BRAKES – OFF (tb-OFF)

MODE – SINGLE, ENTER

Mnvr to OBSS CMG R&R VIEWING posn:

	SY	SP	EP	WP	WY	WR	
HANDOFF	+25.8	+66.3	-49.0	-85.9	+10.7	-100.7	
1: SY +	+35.0						
2: EP +			-22.8				
3: WR +						-40.0	
4: WY -					-0.3		
5: SP -		+38.7					
6: WP +				-0.5			
7: WR +						+22.3	
8: SY +	+95.0						
CMG R&R VIEW	+95.0	+38.7	-22.8	-0.5	-0.3	+22.3	
	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-627	-726	-823	91	4	265	2

BRAKES – ON (tb-ON)

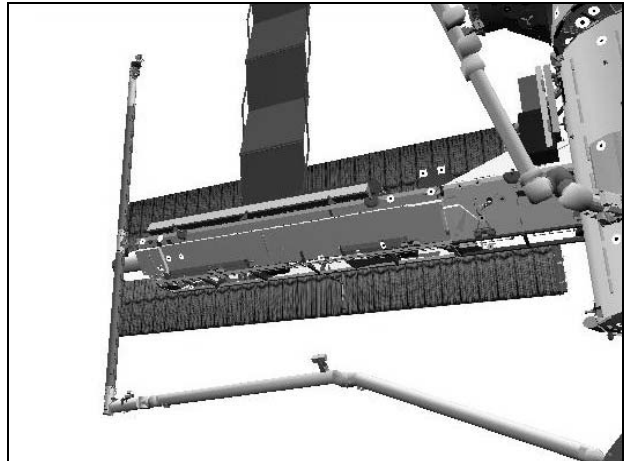
MODE – not DIRECT

PARAM – PORT TEMP

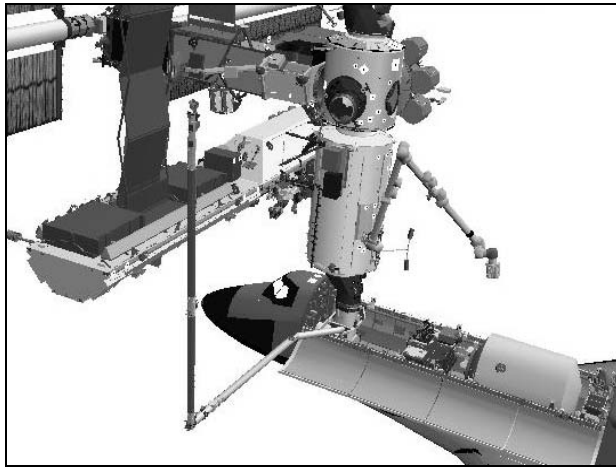
JOINT – CRIT TEMP



CCTV A (60,33)



CCTV B (-25,20)



BIRD'S EYE

A7U

9. RECONFIG PTU

VIDEO OUT MON2 pb – push
IN PL2(VPU) pb – push

CAMR CMD PAN/TILT – HI RATE (LO within 10°)

PAN – L (to hard stop)

TILT – UP (to hard stop)

PAN/TILT – RESET

PAN: +105 (right)

TILT: -50 (down)

VIDEO OUT MUX 1 L pb – push (MIDDECK It on)

LDR1 MODE 2 pb – push (ITVC video)

Give SSRMS Operator GO for mnvr to ACBM Inspection posn



OBSS ITVC (105,-50)

OBSS MNVR FROM CMG R&R VIEWING TO MPLM VIEWING

1. SETUP

SM 94 PDRS CONTROL

√ PL ID, ITEM 3: 2

√ INIT ID, ITEM 24: 2

OBSS CMG R&R VIEWING posn:

X	Y	Z	PITCH	YAW	ROLL	PL ID
-627	-726	-823	91	4	265	2
SY	SP	EP	WP	WY	WR	
+95.0	+38.7	-22.8	-0.5	-0.3	+22.3	

A7U

CCTV – config as reqd

2. SJ MNVR TO OBSS MPLM VIEWING

RHC

RATE – as reqd (VERN within 10 ft)

BRAKES – OFF (tb-OFF)

MODE – SINGLE, ENTER

Mnvr to OBSS MPLM VIEWING posn:

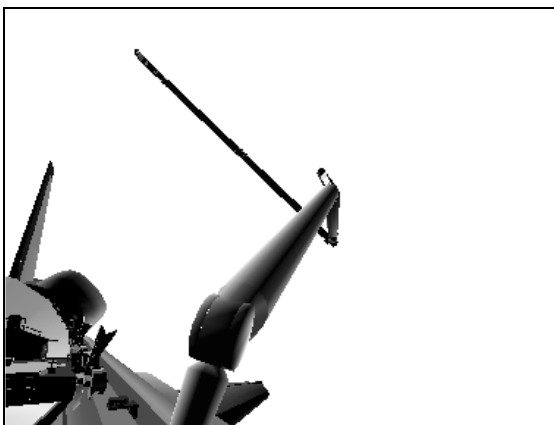
SY	SP	EP	WP	WY	WR	
+95.0	+38.7	-22.8	-0.5	-0.3	+22.3	
1: SY –	+35.0					
2: WR –					-40.0	
MPLM VIEW	+35.0	+38.7	-22.8	-0.5	-0.3	-40.0
X	Y	Z	PITCH	YAW	ROLL	PL ID
-1248	-301	-810	62	324	312	2

BRAKES – ON (tb-ON)

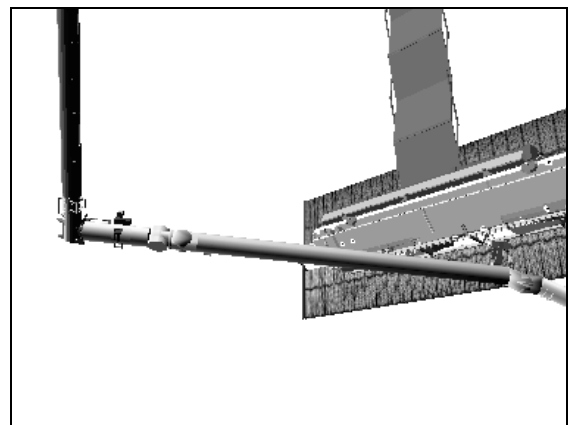
MODE – not DIRECT

PARAM – PORT TEMP

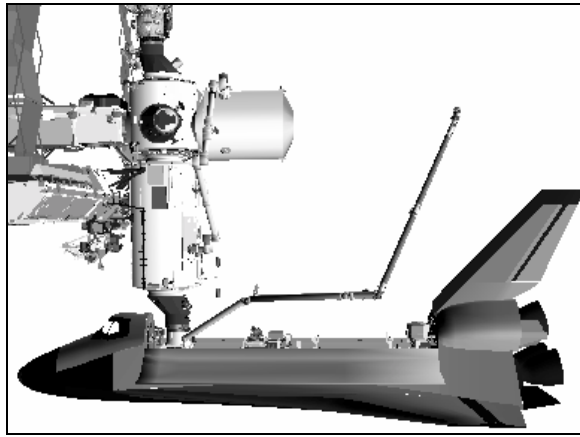
JOINT – CRIT TEMP



CCTV A (30,15)



CCTV B (-45,20)



PORT

A7U

3. CONFIGURE OBSS ITVC FOR MPLM VIEWING

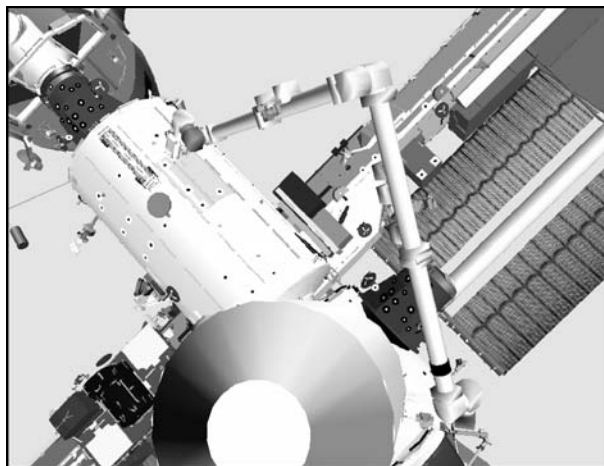
VIDEO OUT MON2 pb – push
IN PL2(VPU) pb – push

If PTU reset reqd:

CAMR CMD PAN/TILT – HI RATE (LO within 10°)
PAN – L (to hard stop)
TILT – UP (to hard stop)
PAN/TILT – RESET

PAN: +60
TILT: -55

VIDEO OUT MUX 1 L pb – push (MIDDECK It on)
LDR1 MODE 2 pb – push (ITVC video)



OBSS ITVC (60,-55)

OBSS HANDOFF FROM SRMS TO SSRMS

1. SETUP

SM 94 PDRS CONTROL

√PL ID, ITEM 3: 2

√INIT ID, ITEM 24: 2

A7U CCTV – config as reqd

Review GENERIC END EFFECTOR CUE CARD – ISS/SHUTTLE DOCKED OPS

2. MANEUVER TO OBSS HANDOFF

RHC On SSRMS Operator GO for mnvr to OBSS Handoff posn,
 RATE – as reqd (VERN within 10 ft)
 BRAKES – OFF (tb-OFF)
 MODE – SINGLE, ENTER

Mnvr to OBSS HANDOFF posn:

	SY	SP	EP	WP	WY	WR	
MPLM View	+35.0	+38.7	-22.8	-0.5	-0.3	-40.0	
1: WP –				-85.9			
2: SP +		+66.3					
3: WY +					+10.7		
4: WR –						-100.7	
5: EP –			-49.0				
6: SY –	+25.8						
Handoff posn	+25.8	+66.3	-49.0	-85.9	+10.7	-100.7	
	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-1031	-44	-610	284	270	270	2

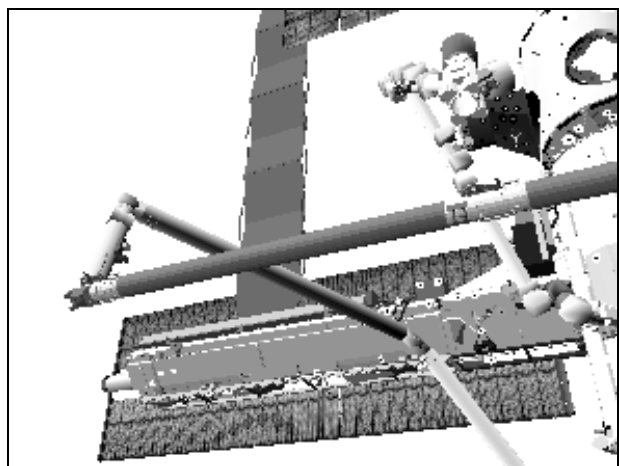
* display singularity

BRAKES – ON (tb-ON)

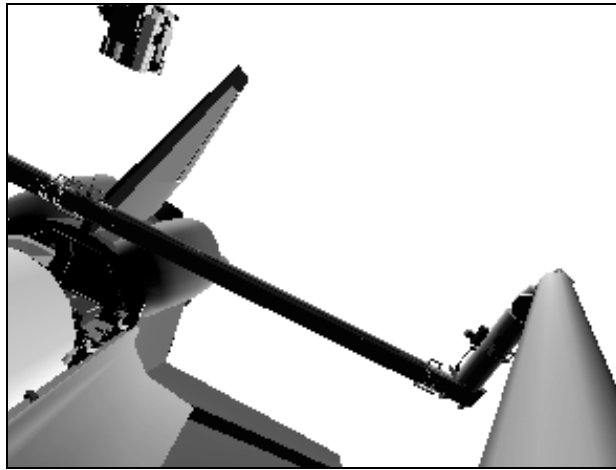
Give SSRMS Operator GO for OBSS Grapple



CCTV A (0,30)



CCTV B (-25,30)



ELBOW (-30,0)

3. STOW PTU

A7U

On SSRMS Operator GO for OBSS Ungrapple,
VIDEO OUT MON2 pb – push
IN PL2(VPU) pb – push

CAMR CMD PAN/TILT – HI RATE (LO within 10°)
PAN – L (to hard stop)
TILT – UP (to hard stop)
PAN/TILT – RESET
PAN: +108 (right)
TILT: -175 (down)

Perform LCC DEACTIVATION (LCS Cue Card, PHOTO/TV)

<p><u>CAUTION</u> STBD RMS HTR power must be applied within 90 min to prevent sensor package damage</p>

Perform DEACTIVATION (LDRI/ITVC Cue Card, PHOTO/TV)

Perform APCU DEACTIVATION (SODF: ASSY OPS, APCU), APCU 2 only

4. OBSS UNGRAPPLE

A7U

CCTV – config for ungrapple
– RMS WRIST, ZOOM: 34.0 HFOV
FOCUS: 5 ft

NOTE

CONTR ERR It and 'S96 PDRS CNTL' msg may
occur due to Consistency/Envelope Check error

RHC

RATE – COARSE (RATE MIN tb-OFF)

<p><u>SM 94 PDRS CONTROL</u></p>

AUTO BRAKE INH – ITEM 10 EXEC (*)

BRAKES – OFF (tb-OFF)
 MODE – TEST, ENTER
 Wait 5 sec

BRAKES – ON (tb-ON)







SM 94 PDRS CONTROL
 AUTO BRAKE ENA – ITEM 9 EXEC (*)
 PL ID – ITEM 3 +0 EXEC
 INIT ID – ITEM 24 +0 EXEC

RHC RATE – VERN (RATE MIN tb-ON)
 BRAKES – OFF (tb-OFF)
 MODE – END EFF, ENTER

CAUTION
 Monitor EE tb timing to prevent EE motor burnout

EE MODE – AUTO
 RELEASE sw – depress (mom)

When OPEN tb – gray, mnvr arm clear of grapple pin

√	RIGID 	CLOSE 	CAPTURE 	<u>CRITICAL TIMES (28 sec total)</u> DERIGID tb – gray, 5 sec max, then OPEN tb – gray, 3 sec max, then EXTEND tb – gray, 20 sec max
	DERIGID 	OPEN 	EXTEND 	

EE MODE – OFF

- * If manual release reqd: *
- * EE MODE – MAN *
- * MAN CONTR – DERIGID (hold until DERIGID tb-gray, 5 sec max) *
- * RELEASE sw – depress (hold until OPEN tb-gray, 3 sec max) *
- * Mnvr arm clear of grapple pin, then: *
- * EE MAN CONTR – DERIGID (hold until EXTEND tb-gray, 20 sec max) *
- * MODE – OFF *

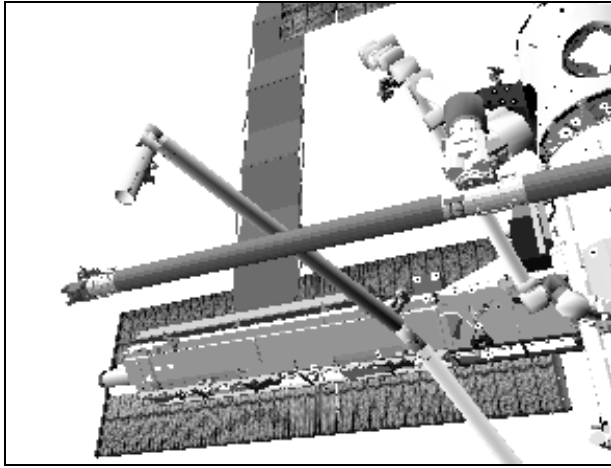
RHC 5. MNVR TO OBSS PRE-GRAPPLE
 RATE – VERN (RATE MIN tb-ON)
 MODE – as desired

Mnvr to OBSS PRE-GRAPPLE posn:

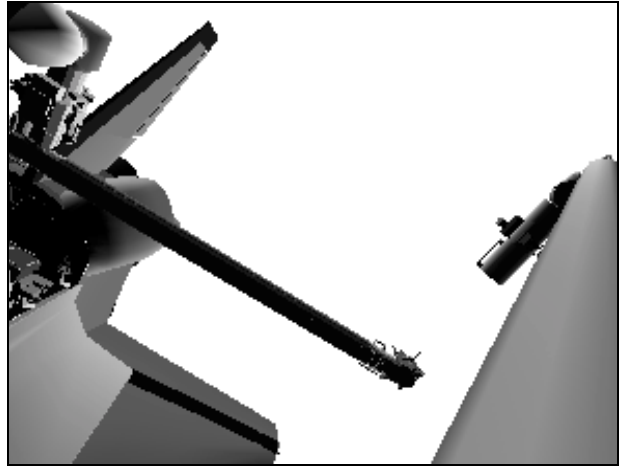
X	Y	Z	PITCH	YAW	ROLL	PL ID
-1015	-362	-688	284	0	270	0
SY	SP	EP	WP	WY	WR	
+23.5	+63.5	-29.6	-102.9	+11.5	-98.6	

BRAKES – ON (tb-ON)
 MODE – not DIRECT
 JOINT – CRIT TEMP

Give SSRMS Operator GO to mnvr to Aft posn



CCTV B (-25,30)



ELBOW (-35,-15)

6. CONFIGURE CIRCUIT BREAKERS
 MA73C:C cb MCA PWR AC3 3Φ MID 2 – op
 √AC2 3Φ MID 2 – op
 :D √AC3 3Φ MID 4 – op

7. CONFIGURE FOR MONITORING
 On SSRMS notification to watch for STBD RMS RFLs,
SM 94 PDRS CONTROL
 RMS STBD – ITEM 2 EXEC (*)

Notify SSRMS operator when STBD RMS R-F-L tb (three) – gray

8. STBD MRL LATCH
 On SSRMS Operator GO to latch STBD MRLs to TC,
 √STBD RMS R-F-L tb (three) – gray

SM 94 PDRS CONTROL
 √STBD AFT, MID, FWD LAT (six) = 0

R13L PL BAY MECH PWR SYS (two) – ON

NOTE

Expect single motor drive time for MRL latching (18 sec max).
 The following STBD RMS RETEN LAT – OFF and PL BAY
 MECH PWR SYS (two) – OFF actions are to be performed simo

Verify AOS for latching to TC

STBD RMS RETEN LAT – LAT (6 sec max)
 – OFF

R13L PL BAY MECH PWR SYS (two) – OFF

Give SSRMS Operator GO to Limp All SSRMS Joints and Derigidize

R13L On SSRMS Operator GO to continue STBD MRL latching,
 PL BAY MECH PWR SYS (two) – ON

STBD RMS RETEN LAT – LAT (tb-LAT) (12 sec max)
 – OFF

R13L 9. RECONFIGURE POWER
PL BAY MECH PWR SYS (two) – OFF

STBD RMS HTR A,B (two) – AUTO

A6U EVENT TIMER CNTL – STOP

SM 94 PDRS CONTROL

√STBD AFT, MID, FWD LAT (six) = 1
RMS PORT – ITEM 1 EXEC (*)

MA73C:C cb MCA PWR AC3 3Φ MID 2 – cl

√AC2 3Φ MID 2 – op

:D √AC3 3Φ MID 4 – op

Give SSRMS Operator GO for OBSS Ungrapple

On SSRMS Operator GO, go to RMS PWRDN

SURVEYS

I

SRMS EE CAM WSB VENT SURVEY	FS 2-2
OBSS LDRI RCC SURVEY – STBD.....	FS 2-5
LCS RCC SURVEY – NOSE CAP	FS 2-20
LDRI RCC SURVEY – PORT	FS 2-32
SRMS EE CAM CREW CABIN SURVEY	FS 2-48
OBSS TILE BOARD SURVEY.....	FS 2-59
KU CLEARANCE SURVEY	FS 2-65

SURVEYS

SRMS EE CAM WSB VENT SURVEY

NOTE

Assumed starting point is EE checkout posn, following RMS Checkout

1. SETUP

MON 1	A/EE
MON 2	B/C

A7U

CCTV – RMS WRIST, ZOOM: 20.0 HFOV (or as required)
 VIDEO OUT DTV pb – push
 IN RMS pb – push

SM 94 PDRS CONTROL

√ PL ID, ITEM 3: 0
 √ INIT ID, ITEM 24: 0

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-1233	-119	-502	317	337	355	0
	SY	SP	EP	WP	WY	WR	
√	0.0	+27.6	-28.7	-45.7	-9.1	+0.2	

2. MNVR TO VENT SURVEY POSN

SM 94 PDRS CONTROL

END POS – ITEM 18 -1 2 0 3 +3 9 -5 8 2 EXEC
 ATT – ITEM 21 +3 2 8 +4 +3 5 7 EXEC
 CMD CK – ITEM 25 EXEC (GOOD)

RHC

RATE – VERN (RATE MIN tb-ON)

BRAKES – OFF (tb-OFF)

MODE – OPR CMD, ENTER (READY It on)

NOTE

EE to WSB vent port distance at survey posn = 165 in

AUTO SEQ – PROCEED (IN PROG It on)

When AUTO SEQ IN PROG It – off:

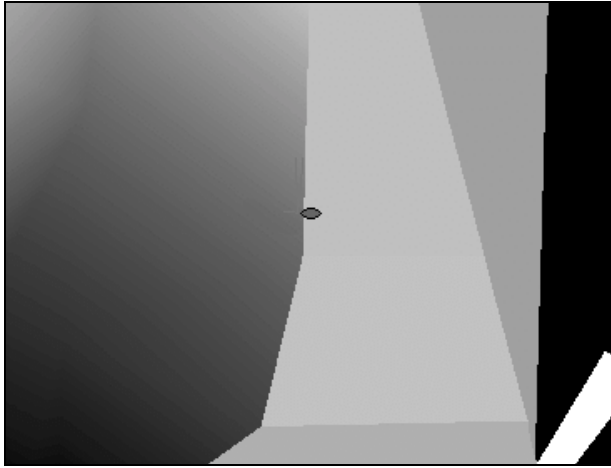
BRAKES – ON (tb-ON)

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-1203	+39	-582	328	4	357	0
	SY	SP	EP	WP	WY	WR	
√	-22.6	+28.8	-29.8	-33.7	+33.2	+12.5	

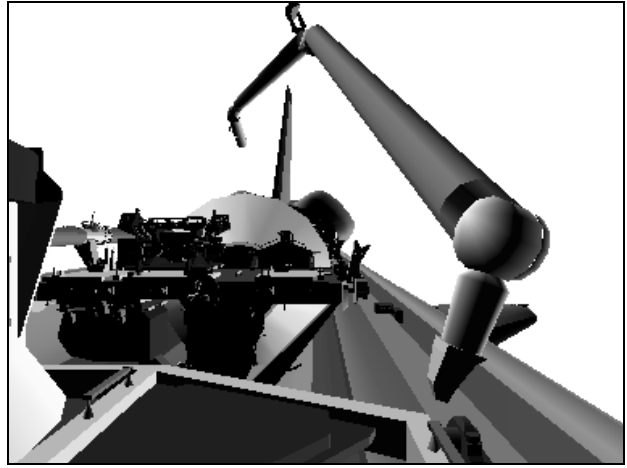
L10(VTR)

REC pb – push, hold
 PLAY pb – push, simo (red ●)

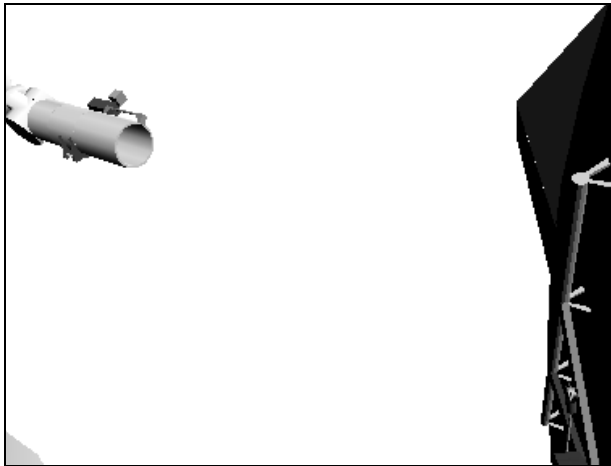
SURVEYS



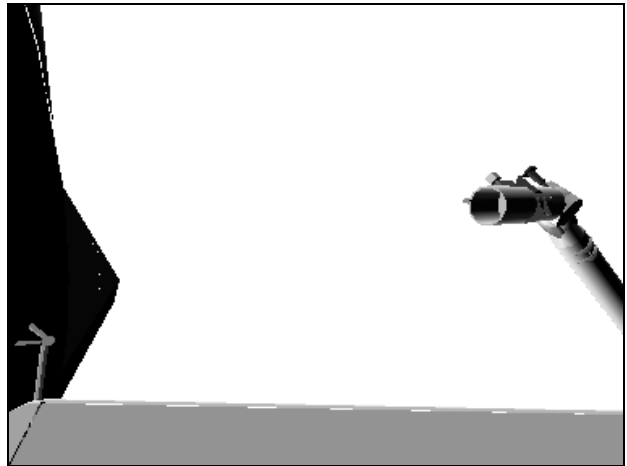
WRIST



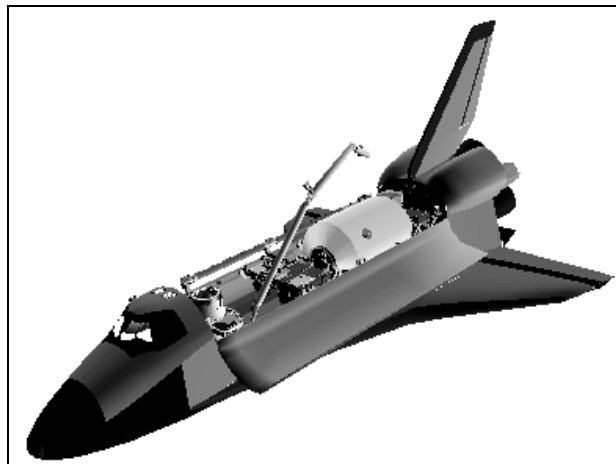
CCTV A (0,0)



CCTV B (75,35)



CCTV C (-65,55)



BIRD'S EYE

3. RETURN TO PRE-CRADLE

On MCC GO,
L10(VTR) STOP pb – push (no red ●)

RATE – as reqd (VERN within 10 ft)

BRAKES – OFF (tb-OFF)

MODE – as desired

Mnvr to PRE-CRADLE posn (OCAS valid):

X	Y	Z	PITCH	YAW	ROLL	PL ID
-1261	-146	-551	5	2	0	0
SY	SP	EP	WP	WY	WR	
0.0	+25.0	-25.0	+5.0	0.0	0.0	

BRAKES – ON (tb-ON)

MODE – not DIRECT

PARAM – PORT TEMP

JOINT – CRIT TEMP

OBSS LDRI RCC SURVEY – STBD

WARNING
For UNDOCKED ops only
Stbd PLBD radiator must be stowed
APAS Docking Ring must be retracted

NOTE

Assumed starting posn is last LDRI FF posn

1. SETUP

SM 94 PDRS CONTROL

√PL ID, ITEM 3: 3

√INIT ID, ITEM 24: 3

2. MNVR TO STBD LDRI ACAS START POSN

SJ Mnvr Clearance Views	Cameras
OBSS-to-Wing	C[6], D[7], ELBOW[5], RSC[1,3,4]
OBSS-to-PLBD	C[6], D[7], ELBOW[5], RSC[2]
[1]Wing enters FOV at WR = +129	[5]Good until WR = +157
[2]PLBD enters FOV at WR = +130	[6]Good until WR = +160
[3]Good until WR = +141	[7]Good until WR = +164
[4]Good after WR = +151	

RHC

√RATE – VERN (RATE MIN tb-ON)

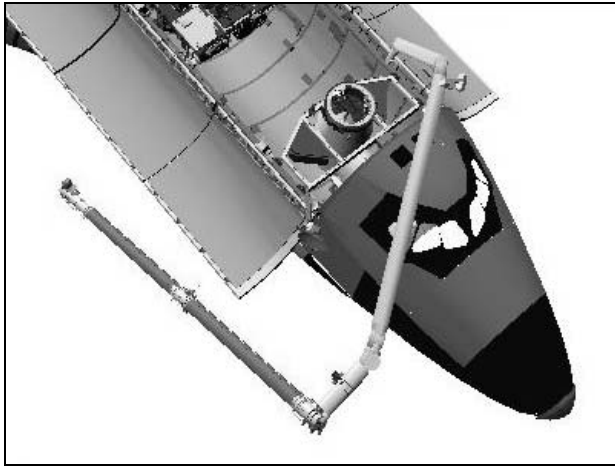
BRAKES – OFF (tb-OFF)

MODE – SINGLE, ENTER

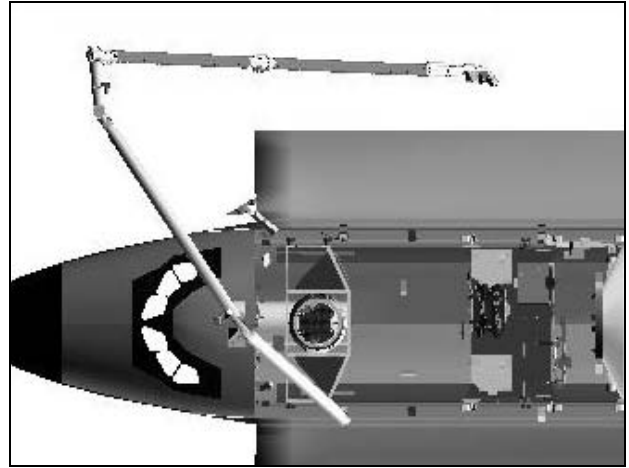
Mnvr to STBD LDRI ACAS START posn:

	SY	SP	EP	WP	WY	WR	
Last FF Posn	-89.6	+44.5	-84.6	-45.4	0.0	+109.6	
1: EP +			-54.2				
2: SY -	-126.0						
3: WP +				-16.7			
4: WY +					+25.9		
5: WR +						+166.4	
6: SP -		+38.1					
STBD LDRI	-126.0	+38.1	-54.2	-16.7	+25.9	+166.4	
ACAS START	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-854	+276	-266	322	2	79	3

BRAKES – ON (tb-ON)



BIRD'S EYE



OVERHEAD

3. STBD LDRI ACAS, SECTION 1

NOTE

Section 1 scans RCC Zones 2 & 3 (oblique view), Panels 1 → 20

A7U VIDEO OUT MON2 pb – push
IN PL2(VPU) pb – push

PAN: +95 (left)
TILT: -105 (up)

√VIDEO OUT MUX 1 L pb – push (MIDDECK It on)
√LDRI MODE 6 pb – push (flickering LDRI displayed)

VIDEO OUT MON2 pb – push
IN – as desired (not PL2)

For survey scan pattern, refer to OBSS LDRI SCAN PATTERN CUE CARD – STBD & PORT

For camera views, refer to OBSS LDRI RCC SURVEY CAMERA VIEWS – STBD (SURVEY CAMERA VIEWS)

SM 94 PDRS CONTROL

AUTO MODES – ITEM 13 +1 +2 +3 +4 EXEC

RHC RATE – COARSE (RATE MIN tb-OFF)

BRAKES – OFF (tb-OFF)
MODE – AUTO 1, ENTER (READY It on)

* If unable to enter AUTO mode (no AUTO READY It): *
* √Joint angles and adjust as reqd *

SM 94 PDRS CONTROL

√START PT, ITEM 17: 1

SM 169 PDRS STATUS

Monitor ACAS progress

NOTE

Section 1 run time ~ 3:15 min



Section 1 Clearance Views	Cameras
RMS Upper Arm-to-APAS	A[1]
OBSS-to-PLBD	C[4], D[5], ELBOW[2], RSC[3]
OBSS-to-Wing	D[5], ELBOW[2], RSC
[1]Good for all subsequent scan sections [2]Good after X ~ -1028 [3]PLBD leaves FOV at X ~ -1065	[4]Good after X ~ -1080 [5]Good after X ~ -1105

- * If RSC failed: *
- * To regain OBSS-to-PLBD clearance view at any time during ACAS, *
- * perform CONTINGENCY LDRI CLEARANCE VIEW (LDRI/ITVC *
- * Cue Card, PHOTO/TV) *

L10(VTR) REC pb – push, hold
PLAY pb – push, simo (red ●)

On MCC GO,
AUTO SEQ – PROCEED (IN PROG It on)

ACAS, pause pts **shaded in bold**, ● col indicates data recording (black = VTR on) and damage criteria (inches):

Pt	X	Y	Z	PITCH	YAW	ROLL	●
1P	-854	+276	-266	322	2	79	
2	-941	+276	-261	322	2	73	
3	-1021	+282	-277	322	359	82	
4	-1228	+486	-281	326	354	69	
5P	-1255	+502	-281	326	352	67	

L10(VTR) When AUTO SEQ READY It – on:
STOP pb – push (no red ●)

4. STBD LDRI ACAS, PREPARE FOR SECTION 2

NOTE

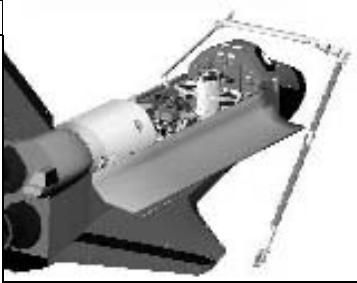
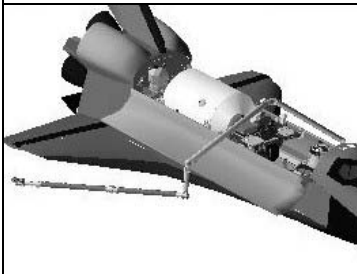
Between Pts 5 and 7, arm adjusts for survey of Zones 1 & 2.
 Section 2 then scans Zones 1 & 2, Panels 22 → 1. At Pt 6, Upper
 Arm-to-APAS = 20.6 in. Time between Pts 5 and 7 ~ 2:50 min

A7U VIDEO OUT MON2 pb – push
 IN PL2(VPU) pb – push

PAN: +80 (left)
 TILT: -65 (up)

VIDEO IN – as desired (not PL2)

AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	
5P	-1255	+502	-281	326	352	67	
6	-1255	+502	-220	346	352	67	
7P	-1358	+477	-220	346	347	16	

5. LCS CHARACTERIZATION

NOTE

LCS characterization image is obtained here to assess
 LCS sensor performance while looking at RCC. Detailed
 Area Scan time should be less than 3 min (max)

Allow arm motion to damp-out for 30 sec, then:

LCC/
 PGSC

'Scanning' 'Detailed Area Scan'
 sel – Test Scan
cmd Start Area Scan (verify Scan Line - Done)

On MCC GO, proceed to step 6

6. STBD LDRI ACAS, CONTINUE WITH SECTION 2

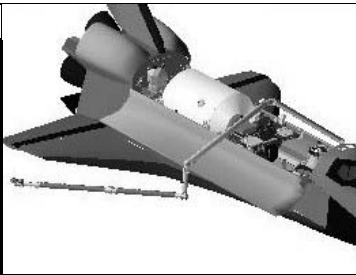
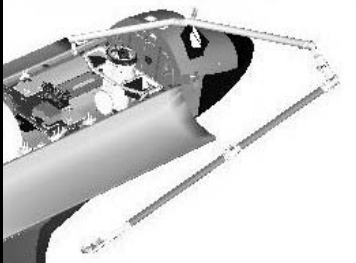
NOTE

At Pt 12, Upper Arm-to-APAS = 19 in.
Time between Pts 7 and 12 ~ 4:00 min

Section 2 Clearance Views	Cameras
OBSS-to-PLBD	C[2], D[1], ELBOW[4], RSC[3]
OBSS-to-Wing	D[1], ELBOW[4], RSC
[1]Good until X ~ -1275 [2]Good until X ~ -1200	[3]PLBD enters FOV at X ~ -1145 [4]Good until X ~ -1130

L10(VTR) REC pb – push, hold
PLAY pb – push, simo (red ●)

On MCC GO,
AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	●
7P	-1358	+477	-220	346	347	16	
8	-1316	+463	-220	346	347	16	
9	-1294	+464	-222	346	347	19	
10	-1061	+218	-201	334	12	22	¼
11	-1004	+200	-205	332	20	27	
12P	-930	+220	-225	323	19	54	

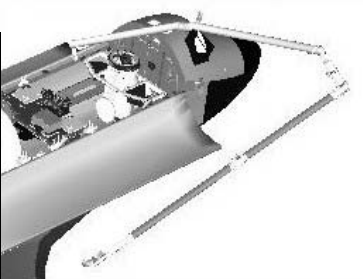
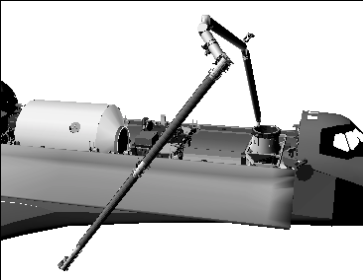
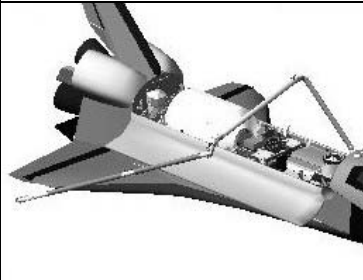
7. STBD LDRI ACAS, SECTION 3

NOTE

VTR not stopped between Sections 2 & 3. Section 3 scans RCC Zones 2 & 3, Panels 1 → 22. Run time ~ 4:55 min

Section 3 Clearance Views	Cameras
OBSS-to-PLBD	C[2], D[3], ELBOW, RSC[1]
OBSS-to-Wing	D, ELBOW, RSC
[1]PLBD leaves FOV at X ~ -1130 [2]Good after X ~ -1110 [3]Good after X ~ -1212	

AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	●
12P	-930	+220	-225	323	19	54	
13	-1012	+246	-228	325	14	55	
14	-1016	+245	-221	309	13	38	
15	-1252	+472	-233	337	343	30	
16	-1281	+497	-240	338	341	38	
17P	-1335	+540	-282	336	335	71	

L10(VTR) When AUTO SEQ READY It – on:
STOP pb – push (no red ●)

8. STBD LDRI ACAS, SECTION 4

NOTE

Section 4 scans RCC Zone 4, Panels 22 → 1.
Run time ~ 7:00 min

Section 4 Clearance Views	Cameras
OBSS-to-PLBD	C[4], D[3], ELBOW[5], RSC[2]
OBSS-to-Wing	C[1,4], D[3], ELBOW[5], RSC
[1]Good after X ~ -1310	[4]Good until X ~ -1038
[2]PLBD enters FOV at X ~ -1075	[5]Good until X ~ -1000
[3]Good until X ~ -1056	

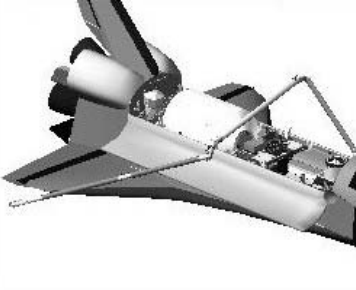
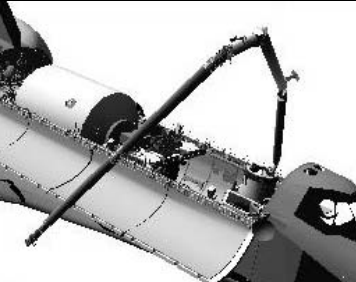
A7U VIDEO OUT MON2 pb – push
IN PL2(VPU) pb – push

√PAN: +80
TILT: -90 (down)

VIDEO IN – as desired (not PL2)

L10(VTR) REC pb – push, hold
PLAY pb – push, simo (red ●)

AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	●
17P	-1335	+540	-282	336	335	71	
18	-1279	+527	-325	325	351	93	
19	-1227	+502	-300	329	344	74	
20	-1031	+303	-290	321	356	76	1/4
21	-1002	+276	-288	329	8	85	
22P	-915	+271	-282	311	10	81	

L10(VTR) When AUTO SEQ READY It – on:
STOP pb – push (no red ●)

9. STBD LDRI ACAS, SECTION 5

NOTE

Between Pts 22 and 23, arm adjusts for survey of black tiles on fwd wing glove. Section 5 then scans apex of wing glove black tiles. Time between Pts 22 and 23 ~ 2:00 min

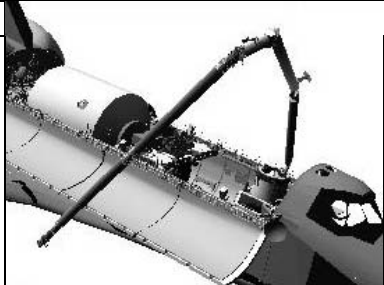
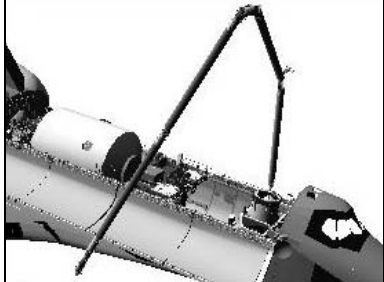
Section 5 Clearance Views	Cameras
OBSS-to-PLBD	C[3], RSC[2], ELBOW[1]
[1]Good after X ~ -905 [2]Wing leaves FOV at X ~ -848 [3]Good after X ~ -670	

A7U VIDEO OUT MON2 pb – push
IN PL2(VPU) pb – push

√PAN: +80
TILT: -85 (up)

VIDEO IN – as desired (not PL2)

AUTO SEQ – PROCEED (IN PROG It on)

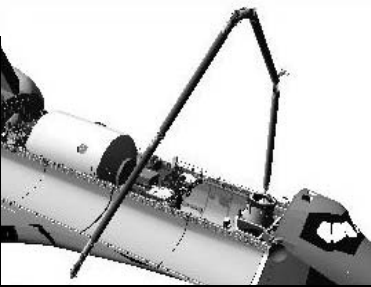
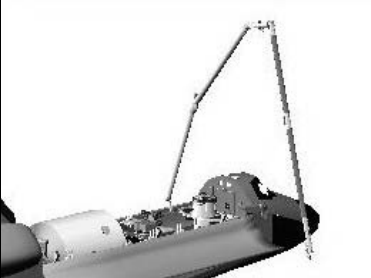
Pt	X	Y	Z	PITCH	YAW	ROLL	●
22P	-915	+271	-282	311	10	81	
23P	-906	+285	-304	294	359	84	

L10(VTR) When AUTO SEQ READY It – on:
REC pb – push, hold
PLAY pb – push, simo (red ●)

NOTE

Time between Pts 23 and 26 ~ 2:40 min

AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	•	
23P	-906	+285	-304	294	359	84		
24	-733	+285	-299	289	357	84		
25	-686	+288	-320	276	354	86	3	
26P	-562	+299	-343	266	350	87		

10. STBD LDRI ACAS, SECTION 6

NOTE

VTR is not stopped between sections 5 and 6. Section 6 scans top side of fwd wing glove, then continues aft for RCC Zones 5 & 6, Panels 1 → 8. Run time ~ 5:10 min

Section 6 Clearance Views	Cameras
OBSS-to-PLBD	C, D[1], ELBOW, RSC
OBSS-to-Wing	D[1,4], ELBOW[3], RSC[2]
[1]Good after X ~ -655	[3]Good after X ~ -921
[2]Wing enters FOV at X ~ -875	[4]Good until X ~ -980

AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	●
26P	-562	+299	-343	266	350	87	3
27	-563	+286	-369	266	343	86	
28	-678	+286	-373	270	339	86	
29	-906	+284	-379	294	332	98	
30	-963	+284	-381	295	322	87	
31	-1028	+291	-372	302	322	94	
32P	-1051	+299	-359	302	322	92	1

L10(VTR) When AUTO SEQ READY It – on:
STOP pb – push (no red ●)

11. STBD LDRI ACAS, SECTION 7

NOTE

Between Pts 32 and 33, arm adjusts to optimize remaining survey of Zones 5 & 6. Section 7 then scans Zones 5 & 6, Panels 9 → 22. Time between Pts 32 and 33 ~ 1:20 min

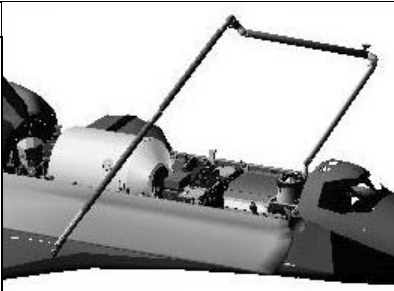
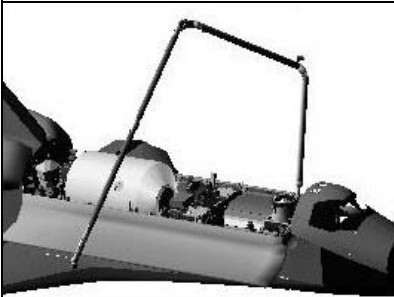
Section 7 Clearance Views	Cameras
OBSS-to-PLBD	C, D, ELBOW, RSC
OBSS-to-Wing	C, D[1], ELBOW, RSC[2]
[1]Good after X ~ -1110	
[2]PLBD leaves FOV at X ~ -1131	

A7U VIDEO OUT MON2 pb – push
IN PL2(VPU) pb – push

√PAN: +80
TILT: -105 (down)

VIDEO IN – as desired (not PL2)

AUTO SEQ – PROCEED (IN PROG It on)


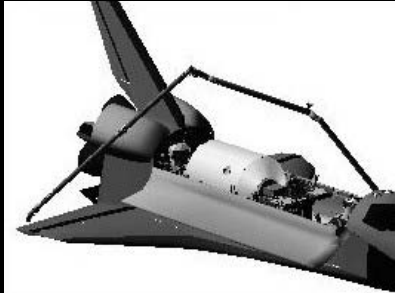
Pt	X	Y	Z	PITCH	YAW	ROLL	●
32P	-1051	+299	-359	302	322	92	
33P	-1047	+290	-358	291	336	83	

L10(VTR) When AUTO SEQ READY It – on:
REC pb – push, hold
PLAY pb – push, simo (red ●)

NOTE

Time between Pts 33 and 37 ~ 3:45 min

AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	●
33P	-1047	+290	-358	291	336	83	
34	-1235	+453	-381	300	316	97	
35	-1259	+495	-367	308	333	99	
36	-1280	+499	-373	305	329	97	
37P	-1325	+515	-370	311	334	101	

L10(VTR) When AUTO SEQ READY It – on:
 STOP pb – push (no red ●)

12. STBD LDRI ACAS, SECTION 8

NOTE

Between Pts 37 and 38, arm adjusts for survey of Zone 6.
 Section 8 then scans Zone 6, Panels 22 → 1. Time
 between Pts 37 and 38 ~ 0:45 sec

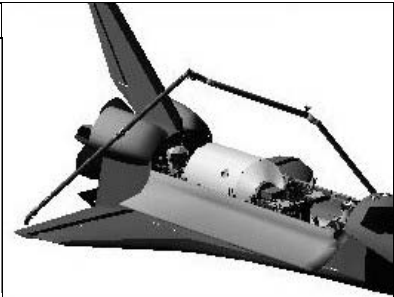
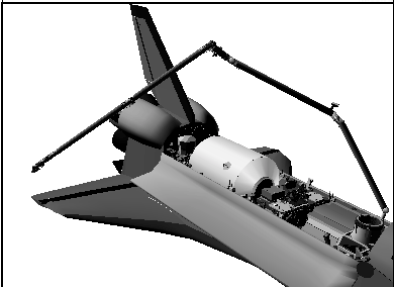
Section 8 Clearance Views	Cameras
OBSS-to-PLBD	C, D[3,6], ELBOW[5], RSC[2]
OBSS-to-Wing	C, D[3,6,7,8], ELBOW[4], RSC[1]
[1]Good until X ~ -1205	[5]Good until X ~ -1027
[2]PLBD enters FOV at X ~ -1150	[6]Good after X ~ -1027
[3]Good until X ~ -1141	[7]Good until X ~ -1003
[4]Good until X ~ -1035	[8]Good after X ~ -973

A7U VIDEO OUT MON2 pb – push
 IN PL2(VPU) pb – push

PAN: +50 (left)
 TILT: -115 (down)

VIDEO IN – as desired (not PL2)

AUTO SEQ – PROCEED (IN PROG It on)

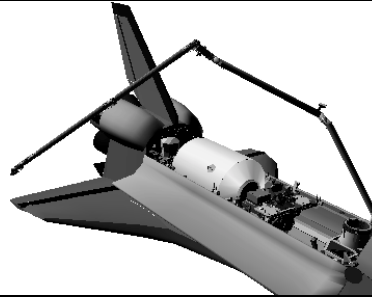
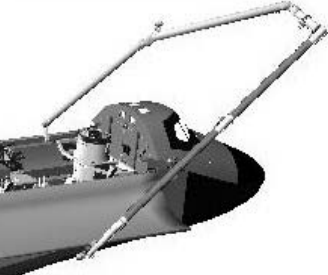
Pt	X	Y	Z	PITCH	YAW	ROLL	●
37P	-1325	+515	-370	311	334	101	
38P	-1347	+480	-395	314	332	103	

L10(VTR) When AUTO SEQ READY It – on:
 REC pb – push, hold
 PLAY pb – push, simo (red ●)

NOTE

Between Pts 41 & 42, LDRI scan distance increases beyond 7 ft due to OBSS prox to STBD PLBD. Time between Pts 38 and 46 ~ 6:55 min

AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	●
38P	-1347	+480	-395	314	332	103	1/4 
39	-1303	+474	-393	312	336	98	
40	-1282	+467	-390	312	337	94	
41	-1270	+448	-392	311	336	99	
42	-1077	+264	-408	305	335	94	
43	-1029	+272	-400	298	347	76	
44	-1002	+285	-385	305	355	72	
45	-970	+290	-365	316	4	65	
46P	-875	+288	-365	322	1	69	1 

When AUTO SEQ IN PROG It – off:
BRAKES – ON (tb-ON)

L10(VTR) STOP pb – push (no red ●)

A7U VIDEO OUT MUX 1 L pb – push (MIDDECK It on)
LDRI MODE 2 pb – push (ITVC video displayed)

VIDEO OUT MON2 pb – push
IN PL2(VPU) pb – push

If continuing OBSS ops with Nose Cap survey >>

13. RETURN TO OBSS HOVER
 RHC RATE – as reqd (VERN within 10 ft)
 BRAKES – OFF (tb-OFF)
 MODE – SINGLE, ENTER

Mnvr to OBSS HOVER:

	SY	SP	EP	WP	WY	WR	
STBD LDRI	-120.8	+32.5	-23.7	-45.8	+12.8	+164.7	
ACAS End							
1: WR –						+70.0	
2: SP +		+79.8					
3: SY +	-90.0						
4: WP –				-55.7			
5: WY –					0.0		
6: EP –			-123.1				
7: WR +						+110.0	
OBSS HOVER	-90.0	+79.8	-123.1	-55.7	0.0	+110.0	
	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-1271	+127	-511	0	0	11	3

BRAKES – ON (tb-ON)

OBSS LCS RCC SURVEY – NOSE CAP

<u>WARNING</u>
For UNDOCKED ops only
PLBD radiators must be stowed
APAS Docking Ring must be retracted thru step 6

NOTE

LCS “stop and stare” mode is used to survey nose cap at each ACAS pause point. Allow arm motion to damp-out for 30 sec prior to each area scan

1. SETUP

SM 94 PDRS CONTROL
PL ID – ITEM 3 +2 EXEC
INIT ID – ITEM 24 +2 EXEC

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-660	+298	-532	322	1	69	2
	SY	SP	EP	WP	WY	WR	
√	-120.8	+32.5	-23.7	-45.8	+12.8	+164.7	

2. INHIBIT NOSE JETS

O14:F, √Pri RJDA LOGIC, DRIVER (eight) – ON
O15:F, √Pri RJDF LOGIC, DRIVER (eight) – OFF
O16:F

A6U DAP: A14/AUTO/ALT (Tail Only)

NOTE

Expect DAP RECONFIG message after
FRCS manifold 5 status overridden to close

GNC 23 RCS
RCS FWD – ITEM 1 EXEC (*)
MANF VLVS OVRD 1 – ITEM 40 EXEC (CL)
 2 – ITEM 41 EXEC (CL)
 3 – ITEM 42 EXEC (CL)
 4 – ITEM 43 EXEC (CL)
 5 – ITEM 44 EXEC (CL)

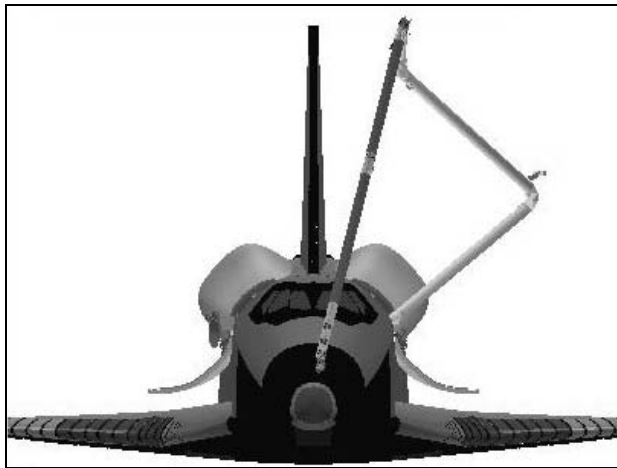
- RHC 3. MNVr TO NOSE CAP ACAS START POSN
 RATE – as reqd (VERN within 10 ft)
 BRAKES – OFF (tb-OFF)
 MODE – SINGLE, ENTER

Mnvr to NOSE CAP LCS ACAS START posn:

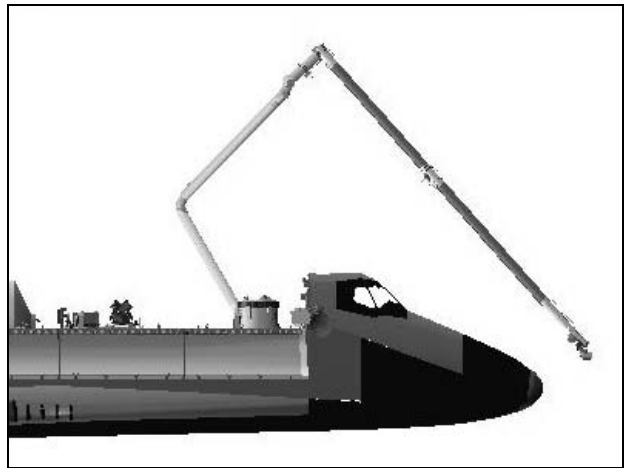
	SY	SP	EP	WP	WY	WR	
LDRI STBD ACAS End	-120.8	+32.5	-23.7	-45.8	+12.8	+164.7	
1: WP +				+31.6			[1]
2: WY -					-31.3		
3: SP +		+90.0					
4: EP -			-109.0				
5: SY -	-125.3						
6: SP +		+127.0					
7: WR +						+242.7	[2]
NOSE CAP LCS ACAS START	-125.3	+127.0	-109.0	+31.6	-31.3	+242.7	
	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-347	-58	-583	227	349	356	2

[1]Orbiter leaves RSC FOV at WP ~ -30
 [2]Nose enters RSC FOV at WR ~ +223

BRAKES – ON (tb-ON)



FRONT



RSC



BIRD'S EYE

RHC 4. NOSE CAP LCS ACAS, SECTION 1
RATE – VERN (RATE MIN tb-ON)

For survey scan pattern, refer to OBSS LCS SCAN PATTERN CUE CARD – NOSE CAP

For camera views, refer to OBSS LCS RCC SURVEY CAMERA VIEWS – NOSE CAP (SURVEY CAMERA VIEWS)

BRAKES – OFF (tb-OFF)
MODE – AUTO 2, ENTER (READY It on)

- * If unable to enter AUTO mode (no AUTO READY It): *
- * √Joint angles and adjust as reqd *

SM 94 PDRS CONTROL

√START PT, ITEM 17: 47

SM 169 PDRS STATUS

Monitor ACAS progress

NOTE

For all LCS Detailed Area Scans, image acquisition time should be less than 3 min (max)

LCC/
PGSC



'Scanning' 'Detailed Area Scan'
sel – Nose Cap Scan
cmd Start Area Scan (verify Scan Line - Done)

NOTE

Time between Pts 47 and 49 ~ 4:00 min

Section 1 Clearance Views	Cameras
RMS-to-Orbiter	A, B, C, D, ELBOW
OBSS-to-Orbiter	ELBOW, RSC

AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	
47P	-347	-58	-583	227	349	356	
48	-343	+88	-544	221	14	21	
49P	-384	+198	-466	205	31	51	

When AUTO SEQ IN PROG It – off:

Allow arm motion to damp-out for 30 sec, then:

cmd Start Area Scan (verify Scan Line - Done)

LCC/
PGSC



5. NOSE CAP LCS ACAS, SECTION 2

NOTE

Between Pts 49 and 51, arm mnvrs to next survey
posn. Time between Pts 49 and 51 ~ 1:45 min

Section 2 Clearance Views	Cameras
RMS-to-Orbiter	A, C, D, ELBOW
OBSS-to-Orbiter	ELBOW, RSC

AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	
49P	-384	+198	-466	205	31	51	
50	-379	+219	-431	206	33	71	
51P	-406	+224	-349	203	37	114	

When AUTO SEQ IN PROG It – off:

Allow arm motion to damp-out for 30 sec, then:

cmd Start Area Scan (verify Scan Line - Done)

LCC/
PGSC

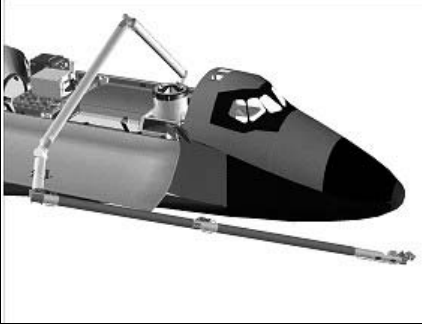

6. NOSE CAP LCS ACAS, SECTION 3

NOTE

Between Pts 51 and 52, arm mnvrs to next survey posn.
 At Pt 52 Upper Arm-to-APAS = 29.9 in. Time between
 Pts 51 and 52 ~ 0:30 sec

Section 3 Clearance Views	Cameras
RMS-to-Orbiter	A, C, D, ELBOW
OBSS-to-Orbiter	ELBOW, RSC

AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	
51P	-406	+224	-349	203	37	114	
52P	-410	+221	-333	203	38	114	

When AUTO SEQ IN PROG It – off:

Allow arm motion to damp-out for 30 sec, then:
cmd Start Area Scan (verify Scan Line - Done)

LCC/
 PGSC

BRAKES – ON (tb-ON)

7. MNVR TO NOSE CAP LCS ACAS POINT 53
 RHC RATE – as reqd (VERN within 10 ft)
 BRAKES – OFF (tb-OFF)
 MODE – SINGLE, ENTER

NOTE

APAS docking ring may be extended following SJ mnvr 1 (SP)

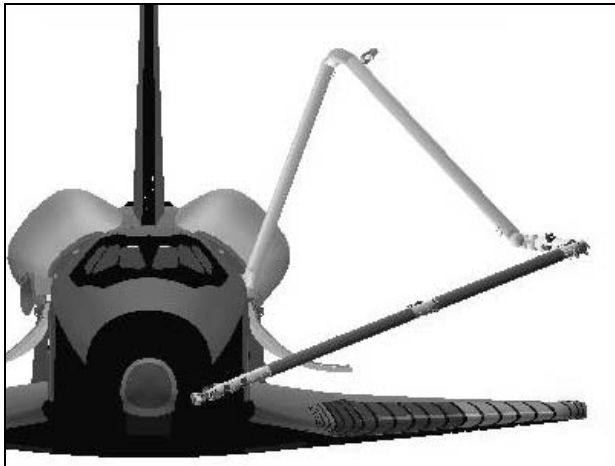
Mnvr to NOSE CAP LCS ACAS POINT 53:

	SY	SP	EP	WP	WY	WR	
NOSE CAP ACAS Pt 52	-92.0	+15.9	-58.9	-15.4	-20.0	+252.8	
1: SP +		+88.6					[1]
2: WP +				+37.4			
3: WY +					+31.3		
4: SY +	+102.6						
5: WR -						+132.9	
6: EP -			-114.7				[2]
NOSE CAP LCS ACAS Pt 53	+102.6	+88.6	-114.7	+37.4	+31.3	+132.9	
	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-357	-242	-394	201	317	280	2

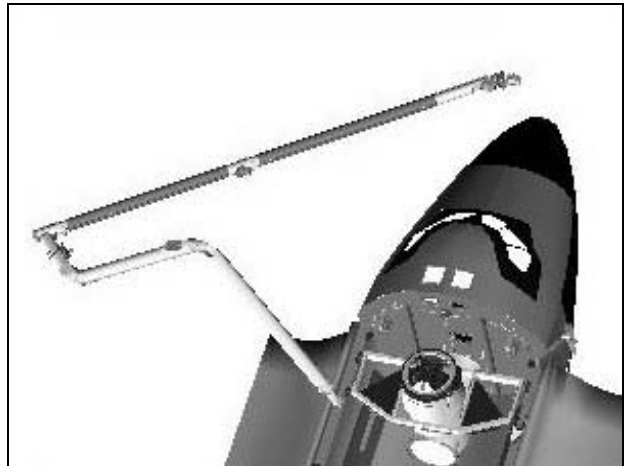
[1]Nose leaves RSC FOV at SP ~ +63

[2]Nose enters RSC FOV at EP ~ -107

BRAKES – ON (tb-ON)



FRONT




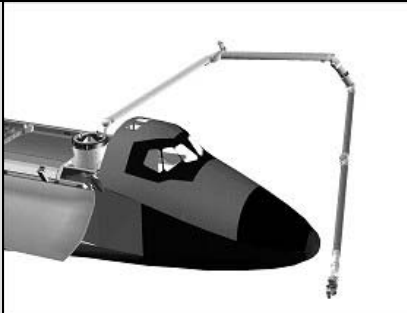
BIRD'S EYE

NOTE

Between Pts 53 and 55, arm mnvrs to next survey
posn. Time between Pts 53 and 55 ~ 2:35 min

Section 4 Clearance Views	Cameras
RMS-to-Orbiter	A[2], B, D[1]
OBSS-to-Orbiter	ELBOW, RSC
[1]Good until X ~ -350	
[2]Good until X ~ -282	

AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	
53P	-357	-242	-394	201	317	280	
54	-321	-263	-372	212	307	271	
55P	-282	-269	-319	229	291	259	

When AUTO SEQ IN PROG It – off:

Allow arm motion to damp-out for 30 sec, then:

cmd Start Area Scan (verify Scan Line - Done)

LCC/
PGSC

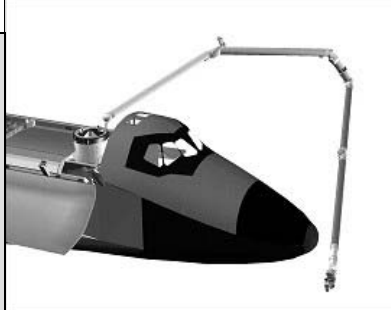
9. NOSE CAP LCS ACAS, SECTION 5

NOTE

Between Pts 55 and 57, arm mnvrs to next survey posn. Time between Pts 55 and 57 ~ 1:15 min

Section 5 Clearance Views	Cameras
RMS-to-Orbiter	B
OBSS-to-Orbiter	ELBOW, RSC

AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	
55P	-282	-269	-319	229	291	259	
56	-243	-261	-339	224	290	280	
57P	-219	-246	-371	219	288	302	

When AUTO SEQ IN PROG It – off:

Allow arm motion to damp-out for 30 sec, then:

LCC/
PGSC

cmd Start Area Scan (verify Scan Line - Done)

BRAKES – ON (tb-ON)

RHC

10. MNVR TO NOSE JET CLEAR POSN

RATE – as reqd (VERN within 10 ft)

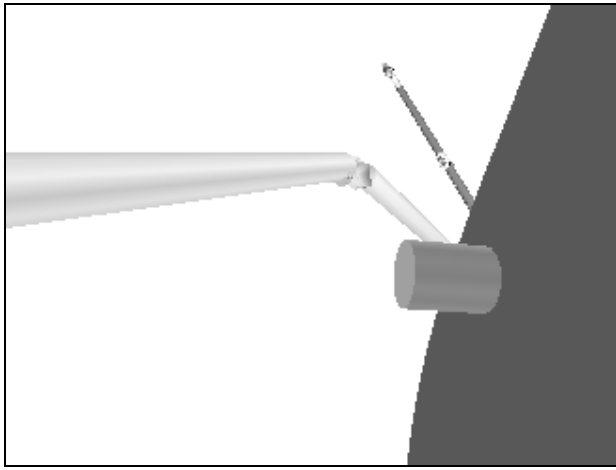
BRAKES – OFF (tb-OFF)

MODE – SINGLE, ENTER

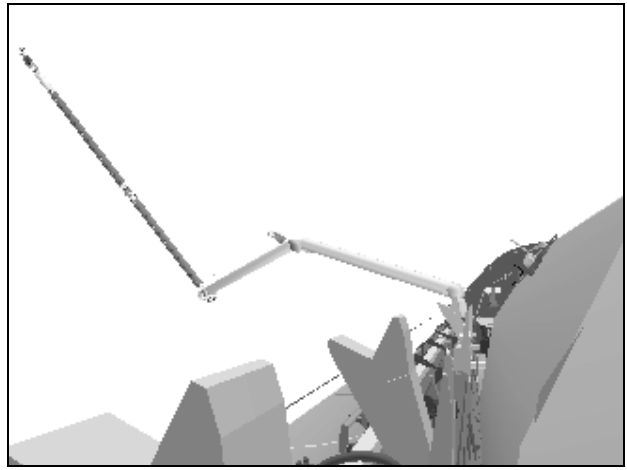
Drive WR (-) to 0.0

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-325	-748	-680	83	39	200	2
	SY	SP	EP	WP	WY	WR	
√	+128.8	+30.3	-28.5	-2.0	+35.0	0.0	

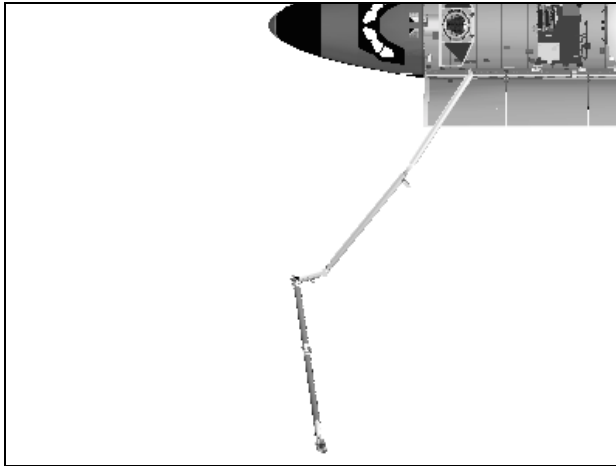
BRAKES – ON (tb-ON)



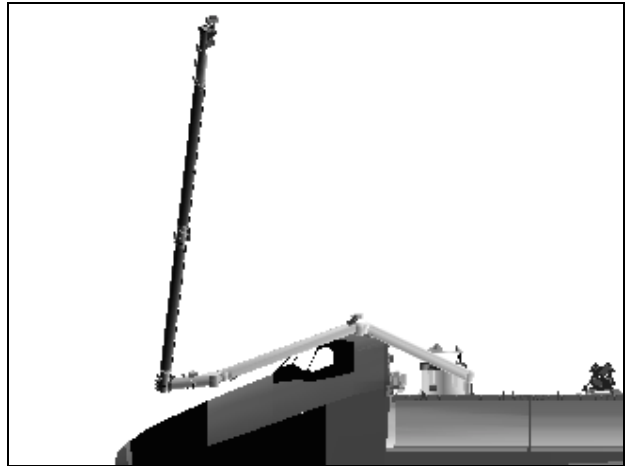
CCTV A (95,5)



CCTV B (-15,5)



OVERHEAD



PORT

11. ENABLE NOSE JETS

GNC 23 RCS

RCS FWD – ITEM 1 EXEC (*)

MANF VLVS OVRD 1 – ITEM 40 EXEC (OP)

2 – ITEM 41 EXEC (OP)

3 – ITEM 42 EXEC (OP)

4 – ITEM 43 EXEC (OP)

5 – ITEM 44 EXEC (OP)

A6U

DAP: as reqd

O14:F,
O15:F,
O16:F

Pri RJDA LOGIC,DRIVER (eight) – OFF

RJDA 1A L2/R2 DRIVER – ON

If continuing OBSS ops with Port Wing survey >>

RHC 12. RETURN TO OBSS HOVER
 RATE – as reqd (VERN within 10 ft)
 BRAKES – OFF (tb-OFF)
 MODE – SINGLE, ENTER

Mnvr to OBSS HOVER:

	SY	SP	EP	WP	WY	WR	
NOSE JET CLEAR	+128.8	+30.3	-28.5	-2.0	+35.0	0.0	
1: SP +		+79.8					
2: SY -	-90.0						
3: EP -			-123.1				
4: WP -				-55.7			
5: WY -					0.0		
6: WR +						+110.0	
OBSS HOVER	-90.0	+79.8	-123.1	-55.7	0.0	+110.0	
	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-998	+129	-507	0	0	11	2

BRAKES – ON (tb-ON)

OBSS LDRI RCC SURVEY – PORT

WARNING
 Port PLBD radiator must be stowed
 If DOCKED, SSRMS must be based on MBS.
 If SSRMS based on Lab PDGF, √MCC

1. SETUP

SM 94 PDRS CONTROL

PL ID – ITEM 3 +3 EXEC
 INIT ID – ITEM 24 +3 EXEC

RHC

2. MNVR TO PORT LDRI ACAS START POSN

RATE – VERN (RATE MIN tb-ON)
 BRAKES – OFF (tb-OFF)
 MODE – SINGLE, ENTER

If performing on FD2:

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-355	-916	-892	83	39	200	3
	SY	SP	EP	WP	WY	WR	
√	+128.8	+30.3	-28.5	-2.0	+35.0	0.0	

Mnvr to PORT LDRI ACAS START posn:

	SY	SP	EP	WP	WY	WR	
NOSE JET CLEAR	+128.8	+30.3	-28.5	-2.0	+35.0	0.0	
1: SY +	+138.8						
2: SP -		+24.6					
3: EP -			-61.2				
4: WP +				+36.9			
5: WR -						-74.2	
6: WY -					-67.4		
PORT LDRI ACAS START	+138.8	+24.6	-61.2	+36.9	-67.4	-74.2	
	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-899	-243	-284	2	341	289	3

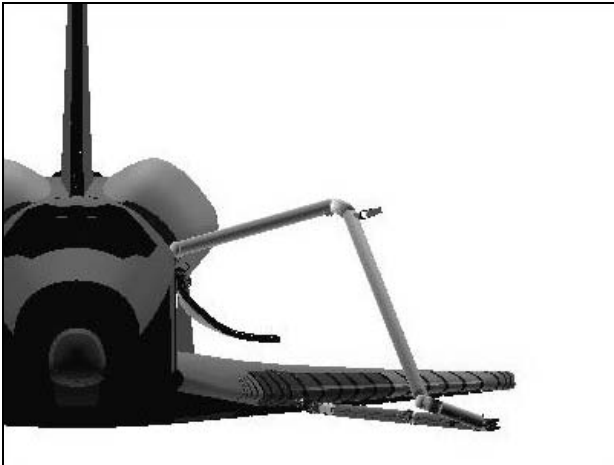
If performing on FD4:

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-622	-740	-1095	91	4	265	3
	SY	SP	EP	WP	WY	WR	
√	+95.0	+38.7	-22.8	-0.5	-0.3	+22.3	

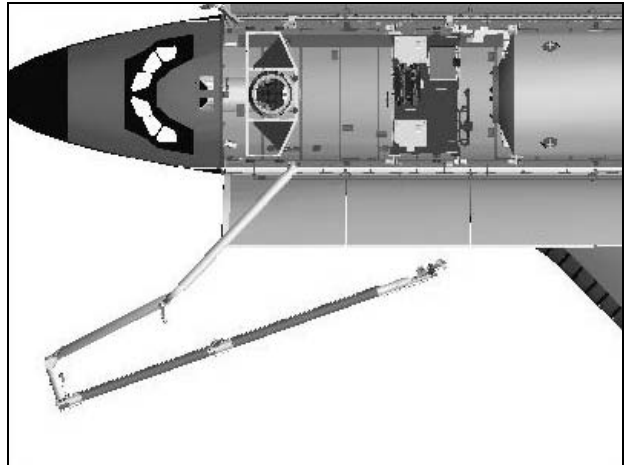
Mnvr to PORT LDRI ACAS START posn:

	SY	SP	EP	WP	WY	WR	
CMG R&R	+95.0	+38.7	-22.8	-0.5	-0.3	+22.3	
1: SP -		+24.6					
2: EP -			-61.2				
3: WY -					-67.4		
4: WR -						-74.2	
5: SY +	+150.0						
6: WP +				+36.9			
7: SY -	+138.8						
PORT LDRI ACAS START	+138.8	+24.6	-61.2	+36.9	-67.4	-74.2	
	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-899	-243	-284	2	341	289	3

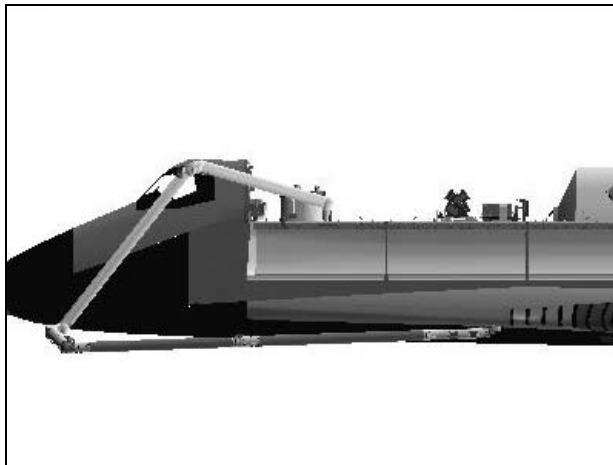
BRAKES – ON (tb-ON)



FRONT



OVERHEAD



PORT

NOTE

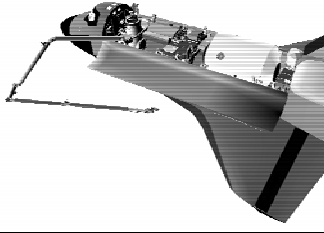
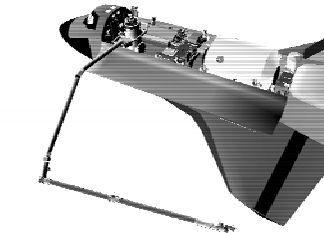
Time between Pts 58 and 64 ~ 4:45 min

Section 1 Clearance Views	Cameras
RMS Upper Arm-to-Orbiter	A[1]
OBSS-to-PLBD	A[5], B[4], ELBOW, RSC[3]
OBSS-to-Wing	A[5], ELBOW, RSC[2]
[1]Good for all subsequent scan sections [2]Good after X ~ -1050 [3]PLBD leaves FOV at X ~ -1098	[4]Good after X ~ -1099 [5]Good after X ~ -1110

L10(VTR) REC pb – push, hold
PLAY pb – push, simo (red ●)

On MCC GO,
AUTO SEQ – PROCEED (IN PROG It on)

ACAS, pause pts **shaded in bold**, ● col indicates data recording (black = VTR on) and damage criteria (inches):

Pt	X	Y	Z	PITCH	YAW	ROLL	●	
58P	-899	-243	-284	2	341	289		
59	-958	-253	-278	2	341	293		
60	-1023	-277	-267	0	353	308		
61	-1057	-310	-267	0	356	307		
62	-1186	-442	-272	0	359	309		
63	-1265	-509	-274	0	350	309		
64P	-1324	-523	-274	0	348	315		

L10(VTR) When AUTO SEQ READY It – on:
STOP pb – push (no red ●)

4. PORT LDRI ACAS, SECTION 2

NOTE

Between Pts 64 and 65, arm adjusts for survey of Zones 1 & 2.
 Section 2 then scans RCC Zones 1 & 2, Panels 22 → 1. Time
 between Pts 64 and 65 ~ 1:50 min

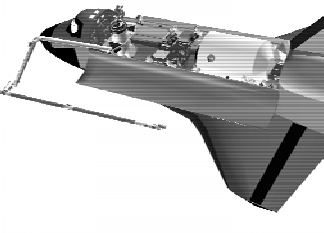
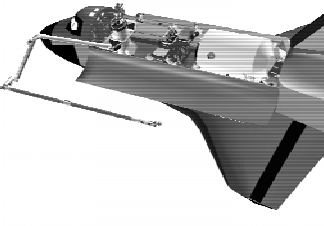
Section 2 Clearance Views	Cameras
OBSS-to-PLBD	A[1], B[3], ELBOW, RSC[2]
OBSS-to-Wing	A[1], ELBOW, RSC
[1]Good until X ~ -1235 [2]PLBD enters FOV at X ~ -1198	[3]Good until X ~ -1157

A7U VIDEO OUT MON2 pb – push
 IN PL2(VPU) pb – push

PAN: +10 (left)
 TILT: -80 (up)

VIDEO IN – as desired (not PL2)

AUTO SEQ – PROCEED (IN PROG It on)

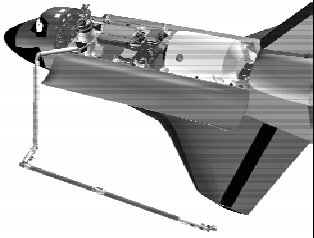
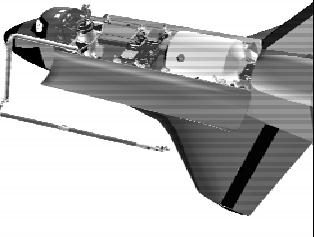
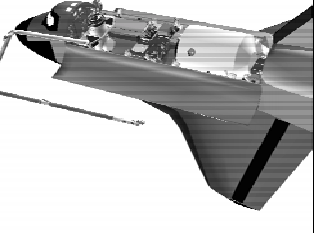
Pt	X	Y	Z	PITCH	YAW	ROLL	●
64P	-1324	-523	-274	0	348	315	
65P	-1345	-496	-232	345	352	262	

L10(VTR) When AUTO SEQ READY It – on:
 REC pb – push, hold
 PLAY pb – push, simo (red ●)

NOTE

At Pt 74, WP of +110.2° approaches reach limit.
Time between Pts 65 and 74 ~ 3:30 min

AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	●
65P	-1345	-496	-232	345	352	262	
66	-1268	-456	-230	345	352	262	
67	-1175	-357	-219	345	345	262	
68	-1134	-315	-218	345	345	262	
69	-1097	-277	-214	345	345	262	
70	-1061	-238	-210	345	345	262	¼ 
71	-998	-216	-214	345	345	259	
72	-972	-211	-216	345	345	259	
73	-935	-206	-219	345	345	259	
74P	-906	-204	-220	345	345	259	

L10(VTR) When AUTO SEQ READY It – on:
STOP pb – push (no red ●)

5. PORT LDRI ACAS, SECTION 3

NOTE

Between Pts 74 & 75, arm adjusts for survey of Zones 2 & 3.
 Section 3 then scans Zones 2 & 3, Panels 1 → 22. At Pt 75,
 WP: +112.4°. Time between Pts 74 and 75 ~ 0:30 sec

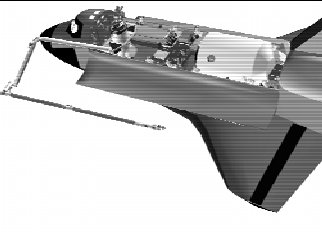
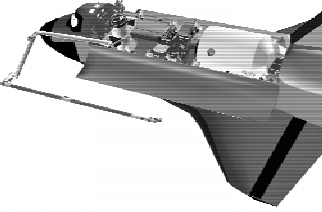
Section 3 Clearance Views	Cameras
OBSS-to-PLBD	A[3], B[1], ELBOW, RSC[2]
OBSS-to-Wing	A[3], ELBOW, RSC
[1]Good after X ~ -1128 [2]PLBD leaves FOV at X ~ -1180	[3]Good after X ~ -1187

A7U VIDEO OUT MON2 pb – push
 IN PL2(VPU) pb – push

√PAN: +10
 TILT: -95 (down)

VIDEO IN – as desired (not PL2)

AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	●
74P	-906	-204	-220	345	345	259	
75P	-898	-214	-230	347	348	259	

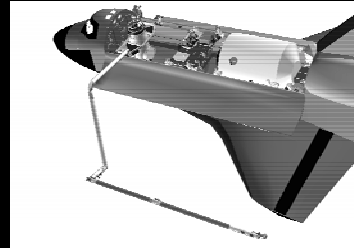
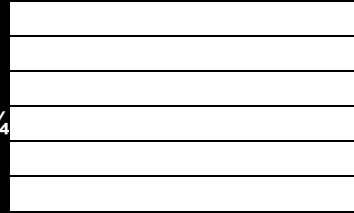
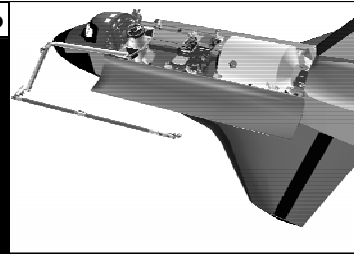
L10(VTR) When AUTO SEQ READY It – on:
 REC pb – push, hold
 PLAY pb – push, simo (red ●)

NOTE

Time between Pts 75 and 82 ~ 3:30 min

AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	●
75P	-898	-214	-230	347	348	259	
76	-979	-231	-226	347	348	259	
77	-1034	-262	-231	347	348	259	
78	-1110	-338	-234	347	348	259	
79	-1183	-406	-238	353	356	254	1/4
80	-1244	-467	-242	354	356	254	
81	-1312	-504	-245	359	0	254	
82P	-1343	-511	-246	359	0	254	



L10(VTR) When AUTO SEQ READY It – on:
STOP pb – push (no red ●)

6. PORT LDRI ACAS, SECTION 4

NOTE

Between Pts 82 & 83, arm adjusts for survey of Zone 4.
 Section 4 then scans RCC Zone 4, Panels 22 → 1. Time
 between Pts 82 and 83 ~ 1:50 min

Section 4 Clearance Views	Cameras
OBSS-to-PLBD	A[3], B[4], ELBOW, RSC[2]
OBSS-to-Wing	A[3], B[1,4], ELBOW, RSC[5]
[1]Good after X ~ -1327	[4]Good until X ~ -1036
[2]PLBD enters FOV at X ~ -1067	[5]Good until X ~ -975
[3]Good until X ~ -1042	

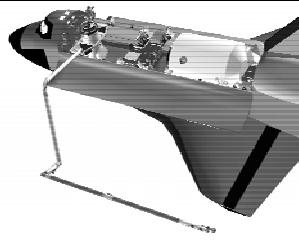
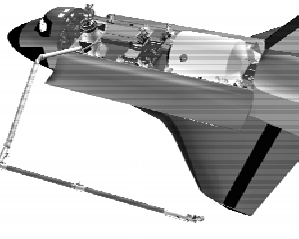
A7U

VIDEO OUT MON2 pb – push
 IN PL2(VPU) pb – push

PAN: +88 (right)
 TILT: -120 (down)

VIDEO IN – as desired (not PL2)

AUTO SEQ – PROCEED (IN PROG It on)

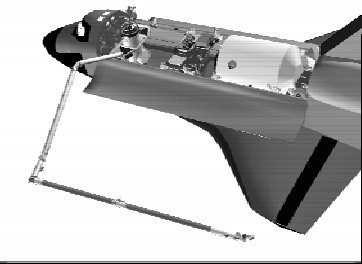
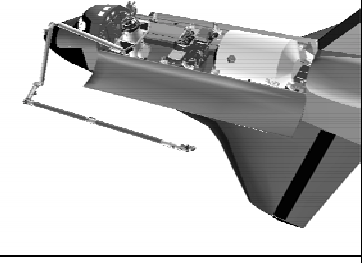
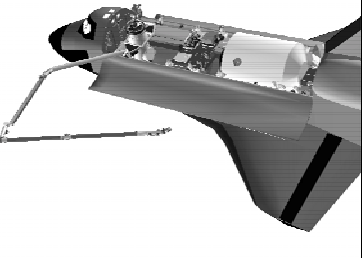
Pt	X	Y	Z	PITCH	YAW	ROLL	●
82P	-1343	-511	-246	359	0	254	
83P	-1323	-537	-315	346	348	282	

L10(VTR) When AUTO SEQ READY It – on:
 REC pb – push, hold
 PLAY pb – push, simo (red ●)

NOTE

Time between Pts 83 and 91 ~ 6:05 min

AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	●
83P	-1323	-537	-315	346	348	282	
84	-1244	-513	-305	353	357	287	
85	-1176	-450	-298	352	2	290	
86	-1106	-380	-295	352	4	291	
87	-1023	-300	-288	354	357	289	
88	-989	-275	-294	350	350	282	
89	-965	-263	-294	350	350	282	
90	-933	-253	-289	358	347	283	
91P	-887	-248	-287	4	341	282	

L10(VTR) When AUTO SEQ READY It – on:
 STOP pb – push (no red ●)

7. PORT LDRI ACAS, SECTION 5

NOTE

Between Pts 91 and 93, arm adjusts for survey of Zones 4 & 5. Section 5 then scans Zones 4 & 5, Panels 1 → 22.
Time between Pts 91 and 93 ~ 1:35 min

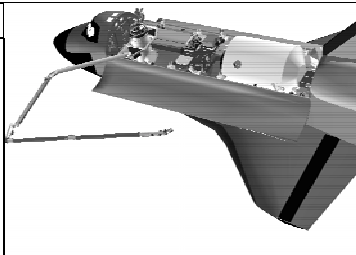
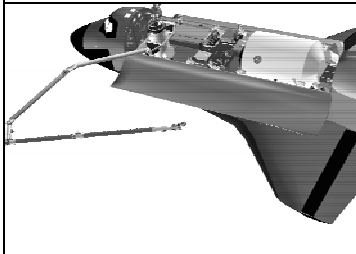
Section 5 Clearance Views	Cameras
OBSS-to-PLBD	A[1], B[2], ELBOW, RSC[4]
OBSS-to-Wing	A[1,3,5], B[2], ELBOW, RSC[6]
[1]Good after X ~ -896	[4]PLBD leaves FOV at X ~ -1098
[2]Good after X ~ -1015	[5]Good after X ~ -1104
[3]Good until X ~ -1045	[6]Good after X ~ -1220

A7U VIDEO OUT MON2 pb – push
IN PL2(VPU) pb – push

PAN: +120 (right)
√TILT: -120 (down)

VIDEO IN – as desired (not PL2)

AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	●
91P	-887	-248	-287	4	341	282	
92	-887	-285	-287	4	341	282	
93P	-897	-285	-331	2	336	302	

L10(VTR) When AUTO SEQ READY It – on:
REC pb – push, hold
PLAY pb – push, simo (red ●)

NOTE

Time between Pts 93 and 103 ~ 7:15 min

AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	●
93P	-897	-285	-331	2	336	302	
94	-910	-285	-330	2	340	302	
95	-926	-285	-325	1	340	298	
96	-950	-287	-335	359	340	292	1
97	-978	-289	-352	357	345	287	
98	-1020	-286	-332	350	350	297	
99	-1074	-329	-341	342	1	292	
100	-1148	-401	-346	340	357	289	
101	-1229	-475	-357	333	359	289	
102	-1280	-503	-363	327	1	285	
103P	-1328	-517	-364	327	1	285	¼

L10(VTR) When AUTO SEQ READY It – on:
STOP pb – push (no red ●)

8. PORT LDRI ACAS, SECTION 6

NOTE

Between Pts 103 & 104, arm adjusts for survey of Zone 6. Section 6 then scans Zone 6, Panels 22 → 5.
Time between Pts 103 and 104 ~ 1:25 min

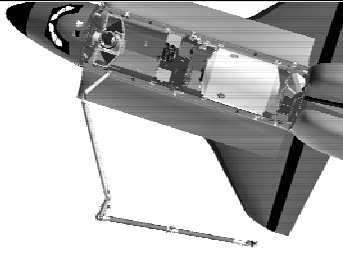
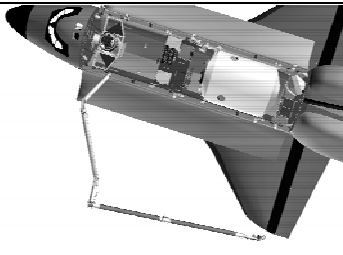
Section 6 Clearance Views	Cameras
OBSS-to-PLBD	A[4,6], B, ELBOW, RSC[2,5]
OBSS-to-Wing	A[4,6], B, ELBOW[1], RSC[3,7]
[1]Good until X ~ -1264	[5]Good until X ~ -1114
[2]PLBD enters FOV at X ~ -1210	[6]Good after X ~ -1086
[3]Good until X ~ -1154	[7]Good after X ~ -1092
[4]Good until X ~ -1114	

A7U VIDEO OUT MON2 pb – push
IN PL2(VPU) pb – push

PAN: +135 (right)
TILT: -110 (up)

VIDEO IN – as desired (not PL2)

AUTO SEQ – PROCEED (IN PROG It on)

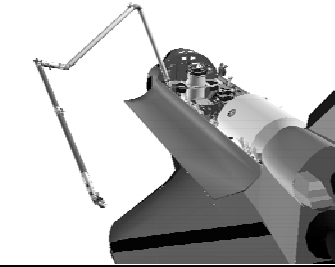
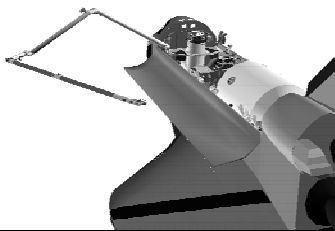
Pt	X	Y	Z	PITCH	YAW	ROLL	●
103P	-1328	-517	-364	327	1	285	
104P	-1338	-476	-389	345	357	254	

L10(VTR) When AUTO SEQ READY It – on:
REC pb – push, hold
PLAY pb – push, simo (red ●)

NOTE

Time between Pts 104 and 110 ~ 3:50 min

AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	●
104P	-1338	-476	-389	345	357	254	1/4 
105	-1283	-453	-391	343	350	243	
106	-1166	-340	-392	343	350	243	
107	-1113	-285	-388	342	337	239	
108	-1071	-284	-378	352	332	270	
109	-1050	-279	-387	357	332	272	
110P	-985	-279	-386	1	331	281	1 

When AUTO SEQ IN PROG It – off:
BRAKES – ON (tb-ON)

L10(VTR) STOP pb – push (no red ●)

A7U VIDEO OUT MUX 1 L pb – push (MIDDECK It on)
 LDRI MODE 2 pb – push (ITVC video displayed)

 VIDEO OUT MON2 pb – push
 IN PL2(VPU) pb – push

RHC

9. MNVR TO OBSS HOVER/PARK POSN

RATE – as reqd (VERN within 10 ft)

BRAKES – OFF (tb-OFF)

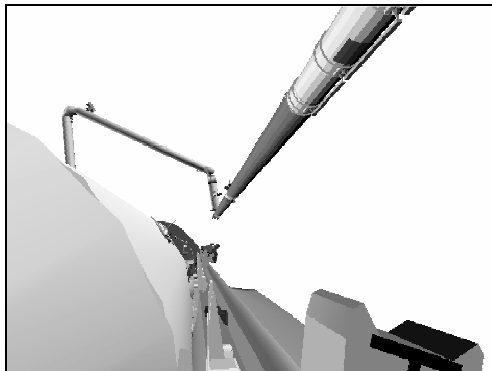
MODE – SINGLE, ENTER

If performing on FD2:

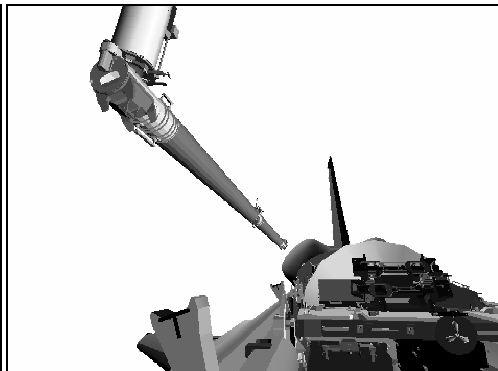
Mnvr to OBSS HOVER posn:

	SY	SP	EP	WP	WY	WR	
PORT LDRI	+120.7	+42.9	-62.9	+32.8	-58.9	-67.5	
ACAS End					0.0		
1: WY +							
2: WR +						+30.0	
3: SP +		+79.8					
4: SY -	-90.0						
5: EP -			-123.1				
6: WP -				-55.7			
7: WR +						+110.0	
OBSS HOVER	-90.0	+79.8	-123.1	-55.7	0.0	+110.0	
	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-1271	+127	-511	0	0	11	3

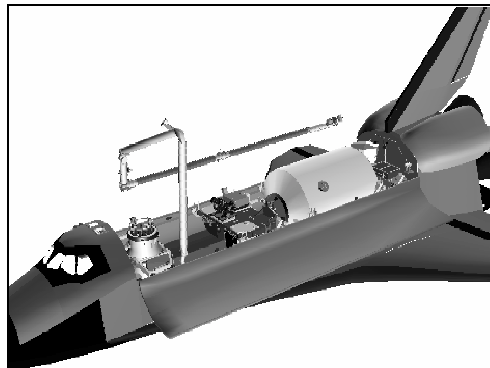
BRAKES – ON (tb-ON)



CCTV C (10,10)



CCTV D (-10,15)



BIRD'S EYE

If performing on FD4:

Mnvr to CMG R&R VIEWING posn:

	SY	SP	EP	WP	WY	WR	
PORT LDRI	+120.7	+42.9	-62.9	+32.8	-58.9	-67.5	
ACAS End					-0.3		
1: WY +							
2: SY -	+95.0						
3: EP +			-22.8				
4: SP -		+38.7					
5: WP -				-0.5			
6: WR +						+22.3	
CMG R&R VIEWING	+95.0	+38.7	-22.8	-0.5	-0.3	+22.3	
	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-622	-740	-1095	91	4	265	3

BRAKES – ON (tb-ON)

A7U

VIDEO OUT MON2 pb – push
IN PL2(VPU) pb – push

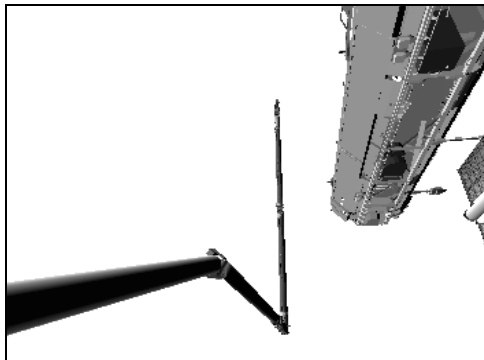
PAN: +60 (left)

TILT: -80 (up)

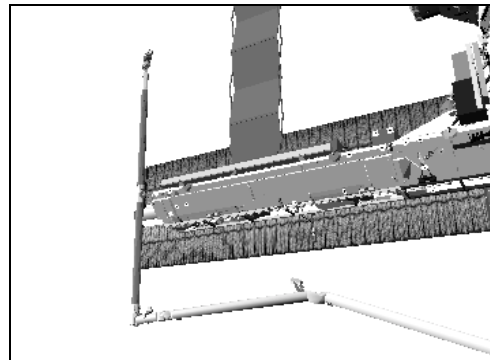
VIDEO IN – as desired (not PL2)

MODE – not DIRECT

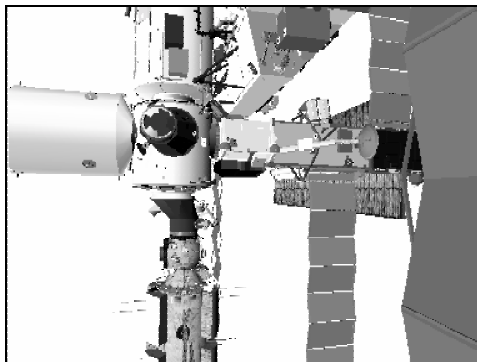
JOINT – CRIT TEMP



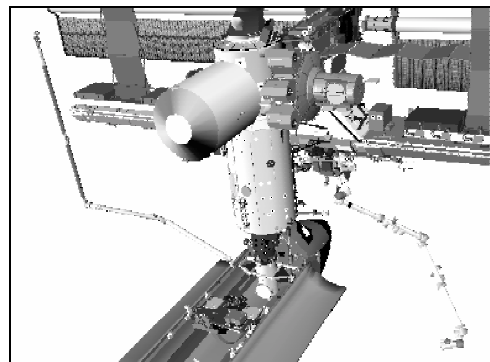
CCTV A (80,30)



CCTV B (-30,20)



OBSS ITVC (60,-80)



BIRD'S EYE

SRMS EE CAM CREW CABIN SURVEY

WARNING
 For UNDOCKED ops only
 Port and stbd PLBD radiators must be stowed

NOTE

Scanning (VTR recorded) portions of this procedure require daylight.
 If step 7 not completed on FD3 15 min prior to reqd RNDZ OMS
 burn, break out of procedure and return to Pre-Cradle

- A7U 1. SETUP
 CCTV – RMS WRIST, ZOOM: 25.0 HFOV
 VIDEO OUT DTV pb – push
 IN RMS pb – push

SM 94 PDRS CONTROL

- √ PL ID, ITEM 3: 0
- √ INIT ID, ITEM 24: 0
- AUTO MODES – ITEM 13 +5 +6 EXEC

- A6U 2. INHIBIT NOSE JETS
 DAP: VERN(FREE)

GNC 23 RCS

- RCS FWD – ITEM 1 EXEC (*)
- MANF VLVS OVRD 1 – ITEM 40 EXEC (CL)
- 2 – ITEM 41 EXEC (CL)
- 3 – ITEM 42 EXEC (CL)
- 4 – ITEM 43 EXEC (CL)

- RHC 3. MNVR TO STBD CREW CABIN POSN
 RATE – as reqd (VERN within 10 ft)
 BRAKES – OFF (tb-OFF)
 MODE – SINGLE, ENTER

NOTE

To assist with camera views, start posn is fwd, near nose cap

If performing on FD2:

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-680	+96	-513	270	350	1	0
	SY	SP	EP	WP	WY	WR	
√	-90.0	+87.6	-129.5	-57.5	0.0	+110.4	

Mnvr to STBD CREW CABIN SURVEY START posn:

	SY	SP	EP	WP	WY	WR	
OBSS PRE-GRAPPLE	-90.0	+87.6	-129.5	-57.5	0.0	+110.4	
1: EP +			-57.5				
2: WR +						+228.2	
3: WY -					-59.5		
4: WP -				-112.6			
5: SP -		+17.2					
6: SY -	-134.9						[1,2]
STBD CREW CABIN SURVEY START	-134.9	+17.2	-57.5	-112.6	-59.5	+228.2	
	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-351	+180	-411	241	53	123	0

[1]Upper Arm-To-Crew Cabin = 13 in

[2]Upper Arm-To-APAS = 19 in

If performing on FD3:

√	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-1261	-146	-551	5	2	0	0
√	SY	SP	EP	WP	WY	WR	
	0.0	+25.0	-25.0	+5.0	0.0	0.0	

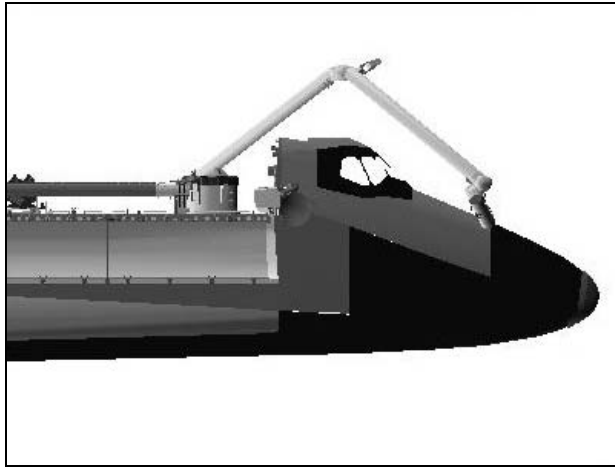
Mnvr to STBD CREW CABIN SURVEY START posn:

	SY	SP	EP	WP	WY	WR	
PRE-CRADLE	0.0	+25.0	-25.0	+5.0	0.0	0.0	
1: SP +		+45.0					
2: WR +						+228.2	
3: WY -					-59.5		
4: WP -				-112.6			
5: SY -	-90.0						
6: EP -			-57.5				
7: SP -		+17.2					
8: SY -	-134.9						[1,2]
STBD CREW CABIN SURVEY START	-134.9	+17.2	-57.5	-112.6	-59.5	+228.2	
	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-351	+180	-411	241	53	123	0

[1]Upper Arm-To-Crew Cabin = 13 in

[2]Upper Arm-To-APAS = 19 in

BRAKES – ON (tb-ON)



STBD



FRONT

4. STBD CREW CABIN SURVEY, SECTION 1

SM 94 PDRS CONTROL

PL ID – ITEM 3 +5 EXEC
 INIT ID – ITEM 24 +5 EXEC

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-351	+180	-411	241	53	123	5
	SY	SP	EP	WP	WY	WR	
√	-134.9	+17.2	-57.5	-112.6	-59.5	+228.2	

RHC RATE – VERN (RATE MIN tb-ON)

A7U √CCTV – RMS WRIST

For camera views, refer to SRMS EE CAM CREW CABIN SURVEY CAMERA VIEWS (SURVEY CAMERA VIEWS)

L10(VTR) REC pb – push, hold
 PLAY pb – push, simo (red ●)

BRAKES – OFF (tb-OFF)
 MODE – AUTO 1, ENTER (READY lt on)

- * If unable to enter AUTO mode (no AUTO READY lt): *
- * √Joint angles and adjust as reqd *

SM 94 PDRS CONTROL

√START PT, ITEM 17: 111

SM 169 PDRS STATUS

Monitor ACAS progress

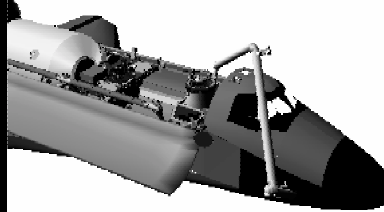
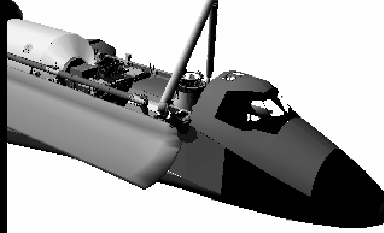
NOTE

Time between Pts 111 and 112 ~ 0:50 sec

Section 1 Clearance Views	Cameras
EE-to-Crew Cabin and Ku Dish	ELBOW[1]
Lower Arm-to-Crew Cabin	C, D, ELBOW[1]
Upper Arm-to-Docking Ring (Extended)	A
Upper Arm-to-Crew Cabin	A, B, ELBOW[1]
[1]ELBOW and WRIST cameras are mutually exclusive	

On MCC GO,
 AUTO SEQ – PROCEED (IN PROG It on)

ACAS, pause pts **shaded in bold**, ● col indicates data recording (black = VTR on) and damage criteria (inches):

Pt	X	Y	Z	PITCH	YAW	ROLL	●	
111P	-351	+180	-411	241	53	123		
112P	-484	+230	-465	255	48	103	3	

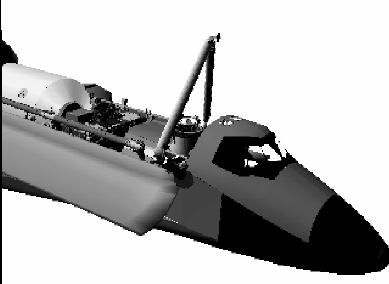
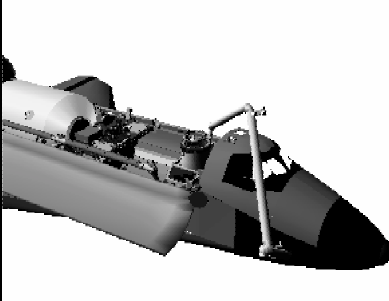
L10(VTR) When AUTO SEQ IN PROG It – off:
 STOP pb – push (no red ●)

5. PREPARE FOR SECTION 2

NOTE

Between Pts 112 and 113, arm repositions back to start pt, preparing for completion of survey of STBD side of crew cabin. At Pt 113, Upper Arm-to-Crew Cabin = 13 in, Upper Arm-to-APAS = 19 in. Time between Pts 112 and 113 ~ 0:50 sec

AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	•
112P	-484	+230	-465	255	48	103	
113P	-351	+180	-411	241	53	123	

6. STBD CREW CABIN SURVEY, SECTION 2

NOTE

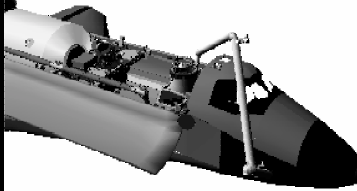
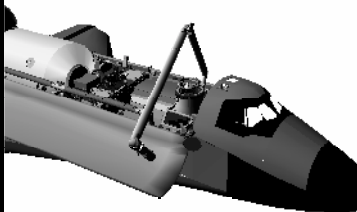
Time between Pts 113 and 114 ~ 1:30 min

Section 2 Clearance Views	Cameras
EE-to-Crew Cabin and Ku Dish	ELBOW[1]
Lower Arm-to-Crew Cabin	C, D, ELBOW[1]
Upper Arm-to-Docking Ring (Extended)	A
Upper Arm-to-Crew Cabin	A, B
[1]ELBOW and WRIST cameras are mutually exclusive	

A7U √CCTV – RMS WRIST

L10(VTR) REC pb – push, hold
 PLAY pb – push, simo (red ●)

AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	●
113P	-351	+180	-411	241	53	123	
114P	-548	+266	-478	270	38	45	3 

When AUTO SEQ IN PROG It – off:
 BRAKES – ON (tb-ON)

L10(VTR) STOP pb – push (no red ●)

RHC

7. MNVR TO PORT CREW CABIN SURVEY START POSN

RATE – as reqd (VERN within 10 ft)

BRAKES – OFF (tb-OFF)

MODE – SINGLE, ENTER

If performing immediately after STBD CREW CABIN SURVEY:

		Mnvr to PORT CREW CABIN SURVEY START posn:					
		SY	SP	EP	WP	WY	WR
STBD CREW CABIN SURVEY		-107.7	+28.3	-66.4	-108.1	-14.9	+164.2
	End						
1:	SP +		+53.3				
2:	SY +	+65.9					
3:	EP -			-94.3			
4:	WP +				-99.6		
5:	WY -					-36.5	
6:	WR +						+216.5
PORT CREW CABIN SURVEY START		+65.9	+53.3	-94.3	-99.6	-36.5	+216.5
	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-840	-364	-333	324	291	323	5

If performing PORT CREW CABIN SURVEY from PRE-CRADLE:

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-1261	-146	-551	5	2	0	0(5)
	SY	SP	EP	WP	WY	WR	
√	0.0	+25.0	-25.0	+5.0	0.0	0.0	

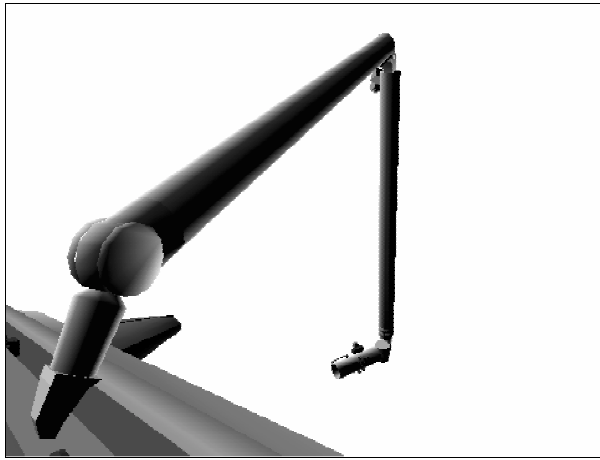
SM 94 PDRS CONTROL

PL ID – ITEM 3 +5 EXEC

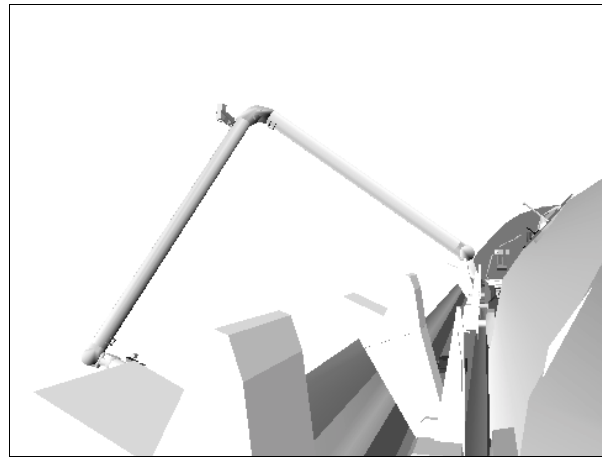
INIT ID – ITEM 24 +5 EXEC

		Mnvr to PORT CREW CABIN SURVEY START posn:					
		SY	SP	EP	WP	WY	WR
PRE-CRADLE		0.0	+25.0	-25.0	+5.0	0.0	0.0
1:	SY +	+65.9					
2:	SP +		+53.3				
3:	EP -			-94.3			
4:	WP -				-99.6		
5:	WY -					-36.5	
6:	WR +						+216.5
PORT CREW CABIN SURVEY START		+65.9	+53.3	-94.3	-99.6	-36.5	+216.5
	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-840	-364	-333	324	291	323	5

BRAKES – ON (tb-ON)



CCTV A (45,3)



CCTV B (-17,2)

RHC 8. PORT CREW CABIN SURVEY, SECTION 1
RATE – VERN (RATE MIN tb-ON)

A7U √CCTV – RMS WRIST

L10(VTR) REC pb – push, hold
PLAY pb – push, simo (red ●)

BRAKES – OFF (tb-OFF)
MODE – AUTO 2, ENTER (READY lt on)

- * If unable to enter AUTO mode (no AUTO READY lt): *
- * √Joint angles and adjust as reqd *

SM 94 PDRS CONTROL

√START PT, ITEM 17: 115

SM 169 PDRS STATUS

Monitor ACAS progress

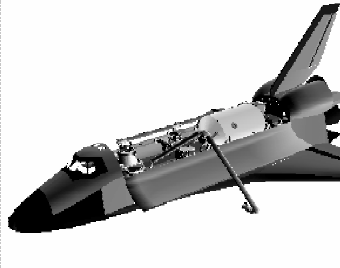
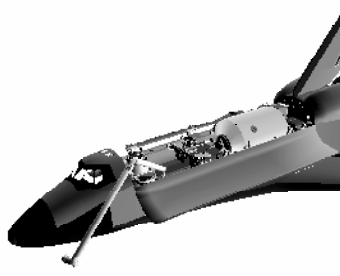
NOTE

Time between Pts 115 and 117 ~ 2:40 min

Section 1 Clearance Views	Cameras
EE-to-PLBD	A[1], B[2], ELBOW[3]
EE-to-Crew Cabin	B[2], ELBOW[3]
Lower Arm-to-Crew Cabin	A, B
[1]Lose sight of EE between Pts 116 and 117	
[2]Port MPMs block direct view of EE	
[3]ELBOW and WRIST cameras are mutually exclusive	

On MCC GO,
 AUTO SEQ – PROCEED (IN PROG It on)

ACAS, pause pts **shaded in bold**, ● col indicates data recording (black = VTR on) and damage criteria (inches):

Pt	X	Y	Z	PITCH	YAW	ROLL	●	
115P	-840	-364	-333	324	291	323		
116	-523	-296	-354	298	285	302		
117P	-298	-252	-375	241	283	237	3	

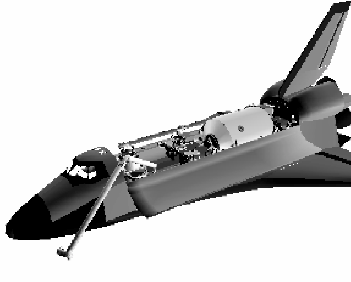
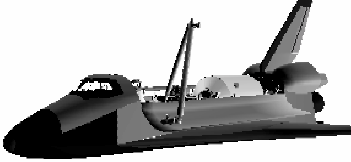
9. PORT CREW CABIN SURVEY, SECTION 2

NOTE

VTR is not stopped between sections 1 and 2.
Time between Pts 117 and 118 ~ 1:15 min

Section 2 Clearance Views	Cameras
EE-to-Crew Cabin	B[1], ELBOW[2]
Lower Arm-to-Crew Cabin	A, B
[1]Port MPMs block direct view of EE	
[2]ELBOW and WRIST cameras are mutually exclusive	

AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	●
117P	-298	-252	-375	241	283	237	
118P	-518	-252	-385	300	281	271	3 

When AUTO SEQ IN PROG It – off:
BRAKES – ON (tb-ON)

L10(VTR) STOP pb – push (no red ●)

10. ENABLE NOSE JETS

GNC 23 RCS

RCS FWD – ITEM 1 EXEC (*)
MANF VLVS OVRD 1 – ITEM 40 EXEC (OP)
2 – ITEM 41 EXEC (OP)
3 – ITEM 42 EXEC (OP)
4 – ITEM 43 EXEC (OP)

A6U DAP: as reqd

11. MNVR TO PRE-CRADLE

SM 94 PDRS CONTROL

PL ID – ITEM 3 +0 EXEC

INIT ID – ITEM 24 +0 EXEC

√	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-518	-252	-385	300	281	271	0
	SY	SP	EP	WP	WY	WR	
√	+129.1	+70.1	-118.9	-97.9	+28.4	+150.5	

RHC RATE – as reqd (VERN within 10 ft)
 BRAKES – OFF (tb-OFF)
 MODE – SINGLE, ENTER

Mnvr to PRE-CRADLE:

	SY	SP	EP	WP	WY	WR	
PORT CREW	+129.1	+70.1	-118.9	-97.9	+28.4	+150.5	
CABIN							
SURVEY End							
1: WR –						0.0	
2: WY –					0.0		
3: WP +				+5.0			
4: EP +			-25.0				
5: SY –	0.0						
6: SP –		+25.0					
PRE-CRADLE	0.0	+25.0	-25.0	+5.0	0.0	0.0	
	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-1261	-146	-551	5	2	0	0

BRAKES – ON (tb-ON)
 MODE – not DIRECT
 PARAM – PORT TEMP
 JOINT – CRIT TEMP

OBSS TILE BOARD SURVEY

NOTE

Assumed starting posn is CMG R&R Viewing

1. SETUP

If not already performed during ESP2 PRIMARY CABLE ROUTING/ESPAD

REMOVAL (EVA, EVA1):

L12U

APCU 2 CONV – OFF (tb-bp)

APCU 2 CONV – ON (tb-on)

Perform LCC ACTIVATION (LCS Cue Card, PHOTO/TV)

On SSRMS operator GO for mnvr to TILE BOARD POSN 1:

SM 94 PDRS CONTROL

PL ID – ITEM 3 +3 EXEC

INIT ID – ITEM 24 +3 EXEC

CMG R&R VIEWING posn:

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-622	-740	-1095	91	4	265	3
	SY	SP	EP	WP	WY	WR	
√	+95.0	+38.7	-22.8	-0.5	-0.3	+22.3	

A7U

CCTV – config as reqd

MON 1	A(B)
MON 2	ELBOW(RSC)

2. SJ MNVR TO TILE BOARD POSN 1

RHC

RATE – as reqd (VERN within 10 ft)

BRAKES – OFF (tb-OFF)

MODE – SINGLE, ENTER

Mnvr to TILE BOARD POSN 1:

CMG R&R
VIEWING

1: WR –

2: WP +

3: SP –

4: SY –

5: EP –

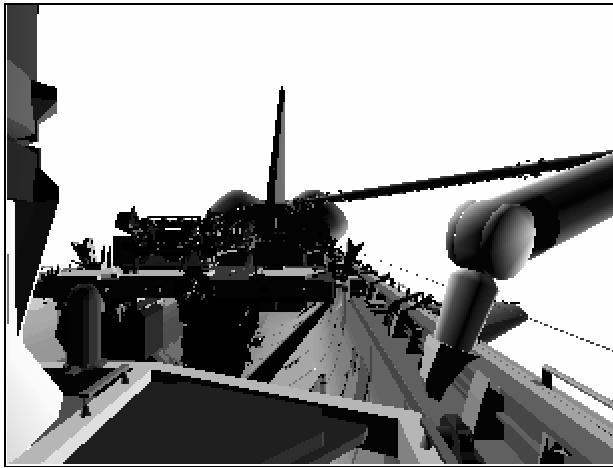
6: WY –

TILE BOARD
POSN 1

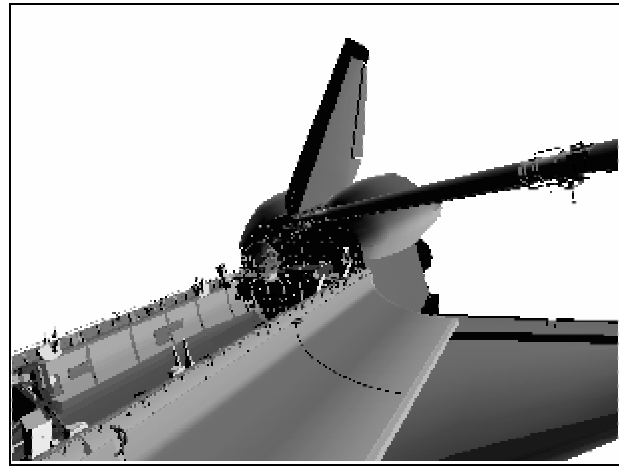
	SY	SP	EP	WP	WY	WR	
	+95.0	+38.7	-22.8	-0.5	-0.3	+22.3	
						-42.7	
				+104.4			
		+32.7					
	+56.2						
			-27.3				
					-14.6		
	+56.2	+32.7	-27.3	+104.4	-14.6	-42.7	
	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-1255	-39	-487	350	302	171	3

BRAKES – ON (tb-ON)

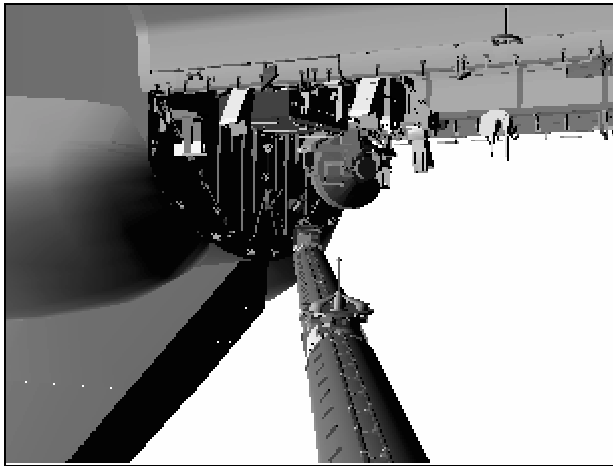
MODE – not DIRECT



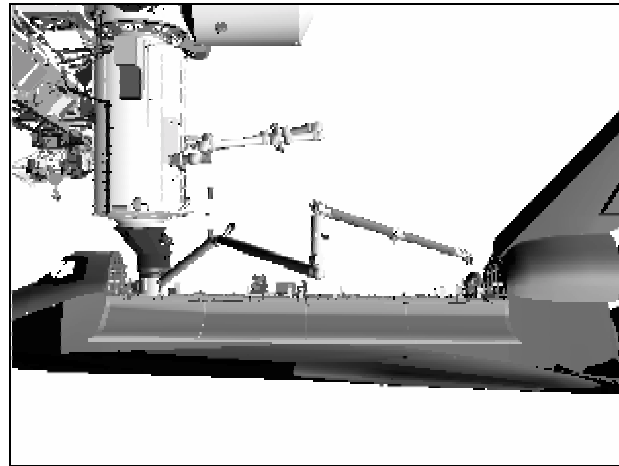
CCTV A (0,0)



ELBOW (-86,28)



RSC



PORT

3. CONFIGURE OBSS LDRI FOR TILE BOARD NORMAL SURVEY

A7U

VIDEO OUT MON2 pb – push
 IN PL2(VPU) pb – push

If PTU reset reqd:

CAMR CMD PAN/TILT – HI RATE (LO within 10°)

PAN – L (to hard stop)

TILT – UP (to hard stop)

PAN/TILT – RESET

PAN: +87

TILT: -86

VIDEO OUT MUX 1 L pb – push (MIDDECK It on)

LDRI MODE 6 pb – push (brighter flickering LDRI video)

L10(VTR)

REC pb – push, hold

PLAY pb – push, simo (red ●)

Record for 3 min

STOP pb – push (no red ●)

- A7U 4. CONFIGURE OBSS LDRI FOR TILE BOARD OFF-NORMAL SURVEY
 VIDEO OUT MON2 pb – push
 IN PL2(VPU) pb – push

√PAN: +87
 TILT: -59 (up)

- L10(VTR) REC pb – push, hold
 PLAY pb – push, simo (red ●)

5. MNVR TO TILE BOARD POSN 2

NOTE

VTR is not stopped between TILE BOARD POSN 1 and POSN 2.
 At TILE BOARD POSN 2, OBSS-to-CMG = 24 in, OBSS-to-Aft Bulkhead = 24 in

A7U CCTV – config as reqd

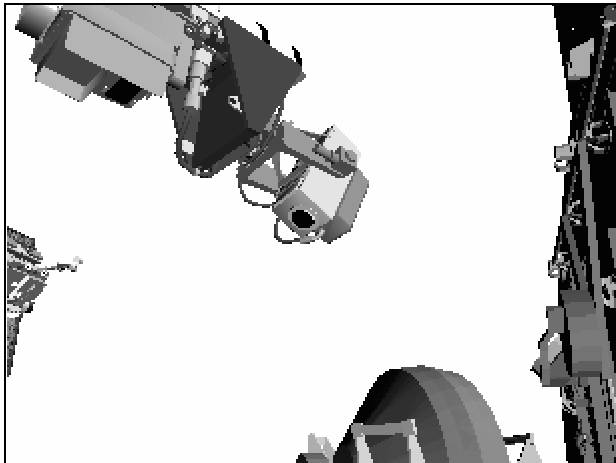
MON 1	B
MON 2	RSC

RATE – VERN (RATE MIN tb-ON)
 BRAKES – OFF (tb-OFF)
 MODE – ORB LD, ENTER

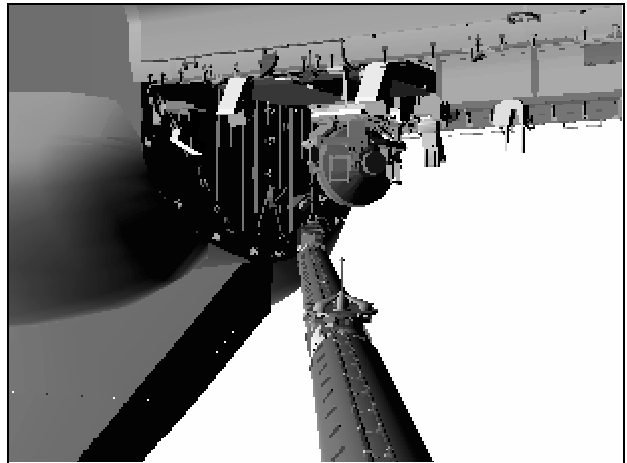
Mnvr to TILE BOARD POSN 2:

X	Y	Z	PITCH	YAW	ROLL	PL ID
-1273	-11	-487	350	302	171	3
SY	SP	EP	WP	WY	WR	
+52.8	+39.8	-41.3	+109.8	-16.3	-46.5	

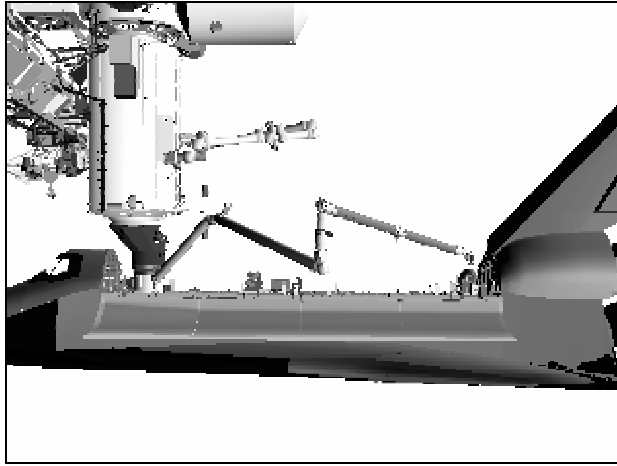
BRAKES – ON (tb-ON)
 MODE – not DIRECT



CCTV B (73,22)



RSC



PORT

6. LCS TILE BOARD SCAN

Allow arm motion to damp-out for 30 sec, then:

NOTE

LCS Detailed Area Scan time should be less than 3 min (max)

LCC/
PGSC

'Scanning' 'Detailed Area Scan'

sel – Nose Cap Scan

cmd Start Area Scan (verify Scan Line - Done)

7. CONFIGURE SENSORS FOR MNVR TO CMG R&R VIEWING

L10(VTR)

STOP pb – push (no red ●)

A7U

VIDEO OUT MUX 1 L pb – push (MIDDECK It on)

LDR1 MODE 1 pb – push (ITVC video)

√MCC to verify LCS file downlink

Perform LCC DEACTIVATION, (LCS Cue Card, PHOTO/TV), steps 1 and 2

8. SJ MNVR TO CMG R&R VIEWING POSN

SM 94 PDRS CONTROL

PL ID – ITEM 3 +2 EXEC

INIT ID – ITEM 24 +2 EXEC

A7U

CCTV – config as reqd

MON 1	A
MON 2	B

RHC

RATE – as reqd (VERN within 10 ft)

BRAKES – OFF (tb-OFF)

MODE – SINGLE, ENTER

Mnvr to CMG R&R VIEWING posn:

TILE BOARD
 POSN 2
 1: WY +
 2: EP +
 3: SY +
 4: SP -
 5: WP -
 6: WR +
 CMG R&R
 VIEWING

SY	SP	EP	WP	WY	WR	
+52.8	+39.8	-41.3	+109.8	-16.3	-46.5	
				-0.3		
		-22.8				
+95.0						
	+38.7					
			-0.5			
					+22.3	
+95.0	+38.7	-22.8	-0.5	-0.3	+22.3	
X	Y	Z	PITCH	YAW	ROLL	PL ID
-627	-726	-823	91	4	265	2

BRAKES – ON (tb-ON)
 MODE – not DIRECT
 PARAM – PORT TEMP
 JOINT – CRIT TEMP

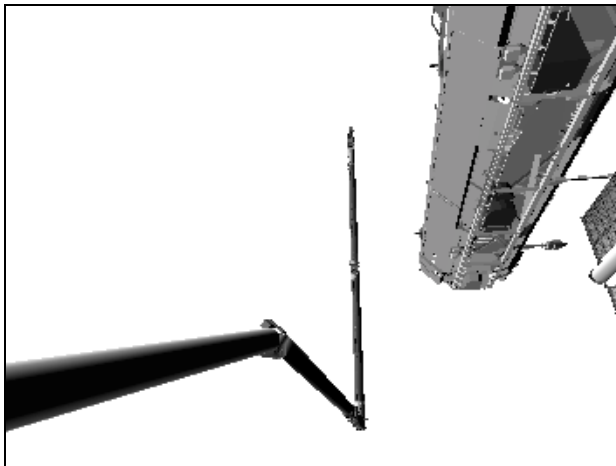
9. CONFIGURE OBSS ITVC AND LDRI FOR CMG R&R VIEWING

A7U

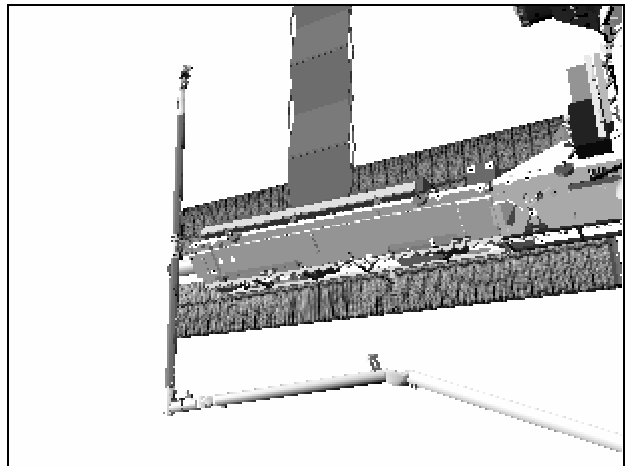
VIDEO OUT MUX 1 L pb – push (MIDDECK It on)
 LDRI MODE 2 pb – push (ITVC video)

VIDEO OUT MON2 pb – push
 IN PL2(VPU) pb – push

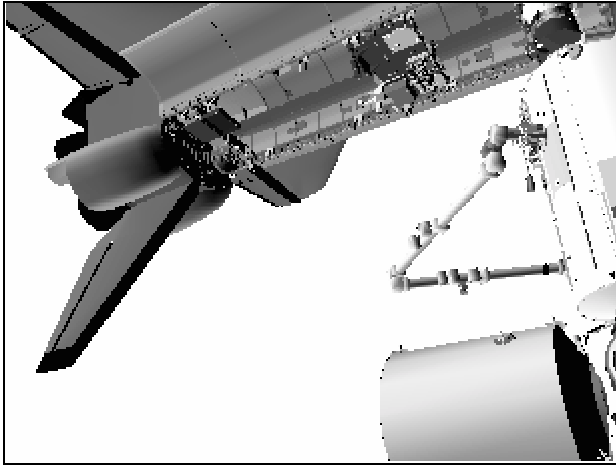
PAN: +105 (right)
 TILT: -55 (up)



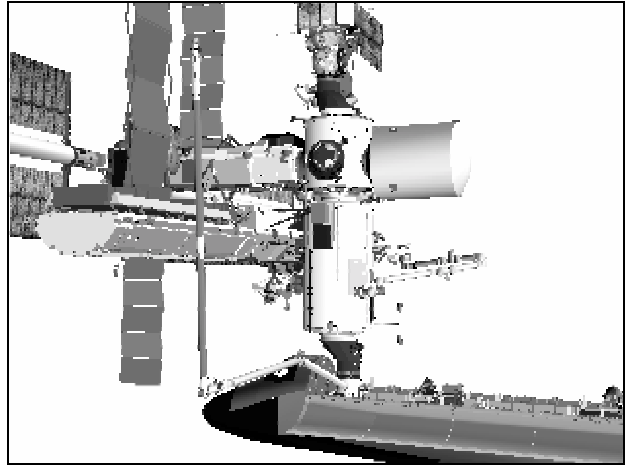
CCTV A (80,30)



CCTV B (-30,20)



OBSS ITVC (105,-55)



BIRD'S EYE

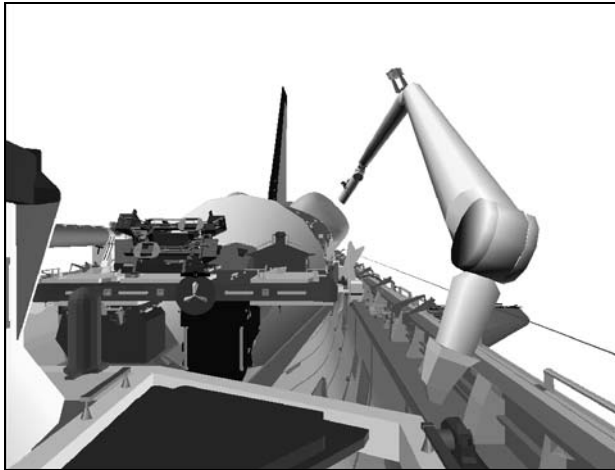
KU CLEARANCE SURVEY

1. EE CHECKOUT POSN

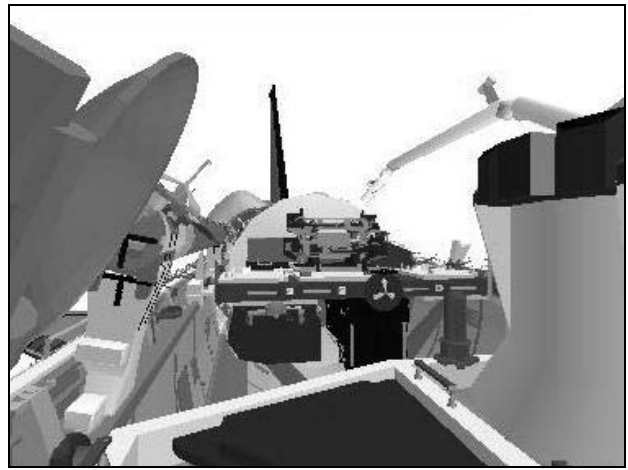
- √BRAKES – ON (tb-ON)
- √MODE – not DIRECT

Verify mnvr to EE CHECKOUT posn complete:

X	Y	Z	PITCH	YAW	ROLL	PL ID
-1233	-119	-502	317	337	355	0
SY	SP	EP	WP	WY	WR	
0	+27.6	-28.7	-45.7	-9.1	+0.2	



CCTV A (0,0)



CCTV D (10,0)

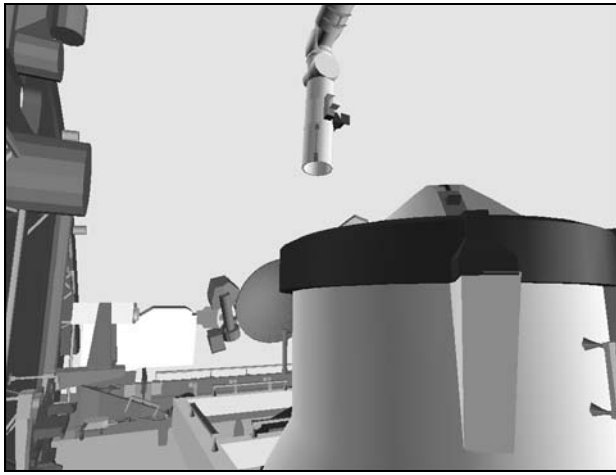
2. MODIFIED HOVER

- RATE – as reqd (VERN within 10 ft)
- BRAKES – OFF (tb-OFF)
- MODE – ORB UNL, ENTER

Mnvr to MODIFIED HOVER posn:

X	Y	Z	PITCH	YAW	ROLL	PL ID
-674	+105	-514	264	7	91	0
SY	SP	EP	WP	WY	WR	
-89.9	+79.9	-123.1	-73.3	-5.9	-160.3	

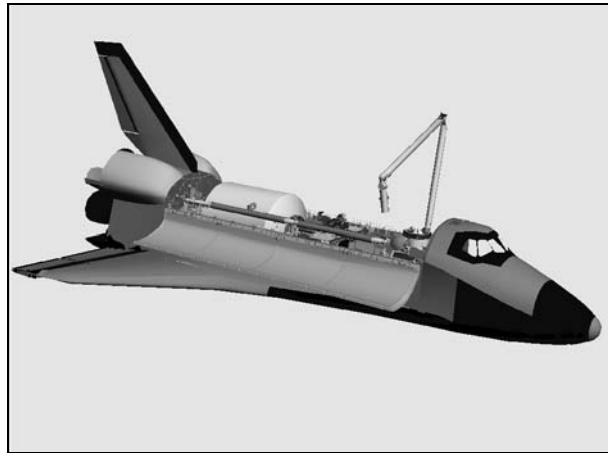
- BRAKES – ON (tb-ON)
- JOINT – CRIT TEMP



CCTV A (-65,10)



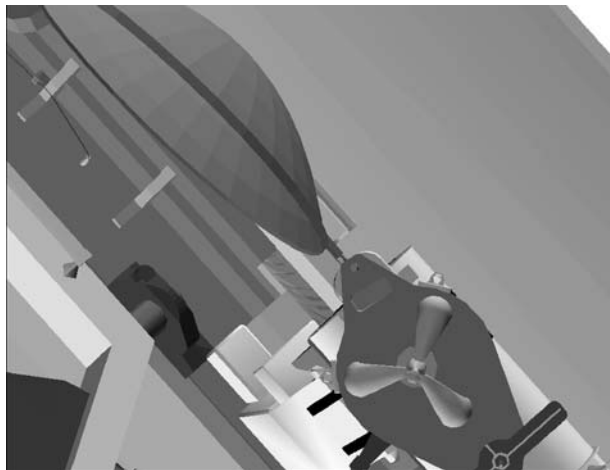
CCTV B (10,15)



BIRD'S EYE

A7U

CCTV – RMS ELBOW, PAN: -21
 TILT: -20
 ZOOM: 9.8 HFOV (full in)



ELBOW (-21,-20) HFOV: 9.8 (full in)

A7U

VIDEO OUT DTV pb – push
 IN RMS pb – push

L10(VTR)

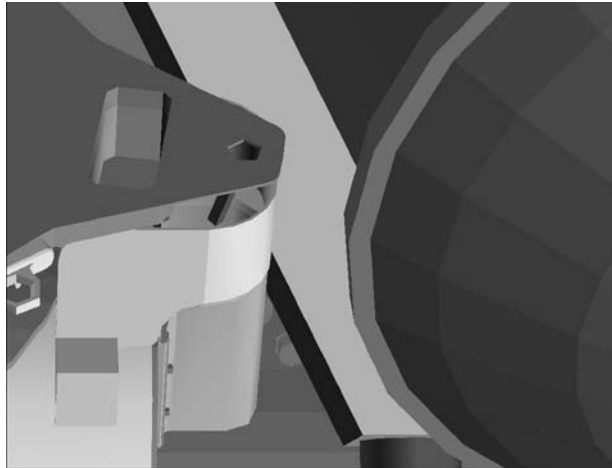
REC pb – push, hold
 PLAY pb – push, simo (red ●)

Record for 60 sec

STOP pb – push (no red ●)

A7U

CCTV – RMS WRIST, ZOOM: 9.8 HFOV



WRIST HFOV: 9.8 (full in)

A7U

√VIDEO OUT DTV pb – push

√IN RMS pb – push

L10(VTR)

REC pb – push, hold

PLAY pb – push, simo (red ●)

Record for 60 sec

STOP pb – push (no red ●)

3. PRE-CRADLE

RATE – as reqd (VERN within 10 ft)

BRAKES – OFF (tb-OFF)

MODE – ORB UNL, ENTER

Mnvr to PRE-CRADLE posn:

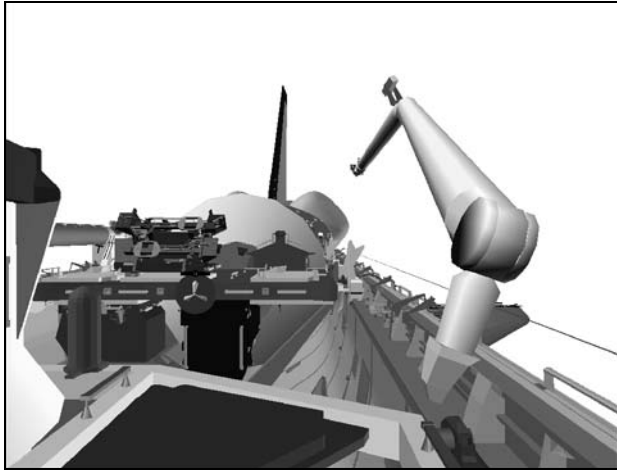
X	Y	Z	PITCH	YAW	ROLL	PL ID
-1261	-146	-551	5	2	0	0
SY	SP	EP	WP	WY	WR	
0.0	+25.0	-25.0	+5.0	0.0	0.0	

BRAKES – ON (tb-ON)

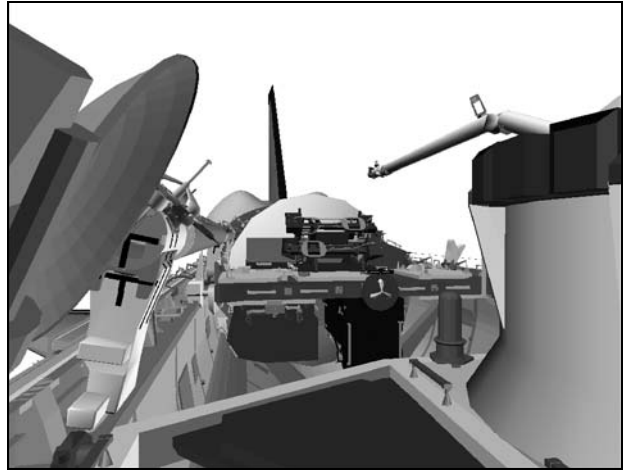
MODE – not DIRECT

PARAM – PORT TEMP

JOINT – CRIT TEMP



CCTV A (0,0)



CCTV D (10,0)

ALTERNATE SURVEYS

I

OBSS LDRI RCC SURVEY – NOSE CAP.....	FS 3-2
LCS RCC SURVEY – STBD.....	FS 3-17
– PORT	FS 3-28
EVA WLE RCC SURVEY	FS 3-48
ITVC TILE ACREAGE SURVEY	FS 3-106

ALTERNATE
SURVEYS

OBSS LDRI RCC SURVEY – NOSE CAP

WARNING
 For UNDOCKED ops only
 Port PLBD radiator must be stowed

NOTE

Assumed starting posn is end of OBSS LDRI
 RCC SURVEY – STBD. APAS docking ring
 may be extended when convenient

1. SETUP

SM 94 PDRS CONTROL

- √PL ID, ITEM 3: 3
- √INIT ID, ITEM 24: 3

2. INHIBIT NOSE JETS

- O14:F, √Pri RJDA LOGIC, DRIVER (eight) – ON
- O15:F, √Pri RJDF LOGIC, DRIVER (eight) – OFF
- O16:F

A6U DAP: A14/AUTO/ALT (Tail Only)

NOTE

Expect DAP RECONFIG message after
 FRCS manifold 5 status overridden to close

GNC 23 RCS

- RCS FWD – ITEM 1 EXEC (*)
- MANF VLVS OVRD 1 – ITEM 40 EXEC (CL)
- 2 – ITEM 41 EXEC (CL)
- 3 – ITEM 42 EXEC (CL)
- 4 – ITEM 43 EXEC (CL)
- 5 – ITEM 44 EXEC (CL)

3. MNVR TO NOSE CAP LDRI ACAS START POSN

SJ Mnvr Clearance Views	Cameras
OBSS-to-Tail	B, C

RHC RATE – as reqd
 BRAKES – OFF (tb-OFF)
 MODE – SINGLE, ENTER

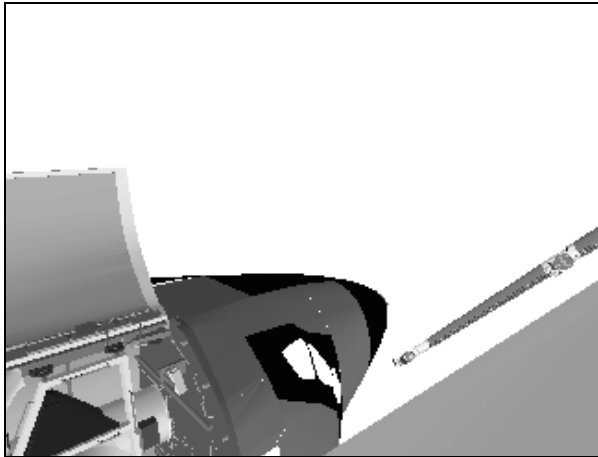
ALTERNATE SURVEYS

Mnvr to NOSE CAP LDRI ACAS START posn:

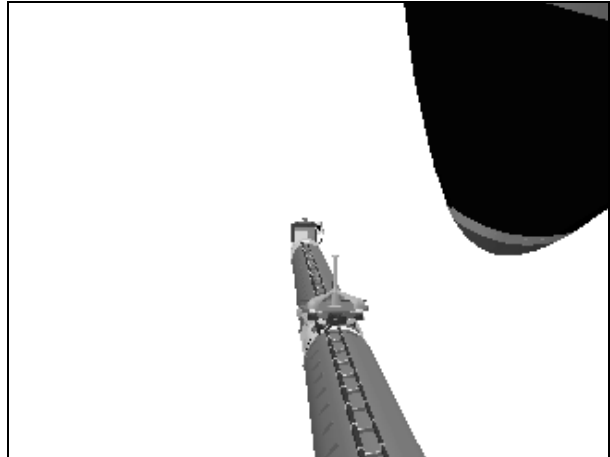
STBD LDRI
ACAS End
1: WP +
2: SP +
3: SY +
4: WY -
5: EP -
6: WR +
NOSE CAP
LDRI ACAS
START

SY	SP	EP	WP	WY	WR	
-120.8	+32.5	-23.7	-45.8	+12.8	+164.7	
			-7.7			
	+95.8					
+173.4						
				-13.2		
		-78.6				
					+175.8	
+173.4	+95.8	-78.6	-7.7	-13.2	+175.8	
X	Y	Z	PITCH	YAW	ROLL	PL ID
-195	+107	-338	248	320	331	3

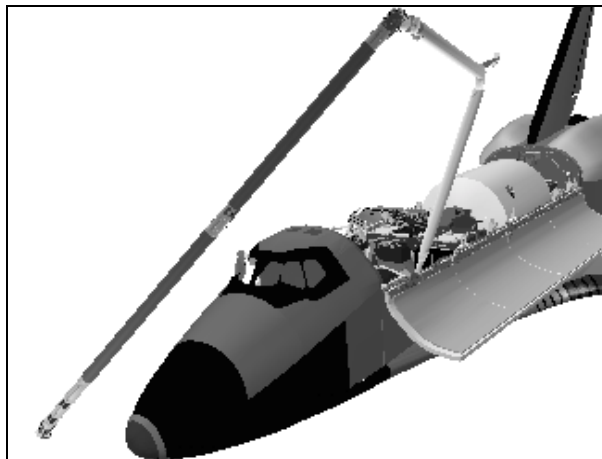
BRAKES – ON (tb-ON)



ELBOW (-60,-40)



RSC



BIRD'S EYE

A7U 4. NOSE CAP LDRI ACAS, SECTION 1

VIDEO OUT MON2 pb – push
IN PL2(VPU) pb – push

PAN: +0 (left)
TILT: -40 (up)

√VIDEO OUT MUX 1 L pb – push (MIDDECK lt on)
√LDRI MODE 6 pb – push (flickering LDRI displayed)

VIDEO OUT MON2 pb – push
IN – as desired (not PL2)

For survey scan pattern, refer to OBSS LDRI SCAN PATTERN CUE CARD – NOSE CAP

For camera views, refer to OBSS LDRI RCC SURVEY CAMERA VIEWS – NOSE CAP

SM 94 PDRS CONTROL
AUTO MODES – ITEM 13 +Z EXEC

RHC RATE – COARSE (RATE MIN tb-OFF)

BRAKES – OFF (tb-OFF)
MODE – AUTO 1, ENTER (READY lt on)

* If unable to enter AUTO mode (no AUTO READY lt): *
* √Joint angles and adjust as reqd *

SM 94 PDRS CONTROL
√START PT, ITEM 17: 119

SM 169 PDRS STATUS
Monitor ACAS progress

NOTE

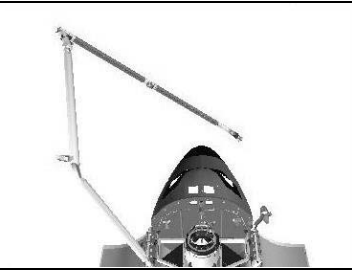
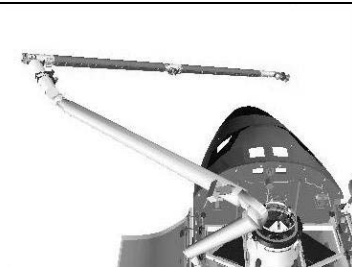
Section 1 run time ~ 2:00 min

Section 1 Clearance Views	Cameras
RMS-to-PLBD	A, ELBOW[2]
OBSS-to-Nose Cap	RSC[1], ELBOW[3]
[1]Good for all subsequent scan sections [2]Good until Z ~ -355 [3]Good after Z ~ -382	

L10(VTR) REC pb – push, hold
 PLAY pb – push, simo (red ●)

On MCC GO,
 AUTO SEQ – PROCEED (IN PROG It on)

ACAS, pause pts **shaded in bold**, ● col indicates data recording (black = VTR on) and damage criteria (inches):

Pt	X	Y	Z	PITCH	YAW	ROLL	●	
119P	-195	+107	-338	248	320	331		
120	-195	+103	-351	241	320	329	1/4	
121P	-185	+88	-386	215	320	315		

L10(VTR) When AUTO SEQ READY It – on:
 STOP pb – push (no red ●)

5. NOSE CAP LDRI ACAS, SECTION 2

NOTE

Time between Pts 121 and 124 ~ 5:15 min

Section 2 Clearance Views	Cameras
RMS-to-PLBD	A[1], ELBOW
OBSS-to-Nose Cap	ELBOW
[1]Good until Y ~ 6	

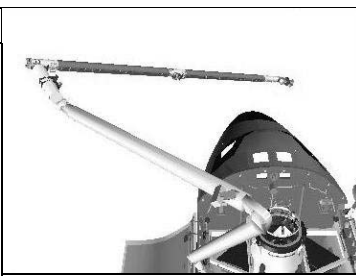
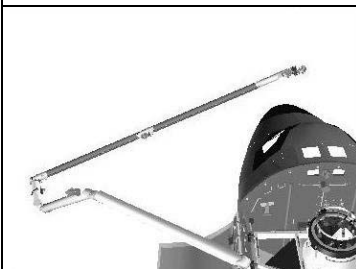
A7U

VIDEO OUT MON2 pb – push
IN PL2(VPU) pb – push

PAN: +75 (right)
TILT: -43 (down)

VIDEO IN – as desired (not PL2)

AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	●
121P	-185	+88	-386	215	320	315	
122	-176	+77	-422	188	299	289	
123	-174	+61	-437	158	293	260	
124P	-157	+50	-383	139	292	240	

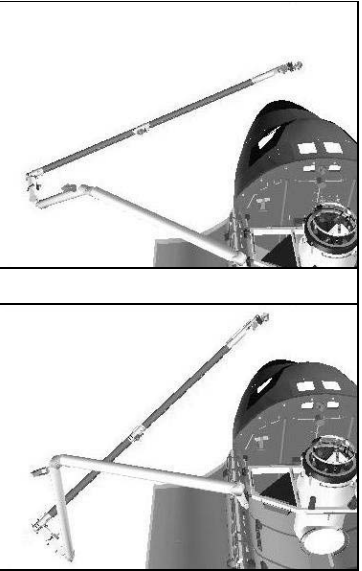
L10(VTR)

When AUTO SEQ READY It – on:
REC pb – push, hold
PLAY pb – push, simo (red ●)

NOTE

Time between Pts 124 and 126 ~ 1:35 min

AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	•
124P	-157	+50	-383	139	292	240	1/4 
125	-171	+27	-411	141	298	261	
126P	-171	-19	-417	144	314	269	

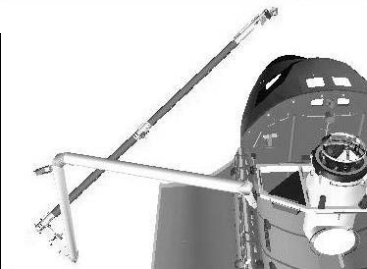
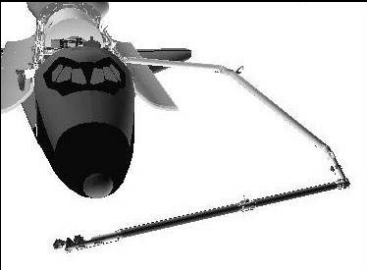
6. NOSE CAP LDRI ACAS, SECTION 3

NOTE

VTR not stopped between sections 2 and 3.
Section 3 run time ~ 4:50 min

Section 3 Clearance Views	Cameras
RMS-to-PLBD	A[1], ELBOW
OBSS-to-Nose Cap	ELBOW[2]
[1]Good after Z ~ -359	
[2]Good until Z ~ -293	

AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	•
126P	-171	-19	-417	144	314	269	
127	-164	-16	-395	147	318	263	
128	-135	+4	-337	169	306	250	
129	-159	+37	-300	233	297	309	
130P	-184	+68	-273	184	282	237	

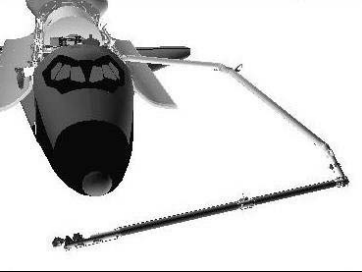
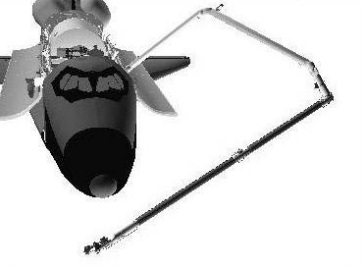
7. NOSE CAP LDRI ACAS, SECTION 4

NOTE

VTR not stopped between sections 3 and 4.
 Section 4 run time ~ 1:40 min

Section 4 Clearance Views	Cameras
RMS-to-PLBD	A, ELBOW

AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	●
130P	-184	+68	-273	184	282	237	
131P	-209	+31	-231	238	298	266	¼ 

L10(VTR)

When AUTO SEQ READY It – on:
 STOP pb – push (no red ●)

8. NOSE CAP LDRI ACAS, SECTION 5

NOTE

Time between Pts 131 and 132 ~ 1:15 min

Section 5 Clearance Views	Cameras
RMSS-to-PLBD	A, ELBOW
OBSS-to-Nose Cap	ELBOW[1][2][3][4][5]
[1]Good after Y ~ 20	[4]Good until Y ~ -56
[2]Good until Y ~ 11	[5]Good after Y ~ -21
[3]Good after Y ~ -49	

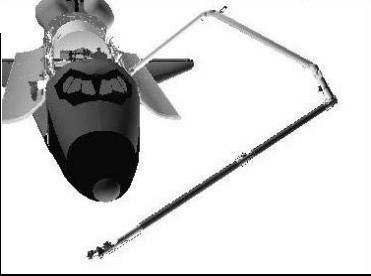
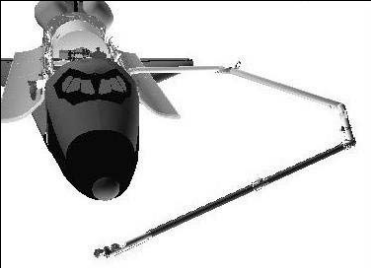
A7U

VIDEO OUT MON2 pb – push
IN PL2(VPU) pb – push

PAN: +65 (left)
TILT: -58 (down)

VIDEO IN – as desired (not PL2)

AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	●
131P	-209	+31	-231	238	298	266	
132P	-207	+18	-230	230	289	249	

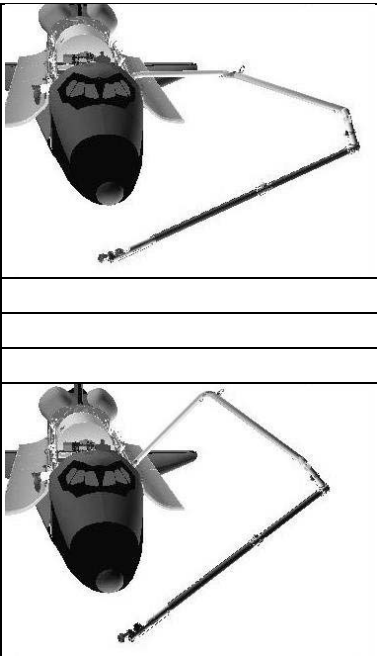
L10(VTR)

When AUTO SEQ READY It – on:
REC pb – push, hold
PLAY pb – push, simo (red ●)

NOTE

Time between Pts 132 and 136 ~ 4:30 min

AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	•
132P	-207	+18	-230	230	289	249	
133	-206	-20	-231	235	302	258	
134	-216	-59	-248	251	321	272	
135	-191	-58	-267	234	322	268	
136P	-168	-13	-270	214	303	256	

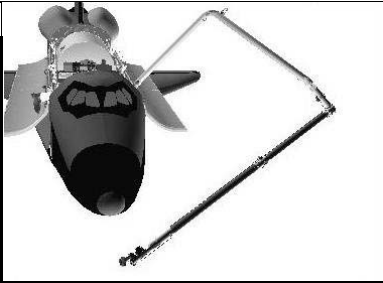
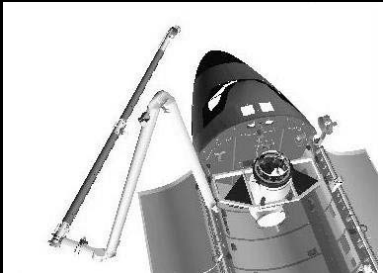
9. NOSE CAP LDRI ACAS, SECTION 6

NOTE

VTR is not stopped between sections 5 and 6.
Section 6 run time ~ 3:35 min

Section 6 Clearance Views	Cameras
RMS-to-PLBD	A, ELBOW[3]
OBSS-to-Nose Cap	ELBOW[1][2]
[1]Good until Z ~ -278	
[2]Good after Z ~ -295	
[3]Good until Z ~ -338	

AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	●
136P	-168	-13	-270	214	303	256	
137	-161	-40	-287	231	317	283	
138	-166	-60	-348	189	326	271	¼
139P	-179	-69	-380	188	333	285	

L10(VTR) When AUTO SEQ READY It – on:
STOP pb – push (no red ●)

10. NOSE CAP LDRI ACAS, SECTION 7

NOTE

Time between Pts 139 and 140 ~ 1:05 min

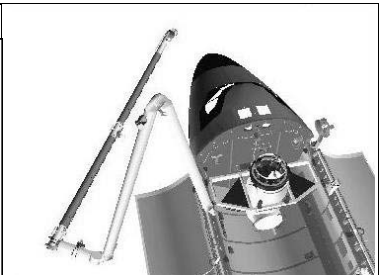
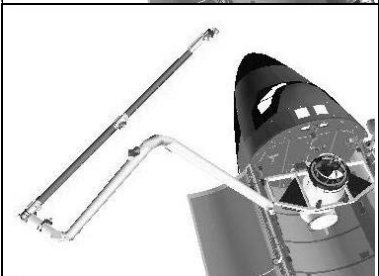
Section 7 Clearance Views	Cameras
RMS-to-PLBD	A, ELBOW
OBSS-to-Nose Cap	ELBOW

A7U VIDEO OUT MON2 pb – push
IN PL2(VPU) pb – push

√PAN: +65
TILT: -75 (down)

VIDEO IN – as desired (not PL2)

AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	●
139P	-179	-69	-380	188	333	285	
140P	-179	-70	-381	185	316	280	

L10(VTR) When AUTO SEQ READY It – on:
REC pb – push, hold
PLAY pb – push, simo (red ●)

NOTE

Time between Pts 140 and 142 ~ 1:50 min

AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	●
140P	-179	-70	-381	185	316	280	
141	-178	-80	-345	204	319	278	1/4
142P	-182	-84	-305	221	320	274	

When AUTO SEQ IN PROG It – off:
BRAKES – ON (tb-ON)

L10(VTR) STOP pb – push (no red ●)

A7U VIDEO OUT MUX 1 L pb – push (MIDDECK It on)
LDRI MODE 2 pb – push (ITVC video displayed)

VIDEO OUT MON2 pb – push
IN PL2(VPU) pb – push

11. MNVR TO NOSE JET CLEAR POSN

SM 94 PDRS CONTROL

PL ID - ITEM 3 +2 EXEC

INIT ID - ITEM 24 +2 EXEC

END POS - ITEM 18 -3 2 5 -7 4 8 -6 8 0 EXEC

ATT - ITEM 21 +8 3 +3 9 +2 0 0 EXEC

CMD CK - ITEM 25 EXEC (GOOD)

RHC RATE - COARSE (RATE MIN tb-OFF)

BRAKES - OFF (tb-OFF)

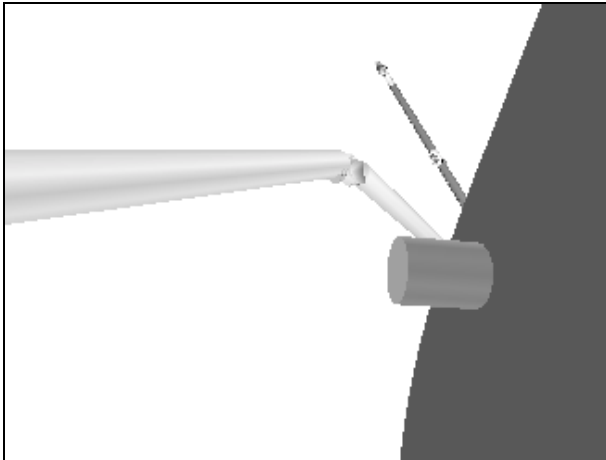
MODE - OPR CMD, ENTER (READY It on)

AUTO SEQ - PROCEED (IN PROG It on)

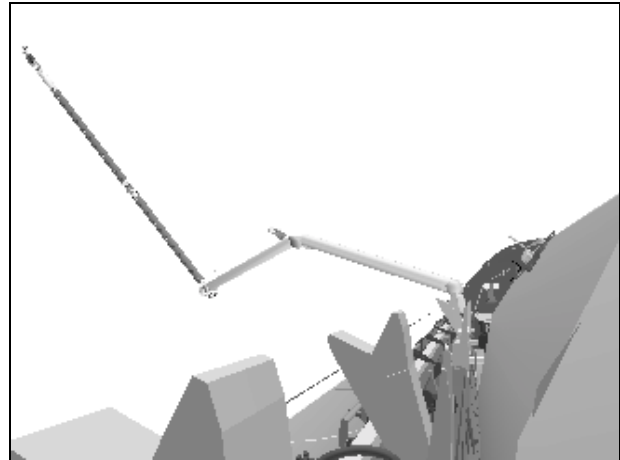
When AUTO SEQ IN PROG It - off:

BRAKES - ON (tb-ON)

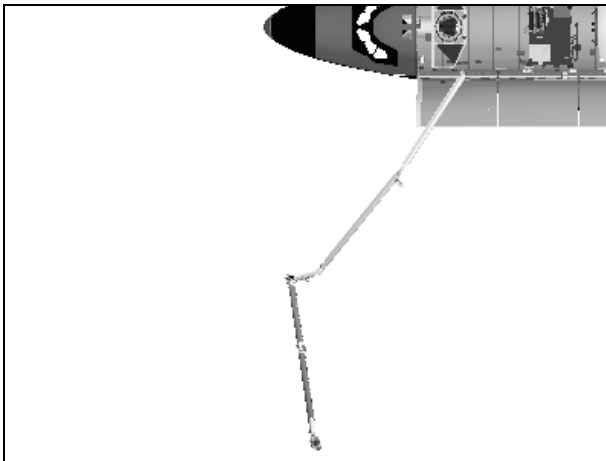
	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-325	-748	-680	83	39	200	2
	SY	SP	EP	WP	WY	WR	
√	+128.8	+30.3	-28.5	-2.0	+35.0	0.0	



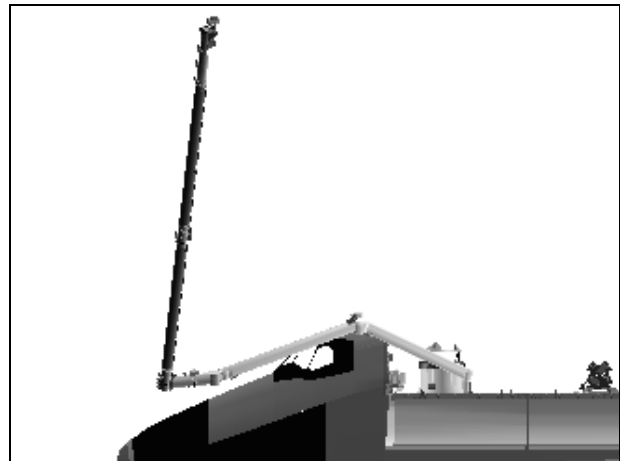
CCTV A (95,5)



CCTV B (-15,5)



OVERHEAD



PORT

12. ENABLE NOSE JETS

GNC 23 RCS

- RCS FWD – ITEM 1 EXEC (*)
- MANF VLVS OVRD 1 – ITEM 40 EXEC (OP)
- 2 – ITEM 41 EXEC (OP)
- 3 – ITEM 42 EXEC (OP)
- 4 – ITEM 43 EXEC (OP)
- 5 – ITEM 44 EXEC (OP)

A6U DAP: as reqd

O14:F, Pri RJDA LOGIC,DRIVER (eight) – OFF
 O15:F,
 O16:F RJDA 1A L2/R2 DRIVER – ON

If continuing OBSS ops with Port Wing survey >>

13. RETURN TO OBSS HOVER

RHC RATE – as reqd (VERN within 10 ft)
 BRAKES – OFF (tb-OFF)
 MODE – SINGLE, ENTER

Mnvr to OBSS HOVER posn:

	SY	SP	EP	WP	WY	WR	
NOSE JET CLEAR	+128.8	+30.3	-28.5	-2.0	+35.0	0.0	
1: WR +						+110.0	
2: SP +		+79.8					
3: SY -	-90.0						
4: WP -				-55.7			
5: WY -					0.0		
6: EP -			-123.1				
OBSS HOVER	-90.0	+79.8	-123.1	-55.7	0.0	+110.0	
	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-998	+129	-507	0	0	11	2

BRAKES – ON (tb-ON)

OBSS LCS RCC SURVEY – STBD

WARNING
 For UNDOCKED ops only
 Stbd PLBD radiator must be stowed
 APAS Docking Ring must be retracted

NOTE

Assumed starting posn end of ITVC/LDRI FLAT FIELDS. LCS
 Detailed Area Scan time should be less than 3 min (max)

1. SETUP

SM 94 PDRS CONTROL

PL ID – ITEM 3 +4 EXEC

INIT ID – ITEM 24 +4 EXEC

	X	Y	Z	PITCH	YAW	ROLL	PLID
√	-1245	+298	-508	270	66	270	4
	SY	SP	EP	WP	WY	WR	
√	-89.6	+44.5	-84.6	-45.4	0.0	+109.6	

AUTO MODES – ITEM 13 +7 +2 +3 +8 EXEC

2. MNVR TO STBD LCS ACAS START POSITION

RHC

√RATE – VERN (RATE MIN tb-ON)

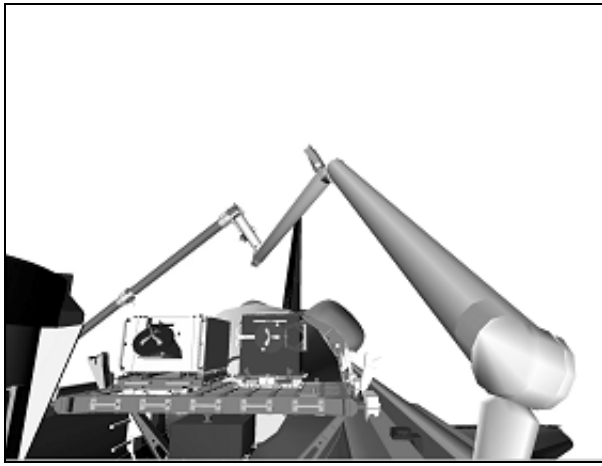
BRAKES – OFF (tb-OFF)

MODE – SINGLE, ENTER

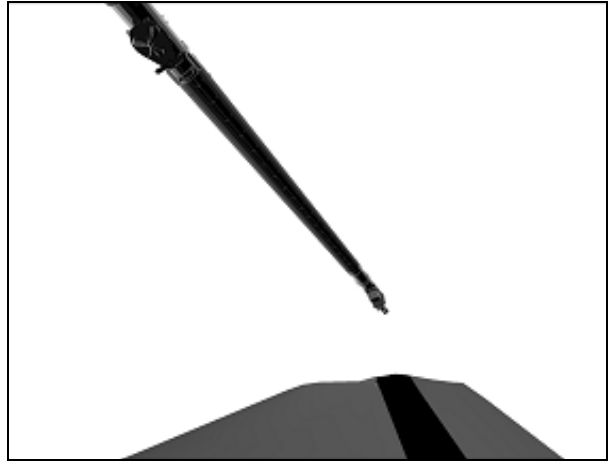
Mnvr to STBD LCS ACAS START posn

	SY	SP	EP	WP	WY	WR	
LDRI FF END	-89.6	+44.5	-84.6	-45.4	0.0	+109.6	
1: EP +			-38.3				
2: WP +				+93.4			
3: WY –					-55.0		
4: WR +						+248.6	
5: SY +	-19.8						
6: SP –		+28.0					
STBD LCS ACAS START	-19.8	+28.0	-38.3	+93.4	-55.0	+248.6	
	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-1364	+504	-374	204	347	215	4

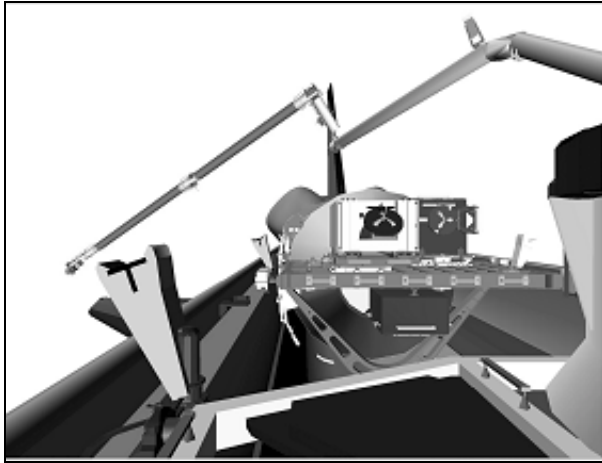
BRAKES – ON (tb-ON)



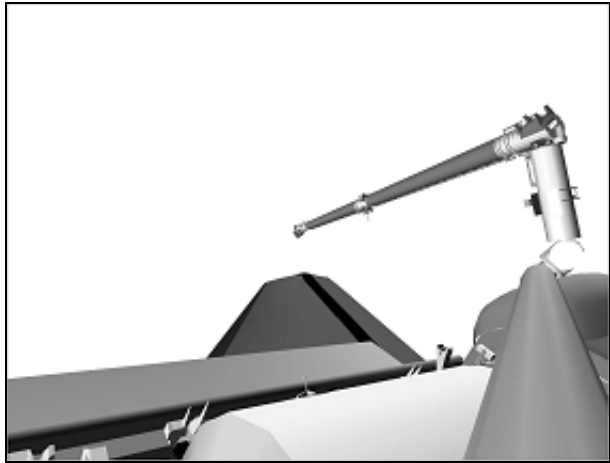
CCTV A (-5,15)



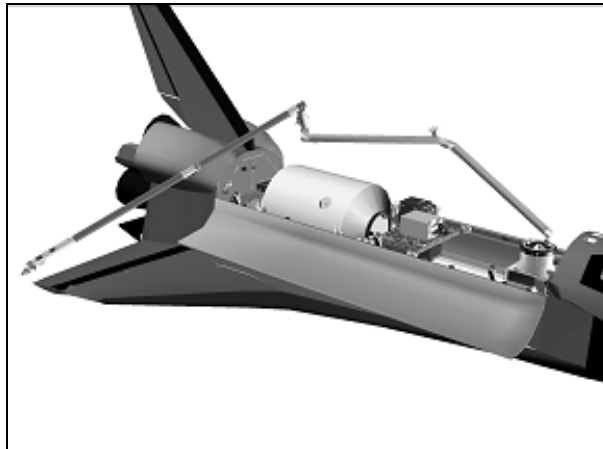
CCTV C (90,0)



CCTV D (0,0)



ELBOW (-30,0)



BIRD'S EYE

3. STBD LCS ACAS, SECTION 1

NOTE

If ACAS is paused by D&C panel switch, a Detailed Area Scan should be performed prior to continuing. Section 1 scans RCC Zones 5 & 6, Panels 22 → 9. Time between Pts 119 and 122 ~ 3:45 min

CAUTION

During LCS Detailed Area scans do not move LDRI PTU or RMS Elbow cameras

Section 1 Clearance Views	Cameras
OBSS-to-PLBD	D, ELBOW
OBSS-to-Wing	ELBOW, RSC

- * If RSC failed: *
- * To regain OBSS-to-PLBD clearance view at any time during ACAS, *
- * perform CONTINGENCY LDRI CLEARANCE VIEW (LDRI/ITVC) *
- * Cue Card, PHOTO/TV) *

RHC RATE – COARSE (RATE MIN tb-OFF)

- * If unable to enter AUTO mode (no AUTO READY It): *
- * √Joint angles and adjust as reqd *

BRAKES – OFF (tb-OFF)
MODE – AUTO 1, ENTER (READY It on)

SM 94 PDRS CONTROL
START PT, ITEM 17: 119

SM 169 PDRS STATUS
Monitor ACAS progress

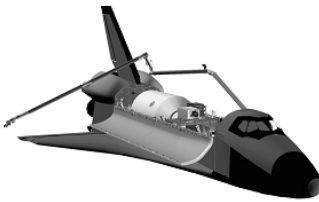

Allow arm motion to damp-out for 30 sec, then:
On MCC GO:

LCC/PGSC 'Scanning' 'Detailed Area Scan'
sel – Stbd Top 119P
cmd Start Area Scan (verify Scan Line - Done)

LCC/PGSC 'Scanning' 'Continuous Line Scan'
sel – Stbd Top 119P-122P
cmd Start Line Scan (verify scan progress on PGSC)

AUTO SEQ – PROCEED (IN PROG It on)

ACAS, pause pts **shaded in bold**, ● col indicates damage criteria (inches)

Pt	X	Y	Z	PITCH	YAW	ROLL	●	
119P	-1364	+504	-374	204	347	215		
120	-1277	+477	-371	202	352	214		
121	-1231	+438	-374	200	357	214	1	
122P	-1072	+301	-356	198	6	229		

LCC/PGSC When AUTO SEQ IN PROG It – off:
cmd Stop Scan



Allow arm motion to damp-out for 30 sec, then:
'Scanning' 'Detailed Area Scan'
sel – Stbd Top 122P
cmd Start Area Scan (verify Scan Line - Done)

'Scanning' 'Continuous Line Scan'
sel – Stbd Top 122P-124P
cmd Start Line Scan (verify scan progress on PGSC)

NOTE

Section 1 scan of RCC Zones 5 & 6 continues for Panels 9 → 1.
Time between Pts 122 and 124 ~ 2:30 min

AUTO SEQ – PROCEED (IN PROG It on)

122P	-1072	+301	-356	198	6	229		
123	-1036	+291	-367	198	8	230	1	
124P	-842	+281	-370	196	17	235		

LCC/PGSC When AUTO SEQ IN PROG It – off:
cmd Stop Scan



4. STBD LCS ACAS, SECTION 2

NOTE

Between Pts 124 and 126, arm is repositioned for scan of RCC zones 4-5. Section 2 then scans Panels 1 → 4.
Time between Pts 124 and 126 ~ 2:30 min

Section 2 Clearance Views	Cameras
OBSS-to-PLBD	C, D
OBSS-to-Wing	C, D, RSC

AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	•
124P	-842	+281	-370	196	17	235	
125	-844	+291	-339	192	20	245	
126P	-853	+285	-308	183	25	261	

RHC When AUTO SEQ IN PROG It – off:
RATE – VERN (RATE MIN tb-ON)

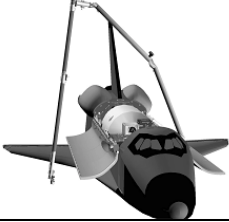

LCC/PGSC Allow arm motion to damp-out for 30 sec, then:
'Scanning' 'Detailed Area Scan'
sel – Stbd Upper 126P
cmd Start Area Scan (verify Scan Line - Done)

NOTE

Time between Pts 126 and 127 ~ 3:40 min

LCC/PGSC 'Scanning' 'Continuous Line Scan'
sel – Stbd Upper 126P-127P
cmd Start Line Scan (verify scan progress on PGSC)

AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	●	
126P	-853	+285	-308	183	25	261		
127P	-951	+287	-293	205	26	262	1/4	

LCC/PGSC When AUTO SEQ IN PROG It – off:
cmd Stop Scan

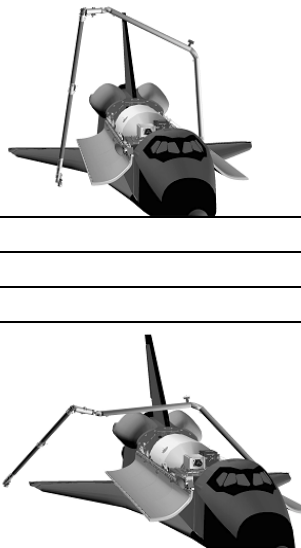
Allow arm motion to damp-out for 30 sec, then:
'Scanning' 'Detailed Area Scan'
sel – Stbd Upper 127P
cmd Start Area Scan (verify Scan Line - Done)

NOTE

Section 2 scan of RCC Zones 4 & 5 continues for Panels 4 → 22.
Time between Pts 127 and 131~ 15:00 min

LCC/PGSC 'Scanning' 'Continuous Line Scan'
sel – Stbd Upper 127P-131P
cmd Start Line Scan (verify scan progress on PGSC)

AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	●
127P	-951	+287	-293	205	26	262	
128	-1044	+310	-301	225	30	244	
129	-1190	+454	-310	228	31	240	
130	-1237	+495	-319	231	21	238	
131P	-1354	+536	-321	237	356	252	

LCC/PGSC When AUTO SEQ IN PROG It – off:
cmd Stop Scan

5. STBD LCS ACAS, SECTION 3

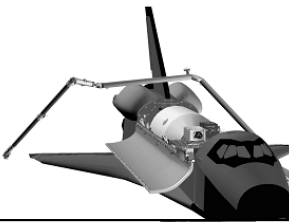
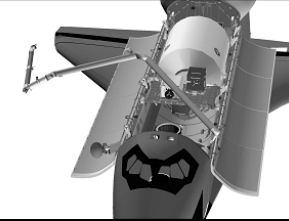
NOTE

Between Pts 131 and 132, arm adjusts for scan of Zones 2-4.
 Section 3 then scans Zones 2-4, Panels 22 → 1. Time between
 Pts 131 and 132 ~ 2:00 min

Section 3 Clearance Views	Cameras
OBSS-to-PLBD	RSC
SRMS-to-Crew Cabin	A, ELBOW

RHC RATE – COARSE (RATE MIN tb-OFF)

AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	•
131P	-1354	+536	-321	237	356	252	
132P	-1353	+529	-267	261	29	253	

RHC When AUTO SEQ IN PROG It – off:
 RATE – VERN (RATE MIN tb-ON)

LCC/PGSC Allow arm motion to damp-out for 30 sec, then:
 'Scanning' 'Continuous Line Scan'
 sel – Stbd Lower 132P-136P
cmd Start Line Scan (verify scan progress on PGSC)

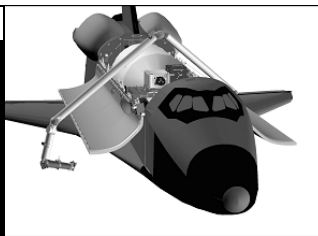
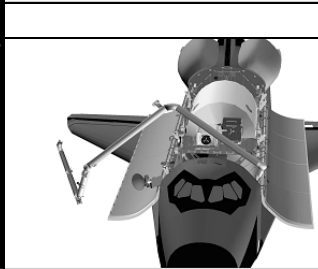
LCC/PGSC Allow arm motion to damp-out for 30 sec, then:
 'Scanning' 'Detailed Area Scan'
 sel – Stbd Bottom 138P
 cmd Start Area Scan (verify Scan Line - Done)

'Scanning' 'Continuous Line Scan'
 sel – Stbd Bottom 138P-140P
 cmd Start Line Scan (verify scan progress on PGSC)

NOTE

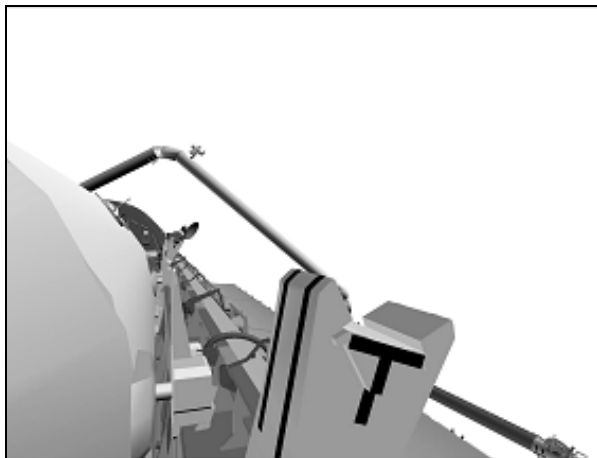
Time between Pts 138 and 140 ~ 12:00 min

AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	•
138P	-1025	+210	-217	215	70	310	
139	-1263	+445	-233	281	67	244	¼ 
140P	-1361	+487	-236	308	67	223	

LCC/PGSC When AUTO SEQ IN PROG It – off:
 cmd Stop Scan

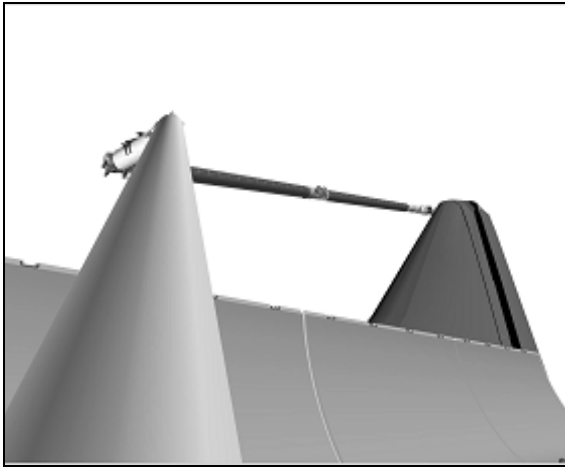
BRAKES – ON (tb-ON)



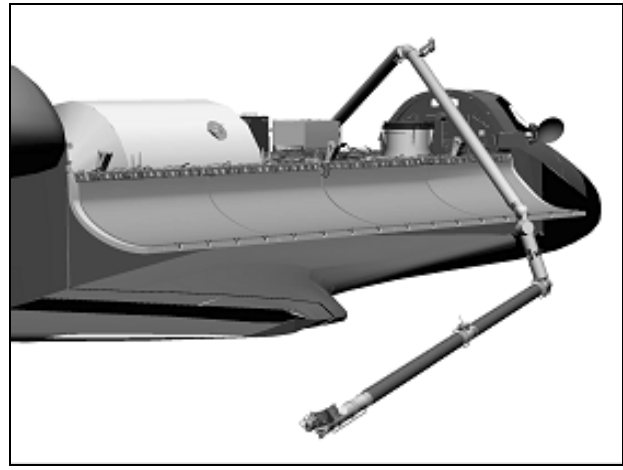
CCTV C (20,0)



CCTV D (-30,0)



ELBOW (15,-20)



BIRD'S EYE

RHC

7. CLEAN UP

- RATE – as reqd (VERN within 10 ft)
- BRAKES – OFF (tb-OFF)
- MODE – SINGLE, ENTER

If continuing OBSS ops with LCS Nose Cap survey:

Mnvr to LDRI STBD ACAS End:

	SY	SP	EP	WP	WY	WR	
LCS STBD ACAS End	-67.0	+6.8	-65.5	-38.8	-8.8	+72.6	
1: WR –						+50.0	[1]
2: SP +		+32.5					
3: SY –	-120.8						
4: WP –				-45.8			
5: WY +					+12.8		
6: EP +			-23.7				
7: WR +						+164.7	[2,3]
LDRI STBD ACAS End	-120.8	+32.5	-23.7	-45.8	+12.8	+164.7	
	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-853	+285	-383	232	21	271	4

- [1]Wing leaves RSC FOV at WR ~ +58
- [2]Wing enters RSC FOV at WR ~ +132
- [3]PLBD enters RSC FOV at WR ~ +137

If returning immediately to OBSS Hover:

Mnvr to OBSS HOVER:

	SY	SP	EP	WP	WY	WR	
LCS STBD ACAS End	-67.0	+6.8	-65.5	-38.8	-8.8	+72.6	
1: WR –						+50.0	
2: SP +		+79.8					
3: SY –	-90.0						
4: WP –				-55.7			
5: WY +					0.0		
6: EP –			-123.1				
7: WR +						+110.0	
OBSS HOVER	-90.0	+79.8	-123.1	-55.7	0.0	+110.0	
	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-1243	+126	-515	270	80	270	4

BRAKES – ON (tb-ON)

OBSS LCS RCC SURVEY – PORT

WARNING
Port PLBD radiator must be stowed

NOTE

Assumed starting posn is end of LCS Nose Cap survey. LCS Detailed Area Scan time should be less than 3 min (max)

1. SETUP

SM 94 PDRS CONTROL

√ PL ID – ITEM 3: 2

√ INIT ID – ITEM 24: 2

RHC

2. MNVR TO PORT LCS ACAS START POSN

RATE – as reqd (VERN within 10 ft)

BRAKES – OFF (tb-OFF)

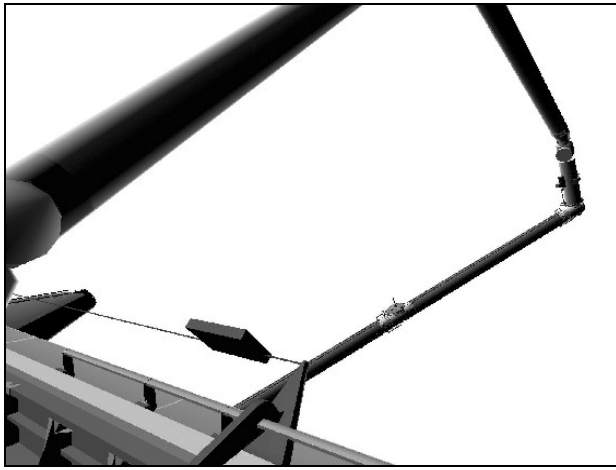
MODE – SINGLE, ENTER

	X	Y	Z	PITCH	YAW	ROLL	PLID
√	-325	-748	-680	83	39	200	2
	SY	SP	EP	WP	WY	WR	
√	+128.8	+30.3	-28.5	-2.0	+35.0	0.0	

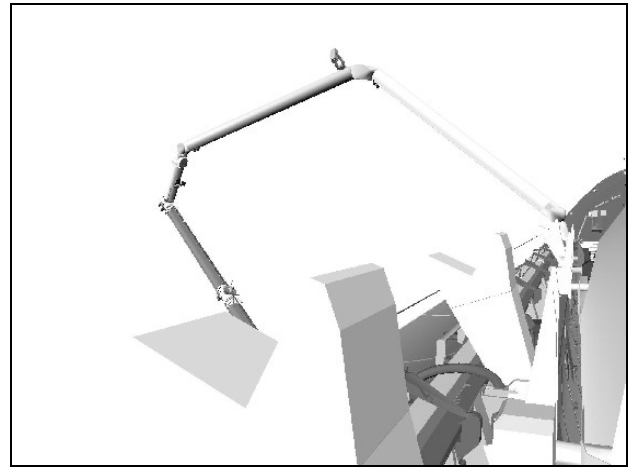
Mnvr to PORT LCS ACAS START posn:

	SY	SP	EP	WP	WY	WR	
LCS NOSE JET CLEAR	+128.8	+30.3	-28.5	-2.0	+35.0	0.0	
1: SY –	+99.0						
2: SP +		+58.9					
3: WY –					+1.5		
4: WR –						-133.1	
5: EP –			-54.8				
6: WP –				-49.1			
PORT LCS ACAS START	+99.0	+58.9	-54.8	-49.1	+1.5	-133.1	
	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-778	-374	-326	322	314	323	2

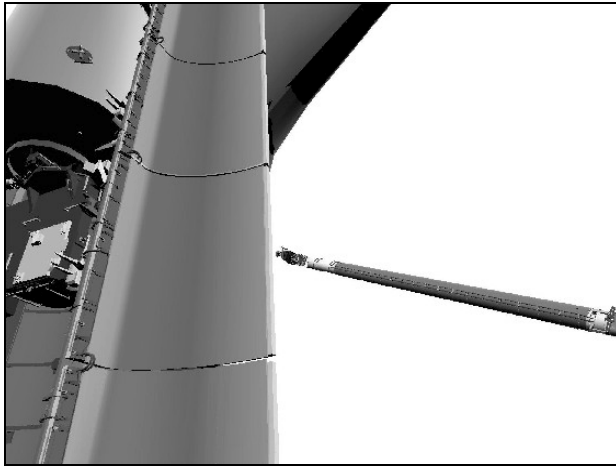
BRAKES – ON (tb-ON)



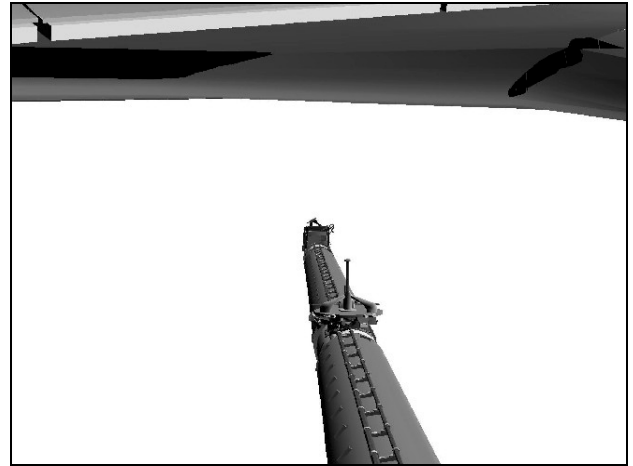
CCTV A (56,-2)



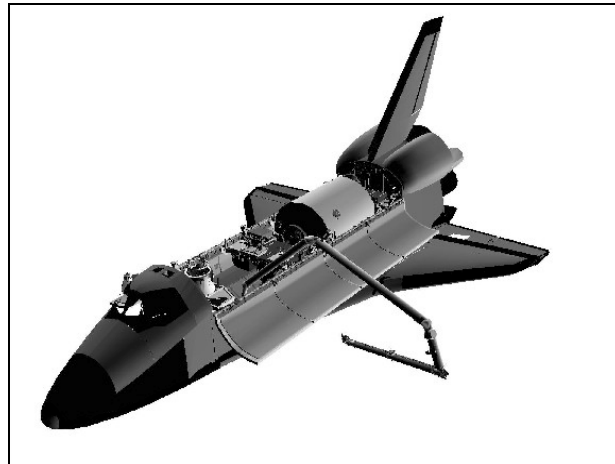
CCTV B (-23,-2)



ELBOW (-96,-12)



RSC



BIRD'S EYE

3. PORT LCS ACAS, SECTION 1

SM 94 PDRS CONTROL

PL ID – ITEM 3 +4 EXEC
 INIT ID – ITEM 24 +4 EXEC

√	X	Y	Z	PITCH	YAW	ROLL	PLID
	-913	-193	-231	9	33	150	4
√	SY	SP	EP	WP	WY	WR	
	+99.0	+58.9	-54.8	-49.1	+1.5	-131.1	

RHC

√RATE – VERN (RATE MIN tb-ON)

- * If unable to enter AUTO mode (no AUTO READY lt): *
- * √Joint angles and adjust as reqd *

BRAKES – OFF (tb-OFF)

MODE – AUTO 4, ENTER (READY lt on)

SM 94 PDRS CONTROL

√START PT, ITEM 17: 141

SM 169 PDRS STATUS

Monitor ACAS progress

NOTE

Section 1 scans RCC Zones 1-3, Panels 1 → 22.
 Time between Pts 141 and 149 ~ 17:00 min

Port LCS Clearance Views	Cameras
RMS Upper Arm to PLBD	A, B
OBSS-to-PLBD	ELBOW
OBSS-to-Wing	ELBOW, RSC

On MCC GO:

Allow arm motion to damp-out for 30 sec, then:

LCC/PGSC


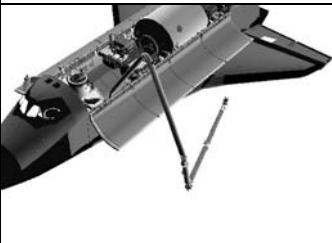
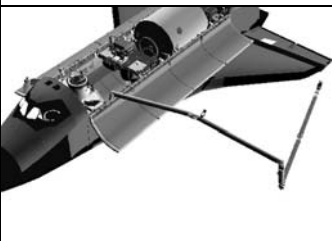
'Scanning' 'Continuous Line Scan'

sel – Port Bottom 141P-149P

cmd Start Line Scan (verify scan progress on PGSC)

AUTO SEQ – PROCEED (IN PROG It on)

ACAS, pause pts **shaded in bold**, ● col indicates data recording

Pt	X	Y	Z	PITCH	YAW	ROLL	●
141P	-913	-193	-231	9	33	150	
142	-998	-206	-224	9	33	154	
143	-1034	-224	-224	15	41	149	
144	-1051	-229	-223	18	53	147	
145	-1084	-255	-224	29	61	138	
146	-1172	-344	-229	31	67	136	
147	-1260	-420	-233	29	72	148	
148	-1294	-447	-235	29	72	148	
149P	-1363	-471	-237	29	72	147	

LCC/PGSC When AUTO SEQ READY It – on:
cmd Stop Scan

4. PORT LCS ACAS, SECTION 2



NOTE

Between points 149 and 151, arm adjusts to survey RCC zones 2-4. Section 2 then scans panels 22 → 20. Time between Pts 149 and 151 ~ 2:10 min

Port LCS Clearance Views	Cameras
RMS Upper Arm-to-PLBD	A, B
OBSS-to-PLBD	ELBOW
OBSS-to-Wing	ELBOW, RSC

RHC RATE – COARSE (RATE MIN tb-OFF)

AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	•
149P	-1363	-471	-237	29	72	147	
150	-1365	-520	-236	105	80	70	
151P	-1348	-512	-256	104	42	70	

RHC When AUTO SEQ READY It – on:
RATE – VERN (RATE MIN tb-ON)

LCC/PGSC Allow arm motion to damp-out for 30 sec, then:
'Scanning' 'Continuous Line Scan'
sel – Port Lower 151P-153P
cmd Start Line Scan (verify scan progress on PGSC)

5. PORT LCS ACAS, SECTION 3


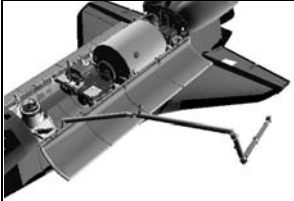
NOTE

Between points 153 and 154, arm repositions to continue scanning RCC zones 2-4. Section 3 then scans panels 20 → 1. Time between Pts 153 and 154 ~ 3:40 min

Port LCS Clearance Views	Cameras
RMS Upper Arm-to-PLBD	A, B
OBSS-to-PLBD	ELBOW
OBSS-to-Wing	ELBOW, RSC

RHC RATE – COARSE (RATE MIN tb-OFF)

AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	•
153P	-1261	-476	-252	104	42	70	
154P	-1271	-482	-255	41	47	114	

RHC When AUTO SEQ READY It – on:
RATE – VERN (RATE MIN tb-ON)

LCC/PGSC Allow arm motion to damp-out for 30 sec, then:
'Scanning' 'Continuous Line Scan'
sel – Port Lower 154P-164P
cmd Start Line Scan (verify scan progress on PGSC)

6. PORT LCS ACAS, SECTION 4



NOTE

Between points 164 and 166 arm adjusts to scan RCC zones 3-5. Section 4 then scans panels 1 → 20. Time between Pts 164 and 166 ~ 2:20 min

Port LCS Clearance Views	Cameras
RMS Upper Arm-to-PLBD	A, B
OBSS-to-PLBD	ELBOW
OBSS-to-Wing	ELBOW, RSC

RHC RATE – COARSE (RATE MIN tb-OFF)

AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	•
164P	-900	-216	-245	5	24	133	
165	-900	-258	-245	5	10	106	
166P	-900	-258	-273	5	10	106	

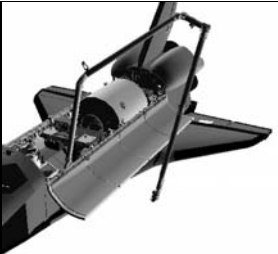
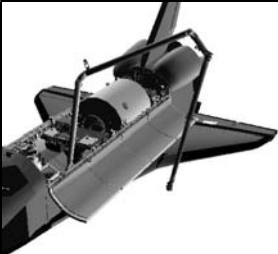
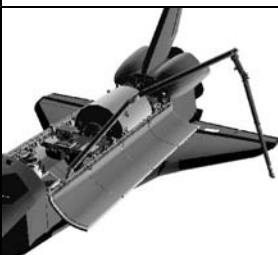
RHC When AUTO SEQ READY It – on:
RATE – VERN (RATE MIN tb-ON)

LCC/PGSC Allow arm motion to damp-out for 30 sec, then:
'Scanning' 'Continuous Line Scan'
sel – Port Upper 166P-172P
cmd Start Line Scan (verify scan progress on PGSC)

NOTE

Time between Pts 166 and 172 ~ 12:40 min

AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	•
166P	-900	-258	-273	5	10	106	
167	-932	-258	-273	5	10	106	
168	-960	-260	-273	9	15	106	
169	-989	-256	-268	9	37	113	
170	-1037	-287	-270	13	41	109	
171	-1129	-376	-272	31	52	96	
172P	-1249	-492	-273	41	51	89	

PGSC When AUTO SEQ READY It – on:
 cmd Stop Scan

7. PORT LCS ACAS, SECTION 5


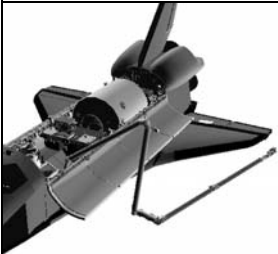
NOTE

Between points 172 and 174, arm adjusts to scan wing tip
 RCC zones 3-5. Section 5 then scans panels 20 → 22.
 Time between Pts 172 and 174 ~ 4:10 min

Port LCS Clearance Views	Cameras
RMS Upper Arm-to-PLBD	A, B
RMS Lower Arm-to-PLBD	A, ELBOW
OBSS-to-PLBD	ELBOW
OBSS-to-Wing	ELBOW, RSC

RHC RATE – COARSE (RATE MIN tb-OFF)

AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	•
172P	-1249	-492	-273	41	51	89	
173	-1259	-525	-307	90	0	74	
174P	-1259	-505	-307	90	0	74	

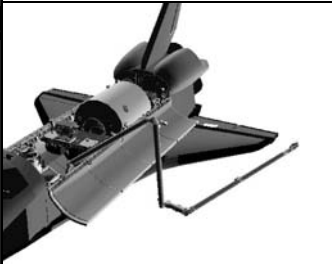
RHC When AUTO SEQ READY It – on:
 RATE – VERN (RATE MIN tb-ON)

LCC/PGSC Allow arm motion to damp-out for 30 sec, then:
 'Scanning' 'Continuous Line Scan'
 sel – Port Upper 174P-175P
 cmd Start Line Scan (verify scan progress on PGSC)

NOTE

Time between Pts 174 and 175 ~ 2:55 min

AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	•
174P	-1259	-505	-307	90	0	74	
175P	-1350	-534	-310	90	0	74	

LCC/PGSC When AUTO SEQ READY It – on:
 cmd Stop Scan

8. PORT LCS ACAS, SECTION 6



NOTE

Between points 175 and 177, arm adjusts to scan RCC zones 5 and 6. Section 6 then scans panels 22 → 16.
Time between Pts 175 and 177 ~ 2:10 min

Port LCS Clearance Views	Cameras
RMS Upper Arm-to-PLBD	A, B
OBSS-to-PLBD	ELBOW
OBSS-to-Wing	ELBOW, RSC

RHC RATE – COARSE (RATE MIN tb-OFF)

AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	•
175P	-1350	-534	-310	90	0	74	
176	-1368	-534	-374	108	305	106	
177P	-1368	-500	-374	108	305	106	

When AUTO SEQ READY It – on:

Allow arm motion to damp-out for 30 sec, then:

LCC/PGSC

'Scanning' 'Continuous Line Scan'



sel – Port Top 177P-180P

cmd Start Line Scan (verify scan progress on PGSC)

NOTE

Time between Pts 177 and 180 ~ 5:20 min

AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	●	
177P	-1368	-500	-374	108	305	106		
178	-1284	-481	-375	108	305	106		
179	-1230	-409	-378	138	300	135	1	
180P	-1218	-396	-380	138	300	135		

LCC/PGSC When AUTO SEQ READY It – on:
 cmd Stop Scan

9. PORT LCS ACAS, SECTION 7



NOTE

Between points 180 and 181, the LCS scans RCC panels 16 → 11. The LCS then takes a full area scan of panels 10 and 11. Time between Pts 180 and 181 ~ 1:20 min

Port LCS Clearance Views	Cameras
RMS Upper Arm-to-PLBD	A, B
OBSS-to-PLBD	ELBOW
OBSS-to-Wing	A, B, RSC

LCC/PGSC Allow arm motion to damp-out for 30 sec, then:
 'Scanning' 'Continuous Line Scan'
 sel – Port Top 180P-181P
cmd Start Line Scan (verify scan progress on PGSC)

AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	●	
180P	-1218	-396	-380	138	300	135		
181P	-1098	-327	-413	144	309	131	1	

LCC/PGSC When AUTO SEQ READY It – on:
cmd Stop Scan

Allow arm motion to damp-out for 30 sec, then:
 'Scanning' 'Detailed Area Scan'
 sel – Port Top 181P
cmd Start Area Scan (verify Scan Line - Done)



10. PORT LCS ACAS, SECTION 8

NOTE

Section 8 mnvrs arm for next area scan. At Pt 182 LCS performs area scan of RCC panels 8 and 9. Time between Pts 181 and 182 ~ 0:40 sec

Port LCS Clearance Views	Cameras
RMS Upper Arm-to-PLBD	A, B
OBSS-to-PLBD	ELBOW
OBSS-to-Wing	A, B, RSC

AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	•
181P	-1098	-327	-413	144	309	131	
182P	-1070	-318	-405	128	320	117	

When AUTO SEQ READY It – on:

Allow arm motion to damp-out for 30 sec, then:

LCC/PGSC

'Scanning' 'Detailed Area Scan'

sel – Port Top 182P

cmd Start Area Scan (verify Scan Line - Done)



11. PORT LCS ACAS, SECTION 9

NOTE

Section 9 mnvrs arm for next area scan. At Pt 183
 LCS performs area scan of RCC panels 6 and 7.
 Time between Pts 182 and 183 ~ 0:35 sec

Port LCS Clearance Views	Cameras
RMS Upper Arm-to-PLBD	A, B
OBSS-to-PLBD	ELBOW
OBSS-to-Wing	B, RSC

AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	•
182P	-1070	-318	-405	128	320	117	
183P	-1036	-309	-404	129	323	112	

When AUTO SEQ READY It – on:

Allow arm motion to damp-out for 30 sec, then:

LCC/PGSC

'Scanning' 'Detailed Area Scan'

sel – Port Top 183P

cmd Start Area Scan (verify Scan Line - Done)



12. PORT LCS ACAS, SECTION 10

NOTE

Section 10 mnvrs arm for next area scan. At Pt 185
 LCS performs area scan of RCC panels 4 and 5.
 Time between Pts 183 and 185 ~ 4:30 min

Port LCS Clearance Views	Cameras
RMS Upper Arm-to-PLBD	A, B
RMS WP joint-to-Crew Cabin	ELBOW, B
OBSS-to-PLBD	ELBOW
OBSS-to-Wing	ELBOW, RSC

AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	•
183P	-1036	-309	-404	129	323	112	
184	-1050	-442	-518	126	324	113	
185P	-1009	-326	-325	92	353	87	

When AUTO SEQ READY It – on:

Allow arm motion to damp-out for 30 sec, then:

LCC/PGSC

'Scanning' 'Detailed Area Scan'

sel – Port Top 185P

cmd Start Area Scan (verify Scan Line - Done)



13. PORT LCS ACAS, SECTION 11

NOTE

Section 11 mnvrs arm for next area scan. At Pt 186 WP approaches reach limit and LCS performs area scan of RCC panels 1-3. Time between Pts 185 and 186 ~ 1:30 min

Port LCS Clearance Views	Cameras
RMS Upper Arm-to-PLBD	A, B
RMS WP joint-to-Crew Cabin	ELBOW, B
OBSS-to-PLBD	ELBOW
OBSS-to-Wing	ELBOW, RSC

AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	•
185P	-1009	-326	-325	92	353	87	
186P	-967	-285	-340	77	340	92	

When AUTO SEQ READY It – on:

Allow arm motion to damp-out for 30 sec, then:

LCC/PGSC

'Scanning' 'Detailed Area Scan'

sel – Port Top 186P

cmd Start Area Scan (verify Scan Line - Done)

BRAKES – ON (tb-ON)

14. MNVR TO OBSS HOVER POSN

SM 94 PDRS CONTROL

PL ID – ITEM 3 +2 EXEC

INIT ID – ITEM 24 +2 EXEC

	X	Y	Z	PITCH	YAW	ROLL	PLID
√	-730	-302	-399	346	358	250	2
	SY	SP	EP	WP	WY	WR	
√	+153.4	+70.1	-115.6	+113.4	-48.2	-25.8	

RHC

RATE – as reqd (VERN within 10 ft)

BRAKES – OFF (tb-OFF)

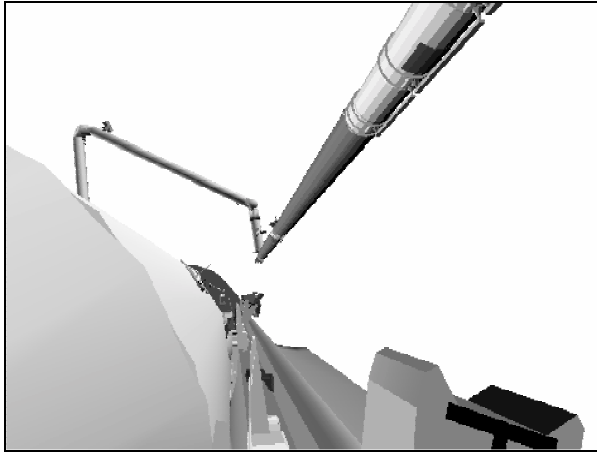
MODE – SINGLE, ENTER

Mnvr to OBSS HOVER posn:

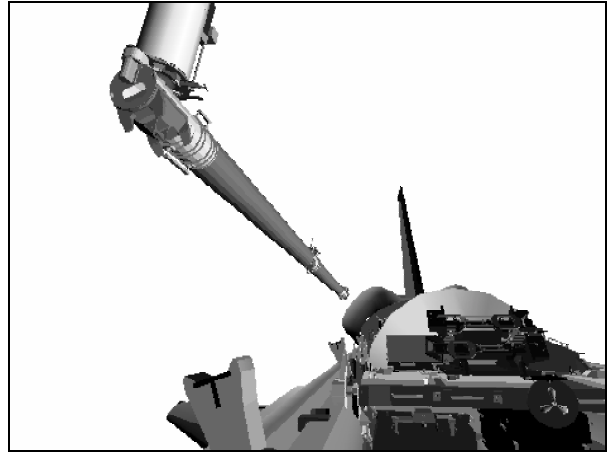
	SY	SP	EP	WP	WY	WR	
PORT End	+153.4	+70.1	-115.6	+113.4	-48.2	-25.8	
1: WY +					0.0		
2: WP -				0.0			
3: EP +			-60.0				
4: SP +		+79.8					
5: SY -	-90.0						
6: WR +						+110.0	
7: WP -				-55.7			
8: EP -			-123.1				
OBSS HOVER	-90.0	+79.8	-123.1	-55.7	0.0	+110.0	
	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-998	+129	-507	0	0	11	2

BRAKES – ON (tb-ON)
 √MODE – not DIRECT
 JOINT – CRIT TEMP

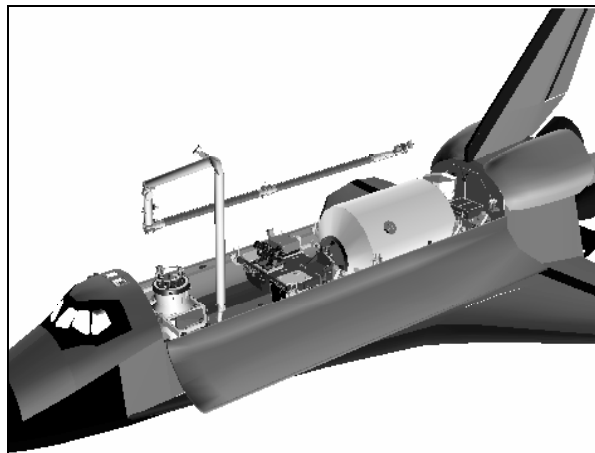
OBSS HOVER posn:



CCTV C (10,10)



CCTV D (-10,15)



BIRD'S EYE

OBSS EVA WLE RCC SURVEY

NOTE

This procedure uses SRMS to mnvr EV crew on OBSS to survey the orbiter WLE RCC panels during the docked timeframe. ISS Cameras required for visual cues

1. SETUP

SM 94 PDRS CONTROL

PL ID - ITEM 3 +5 EXEC

INIT ID - ITEM 24 +5 EXEC

Ingress Clearance Views	Cameras
OBSS-to-PLBD	Tip Elbow, Elbow, C
RMS-to-Lab	C, A

Verify SSRMS in posn per 1.412 MNVR TO SURVEY SUPPORT VIEWING POSN

■ For all OCAS mnvrs, if motion no longer apparent and POR within
 ■ 1 in/1 deg but IN PROG It - on:
 ■ AUTO SEQ - STOP

a. Mnvr to Tether Posn
 To be uplinked realtime

b. Tether Posn

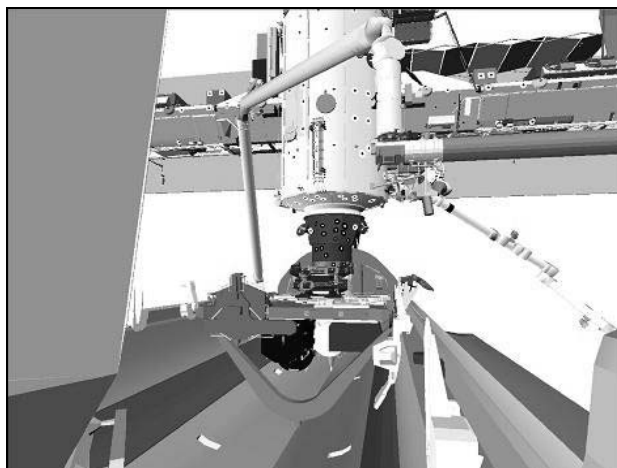
NOTE

At tether posn, OBSS-to-PLBD = 87.7 in, Upper
 Arm-to-PMA GF = 58.4 in

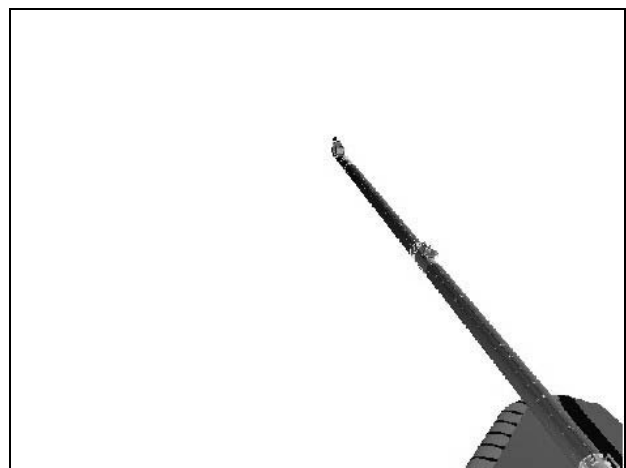
Verify in TETHER posn:

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-1118	+364	-455	238	0	324	5
	SY	SP	EP	WP	WY	WR	
√	-32.7	+48.9	-72.0	-68.9	+21.7	-38.7	

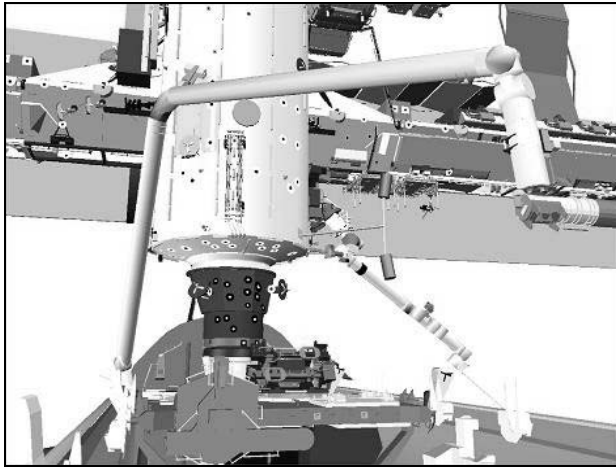
Give EV GO to perform Tether Ops, GCA if reqd



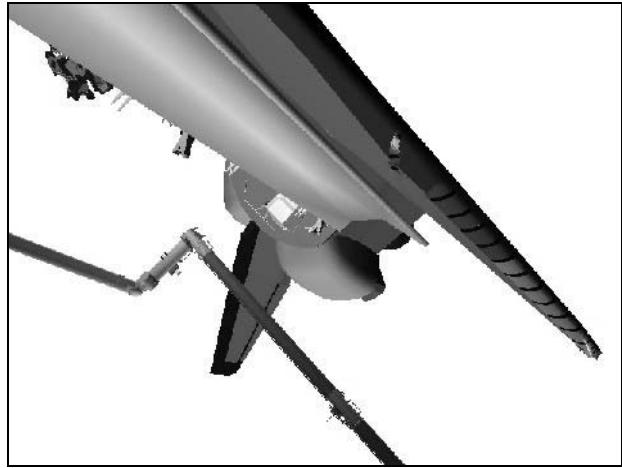
CCTV C (-10,5)



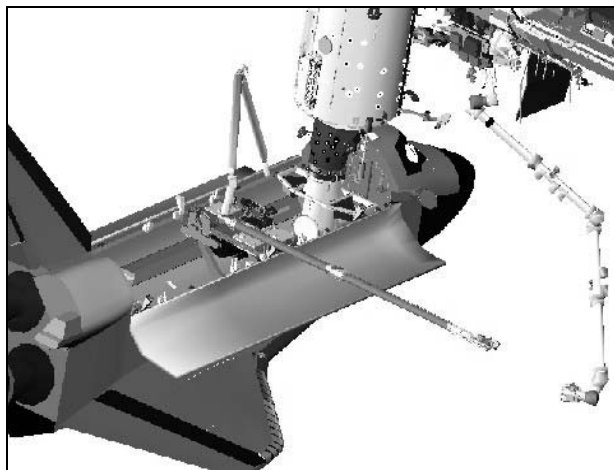
ELBOW (-35,5)



CCTV B (15,12)



TIP ELBOW (-80,-10)



BIRD'S EYE

RHC

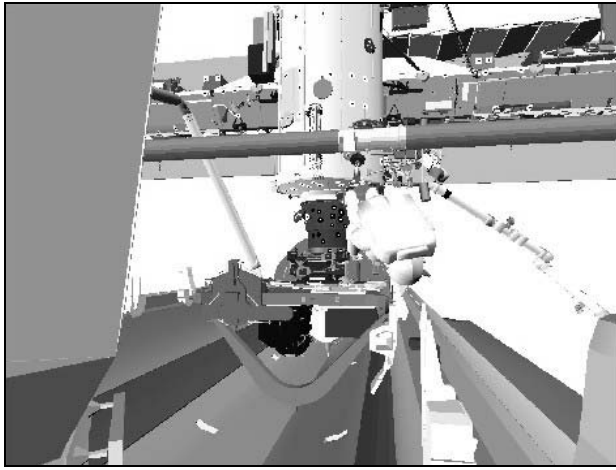
- c. APFR Config at Mid Striker Bar
- RATE – VERN (RATE MIN tb-ON)
- BRAKES – OFF (tb-OFF)
- MODE – ORB LD, ENTER

Mnvr OBSS Port (-Y) to EV1 Ingress posn, Y = +111

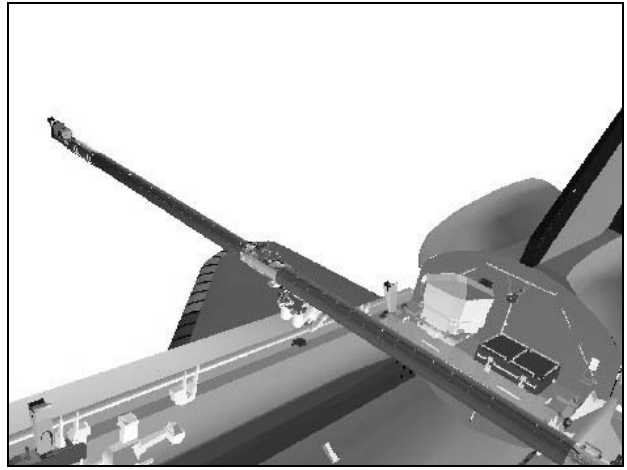
X	Y	Z	PITCH	YAW	ROLL	PL ID
-1118	+111	-455	238	0	324	5
SY	SP	EP	WP	WY	WR	
+1.3	+71.1	-86.8	-63.3	+19.0	-74.9	

BRAKES – ON (tb-ON)

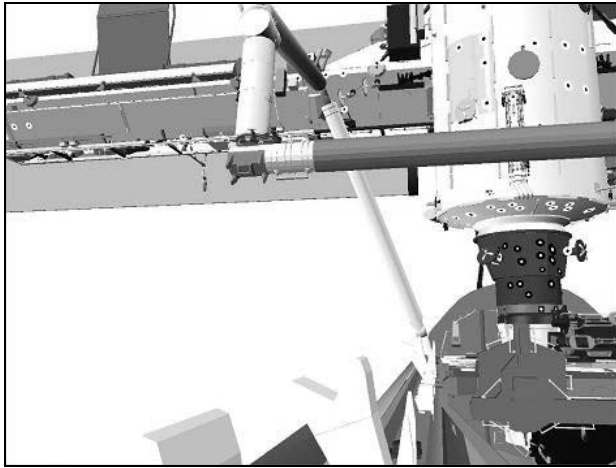
Give EV GO to Install PAD, WIF Adapter, APFR (9, HH, E, 6), and Ingress GCA if reqd



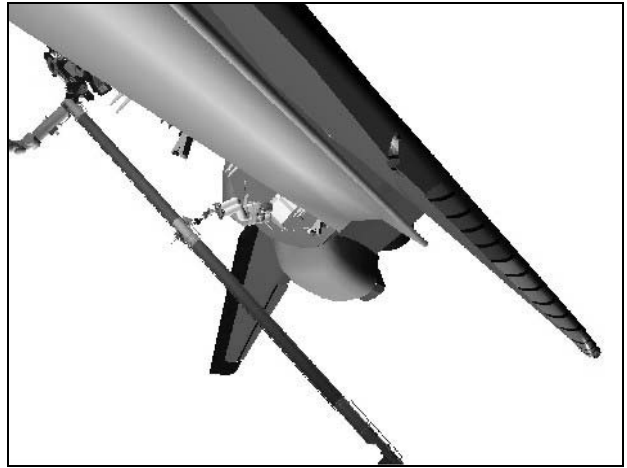
CCTV C (-10,4)



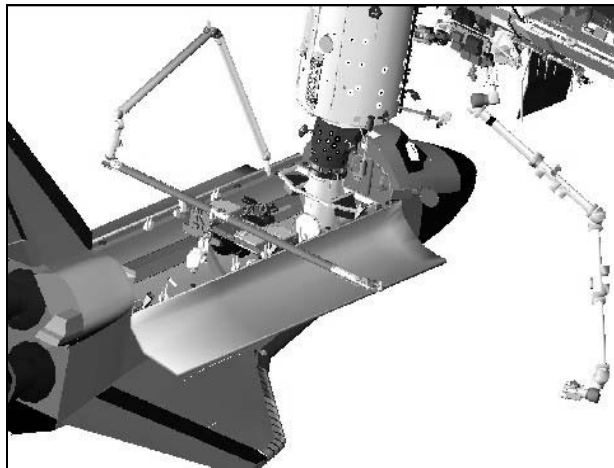
ELBOW (-35,5)



CCTV B (-12,9)



TIP ELBOW (-80,-10)



BIRD'S EYE

2. STBD T-SEALS 5-8
 a. Mnvr to Tether Posn

NOTE

Mnvr back to TETHER posn to prepare for SJ mnvr to APEX 5-8 SHOOT POSN. At end of mnvr OBSS-to-PLBD = 87.7 in, Upper Arm-to-PMA GF = 58.4 in

BRAKES – OFF (tb-OFF)
 MODE – ORB LD, ENTER

Mnvr OBSS Stbd (+Y) to TETHER posn, Y = +364

X	Y	Z	PITCH	YAW	ROLL	PL ID
-1118	+364	-455	238	0	324	5
SY	SP	EP	WP	WY	WR	
-32.7	+48.9	-72.0	-68.9	+21.7	-38.7	

b. Mnvr to Apex 5-8 Shoot Posn

APEX Clearance Views	Cameras
OBSS-to-PLBD	Lab, Tip Elbow
RMS-to-Lab/PMA and UHF Ant	Elbow

NOTE

At end of mnvr OBSS-to-PLBD = 36.7 in, Upper Arm-to-PMA GF = 24.7 in, Lower Arm-to-UHF Antenna = 39.9 in

A6U

√DAP: VERN(FREE)

MODE – SINGLE, ENTER

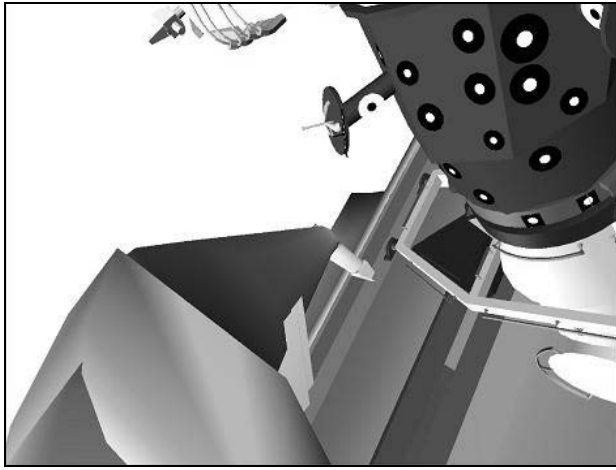
Mnvr to APEX 5-8 SHOOT posn:

TETHER POSN	SY	SP	EP	WP	WY	WR	
	-32.7	+48.9	-72.0	-68.9	+21.7	-38.7	
1: SY –	-57.0						
2: EP +			-46.0				
3: SP –		+18.5					
4: SY –	-64.4						
5: WP +				-17.0			
6: WR –						-90.0	
7: WP +				+20.7			
8: WR –						-191.3	
9: WY +					+83.1		[1]
SHOOT 5-8	-64.4	+18.5	-46.0	+20.7	+83.1	-191.3	
	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-986	+271	-255	14	56	203	5

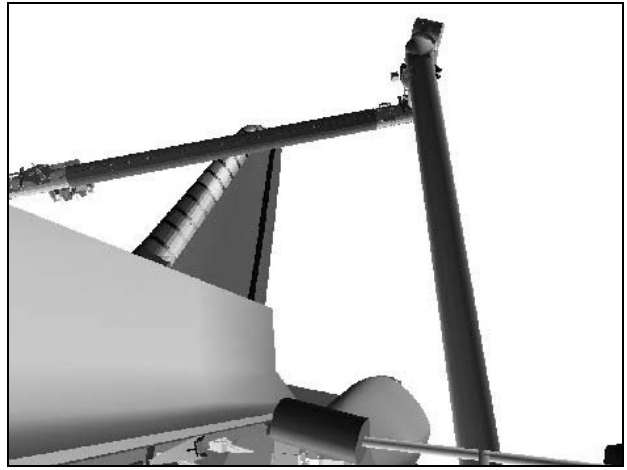
[1] Expect SINGULAR It

BRAKES – ON (tb-ON)

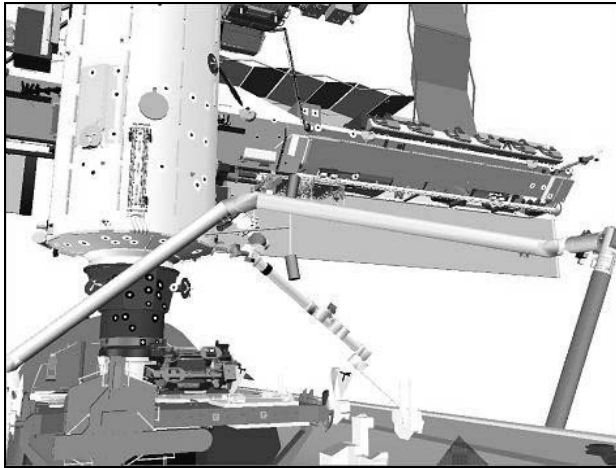
Give EV GO to SHOOT APEX of STBD T-Seals 5, 6, 7, and 8 – two shots each



ELBOW (-148,-32)



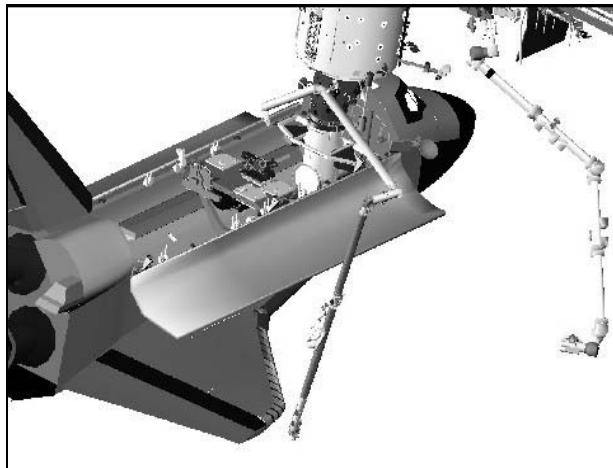
LAB (-14,-8)



CCTV B (24,12)



TIP ELBOW (-80,-10)



BIRD'S EYE

3. STBD T-SEALS 9 & 10
 - a. Mnvr to APEX 5-8 Pre-Posn

NOTE

At end of mnvr OBSS-to-PLBD = 68.1 in,
Upper Arm-to-PMA GF = 31.4 in

RHC

√RATE – VERN (RATE MIN tb-ON)
BRAKES – OFF (tb-OFF)
MODE – SINGLE, ENTER

Mnvr to PRE STBD T-SEAL 5-8 posn:

SHOOT 5-8
1: WR +
2: WY -
3: SY +
PRE 5-8

SY	SP	EP	WP	WY	WR	
-64.4	+18.5	-46.0	+20.7	+83.1	-191.3	
					-170.0	
				+72.5		
-60.0						
-60.0	+18.5	-46.0	+20.7	+72.5	-170.0	
X	Y	Z	PITCH	YAW	ROLL	PL ID
-1053	+369	-256	349	53	240	5

DAP: as reqd

b. Mnvr to Apex 9 & 10 Pre-Posn

NOTE

At end of mnvr APFR on OBSS-to-PLBD = 64.7 in,
Upper Arm-to-PMA GF = 30.5 in

SM 94 PDRS CONTROL

END POS – ITEM 18 -1 0 5 7 +3 3 6 -3 1 2 EXEC
ATT – ITEM 21 +3 4 4 +5 4 +2 4 8 EXEC
CMD CK – ITEM 25 EXEC (GOOD)

MODE – OPR CMD, ENTER (READY lt on)

AUTO SEQ – PROCEED (IN PROG lt on)

When AUTO SEQ IN PROG lt – off,

√	X	Y	Z	PITCH	YAW	ROLL	PLID
	-1057	+336	-312	344	54	248	5
√	SY	SP	EP	WP	WY	WR	
	-58.4	+33.8	-60.8	+21.4	+72.4	-166.8	

c. Mnvr to Apex 9 & 10 Shoot Posn

NOTE

At end of mnvr OBSS-to-PLBD = 39.1 in,
Upper Arm-to-PMA GF = 30.4 in

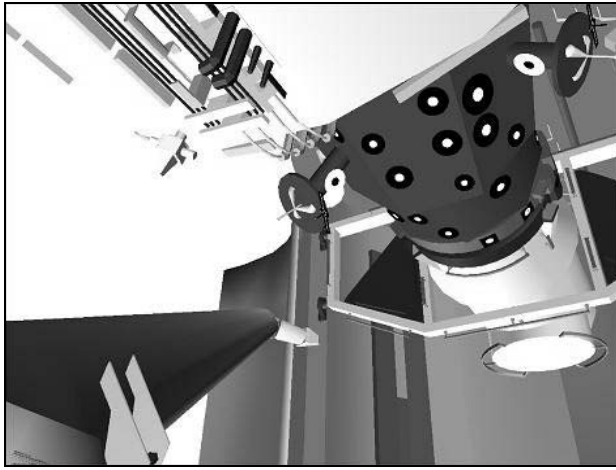
MODE – SINGLE, ENTER

Drive EP (-) to -67.5 to APEX 9 & 10 SHOOT posn

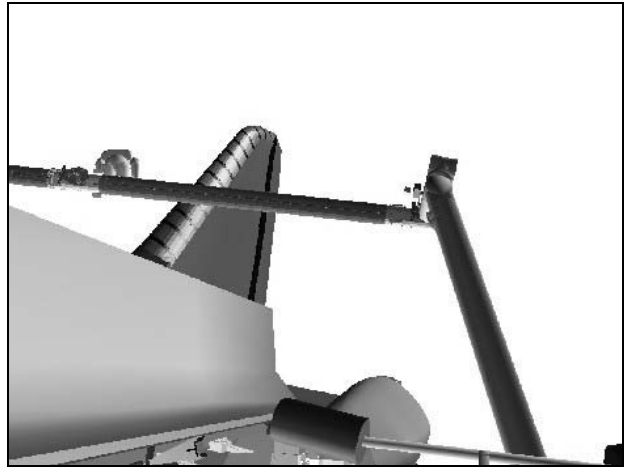
√	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-1031	+307	-267	349	54	238	5
√	SY	SP	EP	WP	WY	WR	
	-58.4	+33.8	-67.5	+21.4	+72.4	-166.8	

BRAKES – ON (tb-ON)

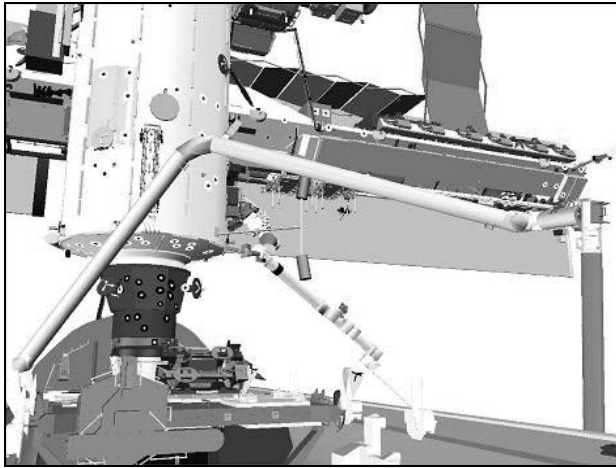
Give EV GO to SHOOT APEX of STBD T-Seals 9 & 10, two shots each



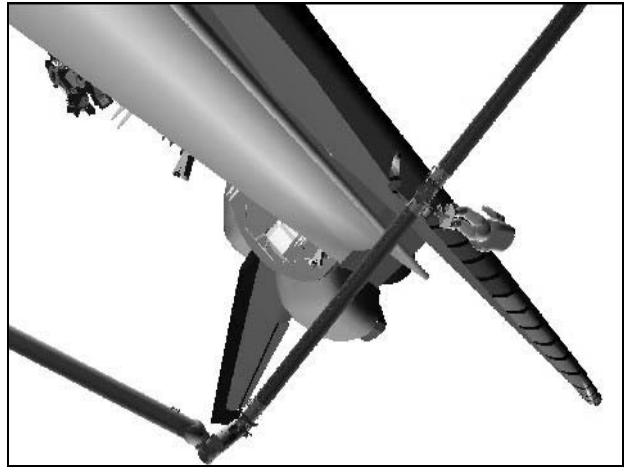
ELBOW (-120,-34)



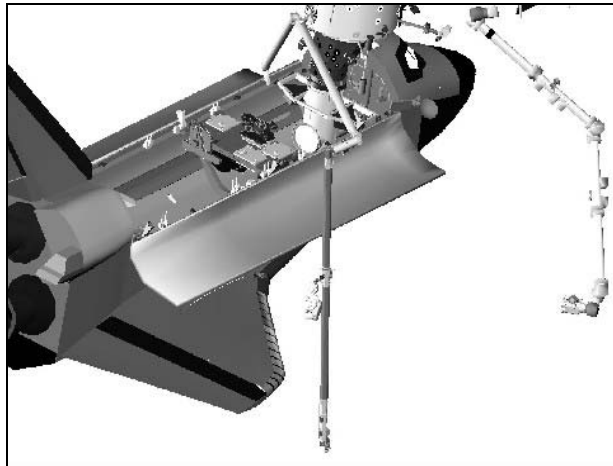
LAB (-14,-8)



CCTV B (23,12)



TIP ELBOW (-80,-10)



BIRD'S EYE

- 4. STBD T-SEAL 11
 - a. Mnvr to Apex 9 & 10 Pre-Posn

NOTE

At end of mnvr APFR on OBSS-to-PLBD = 64.6 in,
Upper Arm-to-PMA GF = 30.5 in

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

Drive EP (+) to -60.8 to APEX 9 & 10 PRE-POSN

√	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-1057	+336	-312	344	54	248	5
	SY	SP	EP	WP	WY	WR	
√	-58.4	+33.8	-60.8	+21.4	+72.4	-166.8	

b. Mnvr to Apex 11 Pre-Posn

NOTE

At end of mnvr OBSS-to-PLBD = 93.1 in,
Upper Arm-to-Lab = 32.1 in

SM 94 PDRS CONTROL

END POS – ITEM 18 -1 0 6 1 +3 9 6 -3 0 7 EXEC
ATT – ITEM 21 +3 2 7 +4 6 +2 7 3 EXEC
CMD CK – ITEM 25 EXEC (GOOD)

MODE – OPR CMD, ENTER (READY It on)

AUTO SEQ – PROCEED (IN PROG It on)

When AUTO SEQ IN PROG It – off,

√	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-1061	+396	-307	327	46	273	5
	SY	SP	EP	WP	WY	WR	
√	-56.6	+37.0	-74.3	+27.0	+68.3	-144.7	

c. Mnvr to Apex 11 Shoot Posn

NOTE

At end of mnvr OBSS-to-PLBD = 53.4 in,
Upper Arm-to-Lab = 32.1 in

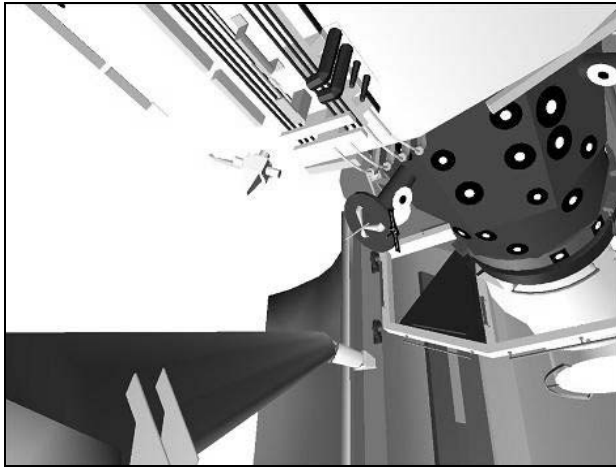
MODE – SINGLE, ENTER

Drive WR (-) to -158.4 to APEX 11 SHOOT posn

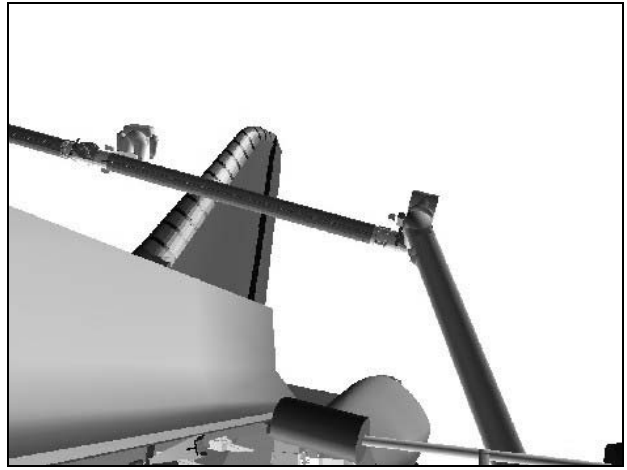
√	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-1046	+339	-274	339	51	254	5
	SY	SP	EP	WP	WY	WR	
√	-56.6	+37.0	-74.3	+27.0	+68.3	-158.4	

BRAKES – ON (tb-ON)

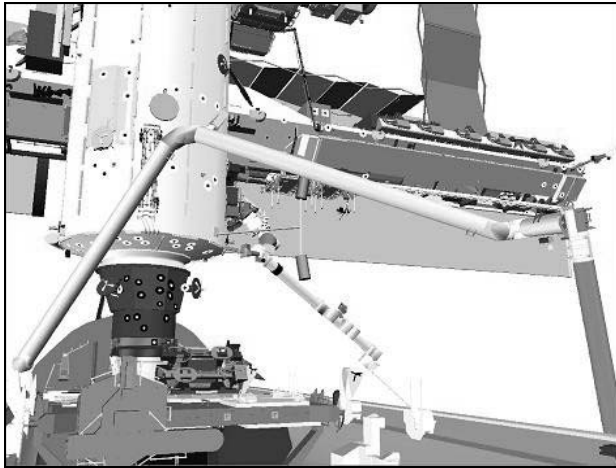
Give EV GO to SHOOT APEX of STBD T-Seal 11, two shots



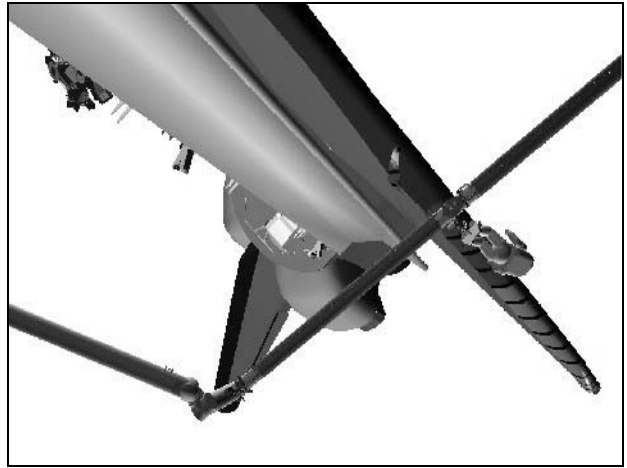
ELBOW (-120,-34)



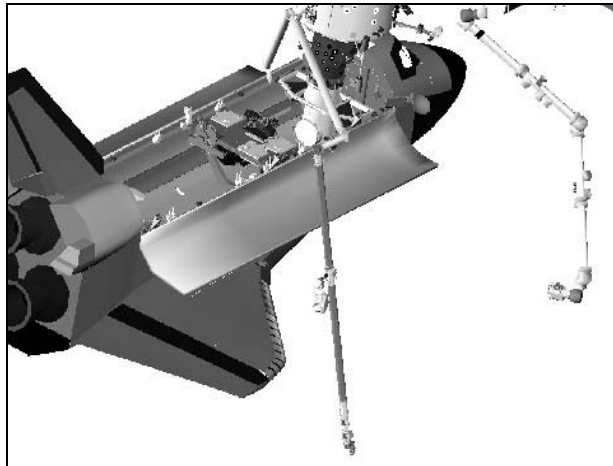
LAB (-14,-8)



CCTV B (23,12)



TIP ELBOW (-80,-10)



BIRD'S EYE

- 5. STBD T-SEAL 12
 - a. Mnvr to Apex 11 Pre-Posn

NOTE

At end of mnvr OBSS-to-PLBD = 93.1 in,
Upper Arm-to-Lab = 32.1 in

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

Drive WR (+) to -144.7 to APEX 11 PRE-POSN

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-1061	+396	-307	327	46	273	5
	SY	SP	EP	WP	WY	WR	
√	-56.6	+37.0	-74.3	+27.0	+68.3	-144.7	

b. Mnvr to Apex 12 Shoot Posn

NOTE

At end of mnvr OBSS-to-PLBD = 72.1 in,
Upper Arm-to-PDGF RU = 37.4 in, Upper
Arm-to-PMA GF = 31.9 in

SM 94 PDRS CONTROL

END POS – ITEM 18 -1 0 6 5 +3 5 7 -2 8 9 EXEC
ATT – ITEM 21 +3 4 8 +4 7 +2 4 7 EXEC
CMD CK – ITEM 25 EXEC (GOOD)

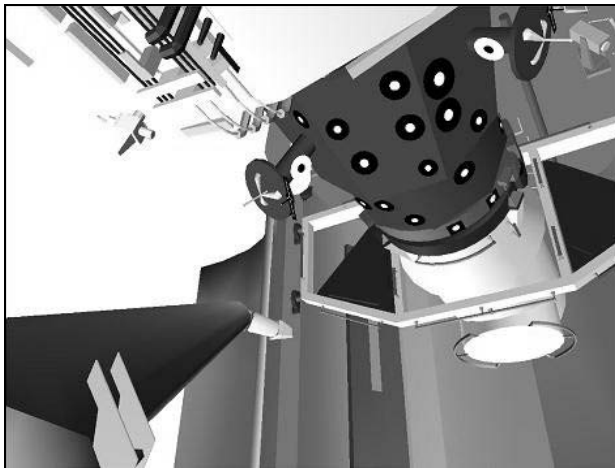
MODE – OPR CMD, ENTER (READY It on)

AUTO SEQ – PROCEED (IN PROG It on)

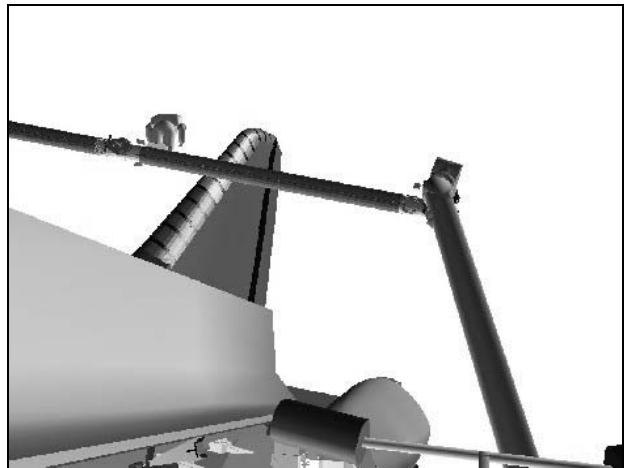
When AUTO SEQ IN PROG It – off:
BRAKES – ON (tb-ON)

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-1065	+357	-289	348	47	247	5
	SY	SP	EP	WP	WY	WR	
√	-57.6	+31.9	-64.3	+29.8	+64.0	-168.5	

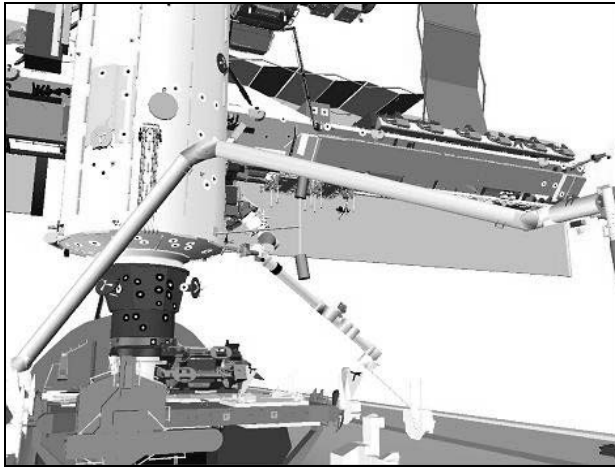
Give EV GO to SHOOT APEX of STBD T-Seal 12, two shots



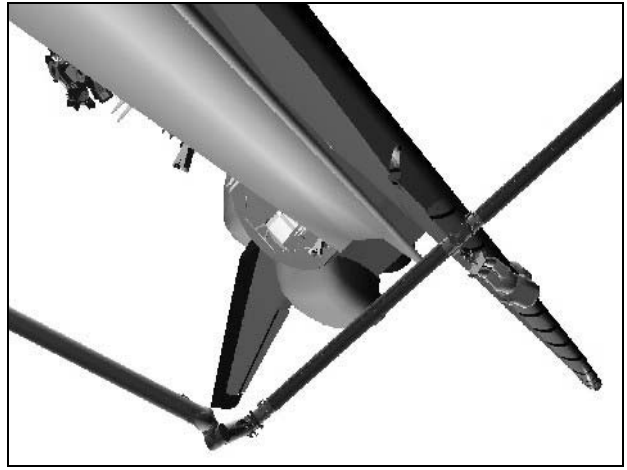
ELBOW (-120,-34)



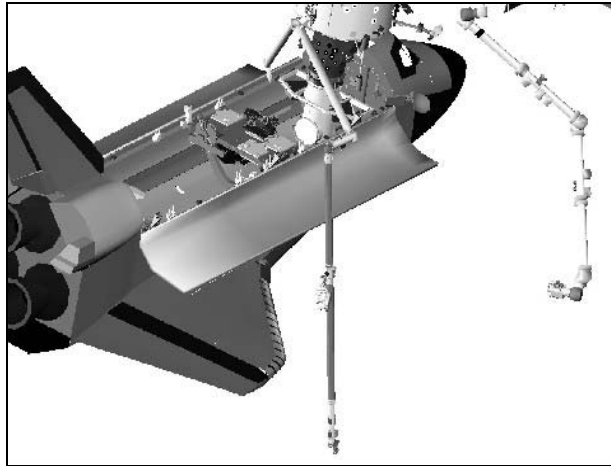
LAB (-14,-8)



CCTVB (23,12)



TIP ELBOW (-80,-10)



BIRD'S EYE

6. STBD T-SEALS APEX 13 & 14 SHOOT POSN

NOTE

At end of mnvr OBSS-to-PLBD = 88.5 in,
Upper Arm-to-PMA GF = 35.0 in

SM 94 PDRS CONTROL

END POS – ITEM 18 -1 0 8 9 +3 7 1 -2 8 3 EXEC
ATT – ITEM 21 +3 4 9 + 4 8 +2 4 5 EXEC
CMD CK – ITEM 25 EXEC (GOOD)

BRAKES – OFF (tb-OFF)

MODE – OPR CMD, ENTER (READY It on)

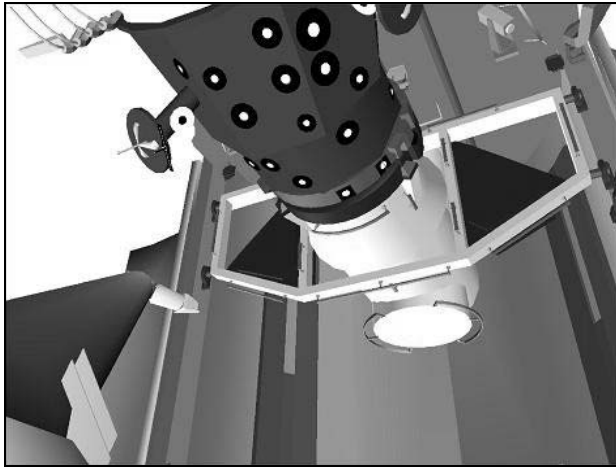
AUTO SEQ – PROCEED (IN PROG It on)

When AUTO SEQ IN PROG It – off:

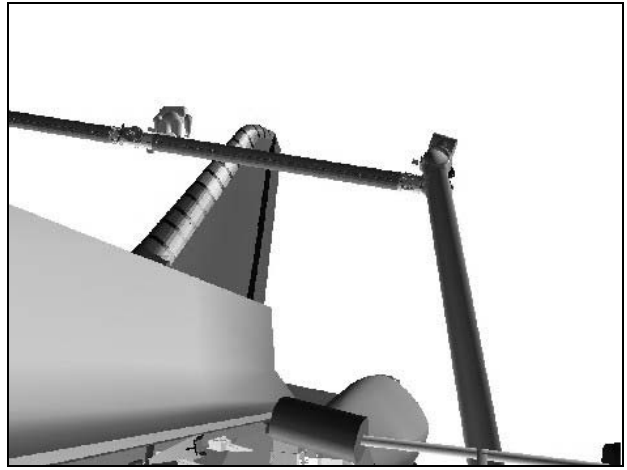
BRAKES – ON (tb-ON)

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-1089	+371	-283	349	48	245	5
	SY	SP	EP	WP	WY	WR	
√	-56.4	+22.8	-49.2	+23.8	+63.7	-170.0	

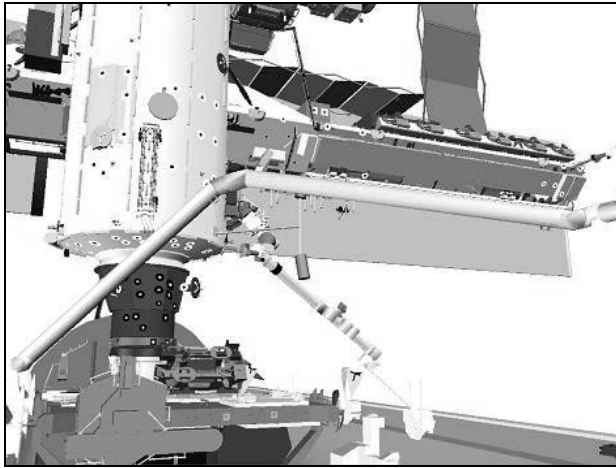
Give EV GO to SHOOT APEX of STBD T-Seal 13 & 14, two shots each



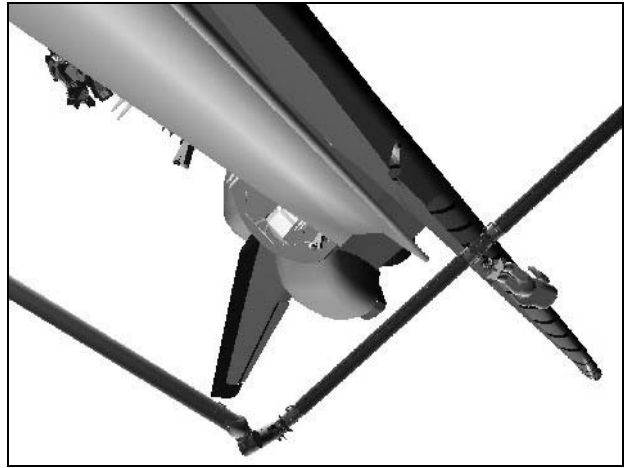
ELBOW (-124,-31)



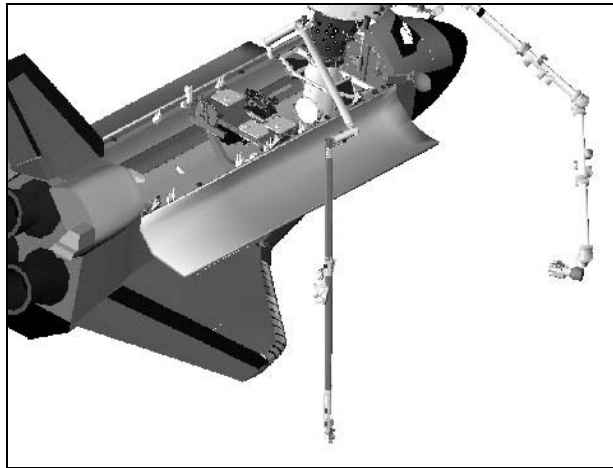
LAB (-14,-8)



CCTV B (23,12)



TIP ELBOW (-80,-10)



BIRD'S EYE

7. EV1/APFR EGRESS/RECONFIG

a. Mnvr to Intermediate Posn

Ingress Clearance Views	Cameras
OBSS-to-PLBD	Tip Elbow, C
RMS-to-Lab	C, Elbow

NOTE

At end of mnvr OBSS-to-PLBD = 97.6 in,
Upper Arm-to-PMA GF = 58.2 in

SM 94 PDRS CONTROL

END POS – ITEM 18 -1 1 1 8 +3 6 4 -4 6 5 EXEC
ATT – ITEM 21 +2 3 8 +0 +3 2 4 EXEC
CMD CK – ITEM 25 EXEC (GOOD)

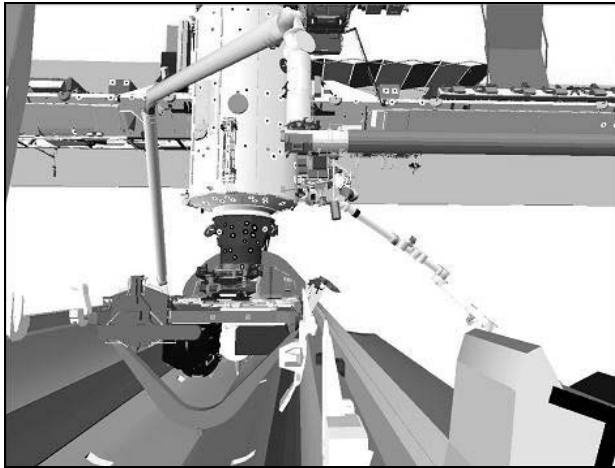
BRAKES – OFF (tb-OFF)

MODE – OPR CMD, ENTER (READY It on)

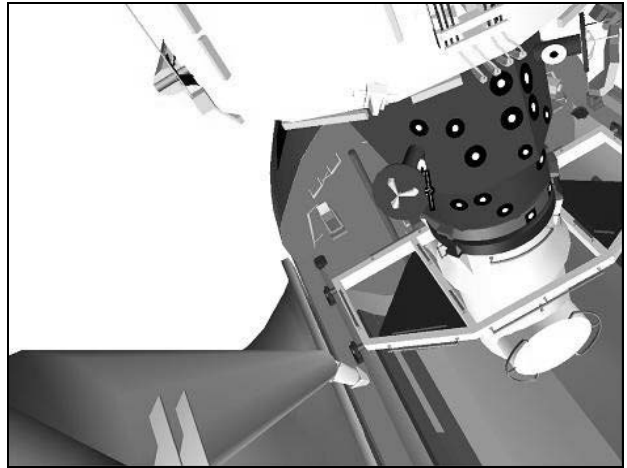
AUTO SEQ – PROCEED (IN PROG It on)

When AUTO SEQ IN PROG It – off,

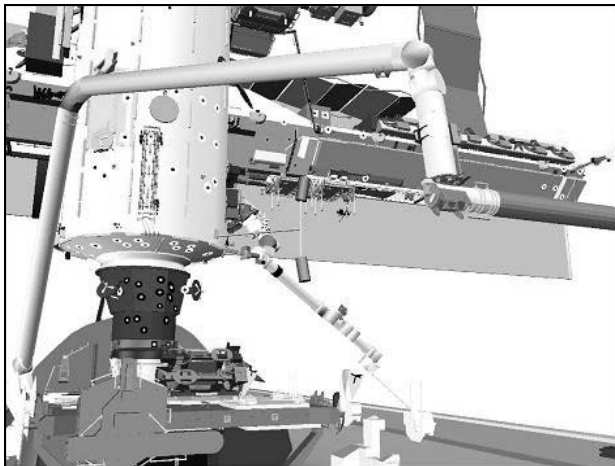
	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-1118	+364	-465	238	0	324	5
	SY	SP	EP	WP	WY	WR	
√	-33.0	+49.3	-70.5	-70.9	+21.7	-38.3	



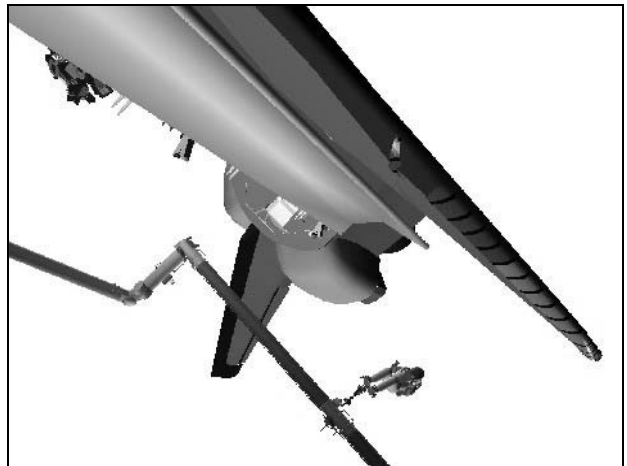
CCTV C (2,6)



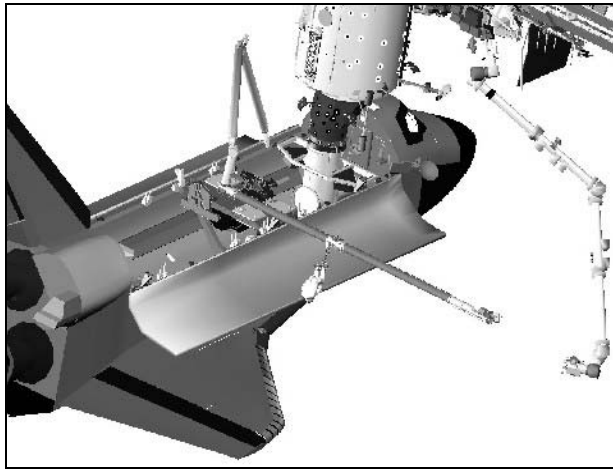
ELBOW (-124,-31)



CCTV B (23,12)



TIP ELBOW (-80,-10)



BIRD'S EYE

b. Mnvr to EV1/APFR Egress Posn

NOTE

At end of mnvr APFR on OBSS-to-Stbd Sill = 71.3 in, Upper Arm-to-PMA GF = 71.7 in

MODE – ORB LD, ENTER

Mnvr OBSS Port (-Y) to EV1/APFR EGRESS posn, Y = +111

√	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-1118	+111	-465	238	0	324	5
	SY	SP	EP	WP	WY	WR	
√	+0.8	+71.6	-85.5	-65.3	+19.1	-74.3	

BRAKES – ON (tb-ON)

Give EV GO to EGRESS/REMOVE APFR
GCA if reqd

8. EV1 INGRESS/APFR INSTALL ON AFT STRIKER BAR

NOTE

This step mnvrs back to EV1/APFR EGRESS posn
to prepare for OCAS to EV1/APFR INGRESS posn

Ingress Clearance Views	Cameras
OBSS-to-PLBD/Wing	Tip Elbow
RMS-to-Lab/Sill	C

SM 94 PDRS CONTROL
PL ID – ITEM 3 +2 EXEC
INIT ID – ITEM 24 +2 EXEC

BRAKES – OFF (tb-OFF)
MODE – ORB LD, ENTER

Verify posn is EV1/APFR EGRESS posn:

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-1028	+443	-458	220	60	270	2
	SY	SP	EP	WP	WY	WR	
√	+0.8	+71.6	-85.5	-65.3	+19.1	-74.3	

NOTE

At end of mnvr, OBSS-to-Port Sill = 97.8 in

SM 94 PDRS CONTROL

END POS – ITEM 18 -1 1 6 6 +1 1 5 -4 8 8 EXEC

ATT – ITEM 21 +2 6 3 +5 3 +2 7 5 EXEC

CMD CK – ITEM 25 EXEC (GOOD)

MODE – OPR CMD, ENTER (READY lt on)

AUTO SEQ – PROCEED (IN PROG lt on)

When AUTO SEQ IN PROG lt – off:

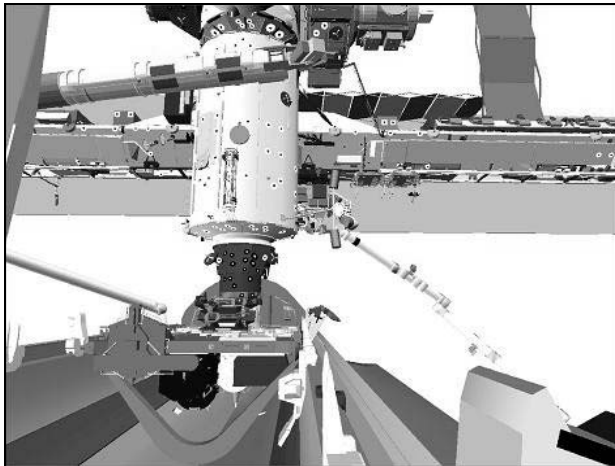
BRAKES – ON (tb-ON)

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-1166	+115	-488	263	53	275	2
	SY	SP	EP	WP	WY	WR	
√	+43.4	+32.7	-18.1	-49.9	-27.1	-102.9	

Give EV GO to INSTALL PAD/APFR/RECONFIG APFR (11, FF, A, 6) and

INGRESS

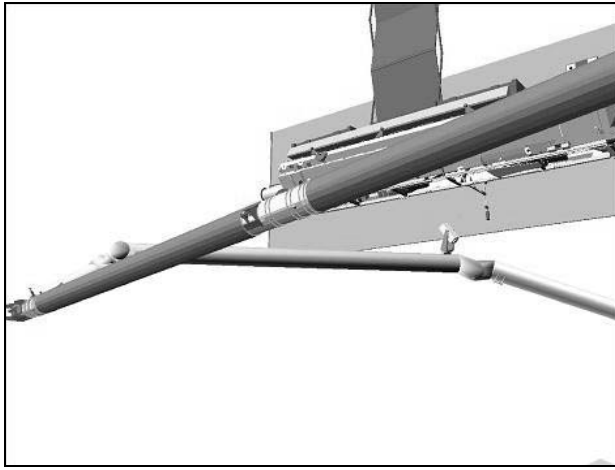
GCA if reqd



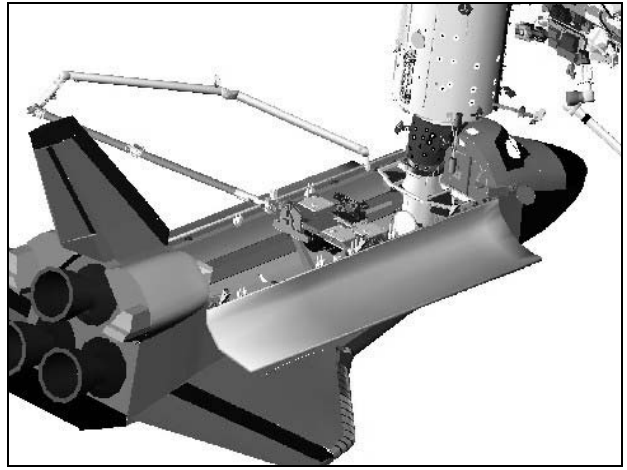
CCTV C (-2,10)



TIP ELBOW (-80,-10)



CCTV B (-39,12)



BIRD'S EYE

9. RETURN TO INGRESS/APFR POSN
 BRAKES – OFF (tb-OFF)
 MODE – ORB LD, ENTER

Reconfigure arm to INGRESS/APFR posn:

X	Y	Z	PITCH	YAW	ROLL	PL ID
-1166	+115	-488	263	53	275	2
SY	SP	EP	WP	WY	WR	
+43.4	+32.7	-18.1	-49.9	-27.1	-102.9	

10. STBD T-SEALS LOWER 19-22

Lower Panel Clearance Views	Cameras
OBSS-to-PLBD/Wing	Lab, RSC
RMS-to-Lab	Elbow

- a. OCAS 1/3

NOTE

At end of mnvr OBSS-to-PLBD = 79.8 in,
 Upper Arm-to-Lab = 66.6 in

SM 94 PDRS CONTROL

END POS – ITEM 18 -1157 +711 -493 EXEC
 ATT – ITEM 21 +264 +55 +275 EXEC
 CMD CK – ITEM 25 EXEC (GOOD)

MODE – OPR CMD, ENTER (READY It on)

AUTO SEQ – PROCEED (IN PROG It on)

When AUTO SEQ IN PROG It – off,

X	Y	Z	PITCH	YAW	ROLL	PL ID
√ -1157	+711	-493	264	55	275	2
√ SY	SP	EP	WP	WY	WR	
-33.0	+47.6	-81.5	-4.8	+37.7	-60.9	

b. OCAS 2/3

NOTE

At end of mnvr Upper Arm-to-PMA GF = 41.5 in

SM 94 PDRS CONTROL

END POS – ITEM 18 -8 7 5 +7 2 9 -1 7 0 EXEC
 ATT – ITEM 21 +1 4 +4 4 +1 9 5 EXEC
 CMD CK – ITEM 25 EXEC (GOOD)

MODE – OPR CMD, ENTER (READY It on)

AUTO SEQ – PROCEED (IN PROG It on)

When AUTO SEQ IN PROG It – off,

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-875	+729	-170	14	44	195	2
	SY	SP	EP	WP	WY	WR	
√	-50.5	+26.5	-52.6	+16.6	+20.8	-120.3	

c. OCAS 3/3

NOTE

At end of mnvr Upper Arm-to-PMA GF = 37.5 in,
 OBSS-to-WLE = 66.6 in

SM 94 PDRS CONTROL

END POS – ITEM 18 -1 2 9 3 +4 8 2 -8 9 EXEC
 ATT – ITEM 21 +8 0 +2 0 +1 7 1 EXEC
 CMD CK – ITEM 25 EXEC (GOOD)

MODE – OPR CMD, ENTER (READY It on)

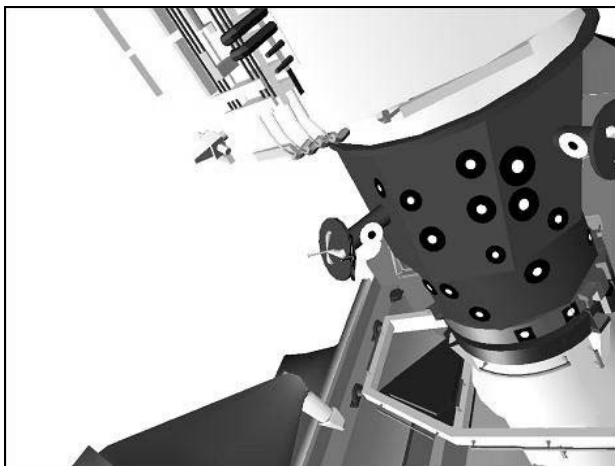
AUTO SEQ – PROCEED (IN PROG It on)

When AUTO SEQ IN PROG It – off:

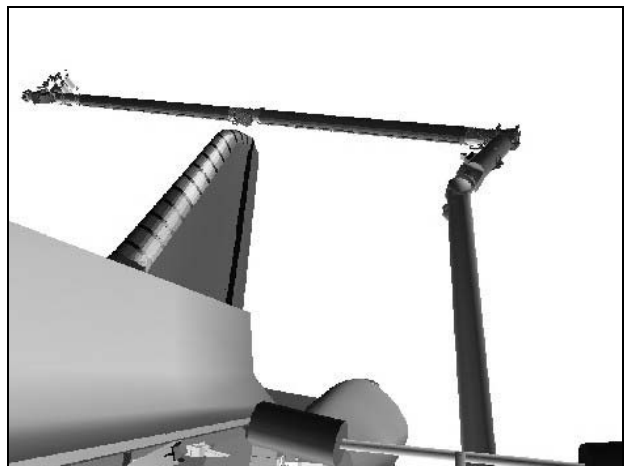
BRAKES – ON (tb-ON)

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-1293	+482	-89	80	20	171	2
	SY	SP	EP	WP	WY	WR	
√	-54.6	+22.3	-41.8	+28.6	+5.1	-179.6	

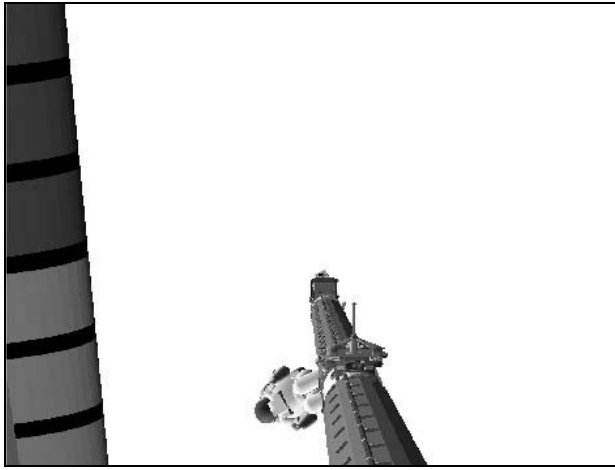
Give EV GO to SHOOT LOWER STBD T-Seals 19-22 – two shots



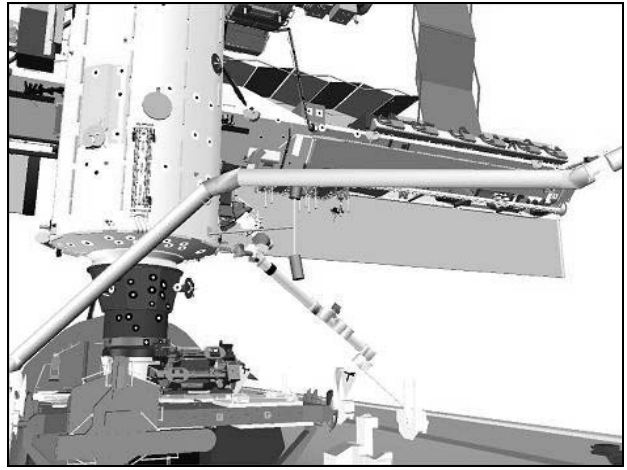
ELBOW (-148,-16)



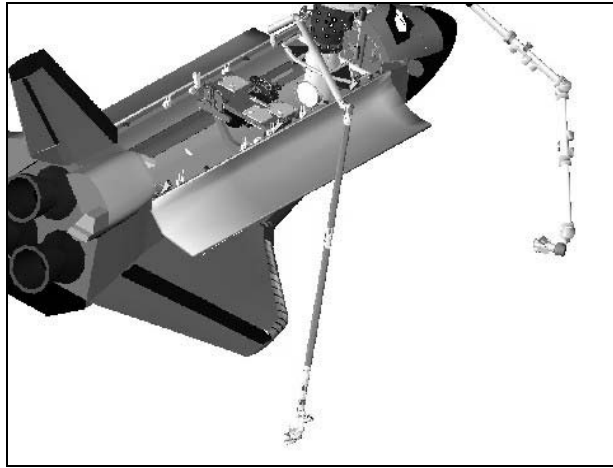
LAB (-12,-8)



RSC



CCTV B (24,12)



BIRD'S EYE

11. STBD T-SEALS LOWER 16-19 SHOOT POSN

NOTE

At end of mnvr OBSS-to-STBD Wing = 95.6 in,
Upper Arm-to-PMA GF = 32.6 in

SM 94 PDRS CONTROL

END POS – ITEM 18 -1 2 2 4 +4 7 4 -9 2 EXEC
ATT – ITEM 21 +7 6 +1 7 +1 7 5 EXEC
CMD CK – ITEM 25 EXEC (GOOD)

BRAKES – OFF (tb-OFF)

MODE – OPR CMD, ENTER (READY It on)

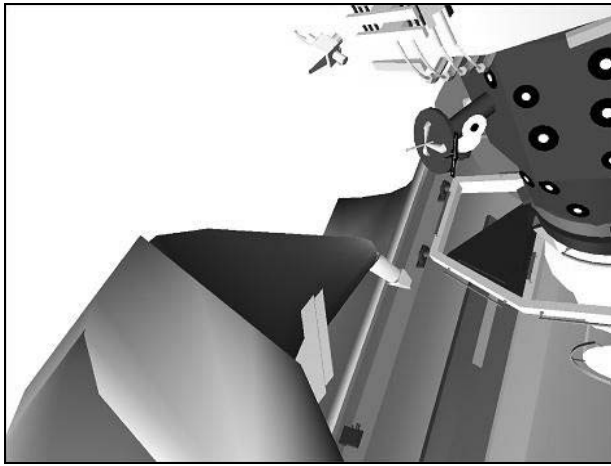
AUTO SEQ – PROCEED (IN PROG It on)

When AUTO SEQ IN PROG It – off:

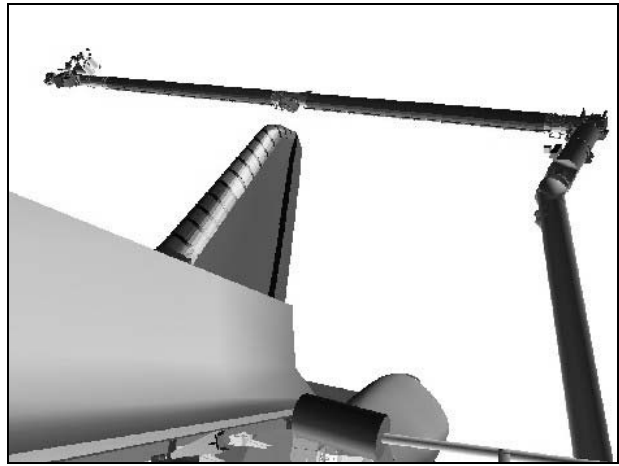
BRAKES – ON (tb-ON)

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-1224	+474	-92	76	17	175	2
	SY	SP	EP	WP	WY	WR	
√	-57.2	+31.1	-52.0	+25.9	+4.8	-177.4	

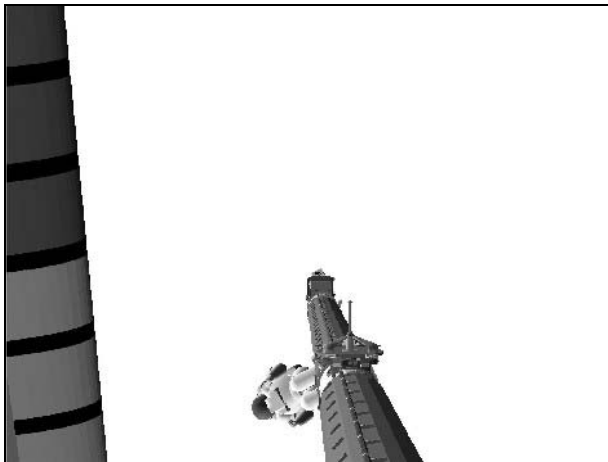
Give EV GO to SHOOT LOWER STBD T-Seals 16-19 – two shots



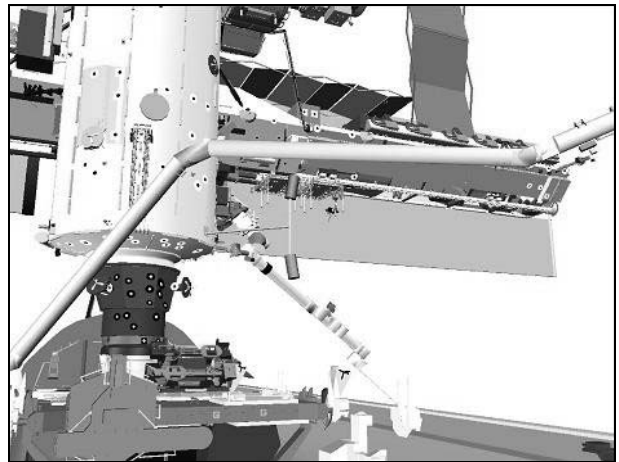
ELBOW (-148,-34)



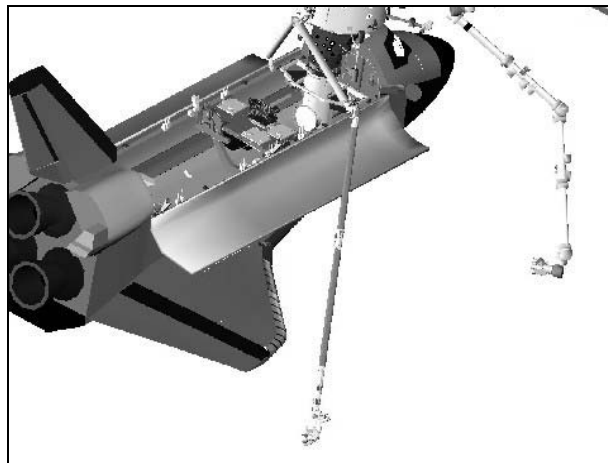
LAB (-16,-8)



RSC



CCTV B (24,12)



BIRD'S EYE

12. STBD T-SEALS LOWER 14-17 SHOOT POSN

NOTE

At end of mnvr Upper Arm-to-PMA GF = 25.1 in,
OBSS-to-Stbd Wing = 132.8 in

SM 94 PDRS CONTROL

END POS – ITEM 18 -1 1 7 4 +4 7 1 -8 4 EXEC

ATT – ITEM 21 +7 5 +1 7 +1 7 2 EXEC

CMD CK – ITEM 25 EXEC (GOOD)

BRAKES – OFF (tb-OFF)

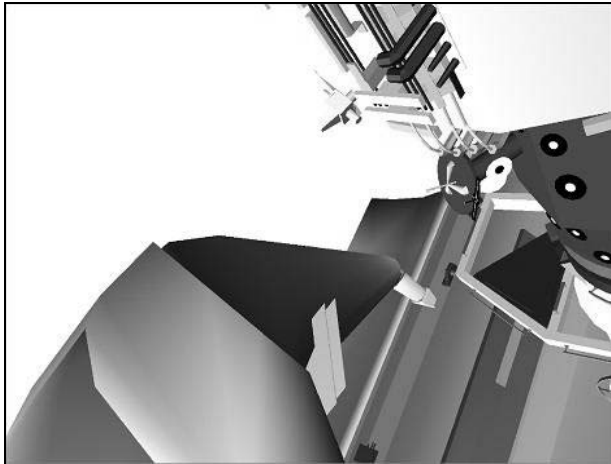
MODE – OPR CMD, ENTER (READY lt on)

AUTO SEQ – PROCEED (IN PROG It on)

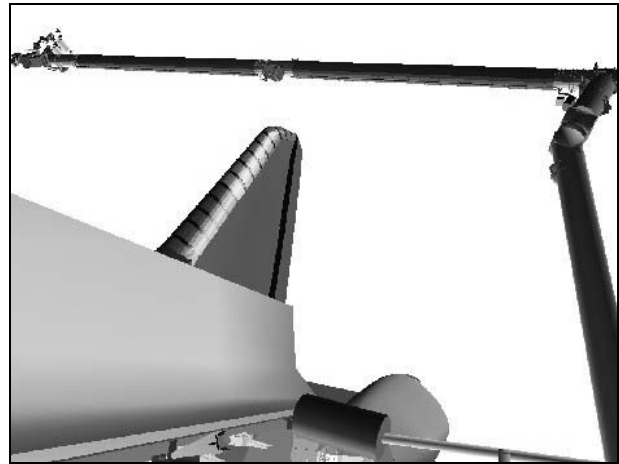
When AUTO SEQ IN PROG It – off:
BRAKES – ON (tb-ON)

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-1174	+471	-84	75	17	172	2
	SY	SP	EP	WP	WY	WR	
√	-62.4	+32.6	-55.3	+26.6	+13.2	-177.7	

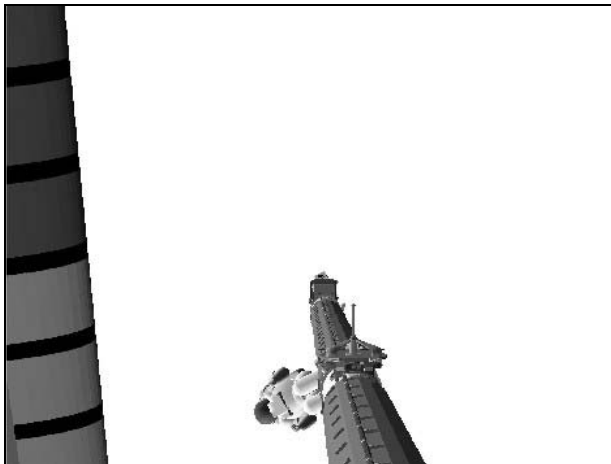
Give EV GO to SHOOT LOWER STBD T-Seals 14-17 – two shots



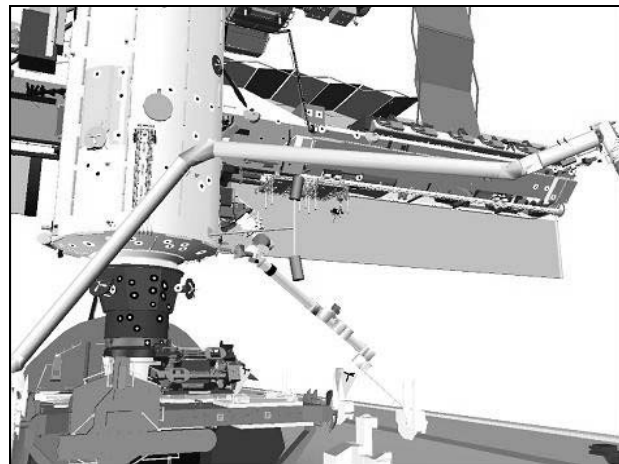
ELBOW (-148,-34)



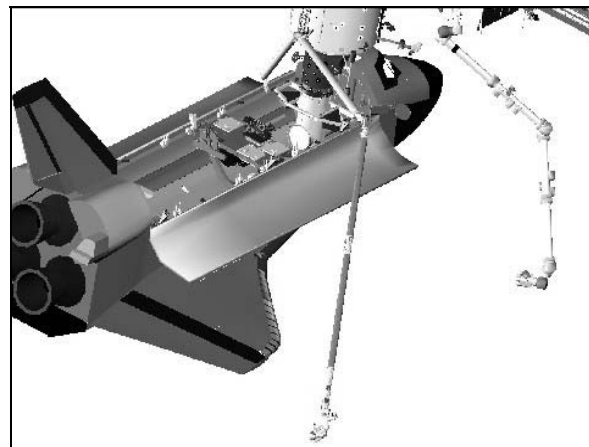
LAB (-16,-8)



RSC



CCTV B (24,12)



BIRD'S EYE

13. STBD T-SEAL LOWER 14 SHOOT POSN

NOTE

At end of mnvr OBSS-to-Wing = 68.8 in,
Upper Arm-to-PMA GF = 26.4 in

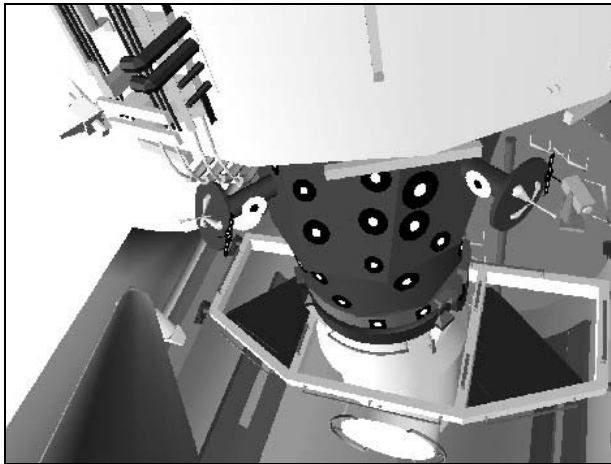
BRAKES – OFF (tb-OFF)
MODE – SINGLE, ENTER

Mnvr to SHOOT STBD T-SEAL 14 posn:

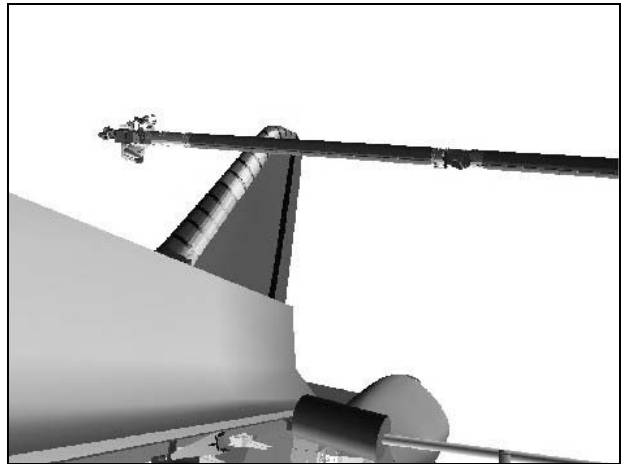
STBD	SY	SP	EP	WP	WY	WR	
T-SEAL 14-17	-62.4	+32.6	-55.3	+26.6	+13.2	-177.7	
1: SP –		+27.0					
2: EP +			-11.5				
3: WP –				-10.1			
4: WY +					+34.0		
5: WR –						-179.2	
STBD	-62.4	+27.0	-11.5	-10.1	+34.0	-179.2	
T-SEAL 14	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-1165	+352	-212	75	23	152	2

BRAKES – ON (tb-ON)

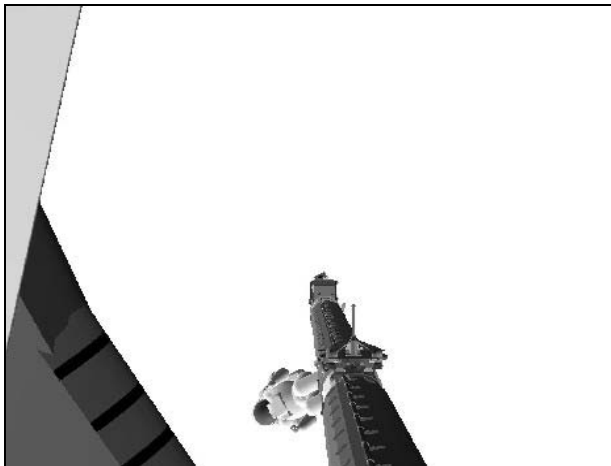
Give EV GO to SHOOT LOWER STBD T-Seal 14 – two shots



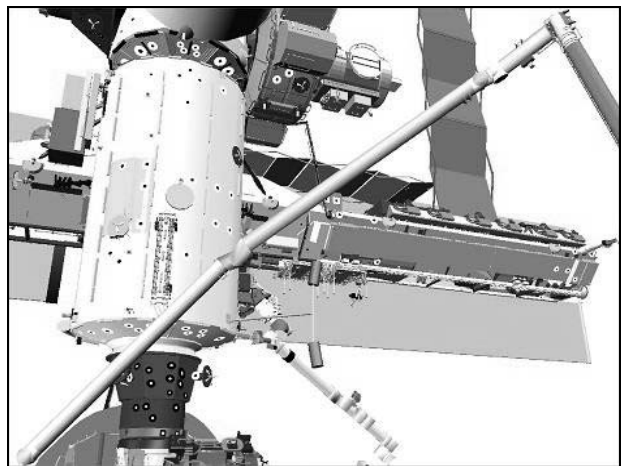
ELBOW (-155,-6)



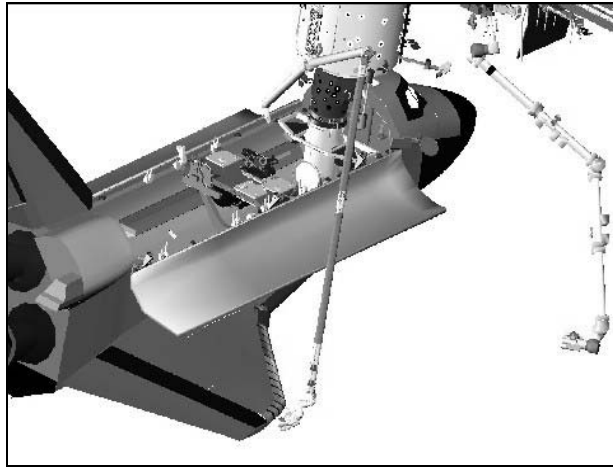
LAB (-16,-8)



RSC



CCTV B (22,20)



BIRD'S EYE

14. STBD T-SEAL LOWER 13 SHOOT POSN

NOTE

At end of mnvr OBSS-to-Wing = 80.0 in,
Upper Arm-to-PMA GF = 24.4 in

SM 94 PDRS CONTROL

END POS – ITEM 18 -1 1 4 7 +3 4 5 -2 1 7 EXEC
ATT – ITEM 21 +7 7 +3 1 +1 4 1 EXEC
CMD CK – ITEM 25 EXEC (GOOD)

BRAKES – OFF (tb-OFF)

MODE – OPR CMD, ENTER (READY It on)

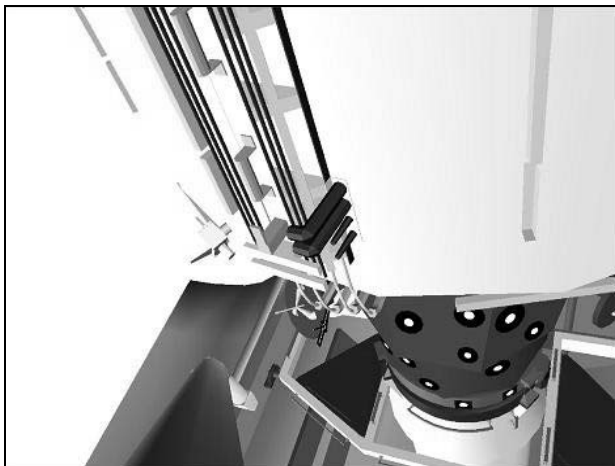
AUTO SEQ – PROCEED (IN PROG It on)

When AUTO SEQ IN PROG It – off:

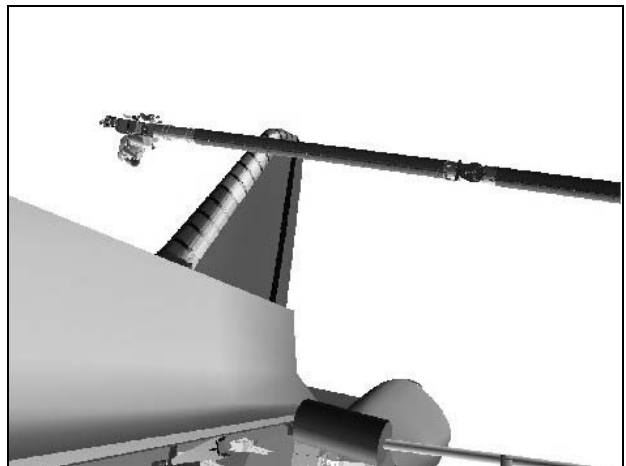
BRAKES – ON (tb-ON)

X	Y	Z	PITCH	YAW	ROLL	PL ID
-1147	+345	-217	77	31	141	2
SY	SP	EP	WP	WY	WR	
-62.8	+33.9	-21.9	-1.3	+46.2	-179.3	

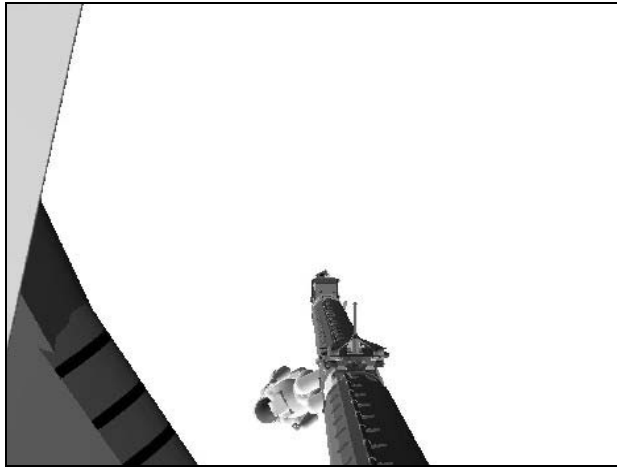
Give EV GO to SHOOT LOWER STBD T-Seal 13 – two shots



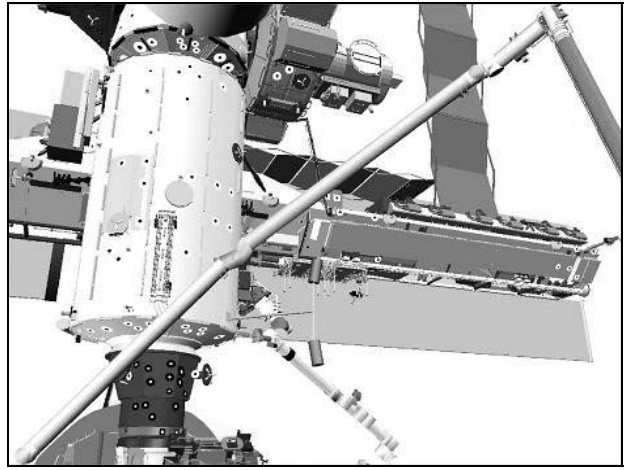
ELBOW (-155,-6)



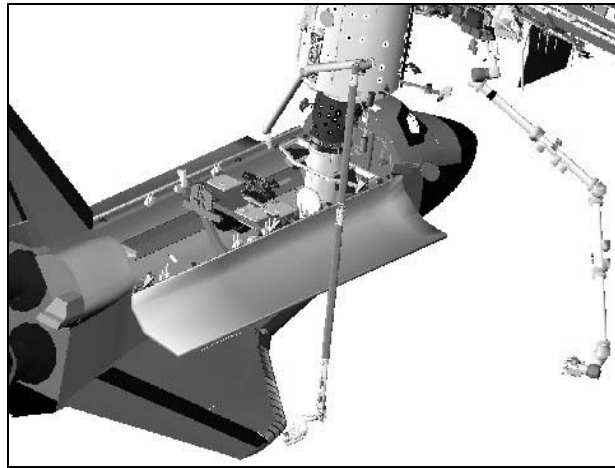
LAB (-16,-8)



RSC



CCTV B (22,20)



BIRD'S EYE

15. STBD T-SEAL LOWER 12 SHOOT POSN
 a. Mnvr to OCAS Clearance Stbd T-Seal 12 Posn

NOTE

At end of mnvr OBSS-to-Stbd Wing = 78.0 in,
 Upper Arm-to-Lab = 25.0 in

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

Mnvr to OCAS CLEARANCE STBD T-SEAL 12 posn:

STBD
 T-SEAL 13
 1: WR +
 2: SY +
 Pre STBD
 T-SEAL 12

SY	SP	EP	WP	WY	WR	
-62.8	+33.9	-21.9	-1.3	+46.2	-179.3	
					-170.5	
-55.1						
-55.1	+33.9	-21.9	-1.3	+46.2	-170.5	
X	Y	Z	PITCH	YAW	ROLL	PL ID
-1179	+376	-210	76	41	137	2

b. OCAS to Stbd T-Seal 12 Shoot Posn

NOTE

At end of mnvr OBSS-to-STBD Wing = 78.0 in,
Upper Arm-to-Lab = 25.0 in

SM 94 PDRS CONTROL

END POS – ITEM 18 -1 1 2 4 +3 2 9 -2 1 9 EXEC

ATT – ITEM 21 +7 3 +3 4 +1 4 3 EXEC

CMD CK – ITEM 25 EXEC (GOOD)

MODE – OPR CMD, ENTER (READY It on)

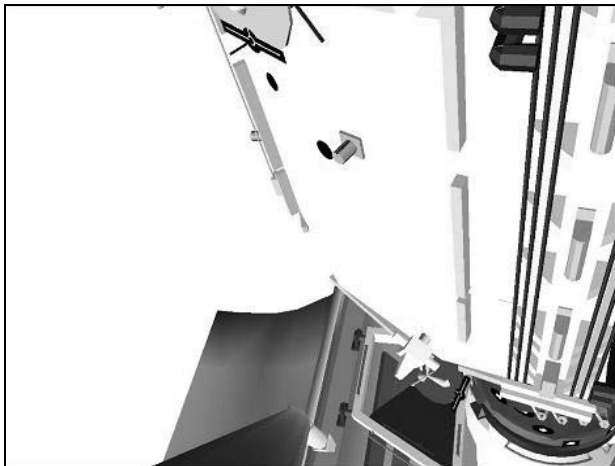
AUTO SEQ – PROCEED (IN PROG It on)

When AUTO SEQ IN PROG It – off:

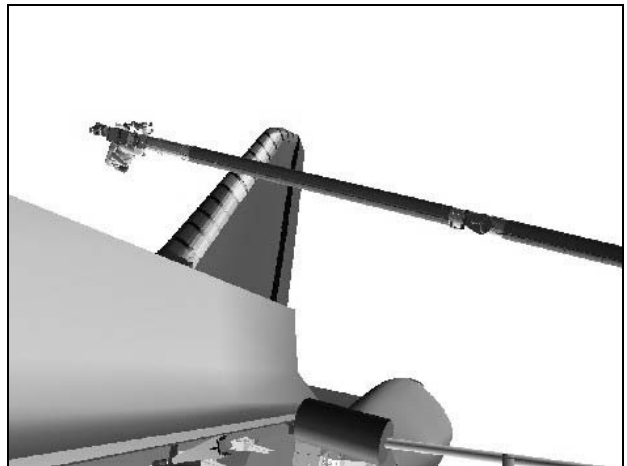
BRAKES – ON (tb-ON)

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-1124	+329	-219	73	34	143	2
	SY	SP	EP	WP	WY	WR	
√	-59.2	+49.1	-42.5	+0.8	+43.6	-172.6	

Give EV GO to SHOOT LOWER STBD T-Seal 12 – two shots



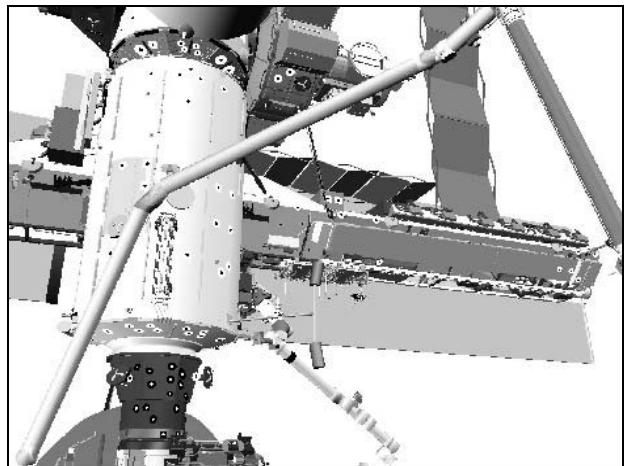
ELBOW (-148,-13)



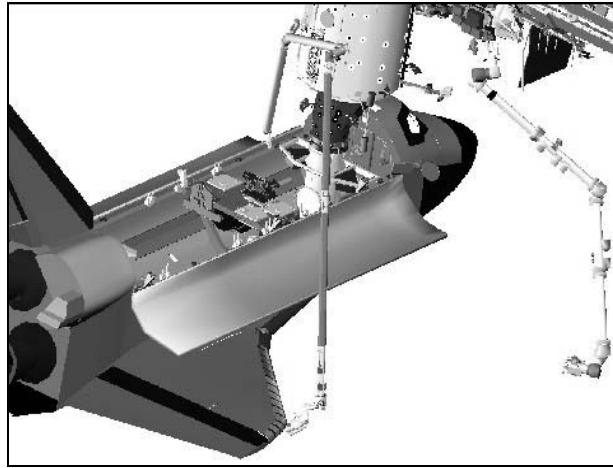
LAB (-16,-8)



RSC



CCTV B (22,20)



BIRD'S EYE

16. STBD T-SEAL 11 LOWER SHOOT POSN

NOTE

At end of mnvr OBSS-to-PLBD = 66.3 in,
Upper Arm-to-Lab = 24.6 in

SM 94 PDRS CONTROL

END POS – ITEM 18 -1104 +295 -206 EXEC
ATT – ITEM 21 +79 +33 +135 EXEC
CMD CK – ITEM 25 EXEC (GOOD)

BRAKES – OFF (tb-OFF)

MODE – OPR CMD, ENTER (READY It on)

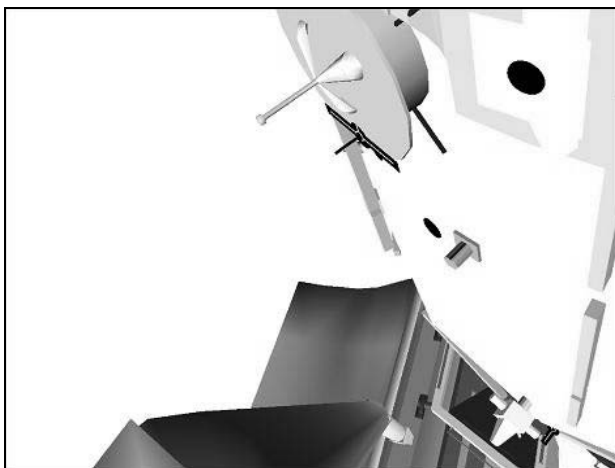
AUTO SEQ – PROCEED (IN PROG It on)

When AUTO SEQ IN PROG It – off:

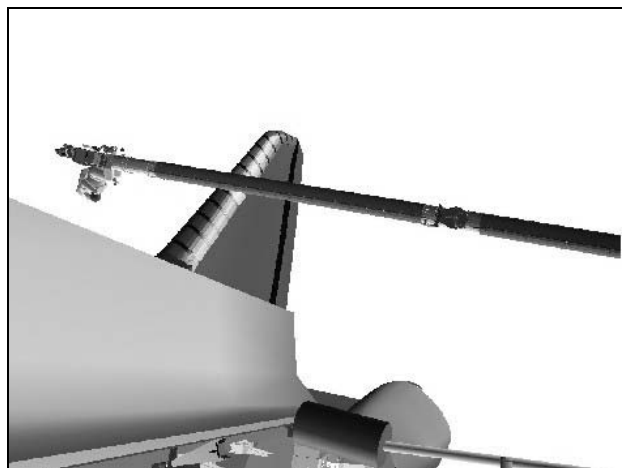
BRAKES – ON (tb-ON)

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-1104	+295	-206	79	33	135	2
	SY	SP	EP	WP	WY	WR	
√	-65.2	+53.7	-54.0	+14.4	+53.9	-182.3	

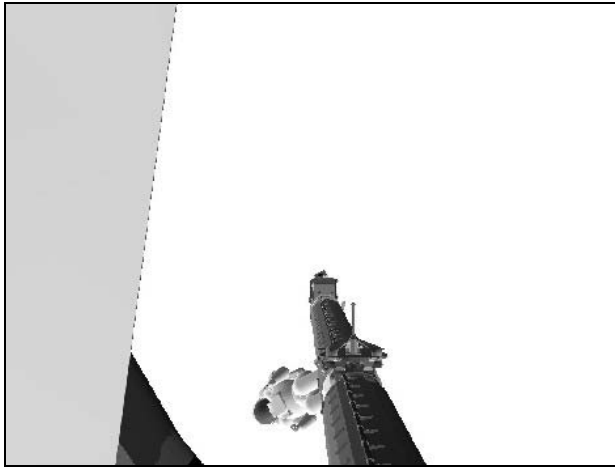
Give EV GO to SHOOT LOWER STBD T-Seal 11 – two shots



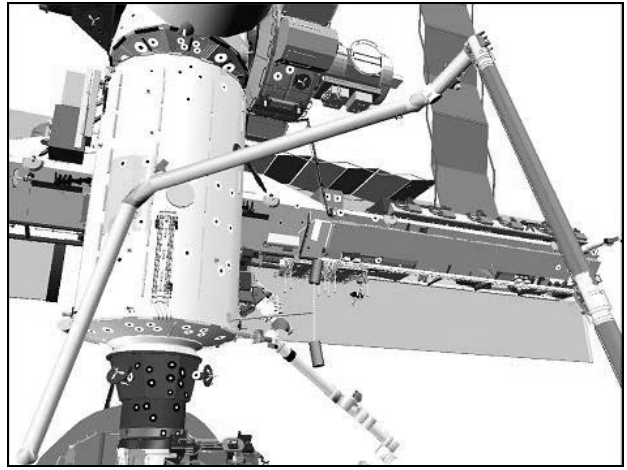
ELBOW (-147,-20)



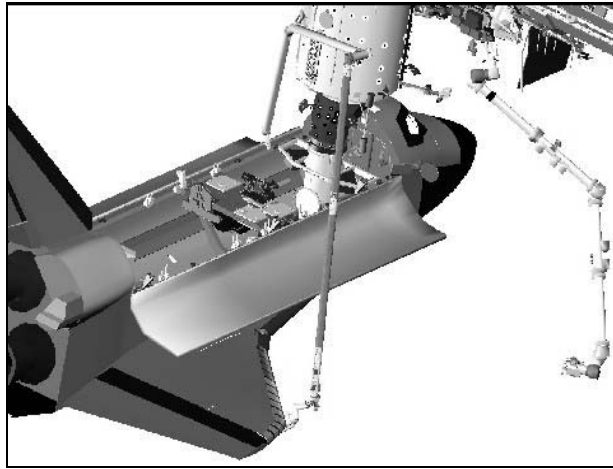
LAB (-16,-8)



RSC



CCTV B (22,20)



BIRD'S EYE

17. STBD T-SEAL 10

a. Mnvr to Clearance for OCAS

NOTE

At end of mnvr OBSS-to-Stbd Wing = 67.8 in,
Upper Arm-to-Lab = 29.1 in

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

Mnvr to OCAS CLEARANCE STBD T-SEAL 11 posn:

STBD
T-SEAL 11
1: WR +
2: SY +
OCAS CLEAR

SY	SP	EP	WP	WY	WR	
-65.2	+53.7	-54.0	+14.4	+53.9	-182.3	
					-178.6	
-60.9						
-60.9	+53.7	-54.0	+14.4	+53.9	-178.6	
X	Y	Z	PITCH	YAW	ROLL	PL ID
-1122	+303	-200	79	37	132	2

b. Mnvr to Lower 10 Pre-Posn

NOTE

At end of mnvr OBSS-to-PLBD = 69.1 in,
Upper Arm-to-Lab PDGF = 34.7 in

SM 94 PDRS CONTROL

END POS – ITEM 18 -1 0 7 1 +3 2 3 -2 1 1 EXEC
ATT – ITEM 21 +7 3 +3 6 +1 4 5 EXEC
CMD CK – ITEM 25 EXEC (GOOD)

MODE – OPR CMD, ENTER (READY It on)

AUTO SEQ – PROCEED (IN PROG It on)

When AUTO SEQ IN PROG It – off,

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-1071	+323	-211	73	36	145	2
	SY	SP	EP	WP	WY	WR	
√	-64.1	+66.8	-70.5	+13.7	+47.2	-172.7	

c. Mnvr to Lower 10 Shoot Posn

NOTE

At end of mnvr OBSS-to-PLBD = 33.1 in, OBSS-to-Stbd
Wing = 62.8 in, Upper Arm-to-PMA GF = 50.7 in

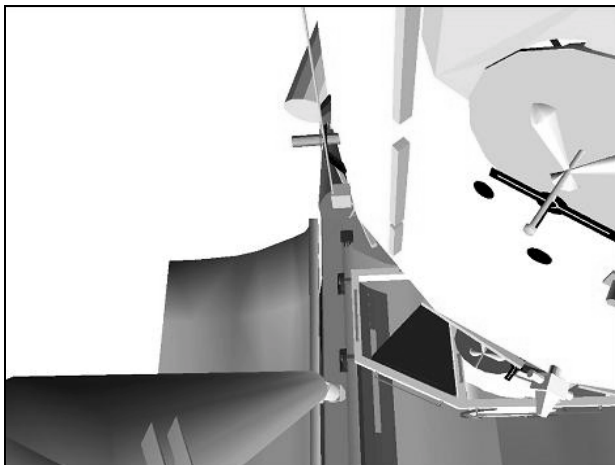
MODE – SINGLE, ENTER

Drive WR (-) to -177.7 to STBD T-SEAL 10 SHOOT posn

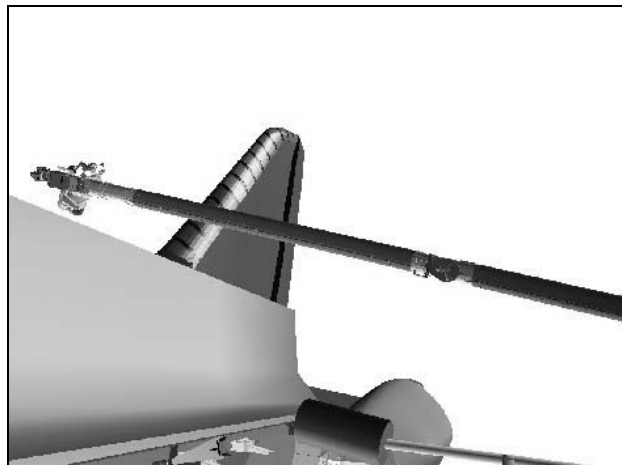
	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-1085	+273	-204	76	32	142	2
	SY	SP	EP	WP	WY	WR	
√	-64.1	+66.8	-70.5	+13.7	+47.2	-177.7	

BRAKES – ON (tb-ON)

Give EV GO to SHOOT LOWER STBD T-Seal 10 – two shots



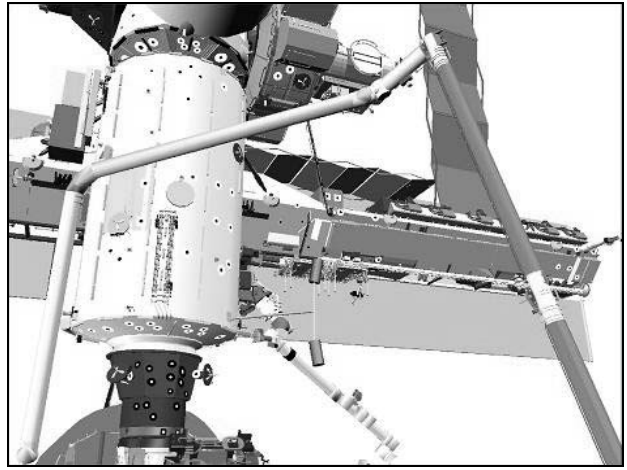
ELBOW (-124,-29)



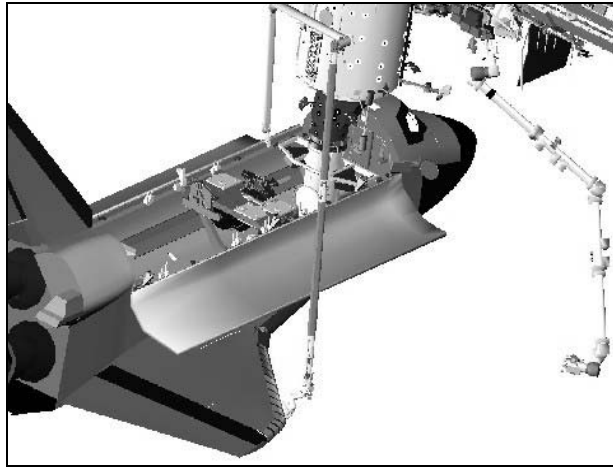
LAB (-16,-8)



RSC



CCTV B (22,20)



BIRD'S EYE

18. STBD T-SEALS 8 & 9

a. Mnvr to Lower 10 Pre-Posn

NOTE

At end of mnvr OBSS-to-PLBD = 69.1 in,
Upper Arm-to-Lab PDGF = 34.7 in

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

Drive WR (+) to -172.7 to PRE STBD T-SEAL 10 posn

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-1071	+323	-211	73	36	145	2
	SY	SP	EP	WP	WY	WR	
√	-64.1	+66.8	-70.5	+13.7	+47.2	-172.7	

b. Mnvr to Lower 8 & 9 Pre-Posn

NOTE

At end of mnvr OBSS-to-PLBD = 70.0 in,
Upper Arm-to-Lab = 25.9 in

SM 94 PDRS CONTROL

END POS – ITEM 18 -1 0 3 4 +3 0 4 -2 1 9 EXEC
ATT – ITEM 21 +6 4 +3 3 +1 4 1 EXEC
CMD CK – ITEM 25 EXEC (GOOD)

MODE – OPR CMD, ENTER (READY It on)

AUTO SEQ – PROCEED (IN PROG It on)

When AUTO SEQ IN PROG It – off,

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-1034	+304	-219	64	33	141	2
	SY	SP	EP	WP	WY	WR	
√	-58.4	+40.2	-20.0	-25.9	+47.3	-162.7	

c. Mnvr to Lower 8 & 9 Shoot Posn

NOTE

At end of mnvr OBSS-to-PLBD = 36.4 in,
Upper Arm-to-Lab = 25.9 in

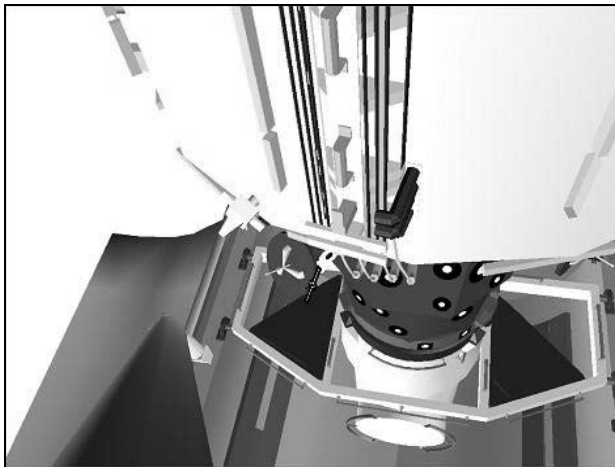
MODE – SINGLE, ENTER

Drive WR (-) to -167.0 to STBD T-SEALS 8 & 9 SHOOT posn

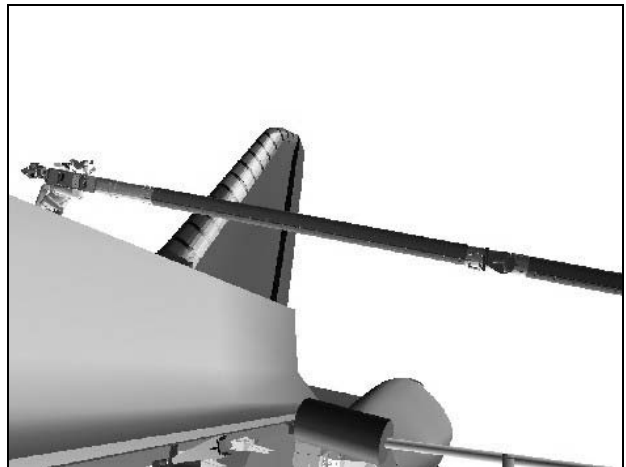
	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-1043	+260	-214	66	29	139	2
	SY	SP	EP	WP	WY	WR	
√	-58.4	+40.2	-20.0	-25.9	+47.3	-167.0	

BRAKES – ON (tb-ON)

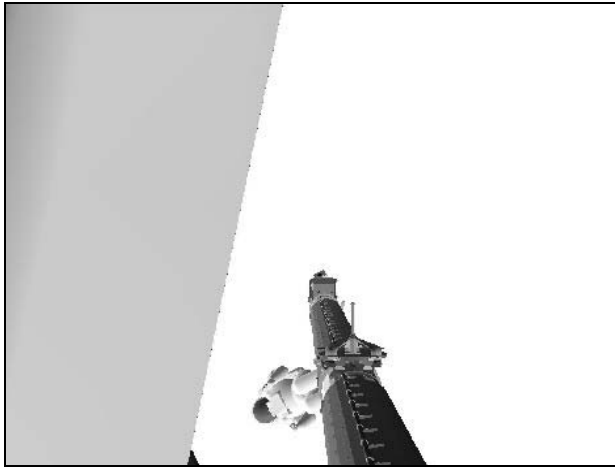
Give EV GO to SHOOT LOWER STBD T-Seals 8 & 9 – two shots each



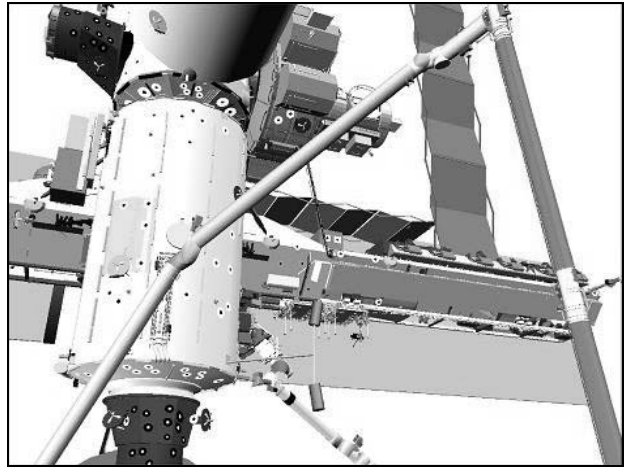
ELBOW (-152,-9)



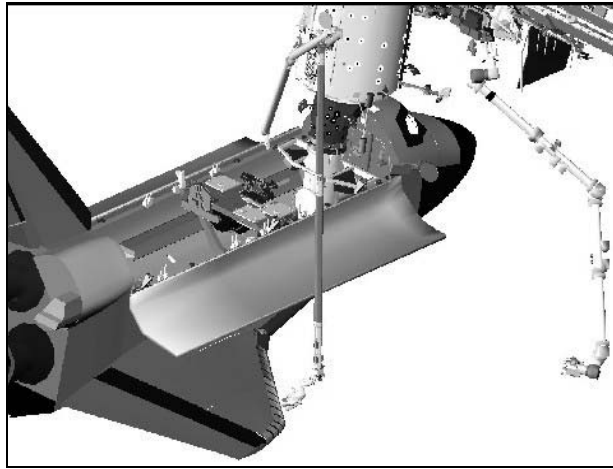
LAB (-16,-8)



RSC



CCTV B (22,24)



BIRD'S EYE

19. STBD T-SEAL 7

a. Mnvr to Lower 8 & 9 Pre-Posn

NOTE

At end of mnvr OBSS-to-PLBD = 70.0 in,
Upper Arm-to-Lab = 25.9 in

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

Drive WR (+) to -162.7 to PRE STBD T-SEALS 8 & 9 posn

√	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-1034	+304	-219	64	33	141	2
√	SY	SP	EP	WP	WY	WR	
	-58.4	+40.2	-20.0	-25.9	+47.3	-162.7	

b. Mnvr to Lower 7 Pre-Posn

NOTE

At end of mnvr OBSS-to-PLBD = 71.4 in,
Upper Arm-to-Lab = 29.9 in

SM 94 PDRS CONTROL

END POS – ITEM 18 -1 0 3 5 +2 9 2 -2 1 7 EXEC
ATT – ITEM 21 +7 2 +4 1 +1 2 2 EXEC
CMD CK – ITEM 25 EXEC (GOOD)

MODE – OPR CMD, ENTER (READY It on)

AUTO SEQ – PROCEED (IN PROG It on)

When AUTO SEQ IN PROG It – off,

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-1035	+292	-217	72	41	122	2
	SY	SP	EP	WP	WY	WR	
√	-58.0	+36.7	-13.7	-26.3	+64.2	-162.4	

c. Mnvr to Lower 7 Shoot Posn

NOTE

At end of mnvr OBSS-to-PLBD = 34.2 in,
Upper Arm-to-Lab = 29.9 in

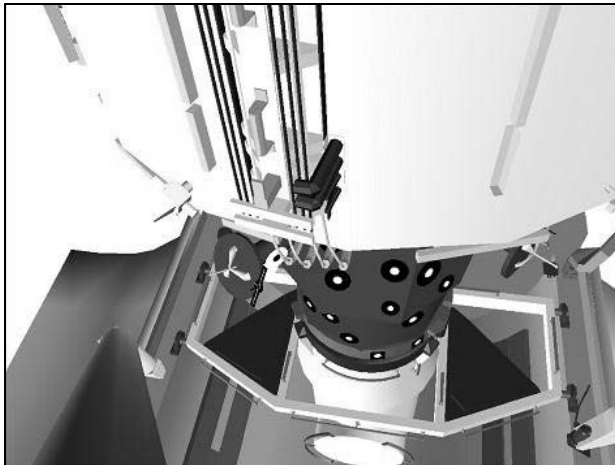
MODE – SINGLE, ENTER

Drive WR (-) to -167.0 to SHOOT STBD T-SEAL 7 posn

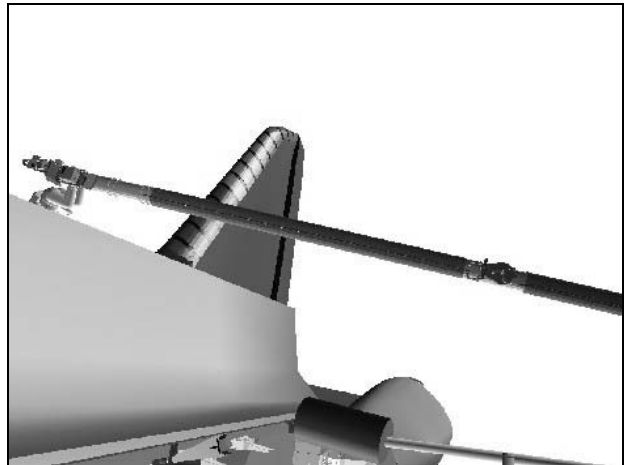
	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-1030	+244	-210	73	37	121	2
	SY	SP	EP	WP	WY	WR	
√	-58.0	+36.7	-13.7	-26.3	+64.2	-167.0	

BRAKES – ON (tb-ON)

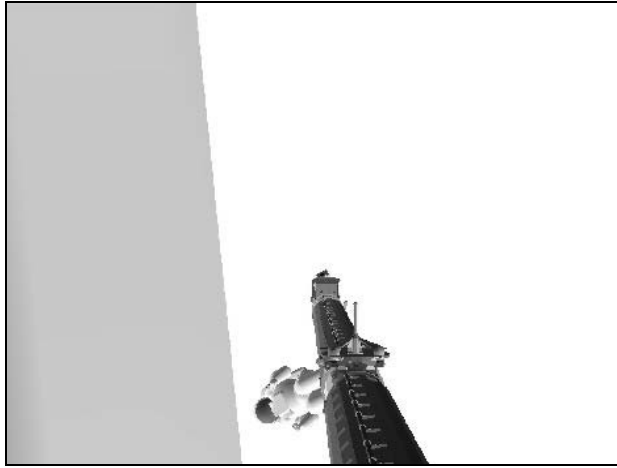
Give EV GO to SHOOT LOWER STBD T-Seal 7 – two shots



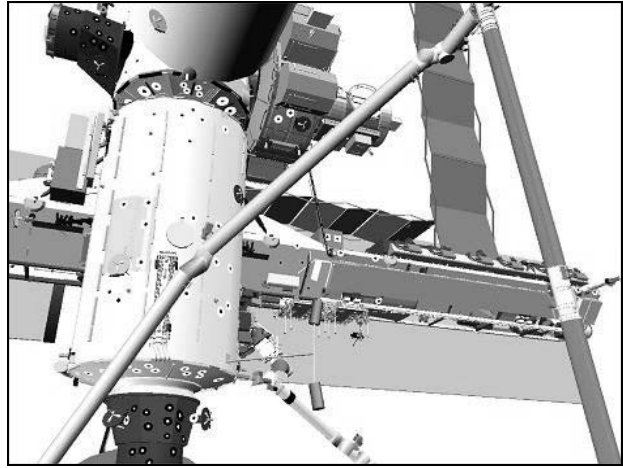
ELBOW (-152,-4)



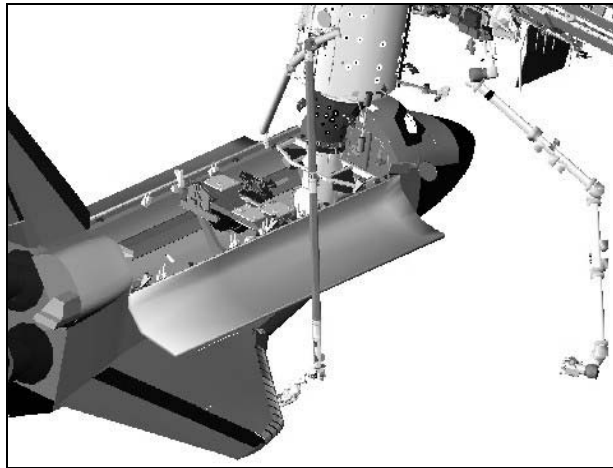
LAB (-16,-8)



RSC



CCTV B (22,24)



BIRD'S EYE

20. STBD T-SEAL 6
 a. Mnvr to Clear for OCAS

NOTE

At end of mnvr OBSS-to-PLBD = 71.1 in,
 Upper Arm-to-Lab = 29.9 in

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

Drive WR (+) to -162.4 to PRE STBD T-SEAL 7 posn

√	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-1035	+292	-217	72	41	122	2
	SY	SP	EP	WP	WY	WR	
√	-58.0	+36.7	-13.7	-26.3	+64.2	-162.4	

- b. Mnvr to Lower 6 Pre-Posn

NOTE

At end of mnvr OBSS-to-PLBD = 78.3 in,
 Upper Arm-to-Lab PDGF = 40.6 in

SM 94 PDRS CONTROL

END POS – ITEM 18 -1 0 4 6 +3 0 6 -2 4 1 EXEC
 ATT – ITEM 21 +8 4 +5 4 +1 0 6 EXEC
 CMD CK – ITEM 25 EXEC (GOOD)

A6U

DAP: VERN(FREE)

MODE – OPR CMD, ENTER (READY It on)

AUTO SEQ – PROCEED (IN PROG It on)

When AUTO SEQ IN PROG It – off,

√	X	Y	Z	PITCH	YAW	ROLL	PLID
	-1046	+306	-241	84	54	106	2
√	SY	SP	EP	WP	WY	WR	
	-56.2	+62.7	-52.2	-7.7	+74.8	-157.0	[1]

[1] WY approaches singularity

c. Mnvr to Lower 6 Shoot Posn

NOTE

At end of mnvr OBSS-to-PLBD = 28.5 in,
Upper Arm-to-Lab PDGF = 40.6 in

MODE – SINGLE, ENTER

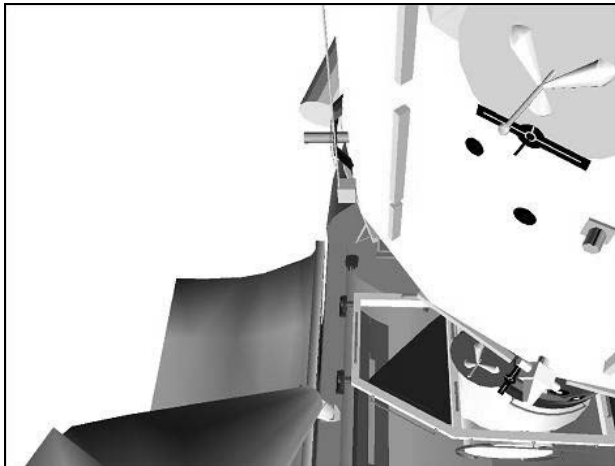
Drive WR (-) to -163.4 to SHOOT STBD T-SEAL 6 posn

√	X	Y	Z	PITCH	YAW	ROLL	PLID
	-1024	+245	-221	82	48	106	2
√	SY	SP	EP	WP	WY	WR	
	-56.2	+62.7	-52.2	-7.7	+74.8	-163.4	[1]

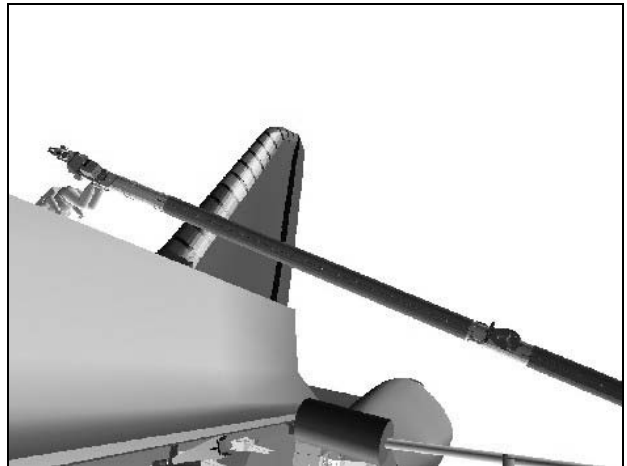
[1] WY approaches singularity

BRAKES – ON (tb-ON)

Give EV GO to SHOOT LOWER STBD T-Seal 6 – two shots



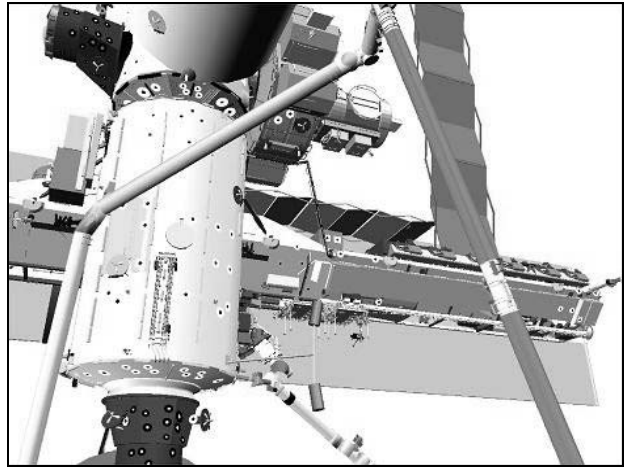
ELBOW (-141,-20)



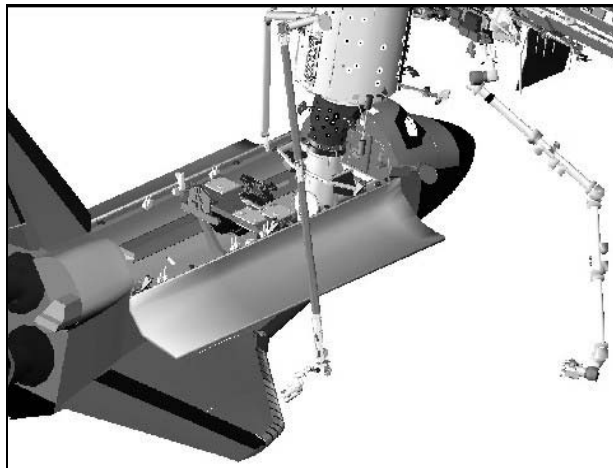
LAB (-16,-8)



RSC



CCTV B (22,24)



BIRD'S EYE

21. STBD T-SEALS 1-5

a. Mnvr to Lower 6 Pre-Posn

NOTE

At end of mnvr OBSS-to-PLBD = 78.3 in,
Upper Arm-to-Lab PDGF = 40.6 in

BRAKES – OFF (tb-OFF)

MODE – SINGLE, ENTER

Drive WR (+) to -157.0 to PRE STBD T-SEAL 6 posn

	X	Y	Z	PITCH	YAW	ROLL	PLID
√	-1046	+306	-241	84	54	106	2
	SY	SP	EP	WP	WY	WR	
√	-56.2	+62.7	-52.2	-7.7	+74.8	-157.0	[1]

[1] WY approaches singularity

b. Mnvr to Lower 1-5 Pre-Posn

NOTE

At end of mnvr OBSS-to-Stbd Wing = 69.6 in,
Upper Arm-to-PMA GF = 39.6 in

SM 94 PDRS CONTROL

END POS – ITEM 18 -1092 +318 -108 EXEC

ATT – ITEM 21 +83 +45 +101 EXEC

CMD CK – ITEM 25 EXEC (GOOD)

MODE – OPR CMD, ENTER (READY It on)

AUTO SEQ – PROCEED (IN PROG It on)

When AUTO SEQ IN PROG It – off,

	X	Y	Z	PITCH	YAW	ROLL	PLID
√	-1092	+318	-108	83	45	101	2
	SY	SP	EP	WP	WY	WR	
√	-52.4	+24.6	-16.6	-6.4	+74.6	-165.9	[1]

[1] WY approaches singularity

c. Mnvr to Lower 1-5 Shoot Posn

NOTE

Expect SINGULAR It while driving WY. At end of mnvr
OBSS-to-PLBD = 63.9 in, Upper Arm-to-PMA GF = 39.6 in

A6U

√DAP: VERN(FREE)

MODE – SINGLE, ENTER

Drive WY (+) to +108.0 to STBD T-SEALS 1-5 SHOOT posn

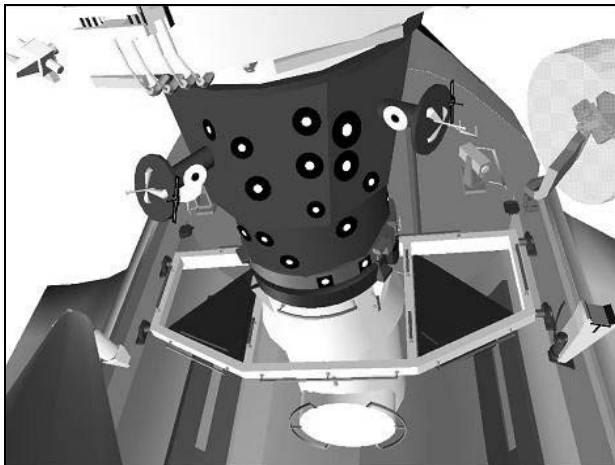
	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-1002	+297	-99	103	44	57	2
	SY	SP	EP	WP	WY	WR	
√	-52.4	+24.6	-16.6	-6.4	+108.0	-165.9	

BRAKES – ON (tb-ON)

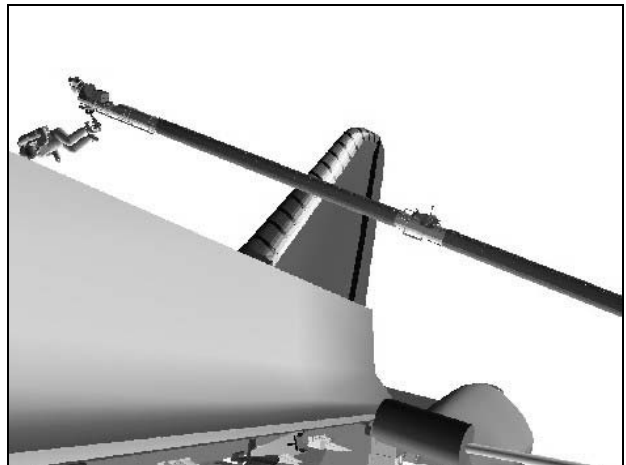
A6U

DAP: as reqd

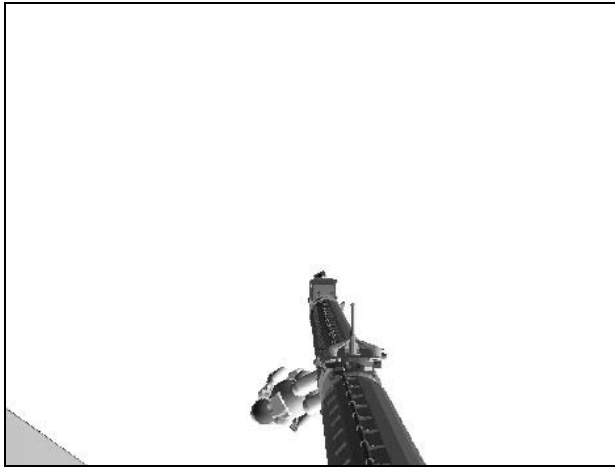
Give EV GO to SHOOT LOWER STBD T-Seals 1-5 – two shots



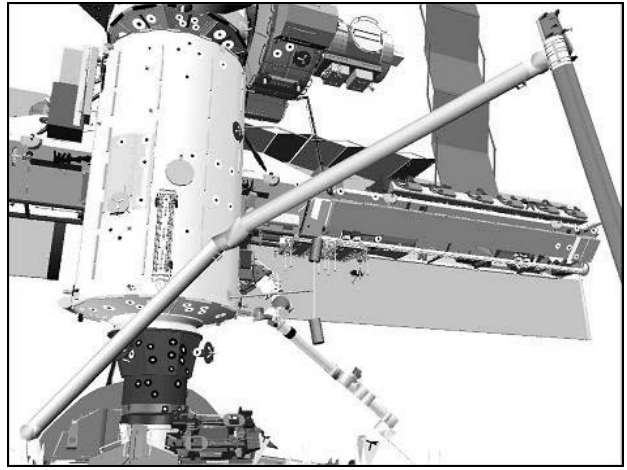
ELBOW (-146,-8)



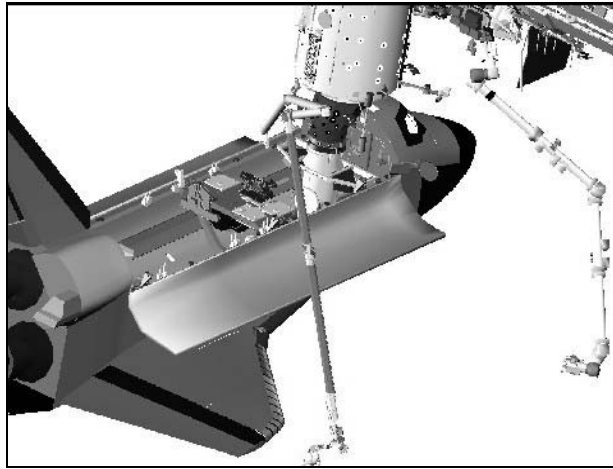
LAB (-23,-8)



RSC



CCTV B (22,18)



BIRD'S EYE

22. EV1 EGRESS/APFR RECONFIG

a. Mnvr to Lower 1-5 Clearance Posn

√DAP: VERN(FREE)

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

Mnvr to STBD T-SEALS 1-5 CLEARANCE posn:

STBD
 T-SEALS 1-5
 SHOOT Posn
 1: WY –
 2: WR +
 STBD
 T-SEAL 1-5
 CLEAR Posn

SY	SP	EP	WP	WY	WR	
-52.4	+24.6	-16.6	-6.4	+108.0	-165.9	
				+74.6		[1]
					-87.0	
-52.4	+24.6	-16.6	-6.4	+74.6	-87.0	
X	Y	Z	PITCH	YAW	ROLL	PL ID
-1338	+757	-698	256	59	313	2

[1] Expect SINGULAR It

b. MNVR to EV1 APFR Aft Reconfig 1 Posn

Sill Clearance Views	Cameras
OBSS-to-PLBD	C, B, Tip Elbow
RMS-to-Lab	C, Elbow, A

NOTE

At end of mnvr OBSS-to-Port Sill = 98.2 in

SM 94 PDRS CONTROL

END POS – ITEM 18 -1 1 6 2 +1 1 5 -4 8 1 EXEC
 ATT – ITEM 21 +2 6 4 +5 5 +2 7 5 EXEC
 CMD CK – ITEM 25 EXEC (GOOD)

MODE – OPR CMD, ENTER (READY It on)

AUTO SEQ – PROCEED (IN PROG It on)

When AUTO SEQ IN PROG It – off:

BRAKES – ON (tb-ON)

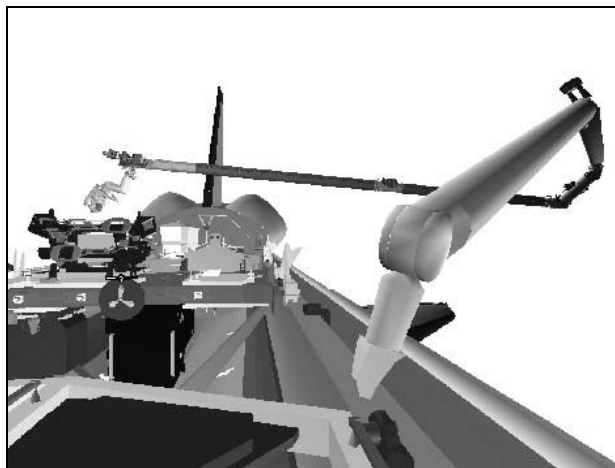
√	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-1162	+115	-481	264	55	275	2
	SY	SP	EP	WP	WY	WR	
√	+43.2	+34.4	-18.8	-49.3	-26.9	-103.9	

A6U

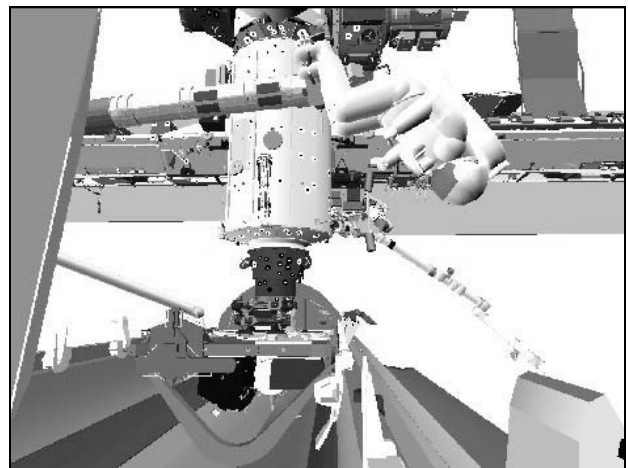
DAP: as reqd

Give EV GO to EGRESS/Reconfig APFR (4, FF, L, 12) and INGRESS

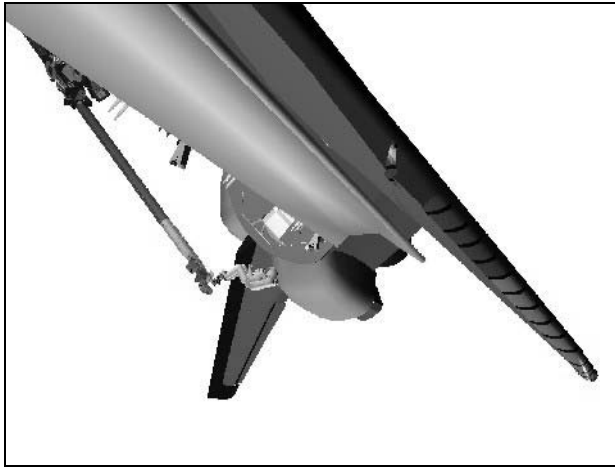
GCA if reqd



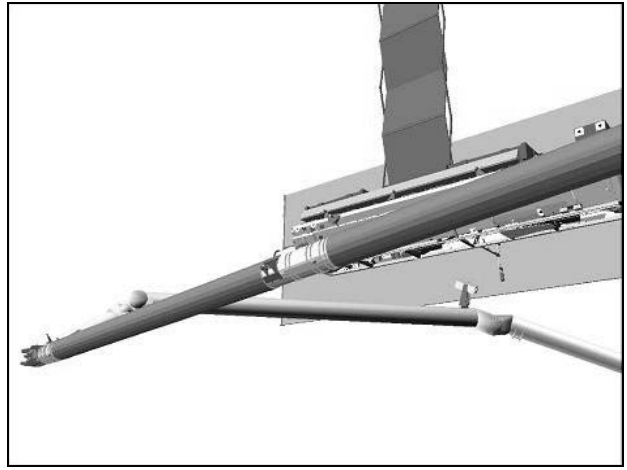
CCTV A (9,0)



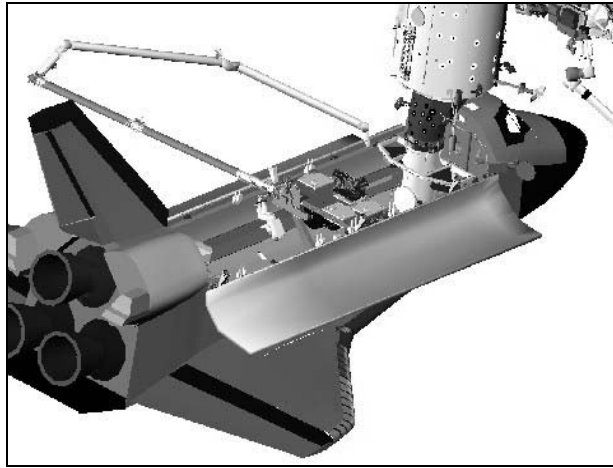
CCTV C (-2,10)



TIP ELBOW (-80,-10)



CCTV B (-40,18)



BIRD'S EYE

23. SILL CLEARANCE MNVR

NOTE

At end of mnvr, OBSS-to-Port Sill = 98.2 in

SM 94 PDRS CONTROL

PL ID - ITEM 3 +3 EXEC

INIT ID - ITEM 24 +3 EXEC

BRAKES - OFF (tb-OFF)

MODE - ORB LD, ENTER

Reconfigure arm to EV1 OCAS CLEARANCE posn:

X	Y	Z	PITCH	YAW	ROLL	PL ID
-1165	+146	-516	267	25	273	3
SY	SP	EP	WP	WY	WR	
+43.2	+34.4	-18.8	-49.3	-26.9	-103.9	

BRAKES - ON (tb-ON)

24. MNVR TO APEX 19-22 SHOOT POSN

Aft Posn APEX Clearance Views	Cameras
OBSS-to-PLBD/Stbd Wing	D, Lab
RMS-to-Lab	Elbow, A

NOTE

At end of mnvr Upper Arm-to-PMA GF = 48.2 in

SM 94 PDRS CONTROL

END POS – ITEM 18 -1 2 3 8 +6 2 5 -3 0 2 EXEC
 ATT – ITEM 21 +3 5 3 +5 9 +2 1 9 EXEC
 CMD CK – ITEM 25 EXEC (GOOD)

BRAKES – OFF (tb-OFF)

MODE – OPR CMD, ENTER (READY lt on)

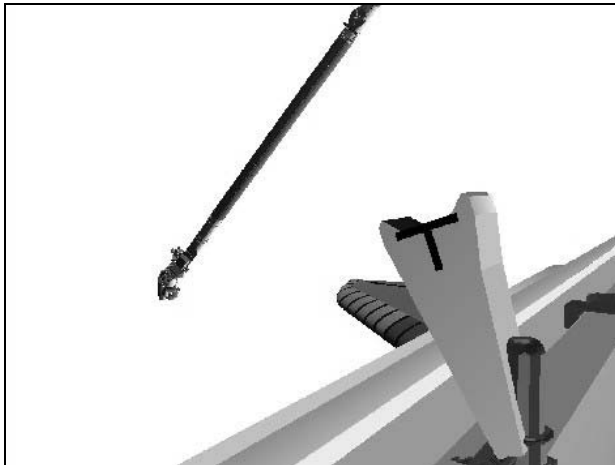
AUTO SEQ – PROCEED (IN PROG lt on)

When AUTO SEQ IN PROG lt – off:

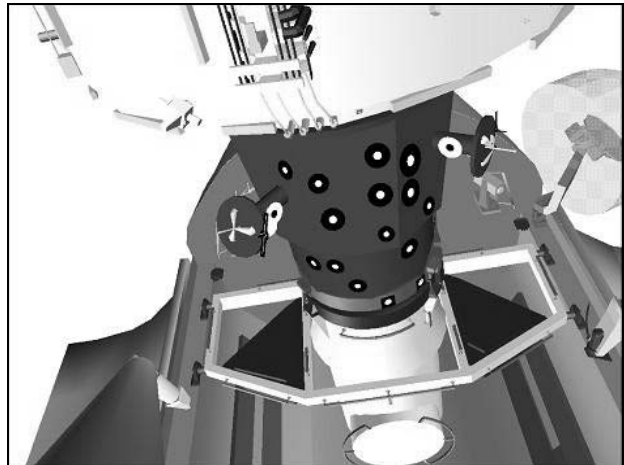
BRAKES – ON (tb-ON)

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-1238	+625	-302	353	59	219	3
	SY	SP	EP	WP	WY	WR	
√	-44.0	+31.7	-24.3	+7.1	+35.4	-143.9	

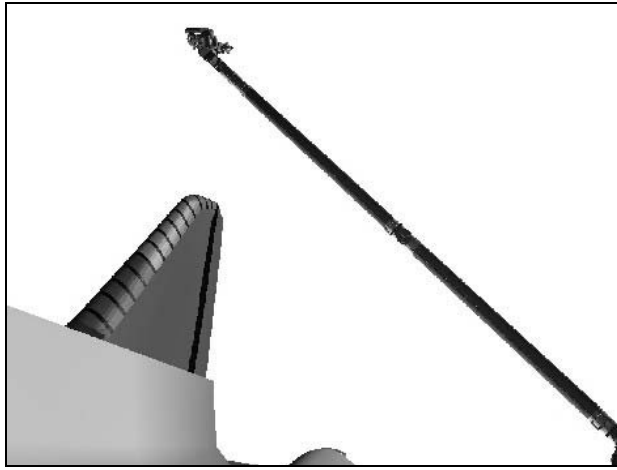
Give EV GO to SHOOT APEX of STBD T-Seals 19-22 – two shots



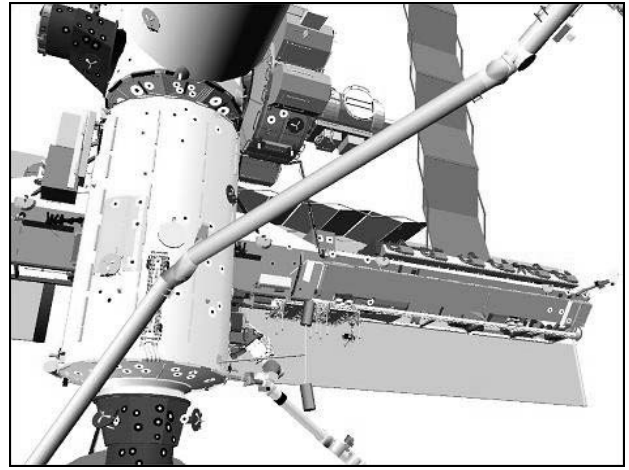
CCTV D (-30,-5)



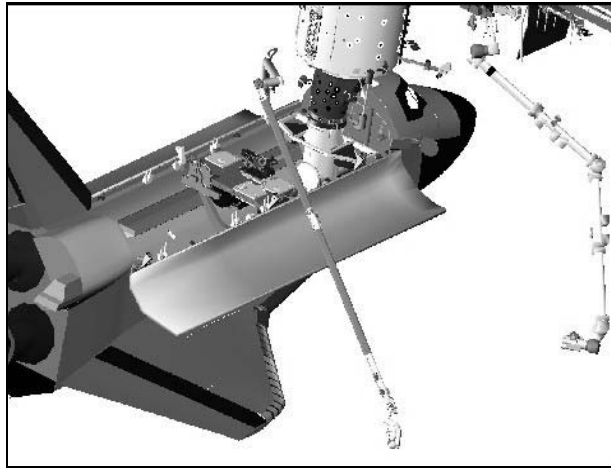
ELBOW (-146,-8)



LAB (-9,-2)



CCTV B (23,24)



BIRD'S EYE

25. MNVR TO APEX 18-20 SHOOT POSN

NOTE

At end of mnvr Upper Arm-to-PMA GF = 43.2 in

SM 94 PDRS CONTROL

END POS – ITEM 18 -1 1 7 2 +5 9 8 -2 7 6 EXEC

ATT – ITEM 21 +3 5 9 +5 8 +2 0 9 EXEC

CMD CK – ITEM 25 EXEC (GOOD)

BRAKES – OFF (tb-OFF)

MODE – OPR CMD, ENTER (READY It on)

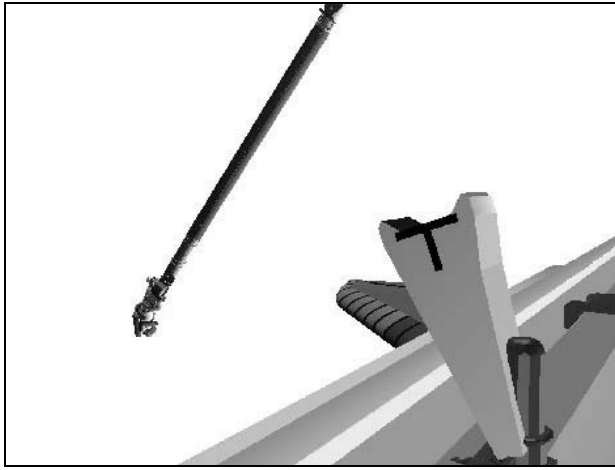
AUTO SEQ – PROCEED (IN PROG It on)

When AUTO SEQ IN PROG It – off:

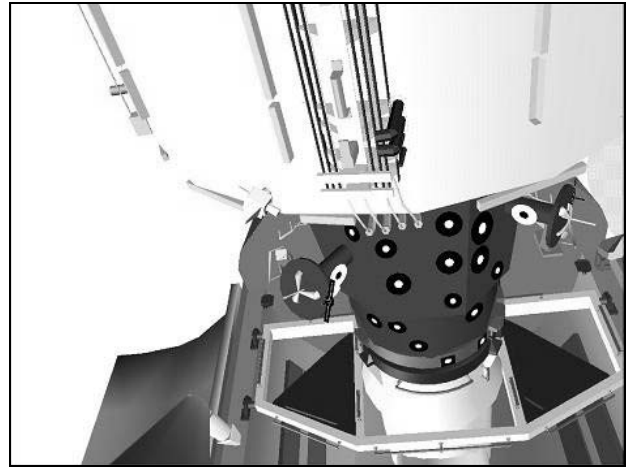
BRAKES – ON (tb-ON)

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-1172	+598	-276	359	58	209	3
	SY	SP	EP	WP	WY	WR	
√	-48.2	+37.7	-31.1	+3.9	+38.7	-146.8	

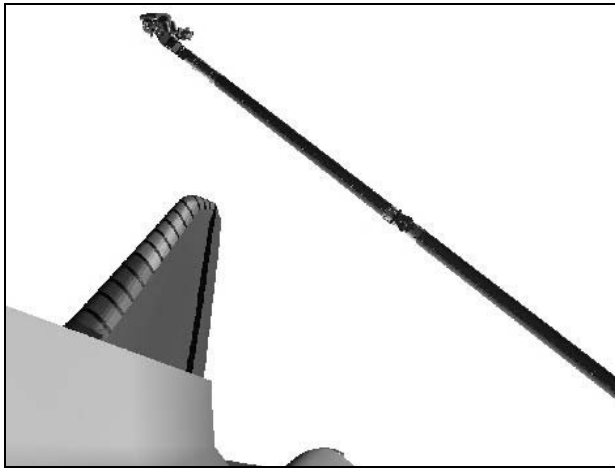
Give EV GO to SHOOT APEX of STBD T-Seals 18-20 – two shots



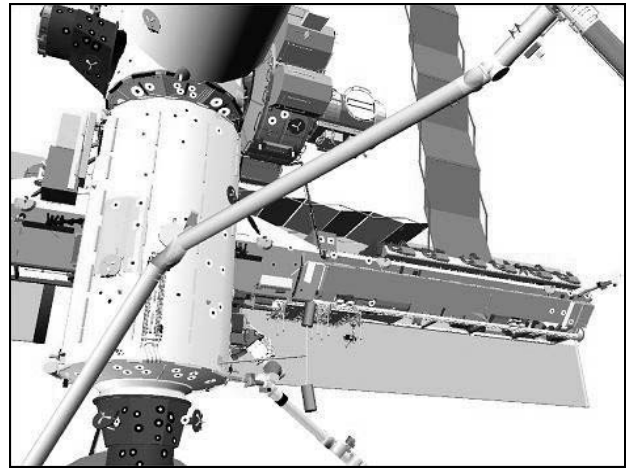
CCTV D (-30,-5)



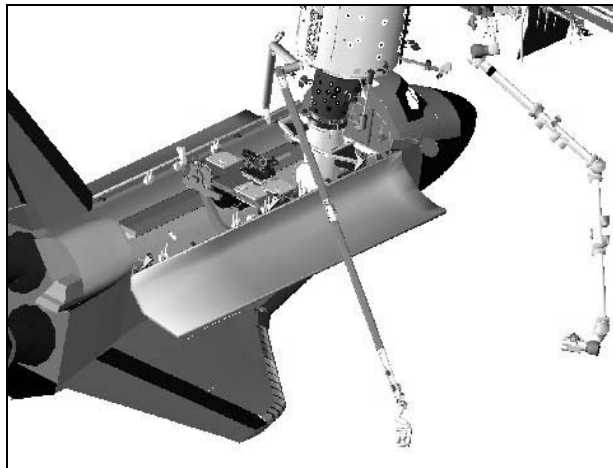
ELBOW (-146,-8)



LAB (-9,-2)



CCTV B (-23,24)



BIRD'S EYE

26. MNVR TO APEX 14-18 SHOOT POSN

NOTE

At end of mnvr Lower Arm-to-Lab = 62.0 in

SM 94 PDRS CONTROL

END POS – ITEM 18 -1071 +500 -270 EXEC

ATT – ITEM 21 +356 +44 +214 EXEC

CMD CK – ITEM 25 EXEC (GOOD)

BRAKES – OFF (tb-OFF)

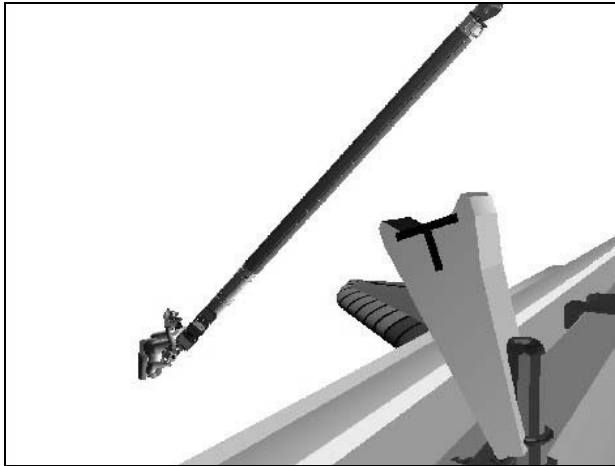
MODE – OPR CMD, ENTER (READY lt on)

AUTO SEQ – PROCEED (IN PROG It on)

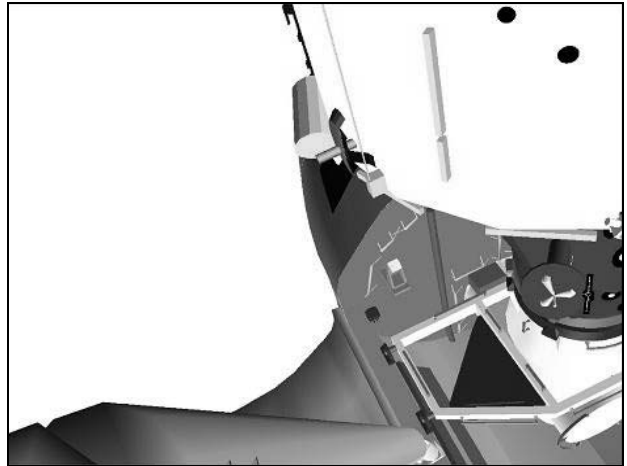
When AUTO SEQ IN PROG It – off:
BRAKES – ON (tb-ON)

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-1071	+500	-270	356	44	214	3
	SY	SP	EP	WP	WY	WR	
√	-32.4	+68.4	-75.2	+12.4	+10.6	-136.6	

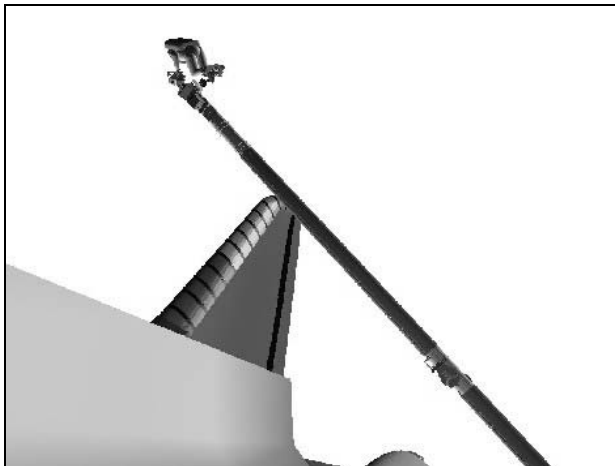
Give EV GO to SHOOT APEX of STBD T-Seals 14-18 – two shots



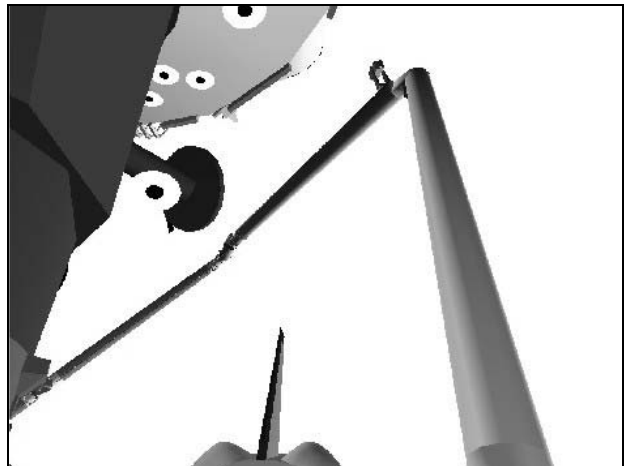
CCTV D (-30,-5)



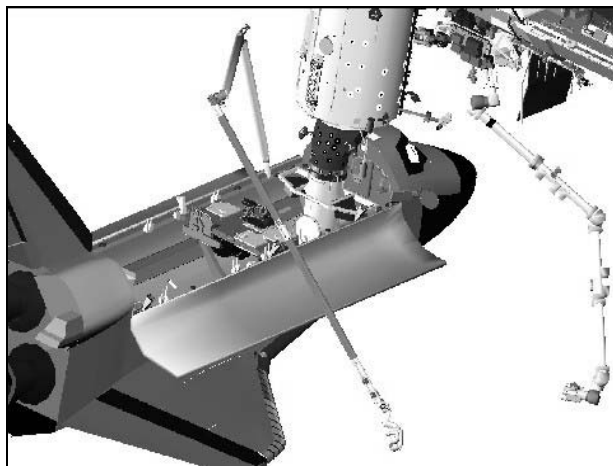
ELBOW (-130,-26)



LAB (-16,-2)



CCTV A (1,33)



BIRD'S EYE

27. MNVR TO APEX 1-4 SHOOT POSN

NOTE

At end of mnvr OBSS-to-PLBD = 75.0 in,
Lower Arm-to-Lab = 52.5 in

SM 94 PDRS CONTROL

END POS – ITEM 18 -924 +355 -243 EXEC

ATT – ITEM 21 +8 +73 +180 EXEC

CMD CK – ITEM 25 EXEC (GOOD)

BRAKES – OFF (tb-OFF)

MODE – OPR CMD, ENTER (READY It on)

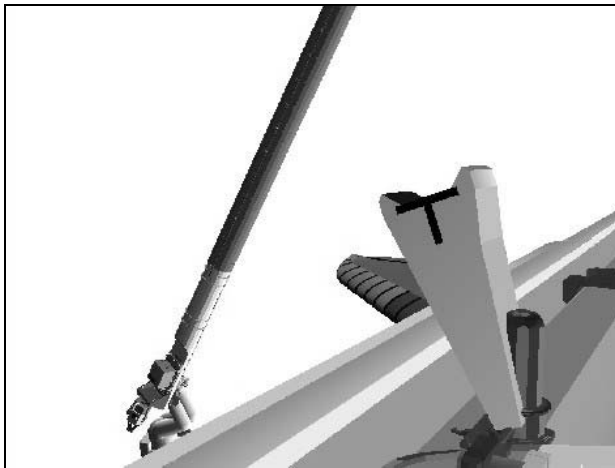
AUTO SEQ – PROCEED (IN PROG It on)

When AUTO SEQ IN PROG It – off:

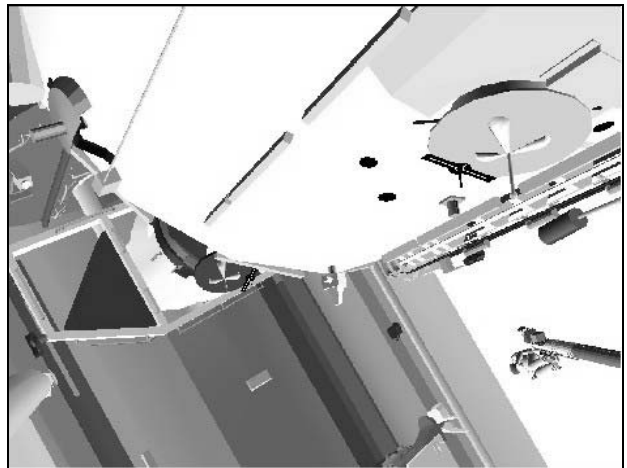
BRAKES – ON (tb-ON)

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-924	+355	-243	8	73	180	3
	SY	SP	EP	WP	WY	WR	
√	-63.1	+81.9	-72.3	-20.6	+73.7	-140.9	

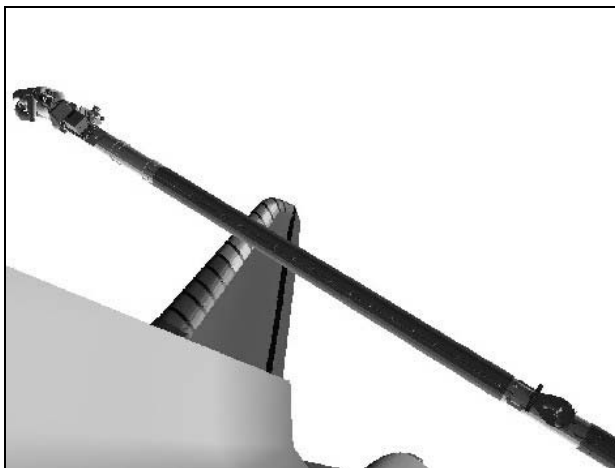
Give EV GO to SHOOT APEX of STBD T-Seals 1-4 – two shots



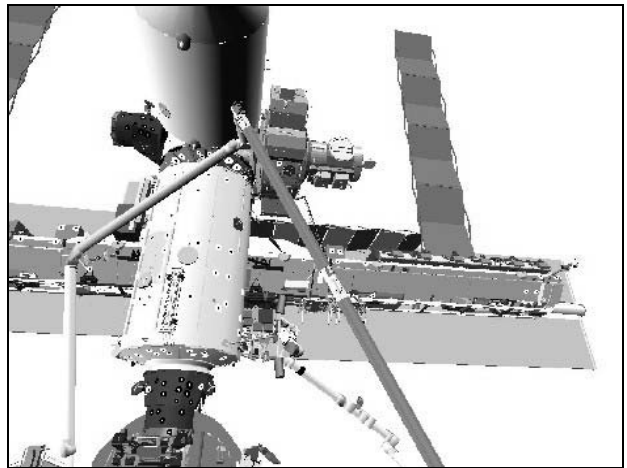
CCTV D (-30,-7)



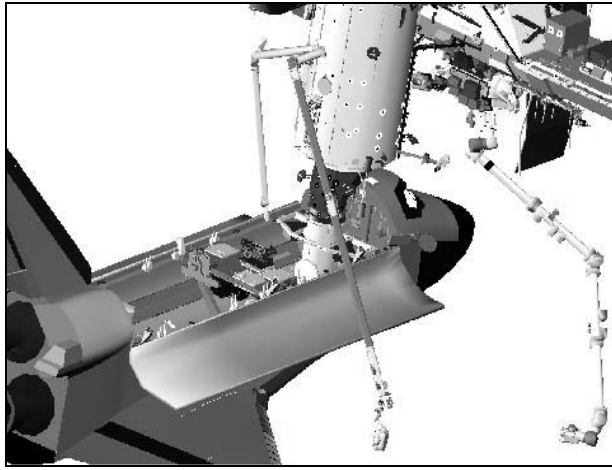
ELBOW (-85,-36)



LAB (-16,-2)



CCTV C (10,27)



BIRD'S EYE

28. MNVR TO SILL CLEARANCE

a. Mnvr to PLBD Clearance Posn

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

Drive WR (+) to -100.0 to PLBD CLEARANCE posn

√	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-1010	+647	-572	294	52	267	3
	SY	SP	EP	WP	WY	WR	
√	-63.1	+81.9	-72.3	-20.6	+73.7	-100.0	

b. Mnvr to EV1 APFR Aft Reconfig 2 Posn

Aft Posn APEX Clearance Views	Cameras
OBSS-to-PLBD	C, Tip Elbow, A
RMS-to-Lab	C, Elbow, A

NOTE

At end of mnvr OBSS-to-Port Sill = 97.4 in

SM 94 PDRS CONTROL

END POS – ITEM 18 -1165 +146 -516 EXEC

ATT – ITEM 21 +267 +25 +273 EXEC

CMD CK – ITEM 25 EXEC (GOOD)

MODE – OPR CMD, ENTER (READY It on)

AUTO SEQ – PROCEED (IN PROG It on)

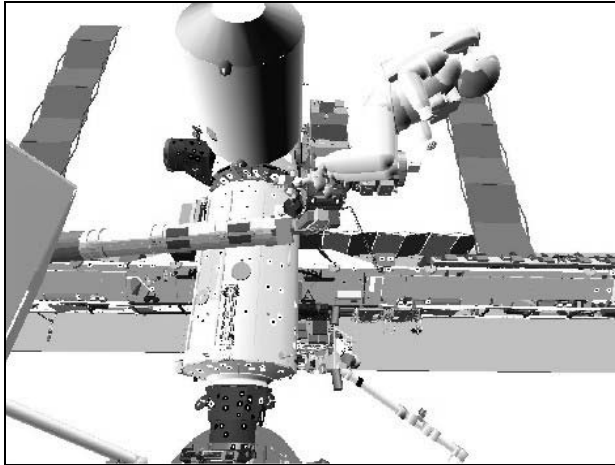
When AUTO SEQ IN PROG It – off:

BRAKES – ON (tb-ON)

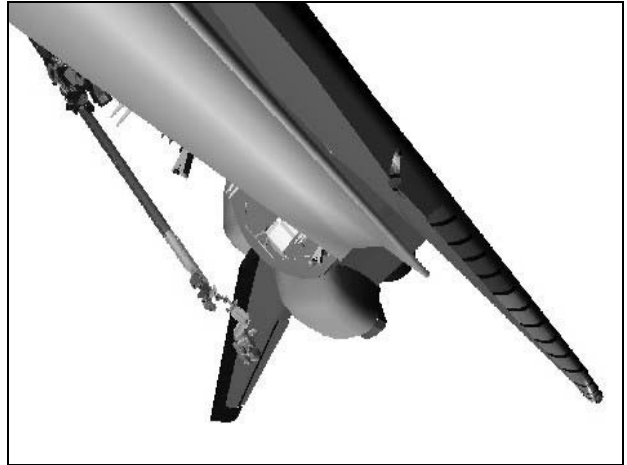
√	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-1165	+146	-516	267	25	273	3
	SY	SP	EP	WP	WY	WR	
√	+43.0	+33.3	-17.2	-49.8	-27.1	-103.8	

Give EV GO to EGRESS/RECONFIG APFR (1, MM, H, 2)/INGRESS

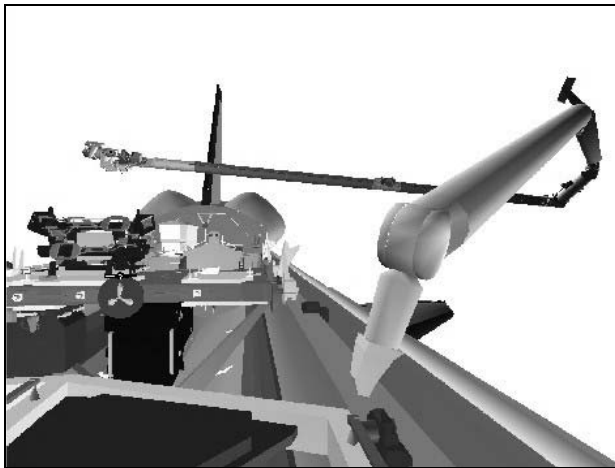
GCA if reqd



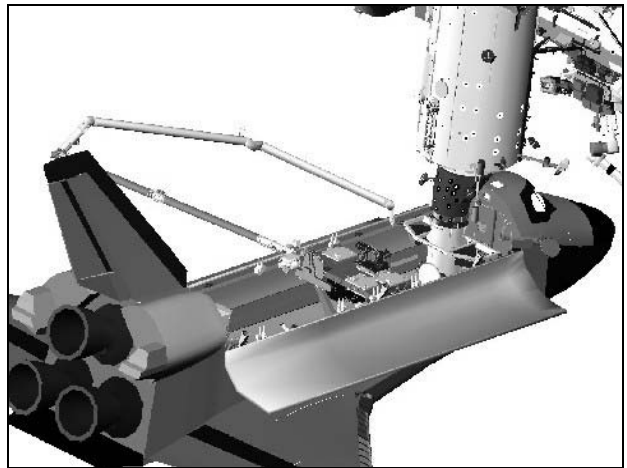
CCTV C (2,13)



TIP ELBOW (-80,-10)



CCTV A (9,0)



BIRD'S EYE

29. STBD T-SEALS 16-22

a. OCAS Clearance Posn

SM 94 PDRS CONTROL

PL ID - ITEM 3 +4 EXEC

INIT ID - ITEM 24 +4 EXEC

BRAKES - OFF (tb-OFF)

MODE - ORB LD, ENTER

Reconfigure arm to SILL CLEARANCE posn:

X	Y	Z	PITCH	YAW	ROLL	PL ID
-1192	+174	-553	256	341	291	4
SY	SP	EP	WP	WY	WR	
+43.0	+33.3	-17.2	-49.8	-27.1	-103.8	

b. Mnvr to Upper 16-22 Shoot Posn

Aft Posn APEX Clearance Views	Cameras
OBSS-to-PLBD/Stbd Wing	D, Lab
RMS-to-Lab	Elbow, A

NOTE

At end of mnvr Upper Arm-to-Lab = 59.7 in,
Lower Arm-to-MPLM = 86.0 in

SM 94 PDRS CONTROL

END POS – ITEM 18 -1 2 6 3 +5 4 1 -4 8 7 EXEC
 ATT – ITEM 21 +2 7 6 +1 8 +3 0 0 EXEC
 CMD CK – ITEM 25 EXEC (GOOD)

MODE – OPR CMD, ENTER (READY lt on)

AUTO SEQ – PROCEED (IN PROG lt on)

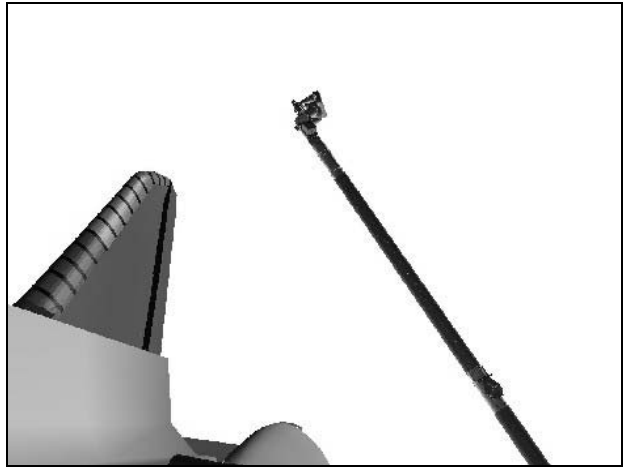
When AUTO SEQ IN PROG lt – off:
 BRAKES – ON (tb-ON)

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-1263	+541	-487	276	18	300	4
	SY	SP	EP	WP	WY	WR	
√	-36.4	+70.2	-56.9	-11.6	+56.4	-120.1	

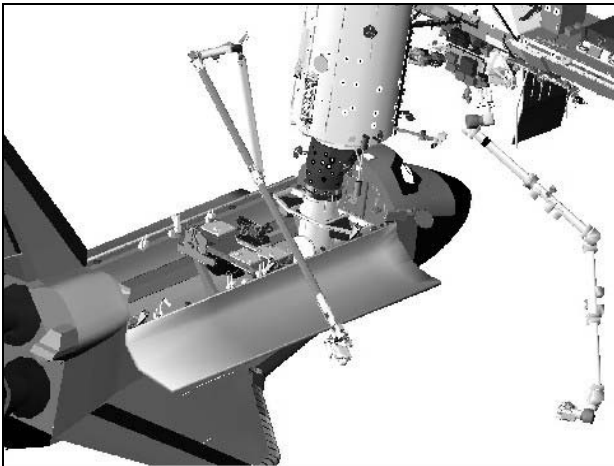
Give EV GO to SHOOT UPPER STBD T-Seals 16-19 and 19-22 – two shots each



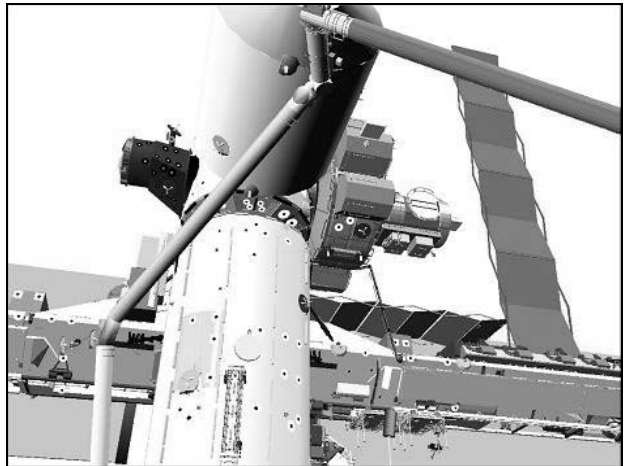
ELBOW (-122,-30)



LAB (-5,-4)



BIRD'S EYE



CCTV B (15,34)

30. OCAS TO CLEAR TAIL POSN

Mnvr to Port Clearance Views	Cameras
RMS-to-Lab	A
OBSS-to-Tail	Elbow, Tip Elbow

NOTE

During OCAS: APFR on OBSS-to-Tail = 65.2 in, Upper Arm-to-Lab = 59.7 in. After OCAS: OBSS-to-Tail = 104.4 in, Upper Arm-to-PMA2 GF = 73.0 in

SM 94 PDRS CONTROL

END POS – ITEM 18 -1 6 9 3 -1 8 -9 7 9 EXEC
 ATT – ITEM 21 +2 9 9 +3 4 7 +3 5 4 EXEC
 CMD CK – ITEM 25 EXEC (GOOD)

BRAKES – OFF (tb-OFF)

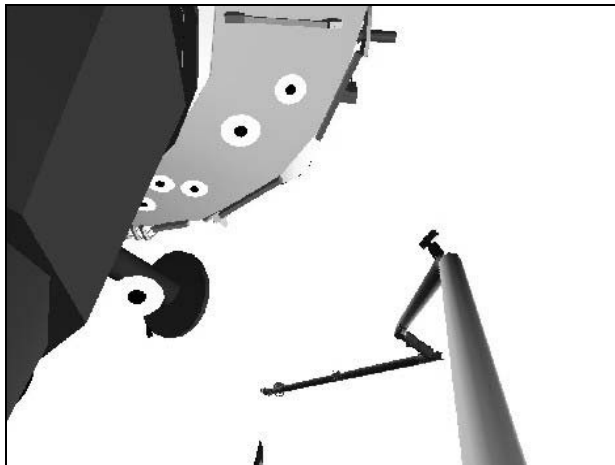
MODE – OPR CMD, ENTER (READY It on)

AUTO SEQ – PROCEED (IN PROG It on)

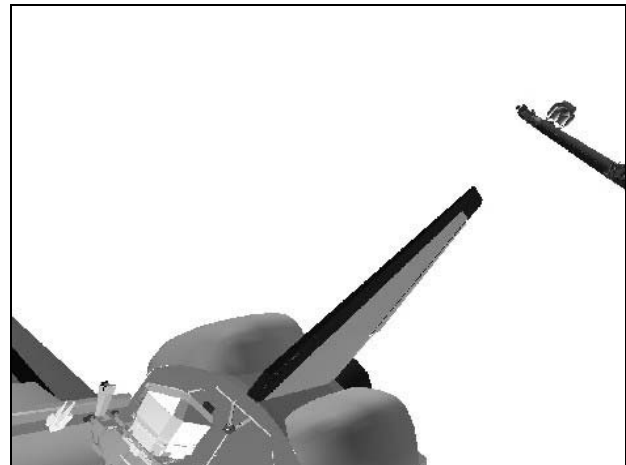
When AUTO SEQ IN PROG It – off:

BRAKES – ON (tb-ON)

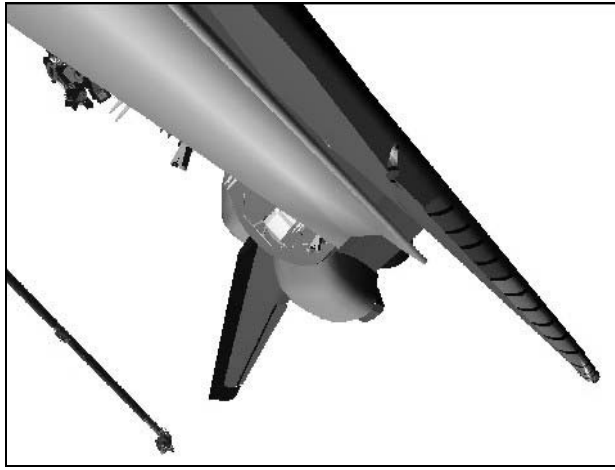
	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-1693	-18	-979	299	347	354	4
	SY	SP	EP	WP	WY	WR	
√	-1.0	+61.5	-35.6	-23.0	+58.8	-65.0	



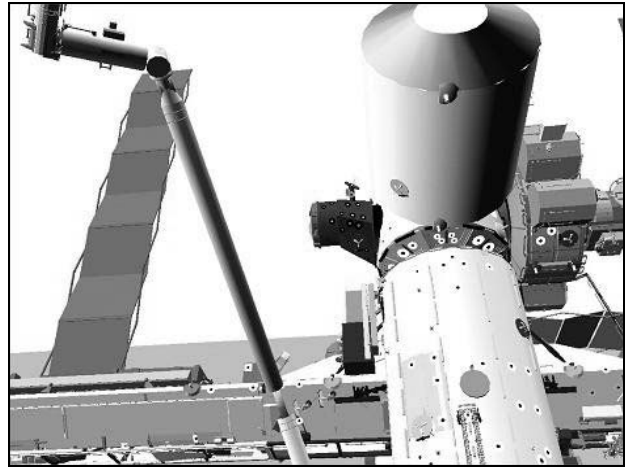
CCTV A (3,47)



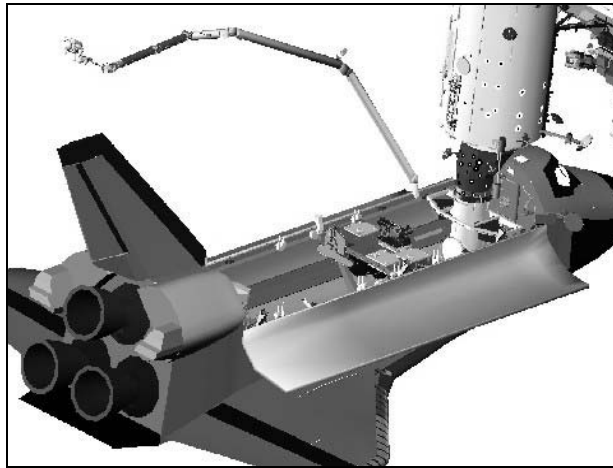
ELBOW (-40,-10)



TIP ELBOW (-80,-10)



CCTV B (-7,38)



BIRD'S EYE

- 31. PORT T-SEAL 16-22
 - a. Mnvr to Clearance Posn

Upper Clearance Views	Cameras
RMS-to-Lab	A
OBSS-to-Tail	Elbow, Tip Elbow
OBSS-to-PLBD/Wing	Elbow, B

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

Drive SY (+) to +25.0 to CLEARANCE posn

√	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-1706	-461	-822	293	358	16	4
	SY	SP	EP	WP	WY	WR	
√	+25.0	+61.5	-35.6	-23.0	+58.8	-65.0	

b. Mnvr to Upper 16-22 Shoot Posn

NOTE

At end of mnvr APFR on OBSS-to-Wing = 208.4 in,
Upper Arm-to-Lab = 62.9 in

SM 94 PDRS CONTROL

END POS – ITEM 18 -1 2 9 7 -5 0 1 -5 1 1 EXEC
ATT – ITEM 21 +2 7 8 +3 4 2 +1 5 EXEC
CMD CK – ITEM 25 EXEC (GOOD)

MODE – OPR CMD, ENTER (READY It on)

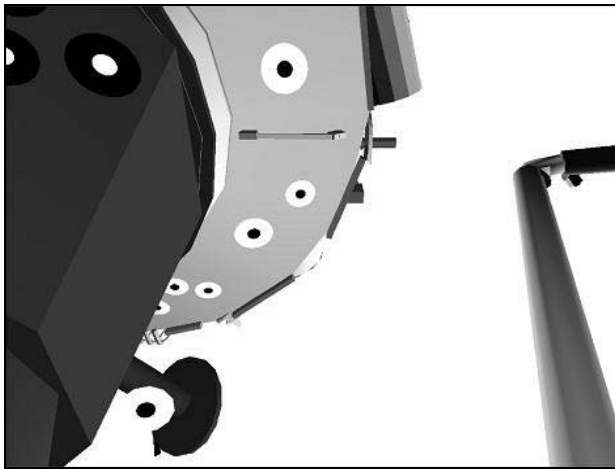
AUTO SEQ – PROCEED (IN PROG It on)

When AUTO SEQ IN PROG It – off:

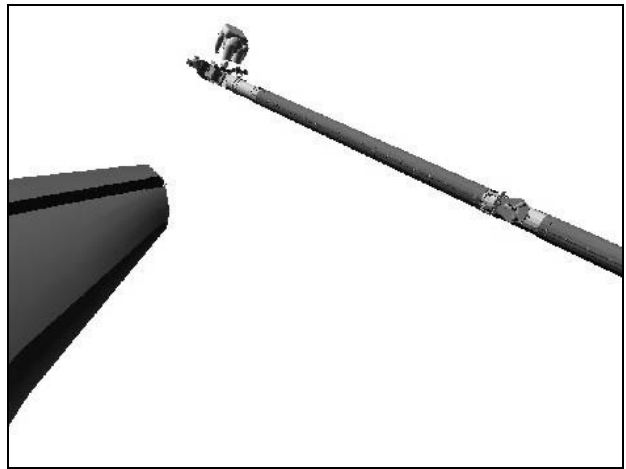
BRAKES – ON (tb-ON)

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-1297	-501	-511	278	342	15	4
	SY	SP	EP	WP	WY	WR	
√	+101.8	+88.7	-85.7	-18.6	-15.8	-81.2	

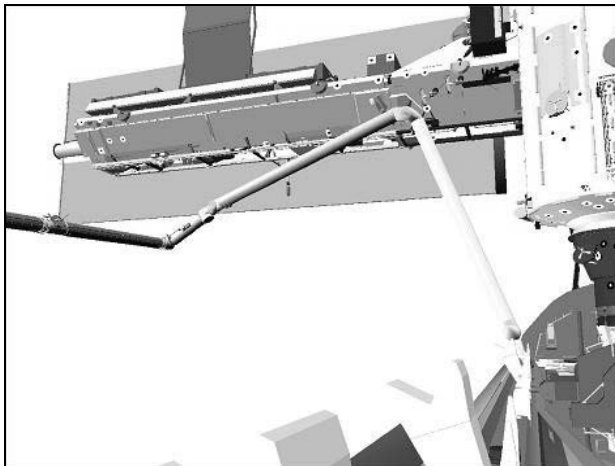
Give EV GO to SHOOT UPPER PORT T-Seals 16-19 and 19-22 – two shots each



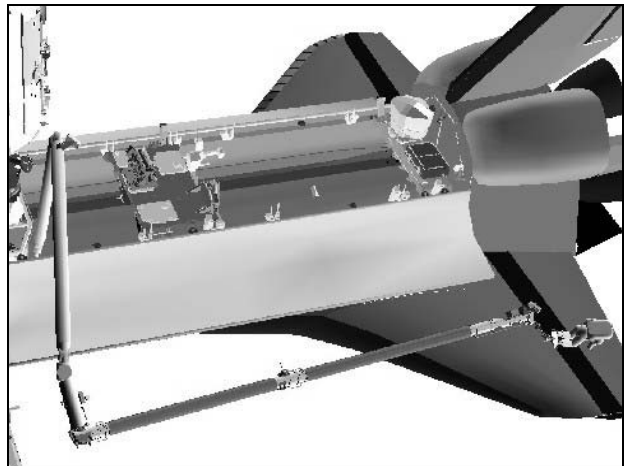
CCTV A (0,60)



ELBOW (-60,17)



CCTV B (-18,9)



BIRD'S EYE

32. MNVN TO EV1 APFR AFT RECONFIG 3 POSN

Sill Clearance Views	Cameras
OBSS-to-PLBD	A, B
RMS-to-Lab	A, B

NOTE

At end of mnvr OBSS-to-Port Sill = 60.5 in

SM 94 PDRS CONTROL

END POS – ITEM 18 -1 1 7 6 -8 0 -4 8 9 EXEC

ATT – ITEM 21 +2 8 0 +4 +3 1 5 EXEC

CMD CK – ITEM 25 EXEC (GOOD)

BRAKES – OFF (tb-OFF)

MODE – OPR CMD, ENTER (READY lt on)

AUTO SEQ – PROCEED (IN PROG lt on)

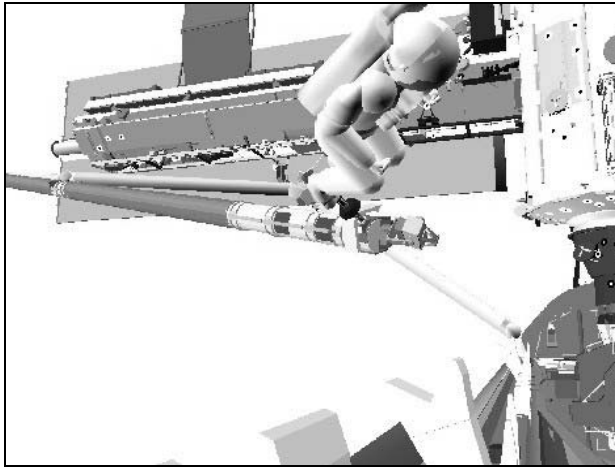
When AUTO SEQ IN PROG lt – off:

BRAKES – ON (tb-ON)

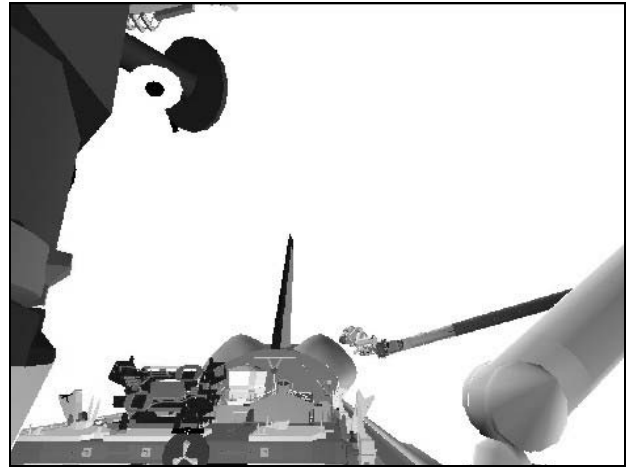
	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-1176	-80	-489	280	4	315	4
	SY	SP	EP	WP	WY	WR	
√	+80.1	+55.3	-30.4	-19.1	-49.4	-95.4	

Give EV GO to EGRESS/Adjust APFR (1, MM, H, 12)/INGRESS

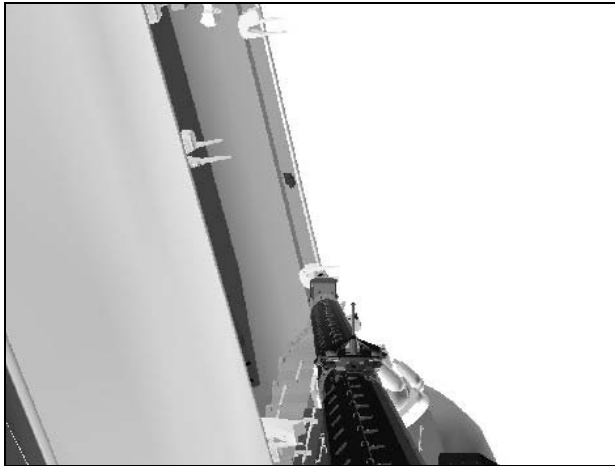
GCA if reqd



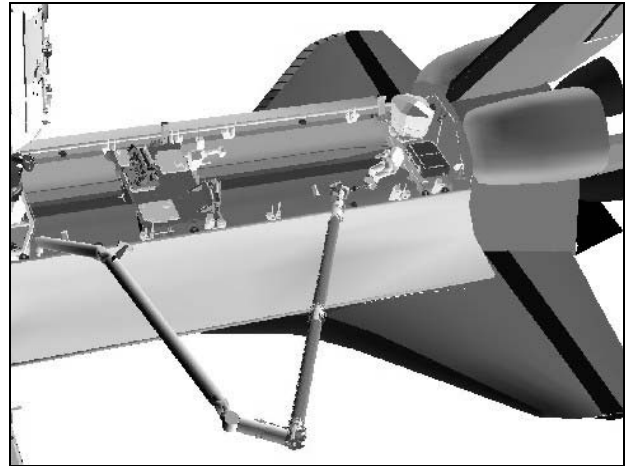
CCTV B (-20,9)



CCTV A (0,20)



RSC



BIRD'S EYE

33. PORT T-SEALS 17-19

- a. Mnvr to Port Sill Clearance Posn
 BRAKES – OFF (tb-OFF)
 MODE – ORB LD, ENTER

Reconfigure arm to PORT SILL CLEARANCE posn:

X	Y	Z	PITCH	YAW	ROLL	PL ID
-1182	-77	-529	282	1	316	4
SY	SP	EP	WP	WY	WR	
+80.1	+55.3	-30.4	-19.1	-49.4	-92.0	

- b. Mnvr to Apex 17-19 Shoot Posn

APEX Clearance Views	Cameras
OBSS-to-PLBD	A, Elbow, RSC
RMS-to-Lab	B

NOTE

At end of mnvr OBSS-to-Port Wing = 211.5 in,
 Upper Arm-to-Truss = 124.7 in

SM 94 PDRS CONTROL

END POS – ITEM 18 -1 1 3 7 -5 8 9 -2 9 2 EXEC
 ATT – ITEM 21 +2 7 9 +3 4 4 +2 7 EXEC
 CMD CK – ITEM 25 EXEC (GOOD)

MODE – OPR CMD, ENTER (READY It on)

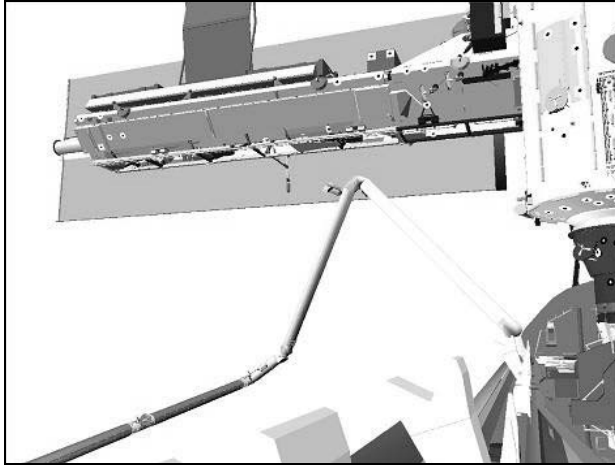
AUTO SEQ – PROCEED (IN PROG It on)

When AUTO SEQ IN PROG It – off:

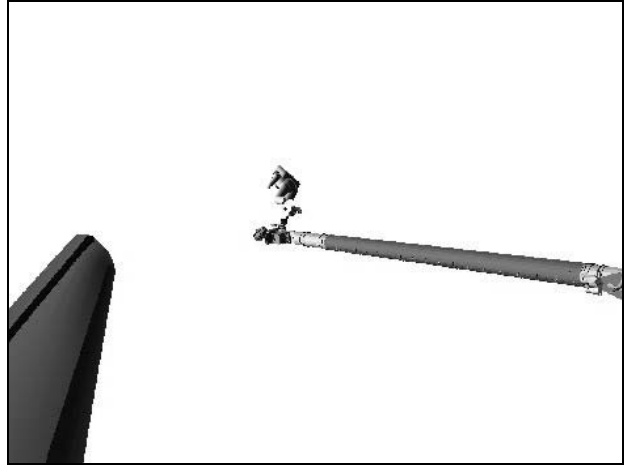
BRAKES – ON (tb-ON)

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-1137	-589	-292	279	344	27	4
	SY	SP	EP	WP	WY	WR	
√	+122.3	+62.7	-95.3	+16.3	-24.4	-82.2	

Give EV GO to SHOOT APEX of PORT T-Seals 17-19 – two shots



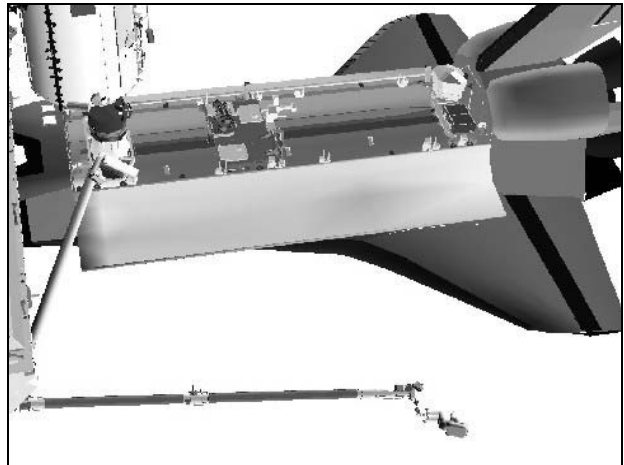
CCTV B (-20,9)



ELBOW (-70,25)



RSC



BIRD'S EYE

34. MNVR TO PORT APEX 19-22 SHOOT POSN

NOTE

At end of mnvr OBSS-to-Port Wing = 170 in,
Upper Arm-to-Lab = 93.2 in

SM 94 PDRS CONTROL

END POS – ITEM 18 -1199 -588 -291 EXEC

ATT – ITEM 21 +279 +343 +26 EXEC

CMD CK – ITEM 25 EXEC (GOOD)

BRAKES – OFF (tb-OFF)

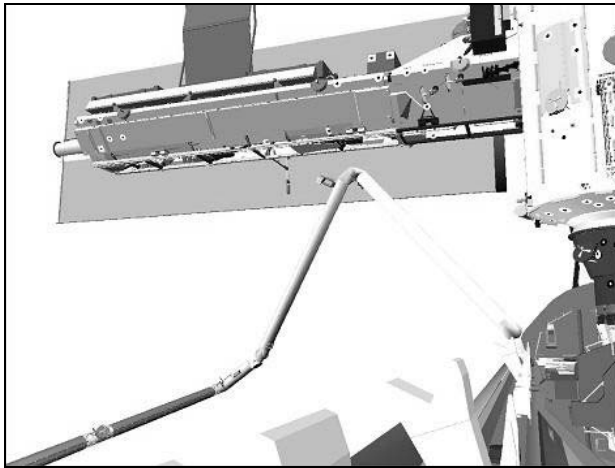
MODE – OPR CMD, ENTER (READY It on)

AUTO SEQ – PROCEED (IN PROG It on)

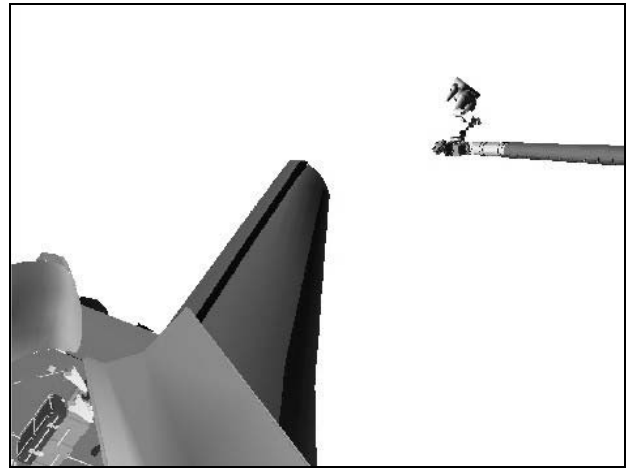
When AUTO SEQ IN PROG It – off:
BRAKES – ON (tb-ON)

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-1199	-588	-291	279	343	26	4
	SY	SP	EP	WP	WY	WR	
√	+113.2	+66.1	-99.6	+17.3	-16.7	-80.3	

Give EV GO to SHOOT APEX of PORT T-Seals 19-20 and 20-22 – two shots each



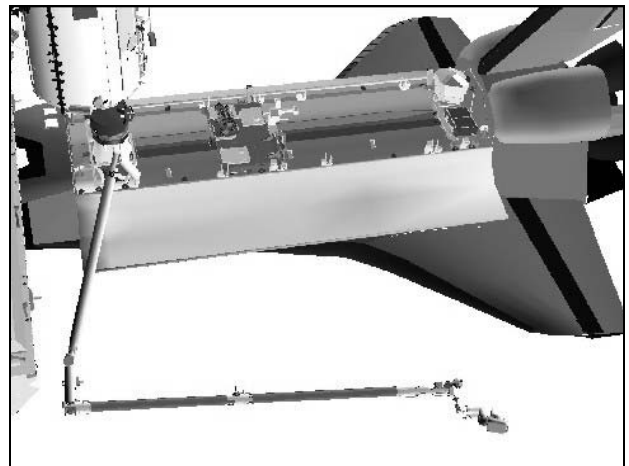
CCTV B (-20,9)



ELBOW (-82,20)



RSC



BIRD'S EYE

35. MNVR FOR APFR RECONFIG

a. Mnvr to Pre OCAS to Port Posn

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

Mnvr to PRE OCAS TO PORT posn:

APEX SHOOT
1: EP +
2: SY –
PRE OCAS

SY	SP	EP	WP	WY	WR	
+113.2	+66.1	-99.6	+17.3	-16.7	-80.3	
		-50.0				
+71.0						
+71.0	+66.1	-50.0	+17.3	-16.7	-80.3	
X	Y	Z	PITCH	YAW	ROLL	PL ID
-1438	-296	-596	295	23	336	4

b. Mnvr to EV1 APFR Aft Reconfig 4 Posn

Port Sill Clearance Views	Cameras
OBSS-to-PLBD	A, B, RSC
RMS-to-Lab	A, B

NOTE

At end of mnvr OBSS-to-Port Sill = 61.2 in

SM 94 PDRS CONTROL

END POS – ITEM 18 -1 1 7 5 -6 3 -4 9 7 EXEC

ATT – ITEM 21 +2 8 1 +3 +3 1 3 EXEC

CMD CK – ITEM 25 EXEC (GOOD)

MODE – OPR CMD, ENTER (READY lt on)

AUTO SEQ – PROCEED (IN PROG lt on)

When AUTO SEQ IN PROG lt – off:

BRAKES – ON (tb-ON)

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-1175	-63	-497	281	3	313	4
	SY	SP	EP	WP	WY	WR	
√	+77.8	+54.2	-29.4	-19.3	-49.4	-95.1	

Give EV GO to EGRESS/Adjust APFR (1,MM, H, 9) and INGRESS

GCA if reqd

36. PORT T-SEALS 17-22

a. Mnvr to Port Sill Clearance Posn

BRAKES – OFF (tb-OFF)
MODE – ORB LD, ENTER

Reconfigure arm to PORT SILL CLEARANCE posn:

X	Y	Z	PITCH	YAW	ROLL	PL ID
-1177	-61	-510	282	2	313	4
SY	SP	EP	WP	WY	WR	
+77.8	+54.2	-29.4	-19.3	-49.4	-94.0	

b. Mnvr to Lower 17-22 Pre-Posn

LOWER Clearance Views	Cameras
OBSS-to-PLBD	A, Elbow, RSC
RMS-to-Lab	B
RMS-to-PLBD	A, Elbow

NOTE

At end of mnvr Lower Arm-to-PLBD = 121.7 in

SM 94 PDRS CONTROL

END POS – ITEM 18 -1 2 2 2 -7 1 7 -3 6 4 EXEC
 ATT – ITEM 21 +3 1 2 +3 5 1 +4 6 EXEC
 CMD CK – ITEM 25 EXEC (GOOD)

MODE – OPR CMD, ENTER (READY lt on)

AUTO SEQ – PROCEED (IN PROG lt on)

When AUTO SEQ IN PROG lt – off,

X	Y	Z	PITCH	YAW	ROLL	PL ID
√ -1222	-717	-364	312	351	46	4
	SY	SP	EP	WP	WY	WR
√ +90.1	+25.5	-103.6	+57.6	+5.2	-38.6	

c. Mnvr to Lower 17-22 Shoot Posn

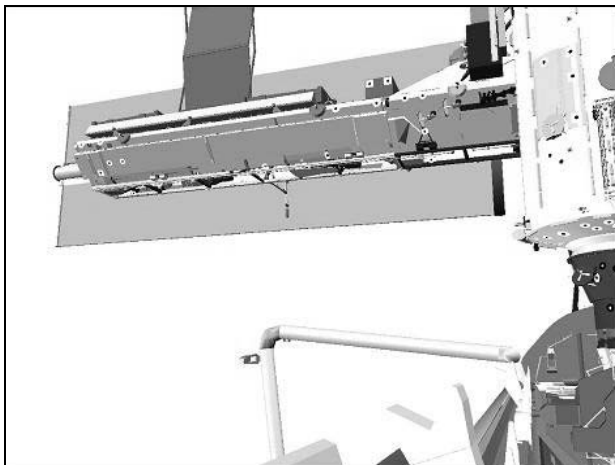
MODE – SINGLE, ENTER

Drive WR (-) to -73.7 to PORT T-SEALS 17-22 SHOOT posn

X	Y	Z	PITCH	YAW	ROLL	PL ID
√ -1341	-475	-58	280	338	27	4
	SY	SP	EP	WP	WY	WR
√ +90.1	+25.5	-103.6	+57.6	+5.2	-73.7	

BRAKES – ON (tb-ON)

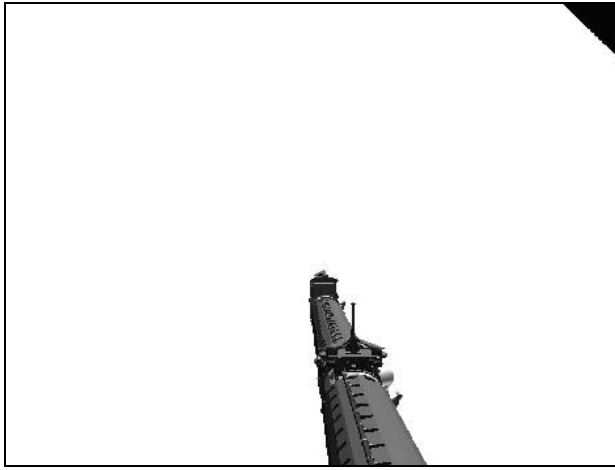
Give EV GO to SHOOT LOWER PORT T-Seals 17-19 and 19-22 two shots each



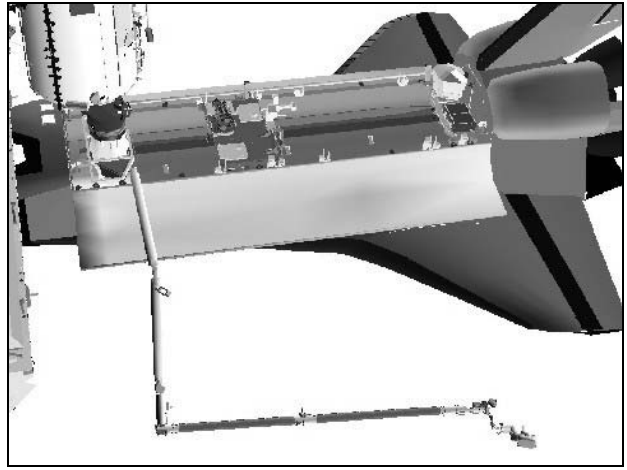
CCTV B (-20,11)



ELBOW (-19,-26)



RSC



BIRD'S EYE

37. MNVR TO CLEAN-UP POSN

a. Mnvr to Lower 17-22 Pre-Posn

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

Drive WR (+) to -38.6 to PORT T-SEALS 17-22 SHOOT posn

√	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-1222	-717	-364	312	351	46	4
	SY	SP	EP	WP	WY	WR	
√	+90.1	+25.5	-103.6	+57.6	+5.2	-38.6	

b. OCAS to Port Sill Clearance Posn

Clean-up Clearance Views	Cameras
OBSS-to-PLBD/Sill	B, C
RMS-to-Lab	A

SM 94 PDRS CONTROL

END POS – ITEM 18 -1 1 7 7 -6 1 -5 1 0 EXEC

ATT – ITEM 21 +2 8 2 +2 +3 1 3 EXEC

CMD CK – ITEM 25 EXEC (GOOD)

MODE – OPR CMD, ENTER (READY It on)

AUTO SEQ – PROCEED (IN PROG It on)

When AUTO SEQ IN PROG It – off:

BRAKES – ON (tb-ON)

√	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-1177	-61	-510	282	2	313	4
	SY	SP	EP	WP	WY	WR	
√	+77.8	+54.2	-29.4	-19.3	-49.4	-94.0	

Give EV GO to remove PAD, WIF ADAPTER, APFR

GCA if reqd

- c. Mnvr to EV Egress Posn
 BRAKES – OFF (tb-OFF)
 MODE – ORB LD, ENTER

Reconfigure arm EV EGRESS posn:

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-1177	-61	-510	282	2	313	4
	SY	SP	EP	WP	WY	WR	
√	+77.8	+54.2	-29.4	-19.3	-49.4	-94.0	

- d. Mnvr to Port Untether Posn

NOTE

At end of mnvr OBSS-to-Port Sill = 63.4 in, OBSS-to-Stbd Sill = 79.5 in, Upper Arm-to-Lab = 81.0 in

SM 94 PDRS CONTROL

END POS – ITEM 18 -1 0 8 5 +5 4 1 -4 9 5 EXEC
 ATT – ITEM 21 +2 0 7 +3 4 5 +2 8 5 EXEC
 CMD CK – ITEM 25 EXEC (GOOD)

MODE – OPR CMD, ENTER (READY lt on)

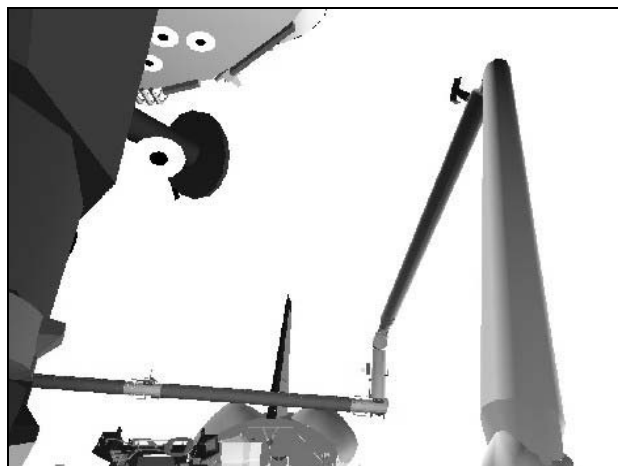
AUTO SEQ – PROCEED (IN PROG lt on)

When AUTO SEQ IN PROG lt – off:
 BRAKES – ON (tb-ON)

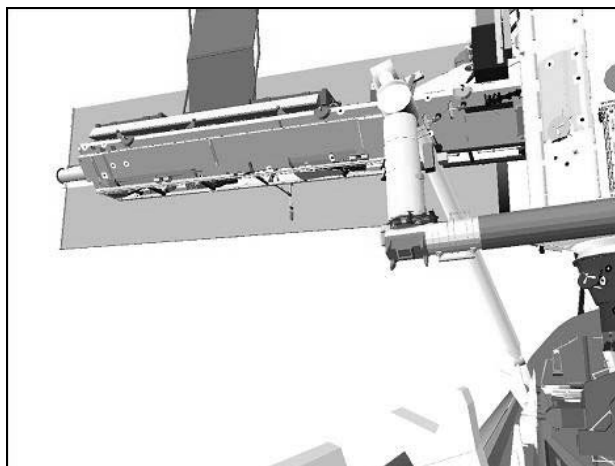
	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-1085	+541	-495	207	345	285	4
	SY	SP	EP	WP	WY	WR	
√	-1.0	+69.0	-91.0	-57.2	+15.2	-72.9	

Give EV GO to remove TETHER

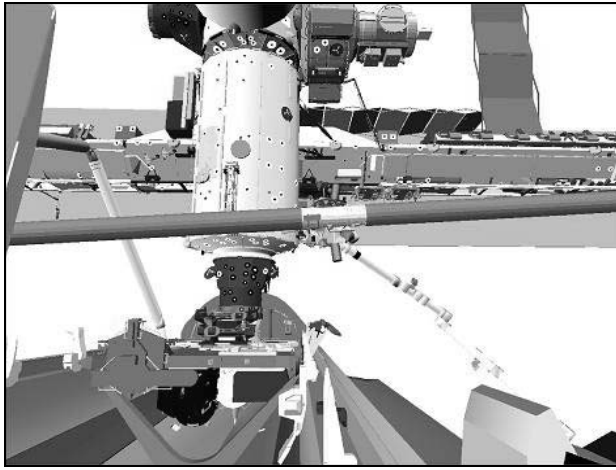
GCA if reqd



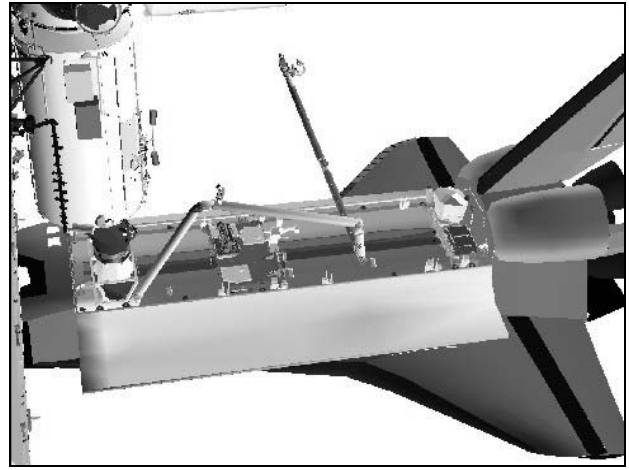
CCTV A (0,28)



CCTV B (-20,11)



CCTV C (2,12)



BIRD'S EYE

OBSS ITVC TILE ACREAGE SURVEY

1. SETUP

SM 94 PDRS CONTROL

√ PL ID, ITEM 3: 2

√ INIT ID, ITEM 24: 2

A7U CCTV – config as reqd

MON 1	SSRMS BASE ELBOW (LAB)
MON 2	RSC

2. MNVR TO STBD SCAN POSN

Mnvr to be uplinked realtime

STBD Scan Posn:

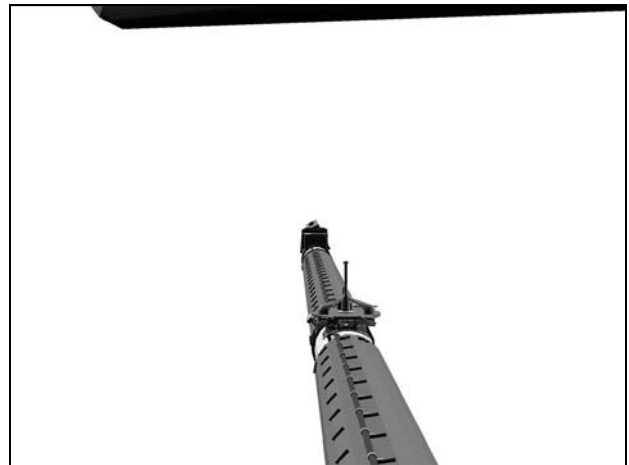
	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-1189	+391	-224	338	344	23	2
	SY	SP	EP	WP	WY	WR	
√	-53.4	+11.7	-60.6	-53.9	-24.6	+63.5	

NOTE

At STBD Scan posn, OBSS-to-Orbiter = 57 in



SSRMS BASE ELBOW (-70,0)



RSC

3. CONFIGURE OBSS ITVC FOR STBD SCAN

A7U VIDEO OUT MON2 pb – push
IN PL2(VPU) pb – push

If PTU reset reqd:

CAMR CMD PAN/TILT – HI RATE (LO within 10°)

PAN – L (to hard stop)

TILT – UP (to hard stop)

PAN/TILT – RESET

PAN: +105

TILT: -59

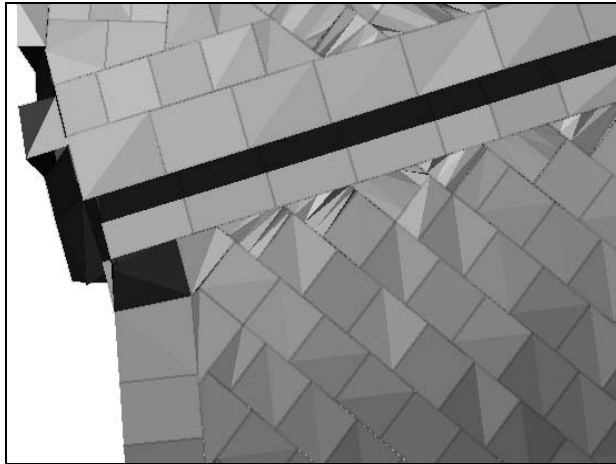
A7U √ CAMR CMD PAN/TILT – LO RATE
ZOOM: 20.0 HFOV

VIDEO OUT MUX 1 L pb – push (MIDDECK It on)

LDR1 MODE 2 pb – push (ITVC video)

VIDEO OUT MON2 pb – push

IN PL2(VPU) pb – push



OBSS ITVC (105,-59)

√MCC to verify correct sensor view

4. PERFORM STBD SCAN

On MCC GO:

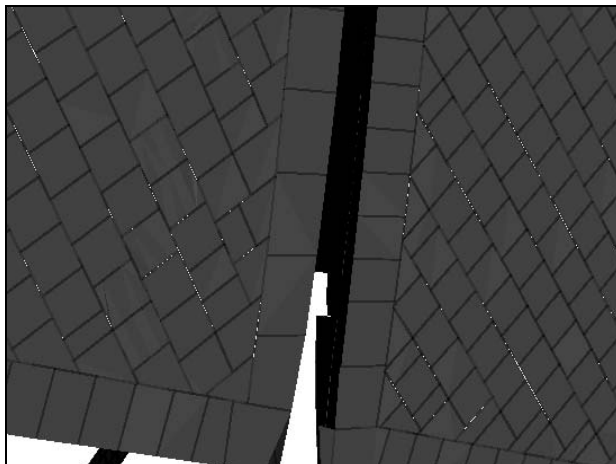
L10(VTR)

REC pb – push, hold

PLAY pb – push, simo (red ●)

Drive PTU to sweep out the survey area:

	PAN	TILT
Start Config	+105	-59
1: Tilt (up)		-23
2: Pan (left)	+90	
3: Tilt (down)		-59
4: Pan (left)	+75	
5: Tilt (up)		-30
6: Pan (left)	+62	
7: Tilt (down)		-59
Final Config	+62	-59



OBSS ITVC (62,-59)

5. MNVR TO PORT CONFIG 1

On MCC GO:

L10(VTR) STOP pb – push (no red ●)

NOTE

Min clearance during Port Config 1 mnvr (SJ step 15),
 OBSS-to-Orbiter = 37 in. At Port Config 1 posn,
 OBSS-to-Orbiter clearance = 164 in

Port Config 1 Clearance Views	Cameras
SJ step 1	C, ELBOW, SSRMS BASE ELBOW
SJ step 2	C, D, ELBOW, LAB
SJ steps 3 thru 7	C, D, LAB
SJ step 8	C, SSRMS BASE ELBOW, LAB
SJ step 9	A, C, B, ELBOW
SJ step 10	A, B, ELBOW, RSC
SJ steps 11 thru 13	A, B, RSC, OBSS ITVC
SJ step 14	A, RSC, SSRMS TIP ELBOW
SJ step 15	A, ELBOW, SSRMS TIP ELBOW

RHC RATE – as reqd (VERN within 10 ft)
 BRAKES – OFF (tb-OFF)
 MODE – SINGLE, ENTER

Mnvr to PORT CONFIG 1 posn:

	SY	SP	EP	WP	WY	WR	
STBD SCAN	-53.4	+11.7	-60.6	-53.9	-24.6	+63.5	
1: WY –					-35.0		
2: WR –						-53.0	
3: WP +				-25.0			
4: EP +			-40.0				
5: SP +		+20.0					
6: SY +	-25.0						
7: WR –						-95.0	
8: SP +		+53.0					
9: SY +	+100.0						
10: WR –						-185.0	
11: WY +					+17.0		
12: WP +				-18.0			
13: EP –			-68.0				
14: SP –		+12.0					
15: SY –	+35.0						
PORT CONFIG 1	+35.0	+12.0	-68.0	-18.0	+17.0	-185.0	
	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-710	-198	-97	184	347	184	2

BRAKES – ON (tb-ON)

Start:
STBD Scan

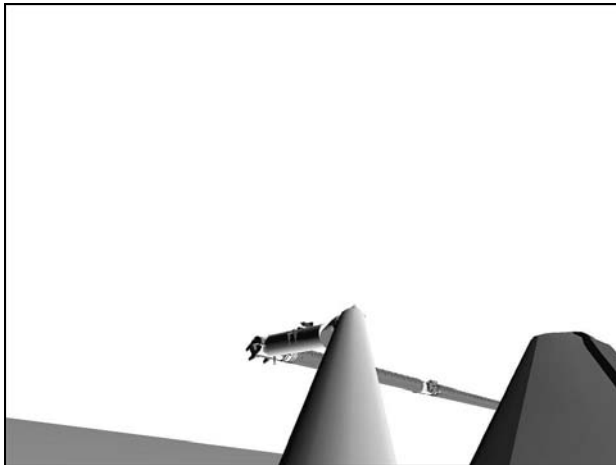
Step 1:
Drive WY (-) from -24.6° to -35.0°



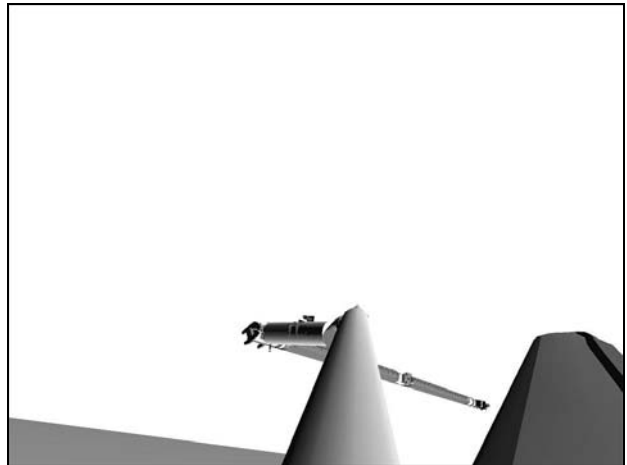
BASE ELBOW (-70,0)



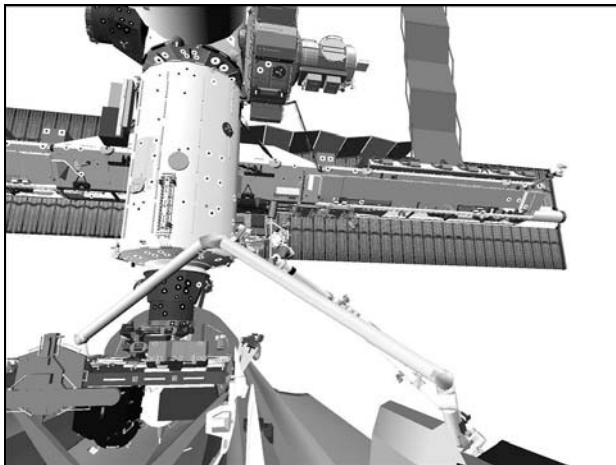
BASE ELBOW (-70,0)



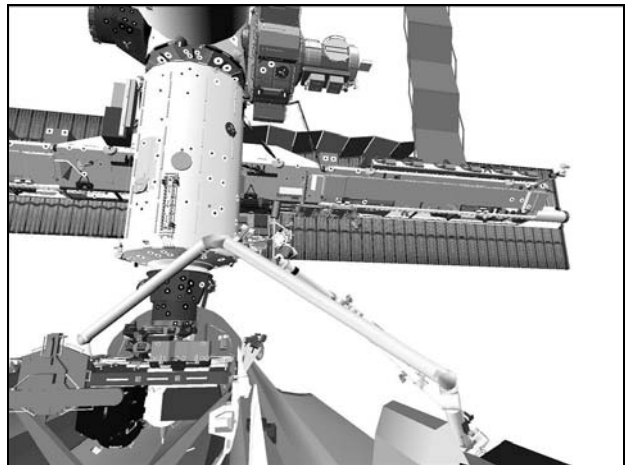
ELBOW (-6,6)



ELBOW (-6,6)



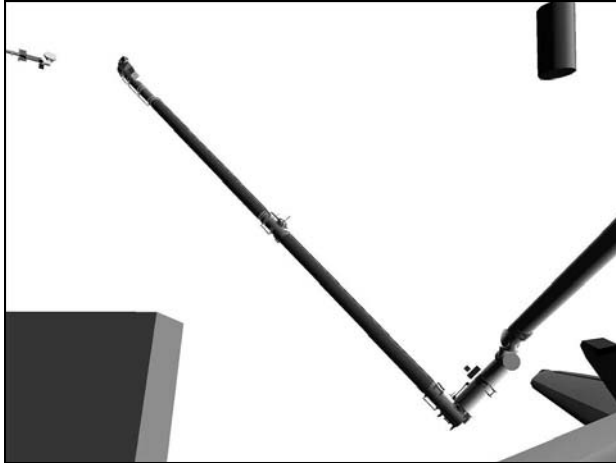
CCTV C (11,14)



CCTV C (11,14)

Step 2:

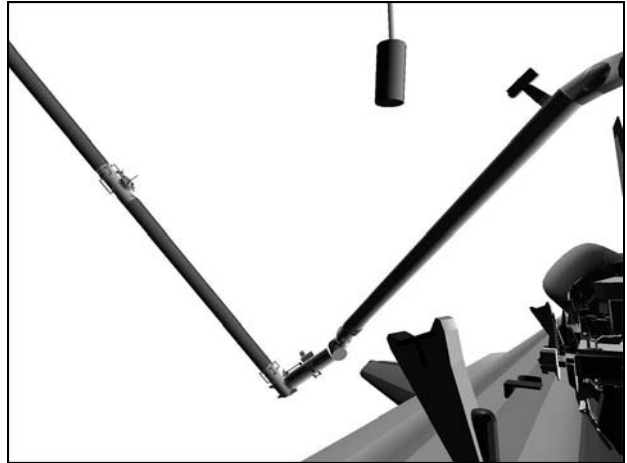
Drive WR (-) from $+63.5^\circ$ to -53.0°



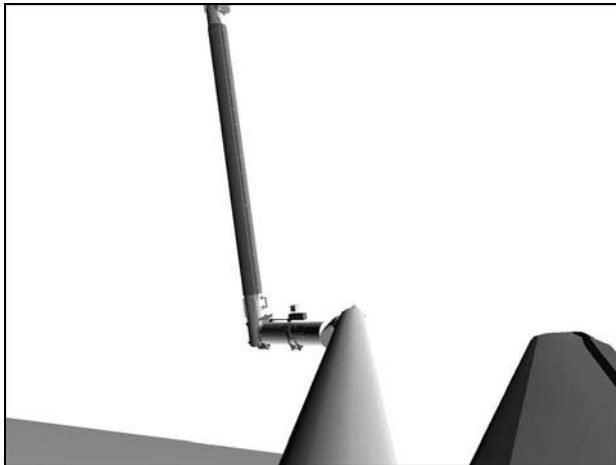
CCTV D (-55,9)

Step 3:

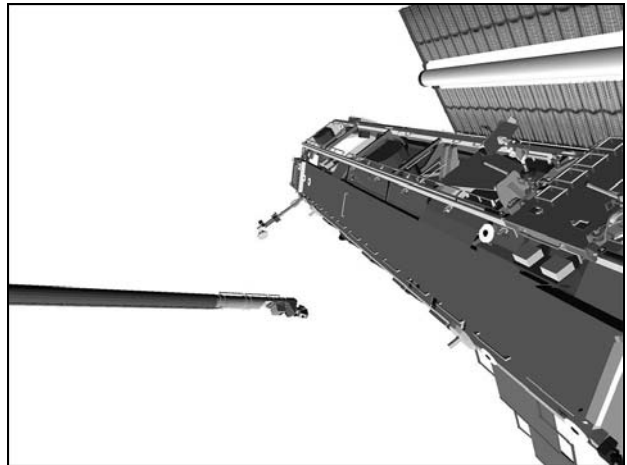
Drive WP (+) from -53.9° to -25.0°



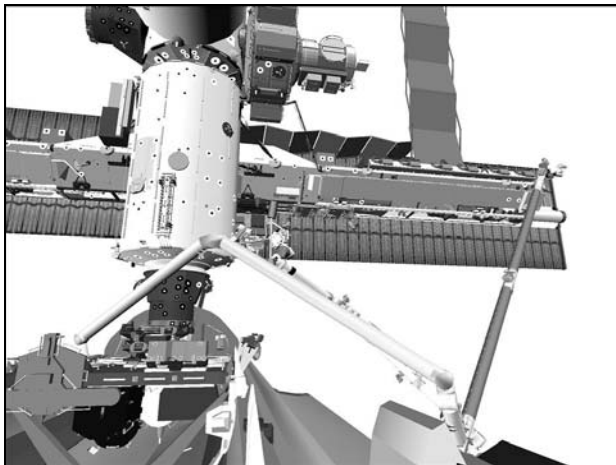
CCTV D (-34,9)



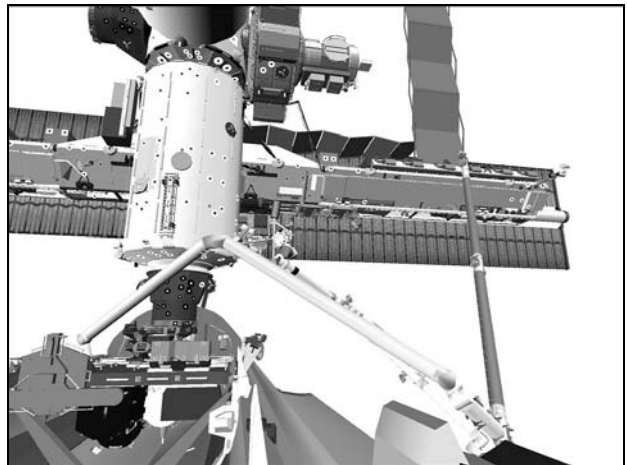
ELBOW (-6,6)



LAB (58,60)



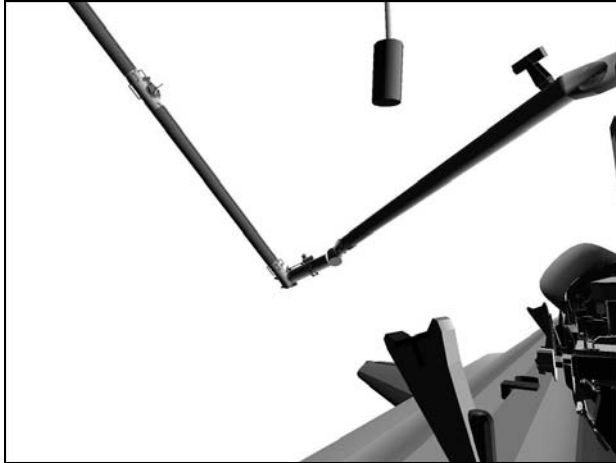
CCTV C (11,14)



CCTV C (11,14)

Step 4:

Drive EP (+) from -60.6° to -40.0°



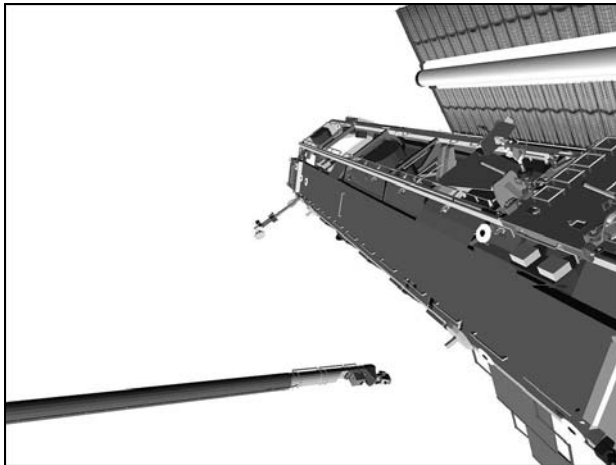
CCTV D (-34,9)

Step 5:

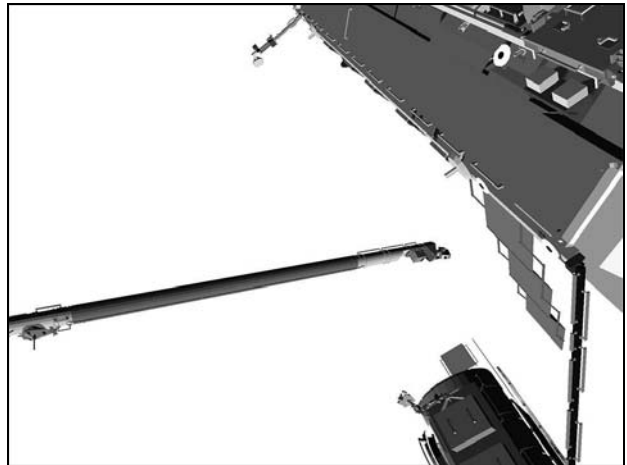
Drive SP (+) from $+11.7^\circ$ to $+20.0^\circ$



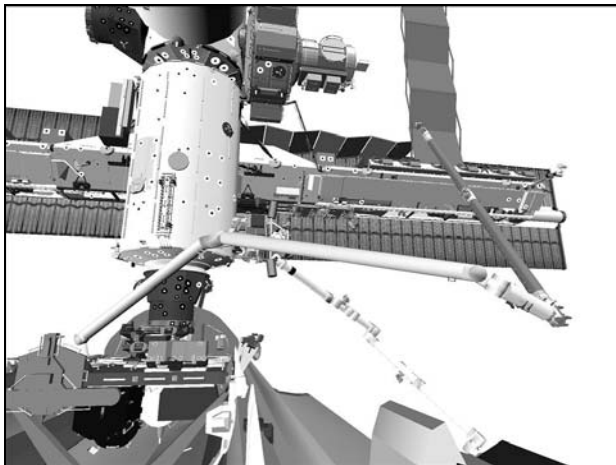
CCTV D (-34,22)



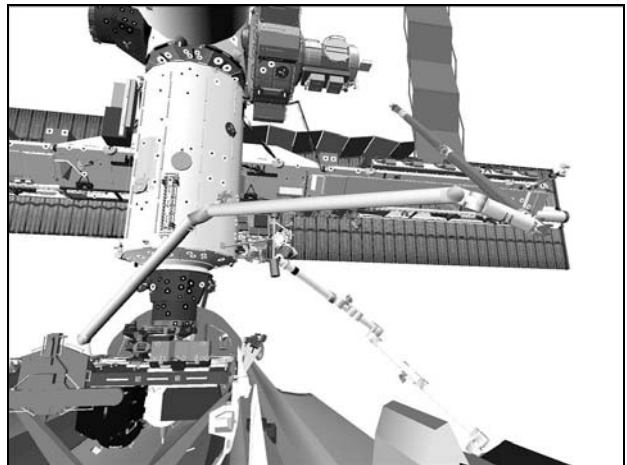
LAB (58,60)



LAB (58,37)



CCTV C (11,14)



CCTV C (11,14)

Step 6:

Drive SY (+) from -53.4° to -25.0°



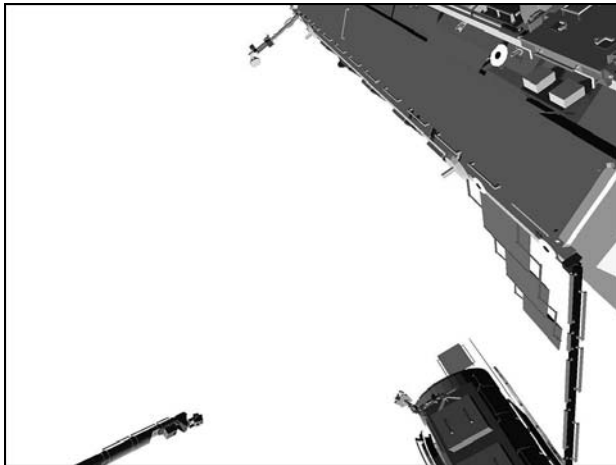
CCTV D (-34,22)

Step 7:

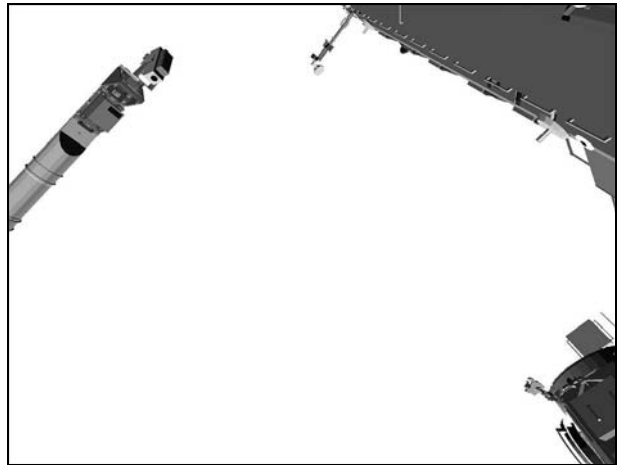
Drive WR (-) from -53.0° to -95.0°



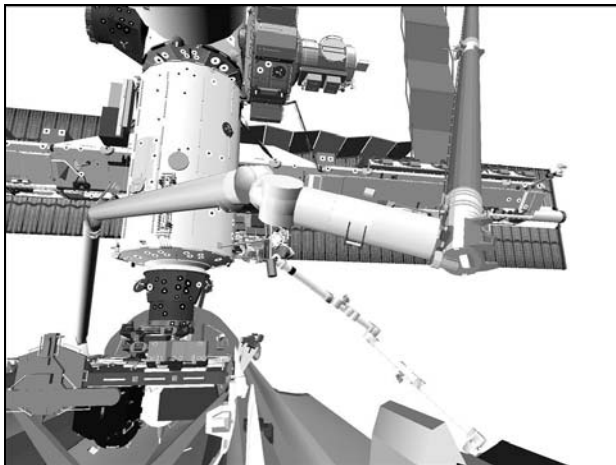
CCTV D (-34,22)



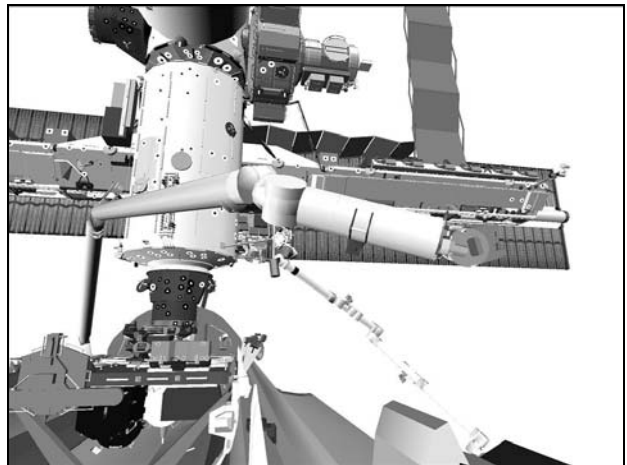
LAB (58,37)



LAB (42,37)



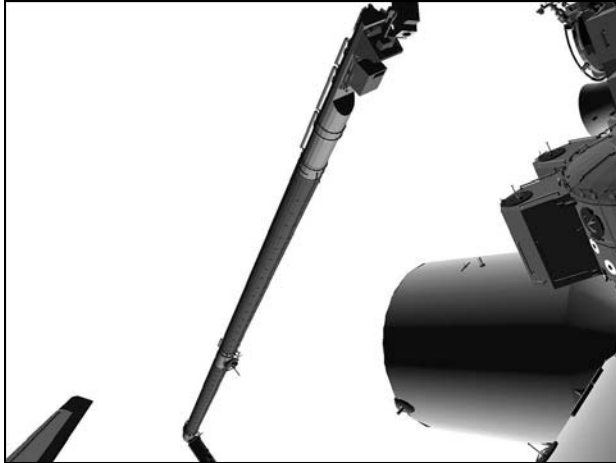
CCTV C (11,14)



CCTV C (11,14)

Step 8:

Drive SP (+) from $+20.0^\circ$ to $+53.0^\circ$



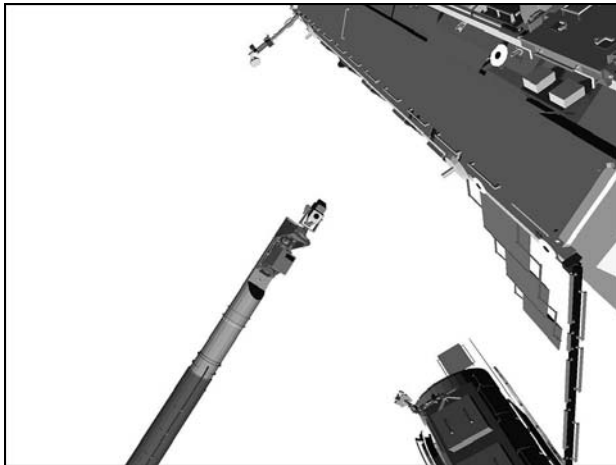
BASE ELBOW (-30,36)

Step 9:

Drive SY (+) from -25.0° to $+100.0^\circ$



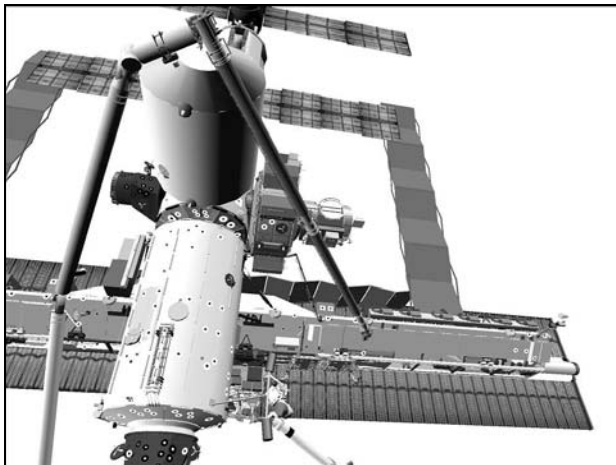
ELBOW (-66,16)



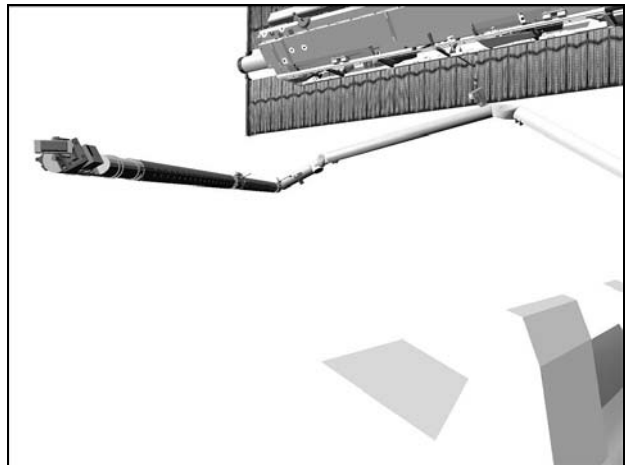
LAB (58,37)



CCTV A (55,10)



CCTV C (11,35)



CCTV B (-37,0)

Step 10:

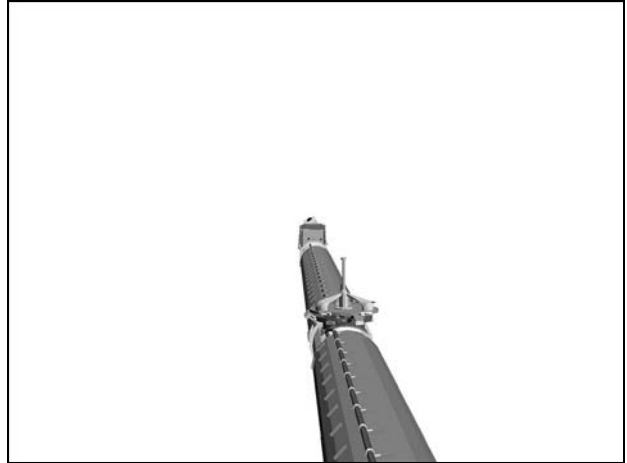
Drive WR (-) from -95.0° to -185.0°



ELBOW (-40,-32)

Step 11:

Drive WY (+) from -35.0° to $+17.0^\circ$



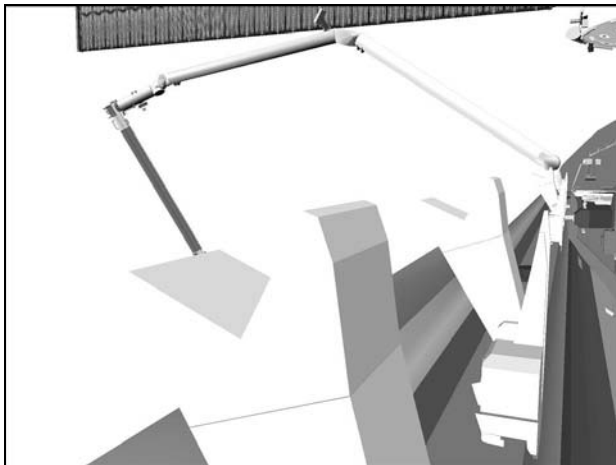
RSC



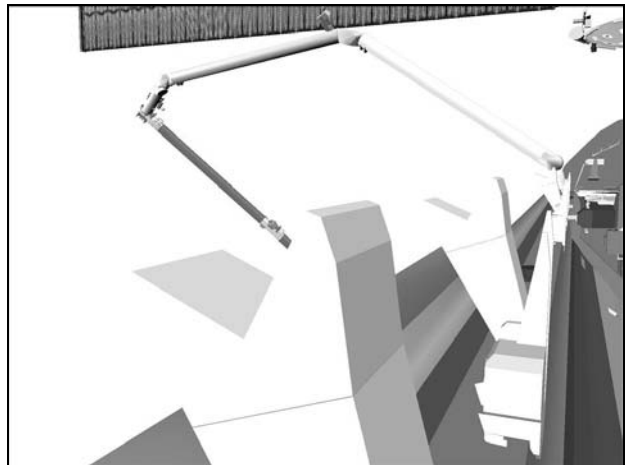
CCTV A (57,2)



CCTV A (80,0)



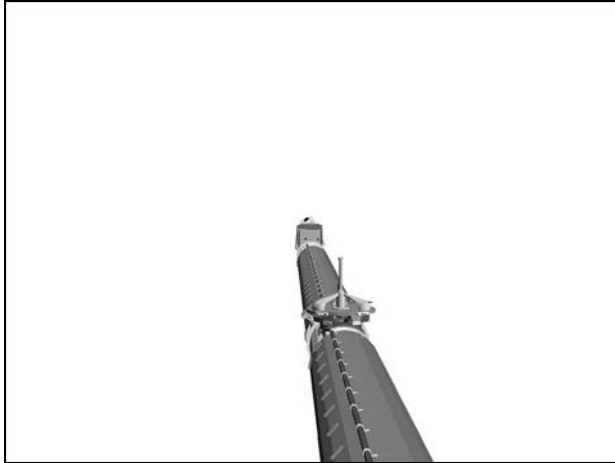
CCTV B (-23,-7)



CCTV B (-23,-7)

Step 12:

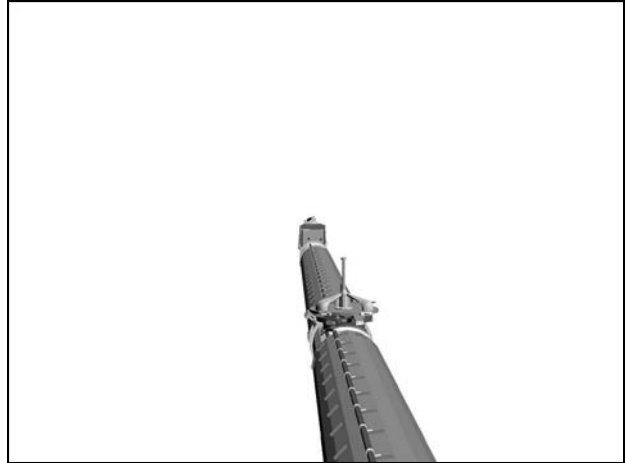
Drive WP (+) from -25.0° to -18.0°



RSC

Step 13:

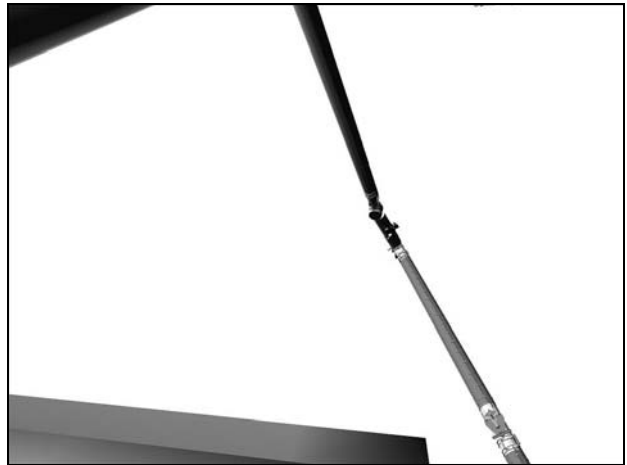
Drive EP (-) from -40.0° to -68.0°



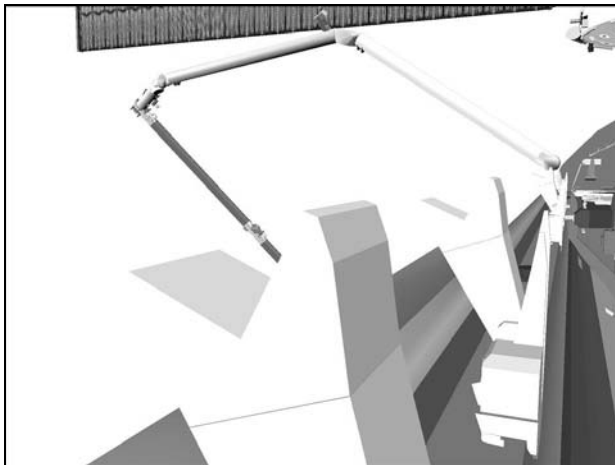
RSC



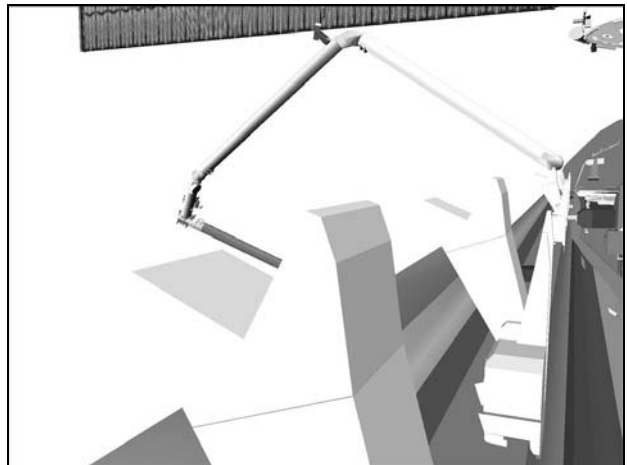
CCTV A (80,0)



CCTV A (80,-7)



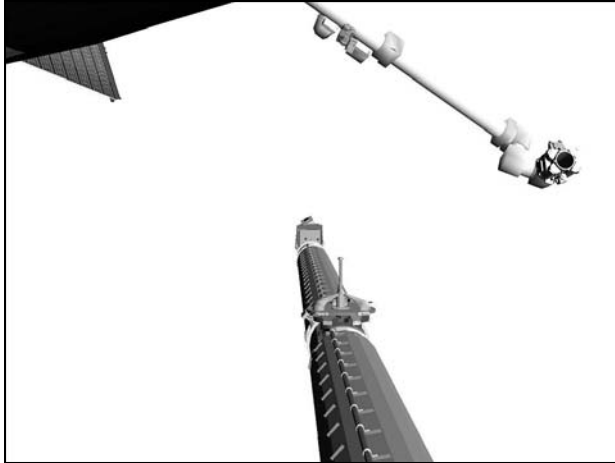
CCTV B (-23,-7)



CCTV B (-23,-7)

Step 14:

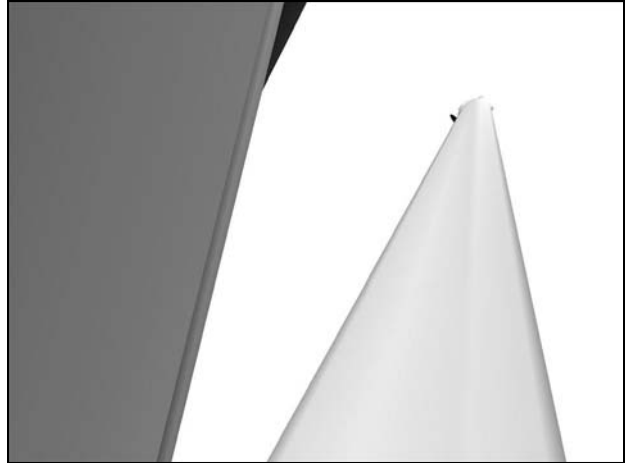
Drive SP (-) from +53.0° to +12.0°



RSC

Step 15:

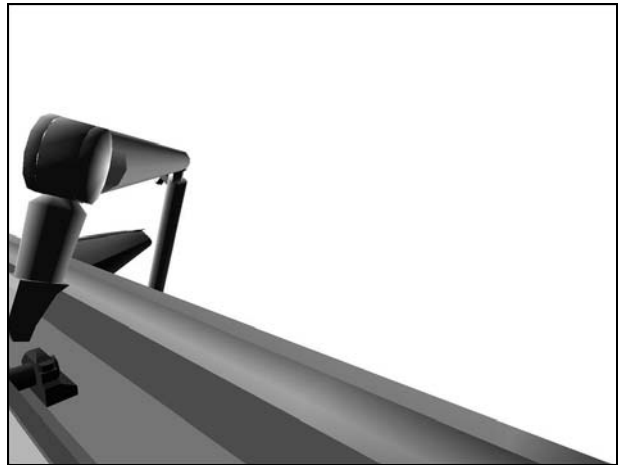
Drive SY (-) from +100.0° to +35.0°



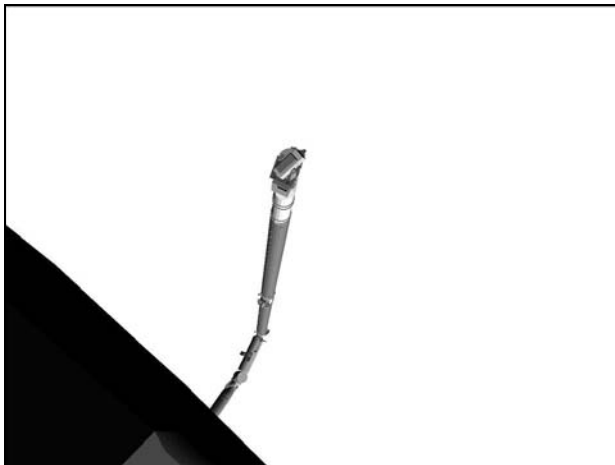
ELBOW (-21,-22)



CCTV A (58,0)



CCTV A (50,-10)



TIP ELBOW (-104,55)



TIP ELBOW (-95,41)

6. PERFORM PORT 1 SCAN

a. Port 1 Scan 1

NOTE

During Port 1 scan, OBSS-to-Orbiter = 131 in

A7U

CCTV – config as reqd

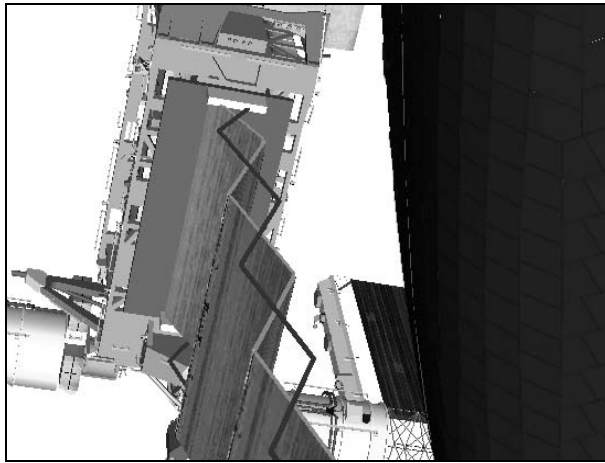
MON 1	SSRMS TIP ELBOW (SSRMS TIP LEE)
MON 2	ELBOW (RSC)

A7U

√VIDEO OUT MON2 pb – push
√IN PL2(VPU) pb – push

PAN: +75 (right)
TILT: -110 (down)

√CAMR CMD PAN/TILT – LO RATE



OBSS ITVC (75,-110)

√MCC to verify correct sensor view

L10(VTR)

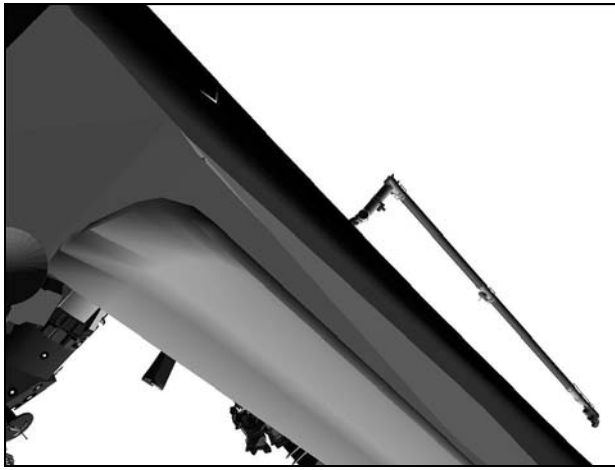
On MCC GO:
REC pb – push, hold
PLAY pb – push, simo (red ●)

RHC

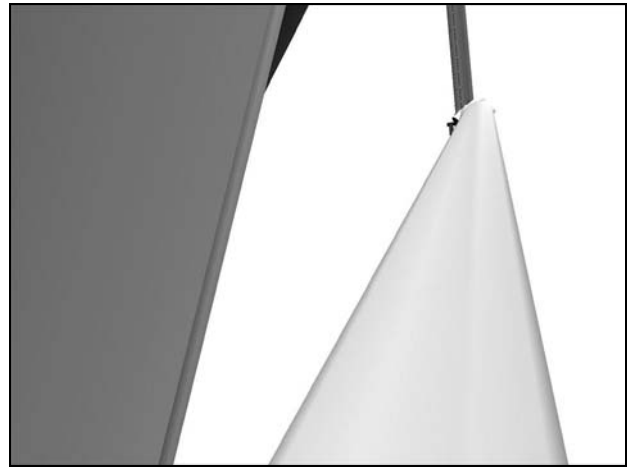
RATE – VERN (RATE MIN tb-ON)
BRAKES – OFF (tb-OFF)
MODE – SINGLE, ENTER

Drive WR (+) to -34.0

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-1326	-180	-125	2	344	356	2
	SY	SP	EP	WP	WY	WR	
√	+35.0	+12.0	-68.0	-18.0	+17.0	-34.0	



TIP ELBOW (-95,20)



ELBOW (-21,-22)

b. Port 1 Scan 2

NOTE

The following and subsequent TILT cmds in step 6 are for the OBSS ITVC

A7U

TILT: -97 (up)

Drive WR (-) to -185.0

√	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-710	-198	-97	184	347	184	2
	SY	SP	EP	WP	WY	WR	
√	+35.0	+12.0	-68.0	-18.0	+17.0	-185.0	



TIP ELBOW (-95,41)



ELBOW (-21,-22)

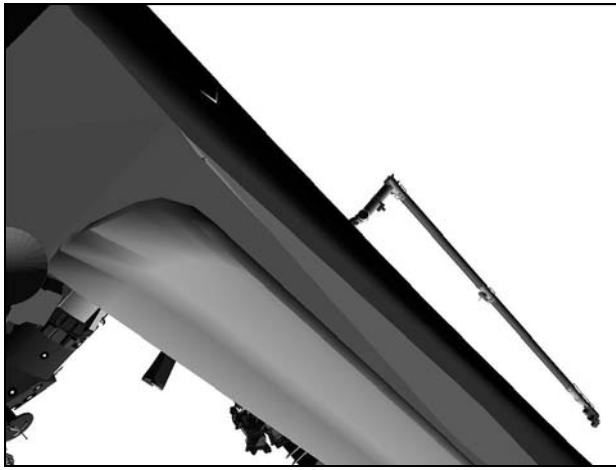
c. Port 1 Scan 3

A7U

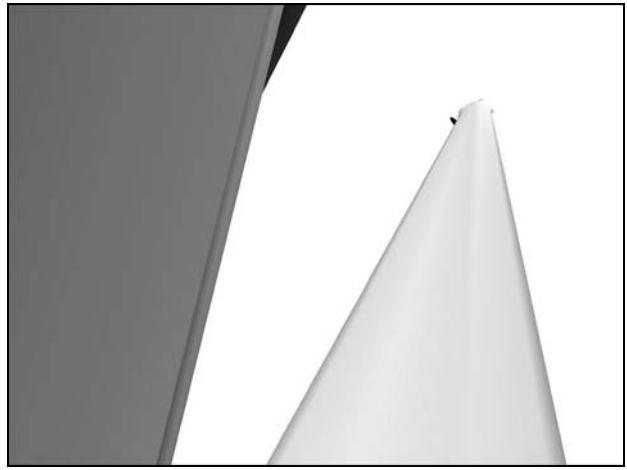
TILT: -84 (up)

Drive WR (+) to -34.0

√	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-1326	-180	-125	2	344	356	2
	SY	SP	EP	WP	WY	WR	
√	+35.0	+12.0	-68.0	-18.0	+17.0	-34.0	



TIP ELBOW (-95,20)



ELBOW (-21,-22)

A7U

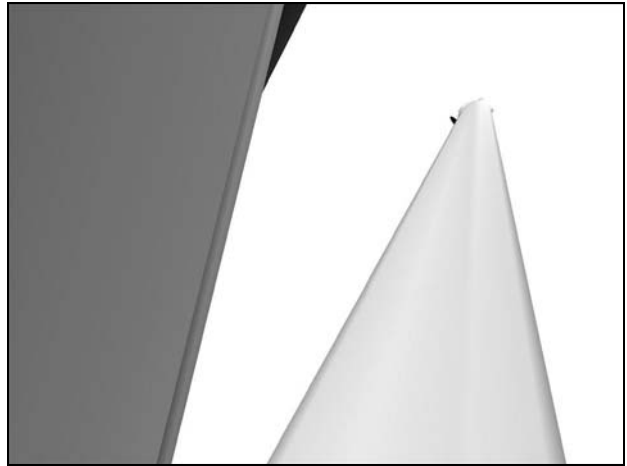
d. Port 1 Scan 4
TILT: -71 (up)

Drive WR (-) to -180.0

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-718	-172	-95	184	342	184	2
	SY	SP	EP	WP	WY	WR	
√	+35.0	+12.0	-68.0	-18.0	+17.0	-180.0	



TIP ELBOW (-95,41)



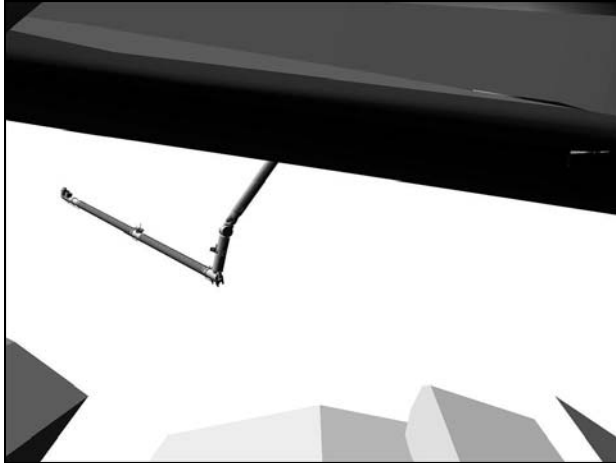
ELBOW (-21,-22)

A7U

e. Port 1 Scan 5
TILT: -58 (up)

Drive WR (+) to +7.0

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-1308	-402	-138	4	25	356	2
	SY	SP	EP	WP	WY	WR	
√	+35.0	+12.0	-68.0	-18.0	+17.0	+7.0	



TIP LEE



ELBOW (-21,-22)

A7U

f. Port 1 Scan 6
TILT: -45 (up)

Drive WR (-) to -178.0

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-721	-161	-95	184	340	184	2
	SY	SP	EP	WP	WY	WR	
√	+35.0	+12.0	-68.0	-18.0	+17.0	-178.0	

BRAKES – ON (tb-ON)



TIP ELBOW (-95,41)



ELBOW (-21,-22)

7. MNVR TO NOSE CONFIG

On MCC GO:

L10(VTR) STOP pb – push (no red ●)

NOTE

At Nose Config final posn, OBSS-to-Orbiter = 143 in

Port Config 2 Clearance Views	Cameras
SJ steps 1 thru 4	A, ELBOW, SSRMS TIP ELBOW, SSRMS TIP LEE, RSC

RHC RATE – as reqd (VERN within 10 ft)
BRAKES – OFF (tb-OFF)
MODE – SINGLE, ENTER

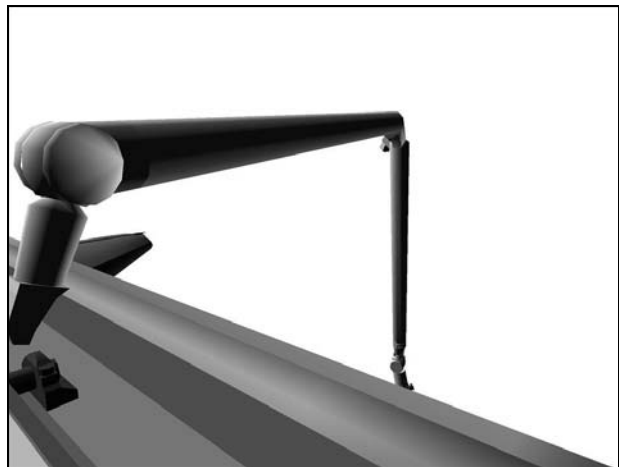
Mnvr to NOSE CONFIG posn:

	SY	SP	EP	WP	WY	WR	
PORT CONFIG 1	+35.0	+12.0	-68.0	-18.0	+17.0	-178.0	
1: SY +	+74.0						
2: SP +		+26.0					
3: WY –					+15.0		
4: WP –				-23.0			
NOSE CONFIG	+74.0	+26.0	-68.0	-23.0	+15.0	-178.0	
	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-624	-222	-135	185	302	196	2

BRAKES – ON (tb-ON)



TIP ELBOW (-95,41)



CCTV A (50,-10)

8. PERFORM NOSE SCAN

NOTE

During nose scan, OBSS-to-Orbiter = 132 in

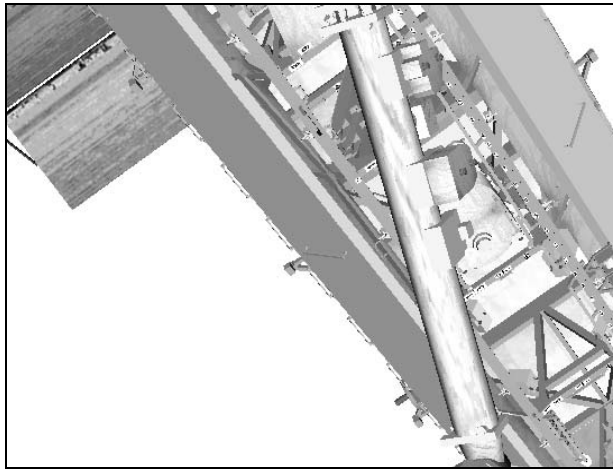
A7U CCTV – config as reqd

MON 1	SSRMS TIP LEE (SSRMS TIP ELBOW)
MON 2	ELBOW (RSC)

A7U √VIDEO OUT MON2 pb – push
 √IN PL2(VPU) pb – push

√PAN: +75
 TILT: -120 (down)

√CAMR CMD PAN/TILT – LO RATE



OBSS ITVC (75,-120)

√MCC to verify correct sensor view

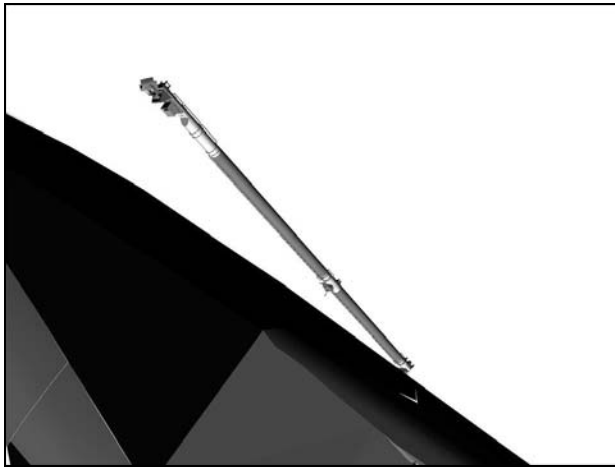
L10(VTR) On MCC GO:
 REC pb – push, hold
 PLAY pb – push, simo (red ●)

RHC RATE – VERN (RATE MIN tb-ON)
 BRAKES – OFF (tb-OFF)
 MODE – SINGLE, ENTER

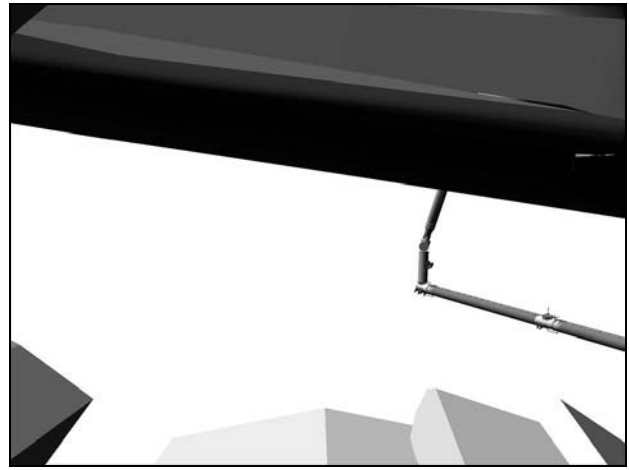
Drive WR (-) to -200.0

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-537	-303	-160	178	324	190	2
	SY	SP	EP	WP	WY	WR	
√	+74.0	+26.0	-68.0	-23.0	+15.0	-200.0	

BRAKES – ON (tb-ON)



TIP ELBOW (-115,46)



TIP LEE

9. MNVR TO PORT CONFIG 2

On MCC GO:

L10(VTR) STOP pb – push (no red ●)

NOTE

At Port Config 2 posn, OBSS-to-Orbiter = 120 in

Port Config 2 Clearance Views	Cameras
SJ steps 1 thru 2	ELBOW, SSRMS TIP LEE, SSRMS TIP ELBOW

RHC RATE – as reqd (VERN within 10 ft)
 BRAKES – OFF (tb-OFF)
 MODE – SINGLE, ENTER

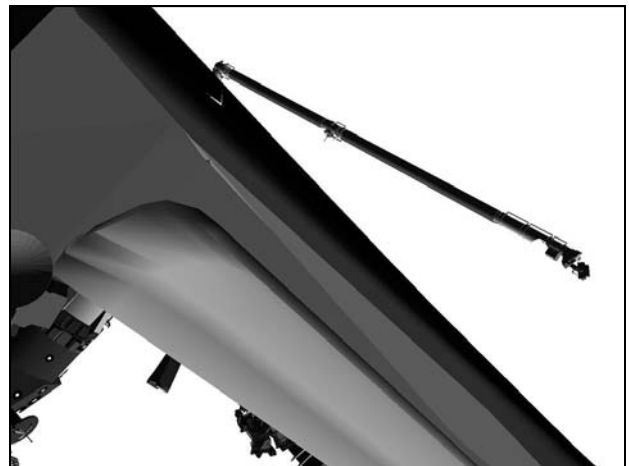
Mnvr to PORT CONFIG 2 posn:

	SY	SP	EP	WP	WY	WR	
NOSE CONFIG	+74.0	+26.0	-68.0	-23.0	+15.0	-200.0	
1: WR +						-126.0	
2: WP –				-34.0			
PORT CONFIG 2	+74.0	+26.0	-68.0	-34.0	+15.0	-126.0	
	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-888	-173	-143	355	288	6	2

BRAKES – ON (tb-ON)



TIP LEE



TIP ELBOW (-95,20)

10. PERFORM PORT 2 SCAN

a. Port 2 Scan 1

NOTE

During Port 2 scan, OBSS-to-Orbiter = 81 in

A7U

CCTV – config as reqd

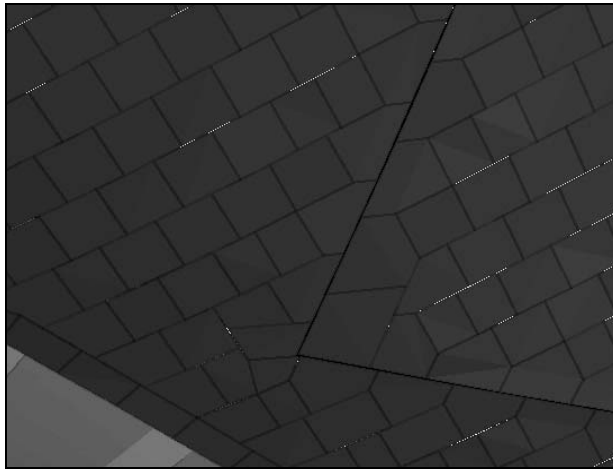
MON 1	SSRMS TIP LEE (SSRMS TIP ELBOW)
MON 2	ELBOW (RSC)

A7U

√VIDEO OUT MON2 pb – push
 √IN PL2(VPU) pb – push

√PAN: +75
 TILT: -115 (up)

√CAMR CMD PAN/TILT – LO RATE



OBSS ITVC (75,-115)

√MCC to verify correct sensor view

L10(VTR)

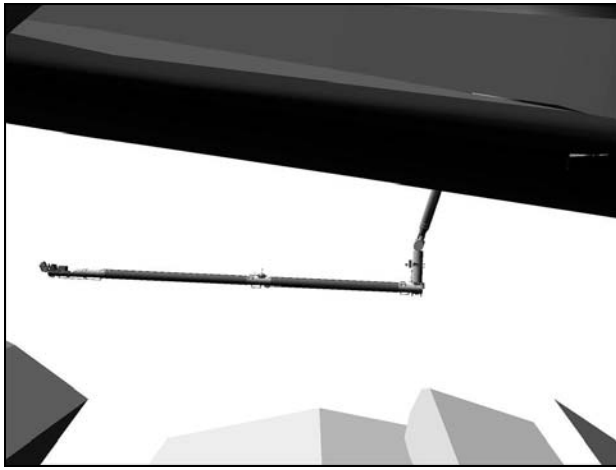
On MCC GO:
 REC pb – push, hold
 PLAY pb – push, simo (red ●)

RHC

RATE – VERN (RATE MIN tb-ON)
 BRAKES – OFF (tb-OFF)
 MODE – SINGLE, ENTER

Drive WR (+) to -73.0

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-1086	-372	-99	350	341	2	2
	SY	SP	EP	WP	WY	WR	
√	+74.0	+26.0	-68.0	-34.0	+15.0	-73.0	



TIP LEE



ELBOW (-30,0)

b. Port 2 Scan 2

NOTE

The following and subsequent TILT cmds in step 10 are for the OBSS ITVC

A7U

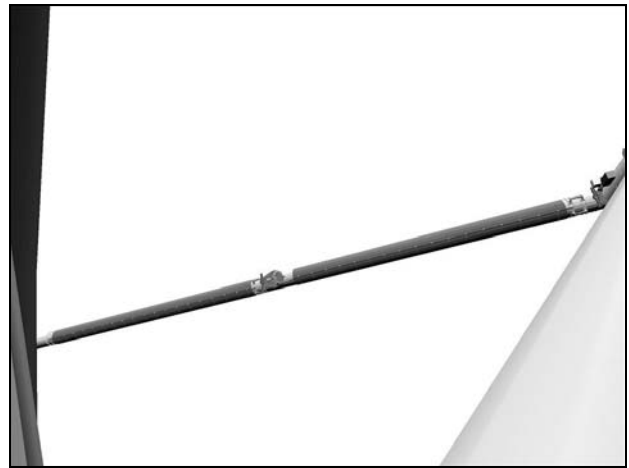
TILT: -102 (up)

Drive WR (-) to -139.0

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-819	-159	-157	11	275	22	2
	SY	SP	EP	WP	WY	WR	
√	+74.0	+26.0	-68.0	-34.0	+15.0	-139.0	



TIP LEE



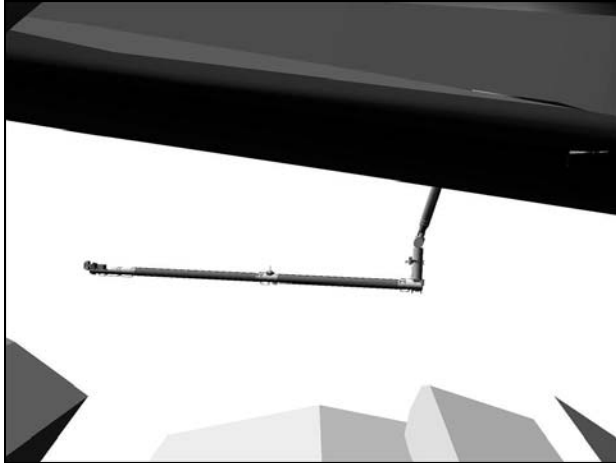
ELBOW (-40,-20)

A7U

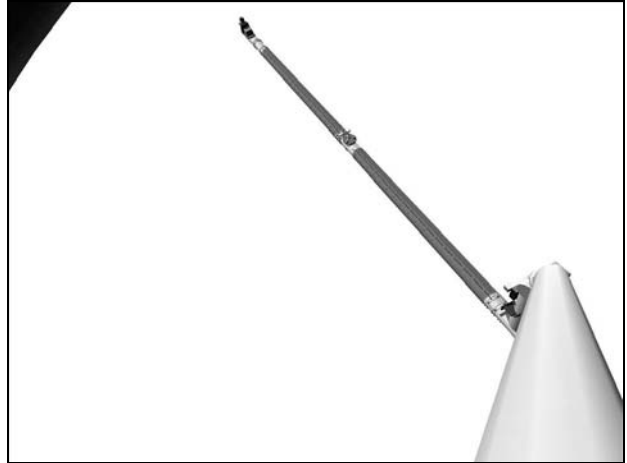
c. Port 2 Scan 3
TILT: -89 (up)

Drive WR (+) to -60.0

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-1101	-442	-94	350	354	2	2
	SY	SP	EP	WP	WY	WR	
√	+74.0	+26.0	-68.0	-34.0	+15.0	-60.0	



TIP LEE



ELBOW (-30,0)

A7U

d. Port 2 Scan 4
TILT: -76 (up)

Drive WR (-) to -147.0

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-775	-159	-165	138	274	149	2
	SY	SP	EP	WP	WY	WR	
√	+74.0	+26.0	-68.0	-34.0	+15.0	-147.0	



TIP LEE



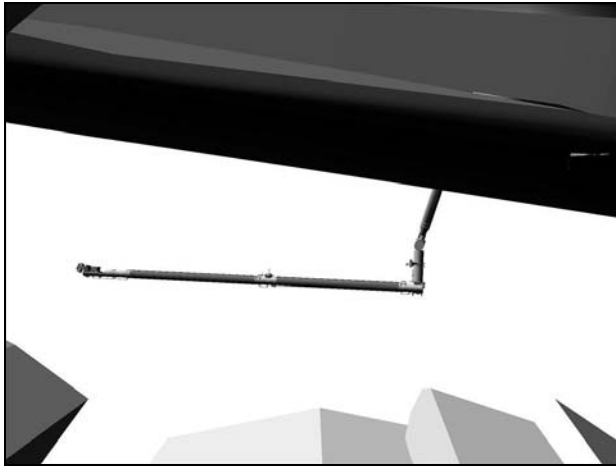
ELBOW (-40,-20)

A7U

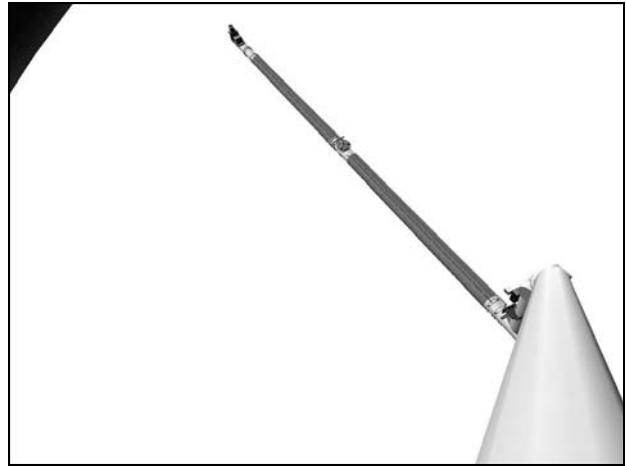
e. Port 2 Scan 5
TILT: -63 (up)

Drive WR (+) to -62.0

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-1100	-431	-95	350	352	2	2
	SY	SP	EP	WP	WY	WR	
√	+74.0	+26.0	-68.0	-34.0	+15.0	-62.0	



TIP LEE



ELBOW (-30,0)

A7U

f. Port 2 Scan 6
TILT: -50 (up)

Drive WR (-) to -152.0

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-748	-161	-170	156	278	167	2
	SY	SP	EP	WP	WY	WR	
√	+74.0	+26.0	-68.0	-34.0	+15.0	-152.0	



TIP LEE



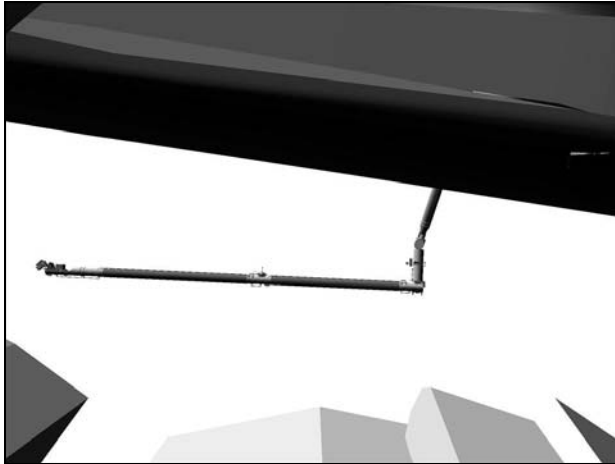
ELBOW (-40,-20)

A7U g. Port 2 Scan 4
TILT: -40 (up)

Drive WR (+) to -74.0

√	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-1084	-366	-100	350	340	2	2
√	SY	SP	EP	WP	WY	WR	
	+74.0	+26.0	-68.0	-34.0	+15.0	-74.0	

BRAKES – ON (tb-ON)



TIP LEE



ELBOW (-30,0)

11. MNVR TO PORT CONFIG 3

On MCC GO:

L10(VTR) STOP pb – push (no red ●)

NOTE

At Port Config 3, OBSS-to-Orbiter = 240 in

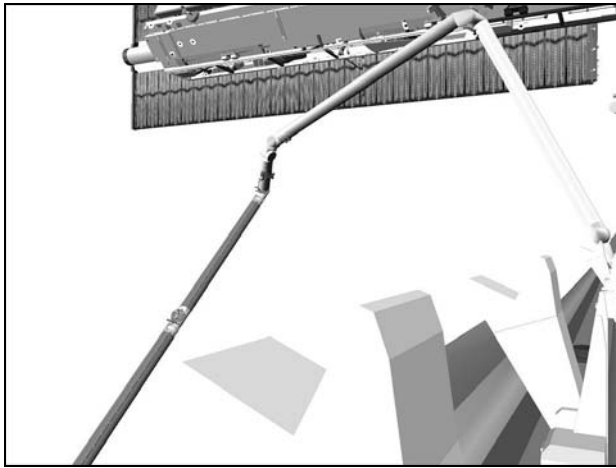
Port Config 2 Clearance Views	Cameras
SJ step 1	A, ELBOW, SSRMS TIP LEE
SJ steps 2 thru 5	A, B, ELBOW
SJ step 6	A, B, ELBOW, SSRMS TIP LEE

RHC RATE – as reqd (VERN within 10 ft)
BRAKES – OFF (tb-OFF)
MODE – SINGLE, ENTER

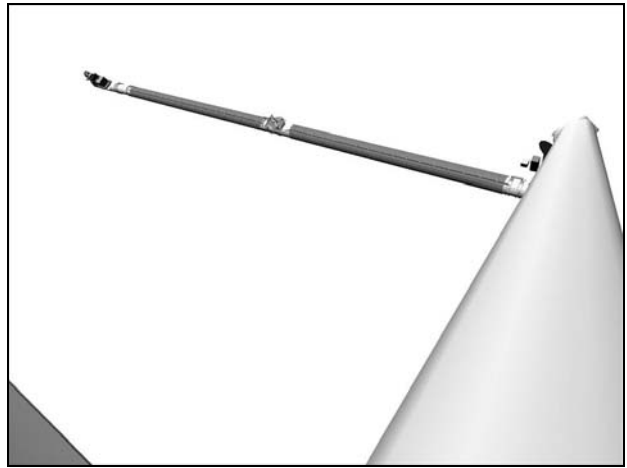
Mnvr to PORT CONFIG 3 posn:

	SY	SP	EP	WP	WY	WR	
PORT CONFIG 2	+74.0	+26.0	-68.0	-34.0	+15.0	-74.0	
1: SY +	+99.5						
2: SP +		+82.5					
3: EP –			-86.0				
4: WP +				-32.0			
5: WY +					+25.0		
6: WR –						-98.0	
PORT CONFIG 3	+99.5	+82.5	-86.0	-32.0	+25.0	-98.0	
	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-840	-505	-307	322	357	334	2

BRAKES – ON (tb-ON)



CCTV B (-27,0)



ELBOW (-32,-20)

12. PERFORM PORT 3 SCAN
 - a. Port 3 Scan 1

NOTE

During Port 3 scan, OBSS-to-Orbiter = 29 in

A7U CCTVB – config as reqd

MON 1	B (SSRMS TIP LEE)
MON 2	ELBOW (RSC)

A7U ✓VIDEO OUT MON2 pb – push
 ✓IN PL2(VPU) pb – push

✓PAN: +75
 TILT: -85 (down)

✓CAMR CMD PAN/TILT – LO RATE



OBSS ITVC (75,-85)

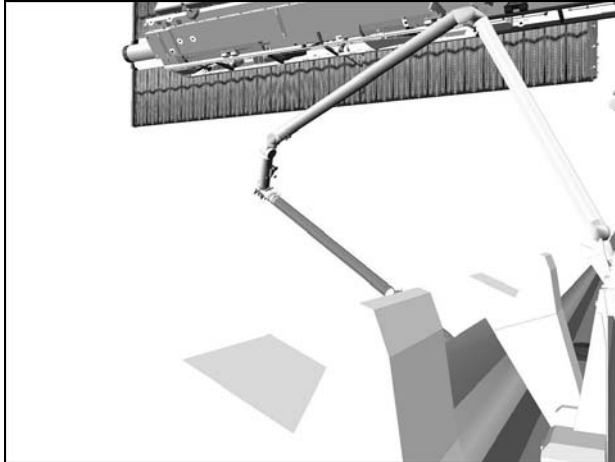
✓MCC to verify correct sensor view

L10(VTR) On MCC GO:
 REC pb – push, hold
 PLAY pb – push, simo (red ●)

RHC RATE – VERN (RATE MIN tb-ON)
 BRAKES – OFF (tb-OFF)
 MODE – SINGLE, ENTER

Drive WR (-) to -161.0

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-616	-260	-323	278	305	309	2
	SY	SP	EP	WP	WY	WR	
√	+99.5	+82.5	-86.0	-32.0	+25.0	-161.0	



CCTV B (-27,0)



RSC

b. Port 3 Scan 2

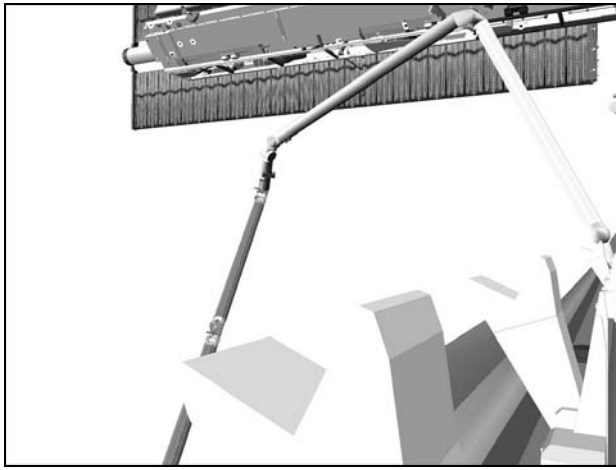
NOTE

The following and subsequent TILT cmds in step 12 are for the OBSS ITVC

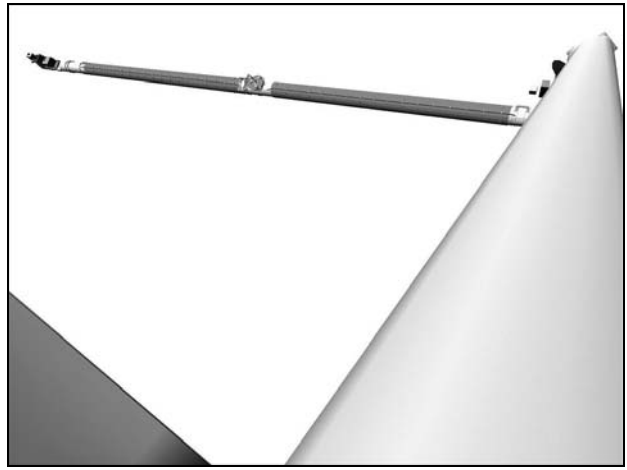
A7U TILT: -72 (up)

Drive WR (+) to -108.0

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-819	-456	-292	317	348	333	2
	SY	SP	EP	WP	WY	WR	
√	+99.5	+82.5	-86.0	-32.0	+25.0	-108.0	



CCTV B (-27,0)



ELBOW (-32,-30)

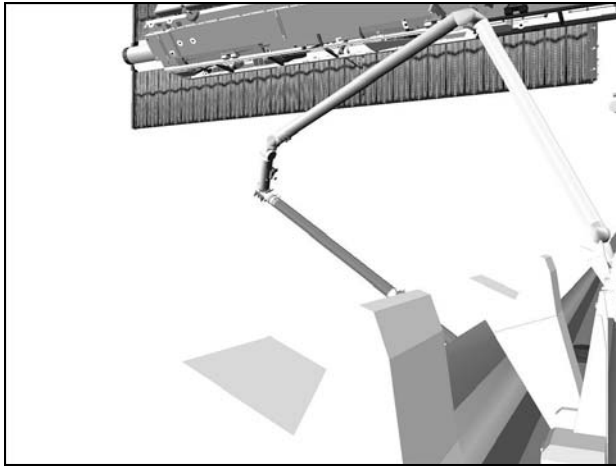
A7U

c. Port 3 Scan 3

TILT: -59 (up)

Drive WR (-) to -162.0

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-612	-258	-325	277	305	308	2
	SY	SP	EP	WP	WY	WR	
√	+99.5	+82.5	-86.0	-32.0	+25.0	-162.0	



CCTV B (-27,0)



RSC

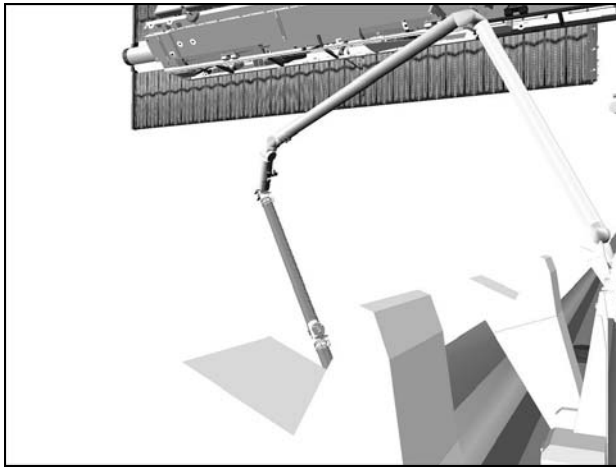
A7U

d. Port 3 Scan 4

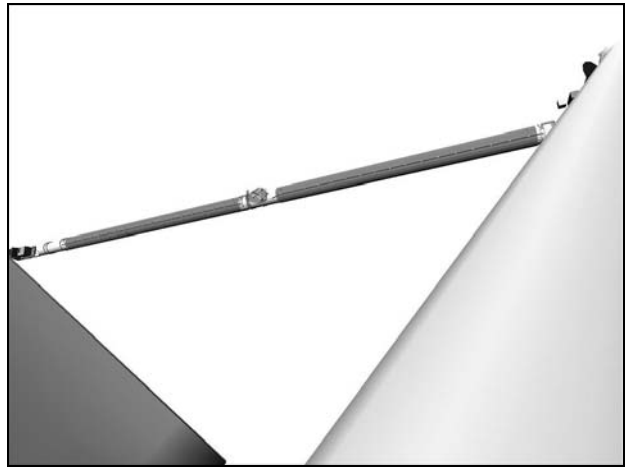
TILT: -46 (up)

Drive WR (+) to -134.0

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-735	-341	-284	303	326	327	2
	SY	SP	EP	WP	WY	WR	
√	+99.5	+82.5	-86.0	-32.0	+25.0	-134.0	



CCTV B (-27,0)



ELBOW (-35,-30)

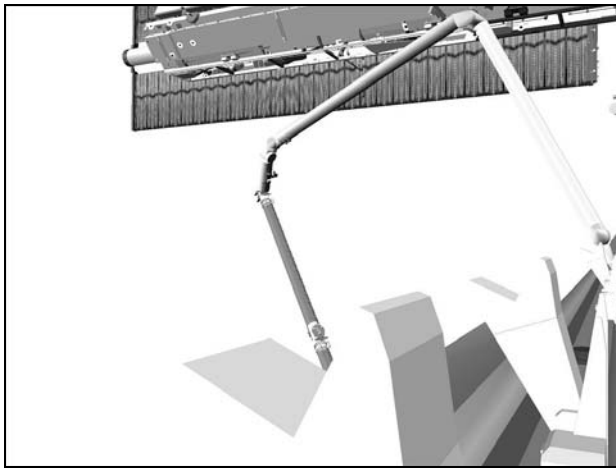
A7U

e. Port 3 Scan 5

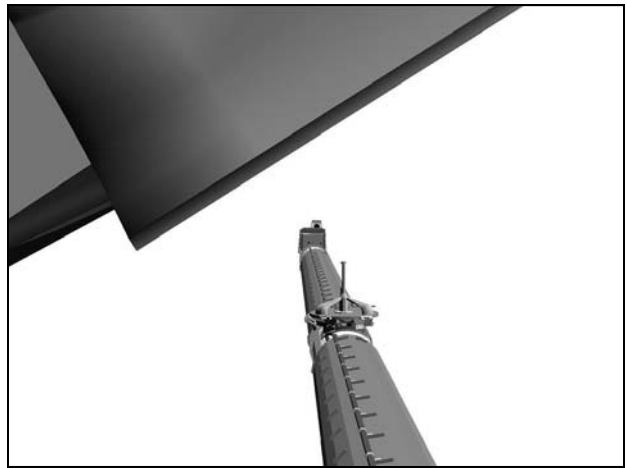
TILT: -33 (up)

Drive WR (-) to -162.0

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-612	-258	-325	277	305	308	2
	SY	SP	EP	WP	WY	WR	
√	+99.5	+82.5	-86.0	-32.0	+25.0	-162.0	



CCTV B (-27,0)



RSC

A7U

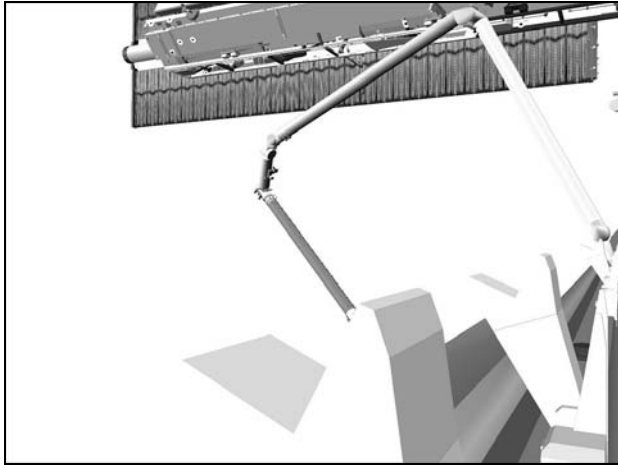
f. Port 3 Scan 6

TILT: -23 (up)

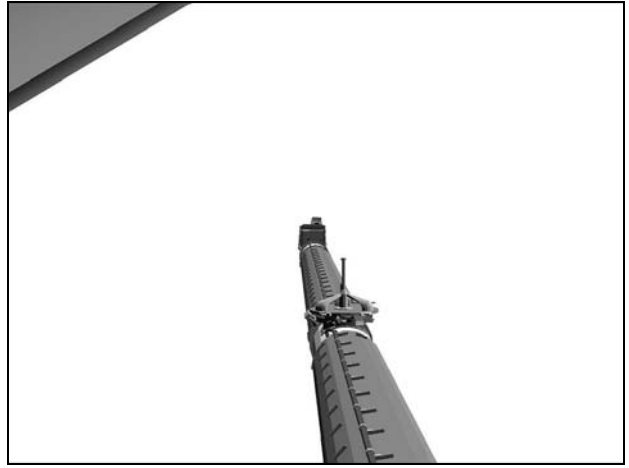
Drive WR (+) to -146.0

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-685	-298	-296	294	316	322	2
	SY	SP	EP	WP	WY	WR	
√	+99.5	+82.5	-86.0	-32.0	+25.0	-146.0	

BRAKES – ON (tb-ON)



CCTV B (-27,0)



RSC

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OBSS CONTINGENCY

I

OBSS SJ UNBERTH	FS 4-2
BERTH.....	FS 4-16
HANDOFF FROM SSRMS TO SRMS.....	FS 4-31
HANDOFF FROM SRMS TO SSRMS.....	FS 4-47
JETTISON.....	FS 4-57
WITH MPMS.....	FS 4-61

OBSS
CONTINGENCY

OBSS SJ UNBERTH

WARNING
For UNDOCKED ops only

NOTE

Stbd MPMs assumed deployed

1. SETUP

- CCTV – config as required
 - perform PAN/TILT RESET for PLB cameras
- ZOOM – full OUT

If SINGLE MODE available:

SM 94 PDRS CONTROL

- √PL ID, ITEM 3: 0
- √INIT ID, ITEM 24: 0

If flight specific DAPs have not been loaded:

Load DAP A14 with permanent edits per STS-114 DAP A CONFIGURATIONS (ORB OPS FS, DAP TABLES). This may be worked in parallel with the following steps 2-4

2. MNVR TO OBSS SJ PRE-GRAPPLE

If SINGLE MODE available:

- RHC
- RATE – as reqd (VERN within 10 ft)
 - BRAKES – OFF (tb-OFF)

MODE – best available

Mnvr to OBSS SJ PRE-GRAPPLE posn:

	SY	SP	EP	WP	WY	WR	
PRE-CRADLE	0.0	+25.0	-25.0	+5.0	0.0	0.0	
1: SP +		+87.9					
2: SY -	-90.0						
3: WP -				-57.0			
4: WR +						+110.0	
5: EP -			-129.8				
OBSS SJ PRE-GRAPPLE	-90.0	+87.9	-129.8	-57.0	0.0	+110.0	
	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-680	+96	-513	270	350	1	0

- BRAKES – ON (tb-ON)
- MODE – not DIRECT
- JOINT – CRIT TEMP

OBSS CONTINGENCY

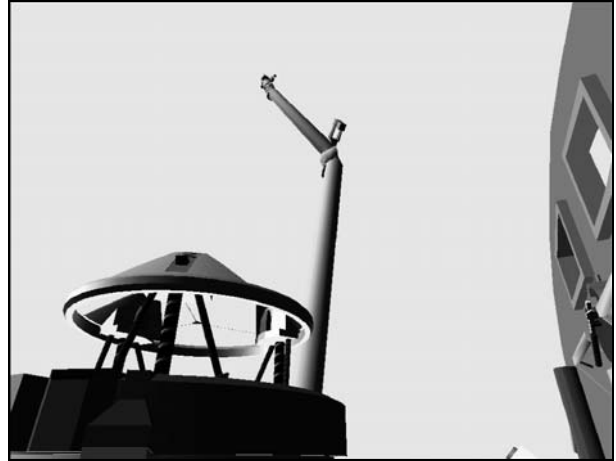
Start:

Step 1:

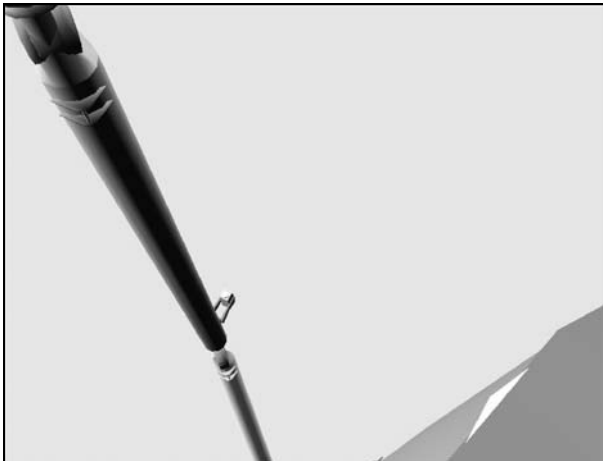
Drive SP (+) from +25.0° to +87.9°



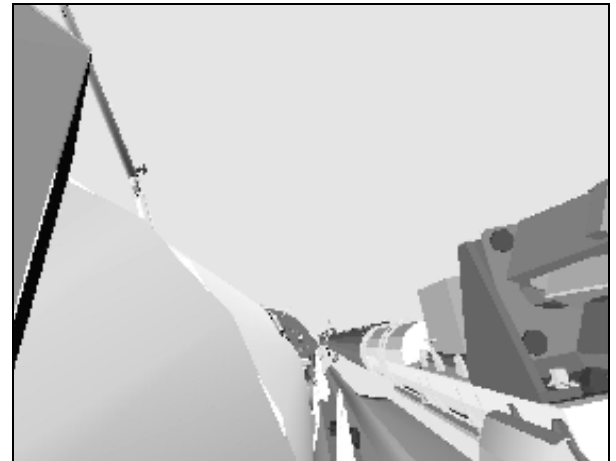
CCTV D (65,30)



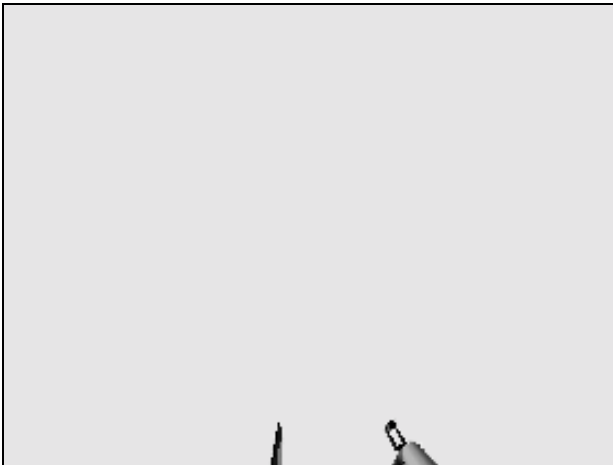
CCTV D (65,30)



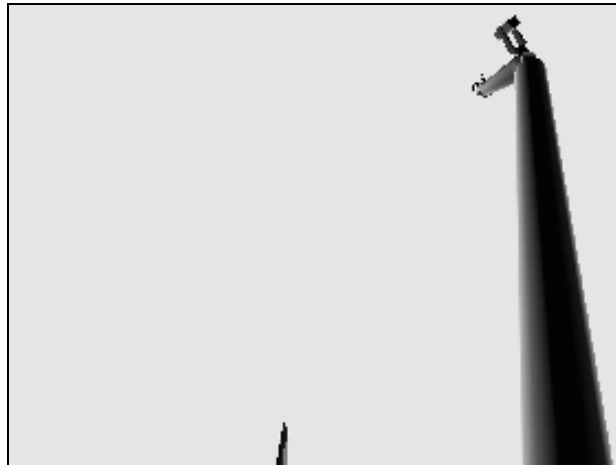
CCTV B (0,25)



CCTV C (0,15)



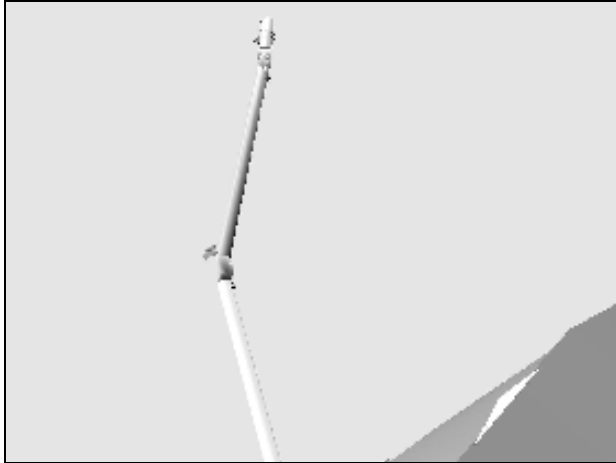
CCTV A (0,45)



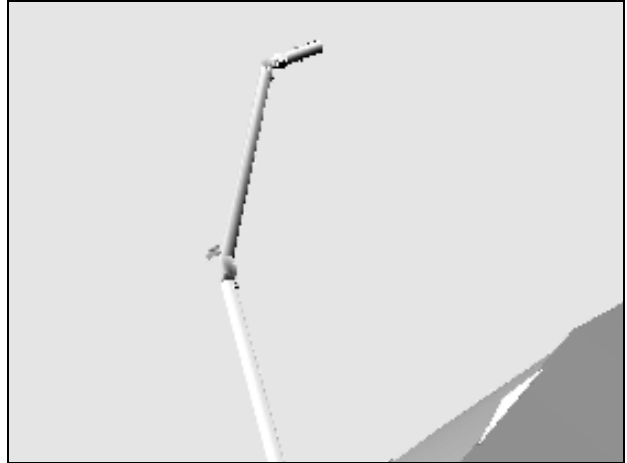
CCTV A (0,45)

Step 2:
Drive SY (-) from 0.0° to -90.0°

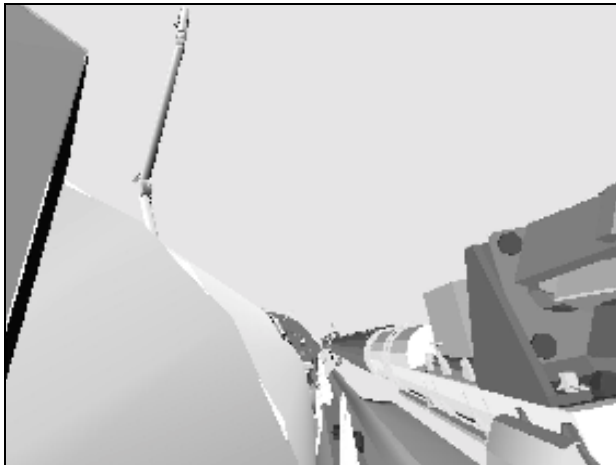
Step 3:
Drive WP (-) from +5.0° to -57.0°



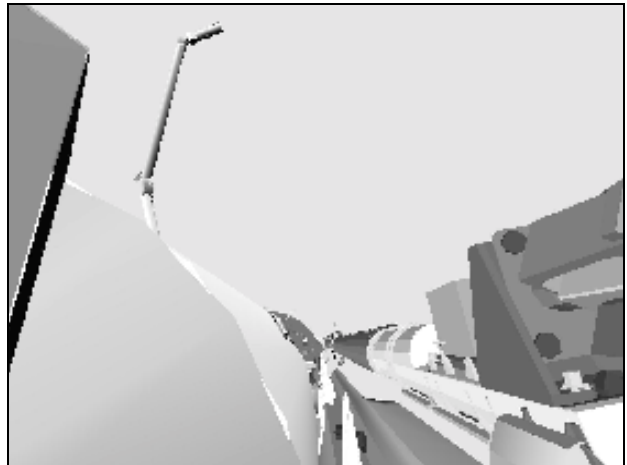
CCTV B (0,25)



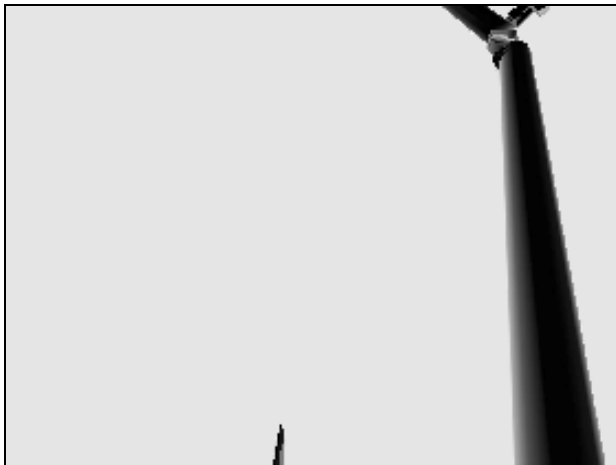
CCTV B (0,25)



CCTV C (0,15)



CCTV C (0,15)



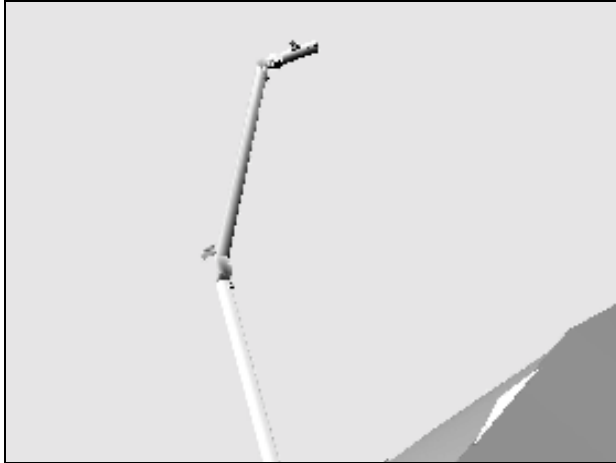
CCTV A (0,45)



ELBOW (-25,0)

Step 4:

Drive WR (+) from 0.0° to +110.0°



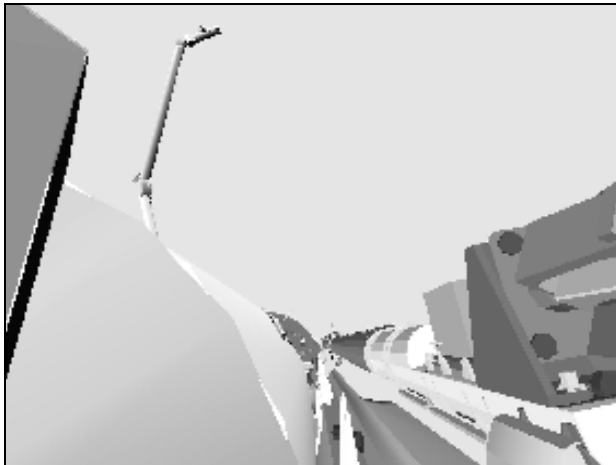
CCTV B (0,25)

Step 5:

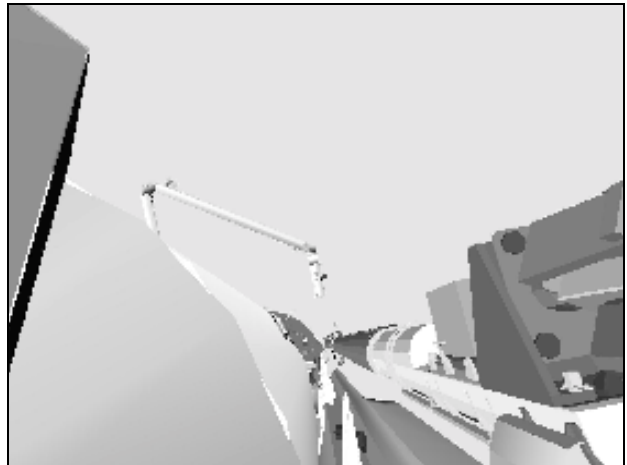
Drive EP (-) from -25.0° to -129.8°



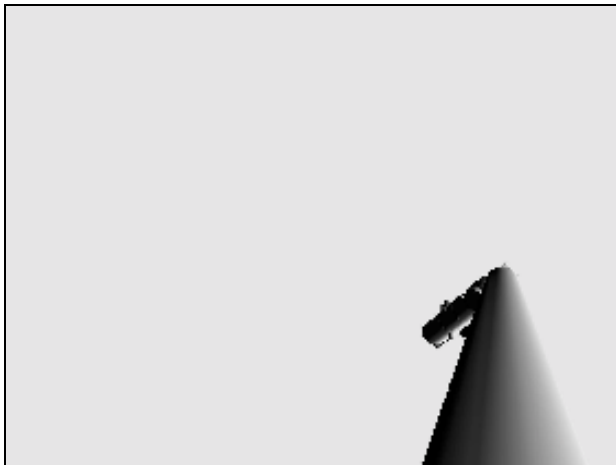
CCTV D (0,25)



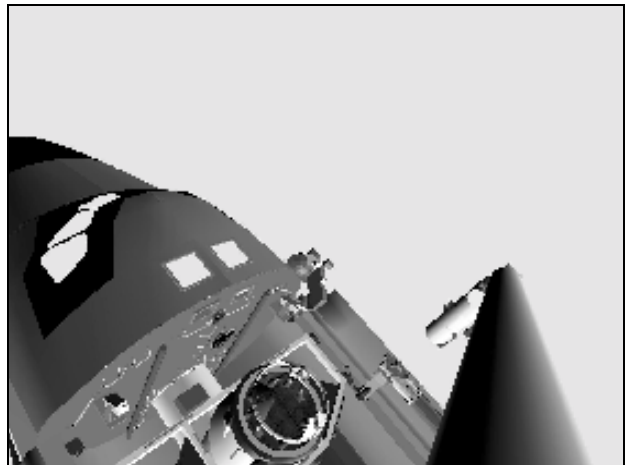
CCTV C (0,15)



CCTV C (0,15)



ELBOW (-25,0)



ELBOW (-25,0)

<p>CAUTION SPEE power must be applied within 90 min to prevent sensor package damage</p>

STBD RMS HTR A,B (two) – OFF

A6U EVENT TIMER MODE – UP
 CNTL – START

R12(OBSS) √SPEE PWR – OFF

3. OBSS GRAPPLE

A7U CCTV – config for grapple
 – install PDRS TARGET OVERLAY FOR CTVM
 – RMS WRIST, ZOOM: 34.0 HFOV
 FOCUS: 5 ft

Maintain eyepoint ~18 in when using grapple overlay

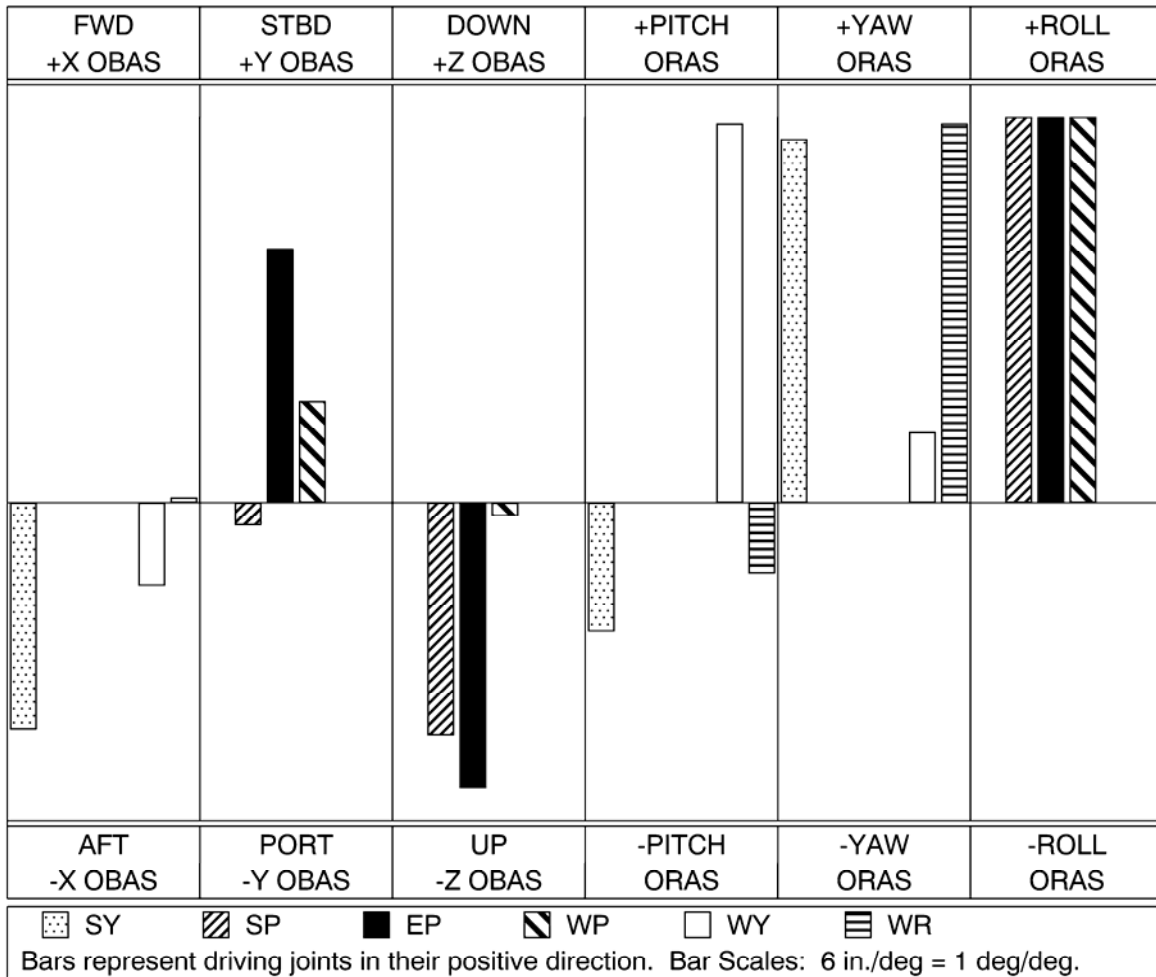
RHC If SINGLE MODE available:
 RATE – VERN (RATE MIN tb-ON)
 BRAKES – OFF (tb-OFF)

A6U DAP: VERN(FREE)
 MODE – best available

Mnvr to OBSS GRAPPLE posn:

	SY	SP	EP	WP	WY	WR
OBSS SJ PRE-GRAPPLE	-90.0	+87.9	-129.8	-57.0	0.0	+110.0
1: WP +				-40.9		
2: EP -			-134.6			
3: SP -		Until in grapple envelope				
Expected OBSS GRAPPLE	-90.0	+76.5	-134.6	-40.9	0.0	+110.0

Continue driving SP (-) until EE close to, but not over CAMs



To get:	Drive:	To get:	Drive:
+X (fwd)	-SY, -WY	+PITCH	+WY
+Y (stbd)	+EP, +WP	+YAW	+WR, +SY
+Z (down)	-SP, -EP	+ROLL	+WP, +SP

Driving:	Results In:	Driving:	Results In:
+SY	-X (aft), +YAW	+WP	+Y (stbd), +ROLL
+SP	-Z (up), +ROLL	+WY	-X (aft), +PITCH
+EP	-Z (up), +ROLL	+WR	+YAW

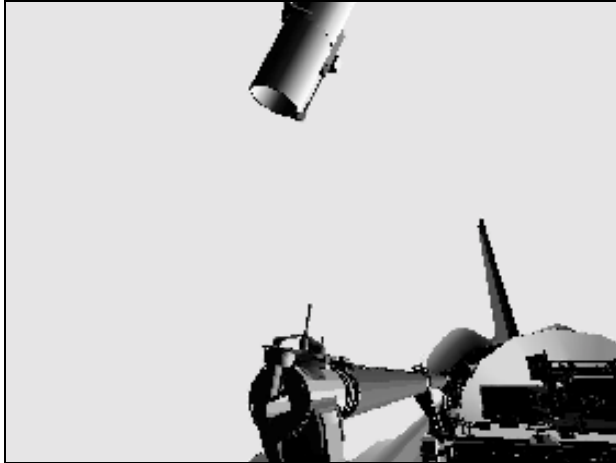
ΔSY	ΔSP	ΔEP	ΔWP	ΔWY	ΔWR
-0.0	-11.4	-4.8	+16.1	+0.0	+0.0

Step 1:

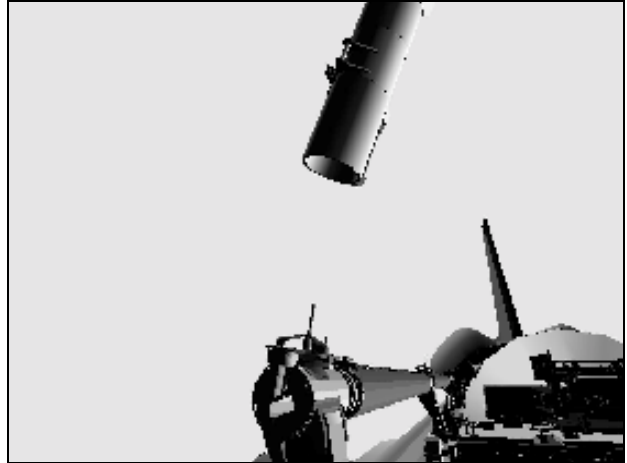
Drive WP (+) from -57.0° to -40.9°

Step 2:

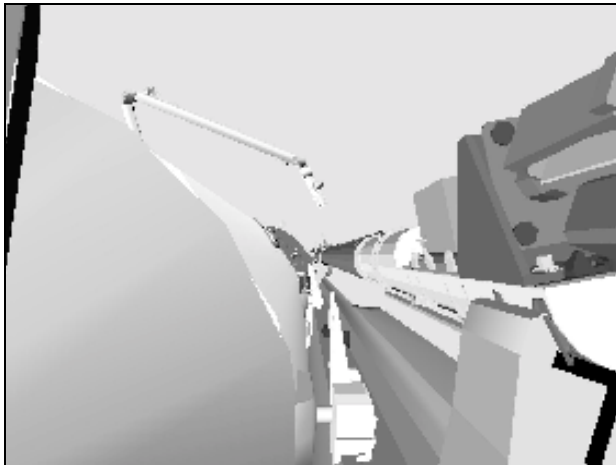
Drive EP (-) from -129.8° to -134.6°



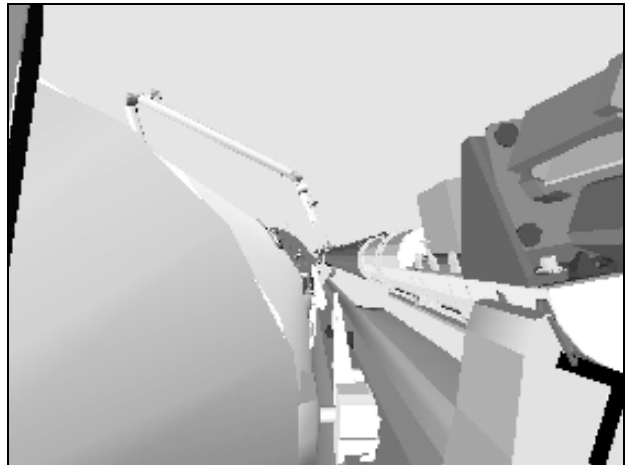
CCTV D (-20,20)



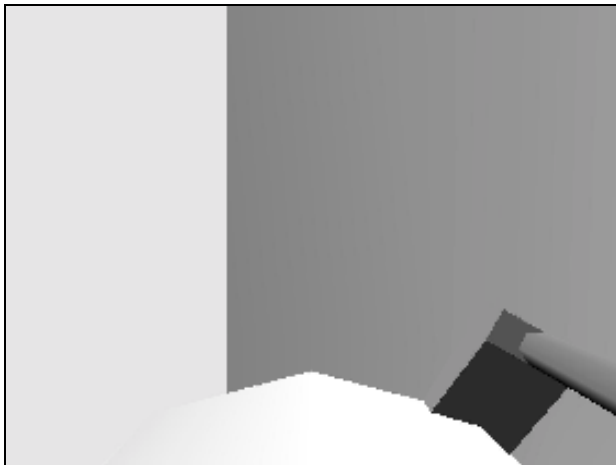
CCTV D (-20,20)



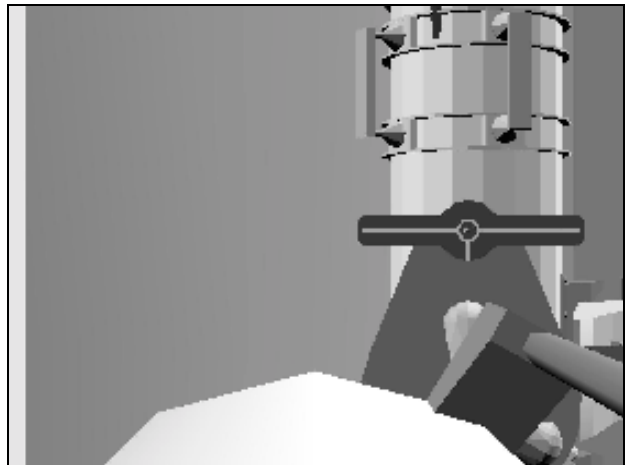
CCTV C (1,3)



CCTV C (1,3)



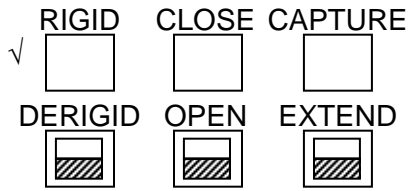
WRIST



WRIST

CAUTION
Monitor EE tb timing to prevent EE motor burnout

EE MODE – AUTO
CAPTURE – depress (mom)



CRITICAL TIMES (28 sec total)
CAPTURE tb – gray, then
CLOSE tb – gray, 3 sec max, then
RIGID tb – gray, 25 sec max

EE MODE – OFF

- * If manual capture reqd: *
- * EE MODE – MAN *
- * CAPTURE sw – depress (hold until CLOSE tb-gray, 3 sec max) *
- * MAN CONTR – RIGID (hold until RIGID tb-gray, 25 sec max) *
- * MODE – OFF *

BRAKES – ON (tb-ON)
MODE – not DIRECT
JOINT – CRIT TEMP

If SINGLE MODE available:

SM 94 PDRS CONTROL

 PL ID – ITEM 3 +1 EXEC
 INIT ID – ITEM 24 +1 EXEC

If digitals available, record POSN/ATT and Joint Angles:

	X	Y	Z	PITCH	YAW	ROLL	PL ID
							1
Expected	-680	+105	-436	0	0	341	1
	SY	SP	EP	WP	WY	WR	
Expected	-90.0	+76.5	-134.6	-40.9	0.0	+110.0	

Review GENERIC END EFFECTOR CUE CARD – SHUTTLE NOT DOCKED OPS

4. CONFIGURE POWER
 MA73C:C cb MCA PWR AC3 3Φ MID 2 – op
 ✓AC2 3Φ MID 2 – op
 :D ✓AC3 3Φ MID 4 – op
- R13L PL BAY MECH PWR SYS (two) – ON

5. STBD MRL RELEASE
 Config DAP A to A14

SM 94 PDRS CONTROL

 RMS STBD – ITEM 2 EXEC (*)
 ✓STBD AFT, MID, FWD REL (six) = 0

NOTE

Expect single motor drive time for MRL release

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

If motor drive time > 18 sec, √MCC

SM 94 PDRS CONTROL

RMS PORT – ITEM 1 EXEC (*)

6. RECONFIGURE POWER

R13L PL BAY MECH PWR SYS (two) – OFF

MA73C:C cb MCA PWR AC3 3Φ MID 2 – cl
√AC2 3Φ MID 2 – op
:D √AC3 3Φ MID 4 – op

If digitals available, record joint angles:

SY	SP	EP	WP	WY	WR

7. MNVR TO OBSS HOVER

A7U CCTV – config for unberth

If SINGLE MODE available:

RHC RATE – VERN (RATE MIN tb-ON)
BRAKES – OFF (tb-OFF)

MODE – best available

Mnvr to OBSS HOVER posn:

	SY	SP	EP	WP	WY	WR	
OBSS GRAPPLE	-90.0	+76.5	-134.6	-40.9	0.0	+110.0	
1: SP +		+79.8					
2: EP +			-123.1				
3: WP –				-55.7			
OBSS HOVER	-90.0	+79.8	-123.1	-55.7	0.0	+110.0	
	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-680	+126	-496	0	0	341	1

BRAKES – ON (tb-ON)

MODE – not DIRECT

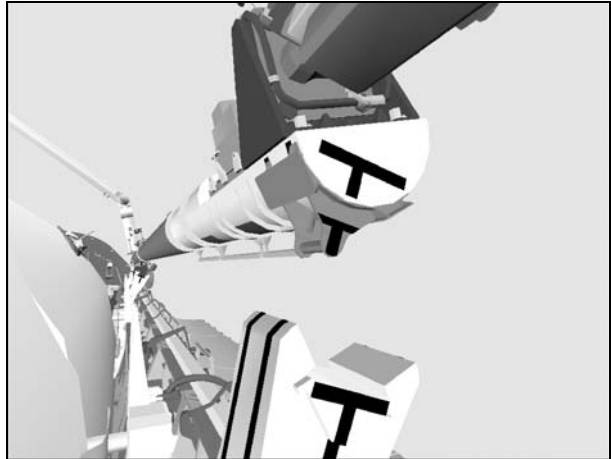
JOINT – CRIT TEMP

Start:
OBSS Grapple

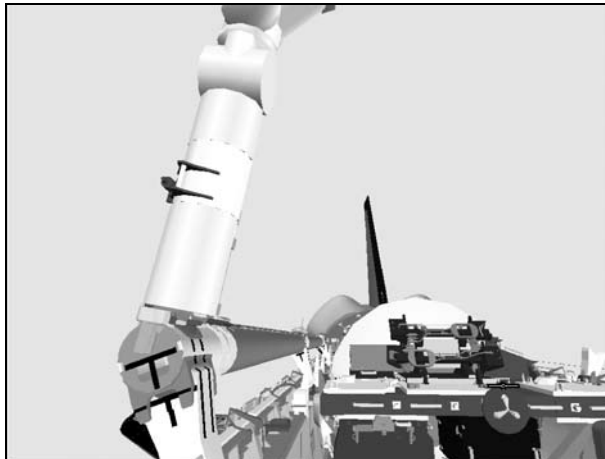
Step 1:
Drive SP (+) from +76.5° to +79.8°



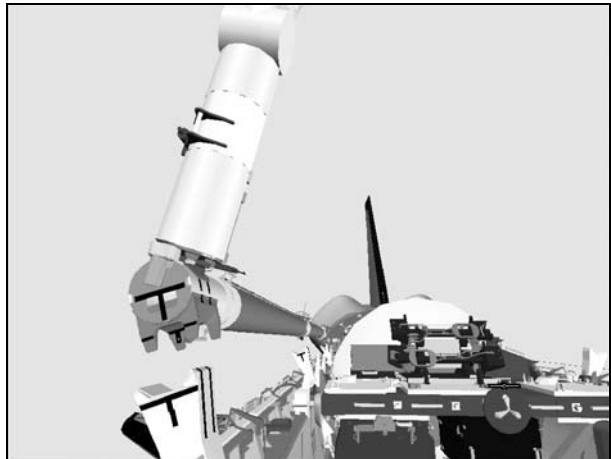
CCTV C (25,5)



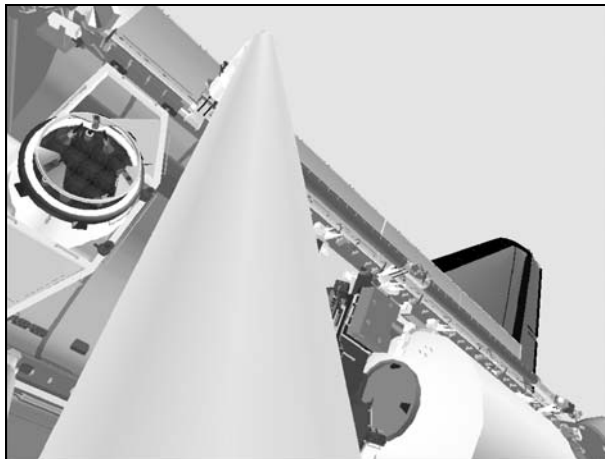
CCTV C (25,5)



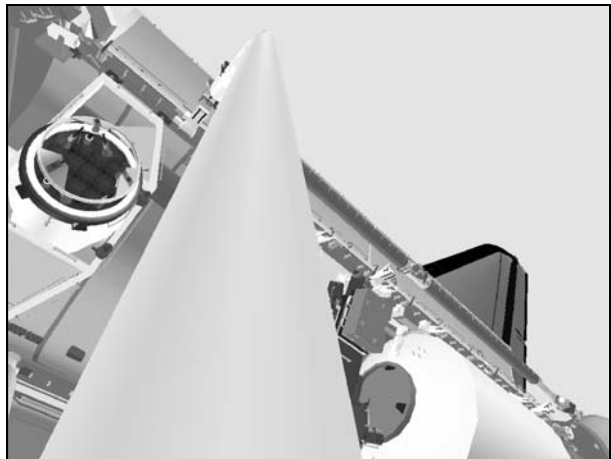
CCTV D (-5,15)



CCTV D (-5,15)



ELBOW (5,-30)



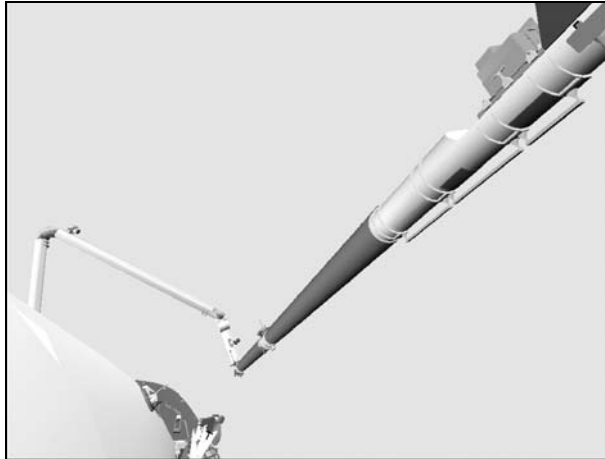
ELBOW (5,-30)

Step 2:

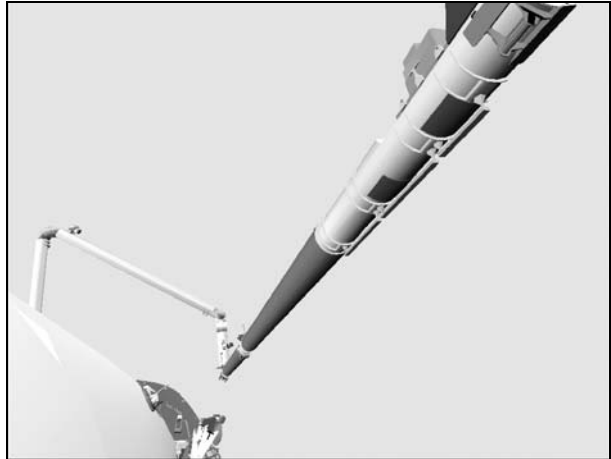
Drive EP (+) from -134.6° to -123.1°

Step 3:

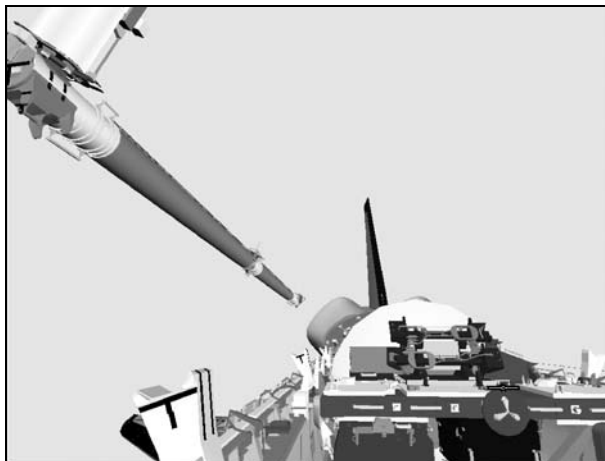
Drive WP (-) from -40.9° to -55.7°



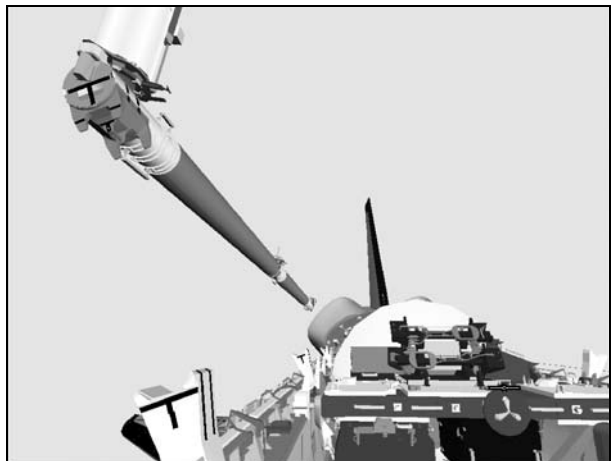
CCTV C (15,25)



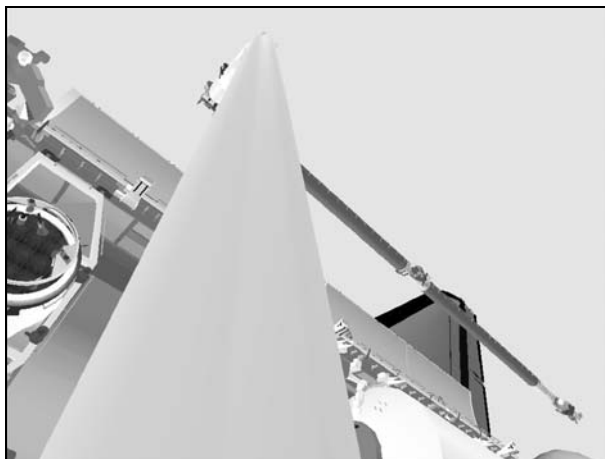
CCTV C (15,25)



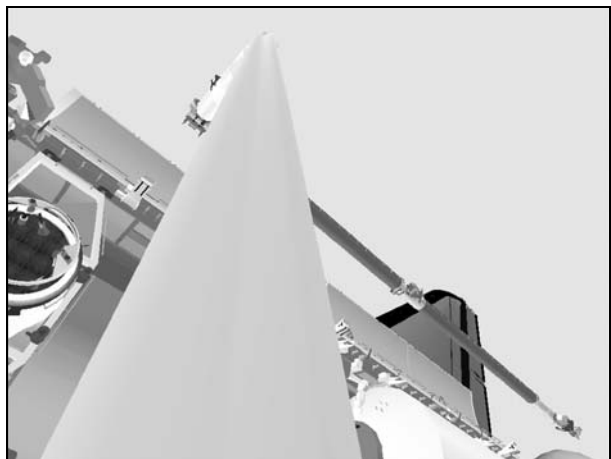
CCTV D (-5,15)



CCTV D (-5,15)



ELBOW (5,-30)



ELBOW (5,-30)

A6U If Verns failed, DAP: AUTO/ALT

In the following P/TV procedure, start 15 min timer upon applying SPEE power and inform MCC when timer is started:

Perform ACTIVATION (LDRI/ITVC Cue Card, PHOTO/TV)

Verify APCU 1 Deact complete, then:

Perform APCU ACTIVATION (SODF: ASSY OPS, APCU), APCU 2 only

Perform LCC ACTIVATION (LCS Cue Card, PHOTO/TV)

A7U 8. RESET PTU
VIDEO OUT MON2 pb – push
IN PL2(VPU) pb – push

CAMR CMD PAN/TILT – HI RATE (LO within 10°)

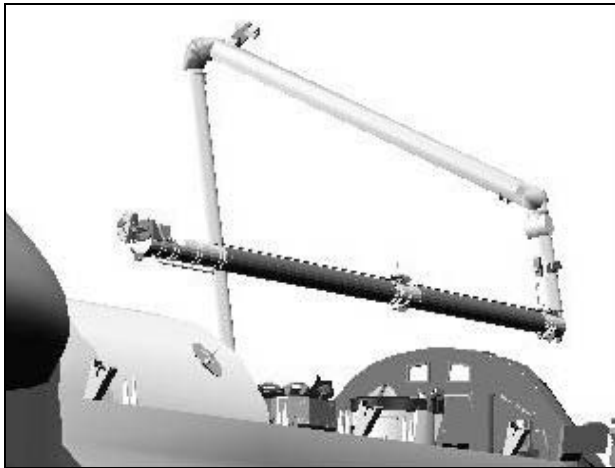
PAN – L (to hard stop)

TILT – UP (to hard stop)

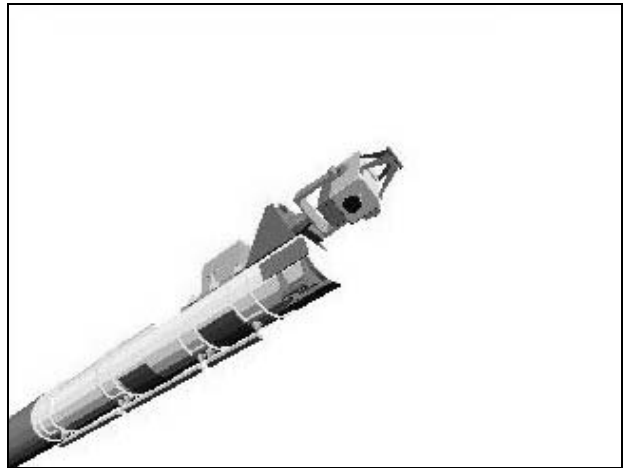
PAN/TILT – RESET

PAN: +103 (right)

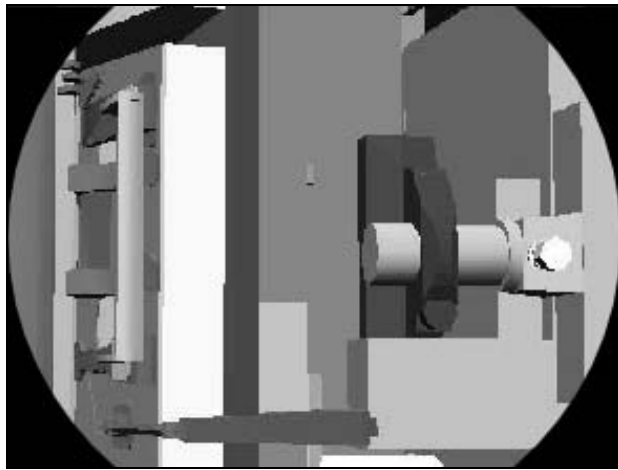
TILT: -260 (down)



BIRD'S EYE



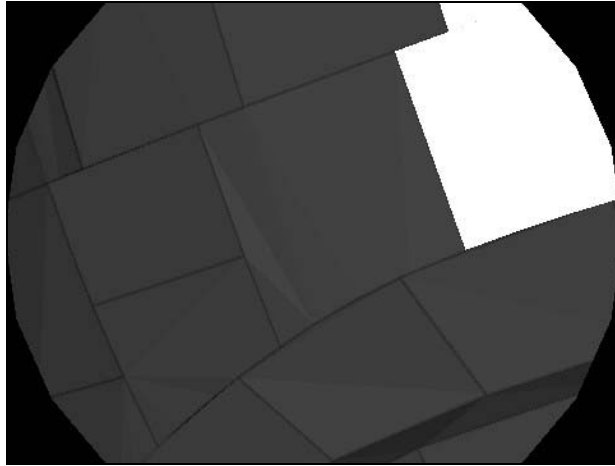
CCTV C (50,50)



LDRI (103,-260)

If LDRI calibration view of STBD sill presents unacceptable specular reflections,

A7U PAN: +110 (right)
TILT: -220 (up)



LDRI (110,-220)

9. LDRI CALIBRATION

Verify 15 min SPEE power timer expired

√VIDEO OUT MON2 pb – push
IN – as desired (not PL2)
OUT MUX 1 L pb – push (MIDDECK It on)

a. Mode 3

LDRI MODE 3 pb – push (LDRI video)

L10(VTR) REC pb – push, hold
PLAY pb – push, simo (red ●)

Record for 30 sec

STOP pb – push (no red ●)

b. Mode 4

A7U LDRI MODE 4 pb – push (brighter LDRI video)

L10(VTR) REC pb – push, hold
PLAY pb – push, simo (red ●)

Record for 30 sec

STOP pb – push (no red ●)

c. Mode 5

A7U LDRI MODE 5 pb – push (flickering LDRI video)

L10(VTR) REC pb – push, hold
PLAY pb – push, simo (red ●)

Record for 30 sec

STOP pb – push (no red ●)

- A7U
- d. Mode 6
LDRI MODE 6 pb – push (brighter flickering LDRI video)
- L10(VTR)
- REC pb – push, hold
PLAY pb – push, simo (red ●)
- Record for 30 sec
- STOP pb – push (no red ●)

OBSS SJ BERTH

WARNING
For UNDOCKED ops only

NOTE

Stbd MPMs assumed deployed

- A7U
1. SETUP
CCTV – config for berth
– perform PAN/TILT RESET for PLB cameras

If SINGLE MODE available:

SM 94 PDRS CONTROL

PL ID – ITEM 3 +1 EXEC

INIT ID – ITEM 24 +1 EXEC

2. OBSS HOVER

Verify mnvr to OBSS HOVER posn complete:

X	Y	Z	PITCH	YAW	ROLL	PL ID
-680	+126	-496	0	0	341	1
SY	SP	EP	WP	WY	WR	
-90.0	+79.8	-123.1	-55.7	0.0	+110.0	

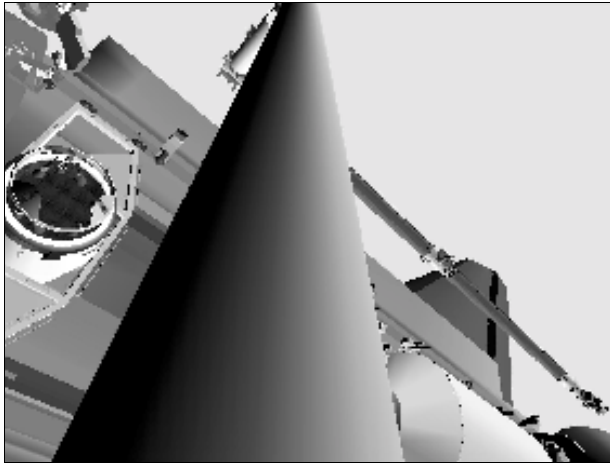
√BRAKES – ON (tb-ON)

√MODE – not DIRECT

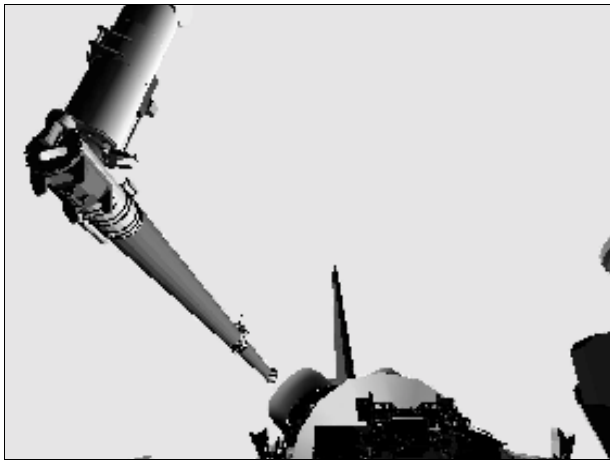
√JOINT – CRIT TEMP

√STBD RMS HTR A,B (two) – OFF

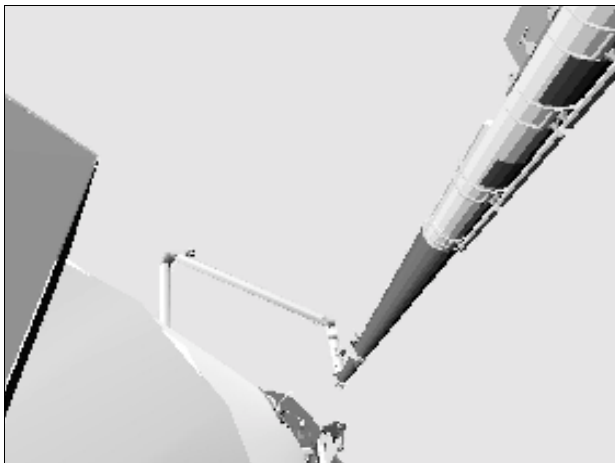
OBSS Hover



ELBOW (-15,-35)



CCTV D (0,25)

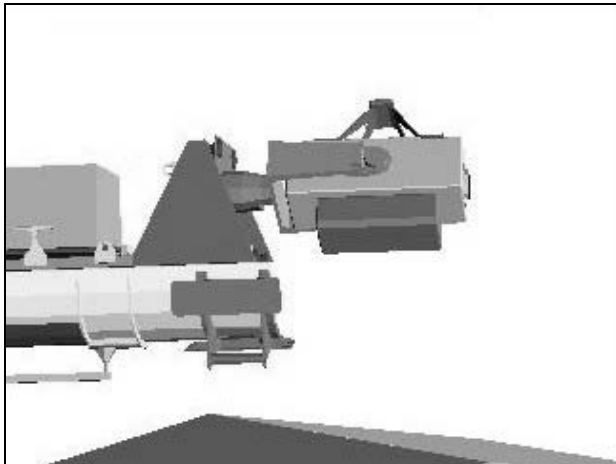


CCTV C (0,25)

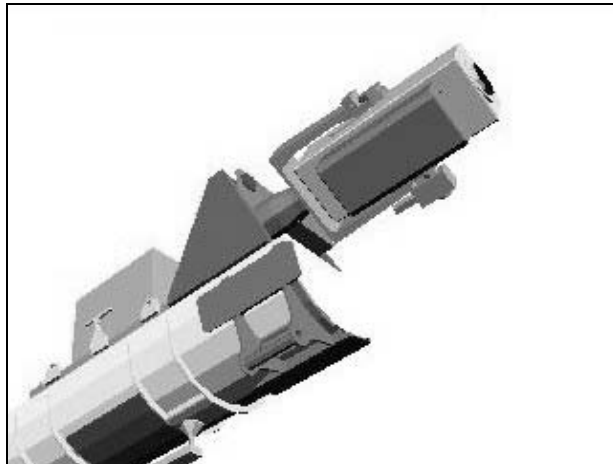
- A7U 3. STOW PTU
 VIDEO OUT MON2 pb – push
 IN PL2(VPU) pb – push

CAMR CMD PAN/TILT – HI RATE (LO within 10°)

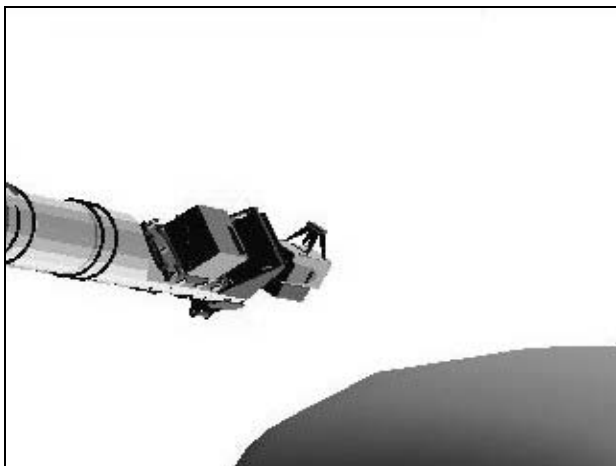
- PAN – L (to hard stop)
 TILT – UP (to hard stop)
 PAN/TILT – RESET
 PAN: +108 (right)
 TILT: -175 (down)



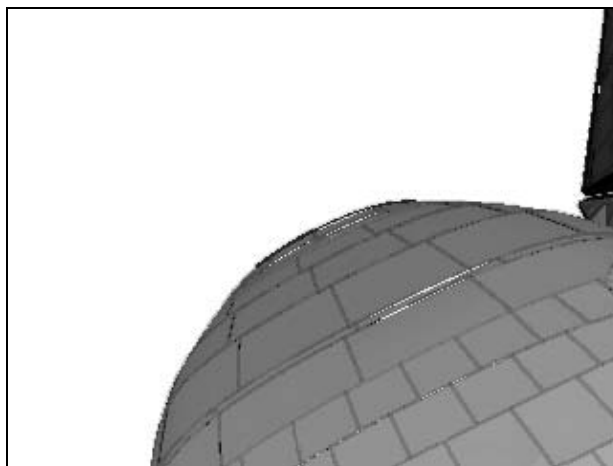
CCTV B (82,16) HFOV: 15.0



CCTV C (50,50) HFOV: 40.0



ELBOW (52,-45) HFOV: 9.8 (full-in)



OBSS ITVC (108,-175) HFOV: 53.8 (full-out)

Perform LCC DEACTIVATION (LCS Cue Card, PHOTO/TV)

CAUTION
 STBD RMS HTR power must be applied within
 90 min to prevent sensor package damage

Perform DEACTIVATION (LDRI/ITVC Cue Card, PHOTO/TV)

Perform APCU DEACTIVATION (SODF: ASSY OPS, APCU), APCU 2 only

A7U 4. OBSS BERTH
 CCTV – configure as required
 ZOOM – full OUT

SM 94 PDRS CONTROL
 RMS STBD – ITEM 2 EXEC (*)

A6U DAP: VERN(FREE)

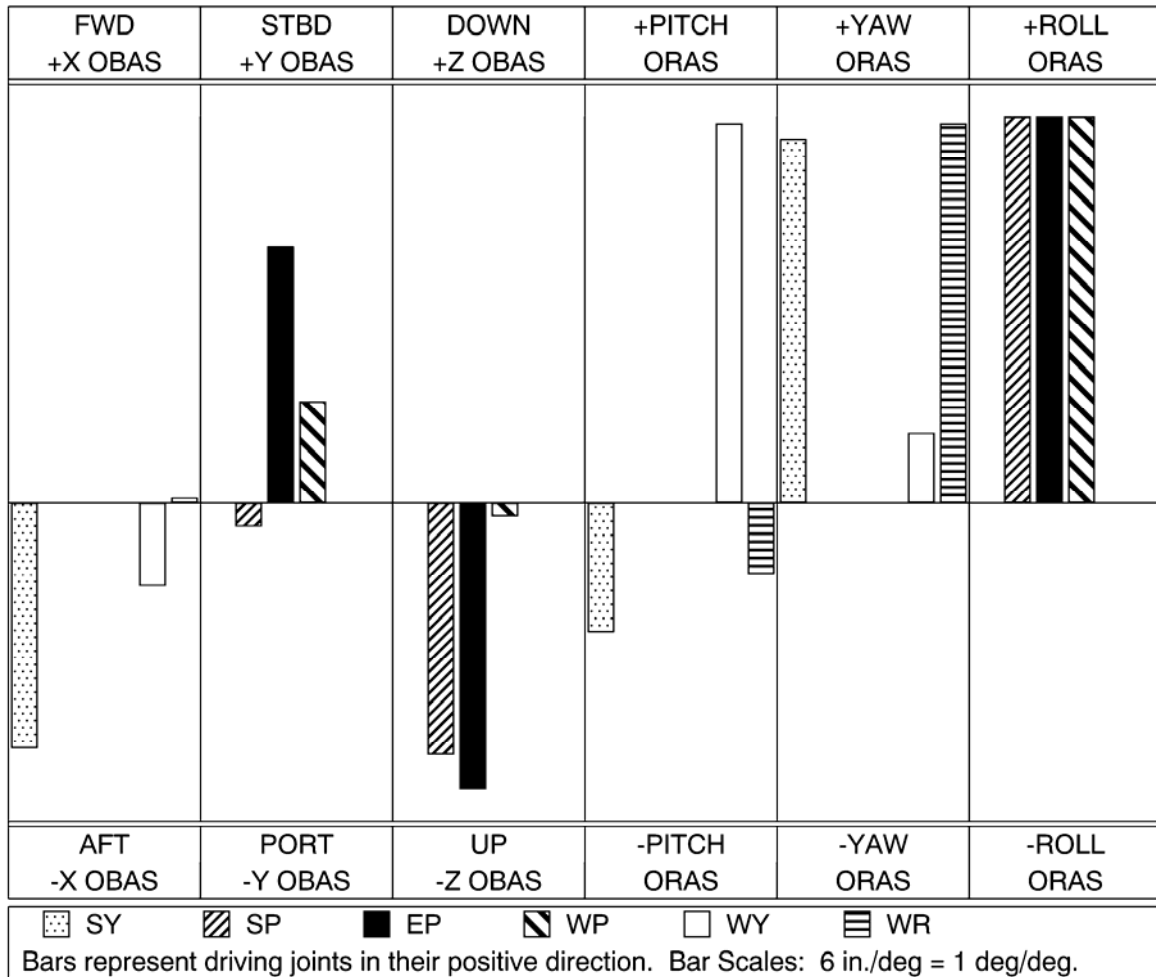
RHC If SINGLE MODE available:
 RATE – VERN (RATE MIN tb-ON)
 BRAKES – OFF (tb-OFF)

MODE – best available

Mnvr to OBSS BERTH posn:

	SY	SP	EP	WP	WY	WR	
OBSS HOVER	-90.0	+79.8	-123.1	-55.7	0.0	+110.0	
1: WP +				-40.9			
2: EP -			-134.6				
3: SP -		+76.5					
Expected OBSS BERTH	-90.0	+76.5	-134.6	-40.9	0.0	+110.0	
	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-680	+105	-436	0	0	341	1

√STBD RMS R-F-L tb (three) – gray
 MODE – not DIRECT



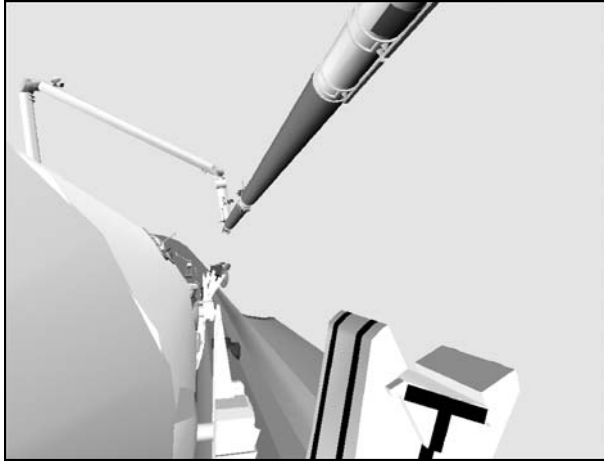
To get:	Drive:	To get:	Drive:
+X (fwd)	-SY, -WY	+PITCH	+WY
+Y (stbd)	+EP, +WP	+YAW	+WR, +SY
+Z (down)	-SP, -EP	+ROLL	+WP, +SP

Driving:	Results In:	Driving:	Results In:
+SY	-X (aft), +YAW	+WP	+Y (stbd), +ROLL
+SP	-Z (up), +ROLL	+WY	-X (aft), +PITCH
+EP	-Z (up), +ROLL	+WR	+YAW

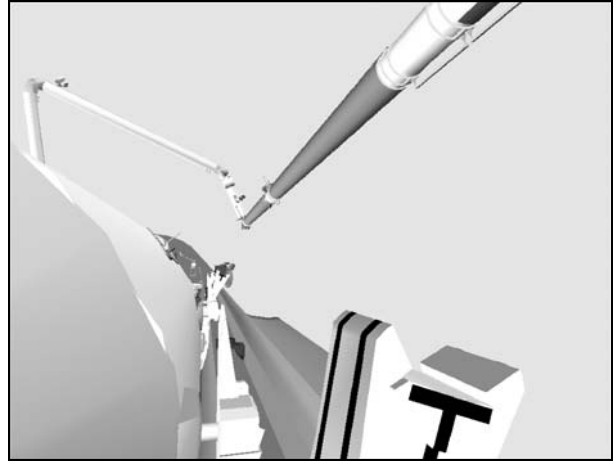
ΔSY	ΔSP	ΔEP	ΔWP	ΔWY	ΔWR
+0.0	-3.3	-11.5	+14.8	+0.0	+0.0

Start:
OBSS Hover

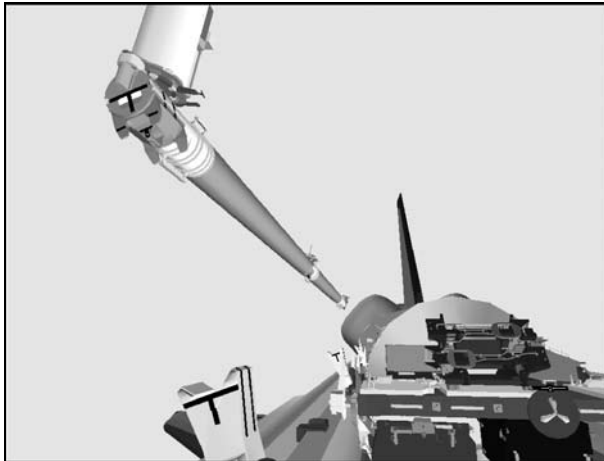
Step 1:
Drive WP (+) from -55.7° to -40.9°



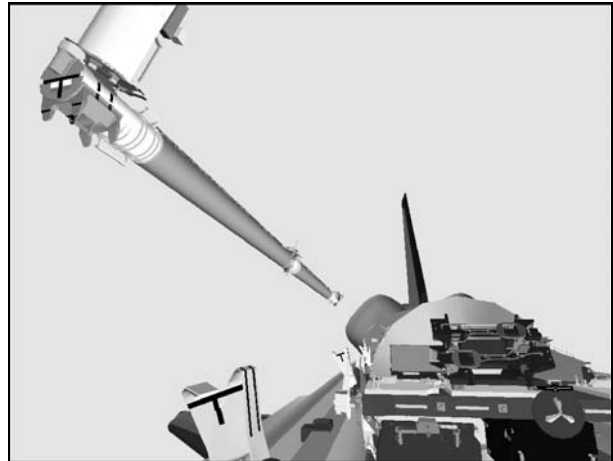
CCTV C (15,5)



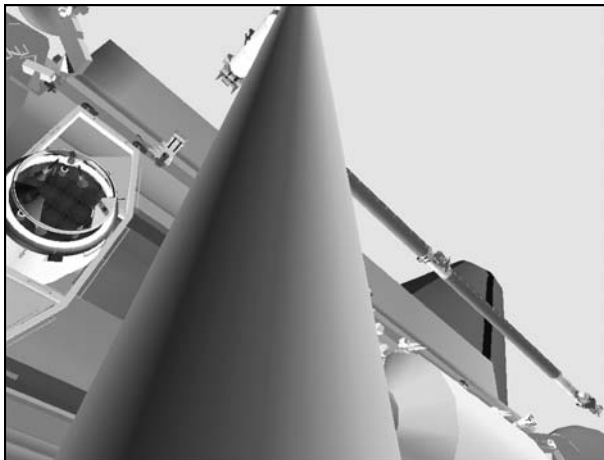
CCTV C (15,5)



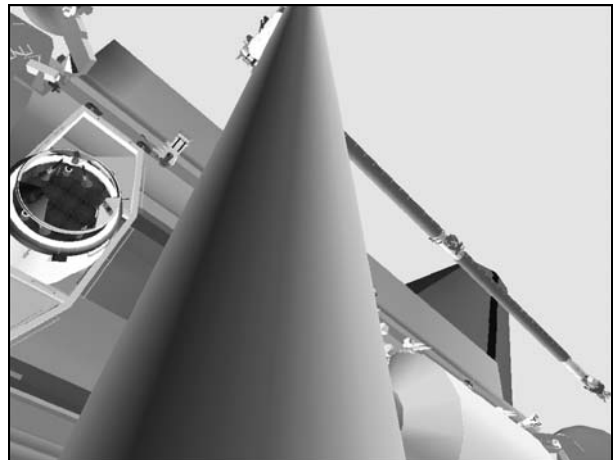
CCTV D (-10,15)



CCTV D (-10,15)



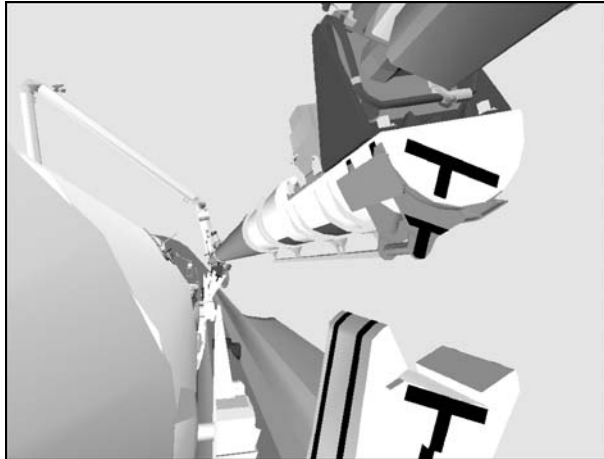
ELBOW (0,-35)



ELBOW (0,-35)

Step 2:

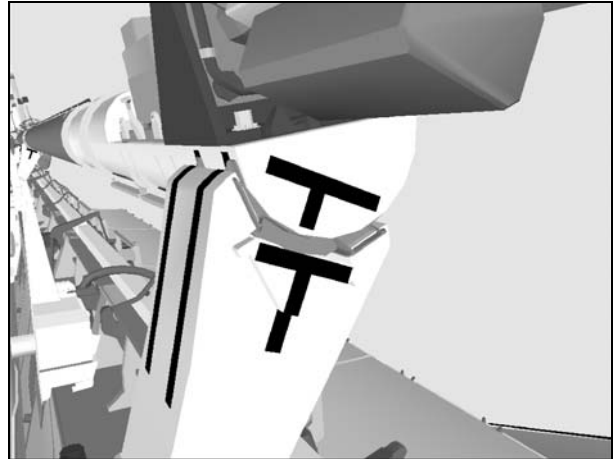
Drive EP (-) from -123.1° to -134.6°



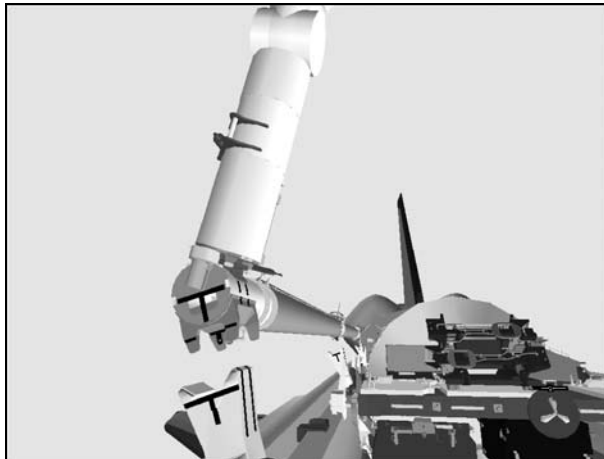
CCTV C (15,5)

Step 3:

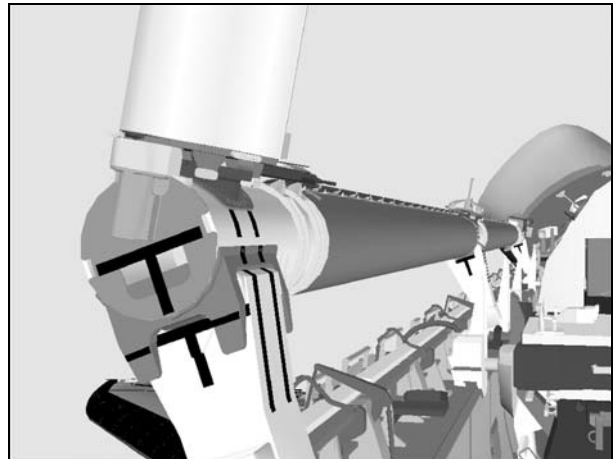
Drive SP (-) from $+79.8^{\circ}$ to $+76.5^{\circ}$



CCTV C (30,-10) HFOV 60.0



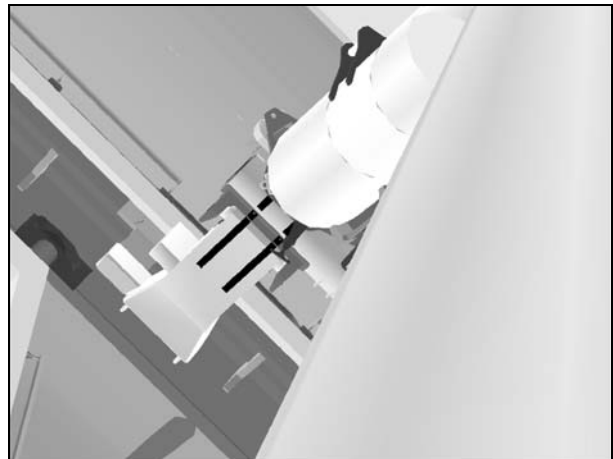
CCTV D (-10,15)



CCTV D (-15,0) HFOV 35.0



ELBOW (0,-35)



ELBOW (-7,-12) HFOV 15.0

5. CONFIGURE POWER
MA73C:C cb MCA PWR AC3 3Φ MID 2 – op
 √AC2 3Φ MID 2 – op
 :D √AC3 3Φ MID 4 – op

R13L PL BAY MECH PWR SYS (two) – ON

6. STBD MRL LATCH
RATE – COARSE (RATE MIN tb-OFF)
SM 94 PDRS CONTROL
√STBD AFT, MID, FWD LAT (six) = 0

AUTO BRAKE INH – ITEM 10 EXEC (*)

NOTE

Expect single motor drive time for MRL latching

STBD RMS RETEN LAT – LAT (tb-LAT) (18 sec max)
– OFF

If motor drive time > 18 sec, √MCC

SM 94 PDRS CONTROL
RMS PORT – ITEM 1 EXEC (*)

If TEST MODE available,
MODE – TEST, ENTER
Wait 5 sec

√BRAKES – ON (tb-ON)
JOINT – CRIT TEMP

SM 94 PDRS CONTROL
AUTO BRAKE ENA – ITEM 9 EXEC (*)

Config DAP A to A1

A6U DAP: A1/AUTO/VERN(ALT)

7. RECONFIGURE POWER
R13L PL BAY MECH PWR SYS (two) – OFF

MA73C:C cb MCA PWR AC3 3Φ MID 2 – cl
 √AC2 3Φ MID 2 – op
 :D √AC3 3Φ MID 4 – op

8. OBSS UNGRAPPLE
A7U CCTV – configure for ungrapple
 – attach overlays as needed
 – RMS WRIST, ZOOM: 34.0 HFOV
 FOCUS: 5 ft

If SINGLE MODE available:

SM 94 PDRS CONTROL

PL ID – ITEM 3 +0 EXEC

INIT ID – ITEM 24 +0 EXEC

RHC RATE – VERN (RATE MIN tb-ON)
BRAKES – OFF (tb-OFF)

MODE – best available

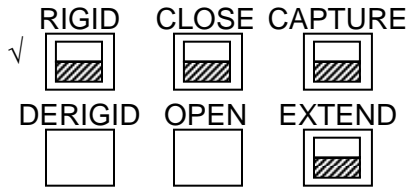
A6U DAP: VERN(FREE)

CAUTION
Monitor EE tb timing to prevent EE motor burnout

EE MODE – MAN

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

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



Drive SP (+) until arm clear of grapple pin

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

MODE – OFF

STBD RMS HTR A,B (two) – AUTO

A6U EVENT TIMER CNTL – STOP

DAP: A1/AUTO/VERN(ALT)

Mnvr to OBSS SJ PRE-GRAPPLE posn:

	SY	SP	EP	WP	WY	WR	
OBSS BERTH	-90.0	+76.5	-134.6	-40.9	0.0	+110.0	
1: SP +		+87.9					
2: EP +			-129.8				
3: WP –				-57.0			
OBSS SJ PRE-GRAPPLE	-90.0	+87.9	-129.8	-57.0	0.0	+110.0	
	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-680	+96	-513	270	350	1	0

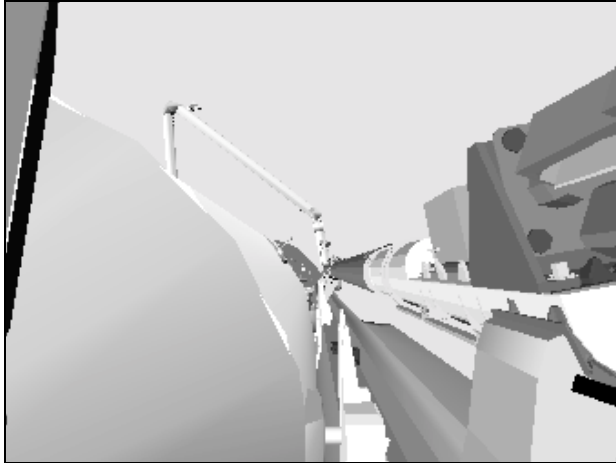
BRAKES – ON (tb-ON)

MODE – not DIRECT

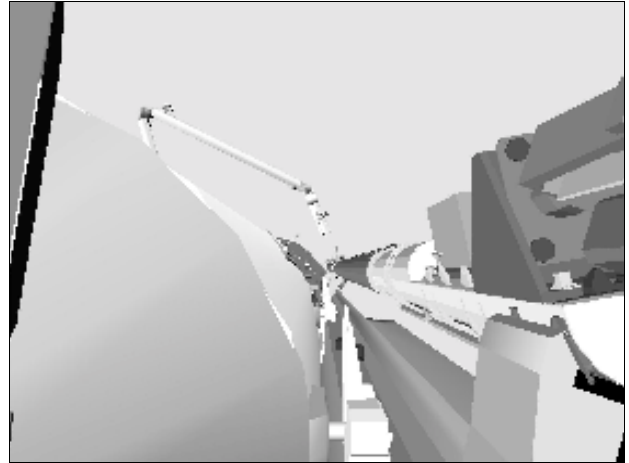
JOINT – CRIT TEMP

Start:
OBSS Berth

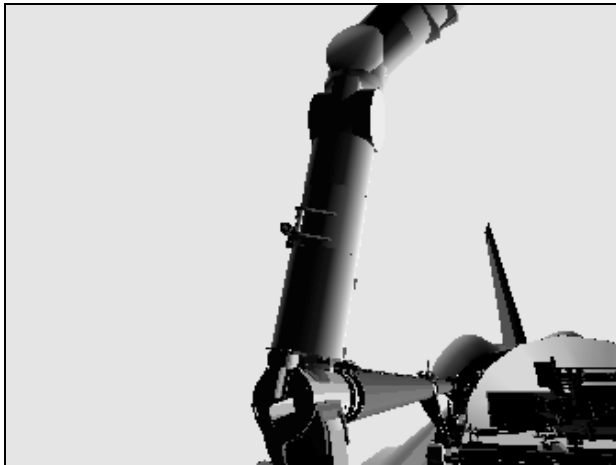
Step 1:
Drive SP (+) from +76.5° to +87.9°



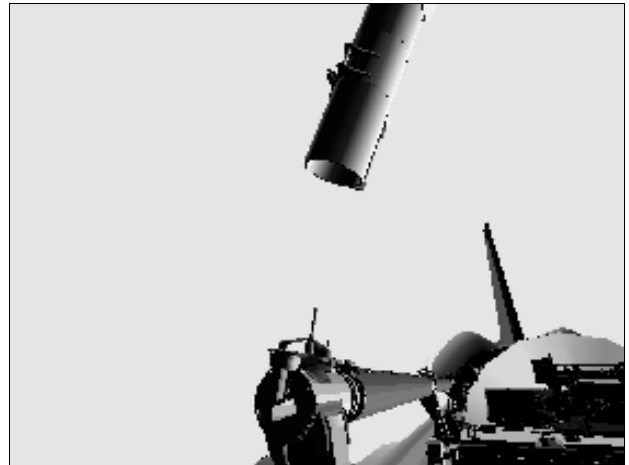
CCTV C (0,5)



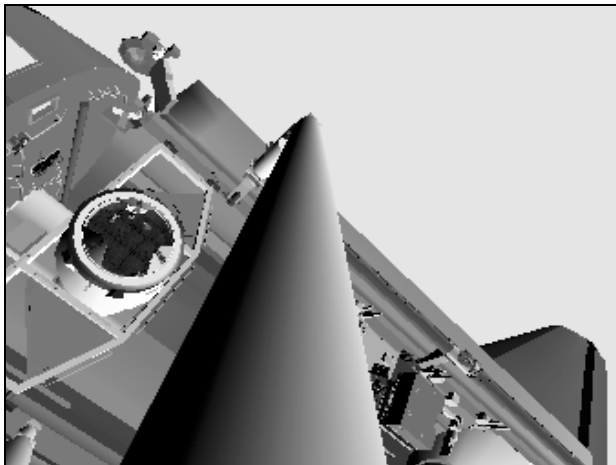
CCTV C (0,5)



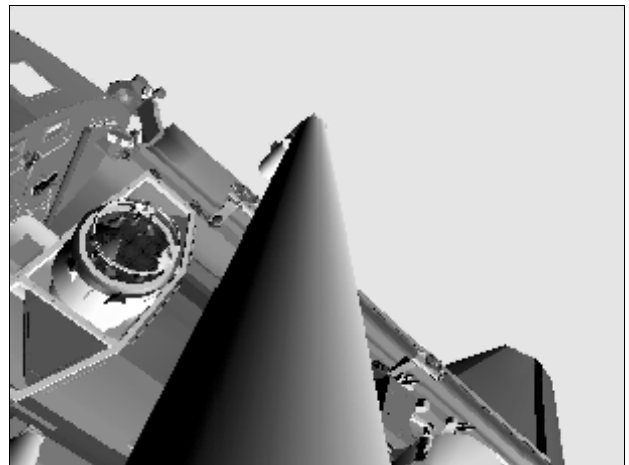
CCTV D (-20,20)



CCTV D (-20,20)



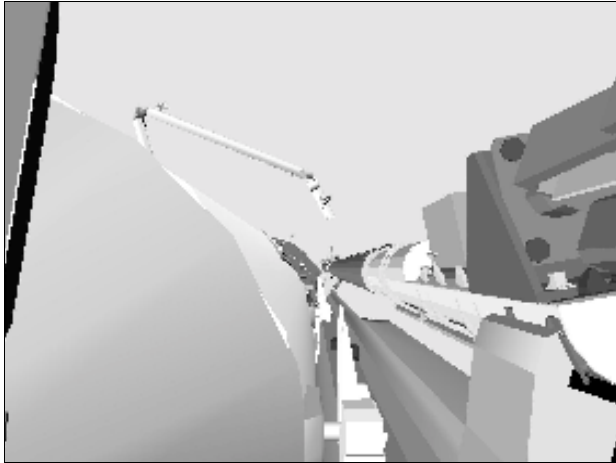
ELBOW (0,-20)



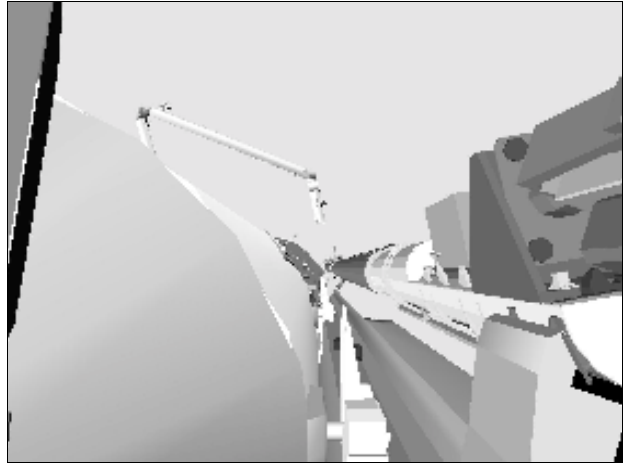
ELBOW (0,-20)

Step 2:
Drive EP (+) from -134.6° to -129.8°

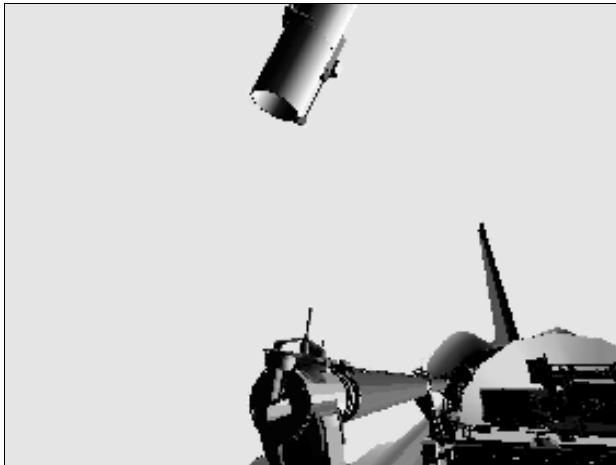
Step 3:
Drive WP (-) from -40.9° to -57.0°



CCTV C (0,5)



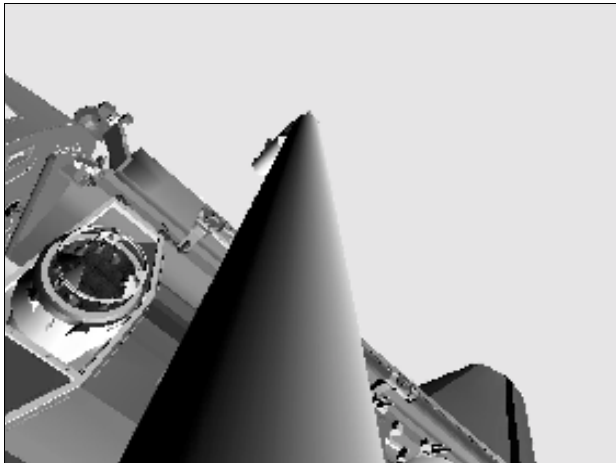
CCTV C (0,5)



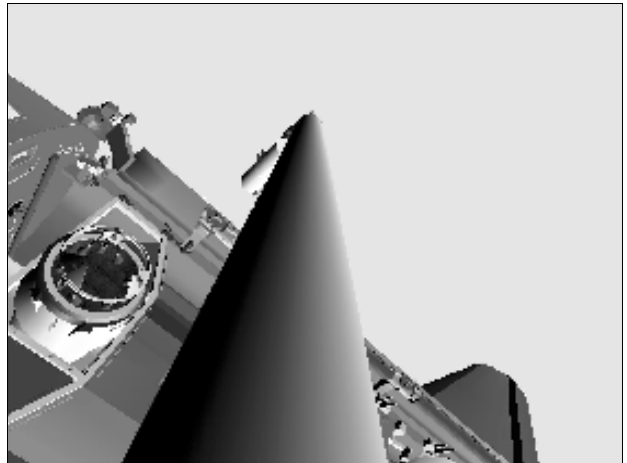
CCTV D (-20,20)



CCTV D (-20,20)



ELBOW (0,-20)



ELBOW (0,-20)

A7U 9. ARM PRE-CRADLE
 CCTV – configure as required
 ZOOM – full OUT

RHC If SINGLE MODE available:
 RATE – as reqd (VERN within 10 ft)
 BRAKES – OFF (tb-OFF)

MODE – best available

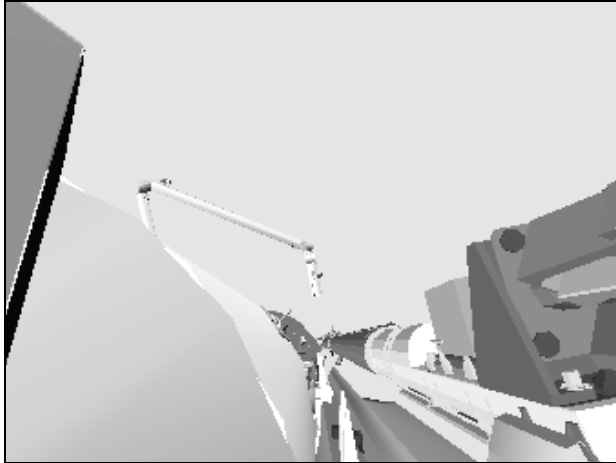
Mnvr to PRE-CRADLE posn:

	SY	SP	EP	WP	WY	WR	
OBSS SJ	-90.0	+87.9	-129.8	-57.0	0.0	+110.0	
PRE-GRAPPLE				+5.0			
1: WP +							
2: WR -						0.0	
3: EP +			-25.0				
4: SY +	0.0						
5: SP -		+25.0					
PRE-CRADLE	0.0	+25.0	-25.0	+5.0	0.0	0.0	
	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-1261	-146	-551	5	2	0	0

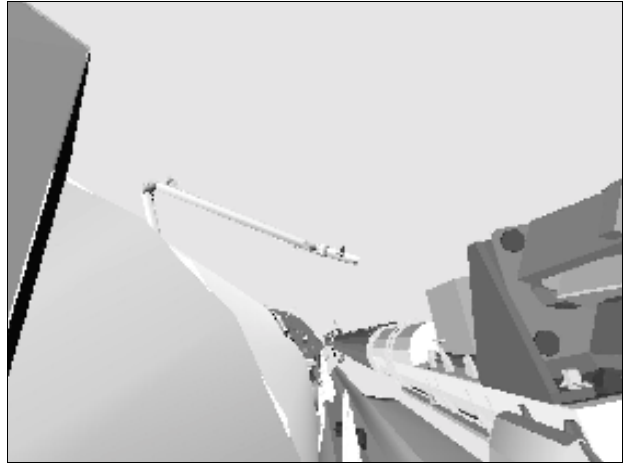
BRAKES – ON (tb-ON)
 MODE – not DIRECT
 PARAM – PORT TEMP
 JOINT – CRIT TEMP

Start:
OBSS Pre-Grapple

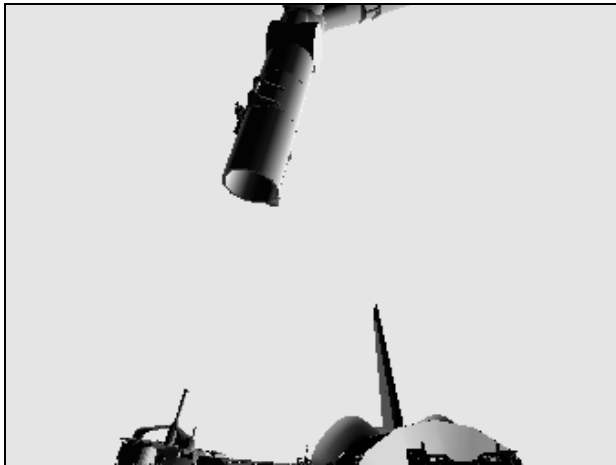
Step 1:
Drive WP (+) from -57.0° to $+5.0^\circ$



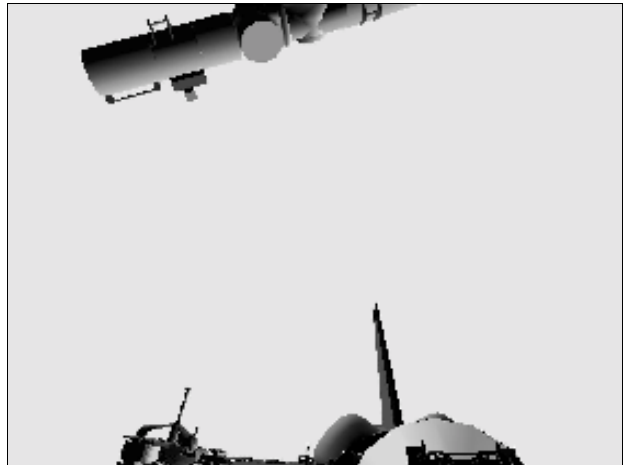
CCTV C (0,15)



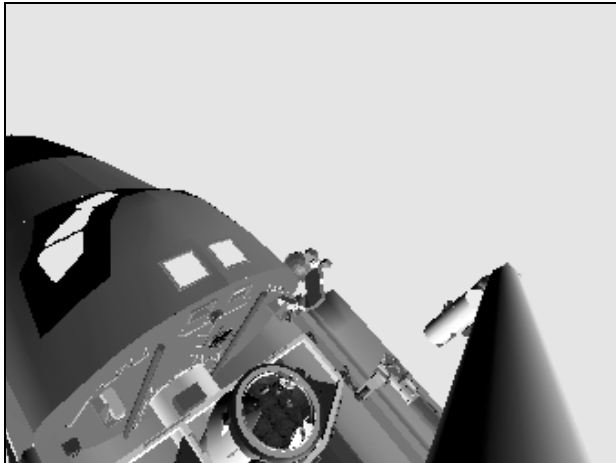
CCTV C (0,15)



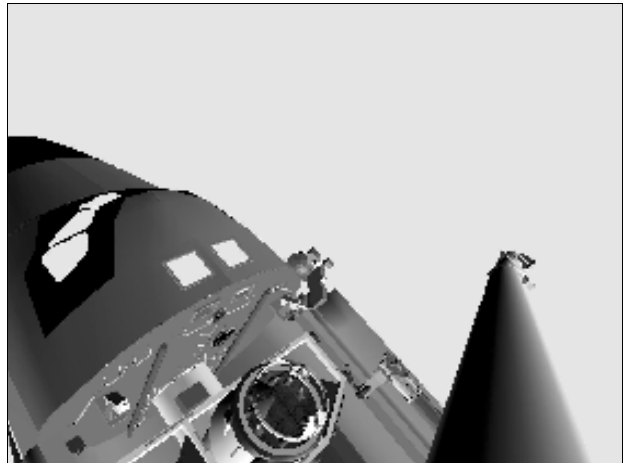
CCTV D (-5,30)



CCTV D (-5,30)



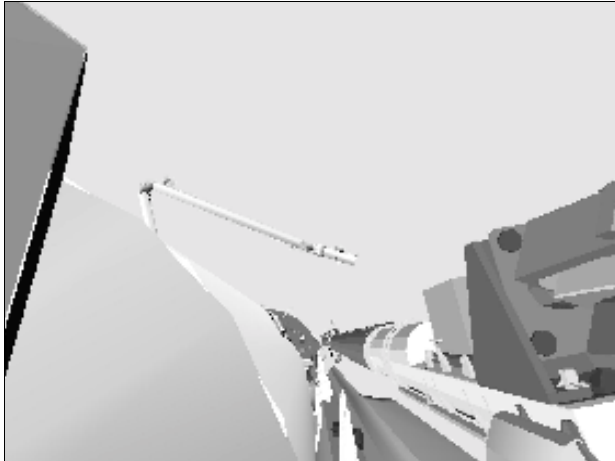
ELBOW (-25,0)



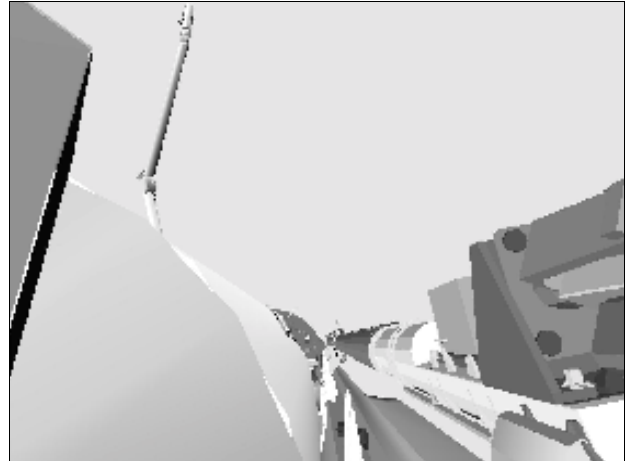
ELBOW (-25,0)

Step 2:
Drive WR (-) from +110.0° to 0.0°

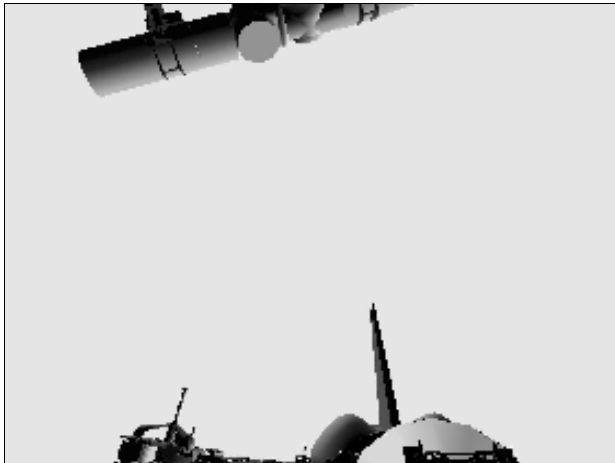
Step 3:
Drive EP (+) from -129.8° to -25.0°



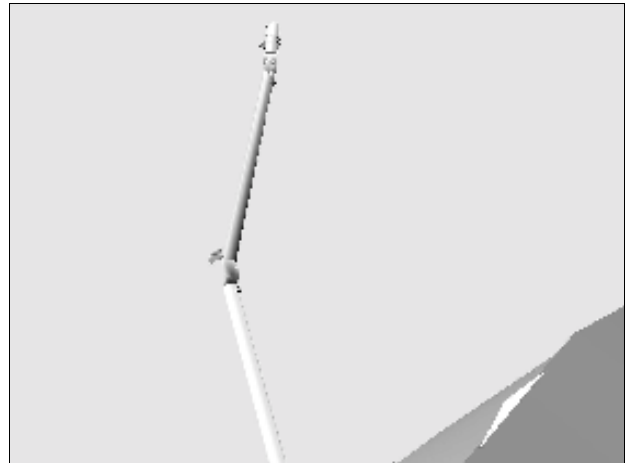
CCTV C (0,15)



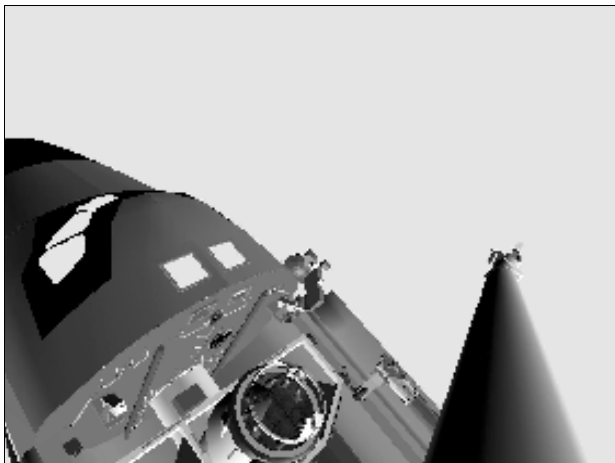
CCTV C (0,15)



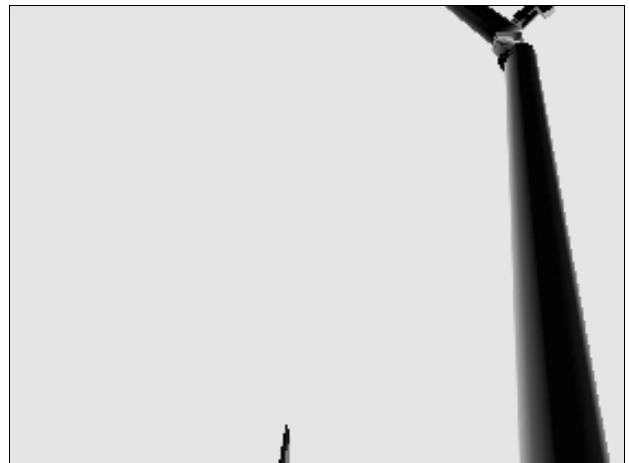
CCTV D (-5,30)



CCTV B (0,25)



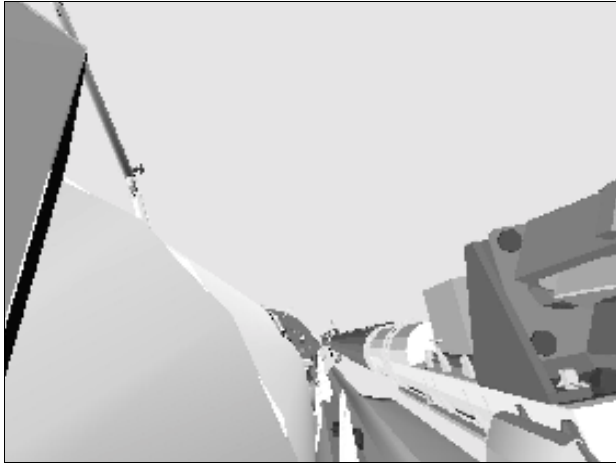
ELBOW (-25,0)



CCTV A (0,45)

Step 4:

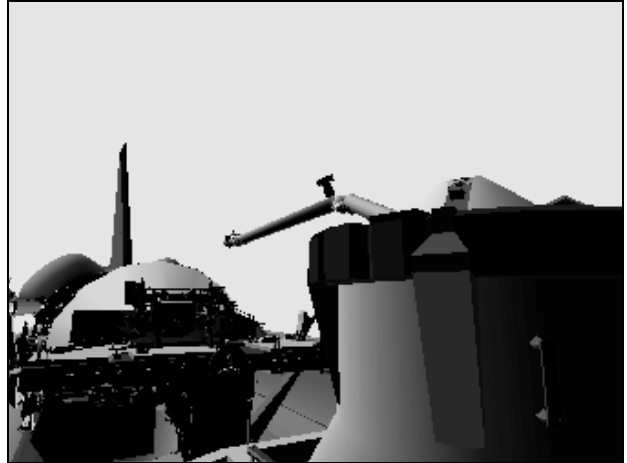
Drive SY (+) from -90.0° to 0.0°



CCTV C (0,15)

Step 5:

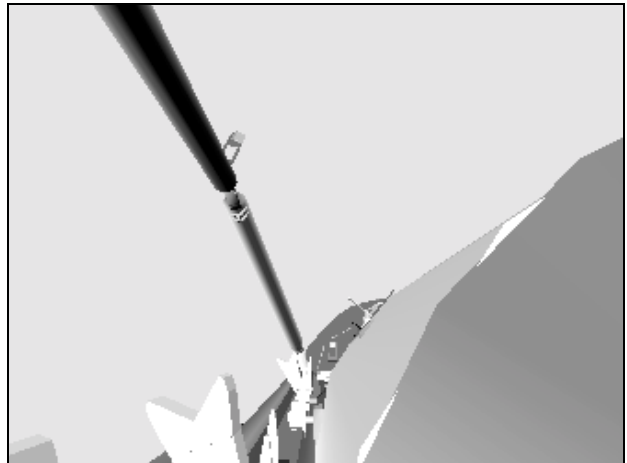
Drive SP (-) from $+87.9^\circ$ to $+25.0^\circ$



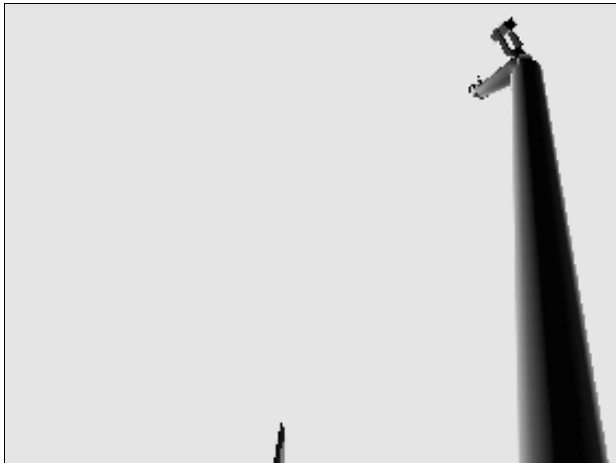
CCTV D (30,10)



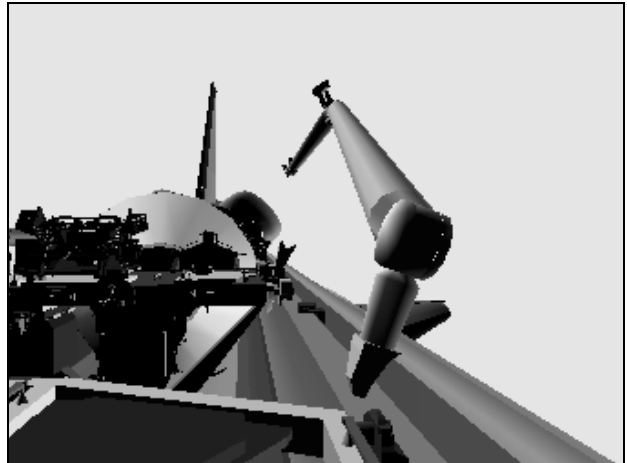
CCTV B (0,25)



CCTV B (0,10)



CCTV A (0,45)



CCTV A (10,0)

OBSS SJ HANDOFF FROM SSRMS TO SRMS

1. SETUP

If SINGLE MODE available:

SM 94 PDRS CONTROL

√PL ID, ITEM 3: 0

√INIT ID, ITEM 24: 0

A7U

CCTV – config as reqd
 – perform PAN/TILT RESET for PLB cameras
 ZOOM – full OUT

2. SJ OBSS PRE-GRAPPLE AT HANDOFF MANEUVER

On SSRMS Operator GO for mnvr to OBSS PRE-GRAPPLE,

If SINGLE MODE available:

RHC

RATE – as reqd (VERN within 10 ft)

BRAKES – OFF (tb-OFF)

MODE – best available

Mnvr to OBSS PRE-GRAPPLE AT HANDOFF posn:

	SY	SP	EP	WP	WY	WR	
PRE-CRADLE	0.0	+25.0	-25.0	+5.0	0.0	0.0	
1: SY +	+23.5						
2: SP +		+63.5					
3: EP –			-29.6				
4: WP –				-102.9			
5: WY +					+11.5		
6: WR –						-98.6	
OBSS PRE-GRAPPLE AT HAND-OFF	+23.5	+63.5	-29.6	-102.9	+11.5	-98.6	
	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-1015	-362	-688	284	0	270	0

BRAKES – ON (tb-ON)

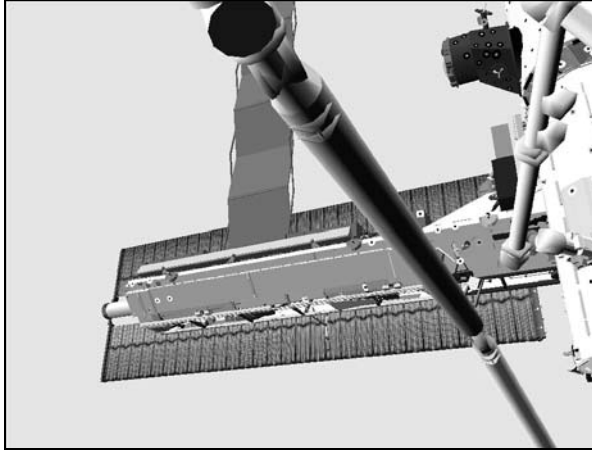
MODE – not DIRECT

JOINT – CRIT TEMP

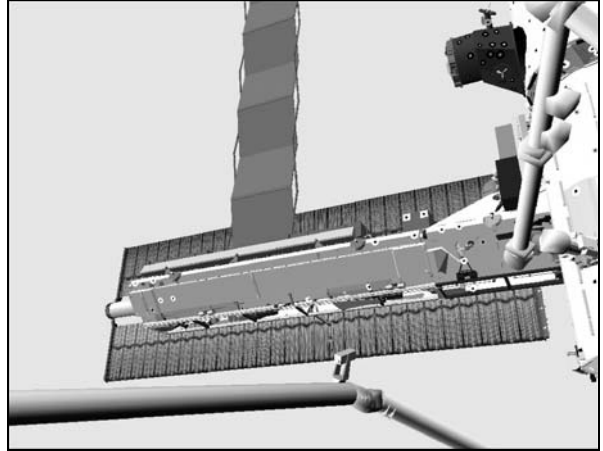
Notify SSRMS Operator that SRMS at OBSS PRE-GRAPPLE posn

Start:
Pre-Cradle

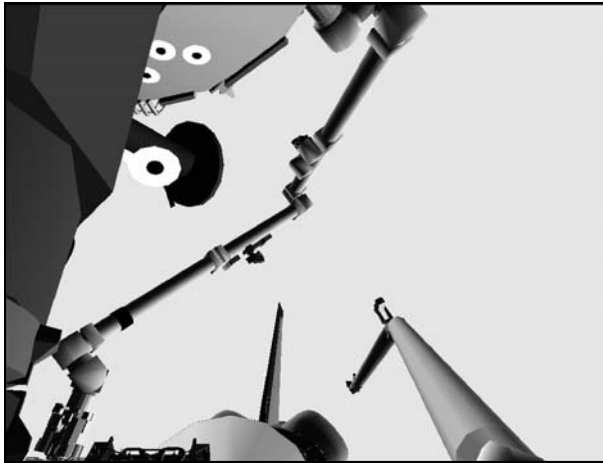
Step 1:
Drive SY (+) from 0.0° to +23.5°



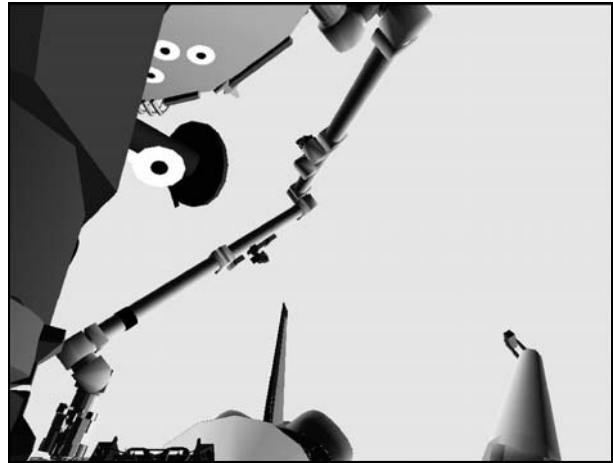
CCTV B (-25,25)



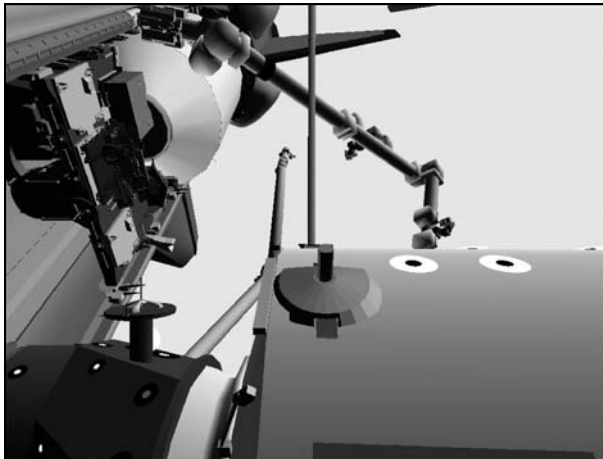
CCTV B (-25,25)



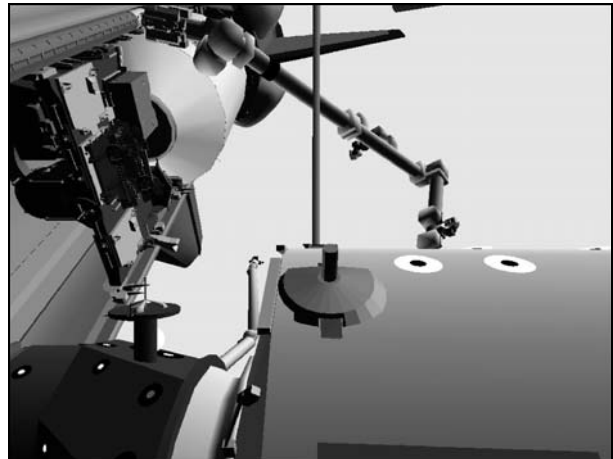
CCTV A (0,30)



CCTV A (0,30)



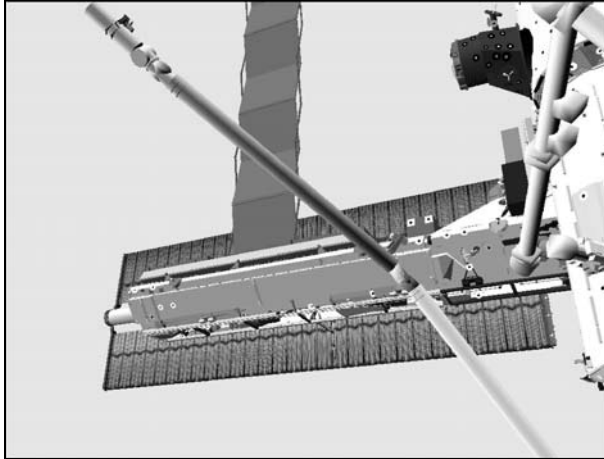
US LAB (0,-55)



US LAB (0,-55)

Step 2:

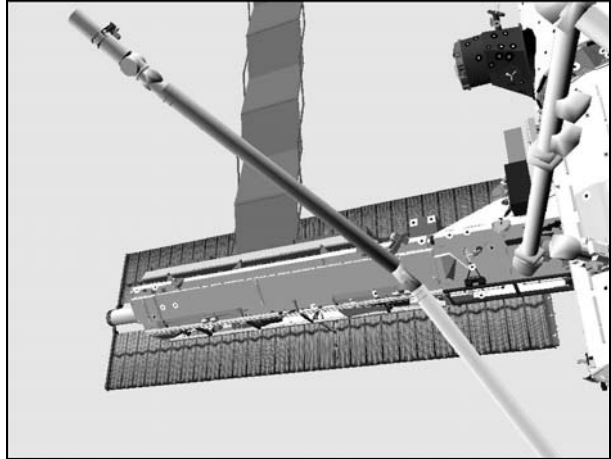
Drive SP (+) from $+25.0^\circ$ to $+63.5^\circ$



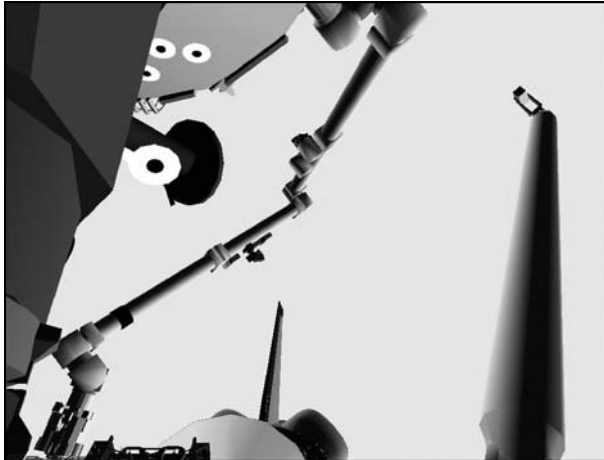
CCTV B (-25,25)

Step 3:

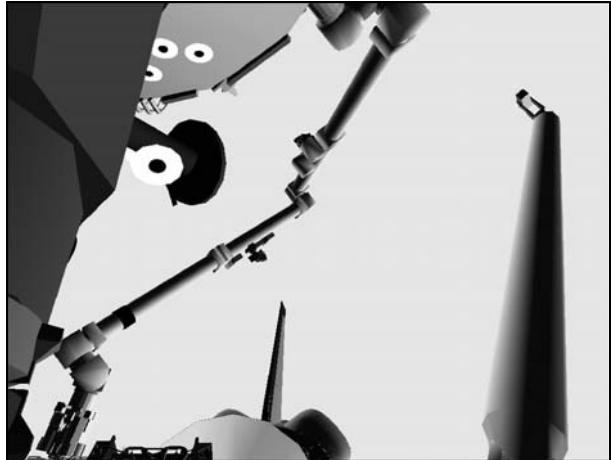
Drive EP (-) from -25.0° to -29.6°



CCTV B (-25,25)



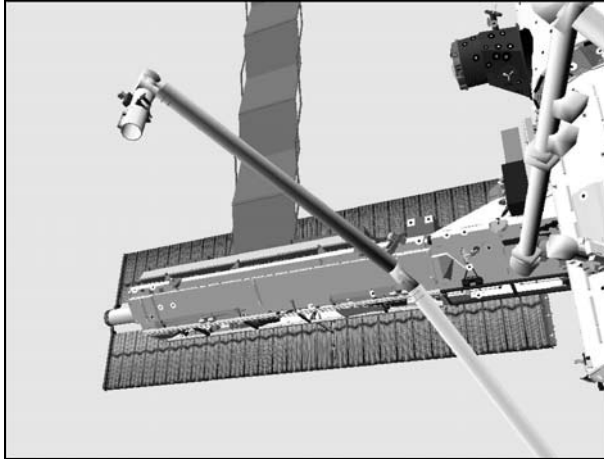
CCTV A (0,30)



CCTV A (0,30)

Step 4:

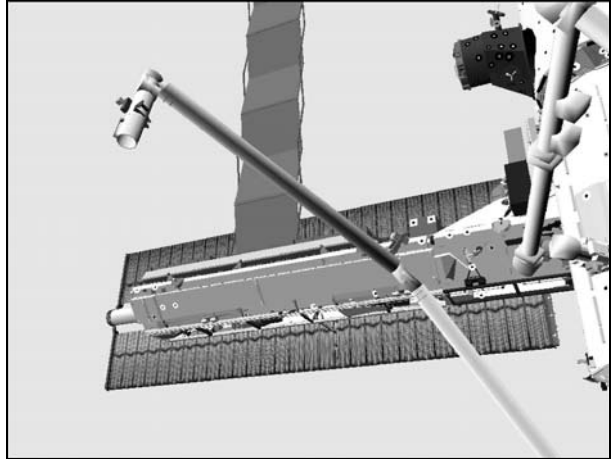
Drive WP (-) from $+5.0^\circ$ to -102.9°



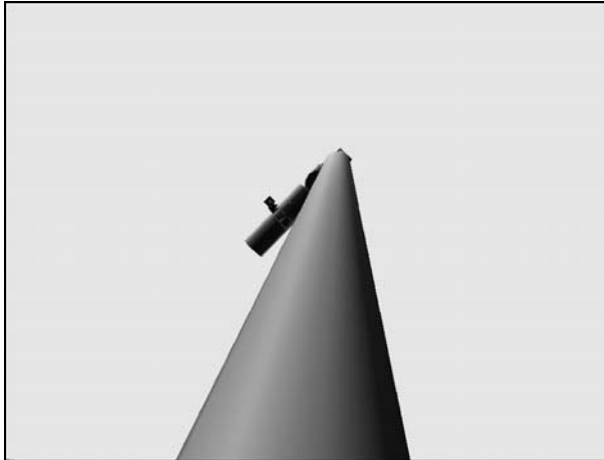
CCTV B (-25,25)

Step 5:

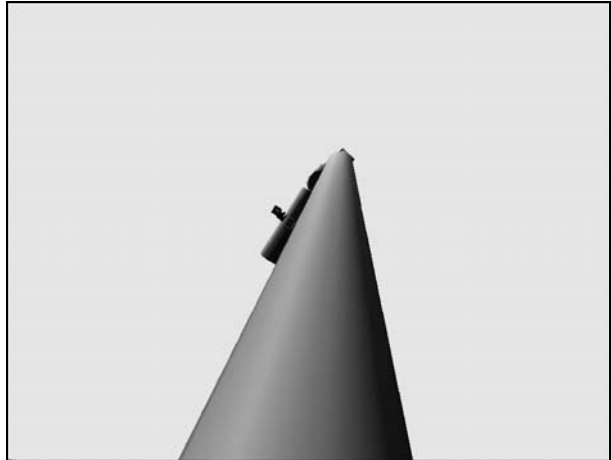
Drive WY (+) from 0.0° to $+11.5^\circ$



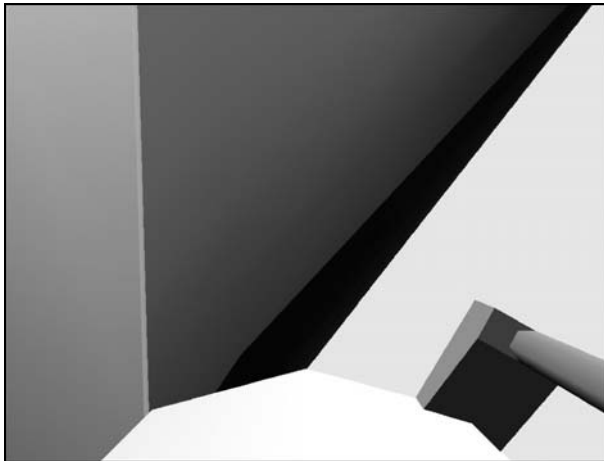
CCTV B (-25,25)



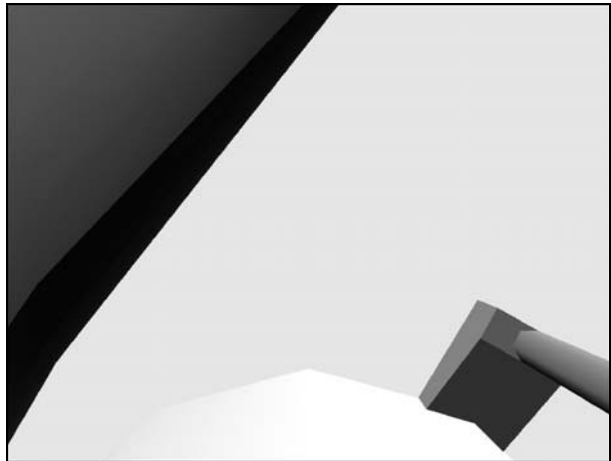
ELBOW (-5,-15)



ELBOW (-5,-15)



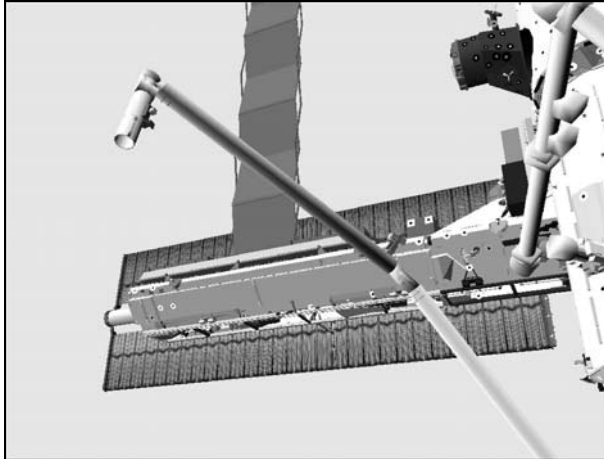
WRIST HFOV: 34.0



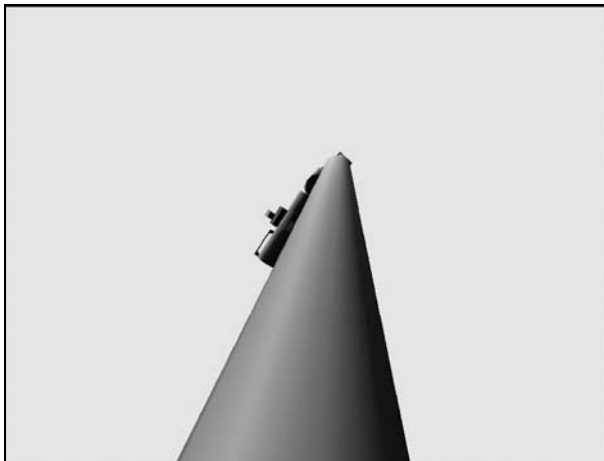
WRIST HFOV: 34.0

Step 6:

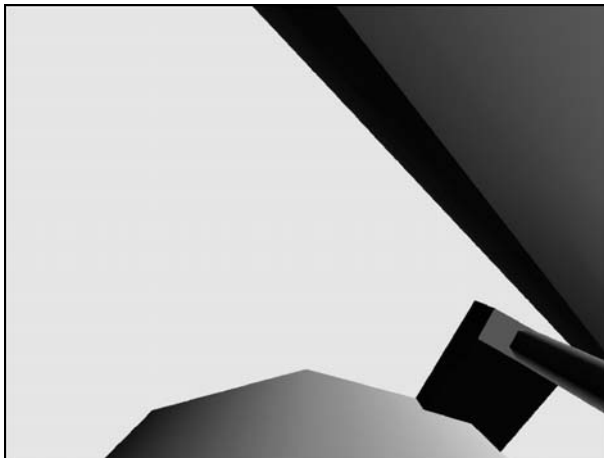
Drive WR (-) from 0.0° to -98.6°



CCTV B (-25,25)



ELBOW (-5,-15)



WRIST HFOV: 34.0

3. CONFIGURE POWER

CAUTION
SPEE power must be applied within 90 min
to prevent sensor package damage

On SSRMS Operator GO to release STBD MRLs,
STBD RMS HTR A,B (two) – OFF

A6U EVENT TIMER MODE – UP
 CNTL – START

MA73C:C cb MCA PWR AC3 3Φ MID 2 – op
 √AC2 3Φ MID 2 – op
 :D √AC3 3Φ MID 4 – op

R13L PL BAY MECH PWR SYS (two) – ON

4. STBD MRL RELEASE

SM 94 PDRS CONTROL

RMS STBD – ITEM 2 EXEC (*)
√STBD AFT, MID, FWD REL (six) = 0

NOTE

Expect single motor drive time for MRL release

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

If motor drive time > 18 sec, √MCC

SM 94 PDRS CONTROL
√STBD AFT, MID, FWD REL (six) = 1

5. RECONFIGURE POWER

R13L PL BAY MECH PWR SYS (two) – OFF

MA73C:C cb MCA PWR AC3 3Φ MID 2 – cl
 √AC2 3Φ MID 2 – op
 :D √AC3 3Φ MID 4 – op

Give SSRMS Operator GO for OBSS Unberth
Monitor RFL Status

After OBSS Unberth,
SM 94 PDRS CONTROL
RMS PORT – ITEM 1 EXEC (*)

6. SETUP FOR GRAPPLE

A7U CCTV – config for grapple
 – install PDRS TARGET OVERLAY FOR CTVM
 – RMS WRIST, ZOOM: 34.0 HFOV
 FOCUS: 5 ft
 Maintain eyepoint approx 18 in when using grapple overlay

R12(OBSS) √SPEE PWR – OFF

7. SJ OBSS GRAPPLE AT HANDOFF

On SSRMS Operator GO for SRMS OBSS Grapple,

If SINGLE MODE available:

RATE – VERN (RATE MIN tb-ON)

BRAKES – OFF (tb-OFF)

RHC

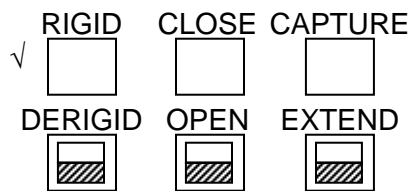
MODE – best available

Drive joints per OBSS SJ HANDOFF SRMS GRAPPLE WRIST CCTV OVERLAY
and diagram until EE within grapple envelope

CAUTION
Monitor EE tb timing to prevent EE motor burnout

EE MODE – AUTO

CAPTURE sw – depress (mom)



CRITICAL TIMES (28 sec total)

CAPTURE tb – gray, then

CLOSE tb – gray, 3 sec max, then

RIGID tb – gray, 25 sec max

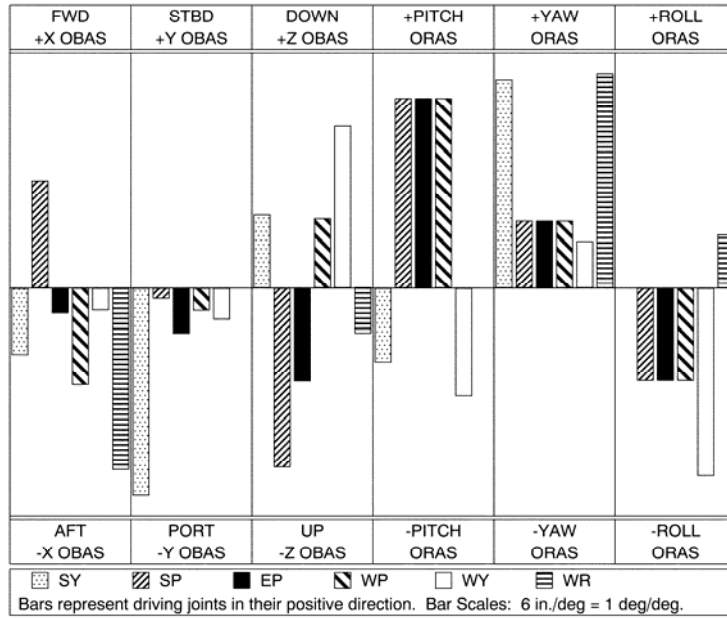
EE MODE – OFF

- * If manual capture required: *
- * EE MODE – MAN *
- * CAPTURE sw – depress (hold until CLOSE tb-gray, 3 sec max) *
- * MAN CONTR – RIGID (hold until RIGID tb-gray, 25 sec max) *
- * MODE – OFF *

If TEST mode available,
MODE – TEST, ENTER
Wait 5 sec

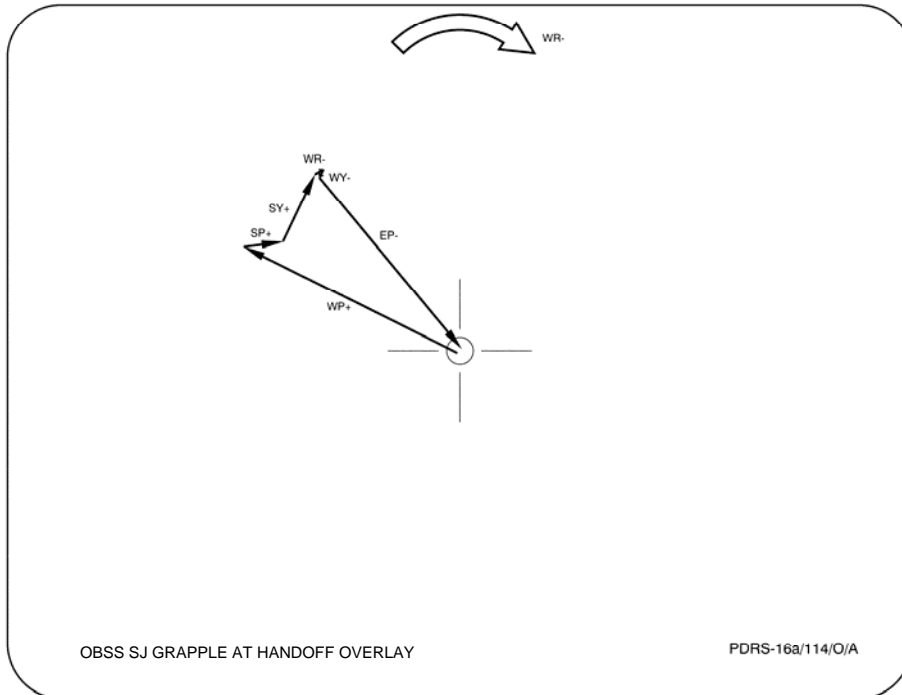
BRAKES – ON (tb-ON)
MODE – not DIRECT
JOINT – CRIT TEMP

OBSS SJ HANDOFF SRMS GRAPPLE



To get:	Drive:	To get:	Drive:	Driving:	Results In:	Driving:	Results In:
+X (fwd)	-WR, -WP	+PITCH	+EP, +WP	+SY	-Y (port), +YAW	+WP	-X (aft), +PITCH
+Y (stbd)	-SY	+YAW	+WR, +SY	+SP	-Z (up), +PITCH	+WY	+Z (down), -ROLL
+Z (down)	+WY, -SP	+ROLL	-WY, -EP	+EP	-Z (up), +PITCH	+WR	-X (aft), +YAW

ΔSY	ΔSP	ΔEP	ΔWP	ΔWY	ΔWR
+2.3	+2.8	-19.4	+17.0	-0.8	-2.1



If SINGLE MODE available:

SM 94 PDRS CONTROL

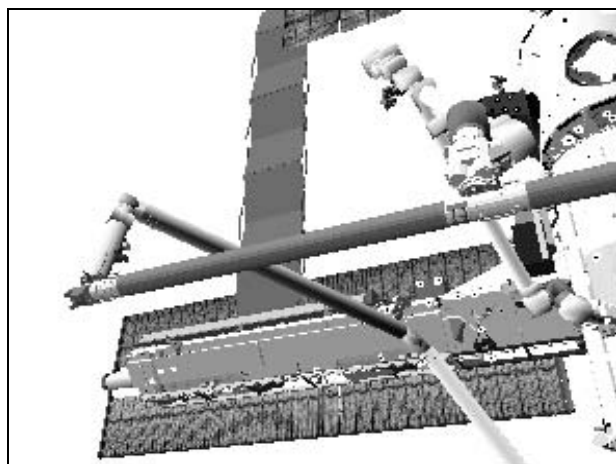
PL ID – ITEM 3 +2 EXEC

INIT ID – ITEM 24 +2 EXEC

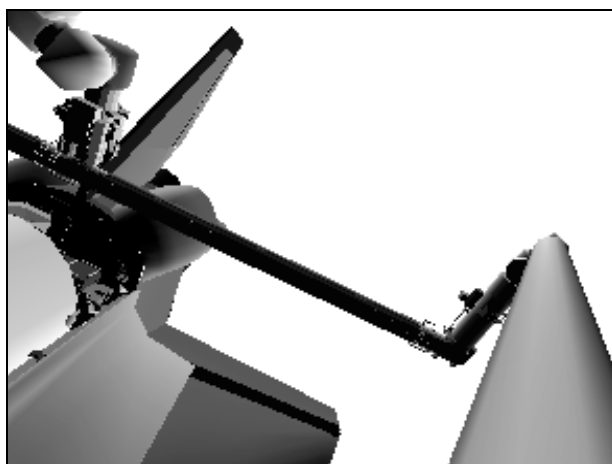
Expected OBSS GRAPPLE AT HANDOFF posn:

X	Y	Z	PITCH	YAW	ROLL	PL ID
-1031	-44	-610	284	270	270	2
SY	SP	EP	WP	WY	WR	
+25.8	+66.3	-49.0	-85.9	+10.7	-100.7	

* display singularity



CCTV B (-25,25)



ELBOW (-30,-5)

R12(OBSS) RSC PWR – OFF, ON

Perform ACTIVATION (LDRI/ITVC Cue Card, PHOTO/TV)

Verify APCU 1 Deact complete, then:

Perform APCU ACTIVATION (SODF: ASSY OPS, APCU), APCU 2 only

Perform LCC ACTIVATION (LCS Cue Card, PHOTO/TV)

Perform LCC DEACTIVATION (LCS Cue Card, PHOTO/TV), steps 1 and 2

Give SSRMS Operator GO for OBSS Ungrapple

Review GENERIC END EFFECTOR CUE CARD – ISS/SHUTTLE DOCKED OPS

8. SJ MNVR TO OBSS CMG R&R VIEWING POSN

On SSRMS Operator GO for mnvr to OBSS CMG R&R VIEWING posn,

If SINGLE MODE available:

RHC

RATE – as reqd (VERN within 10 ft)

BRAKES – OFF (tb-OFF)

MODE – best available

Mnvr to OBSS CMG R&R VIEWING posn:

	SY	SP	EP	WP	WY	WR	
HANDOFF	+25.8	+66.3	-49.0	-85.9	+10.7	-100.7	
1: SY +	+35.0						
2: EP +			-22.8				
3: WR +						-40.0	
4: WY -					-0.3		
5: SP -		+38.7					
6: WP +				-0.5			
7: WR +						+22.3	
8: SY +	+95.0						
CMG R&R VIEW	+95.0	+38.7	-22.8	-0.5	-0.3	+22.3	
	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-627	-726	-823	91	4	265	2

BRAKES – ON (tb-ON)
 MODE – not DIRECT
 PARAM – PORT TEMP
 JOINT – CRIT TEMP

Start:
OBSS Handoff

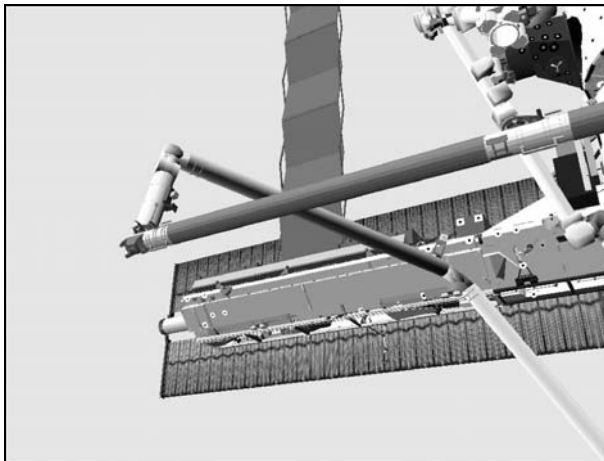
Step 1:
Drive SY (+) from +25.8° to +35.0°



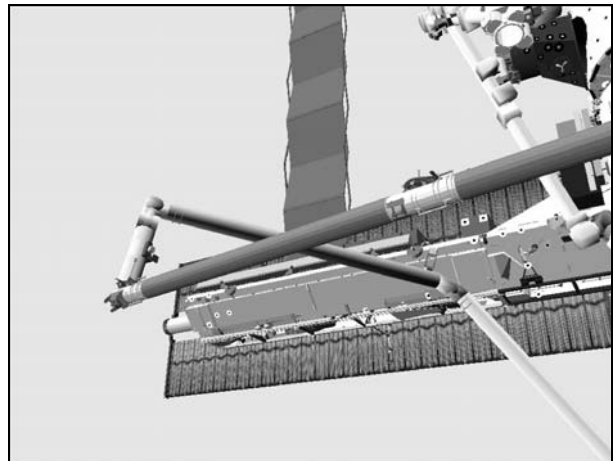
CCTV A (4,25)



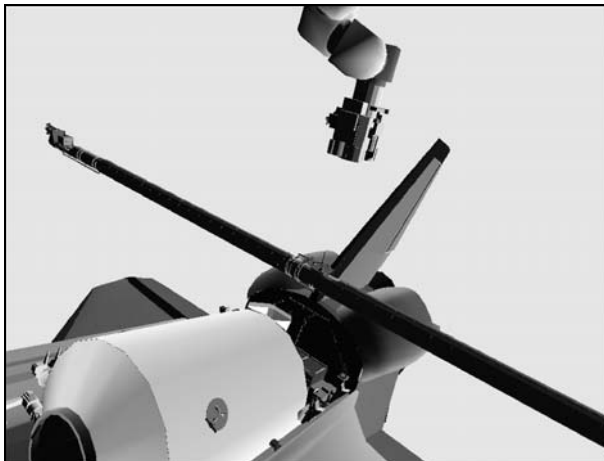
CCTV A (4,25)



CCTV B (-30,25)



CCTV B (-30,25)



ELBOW (-60,10)



ELBOW (-60,10)

Step 2:

Drive EP (+) from -49.0° to -22.8°



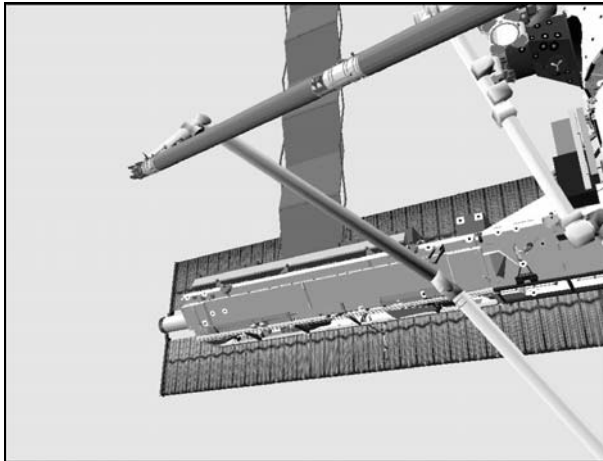
CCTV A (4,25)

Step 3:

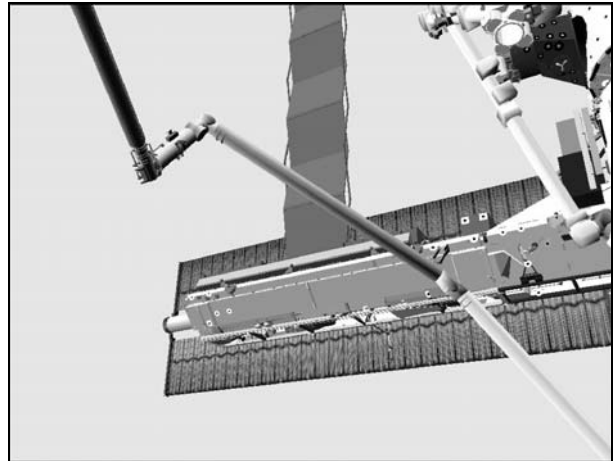
Drive WR (+) from -100.7° to -40.0°



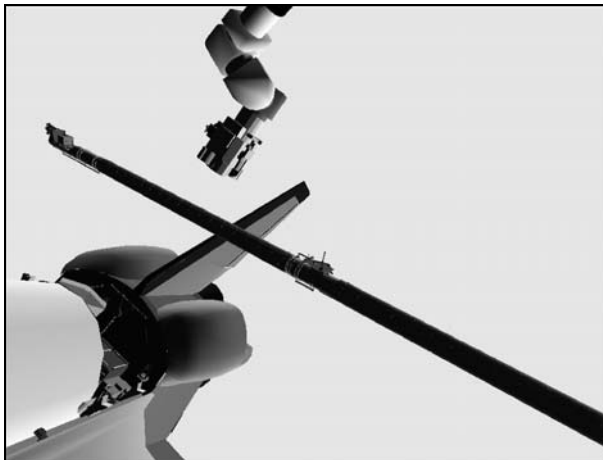
CCTV A (4,25)



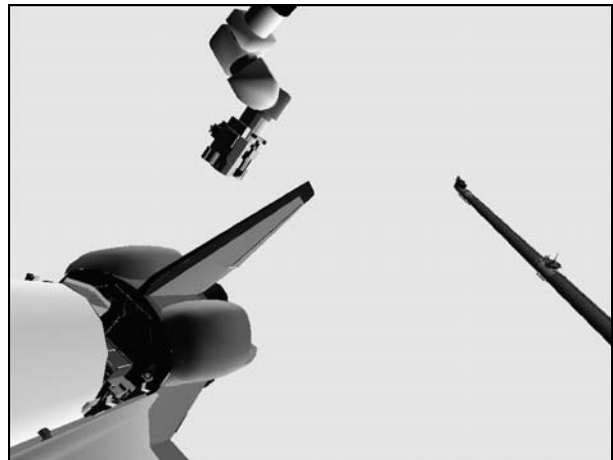
CCTV B (-30,25)



CCTV B (-30,25)



ELBOW (-60,10)



ELBOW (-60,10)

Step 4:

Drive WY (-) from $+10.7^\circ$ to -0.3°



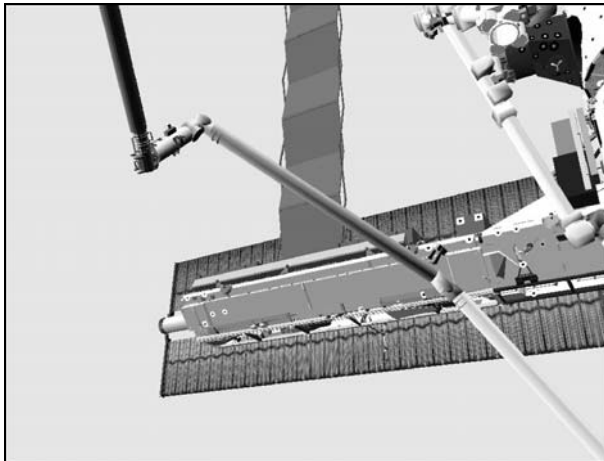
CCTV A (4,25)

Step 5:

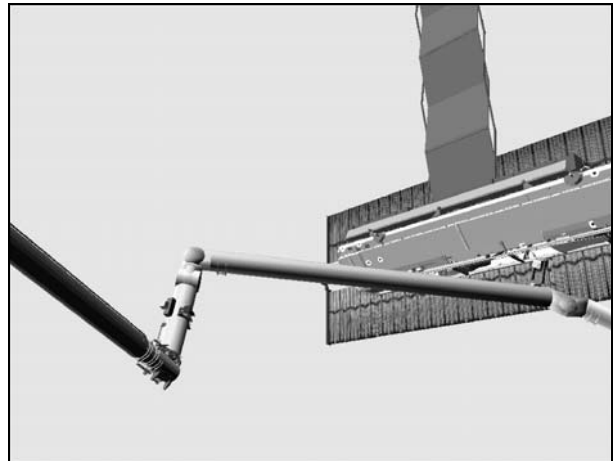
Drive SP (-) from $+66.3^\circ$ to $+38.7^\circ$



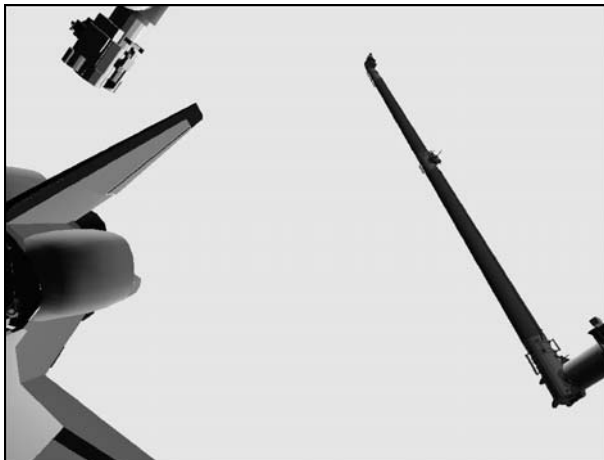
CCTV A (4,25)



CCTV B (-30,25)



CCTV B (-45,20)



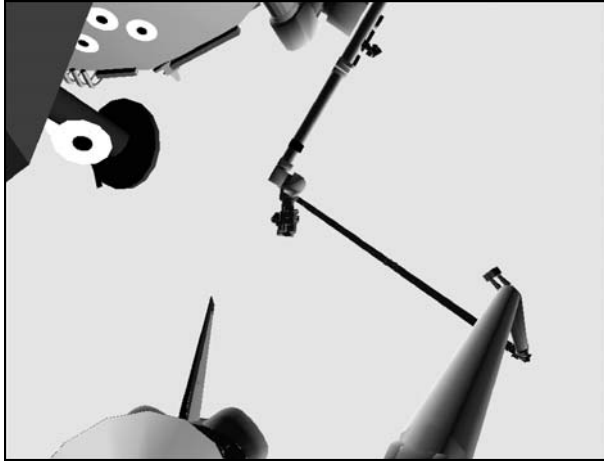
ELBOW (-45,0)



ELBOW (-25,15)

Step 6:

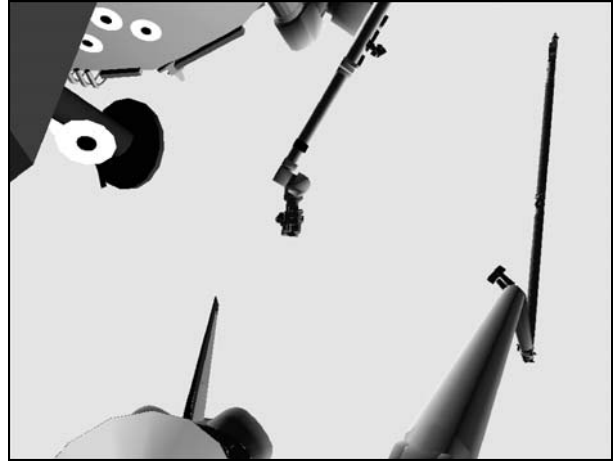
Drive WP (+) from -85.9° to -0.5°



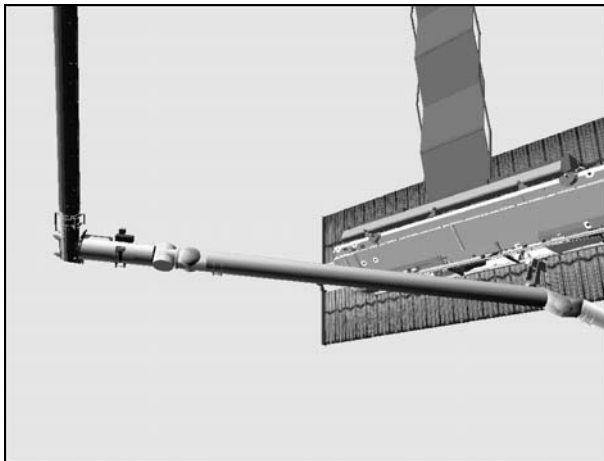
CCTV A (10,30)

Step 7:

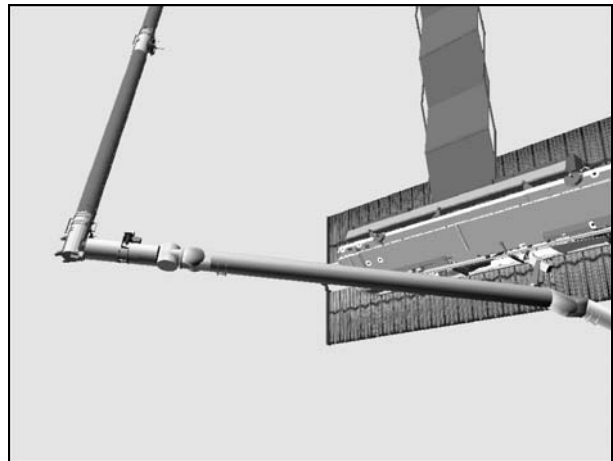
Drive WR (+) from -40.0° to $+22.3^\circ$



CCTV A (10,30)



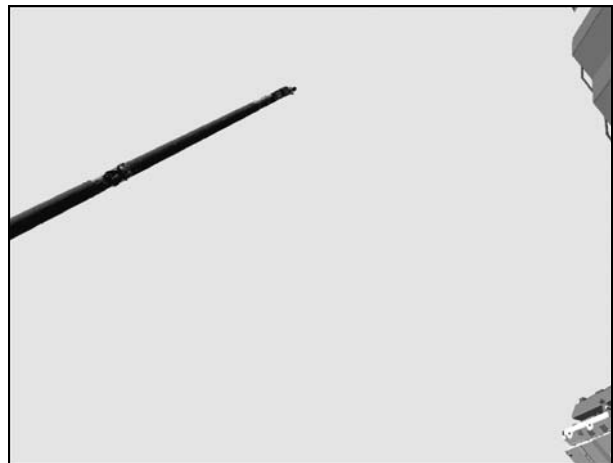
CCTV B (-45,20)



CCTV B (-45,20)



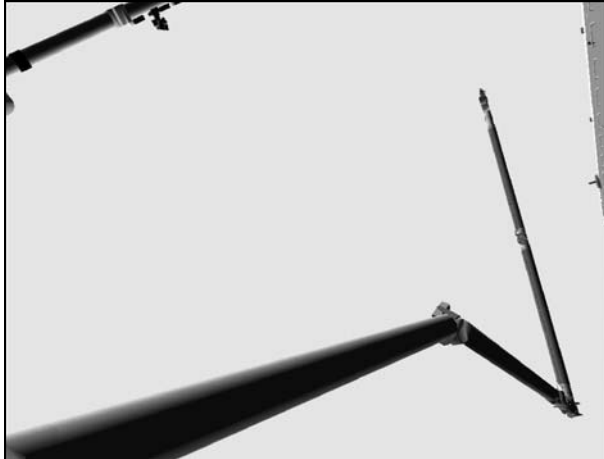
ELBOW (-25,15)



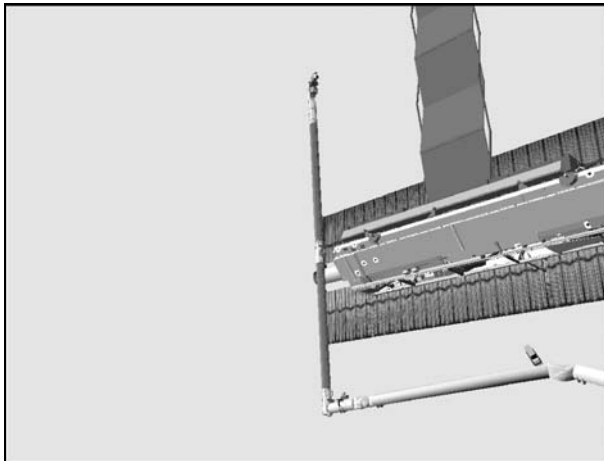
ELBOW (55,15)

Step 8:

Drive SY (+) from +35.0° to +95.0°



CCTV A (55,30)



CCTV B (-45,20)

A7U

9. RECONFIGURE PTU

VIDEO OUT MON2 pb – push
IN PL2(VPU) pb – push

CAMR CMD PAN/TILT – HI RATE (LO within 10°)

PAN – L (to hard stop)

TILT – UP (to hard stop)

PAN/TILT – RESET

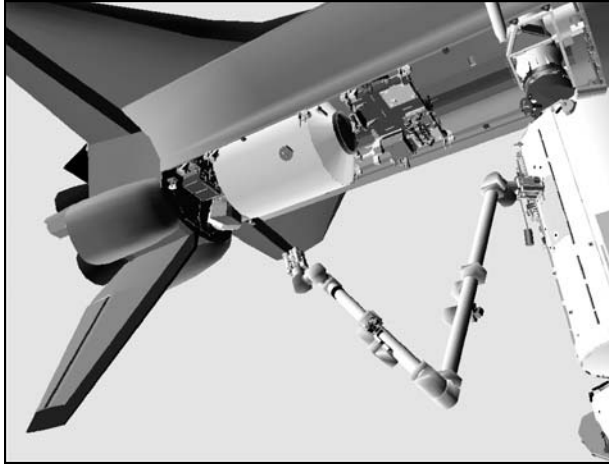
PAN: +105 (right)

TILT: -50 (down)

VIDEO OUT MUX 1 L pb – push (MIDDECK It on)

LDRI MODE 2 pb – push (ITVC video)

Give SSRMS Operator GO for mnvr to ACBM INSPECTION posn



OBSS ITVC (105,-50)

OBSS SJ HANDOFF FROM SRMS TO SSRMS

1. SETUP

If SINGLE MODE available:

SM 94 PDRS CONTROL

√PL ID, ITEM 3: 2

√INIT ID, ITEM 24: 2

A7U

CCTV – config as reqd

– perform PAN/TILT RESET for PLB cameras

Review GENERIC END EFFECTOR CUE CARD – ISS/SHUTTLE DOCKED OPS

2. MANEUVER TO OBSS HANDOFF

On SSRMS Operator GO for mnvr to OBSS Handoff Position,

If SINGLE MODE available:

RHC

RATE – as reqd (VERN within 10 ft)

BRAKES – OFF (tb-OFF)

MODE – best available

Mnvr to OBSS HANDOFF posn:

	SY	SP	EP	WP	WY	WR	
MPLM VIEW	+35.0	+38.7	-22.8	-0.5	-0.3	-40.0	
1: WP –				-85.9			
2: SP +		+66.3					
3: WY +					+10.7		
4: WR –						-100.7	
5: EP –			-49.0				
6: SY –	+25.8						
OBSS HANDOFF	+25.8	+66.3	-49.0	-85.9	+10.7	-100.7	
	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-1031	-44	-610	284	270	270	2

* display singularity

BRAKES – ON (tb-ON)

MODE – not DIRECT

JOINT – CRIT TEMP

Give SSRMS Operator GO for OBSS Grapple

Start:
MPLM View

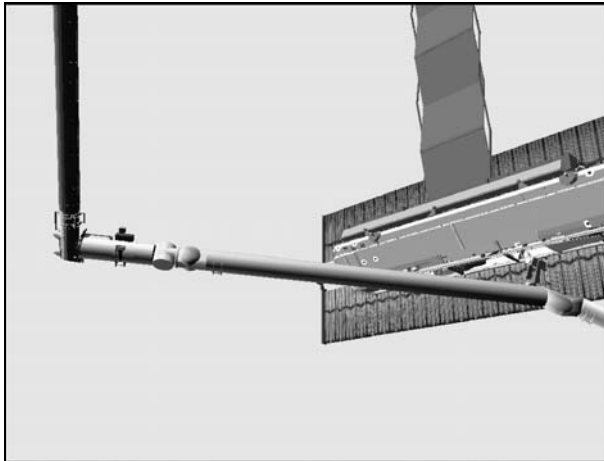
Step 1:
Drive WP (-) from -0.5° to -85.9°



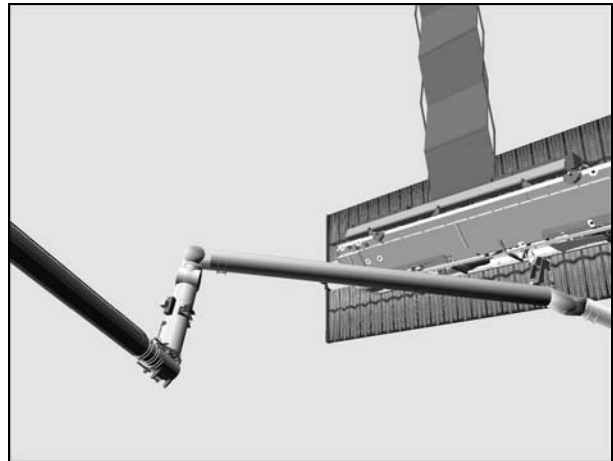
CCTV A (4,25)



CCTV A (4,25)



CCTV B (-45,20)



CCTV B (-45,20)



ELBOW (-25,15)



ELBOW (-25,15)

Step 2:

Drive SP (+) from +38.7° to +66.3°



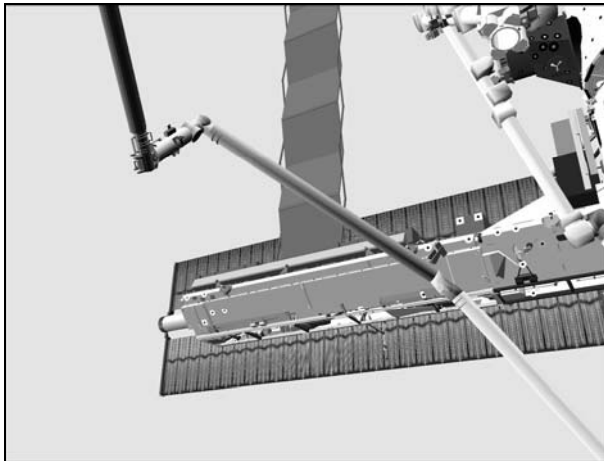
CCTV A (4,25)

Step 3:

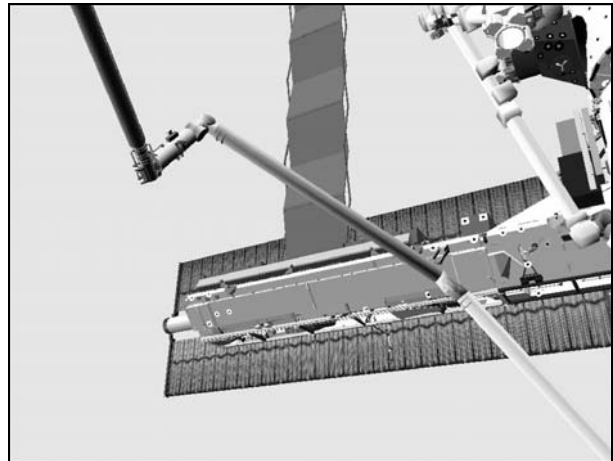
Drive WY (+) from -0.3° to +10.7°



CCTV A (4,25)



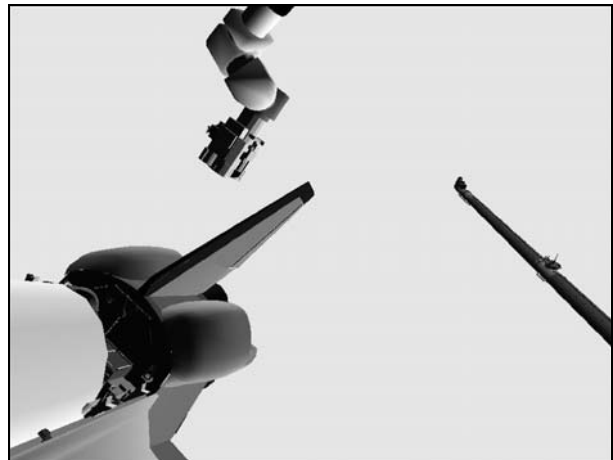
CCTV B (-30,25)



CCTV B (-30,25)



ELBOW (-45,0)



ELBOW (-60,10)

Step 4:

Drive WR (-) from -40.0° to -100.7°



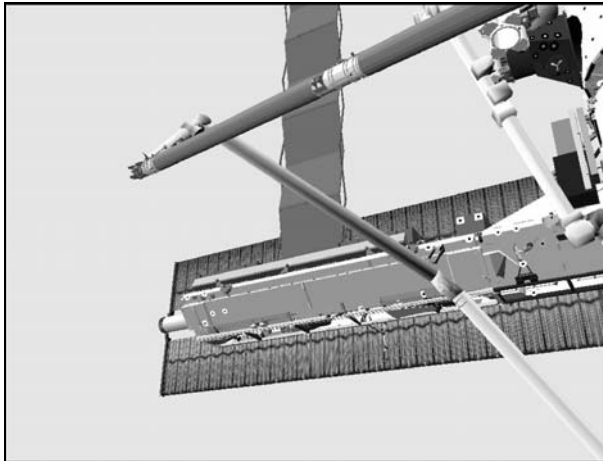
CCTV A (4,25)

Step 5:

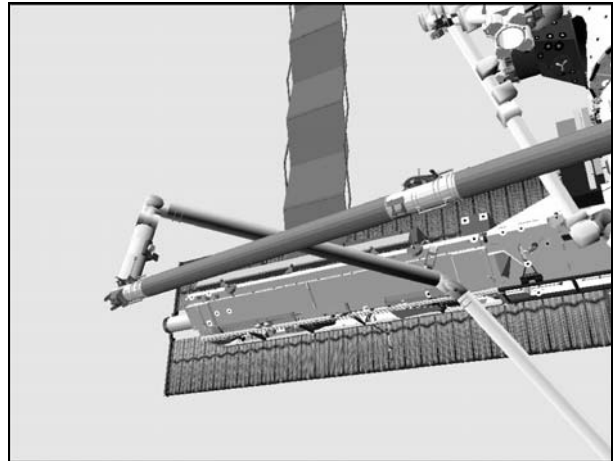
Drive EP (-) from -22.8° to -49.0°



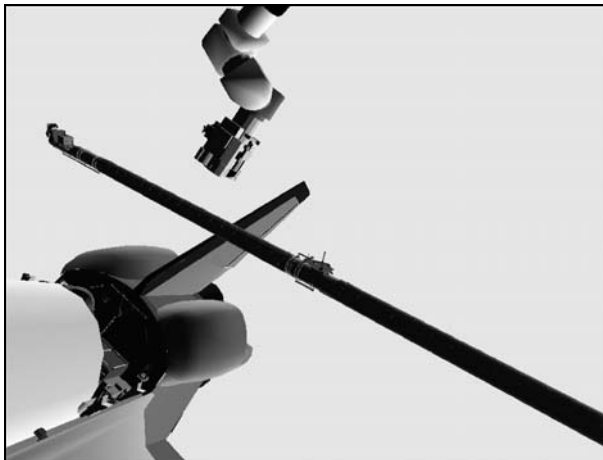
CCTV A (4,25)



CCTV B (-30,25)



CCTV B (-30,25)



ELBOW (-60,10)



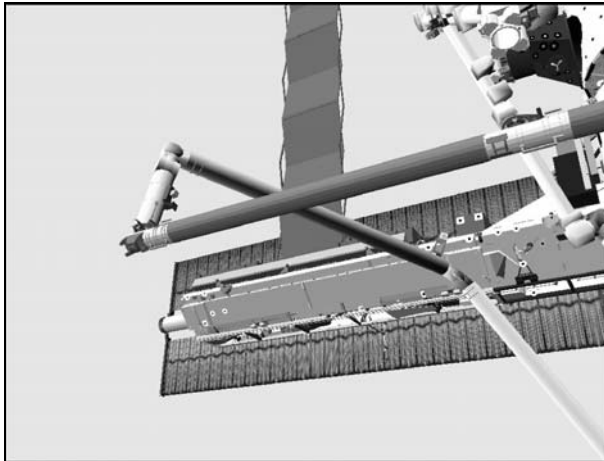
ELBOW (-60,10)

Step 6:

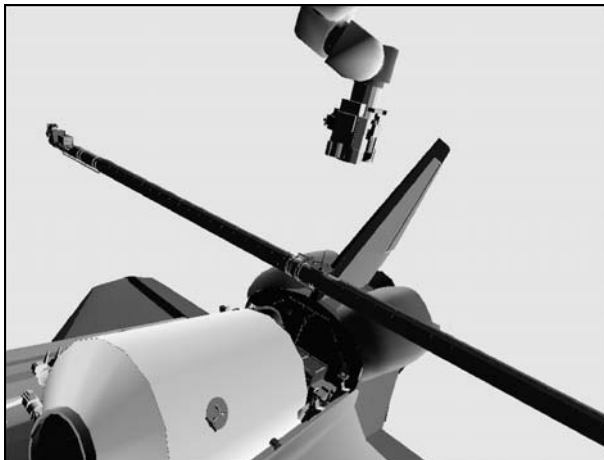
Drive SY (-) from +35.0° to +25.8°



CCTV A (4,25)



CCTV B (-30,25)



ELBOW (-60,10)

3. STOW PTU

A7U On SSRMS Operator GO for OBSS Ungrapple,
VIDEO OUT MON2 pb – push
IN PL2(VPU) pb – push

CAMR CMD PAN/TILT – HI RATE (LO within 10°)

PAN – L (to hard stop)
TILT – UP (to hard stop)
PAN/TILT – RESET
PAN: +108 (right)
TILT: -175 (down)

Perform LCC DEACTIVATION (LCS Cue Card, PHOTO/TV)

CAUTION
STBD RMS HTR power must be applied within
90 min to prevent sensor package damage

Perform DEACTIVATION (LDRI/ITVC Cue Card, PHOTO/TV)

Perform APCU DEACTIVATION (SODF: ASSY OPS, APCU), APCU 2 only

4. OBSS UNGRAPPLE

A7U CCTV – config for ungrapple
– RMS WRIST, ZOOM: 34.0 HFOV
FOCUS: 5 ft

NOTE

CONTR ERR It and 'S96 PDRS CNTL' msg may
occur due to Consistency/Envelope Check error

If TEST MODE available:

RHC RATE – COARSE (RATE MIN tb-OFF)

SM 94 PDRS CONTROL

AUTO BRAKE INH – ITEM 10 EXEC (*)

BRAKES – OFF (tb-OFF)

MODE – TEST, ENTER

Wait 5 sec

BRAKES – ON (tb-ON)

SM 94 PDRS CONTROL

AUTO BRAKE ENA – ITEM 9 EXEC (*)

If SINGLE MODE available:

SM 94 PDRS CONTROL

PL ID – ITEM 3 +0 EXEC

INIT ID – ITEM 24 +0 EXEC

RHC RATE – VERN (RATE MIN tb-ON)

BRAKES – OFF (tb-OFF)

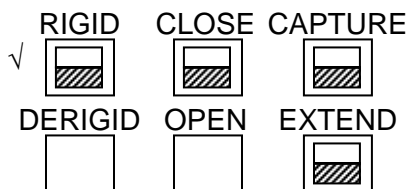
MODE – best available

CAUTION
Monitor EE tb timing to prevent EE motor burnout

EE MODE – MAN

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

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



5. SJ MNVR TO OBSS PRE-GRAPPLE

Drive joints per OBSS SJ HANDOFF SRMS UNGRAPPLE WRIST CCTV OVERLAY and diagram until SRMS at OBSS PRE-GRAPPLE posn

EE MAN CONTR – DERIGID (hold until EXTEND tb-gray, 20 sec max)
MODE – OFF

√POS/ATT and Joint Angles at OBSS PRE-GRAPPLE posn:

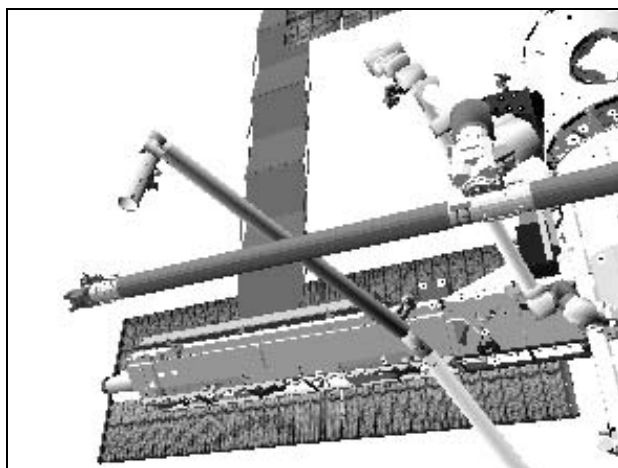
X	Y	Z	PITCH	YAW	ROLL	PL ID
-1015	-362	-688	284	0	270	0
SY	SP	EP	WP	WY	WR	
+23.5	+63.5	-29.6	-102.9	+11.5	-98.6	

BRAKES – ON (tb-ON)

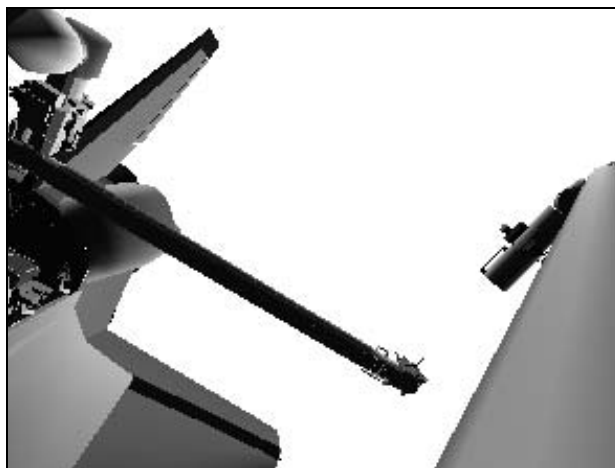
MODE – not DIRECT

JOINT – CRIT TEMP

Give SSRMS Operator GO to mnvr to Aft posn

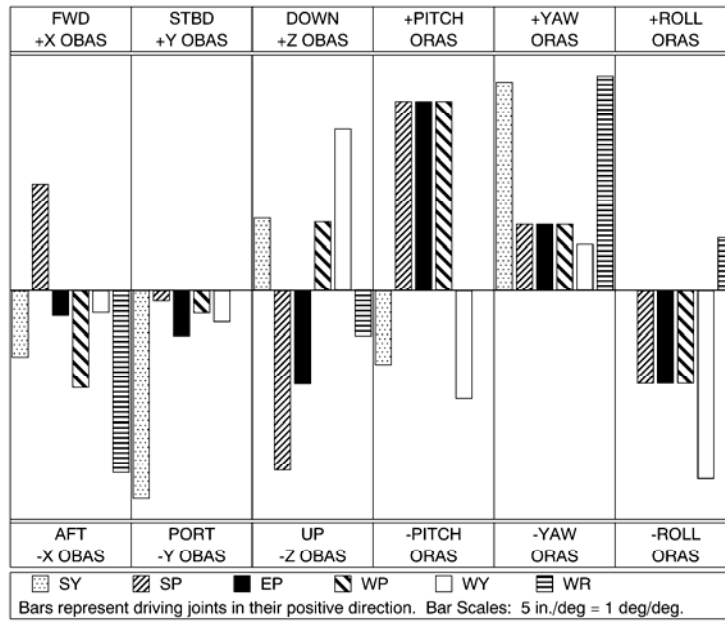


CCTV B (-25,30)



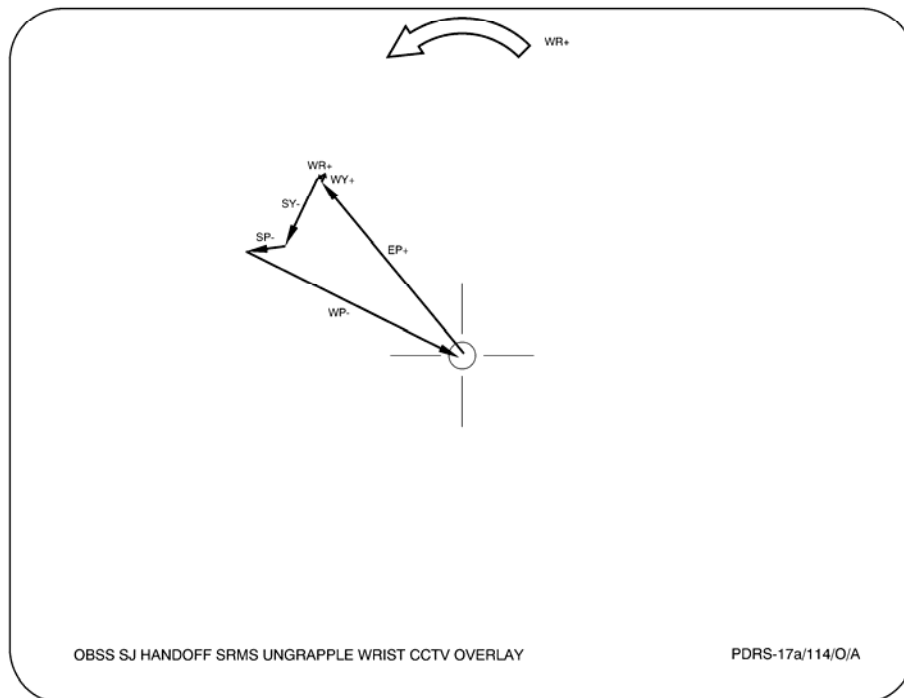
ELBOW (-35,-15)

OBSS SJ HANDOFF SRMS UNGRAPPLE



To get:	Drive:	To get:	Drive:	Driving:	Results In:	Driving:	Results In:
+X (fwd)	-WR, -WP	+PITCH	+EP, +WP	+SY	-Y (port), +YAW	+WP	-X (aft), +PITCH
+Y (stbd)	-SY	+YAW	+WR, +SY	+SP	-Z (up), +PITCH	+WY	+Z (down), -ROLL
+Z (down)	+WY, -SP	+ROLL	-WY, -EP	+EP	-Z (up), +PITCH	+WR	-X (aft), +YAW

ΔSY	ΔSP	ΔEP	ΔWP	ΔWY	ΔWR
-2.3	-2.8	+19.4	-17.0	+0.8	+2.1



6. CONFIGURE CIRCUIT BREAKERS

MA73C:C cb MCA PWR AC3 3Φ MID 2 – op
 √AC2 3Φ MID 2 – op
:D √AC3 3Φ MID 4 – op

7. CONFIGURE FOR MONITORING

On SSRMS notification to watch for STBD RMS RFLs,
SM 94 PDRS CONTROL
RMS STBD – ITEM 2 EXEC (*)

Notify SSRMS operator when STBD RMS R-F-L tb (three) – gray

8. STBD MRL LATCH

On SSRMS Operator GO to latch STBD MRLs to TC,
√STBD RMS R-F-L tb (three) – gray

SM 94 PDRS CONTROL

√STBD AFT, MID, FWD LAT (six) = 0

R13L PL BAY MECH PWR SYS (two) – ON

NOTE

Expect single motor drive time for MRL latching (18 sec max).
The following STBD RMS RETEN LAT – OFF and PL BAY
MECH PWR SYS (two) – OFF actions are to be performed simo

Verify AOS for latching to TC

STBD RMS RETEN LAT – LAT (6 sec max)
– OFF

R13L PL BAY MECH PWR SYS (two) – OFF

Give SSRMS Operator GO to Limp All SSRMS Joints and Derigidize

R13L On SSRMS Operator GO to continue STBD MRL latching,
PL BAY MECH PWR SYS (two) – ON

STBD RMS RETEN LAT – LAT (tb-LAT) (12 sec max)
– OFF

9. RECONFIGURE POWER

R13L PL BAY MECH PWR SYS (two) – OFF

STBD RMS HTR A,B (two) – AUTO

A6U EVENT TIMER CNTL – STOP

SM 94 PDRS CONTROL

√STBD AFT, MID, FWD LAT (six) = 1
RMS PORT – ITEM 1 EXEC (*)

MA73C:C cb MCA PWR AC3 3Φ MID 2 – cl
 √AC2 3Φ MID 2 – op
:D √AC3 3Φ MID 4 – op

Give SSRMS Operator GO for OBSS Ungrapple

On SSRMS Operator GO, go to RMS PWRDN

OBSS JETTISON

ASSUMPTIONS:

1. DAP and RMS have been configured to provide stable position for OBSS prior to entering this procedure
2. For undocked ops only

NOTES:

1. Jettison to be performed between sunrise and noon, if practical, to provide good visibility
2. DAP A used post-jettison for sep mnvr. DAP B (with mod in step 1) used while OBSS attached to RMS to keep loads down and ensure stable orbiter/payload/DAP
3. Jettison must occur greater than 1500 ft from ISS to avoid plume impingement damage
4. For emergency undock scenario, perform Shuttle Emergency Sep (RNDZ C/L) with 3 fps posigrade +X burn in step 3 prior to executing this procedure

CDR

MS

OBSS JETTISON

1. SETUP
 O14:F, O15:F, O16:F
 O14:E √Pri RJD DRIVER, LOGIC (sixteen) – ON

 √cb DDU AFT (two) – cl

 A6U √SENSE: -Z
 √DAP: INRTL

 A7U √Lighting – as reqd

 GNC 20 DAP CONFIG
 Config DAP A to A7, B to B7
 PRI ROT RATE (B7) – ITEM 30 +0.2 EXEC
 ALT RATE DB (B7) – ITEM 38 +0.2 EXEC
 VERN RATE DB (B7) – ITEM 45 +0.2 EXEC
 CNTL ACC (B7) – ITEM 48 +9 EXEC

 2. AUTO MNVR TO -XLV, +ZVV
 GNC UNIV PTG
 √TGT ID: +2
 BODY VECT: +5
 P: +180
 Y: +0
 OM: +0
 TRK – ITEM 19 EXEC (CUR – *)

 A6U DAP: B/AUTO/VERN(ALT)

OBSS JETTISON

1. SETUP

MON 1	A
MON 2	B

SM 94 PDRS CONTROL	
---------------------------	--

 PL ID – ITEM 3 +2 EXEC
 INIT ID – ITEM 24 +2 EXEC

 2. MNVR TO JETTISON POSN
 RATE – as reqd (VERN within 10 ft)
 BRAKES – OFF (tb-OFF)
 MODE – as desired

RHC

If coming from CMG R&R View posn:

Mnvr to JETTISON posn (within 1"/1°):

	SY	SP	EP	WP	WY	WR
CMG R&R VIEW	+95.0	+38.7	-22.8	-0.5	-0.3	+22.3
1: SY -	-22.5					
2: WR -						-5.0
JETT	-22.5	+38.7	-22.8	-0.5	-0.3	-5.0

	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-1059	0	-1049	113	1	15	2

If not coming from CMG R&R View posn:

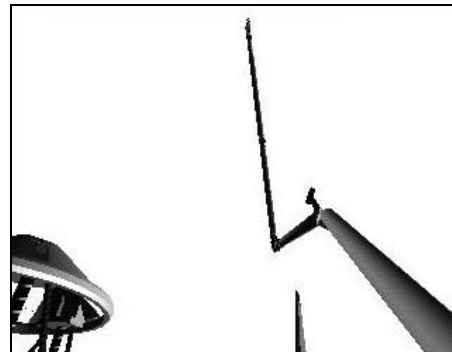
Mnvr to JETTISON posn (within 1"/1°):

X	Y	Z	PITCH	YAW	ROLL	PL ID
-1059	0	-1049	113	1	15	2
SY	SP	EP	WP	WY	WR	
-22.5	+38.7	-22.8	-0.5	-0.3	-5.0	

BRAKES – ON (tb-ON)

CDR

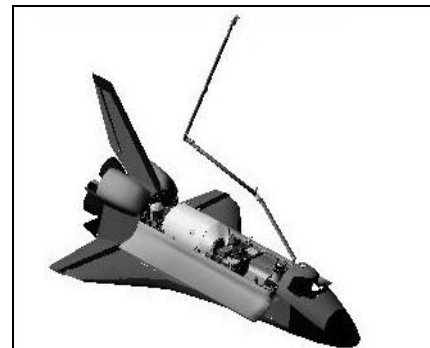
MS



CCTV A (-15,40)



CCTV B (15,50)



BIRD'S EYE

CDR

MS

A6U

On MS call, "OBSS at jettison position" -----

If attitude mnvr not complete:

DAP: ALT

GNC 20 DAP CONFIG

PRI ROT RATE (B7) - ITEM 30 +0.5 EXEC

3. CONFIGURE ORBITER FOR SEP MNVR

When mnvr to attitude complete:

√DAP: VERN(ALT)

When rates damped:

DAP: FREE

FLT CNTLR PWR - ON

√DAP TRANS: PULSE/PULSE/PULSE, NO LO Z

Report to MS, "GO to release OBSS" -----

Report to CDR "OBSS at jettison position"

3. OBSS RELEASE

MON 1	WRIST
MON 2	B(C,ELBOW)

R12
(OBSS)

SPEE PWR - OFF

SSP1

√APCU 1,2 CONV - OFF

√APCU 2 OUTPUT RLY - op (tb-bp)

SM 94 PDRS CONTROL

PL ID - ITEM 3 +0 EXEC

INIT ID - ITEM 24 +0 EXEC

X	Y	Z	PITCH	YAW	ROLL	PL ID
√ -1175	+1	-753	23	345	1	0
SY	SP	EP	WP	WY	WR	
√ -22.5	+38.7	-22.8	-0.5	-0.3	-5.0	

RHC

On CDR call, "GO to release OBSS"

√RATE - VERN (RATE MIN tb-ON)

BRAKES - OFF (tb-OFF)

MODE - END EFF, ENTER







CDR

MS

CAUTION
Monitor EE tb timing to
prevent EE motor burnout

EE MODE – AUTO
RELEASE sw – REL (mom)

When OPEN tb – gray, mnvr arm clear of grapple pin

	RIGID	CLOSE	CAPTURE	CRITICAL TIMES (28 sec total) DERIGID tb – gray, 5 sec max, then OPEN tb – gray, 3 sec max, then EXTEND tb – gray, 20 sec max
√				
	DERIGID	OPEN	EXTEND	
				

EE MODE – OFF

BRAKES – ON (tb-ON)

On MS call, "GO to perform SEP mnvr" ----- Report to CDR, "GO to perform SEP mnvr"

A6U

4. SEP MNVR
 DAP: A/FREE/VERN(ALT)
 THC: +Z (out) 2 pulses (0.2 ft/sec)
 When opening rate confirmed:
 DAP TRANS: PULSE/PULSE/NORM
 DAP: LVLH
 THC: +Z (out) 5 sec (1.7 ft/sec)
 FLT CNTLR PWR – OFF
 DAP TRANS: PULSE/PULSE/PULSE

Report to MS, "SEP mnvr complete" ----- On CDR call, "SEP mnvr complete"

CRT

GNC 20 DAP CONFIG
Config DAP B to B7

4. RMS TO PRE-CRADLE
Go to RMS PWRDN, step 1

OBSS JETTISON WITH MPMS

ASSUMPTIONS:

1. DAP and RMS have been configured to provide stable position for OBSS prior to entering this procedure
2. For undocked ops only

NOTES:

1. Jettison to be performed between sunrise and noon, if practical, to provide good visibility
2. DAP A used post-jettison for sep mnvr. DAP B (with mod in step 1) used while OBSS attached to RMS to keep loads down and ensure stable orbiter/payload/DAP
3. Jettison must occur greater than 1500 ft from ISS to avoid plume impingement damage
4. For emergency undock scenario, perform Shuttle Emergency Sep (RNDZ C/L) with 3 fps posigrade +X burn in step 3 prior to executing this procedure

OBSS JETTISON WITH MPMS

OBSS JETTISON WITH MPMS

1. SETUP

If OBSS not latched:

| Perform OBSS BERTH (NOMINAL), steps 1-7

If OBSS Berthed and SRMS not grappled:

| Perform OBSS UNBERTH (NOMINAL), steps 1-3,
sensor package timer not requiredSM 94 PDRS CONTROL

√PL ID, ITEM 3: 1

√INIT ID, ITEM 24: 1

A14 √PYRO STARBOARD RMS (five) – SAFE
√RMS LAT – SAFEML86B:D cb MNA PYRO JETT SYS A STBD RMS – cl
 MNC PYRO JETT SYS B STBD RMS – cl
√cb MNB PYRO JETT SYS A PORT RMS – op
√MNC PYRO JETT SYS B PORT RMS – op2. STARBOARD MPM JETTISONa. Deadface Latches

R13L √PL BAY MECH PWR SYS (two) – OFF

A8L √STBD RMS RETEN LAT tb – LAT

A14 RMS LAT – DEADFACE

A8L √STBD RMS RETEN LAT tb – bp

b. Guillotine Wires at LatchesA14 PYRO STBD RMS ARM – GUILLOTINE
Wait at least 1 sec, then
PYRO STBD RMS LAT (three) – GUILLOTINE
– SAFE

CDR

MS

1. SETUP
 O14:F, √Pri RJD DRIVER, LOGIC (sixteen) – ON
 O15:F,
 O16:F
 O14:E √cb DDU AFT (two) – cl
 A6U √SENSE: -Z
 √DAP: INRTL
 A7U √Lighting – as reqd
 CRT GNC 20 DAP CONFIG
 Config DAP A to A7, B to B7
 PRI ROT RATE (B7) – ITEM 30 +0.2 EXEC
 ALT RATE DB (B7) – ITEM 38 +0.2 EXEC
 VERN RATE DB (B7) – ITEM 45 +0.2 EXEC
 CNTL ACC (B7) – ITEM 48 +9 EXEC

RHC

c. Jettison Latches
 PYRO STBD RMS ARM – JETT
 Wait at least 1 sec, then
 PYRO STBD RMS LAT (three) – JETT
 – SAFE
 PYRO STBD RMS ARM – SAFE
 RMS LAT – SAFE
 3. OBSS UNBERTH
 Perform OBSS UNBERTH (NOMINAL), step 7, up to
 and including MODE – not DIRECT

4. MNVR TO JETTISON POSN

MON 1	A
MON 2	C

SM 94 PDRS CONTROL
 PL ID – ITEM 3 +2 EXEC
 INIT ID – ITEM 24 +2 EXEC

RATE – as reqd (VERN within 10 ft)
 BRAKES – OFF (tb-OFF)
 MODE – as desired

Mnvr to JETTISON posn (within 1°/1°)

X	Y	Z	PITCH	YAW	ROLL	PL ID
-950	0	-1045	115	0	0	2
SY	SP	EP	WP	WY	WR	
-29.5	+66.7	-68.5	+26.8	+18.9	-9.9	

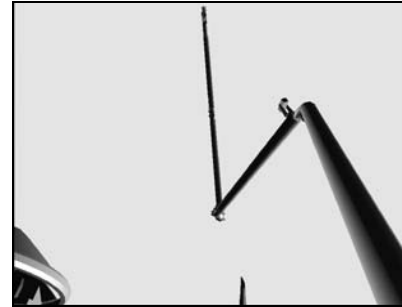
BRAKES – ON (tb-ON)

CDR

MS

3. AUTO MNVR TO -XLV, +ZVV
GNC UNIV PTG
√TGT ID: +2
BODY VECT: +5
P: +180
Y: +0
OM: +0
TRK - ITEM 19 EXEC (CUR - *)

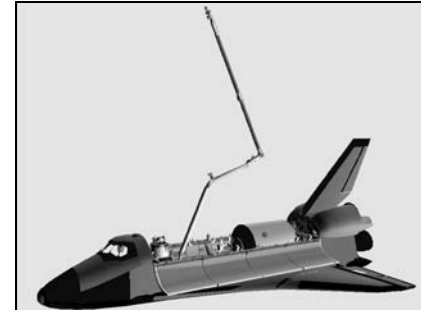
A6U DAP: B/AUTO/VERN(ALT)



CCTV A (-10,45)



CCTV C (0,35)



BIRD'S EYE

CDR

MS

On MS call, "OBSS at jettison position" -----

----- Report to CDR "OBSS at jettison position"

If attitude mnvr not complete:

DAP: ALT

GNC 20 DAP CONFIG

PRI ROT RATE (B7) - ITEM 30 +0.5 EXEC

5. OBSS RELEASE

MON 1	WRIST
MON 2	C(B)

3. CONFIGURE ORBITER FOR SEP MNVR

When mnvr to attitude complete:

√DAP: VERN(ALT)

When rates damped:

DAP: FREE

FLT CNTLR PWR - ON

√DAP TRANS: PULSE/PULSE/PULSE, NO LO Z

R12
(OBSS)
SSP1

√SPEE PWR - OFF

√APCU 1,2 CONV - OFF

√APCU 2 OUTPUT RLY - op (tb-bp)

SM 94 PDRS CONTROL

PL ID - ITEM 3 +0 EXEC

INIT ID - ITEM 24 +0 EXEC

X	Y	Z	PITCH	YAW	ROLL	PL ID
√ -1078	0	-754	25	0	1	0
√ SY	SP	EP	WP	WY	WR	
√ -29.5	+66.7	-68.5	+26.8	+18.9	-9.9	

Report to MS, "GO to release OBSS" -----

----- On CDR call, "GO to release OBSS"

RHC

√RATE - VERN (RATE MIN tb-ON)

BRAKES - OFF (tb-OFF)

MODE - END EFF, ENTER

CDR

MS

CAUTION
Monitor EE tb timing to
prevent EE motor burnout

EE MODE – AUTO
RELEASE sw – REL (mom)

When OPEN tb – gray, mnvr arm clear of grapple pin

	RIGID	CLOSE	CAPTURE	CRITICAL TIMES (28 sec total)	
√					DERIGID tb – gray, 5 sec max, then
	DERIGID	OPEN	EXTEND		OPEN tb – gray, 3 sec max, then
				EXTEND tb – gray, 20 sec max	

EE MODE – OFF

BRAKES – ON (tb-ON)

On MS call, "GO to perform SEP mnvr"

Report to CDR, "GO to perform SEP mnvr"

A6U

4. SEP MNVR

DAP: A/FREE/VERN(ALT)

THC: +Z (out) 2 pulses (0.2 ft/sec)

When opening rate confirmed:

DAP TRANS: PULSE/PULSE/NORM

DAP: LVLH

THC: +Z (out) 5 sec (1.7 ft/sec)

FLT CNTLR PWR – OFF

DAP TRANS: PULSE/PULSE/PULSE

Report to MS, "SEP mnvr complete"

On CDR call, "SEP mnvr complete"

CRT

GNC 20 DAP CONFIG

Config DAP B to B7

6. RMS TO PRE-CRADLE

Go to RMS PWRDN, step 1

ORBITER REPAIR

I

ORBITER REPAIR MANEUVER (CONTINGENCY) FS 5-2
REVERSE ORBITER REPAIR MANEUVER (CONTINGENCY) FS 5-8

ORBITER REPAIR MANEUVER (CONTINGENCY)

1. SETUP

MON 1	ELBOW (EE)
MON 2	C

SM 94 PDRS CONTROL

- √PL ID, ITEM 3: 0
- √INIT ID, ITEM 24: 0

2. MANEUVER TO PMA2 PRE-GRAPPLE

RATE – as reqd (VERN within 10 ft)
 BRAKES – OFF (tb-OFF)
 MODE – as desired

NOTE

PMA2 GF will not be in view for grapple until after ODS ring extension

Mnvr to PMA2 PRE-GRAPPLE posn:

X	Y	Z	PITCH	YAW	ROLL	PL ID
-724	-71	-562	214	330	291	0
SY	SP	EP	WP	WY	WR	
-33.9	+131.6	-141.8	-114.0	-41.0	-4.1	

BRAKES – ON (tb-ON)
 MODE – not DIRECT

3. ODS POWERUP

Perform DOCKING MECHANISM POWERUP (RNDZ, APDS)
 Perform UNDOCKING PREP (RNDZ, APDS)

4. RECAPTURE ODS INTERFACE

SM 167 DOCKING STATUS

A7L

- CL LAT pb – push
- √LATCHES OPEN It – It off
 - √CLOSED It – It on
- APDS CIRC PROT OFF pb – push
 - √CIRCUIT PROTECT OFF It – It on
- FIXER OFF pb – push
- √FIXERS OFF It – It on
- RING OUT pb – push
 - √FINAL POSITION It – It off

When CAPTURE It – on:
 PWR OFF pb – push
 PWR ON pb – push
 √CAPTURE It – It off
 √LATCHES CLOSED It – It on

00:10

- RING IN pb – push
- PWR ON pb – push
- √RING FNL POS It – It off
 - √DRV CMD – OFF

CRT

- C3, A6U 5. VERIFY SHUTTLE ATTITUDE CONTROL CONFIGURATION
 √DAP: A(B)/FREE/VERN(ALT)
 √DAP: LOW Z

GNC 20 DAP CONFIG

- √DAP A, ITEM 1: 12
 √B, ITEM 2: 12
 √NOTCH FLTR ENA, ITEM 6: *
 √XJETS ROT ENA, ITEM 7: *
 √DAP A CNTL ACC, ITEM 28: 1
 √B CNTL ACC, ITEM 48: 2

GNC 23 RCS

- RCS F – ITEM 1 EXEC (*)
 √JET DES F1U, ITEM 17: *
 √F3U, ITEM 19: *
 √F2U, ITEM 21: *
 √F1F, ITEM 31: *
 √F3F, ITEM 33: *
 √F2F, ITEM 35: *

- 00:00 A7L 6. OPEN ODS HOOKS
 APDS CIRC PROT OFF pb – push
 √CIRCUIT PROTECT OFF It – It on
 OP HOOKS pb – push
 02:30 CRT √HK1,2 DRV CMD (two) – ON
 A7L √HOOKS 1, HOOKS 2 OP It (two) – It on

- 00:00 7. EXTEND RING
 RING OUT pb – push
 CRT √DRV CMD – ON
 √FIXERS – ON
 √PETAL POS BASE (three) incr
 03:40 A7L √RING INITIAL POSITION It – It on
 CRT √PETAL POS BASE (three): 76 ± 3%
 03:50 √CLUTCH – blank/SLIP

When no relative motion [PETAL POS BASE (three) not changing for 60 sec], proceed with step 8

- A7U 8. GRAPPLE PMA2
 CCTV – config for grapple
- | | |
|-------|------------|
| MON 1 | EE (ELBOW) |
| MON 2 | C |

CCTV – install PDRS TARGET OVERLAY FOR CTVM
 – RMS WRIST, zoom 34.0 HFOV
 focus 5 ft

Maintain eyepoint ~18 in when using grapple overlay

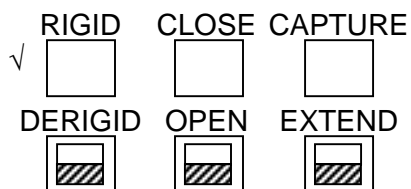
RATE – VERN (RATE MIN tb-ON)
 BRAKES – OFF (tb-OFF)
 MODE – END EFF, ENTER

Mnvr to grapple envelope

CAUTION Monitor EE tb timing to prevent EE motor burnout
--

EE MODE – AUTO

CAPTURE sw – depress (mom)



CRITICAL TIMES (28 sec total)

CAPTURE tb – gray, then
CLOSE tb – gray, 3 sec max, then
RIGID tb – gray, 25 sec max

EE MODE – OFF

BRAKES – ON (tb-ON)

SM 94 PDRS CONTROL

PL ID – ITEM 3 +4 EXEC

INIT ID – ITEM 24 +4 EXEC

PMA2 GRAPPLE posn:

	X	Y	Z	PITCH	YAW	ROLL	PL ID
Expected	-649	0	-475	0	0	0	4
	SY	SP	EP	WP	WY	WR	
Expected	-61.2	+138.2	-151.3	-84.0	-51.1	+32.9	

Review GENERIC END EFFECTOR CUE CARD – ISS/SHUTTLE DOCKED OPS

A7L

9. OPEN CAPTURE LATCHES

OP LAT pb – push

√LATCHES CLOSED It – It off

√OPEN It – It on

PWR OFF pb – push

√STATUS It (eighteen) – It off

10. MANEUVER TO SEPARATION POSN

RATE – VERN (RATE MIN tb-ON)

BRAKES – OFF (tb-OFF)

MODE – ORB LD, ENTER

MON 1	A
MON 2	C

Mnvr to SEPARATION posn:

	X	Y	Z	PITCH	YAW	ROLL	PL ID
	-649	0	-595	0	0	0	4
	SY	SP	EP	WP	WY	WR	
	-70.1	+129.5	-124.7	-90.7	-51.3	+47.2	

BRAKES – ON (tb-ON)

MODE – not DIRECT

11. OCAS TO UNDOCKED POSN

SM 94 PDRS CONTROL

PL ID – ITEM 3 +5 EXEC
 INIT ID – ITEM 24 +5 EXEC

END POS – ITEM 18 -6 7 9 -4 2 -7 2 9 EXEC
 ATT – ITEM 21 +2 1 5 +3 3 0 +2 9 0 EXEC
 CMD CK – ITEM 25 EXEC (GOOD)

RATE – VERN (RATE MIN tb-ON)
 BRAKES – OFF (tb-OFF)
 MODE – OPR CMD, ENTER (READY It on)

AUTO SEQ – PROCEED (IN PROG It on)

When AUTO SEQ IN PROG It – off:

BRAKES – ON
 MODE – not DIRECT

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-679	-42	-729	215	330	290	5
	SY	SP	EP	WP	WY	WR	
√	-74.3	+120.9	-105.2	-96.4	-50.0	+53.3	

12. CONFIGURE ISS ATTITUDE CONTROL

Give MCC-H GO to mnvr ISS to proper attitude in preparation for ACAS to Overnight Park Position

13. AUTO SEQUENCE TO OVERNIGHT PARK POSN

MON 1	A
MON 2	C

SM 94 PDRS CONTROL

AUTO MODE 1 – ITEM 13 +1 EXEC

RATE – VERN (RATE MIN tb-ON)
 BRAKES – OFF (tb-OFF)
 MODE – AUTO 1, ENTER (READY It on)

SM 94 PDRS CONTROL

√START PT, ITEM 17: 1

AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	PLID
1P	-679	-42	-729	215	330	290	5
2	-783	+15	-732	236	291	327	
3	-1082	-104	-722	324	293	66	
4	-1017	-394	-694	354	331	107	
5	-1003	-394	-637	347	356	124	
6	-605	-340	-548	318	23	193	
7	-364	-340	-489	280	10	257	
8P	-375	-194	-589	215	338	284	

When AUTO SEQ IN PROG It – off:

- BRAKES – ON (tb-ON)
- MODE – not DIRECT
- PARAM – PORT TEMP
- JOINT – CRIT TEMP

A7L

14. RECONFIGURE ODS

- PWR ON pb – push
- CL LAT pb – push
- √LATCHES OPEN It – It off
 - √CLOSED It – It on
- PWR OFF pb – push
- √STATUS It (eighteen) – It off

15. ODS POWERDOWN

Perform DOCKING MECHANISM POWERDOWN (RNDZ, APDS)

16. CONFIGURE ISS ATTITUDE CONTROL FOR OVERNIGHT PARK

If remaining at Overnight Park:
 Give MCC-H GO to maneuver ISS to Overnight Park attitude

17. CONFIGURE ISS ATTITUDE CONTROL FOR ACAS TO REPAIR POSN

Give MCC-H GO to maneuver ISS to proper attitude in preparation for auto sequence to Orbiter Tile Repair Position

18. ACAS TO REPAIR POSN

MON 1	A
MON 2	C

SM 94 PDRS CONTROL

- √PL ID, ITEM 3: 5
 - √INIT ID, ITEM 24: 5
- √AUTO MODE 1, ITEM 13: 1

- RATE – VERN (RATE MIN tb-ON)
- BRAKES – OFF (tb-OFF)
- MODE – AUTO 1, ENTER (READY It on)

SM 94 PDRS CONTROL

START PT – ITEM 17 +8 EXEC

AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	PLID
8P	-375	-194	-589	215	338	284	5
9	-158	-151	-381	206	345	273	
10	-158	-151	-248	248	345	273	
11	-340	-151	-109	279	345	273	
12	-498	-120	-97	315	315	287	
13P	-852	-165	-158	341	330	290	

BRAKES – ON (tb-ON)
MODE – not DIRECT
PARAM – PORT TEMP
JOINT – CRIT TEMP

19. CONFIGURE ISS ATTITUDE CONTROL
Give MCC-H GO to mnvr ISS to Orbiter Tile Repair attitude

REVERSE ORBITER REPAIR MANEUVER (CONTINGENCY)

1. SETUP

MON 1	ELBOW
MON 2	B

SM 94 PDRS CONTROL

√PL ID, ITEM 3: 5

√INIT ID, ITEM 24: 5

2. CONFIGURE ISS ATTITUDE CONTROL

Give MCC-H GO to maneuver ISS to proper attitude in prep for auto sequence to Overnight Park Position

3. MANEUVER BACK TO REPAIR START POSN

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-852	-165	-158	341	330	290	5
	SY	SP	EP	WP	WY	WR	
√	+53.4	+16.4	-115.3	+32.1	-61.9	+237.3	

If not within 1 in/1 deg of REPAIR posn:

SM 94 PDRS CONTROL

END POS – ITEM 18 -8 5 2 -1 6 5 -1 5 8 EXEC

ATT – ITEM 21 +3 4 1 +3 3 0 +2 9 0 EXEC

CMD CK – ITEM 25 EXEC (GOOD)

RATE – VERN (RATE MIN tb-ON)

BRAKES – OFF (tb-OFF)

MODE – OPR CMD, ENTER (READY It on)

AUTO SEQ – PROCEED (IN PROG It on)

When AUTO SEQ IN PROG It – off:

BRAKES – ON (tb-ON)

MODE – not DIRECT

4. AUTO SEQUENCE TO OVERNIGHT PARK POSN

SM 94 PDRS CONTROL

AUTO MODE 2 – ITEM 14 +2 EXEC

RATE – VERN (RATE MIN tb-ON)

BRAKES – OFF (tb-OFF)

MODE – AUTO 2, ENTER (READY It on)

SM 94 PDRS CONTROL

√START PT, ITEM 17: 14

AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	PLID
14P	-852	-165	-158	341	330	290	5
15	-498	-120	-97	315	315	287	
16	-340	-151	-109	279	345	273	
17	-158	-151	-248	248	345	273	
18	-158	-151	-381	206	345	273	
19P	-375	-194	-589	215	338	284	

When AUTO SEQ READY It – on:

- BRAKES – ON (tb-ON)
- MODE – not DIRECT
- PARAM – PORT TEMP
- JOINT – CRIT TEMP

5. CONFIGURE ISS ATTITUDE CONTROL FOR OVERNIGHT PARK

If remaining at Overnight Park:

Give MCC-H GO to mnvr ISS to Overnight Park attitude

6. CONFIGURE ISS ATTITUDE CONTROL FOR UNDOCK POSN

Give MCC-H GO to mnvr ISS to proper attitude in preparation for ACAS to Undocked Position

7. ACAS TO UNDOCKED POSN

MON 1	ELBOW
MON 2	B

SM 94 PDRS CONTROL

√PL ID, ITEM 3: 5

√INIT ID, ITEM 24: 5

√AUTO MODE 2, ITEM 14: 2

- RATE – VERN (RATE MIN tb-ON)
- BRAKES – OFF (tb-OFF)
- MODE – AUTO 2, ENTER (READY It on)

START PT – ITEM 17 +1 9 EXEC

AUTO SEQ – PROCEED (IN PROG It on)

Pt	X	Y	Z	PITCH	YAW	ROLL	PLID
19P	-375	-194	-589	215	338	284	5
20	-364	-340	-489	280	10	257	
21	-605	-340	-548	318	23	193	
22	-1003	-394	-637	347	356	124	
23	-1017	-394	-694	354	331	107	
24	-1082	-104	-722	325	293	66	
25	-783	+15	-732	236	291	327	
26P	-679	-42	-729	215	330	290	

- BRAKES – ON (tb-ON)
- MODE – not DIRECT

8. ODS POWERUP
Perform DOCKING MECHANISM POWERUP (RNDZ, APDS)

Give MCC-H GO to maneuver ISS to Capture attitude

9. MANEUVER TO ODS CAPTURE POSN

SM 94 PDRS CONTROL

PL ID – ITEM 3 +4 EXEC

INIT ID – ITEM 24 +4 EXEC

RATE – VERN (RATE MIN tb-ON)

BRAKES – OFF (tb-OFF)

MODE – ORB LD, ENTER

MON 1	A
MON 2	C

Mnvr to CAPTURE posn:

X	Y	Z	PITCH	YAW	ROLL	PL ID
-649	0	-471	0	0	0	4
SY	SP	EP	WP	WY	WR	
-60.6	+138.3	-152.4	-83.7	-51.0	+32.0	

BRAKES – ON (tb-ON)

MODE – not DIRECT

10. ODS CAPTURE
Perform DOCKING PREP (RNDZ, APDS)

O14:F, Pri RJDA 1A L2/R2 MANF DRIVER – OFF
O15:F, RJD MANF L5/F5/R5 DRIVER – OFF
O16:F, Pri RJD LOGIC (eight) – ON

√MCC for GO to power up Pri drivers

RJD MANF L5/F5/R5 DRIVER – ON
Pri RJD DRIVER (eight) – ON

Arm PCT:

F2, SPDBK/THROT pb – AUTO (lt on)
F4

PCT:

A6U, SPARE pb – push
C3

When capture confirmed:

F2, SPDBK/THROT pb – AUTO (lt off)
F4

O14:F, Pri RJD DRIVER, LOGIC (sixteen) – OFF
O15:F, RJDA 1A L2/R2 MANF DRIVER – ON
O16:F

Perform DOCKING SEQUENCE CUE CARD (RNDZ), steps 1-3

11. RELEASE PMA2

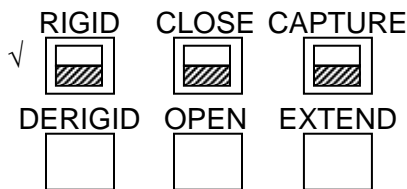
MON 1	EE (ELBOW)
MON 2	C

RATE – VERN (RATE MIN tb-ON)
 BRAKES – OFF (tb-OFF)
 MODE – END EFF, ENTER

CAUTION
 Monitor EE tb timing to prevent EE motor burnout

EE MODE – AUTO
 RELEASE sw – depress (mom)

When OPEN tb – gray,
 mnvr arm clear of grapple pin



CRITICAL TIMES (28 sec total)
 DERIGID tb – gray, 5 sec max, then
 OPEN tb – gray, 3 sec max, then
 EXTEND tb – gray, 20 sec max

EE MODE – OFF

- * If manual release reqd: *
- * EE MODE – MAN *
- * MAN CONTR – DERIGID (hold until DERIGID tb-gray, 5 sec max) *
- * RELEASE sw – depress (hold until OPEN tb-gray, 3 sec max) *
- * Mnvr arm clear of grapple pin, then *
- * EE MAN CONTR – DERIGID (hold until EXTEND tb-gray, 20 sec max) *
- * MODE – OFF *

BRAKES – ON (tb-ON)
 ✓MODE – not DIRECT

12. RETRACT RING AND CLOSE ODS HOOKS

Perform DOCKING SEQUENCE CUE CARD (RNDZ), steps 4-19

13. MANEUVER TO PRE-CRADLE

SM 94 PDRS CONTROL

 PL ID – ITEM 3 +0 EXEC
 INIT ID – ITEM 24 +0 EXEC

RATE – as desired (VERN within 10 ft)
 BRAKES – OFF (tb-OFF)
 MODE – as desired

Mnvr to PRE-CRADLE:

X	Y	Z	PITCH	YAW	ROLL	PL ID
-1261	-146	-551	5	2	0	0
SY	SP	EP	WP	WY	WR	
0	+25	-25	+5	0	0	

BRAKES – ON (tb-ON)
MODE – not DIRECT
PARAM – PORT TEMP
JOINT – CRIT TEMP

14. ODS POWERDOWN
Go to DOCKING MECHANISM POWERDOWN (RNDZ, APDS)

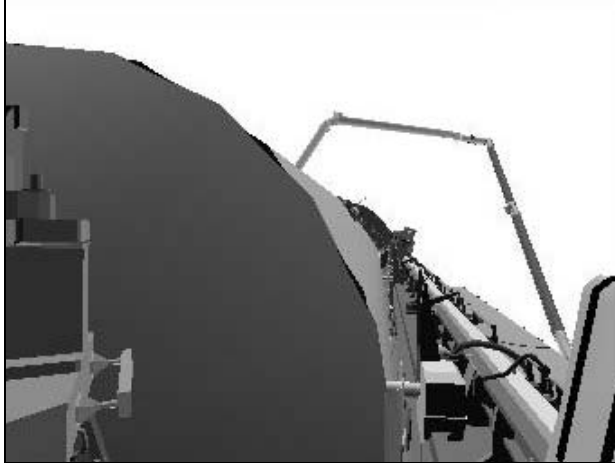
SURVEY CAMERA VIEWS

OBSS LDRI RCC SURVEY CAMERA VIEWS – STBD.....	FS 6-2
LCS RCC SURVEY CAMERA VIEWS – NOSE CAP.....	FS 6-15
LDRI RCC SURVEY CAMERA VIEWS – PORT	FS 6-22
– NOSE CAP.....	FS 6-34
LCS RCC SURVEY CAMERA VIEWS – STBD.....	FS 6-45
– PORT	FS 6-55
SRMS EE CAM CREW CABIN SURVEY CAMERA VIEWS.....	FS 6-72

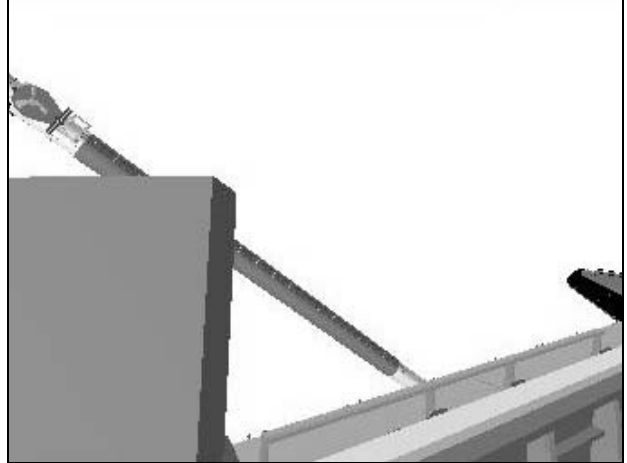
OBSS LDRI RCC SURVEY CAMERA VIEWS – STBD

**SURVEY CAMERA
VIEWS**

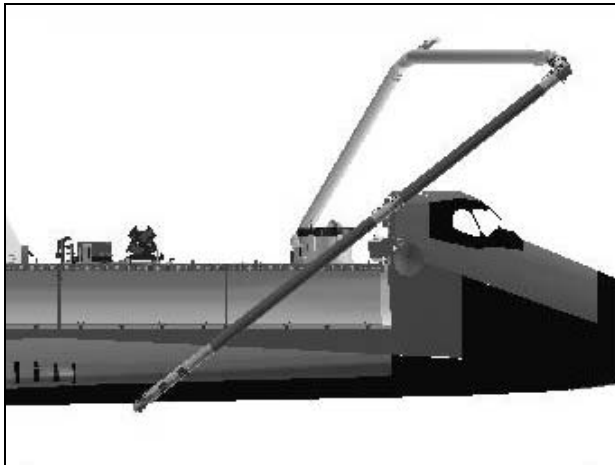
STBD LDRI RCC SURVEY – Pause Pt 1



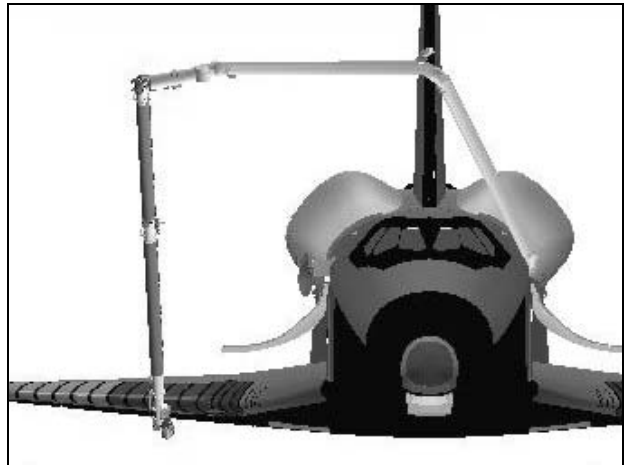
CCTV C (-10,0)



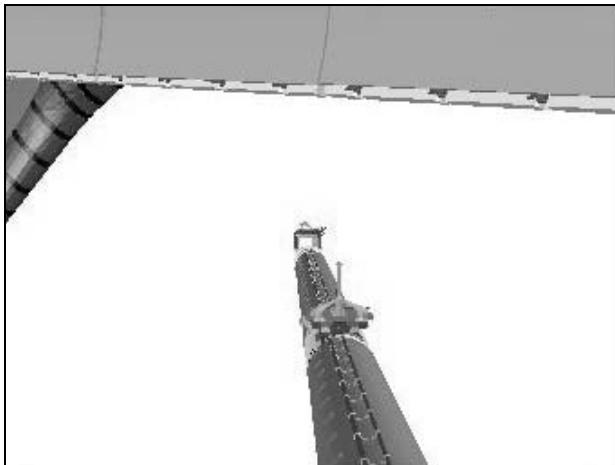
CCTV D (-60,-5)



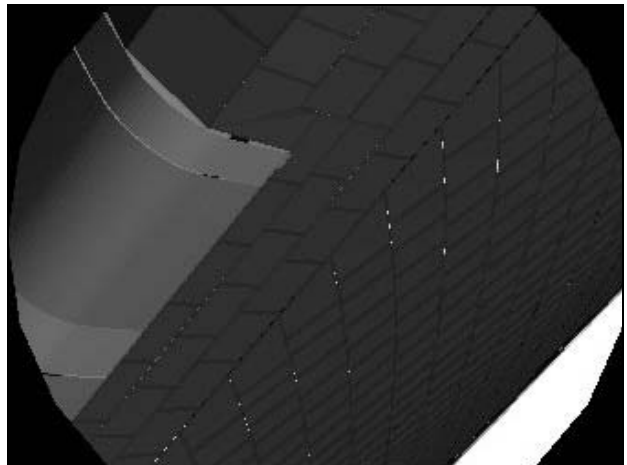
STBD



FRONT

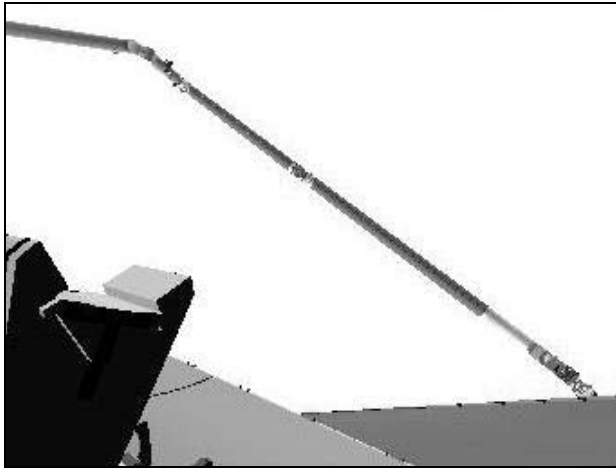


RSC

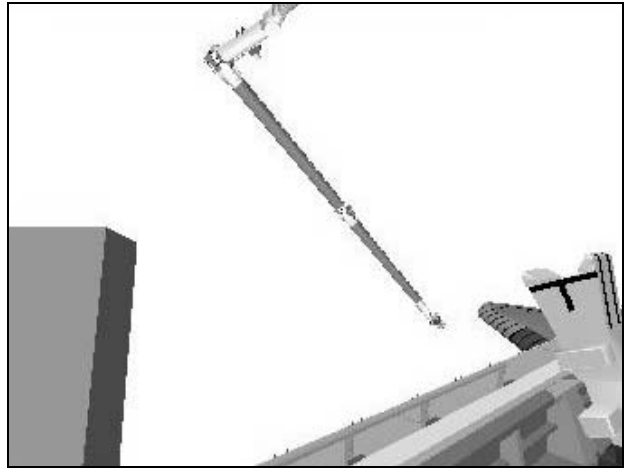


LDRI (95,-105)

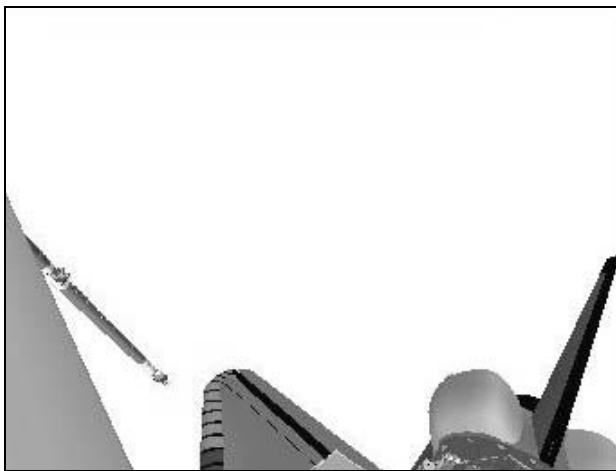
STBD LDRI RCC SURVEY – Pause Pt 5



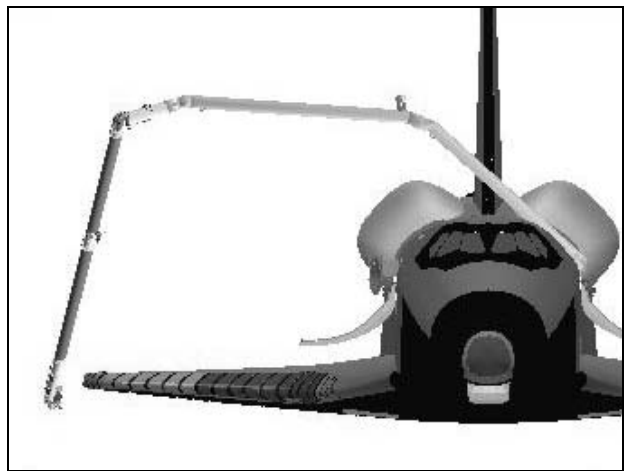
CCTV C (50,-5)



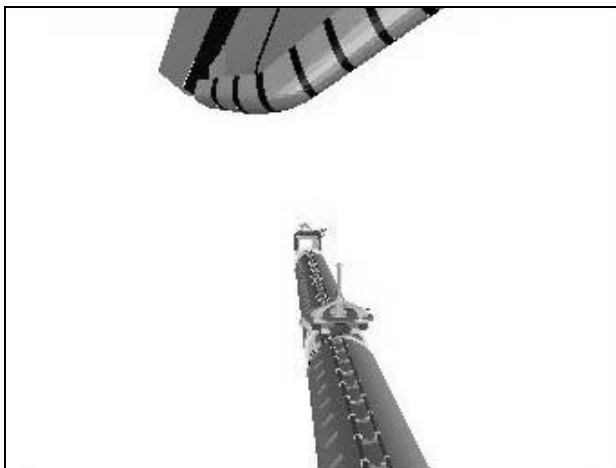
CCTV D (-50,0)



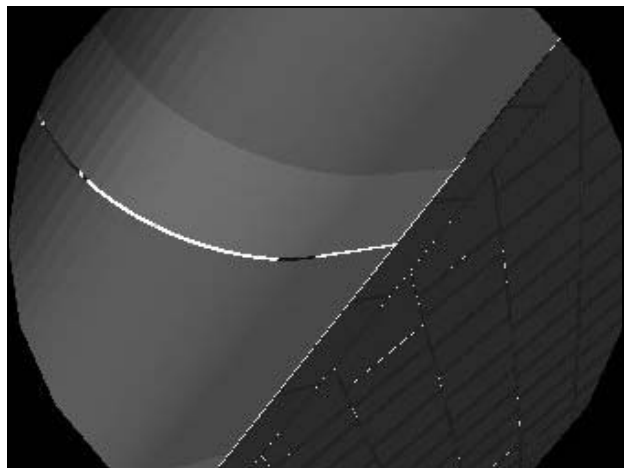
ELBOW (40,-35)



FRONT

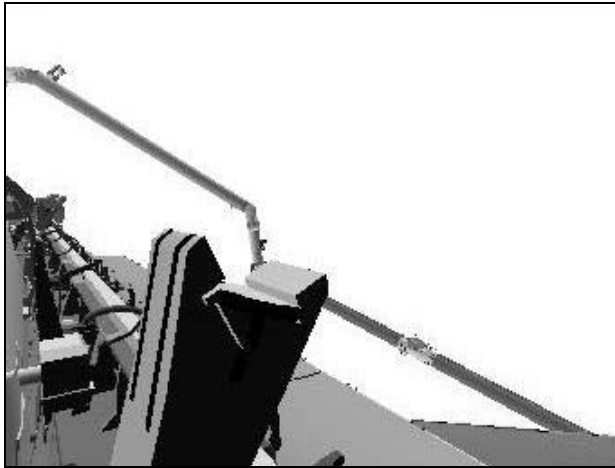


RSC

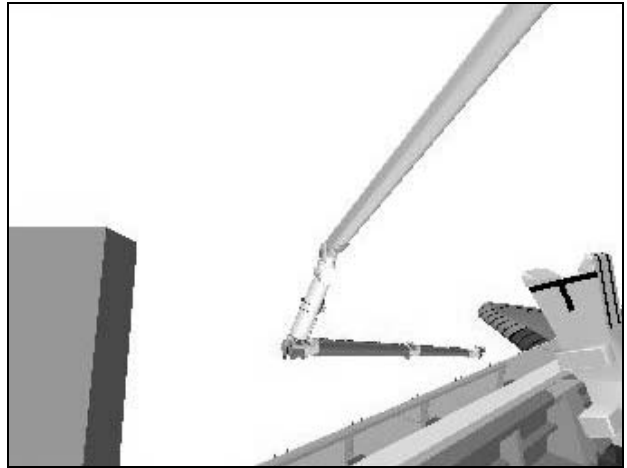


LDRI (95,-105)

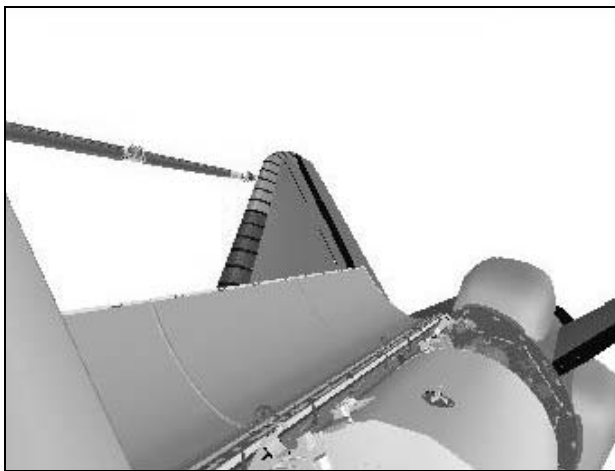
STBD LDRI RCC SURVEY – Pause Pt 7



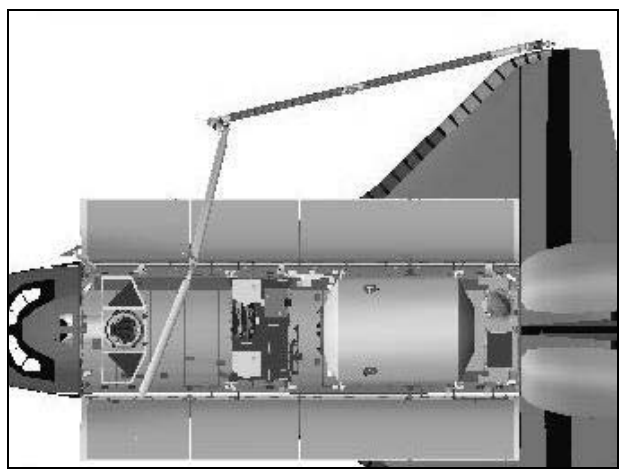
CCTV C (35,-5)



CCTV D (-50,0)



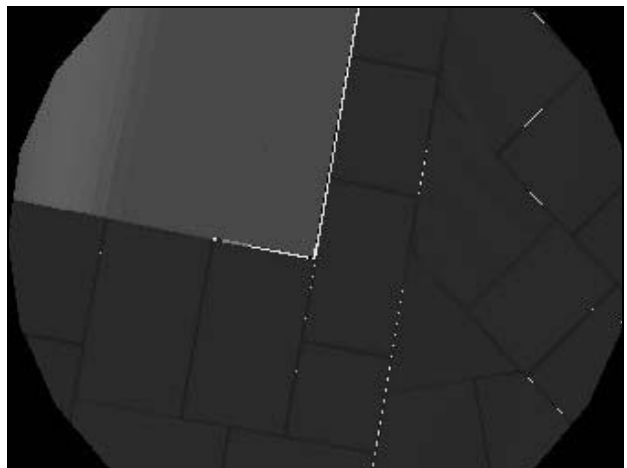
ELBOW (40,-35)



OVERHEAD

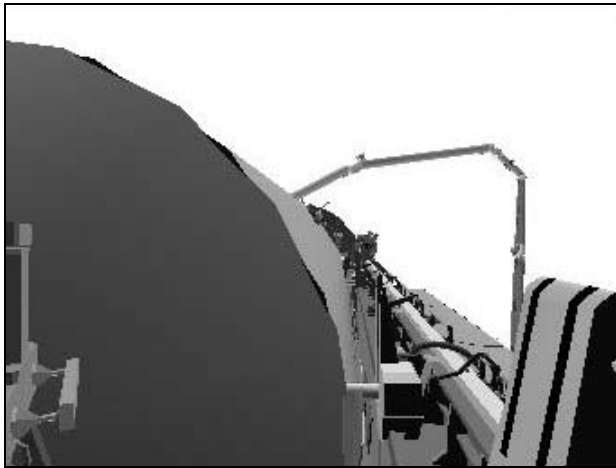


RSC

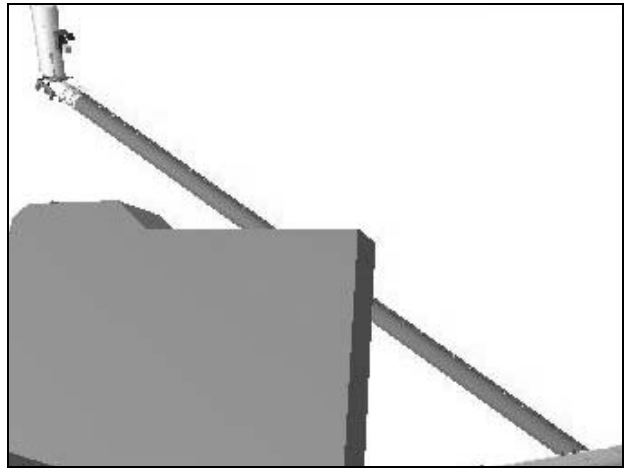


LDRI (80,-65)

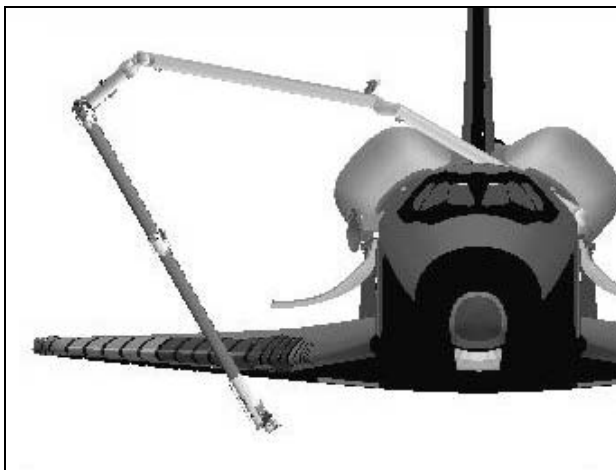
STBD LDRI RCC SURVEY – Pause Pt 12



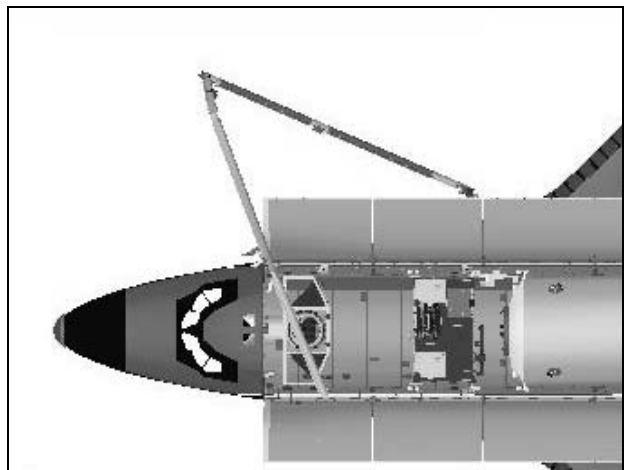
CCTV C (-5,0)



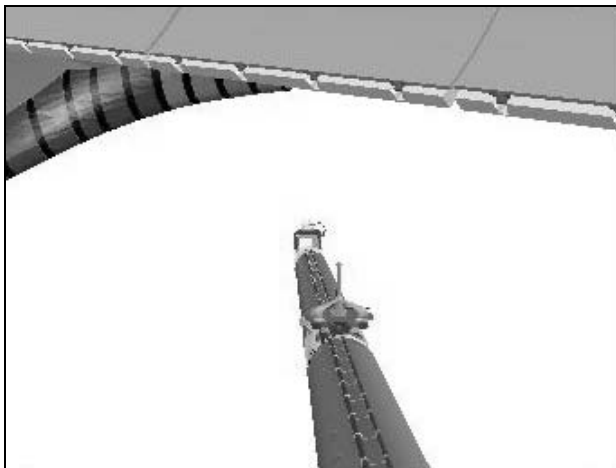
CCTV D (-75,0)



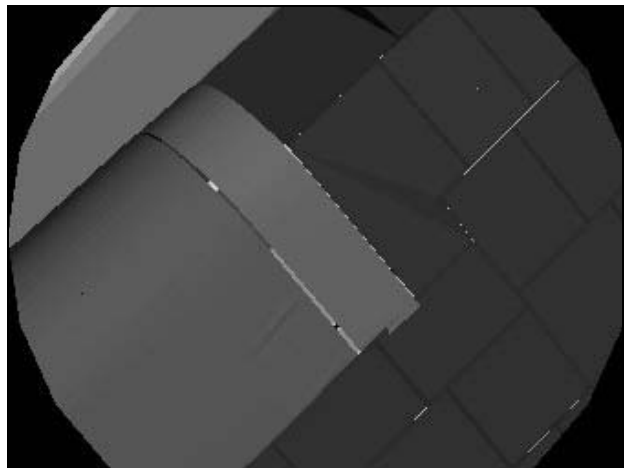
FRONT



OVERHEAD

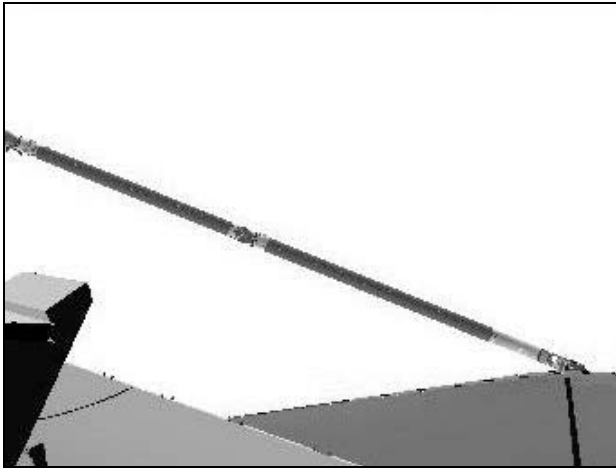


RSC

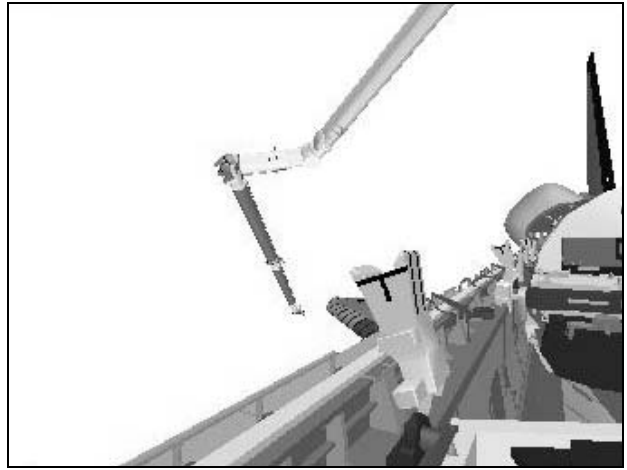


LDRI (80,-65)

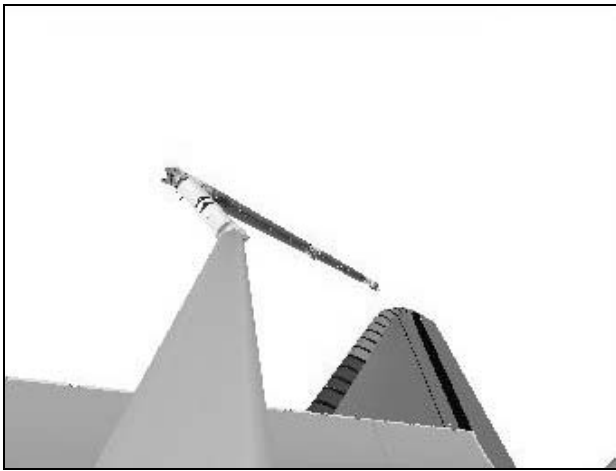
STBD LDRI RCC SURVEY – Pause Pt 17



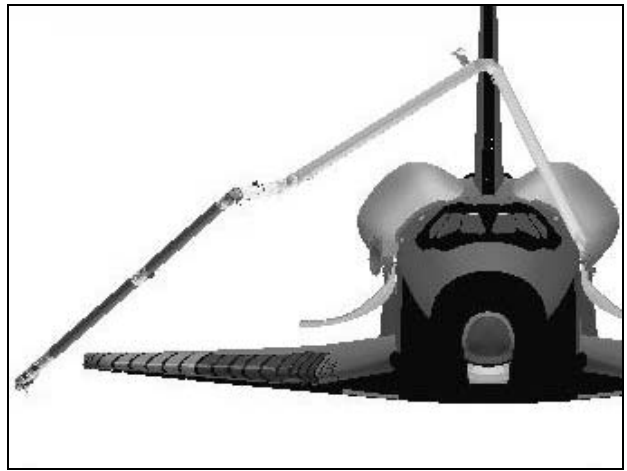
CCTV C (60,-5)



CCTV D (-30,0)



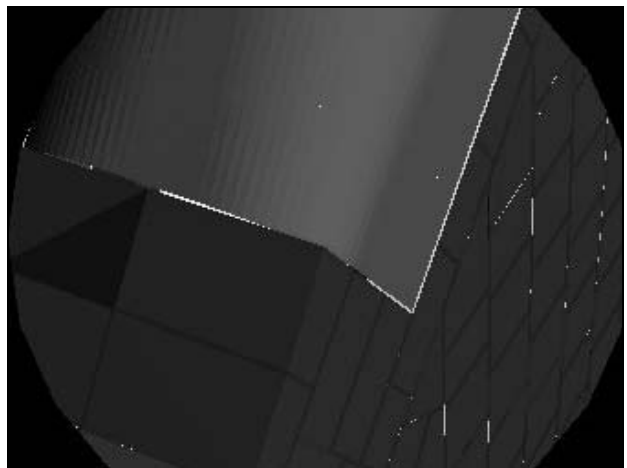
ELBOW (10,-5)



FRONT

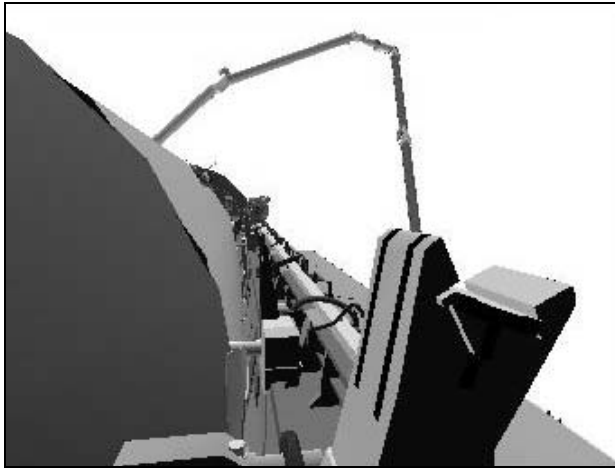


RSC

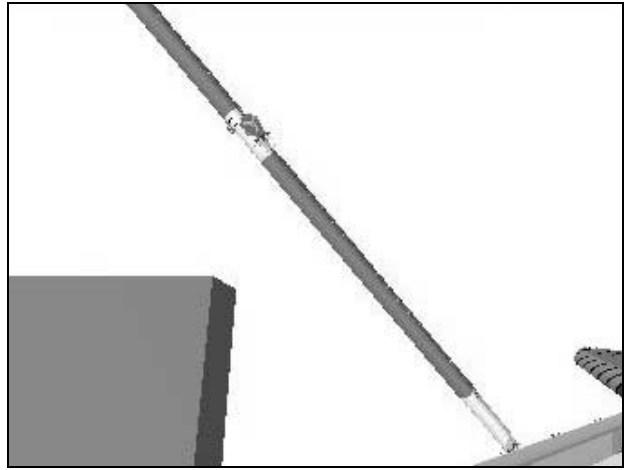


LDRI (80,-65)

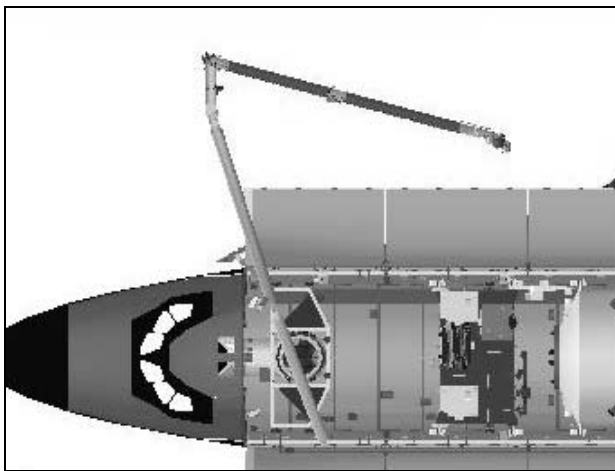
STBD LDRI RCC SURVEY – Pause Pt 22



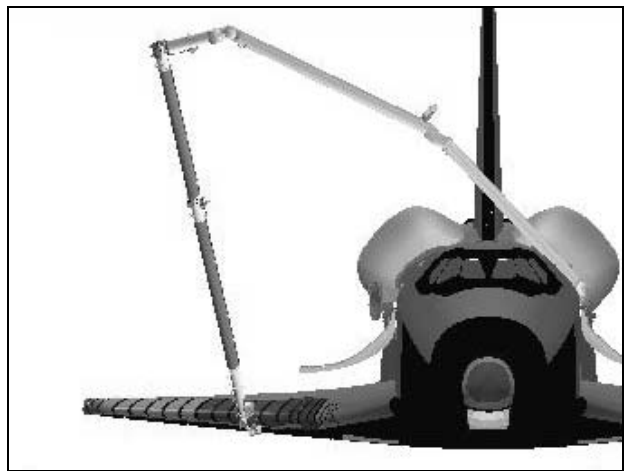
CCTV C (10,-5)



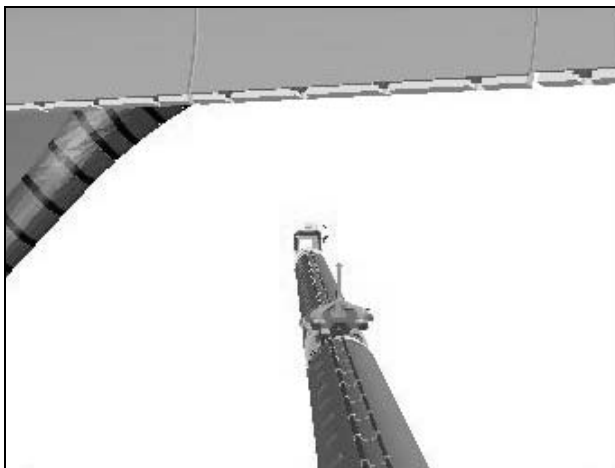
CCTV D (-60,5)



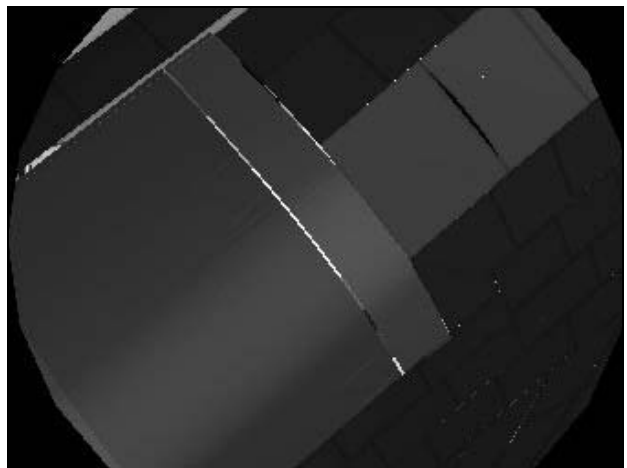
OVERHEAD



FRONT

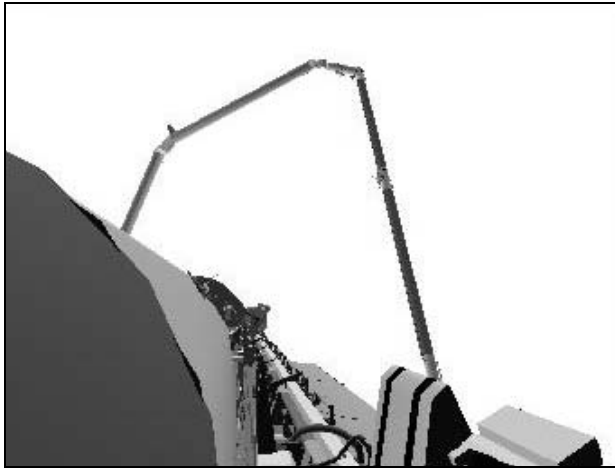


RSC

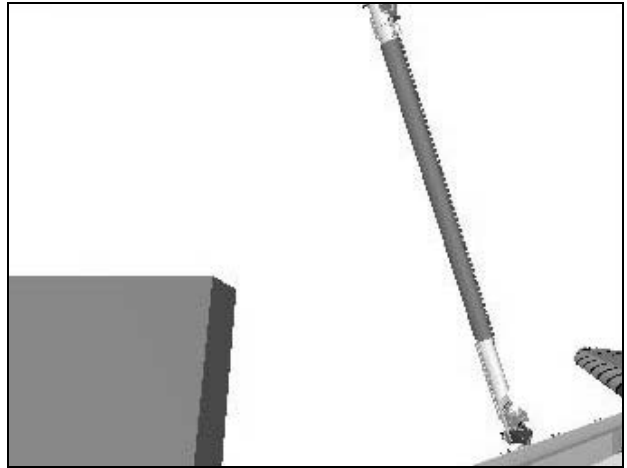


LDRI (80,-90)

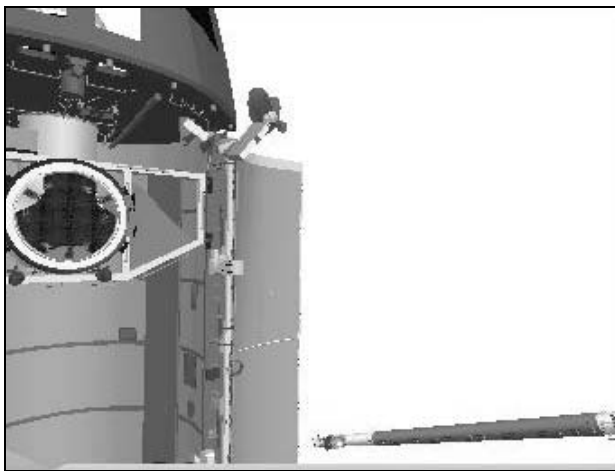
STBD LDRI RCC SURVEY – Pause Pt 23



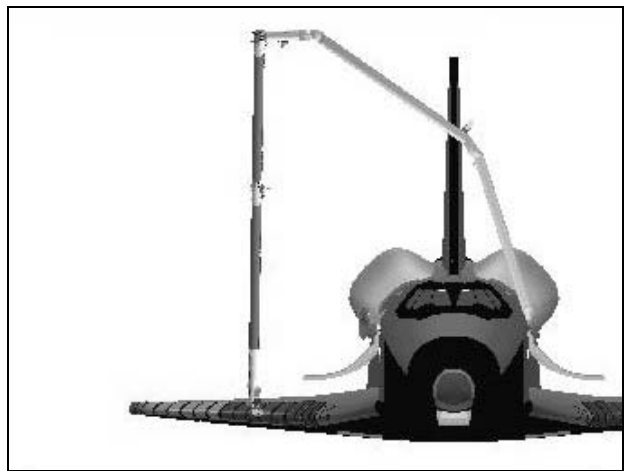
CCTV C (10,10)



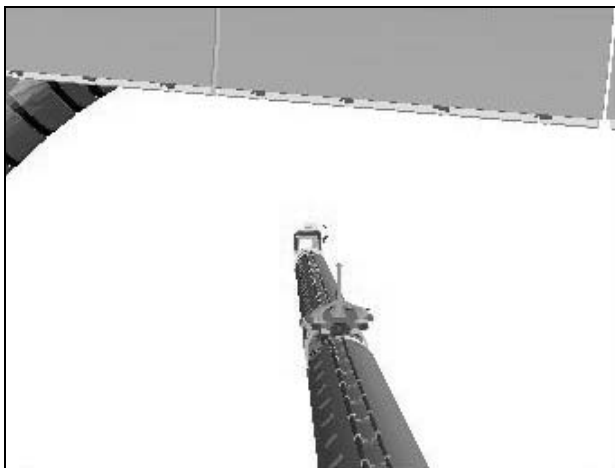
CCTV D (-60,5)



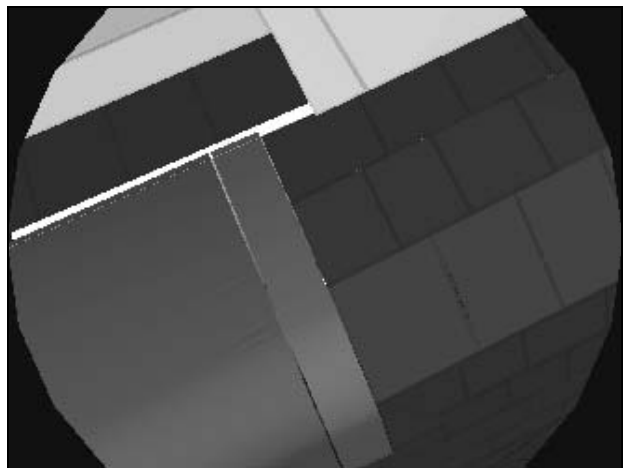
ELBOW (-90,-45)



FRONT

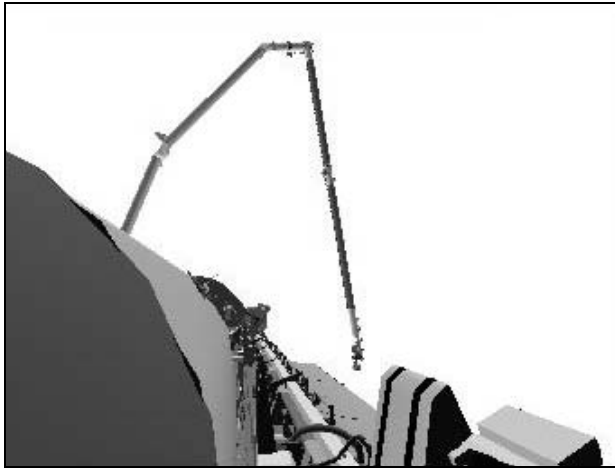


RSC

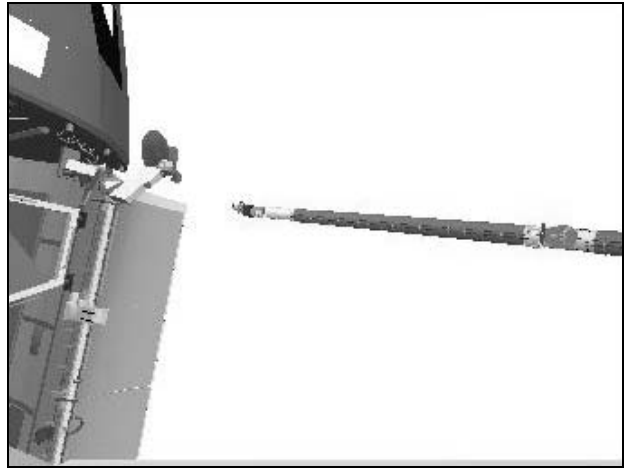


LDRI (80,-85)

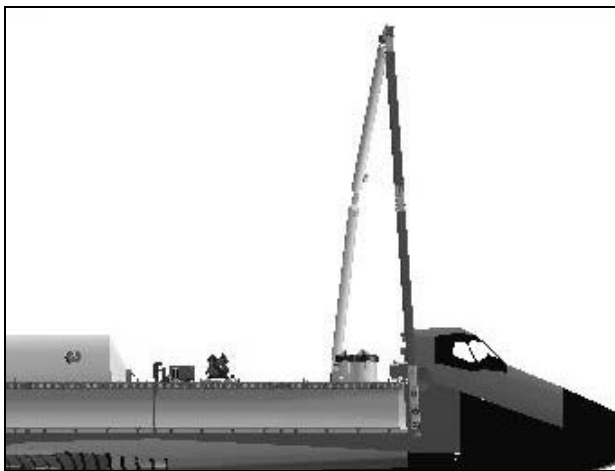
STBD LDRI RCC SURVEY – Pause Pt 26



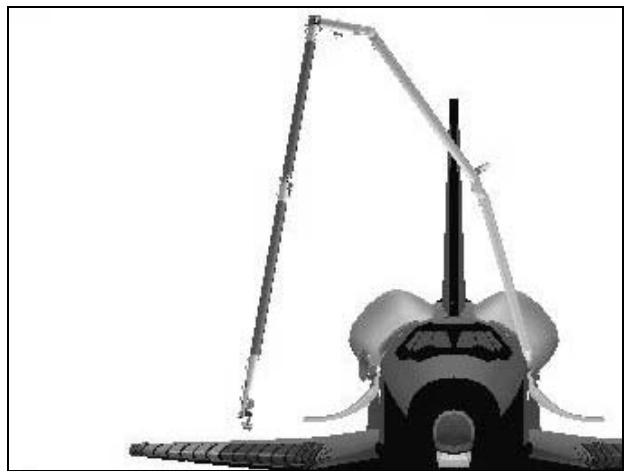
CCTV C (10,10)



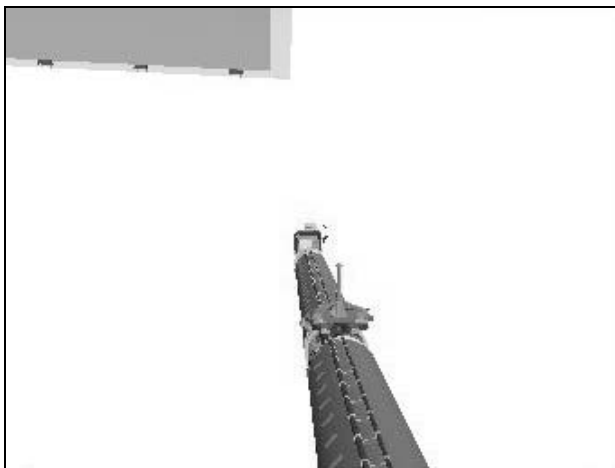
ELBOW (-90,-45)



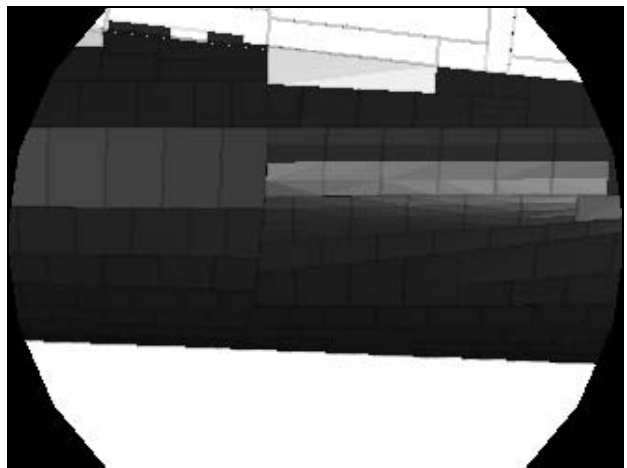
STBD



FRONT

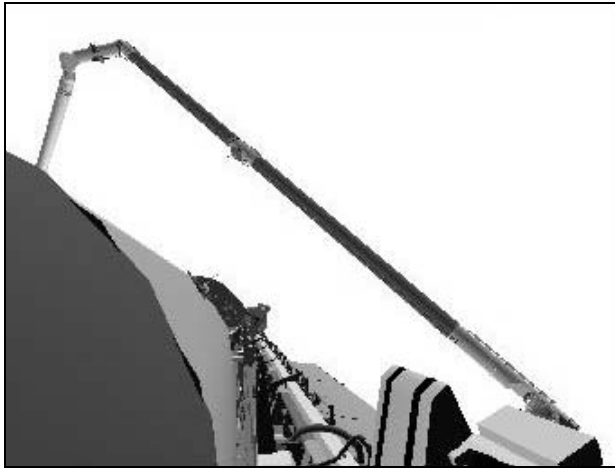


RSC

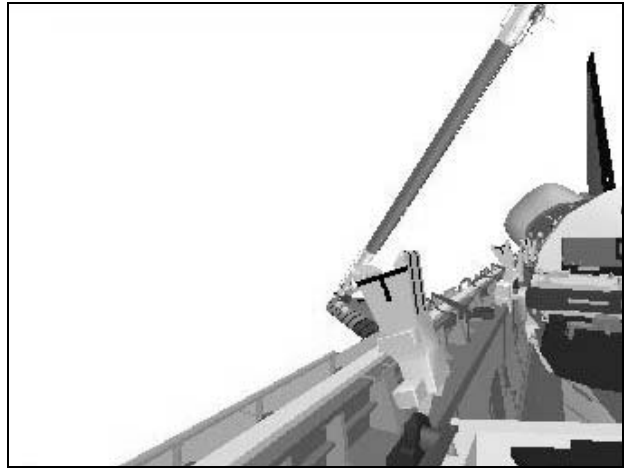


LDRI (80,-85)

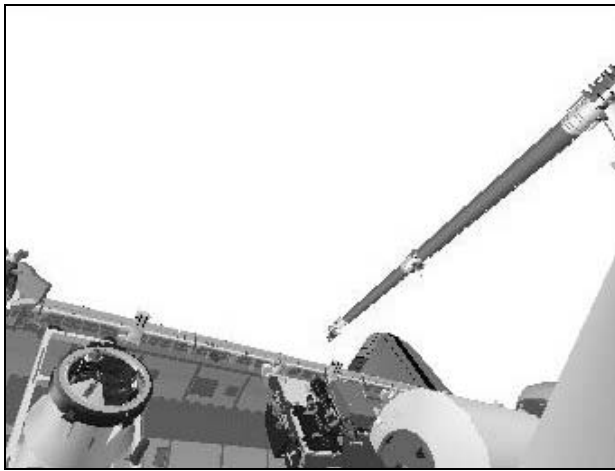
STBD LDRI RCC SURVEY – Pause Pt 32



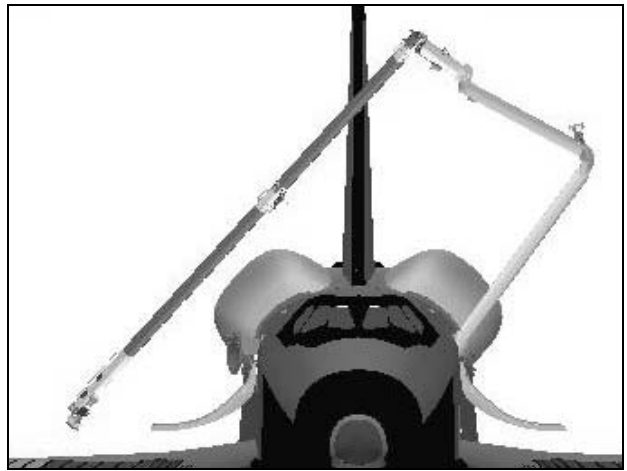
CCTV C (10,10)



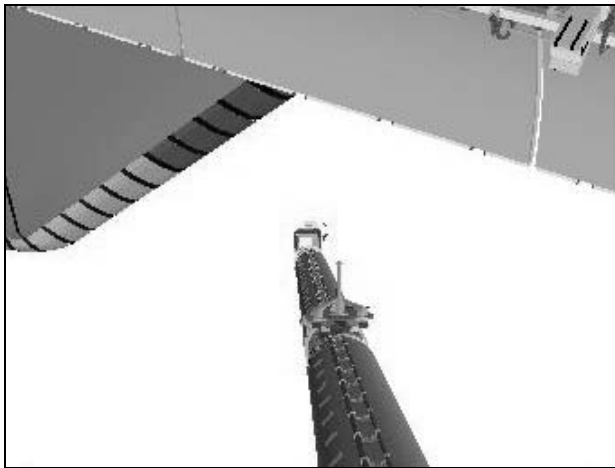
CCTV D (-30,0)



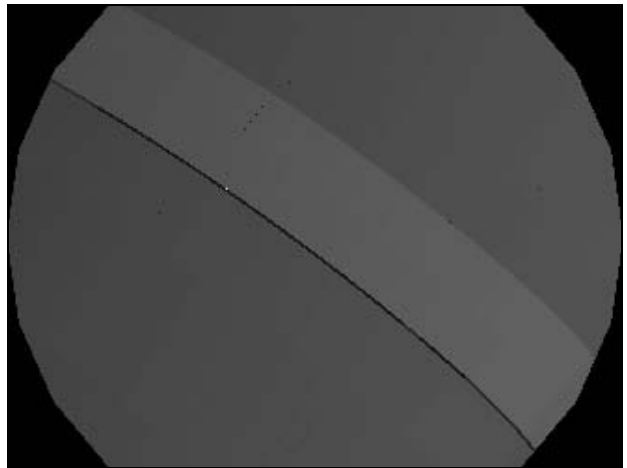
ELBOW (-40,-10)



FRONT

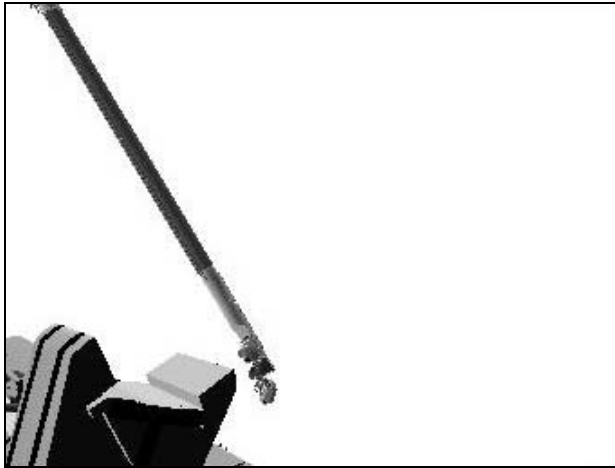


RSC

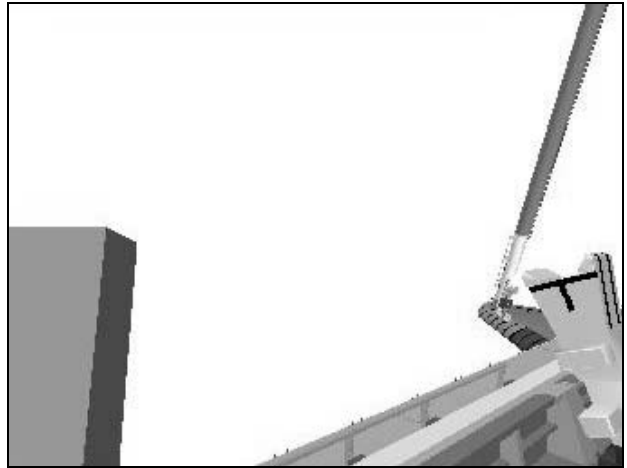


LDRI (80,-85)

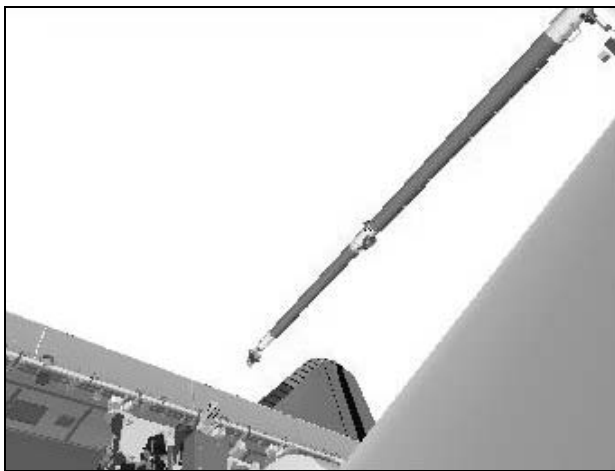
STBD LDRI RCC SURVEY – Pause Pt 33



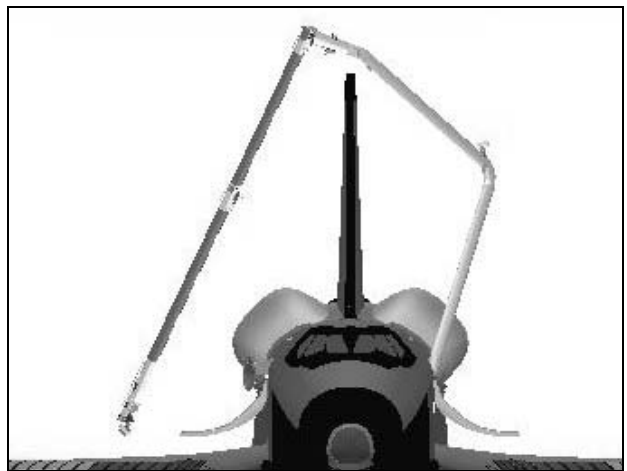
CCTV C (45,5)



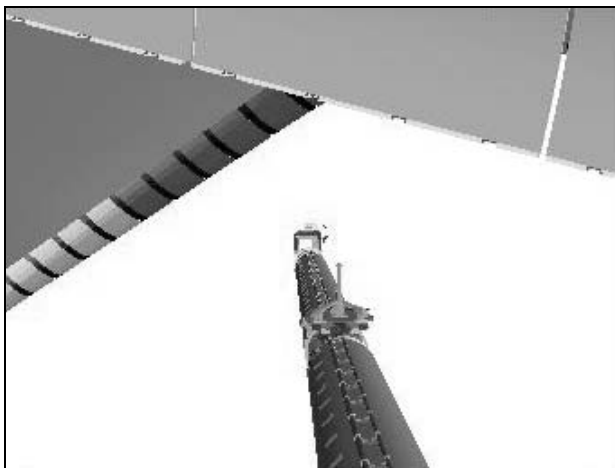
CCTV D (-50,0)



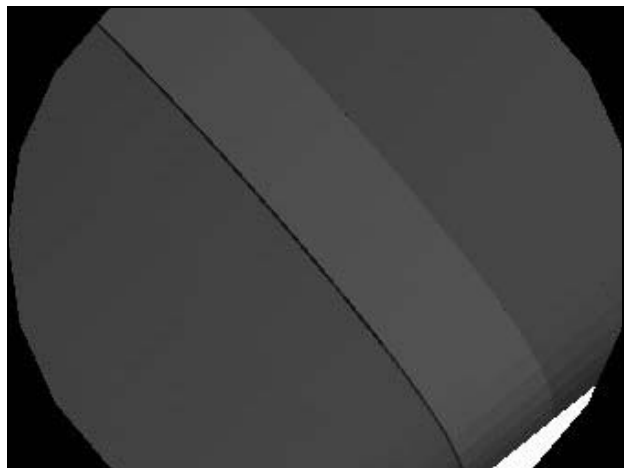
ELBOW (-40,-30)



FRONT

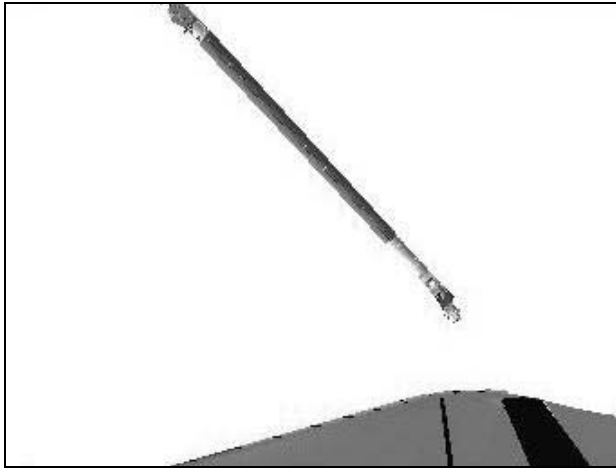


RSC

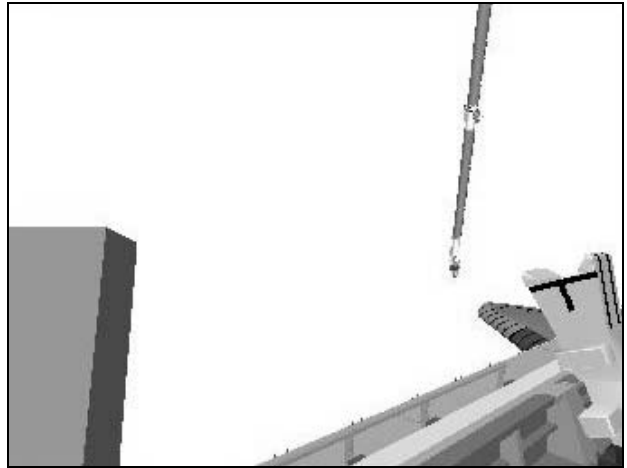


LDRI (80,-105)

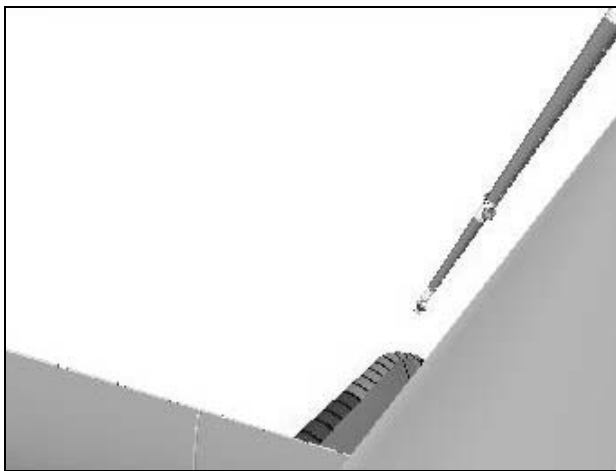
STBD LDRI RCC SURVEY – Pause Pt 37



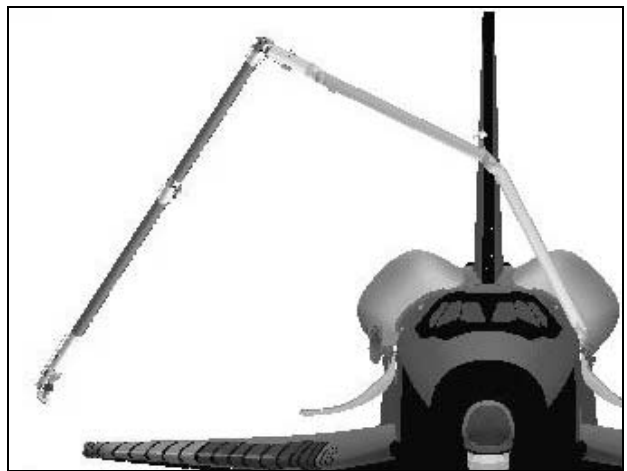
CCTV C (75,0)



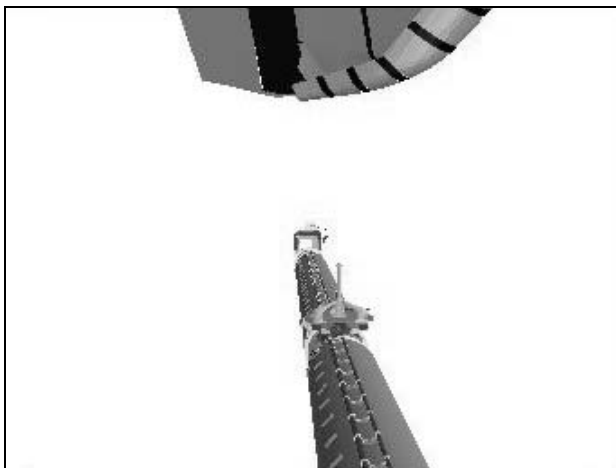
CCTV D (-50,0)



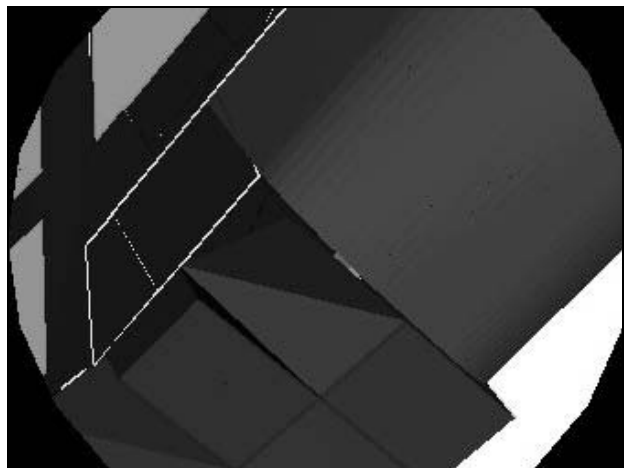
ELBOW (-40,-30)



FRONT

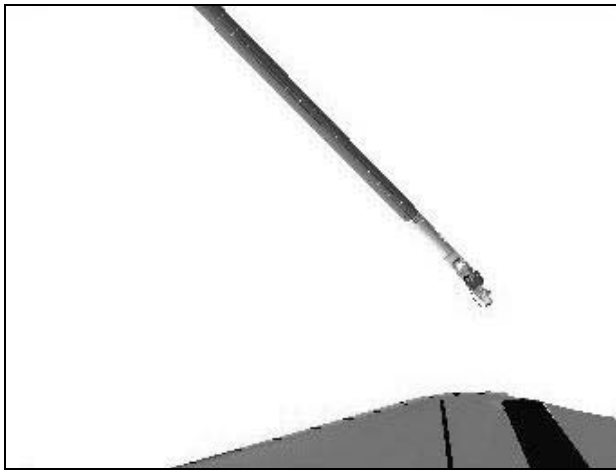


RSC

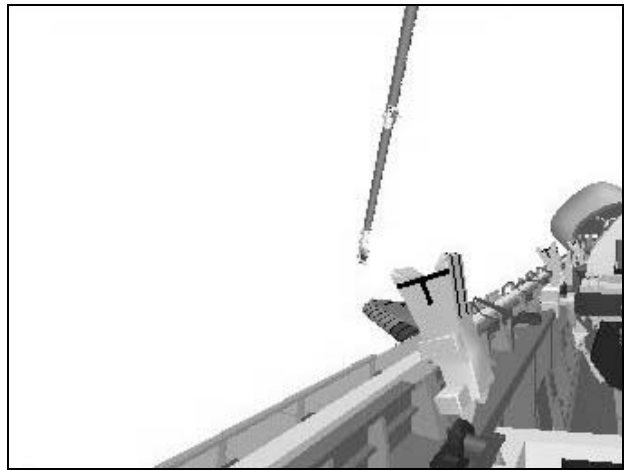


LDRI (80,-105)

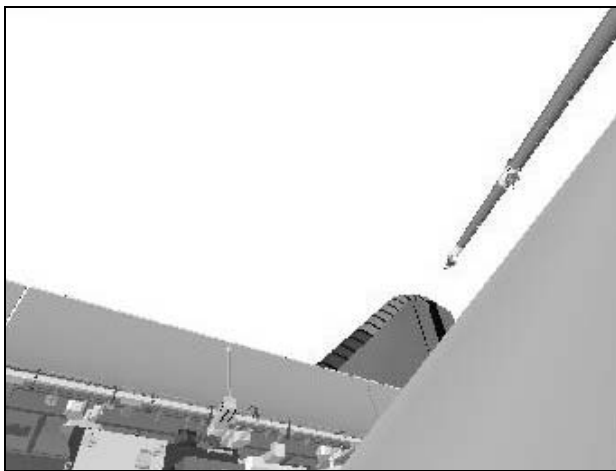
STBD LDRI RCC SURVEY – Pause Pt 38



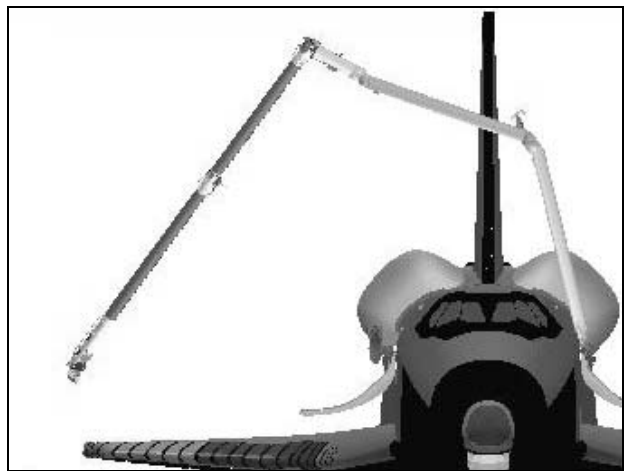
CCTV C (75,0)



CCTV D (-35,0)



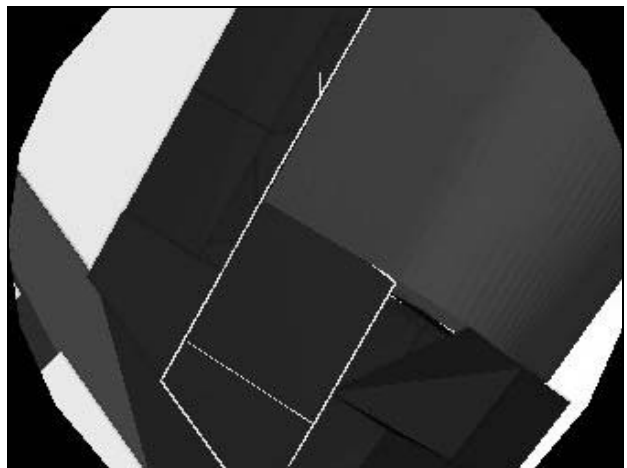
ELBOW (-40,-30)



FRONT

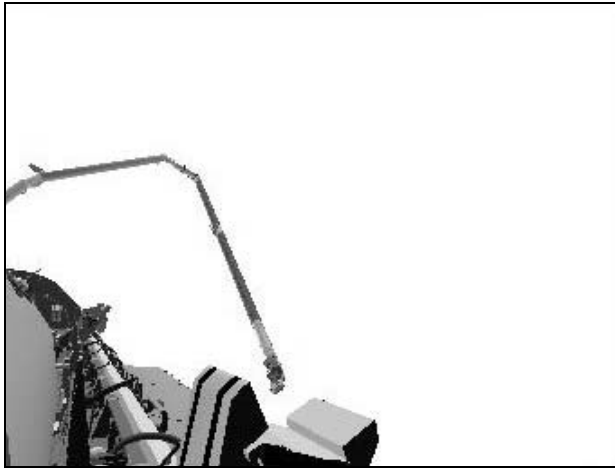


RSC

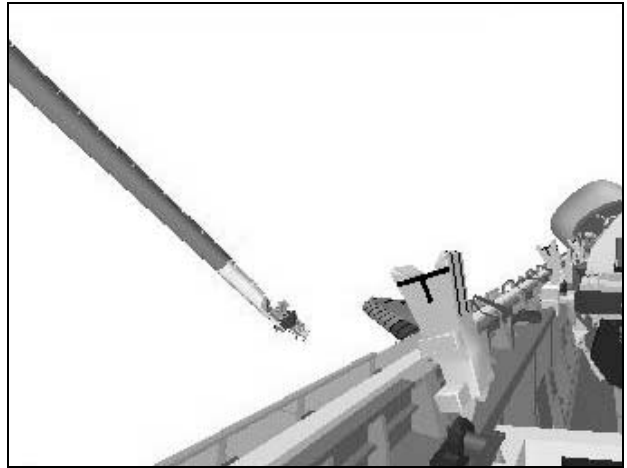


LDRI (50,-115)

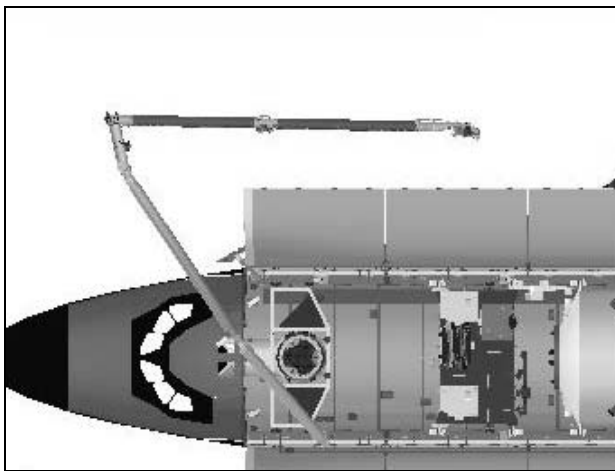
STBD LDRI RCC SURVEY – Pause Pt 46



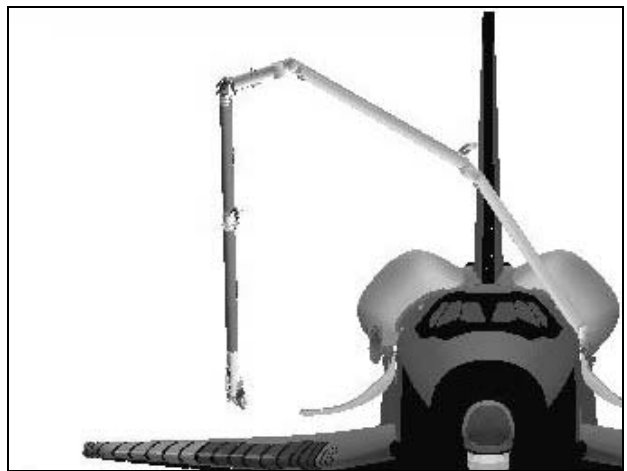
CCTV C (30,10)



CCTV D (-35,0)



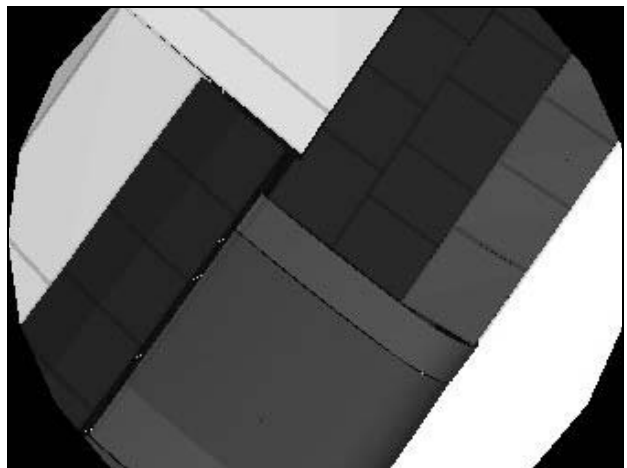
OVERHEAD



FRONT



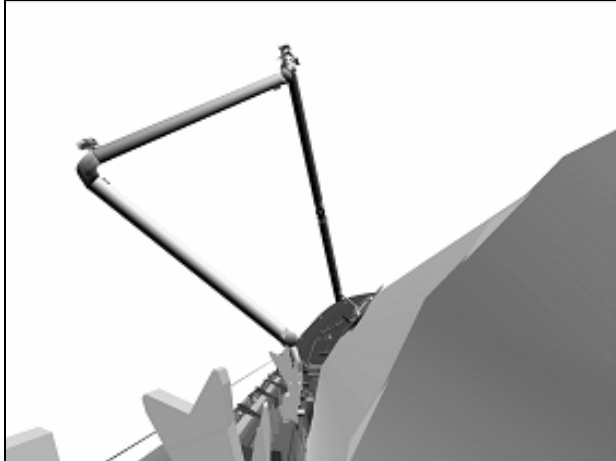
RSC



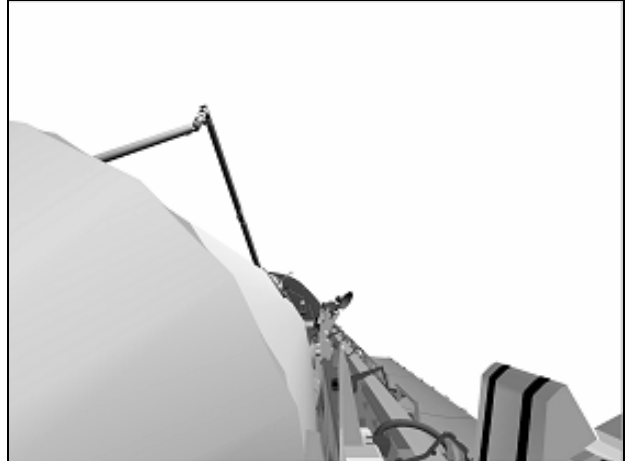
LDRI (50,-115)

OBSS LCS RCC SURVEY CAMERA VIEWS – NOSE CAP

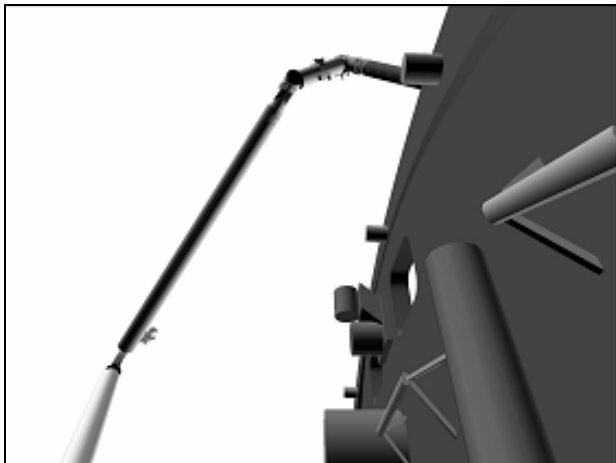
NOSE CAP LCS RCC SURVEY – Pause Pt 47



CCTV B (0,10)



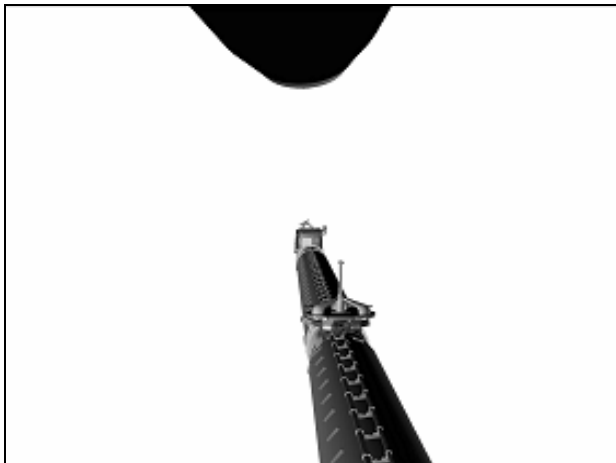
CCTV C (0,10)



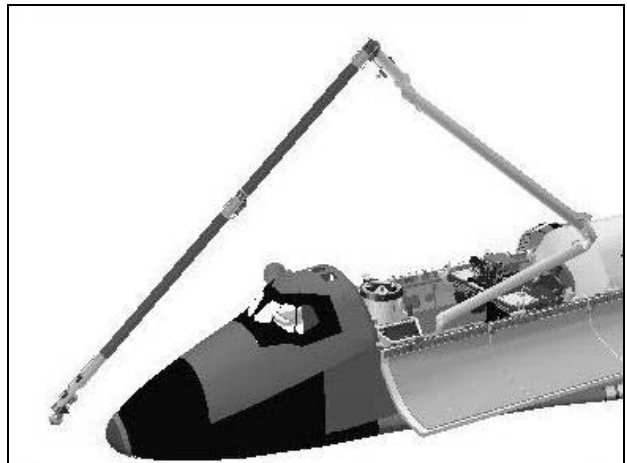
CCTV D (90,40)



ELBOW (35,10)

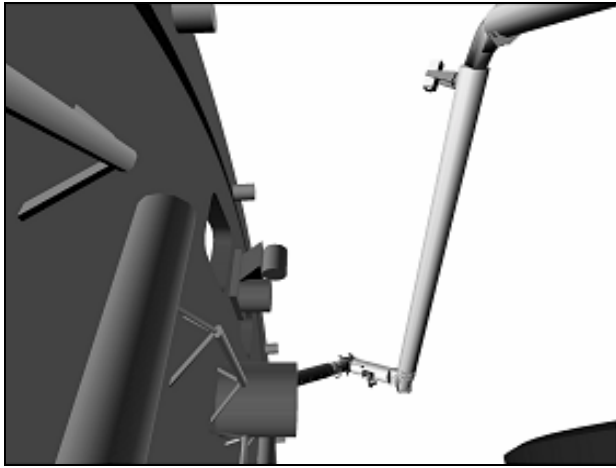


RSC

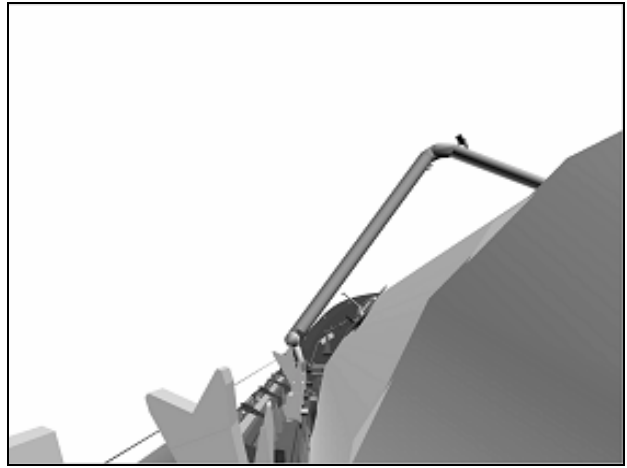


BIRD'S EYE

NOSE CAP LCS RCC SURVEY – Pause Pt 49



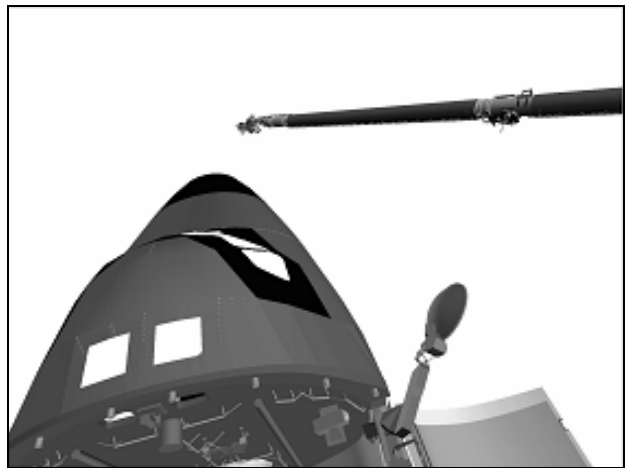
CCTV A (-90,35)



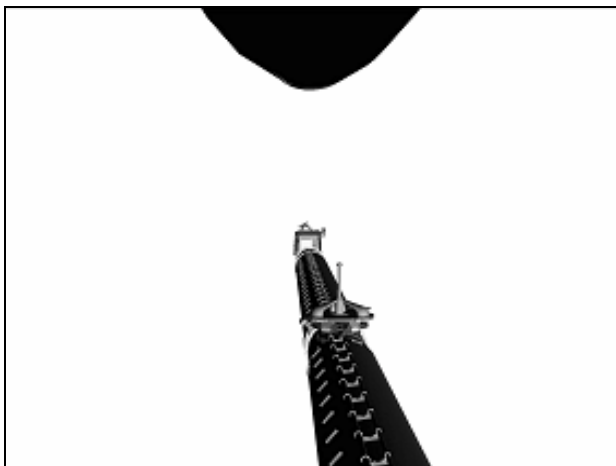
CCTV B (0,10)



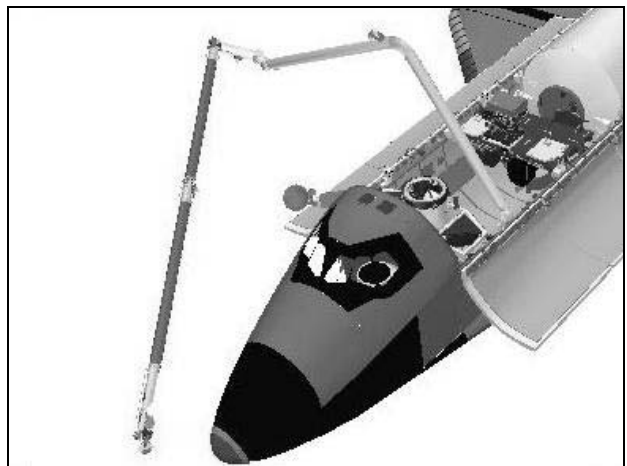
CCTV C (6,6)



ELBOW (-70,0)



RSC

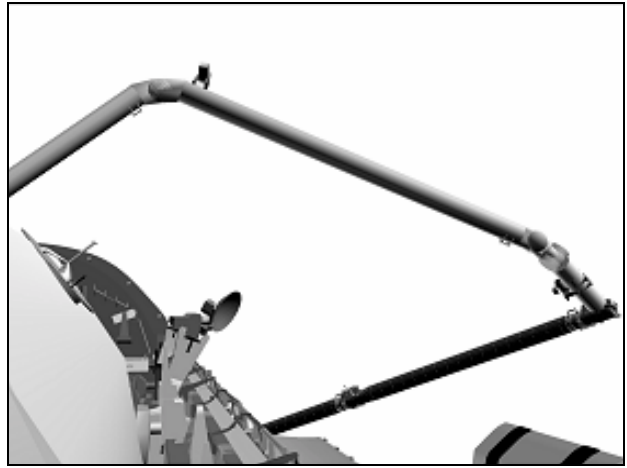


BIRD'S EYE

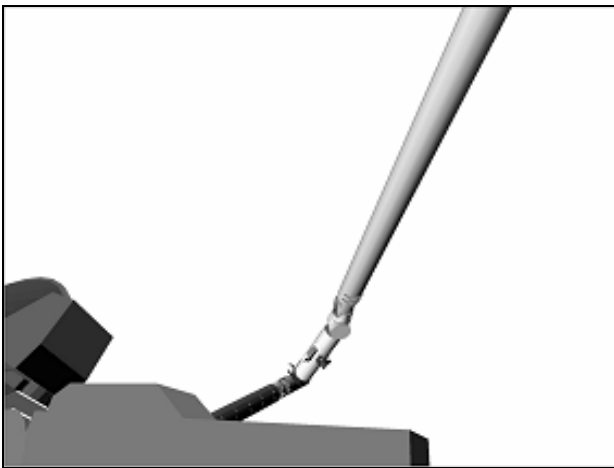
NOSE CAP LCS RCC SURVEY – Pause Pt 51



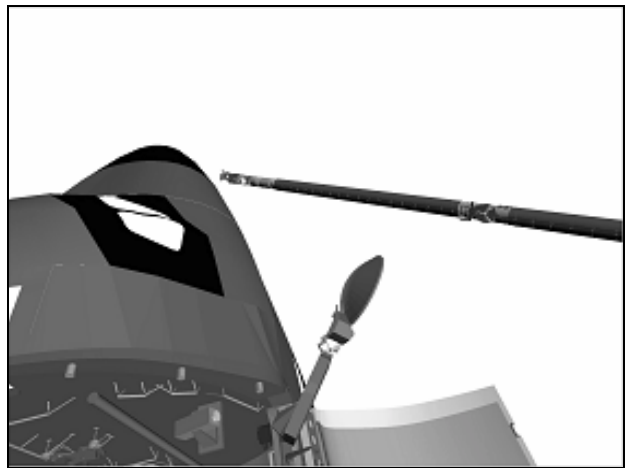
CCTV A (-50,15)



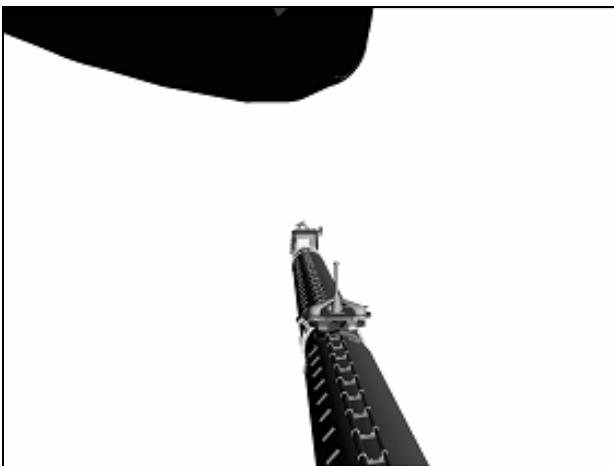
CCTV C (10,5)



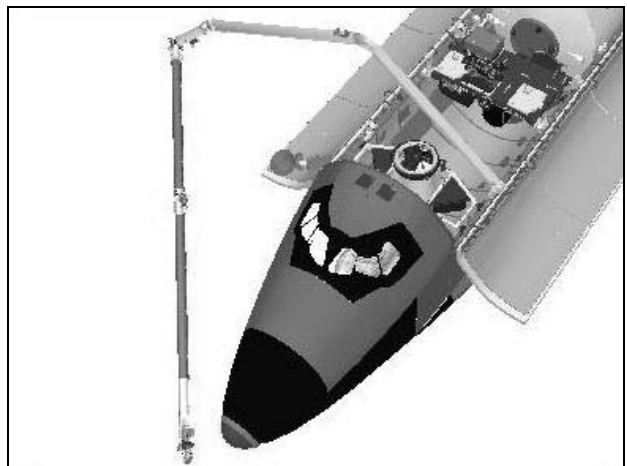
CCTV D (-80,20)



ELBOW (-70,0)



RSC



BIRD'S EYE

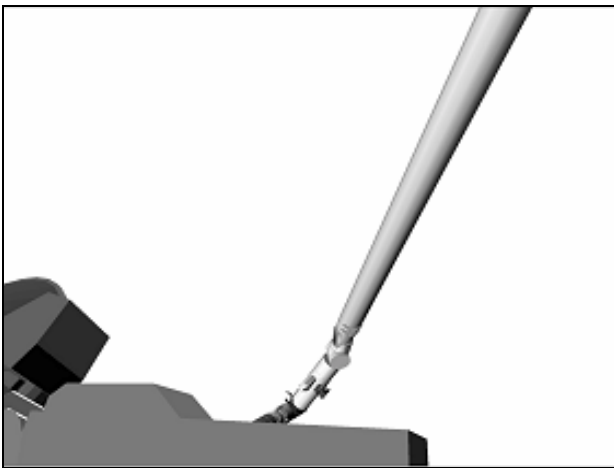
NOSE CAP LCS RCC SURVEY – Pause Pt 52



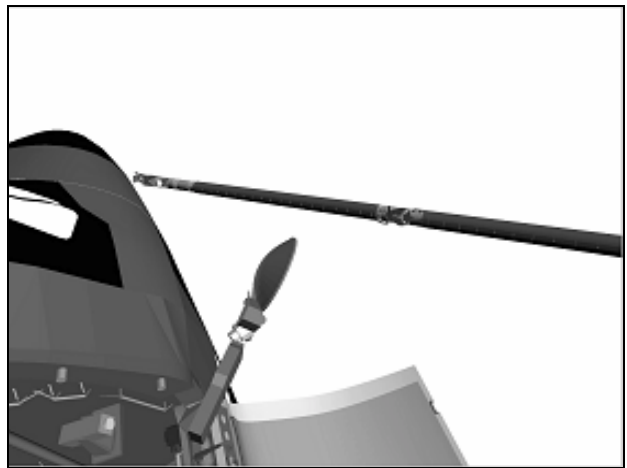
CCTV A (-50,15)



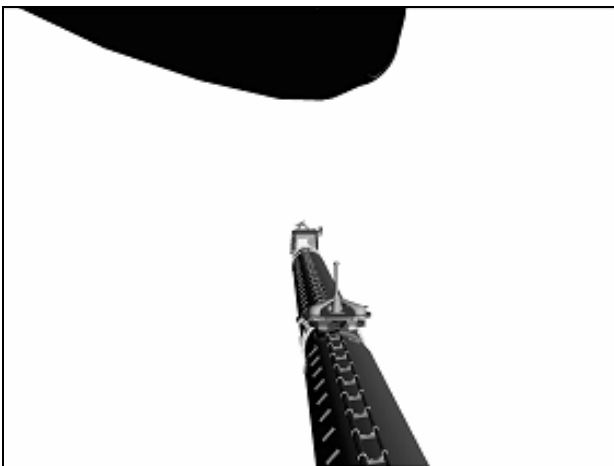
CCTV C (10,5)



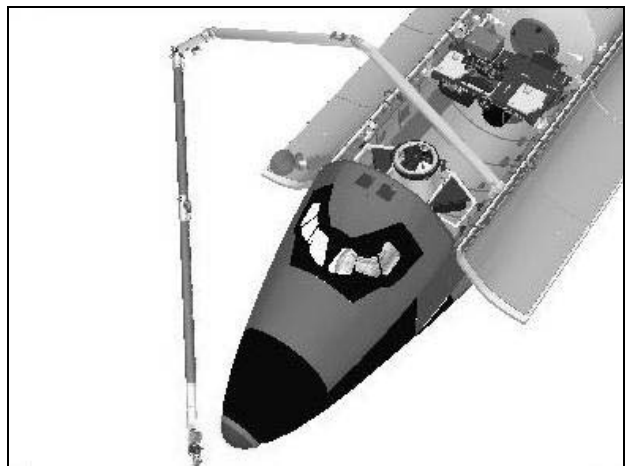
CCTV D (-80,20)



ELBOW (-60,0)

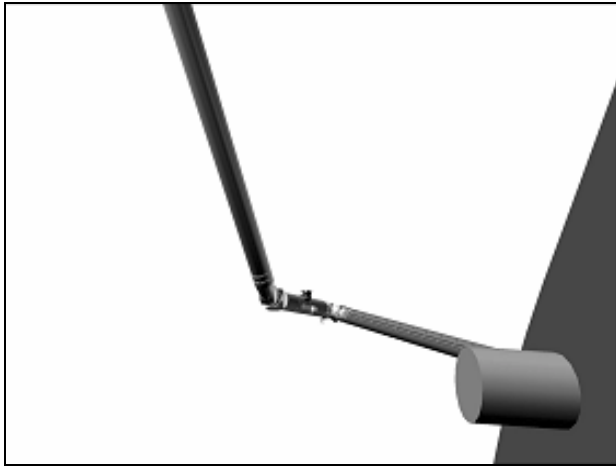


RSC

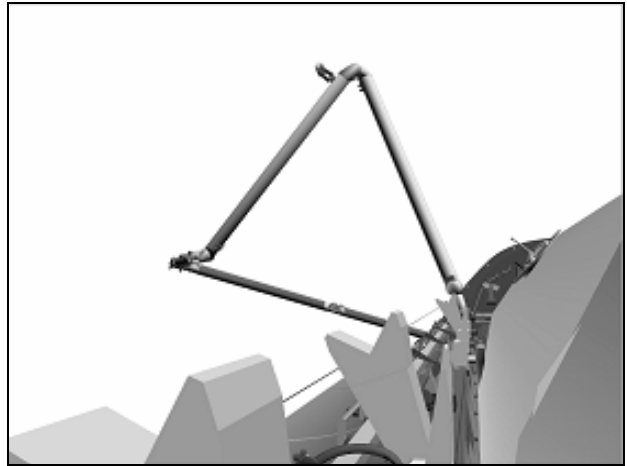


BIRD'S EYE

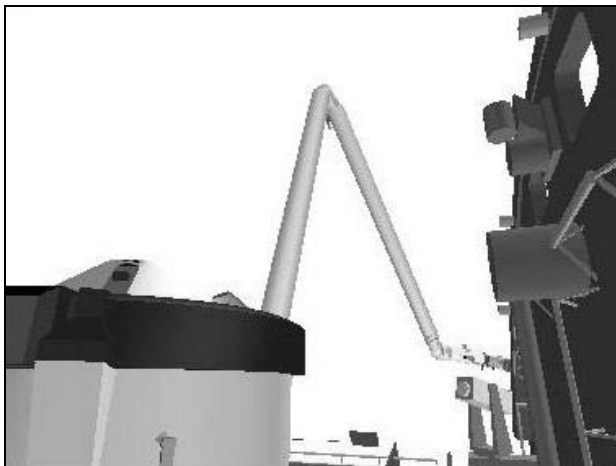
NOSE CAP LCS RCC SURVEY – Pause Pt 53



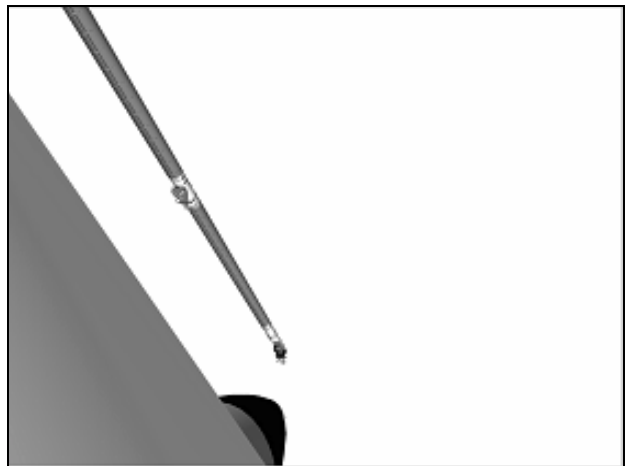
CCTV A (90,15)



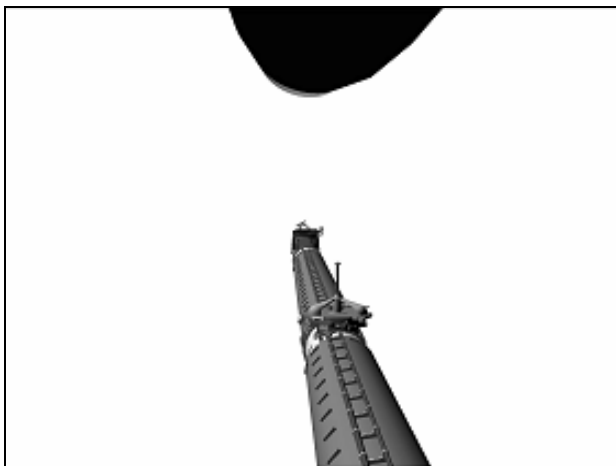
CCTV B (-15,5)



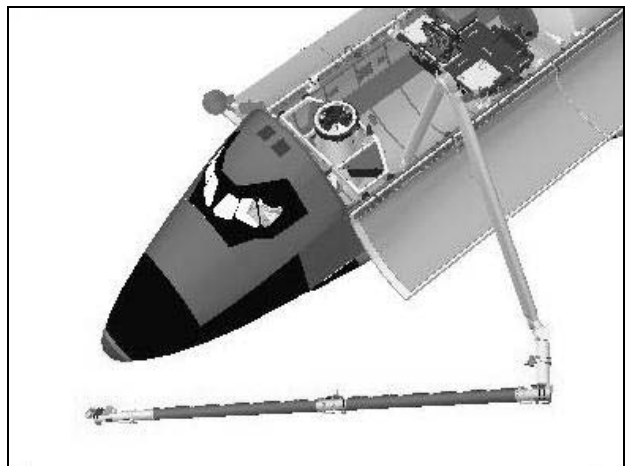
CCTV D (70,20)



ELBOW (40,-50)

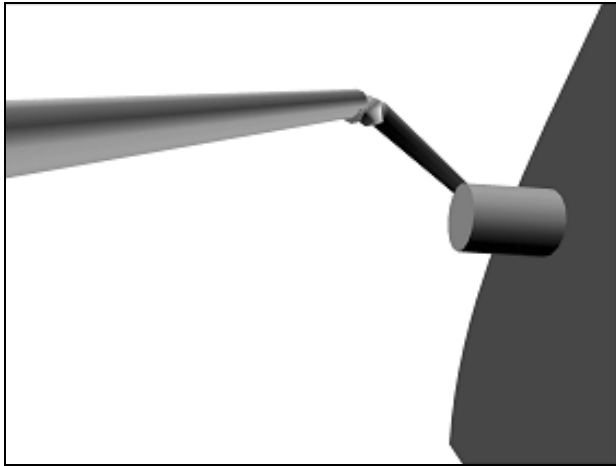


RSC

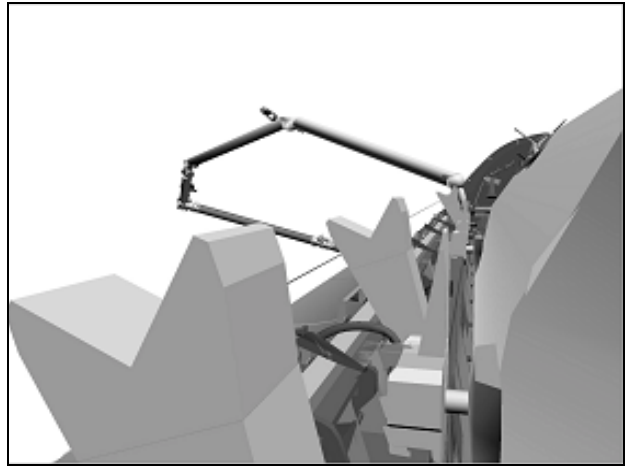


BIRD'S EYE

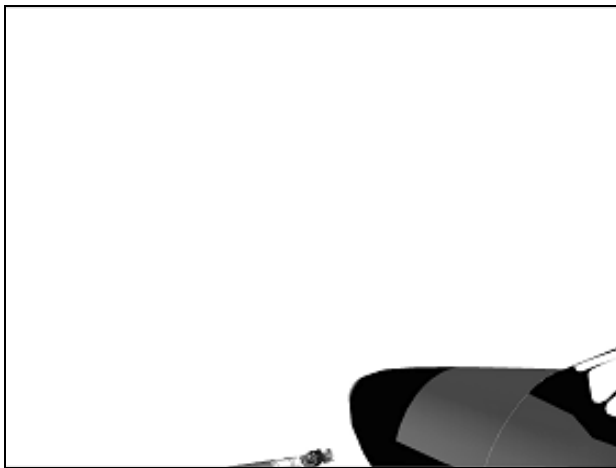
NOSE CAP LCS RCC SURVEY – Pause Pt 55



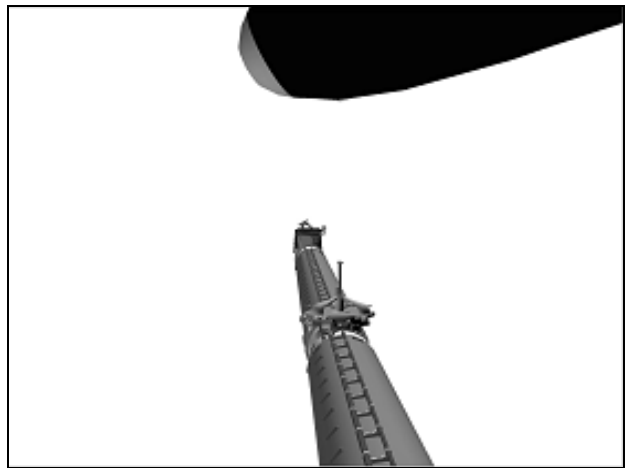
CCTV A (90,0)



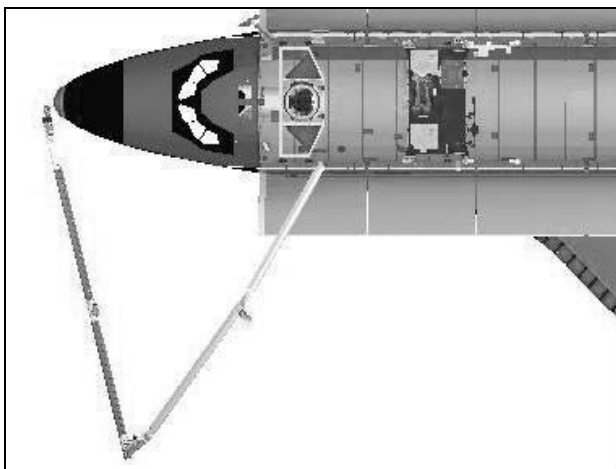
CCTV B (-15,5)



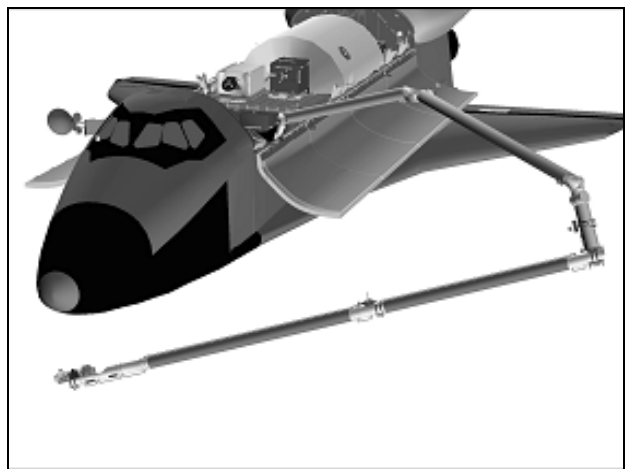
ELBOW (90,-60)



RSC

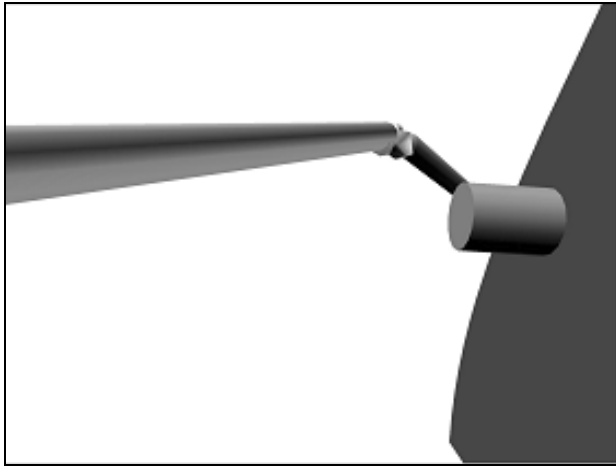


OVERHEAD

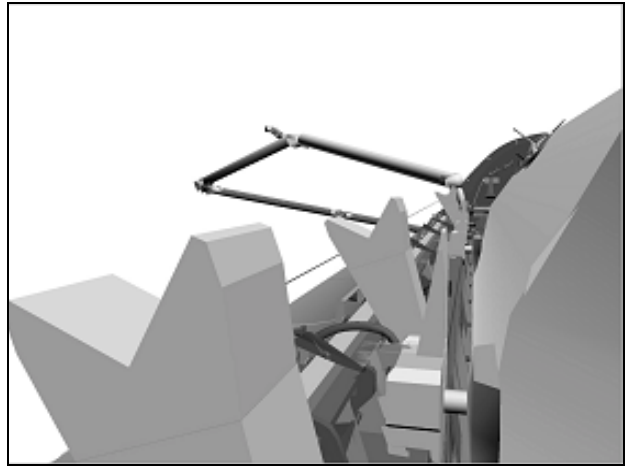


BIRD'S EYE

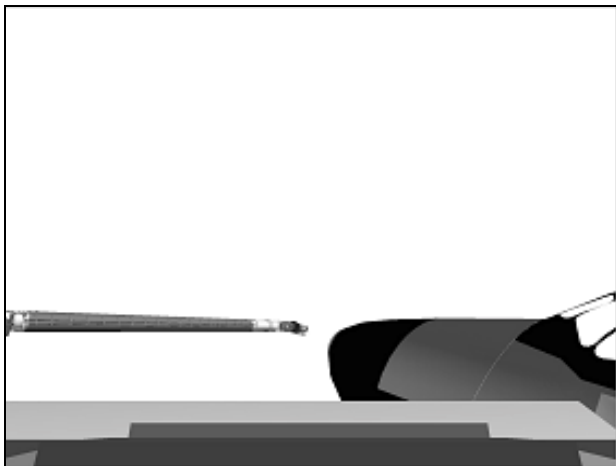
NOSE CAP LCS RCC SURVEY – Pause Pt 57



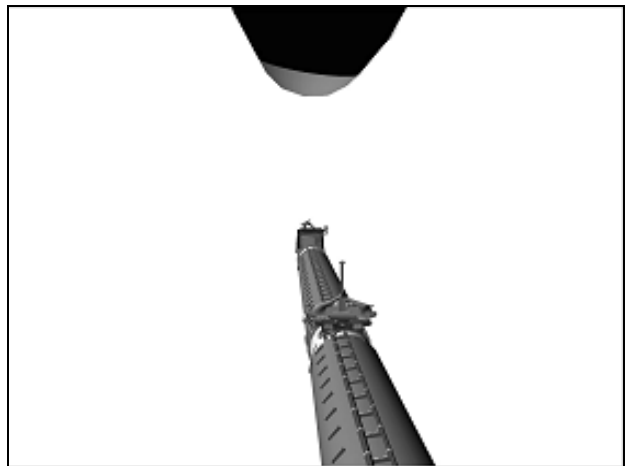
CCTV A (90,0)



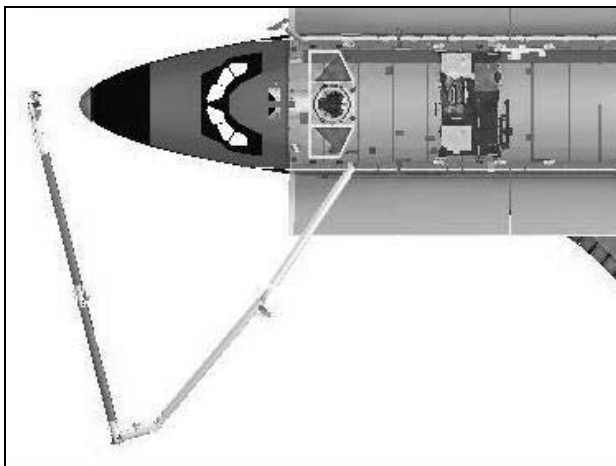
CCTV B (-15,-5)



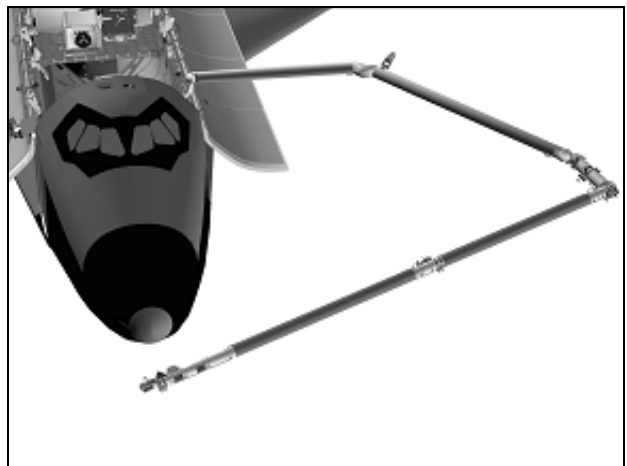
ELBOW (90,-65)



RSC



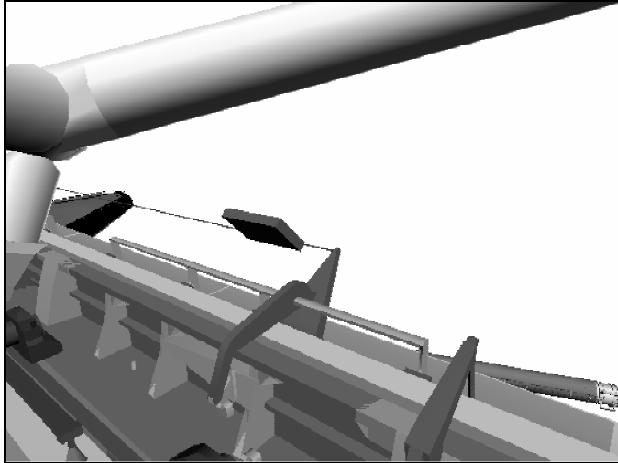
OVERHEAD



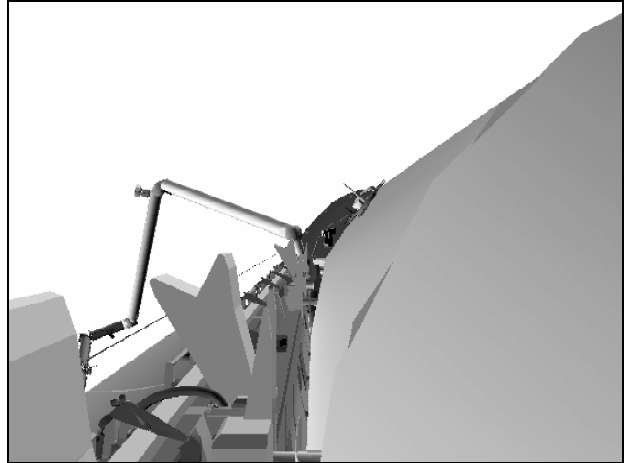
BIRD'S EYE

OBSS LDRI RCC SURVEY CAMERA VIEWS – PORT

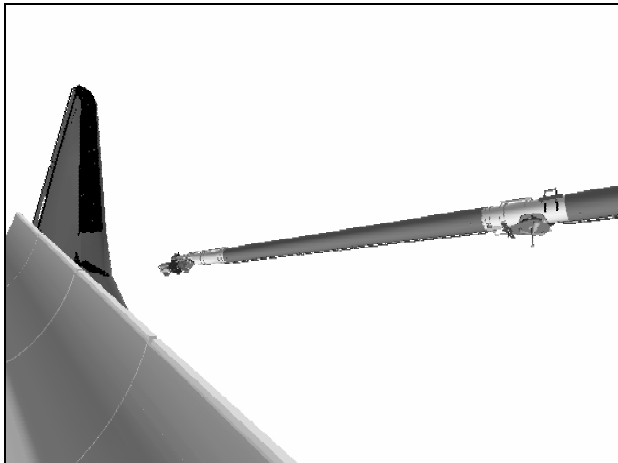
PORT LDRI RCC SURVEY – Pause Pt 58



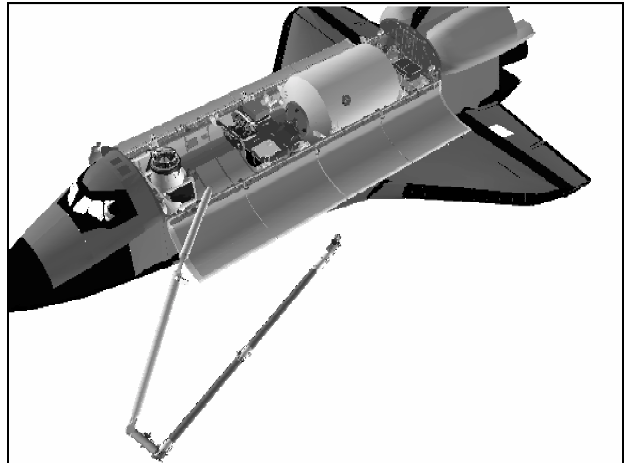
CCTV A (52,-15)



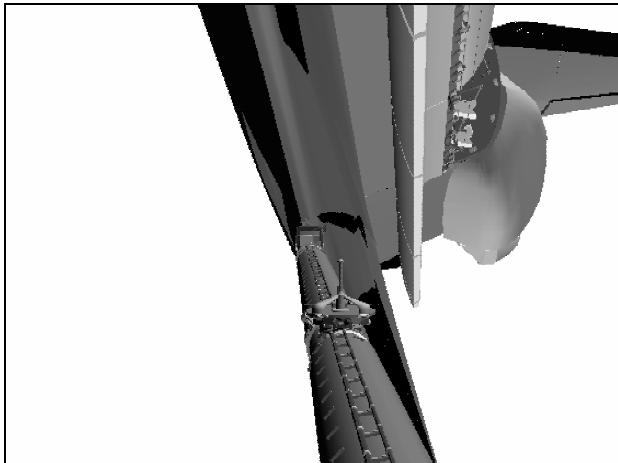
CCTV B (0,0)



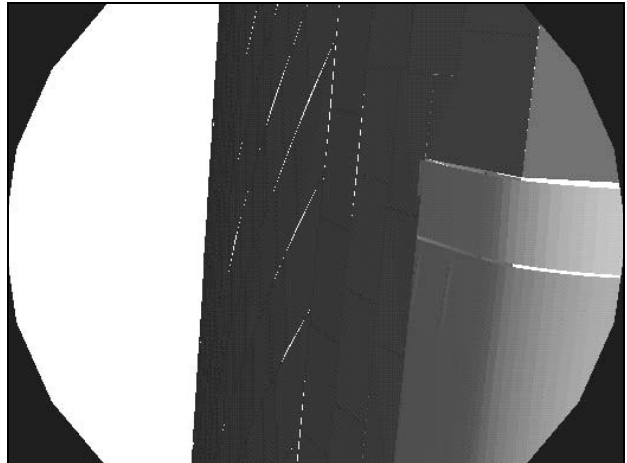
ELBOW (-85,-5)



BIRD'S EYE

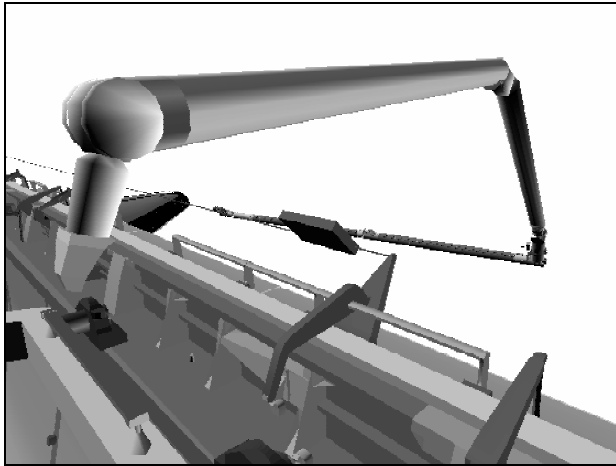


RSC

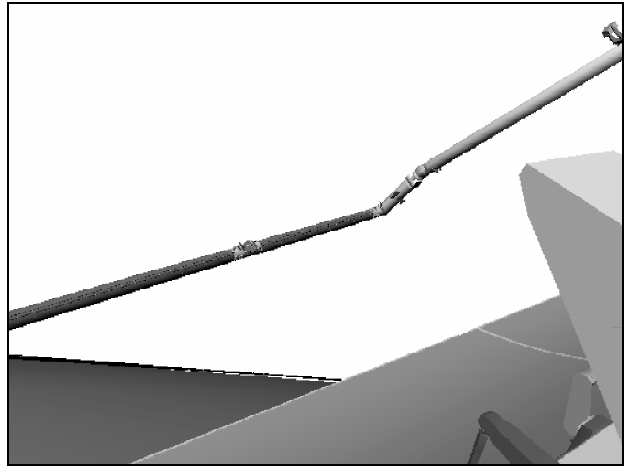


LDRI (100,-120)

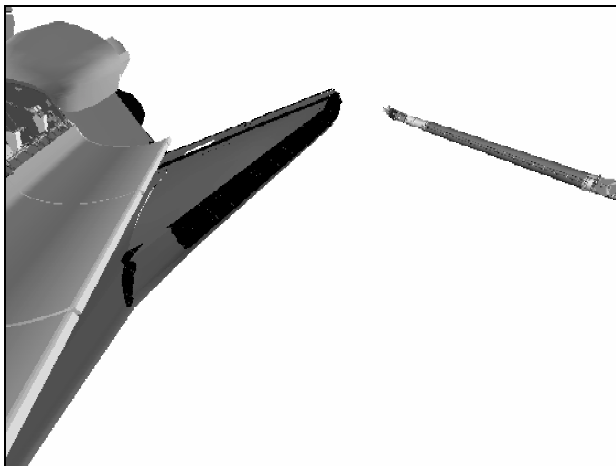
PORT LDRI RCC SURVEY – Pause Pt 64



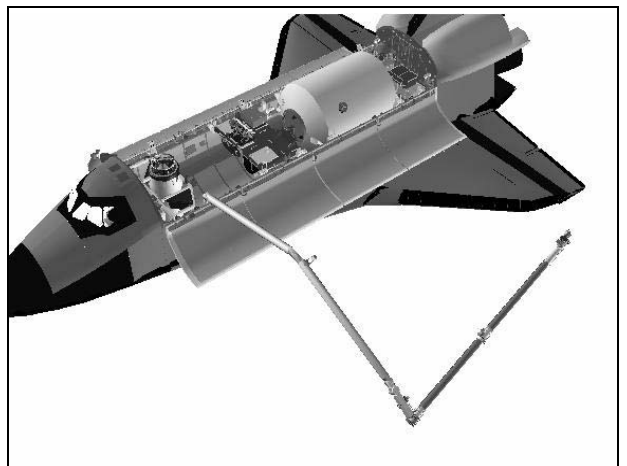
CCTV A (45,-15)



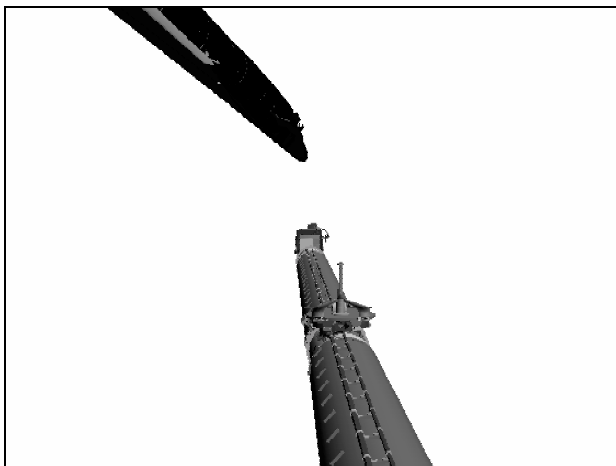
CCTV B (-52,-15)



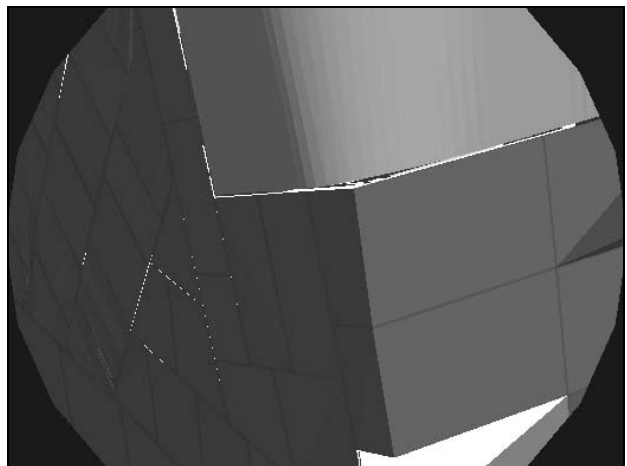
ELBOW (-70,15)



BIRD'S EYE

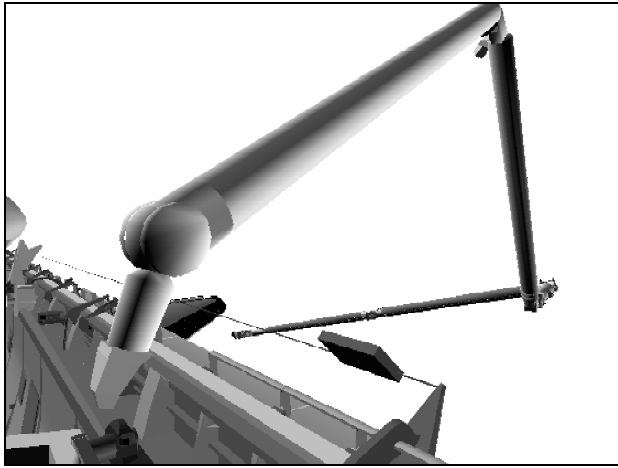


RSC

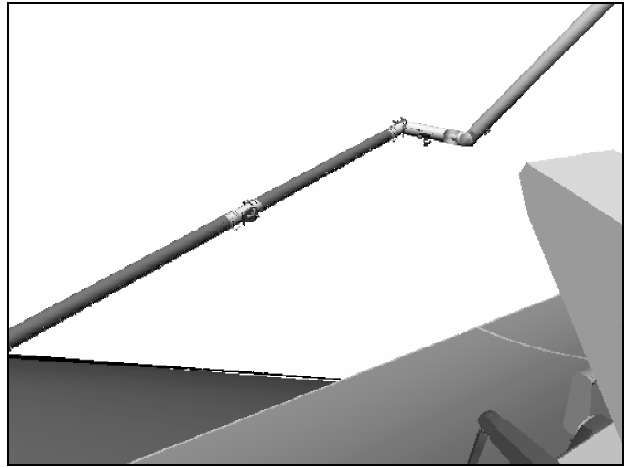


LDRI (100,-120)

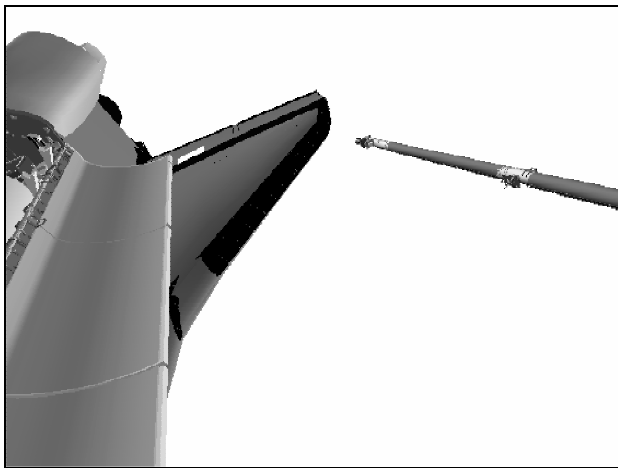
PORT LDRI RCC SURVEY – Pause Pt 65



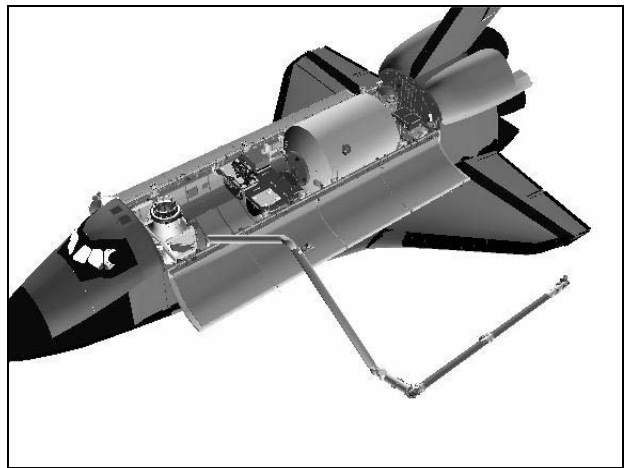
CCTV A (40,0)



CCTV B (-52,-15)



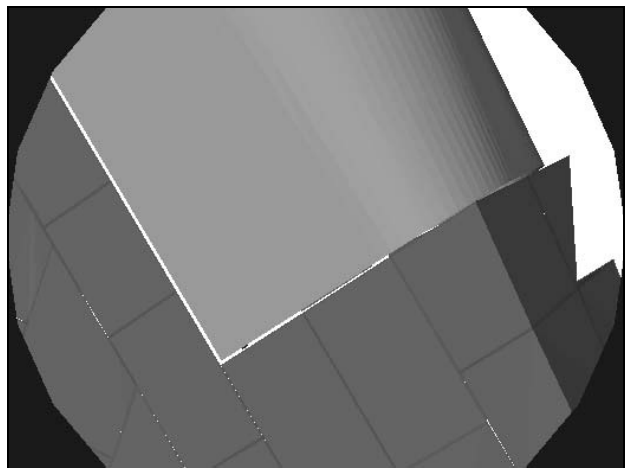
ELBOW (-50,15)



BIRD'S EYE

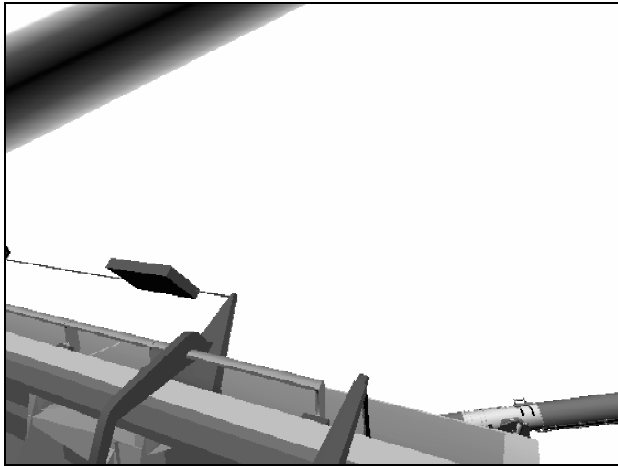


RSC

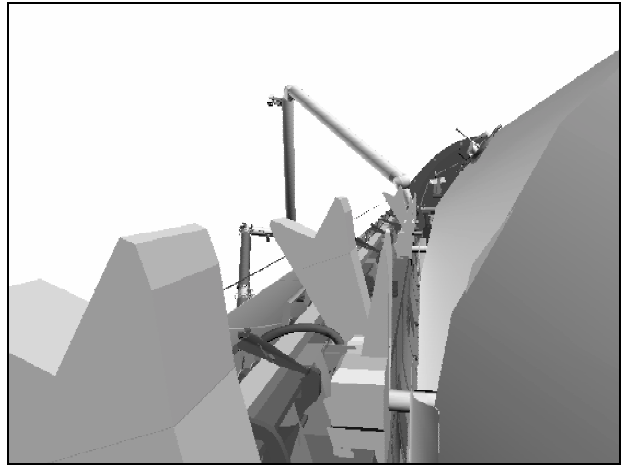


LDRI (10,-80)

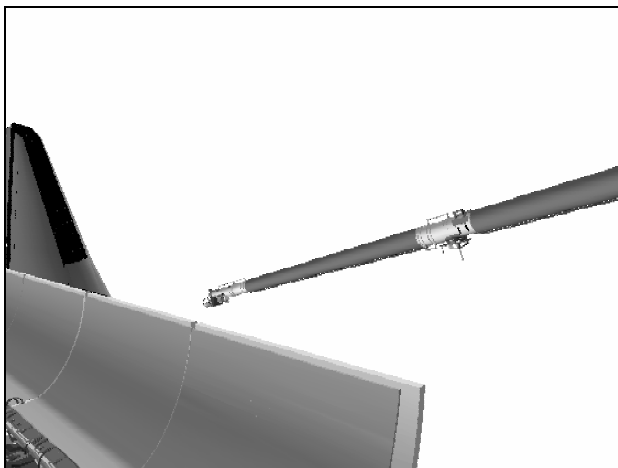
PORT LDRI RCC SURVEY – Pause Pt 74



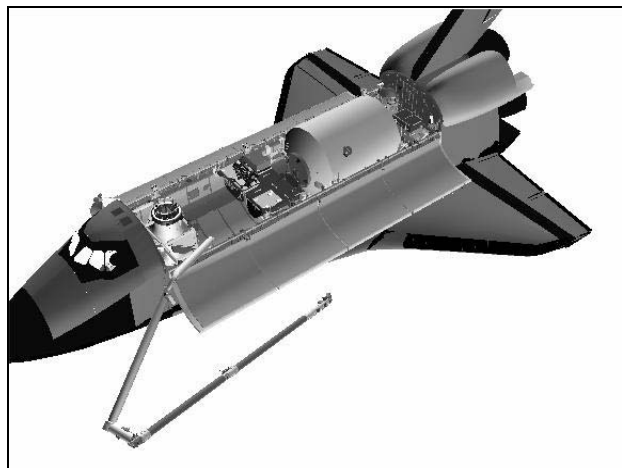
CCTV A (65,-10)



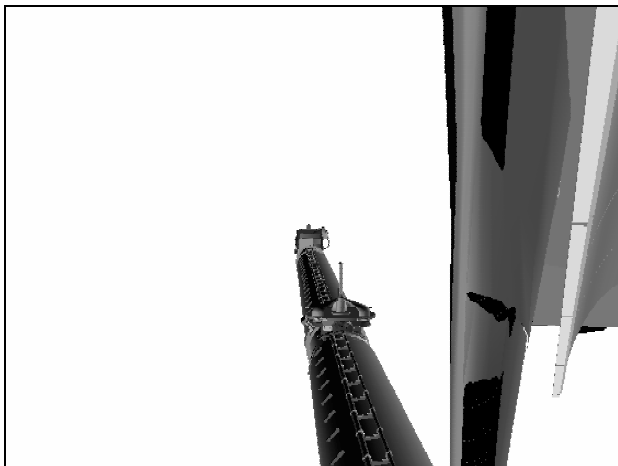
CCTV B (-10,-5)



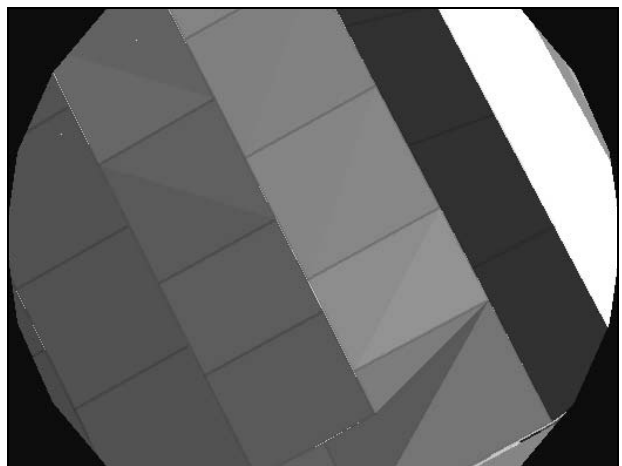
ELBOW (-75,-10)



BIRD'S EYE

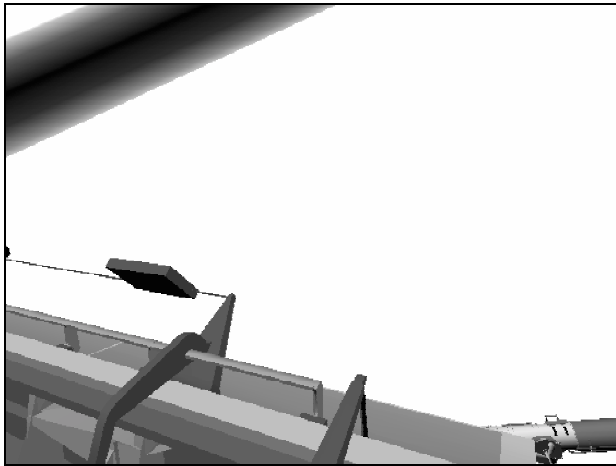


RSC

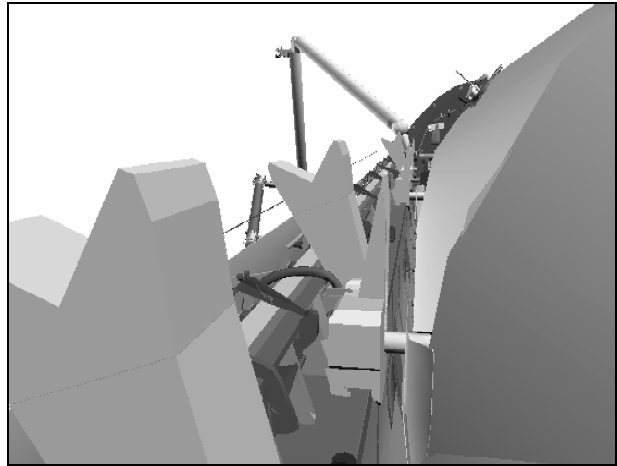


LDRI (10,-80)

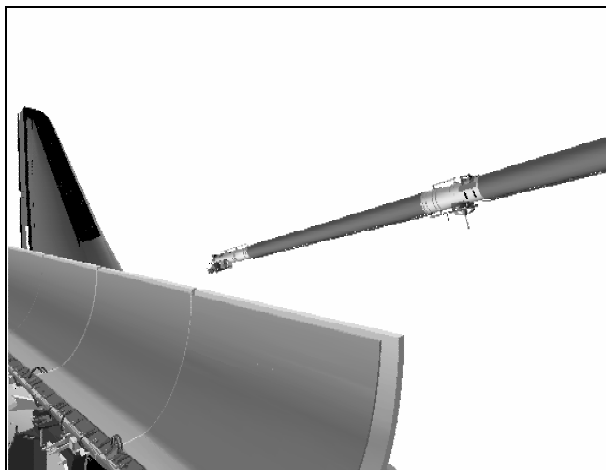
PORT LDRI RCC SURVEY – Pause Pt 75



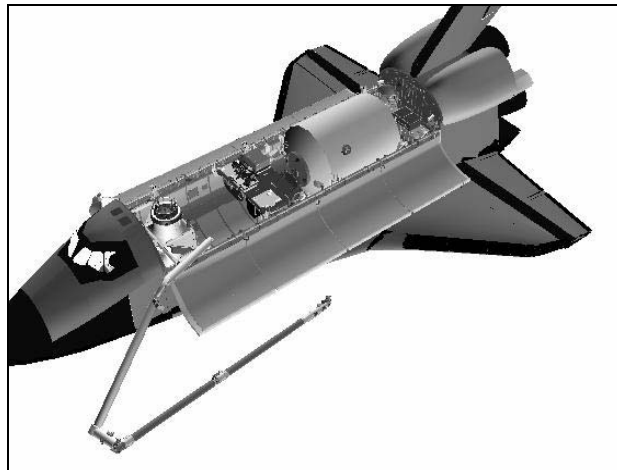
CCTV A (65,-10)



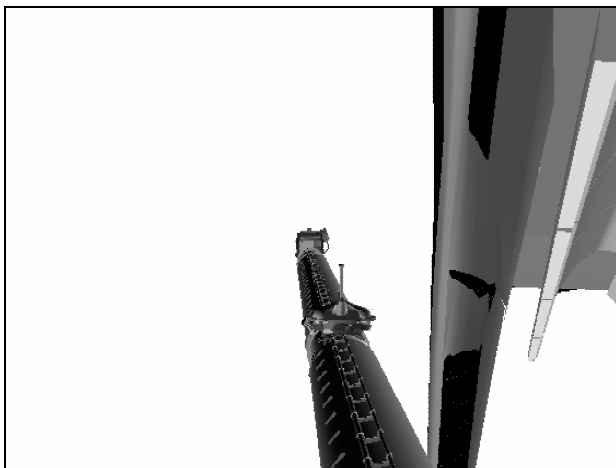
CCTV B (-10,-10)



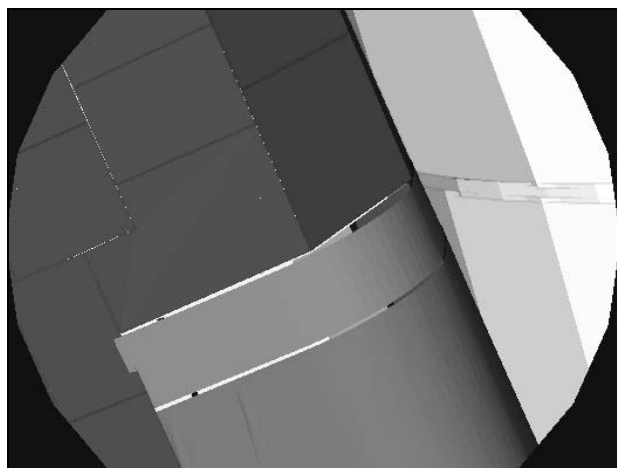
ELBOW (-78,-15)



BIRD'S EYE

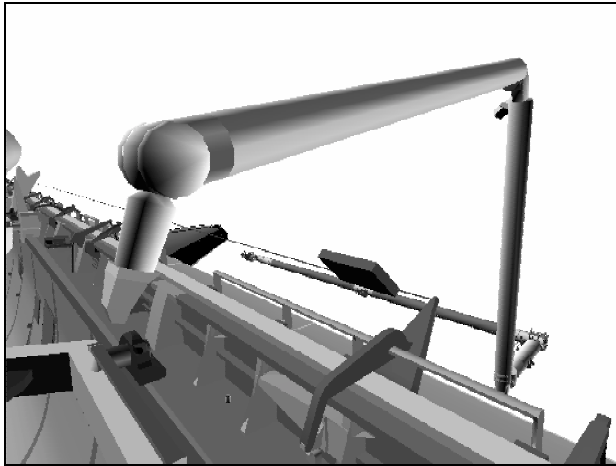


RSC

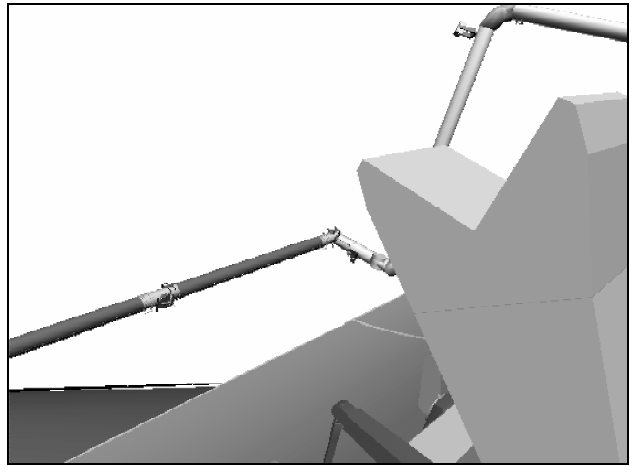


LDRI (10,-95)

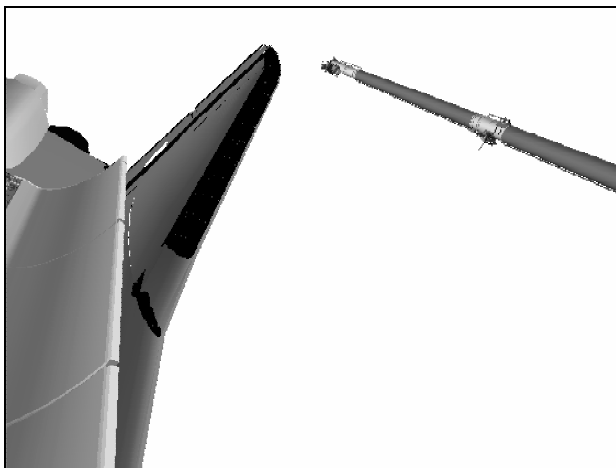
PORT LDRI RCC SURVEY – Pause Pt 82



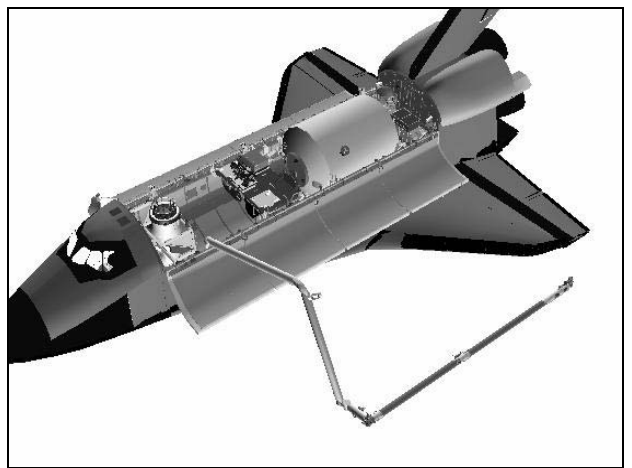
CCTV A (40,-10)



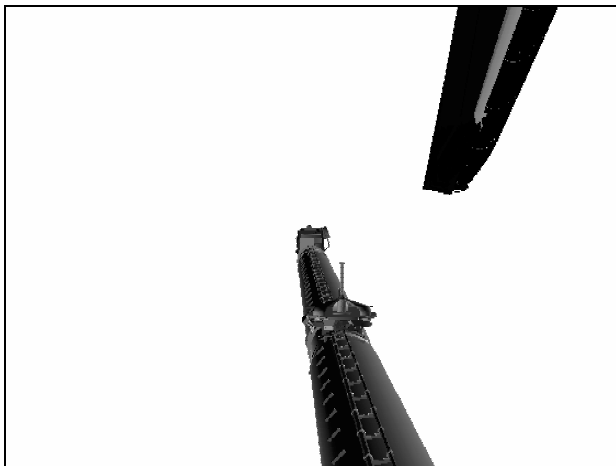
CCTV B (-40,-15)



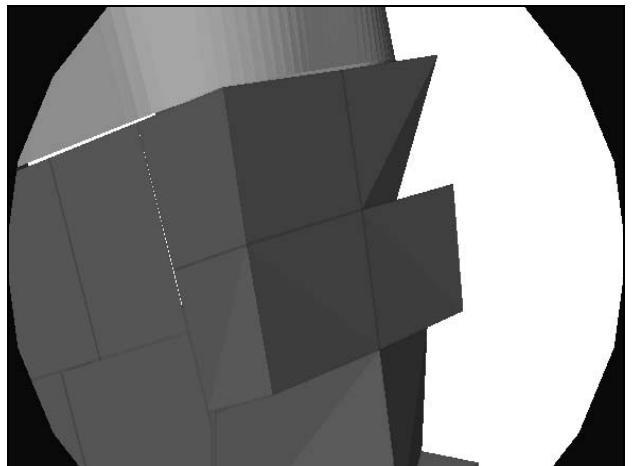
ELBOW (-45,25)



BIRD'S EYE

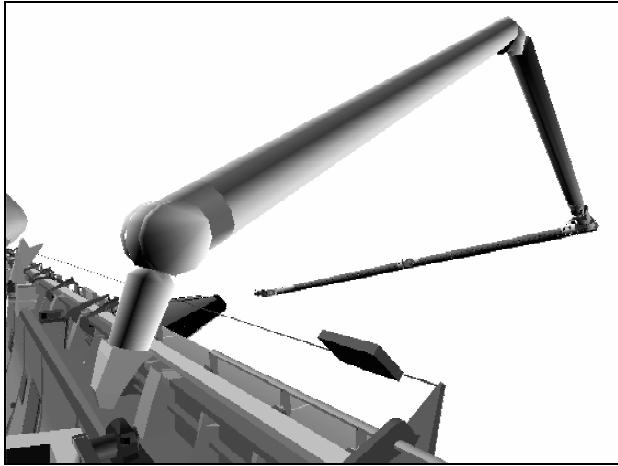


RSC

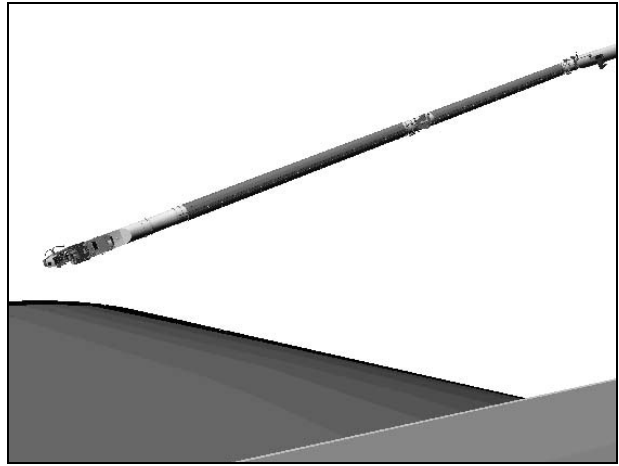


LDRI (10,-95)

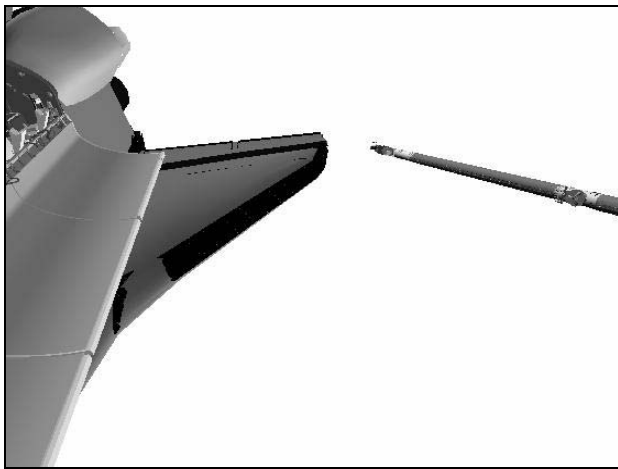
PORT LDRI RCC SURVEY – Pause Pt 83



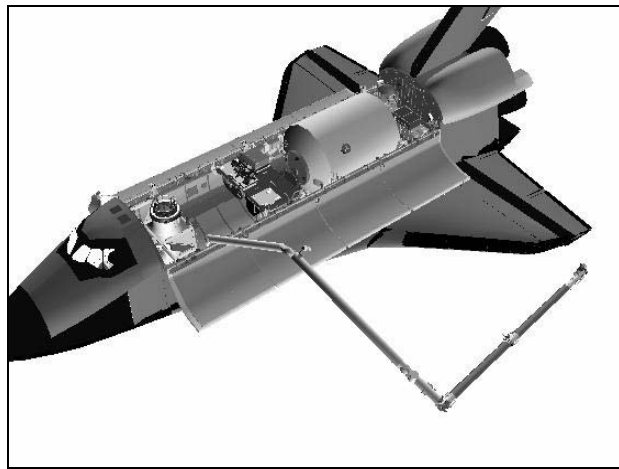
CCTV A (40,0)



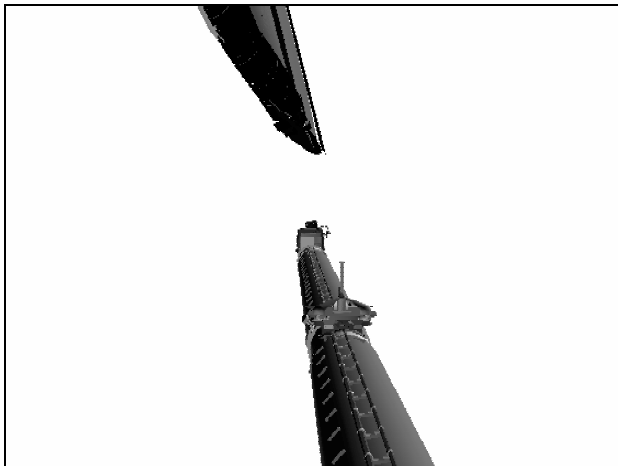
CCTV B (-70,-15)



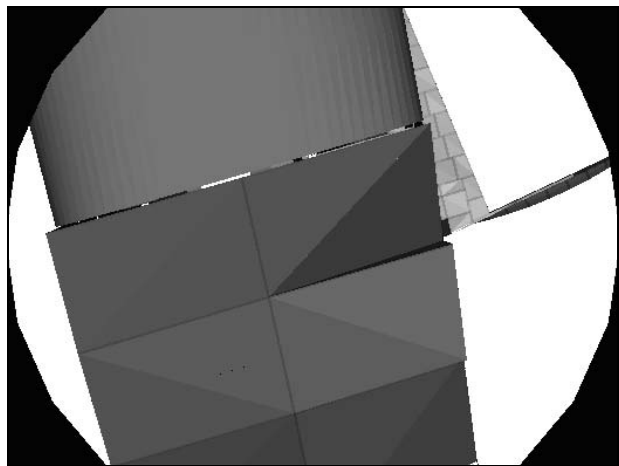
ELBOW (-65,10)



BIRD'S EYE

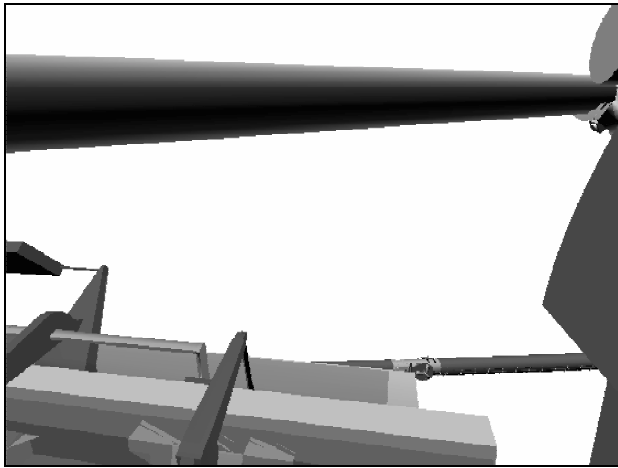


RSC

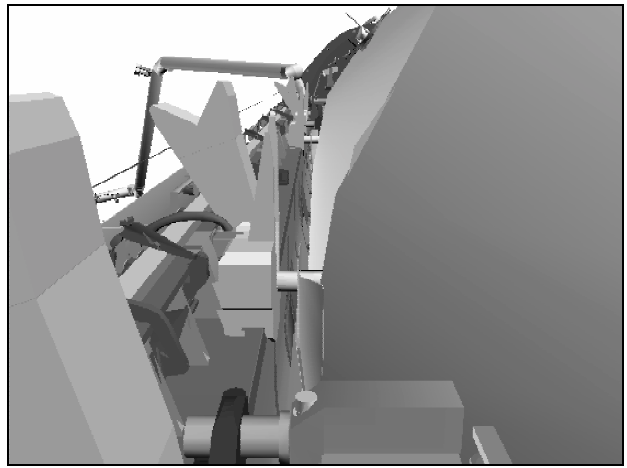


LDRI (88,-120)

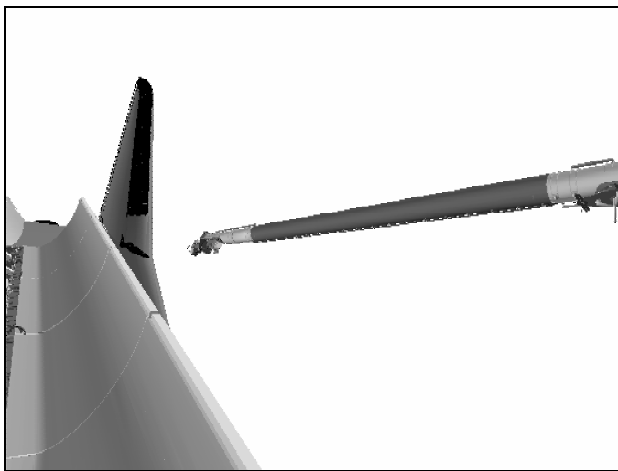
PORT LDRI RCC SURVEY – Pause Pt 91



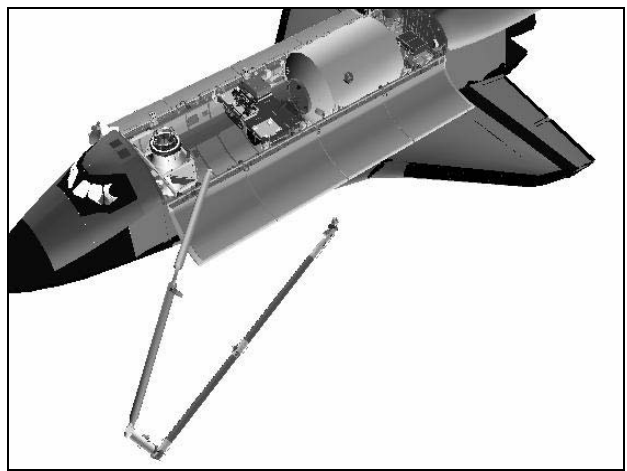
CCTV A (80,-15)



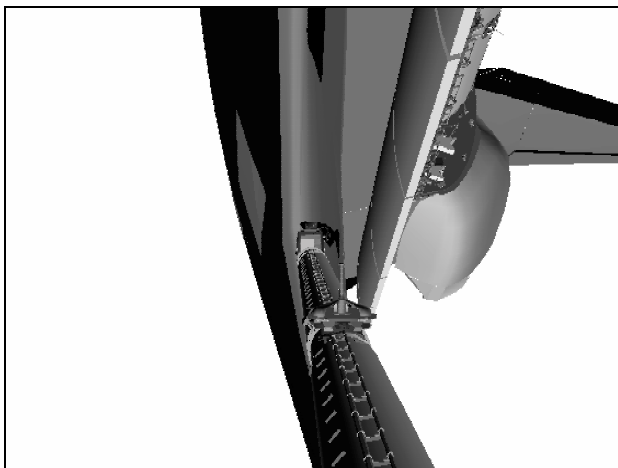
CCTV B (0,-15)



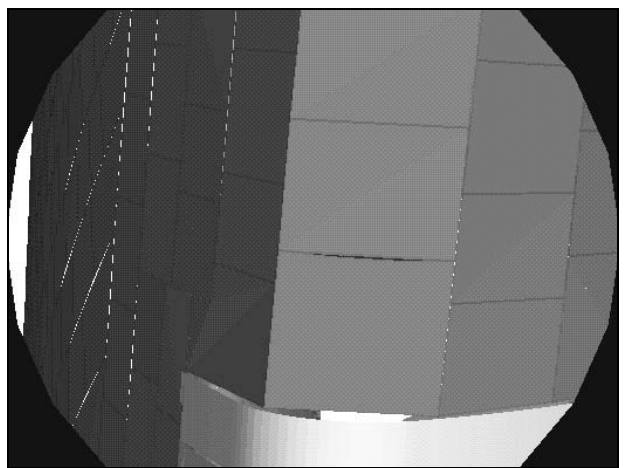
ELBOW (-95,-5)



BIRD'S EYE

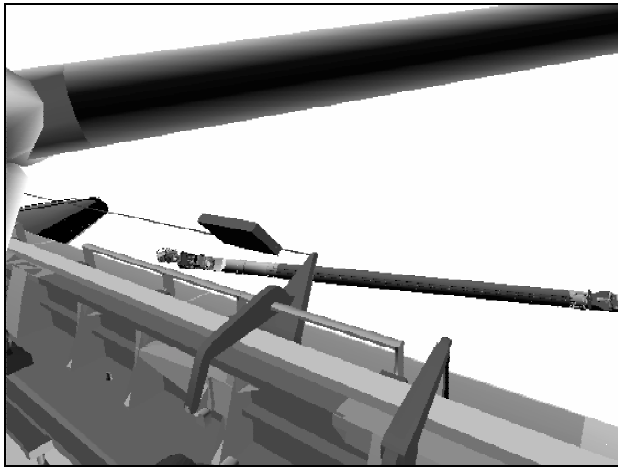


RSC

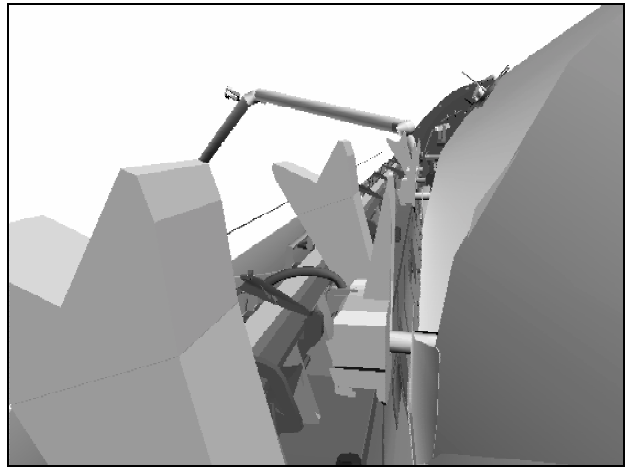


LDRI (88,-120)

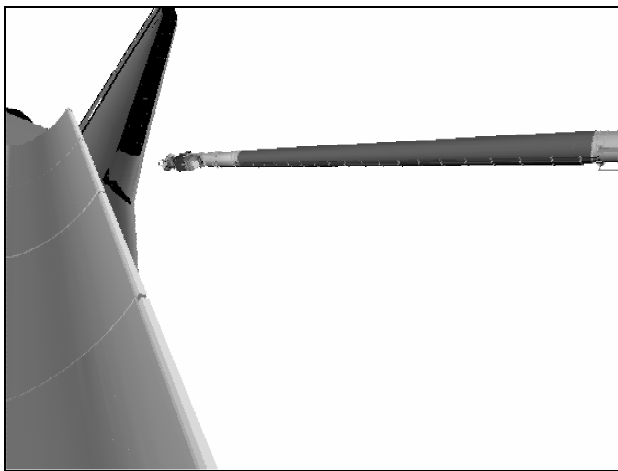
PORT LDRI RCC SURVEY – Pause Pt 93



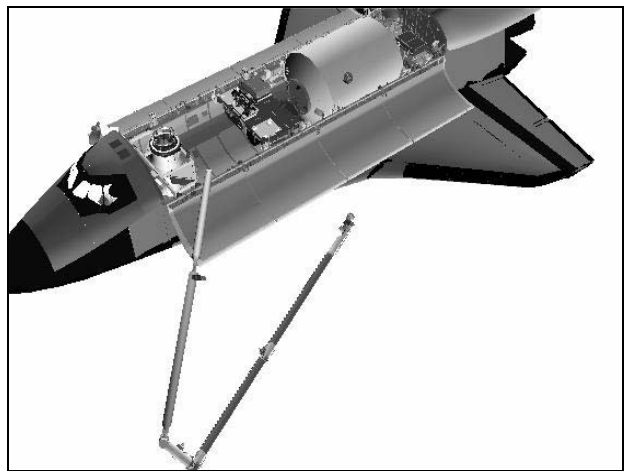
CCTV A (55,-15)



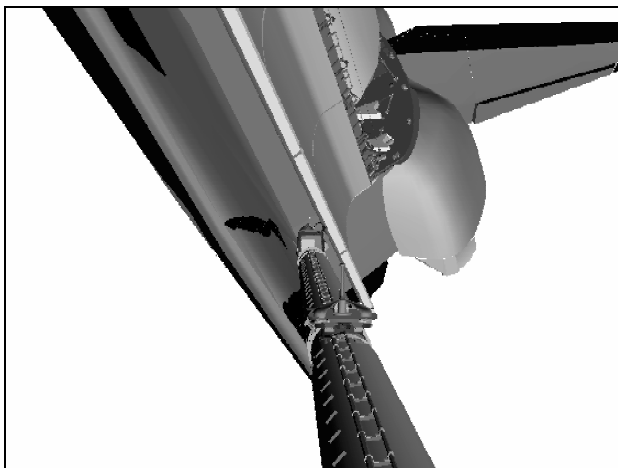
CCTV B (-10,-10)



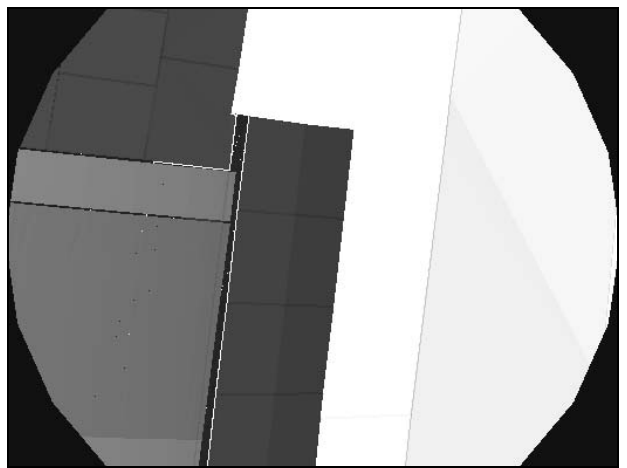
ELBOW (-100,-5)



BIRD'S EYE

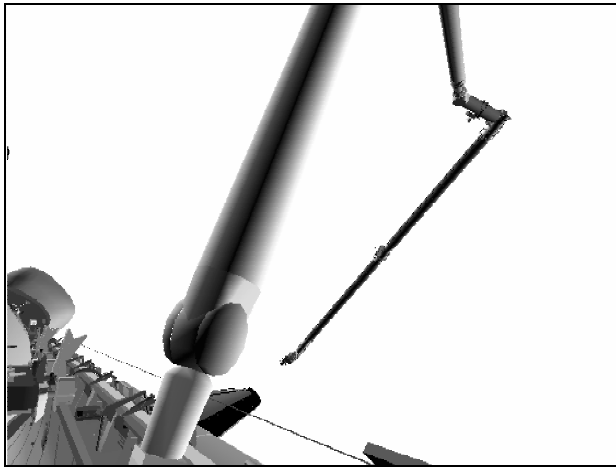


RSC

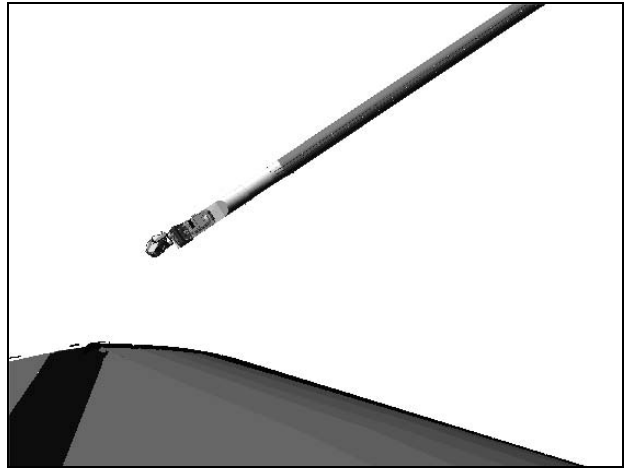


LDRI (120,-120)

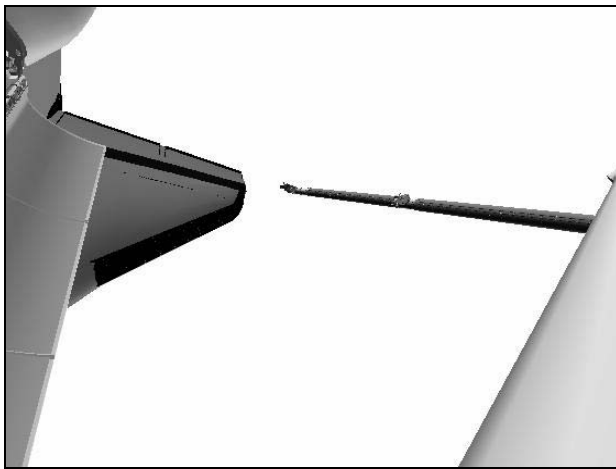
PORT LDRI RCC SURVEY – Pause Pt 103



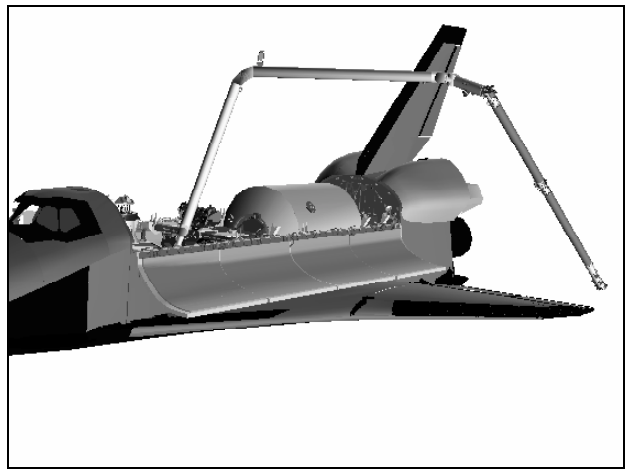
CCTV A (35,12)



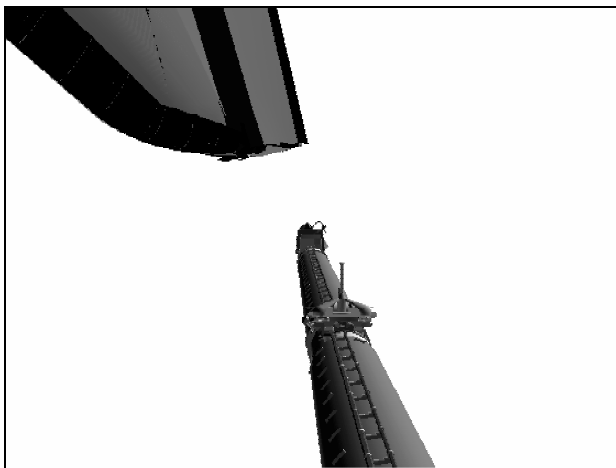
CCTV B (-80,-10)



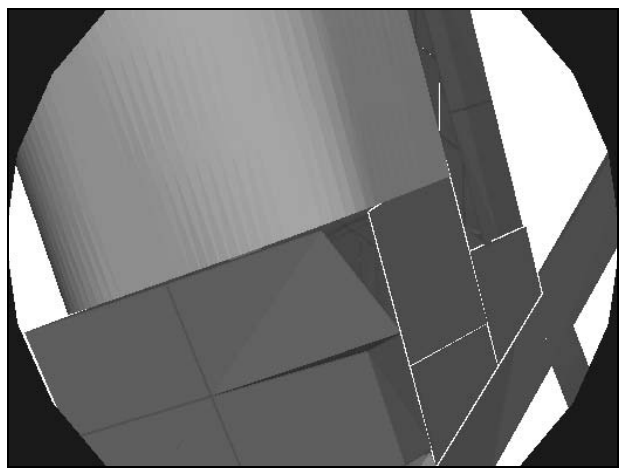
CCTV X (-38,-15)



BIRD'S EYE

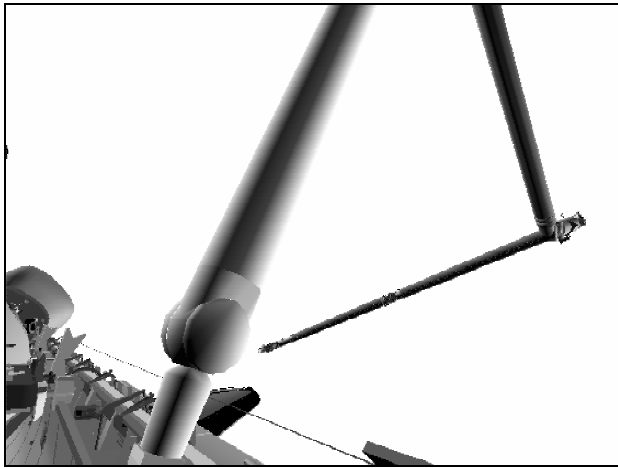


RSC

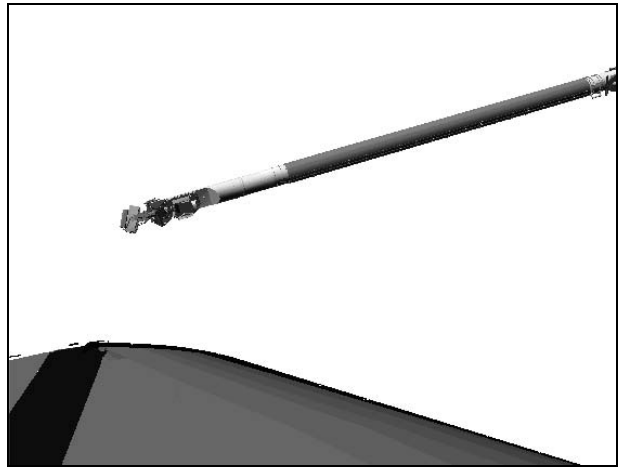


LDRI (120,-120)

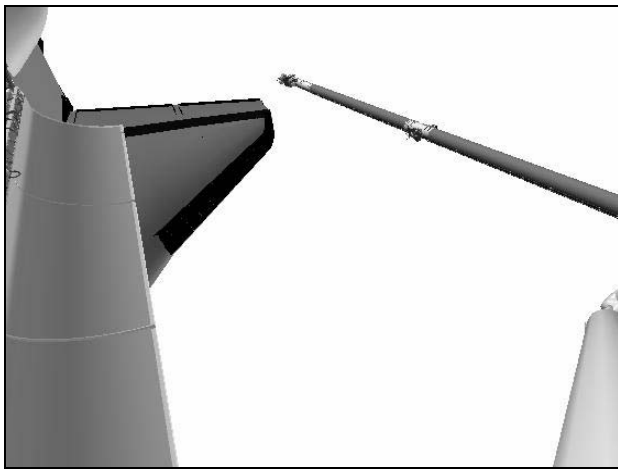
PORT LDRI RCC SURVEY – Pause Pt 104



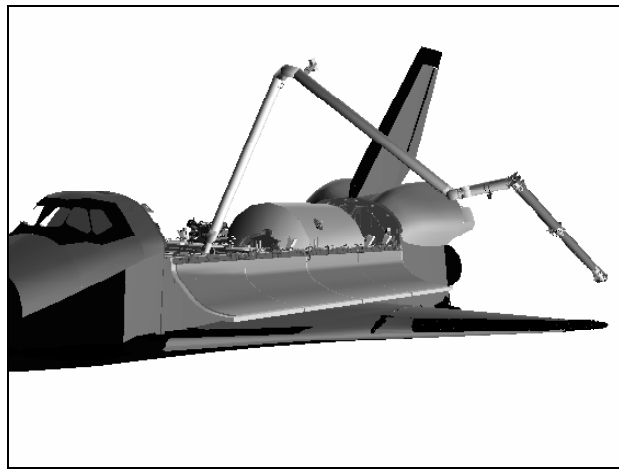
CCTV A (35,12)



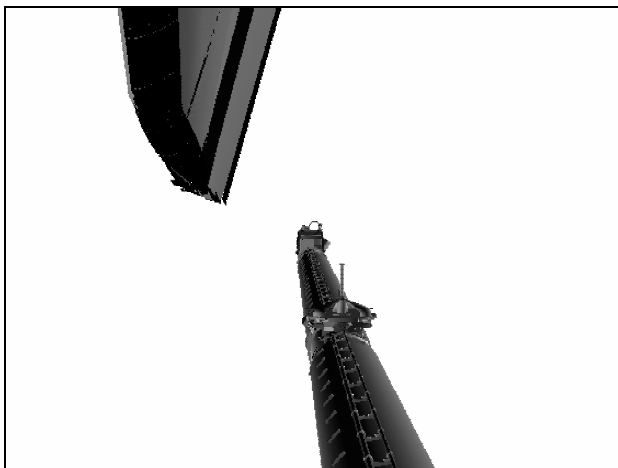
CCTV B (-80,-10)



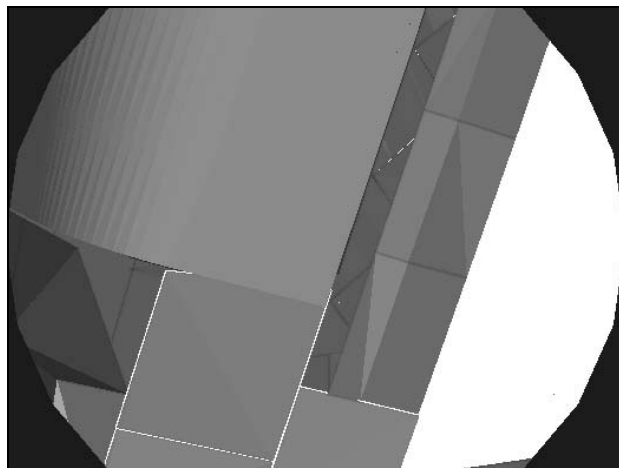
ELBOW (-35,5)



BIRD'S EYE

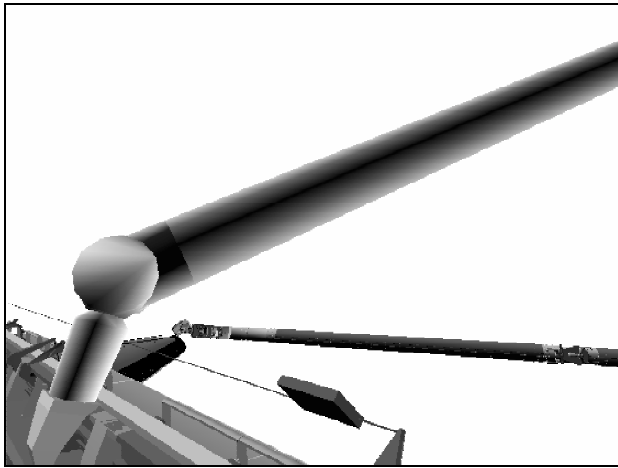


RSC

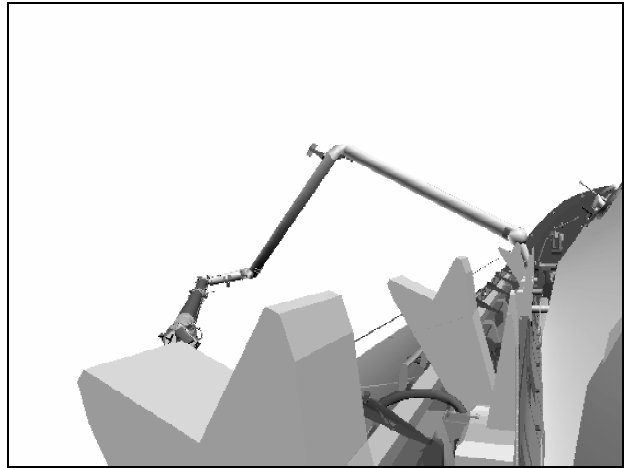


LDRI (135,-110)

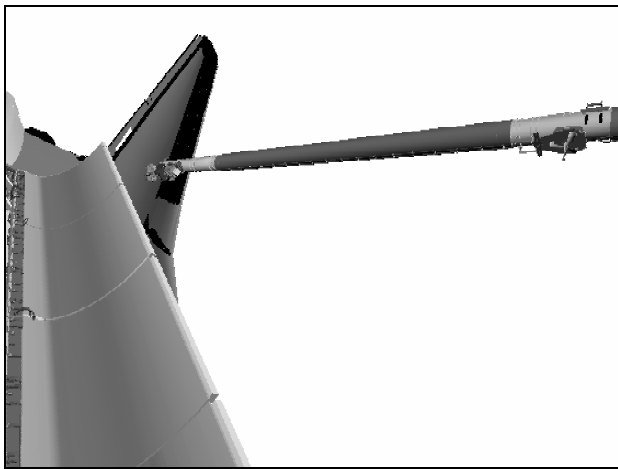
PORT LDRI RCC SURVEY – Pause Pt 110



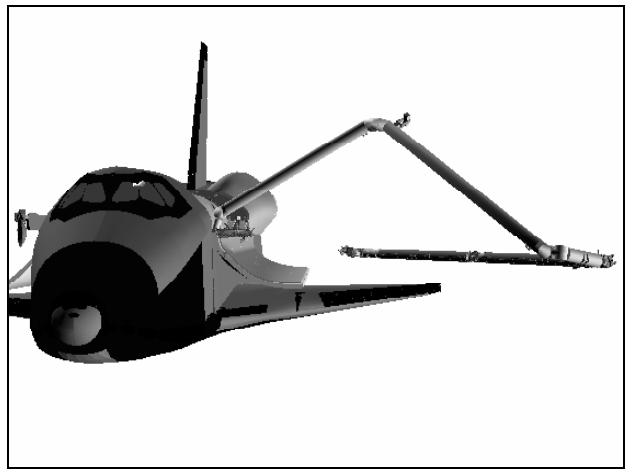
CCTV A (45,5)



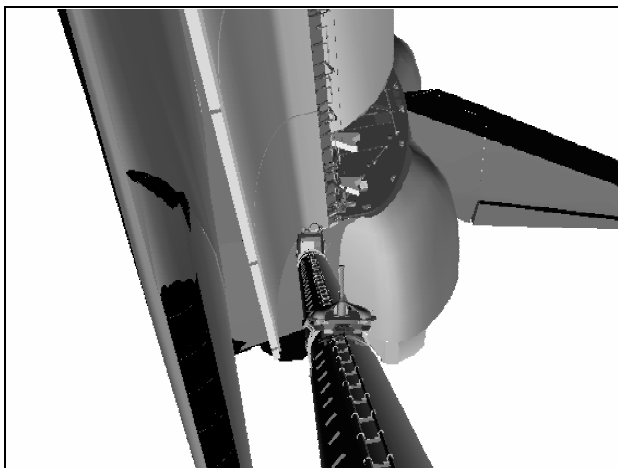
CCTV B (-20,0)



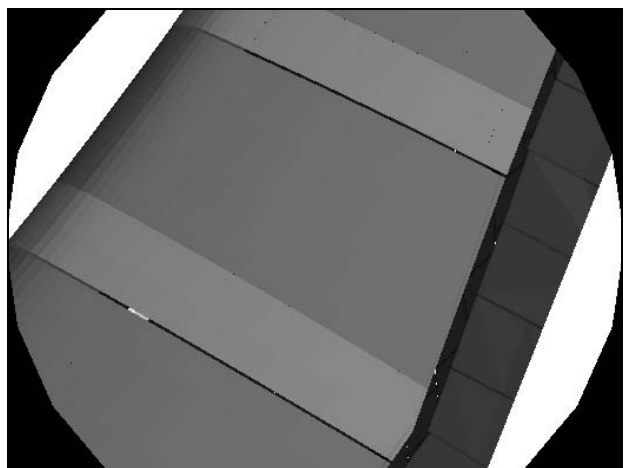
ELBOW (-88,0)



BIRD'S EYE



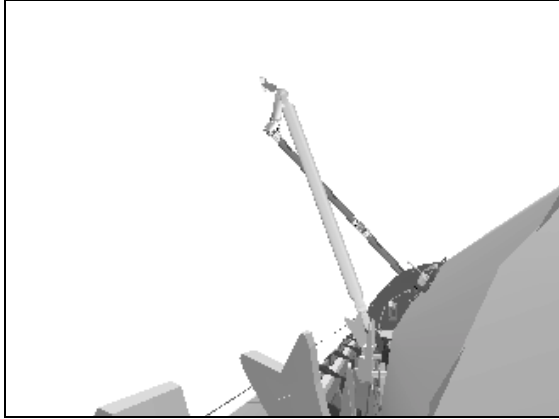
RSC



LDRI (135,-110)

OBSS LDRI RCC SURVEY CAMERA VIEWS – NOSE CAP

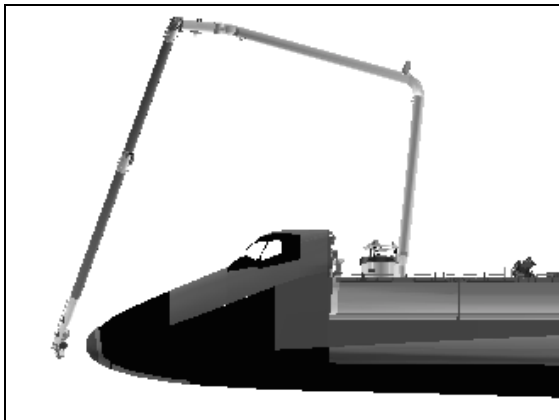
NOSE CAP LDRI RCC SURVEY – Pause Pt 119



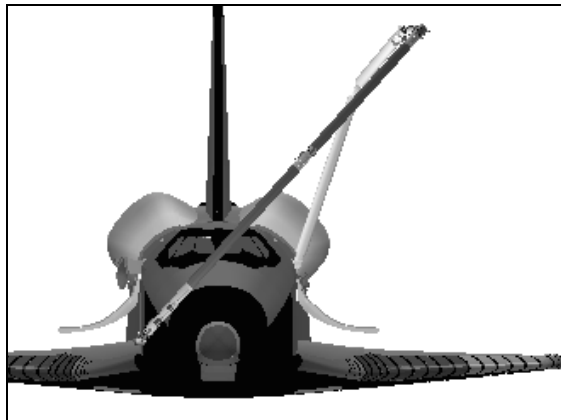
CCTV B (-10,10)



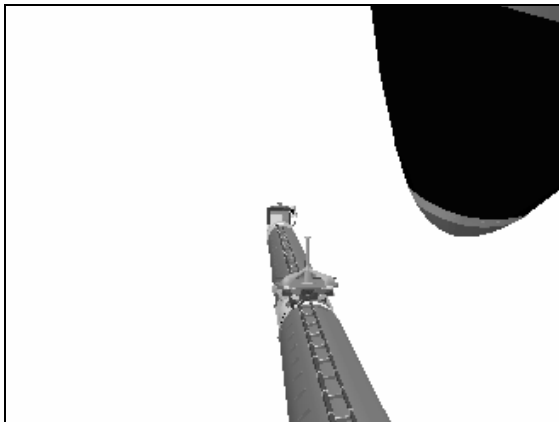
CCTV A (95,45)



PORT



FRONT

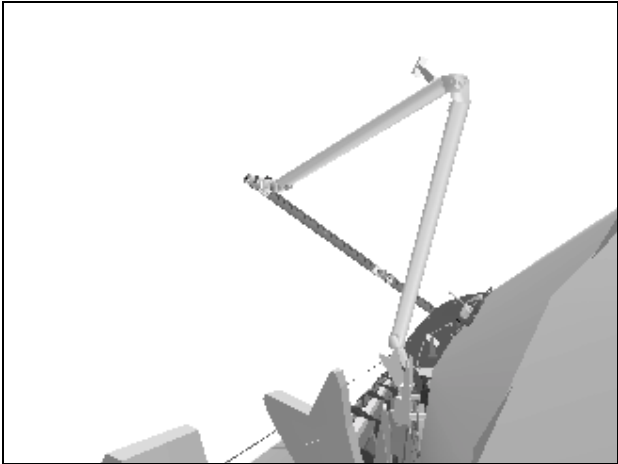


RSC

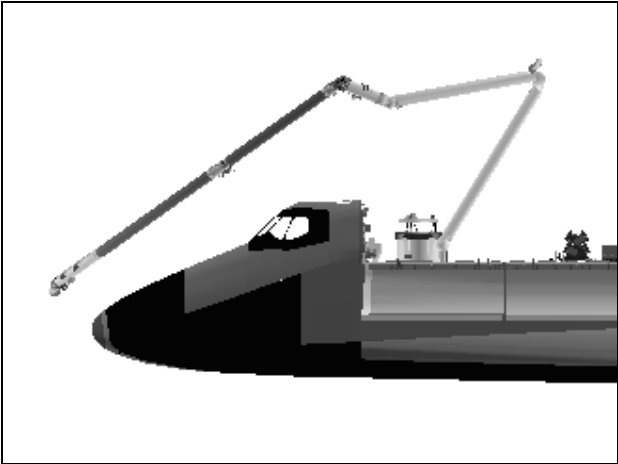


LDRI (0,-40)

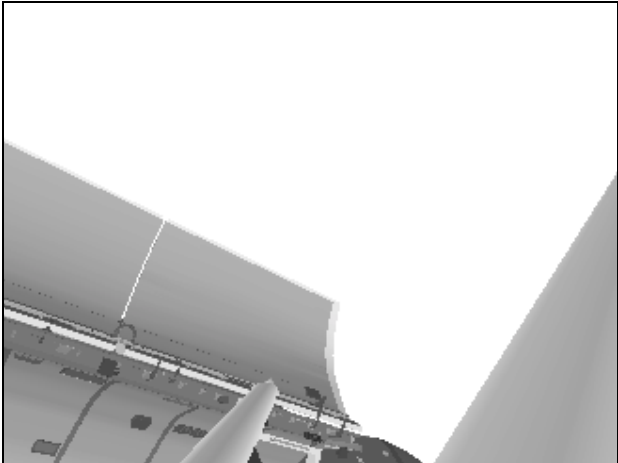
NOSE CAP LDRI RCC SURVEY – Pause Pt 121



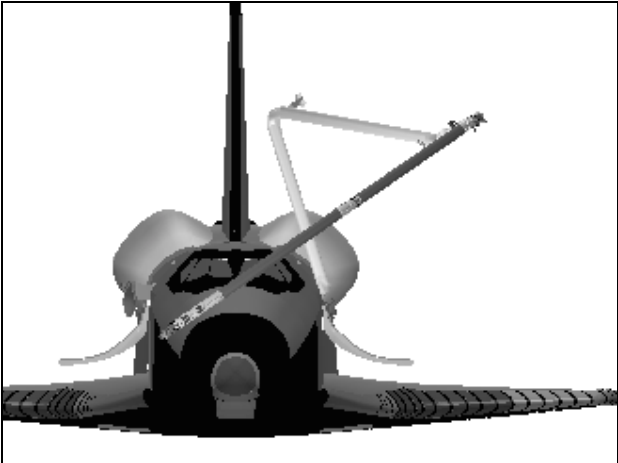
CCTV B (-10,10)



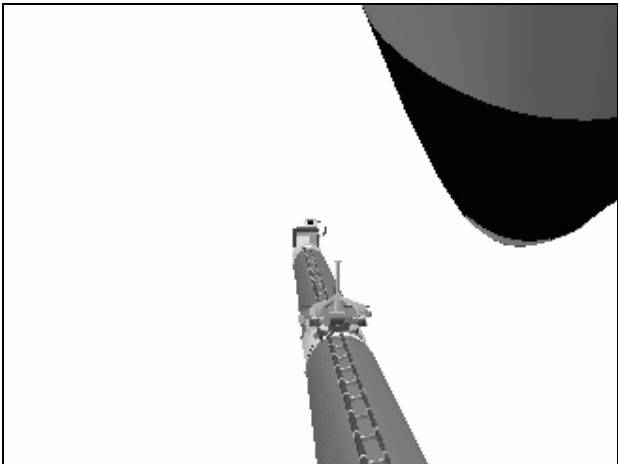
PORT



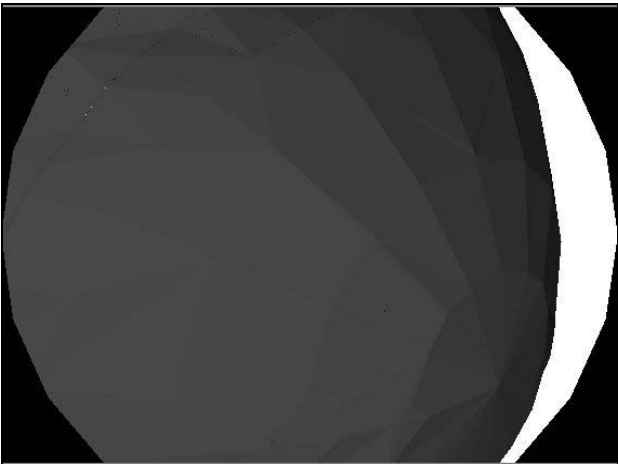
ELBOW (-40,-20)



FRONT

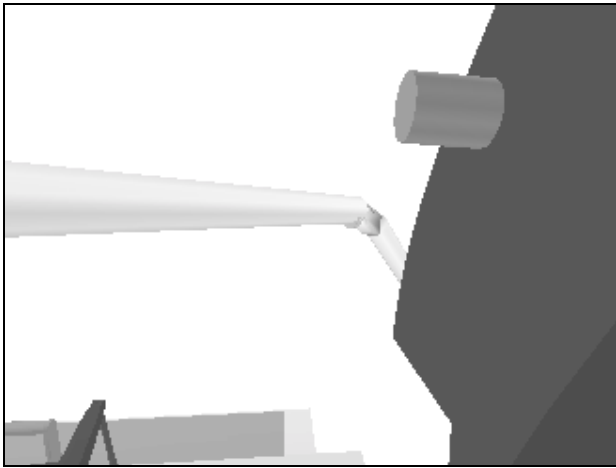


RSC

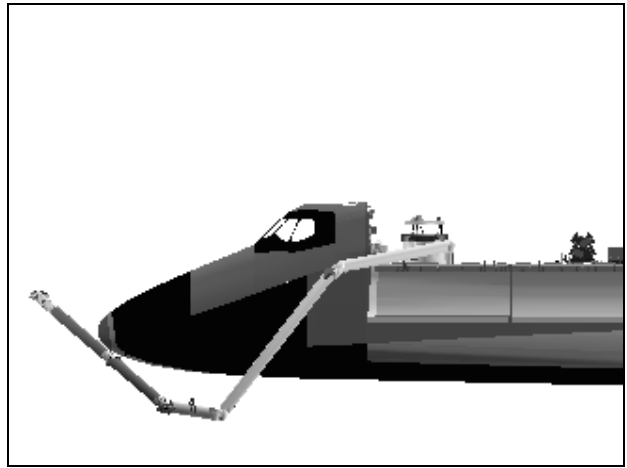


LDRI (0,-40)

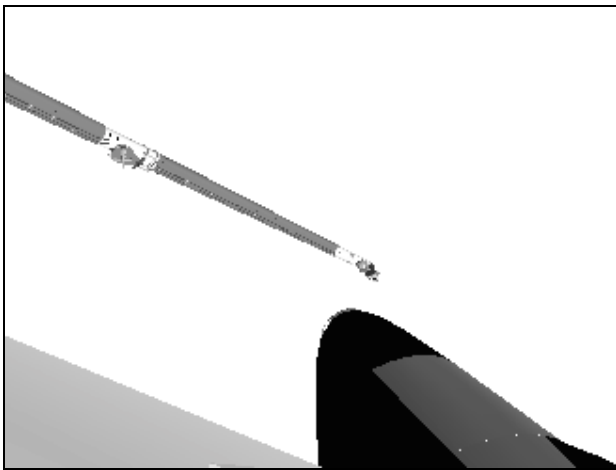
NOSE CAP LDRI RCC SURVEY – Pause Pt 124



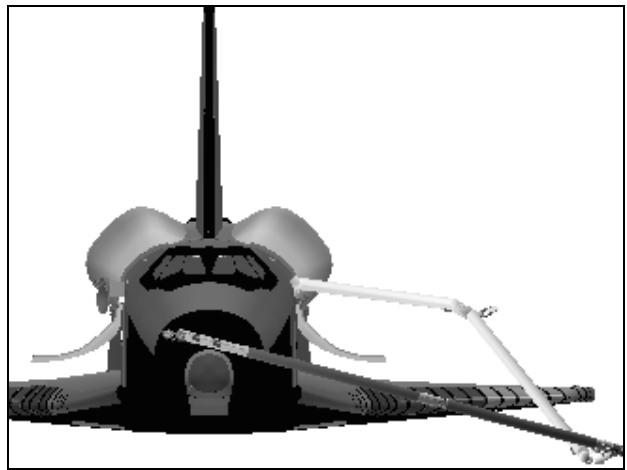
CCTV A (95,-10)



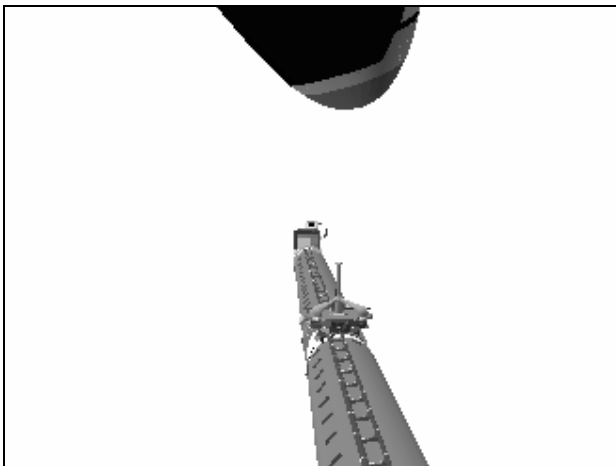
PORT



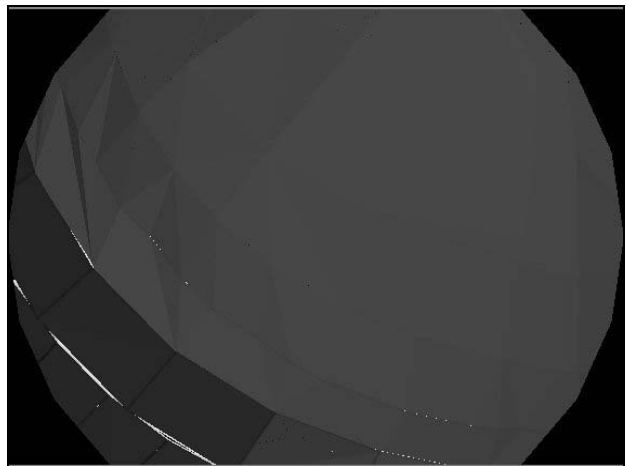
ELBOW (70,-60)



FRONT

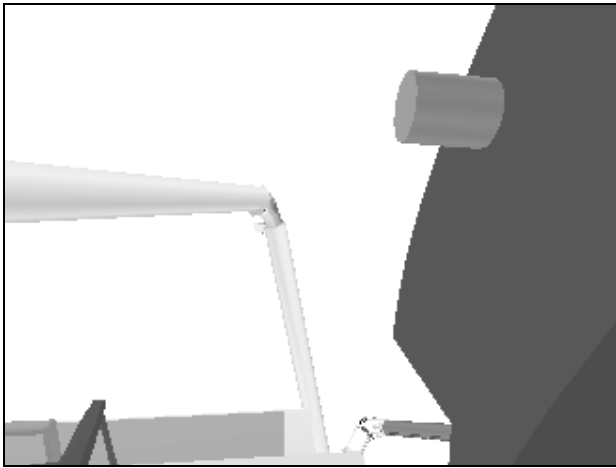


RSC

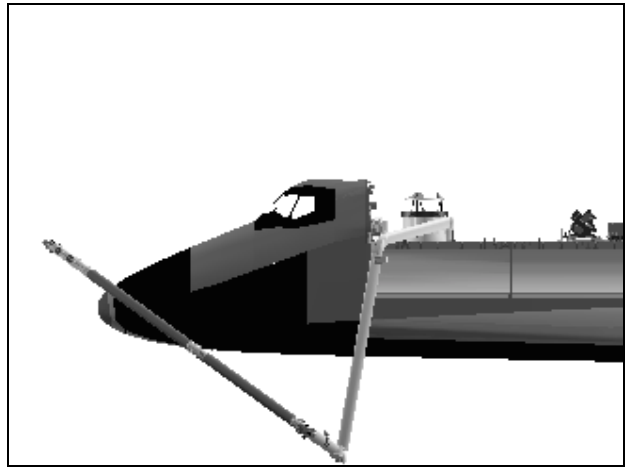


LDRI (75,-43)

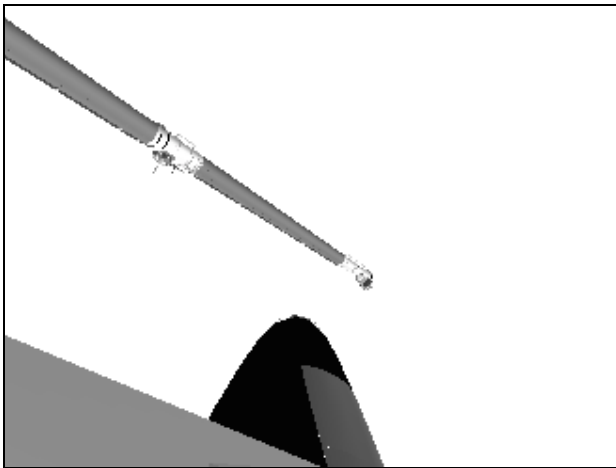
NOSE CAP LDRI RCC SURVEY – Pause Pt 126



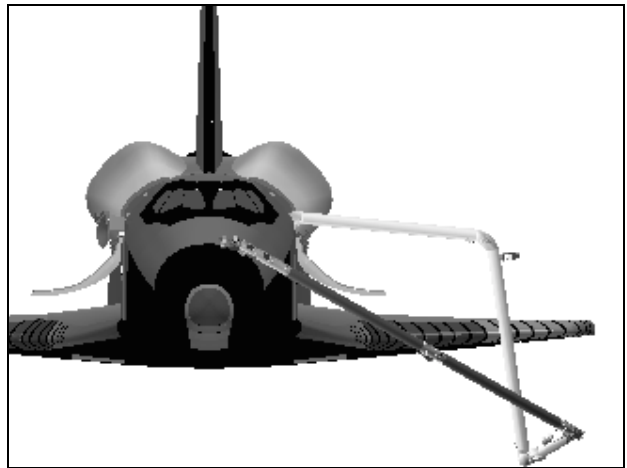
CCTV A (95,-10)



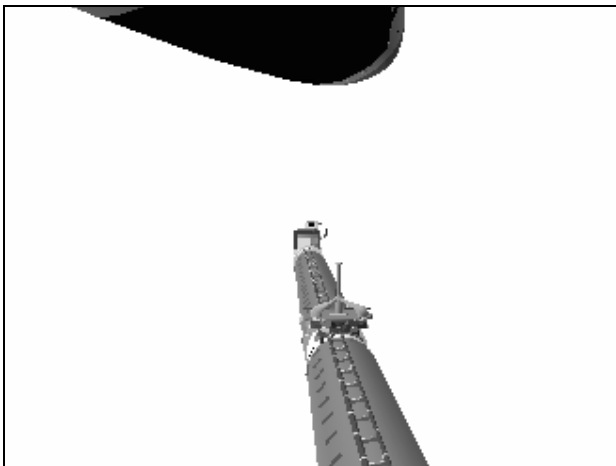
PORT



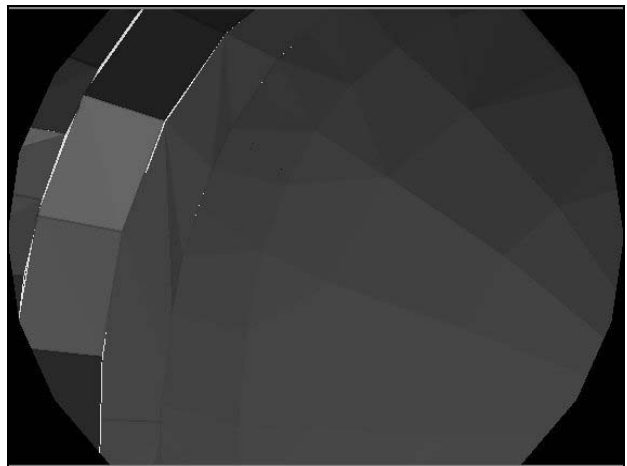
ELBOW (70,-60)



FRONT

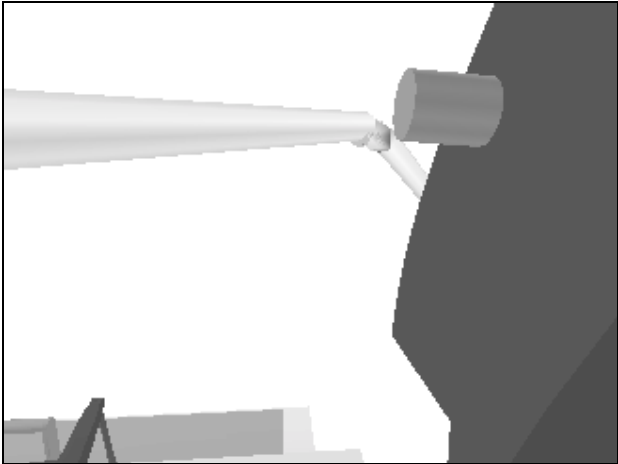


RSC

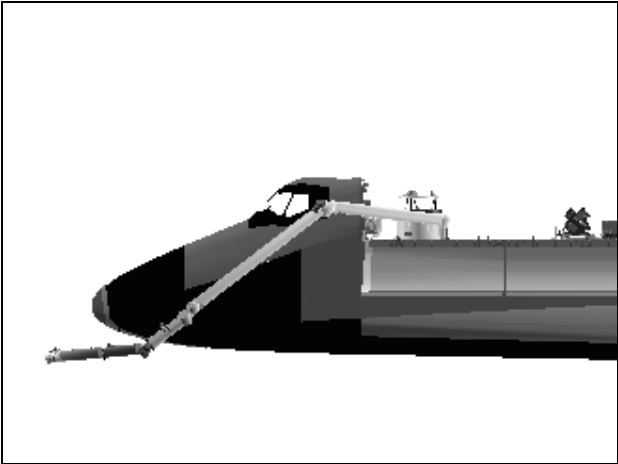


LDRI (75,-43)

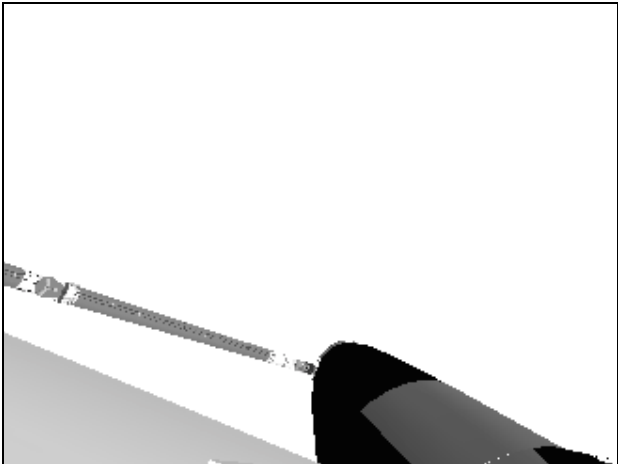
NOSE CAP LDRI RCC SURVEY – Pause Pt 130



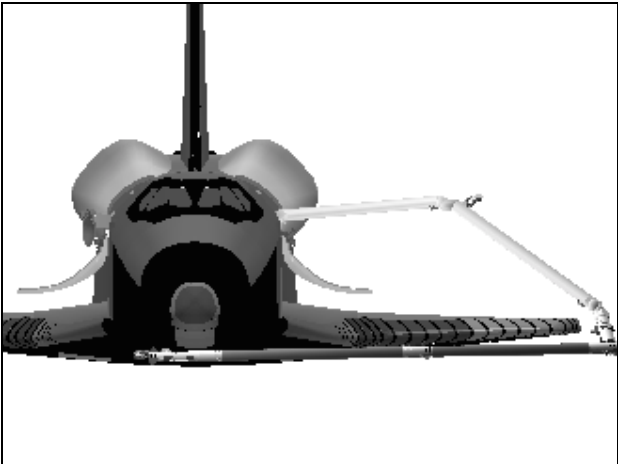
CCTV A (95,-10)



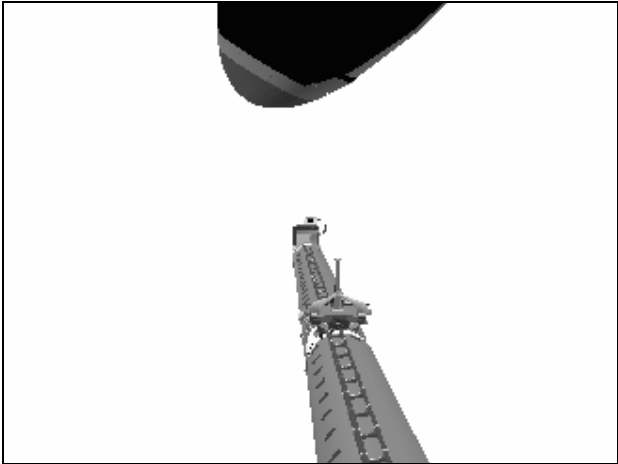
PORT



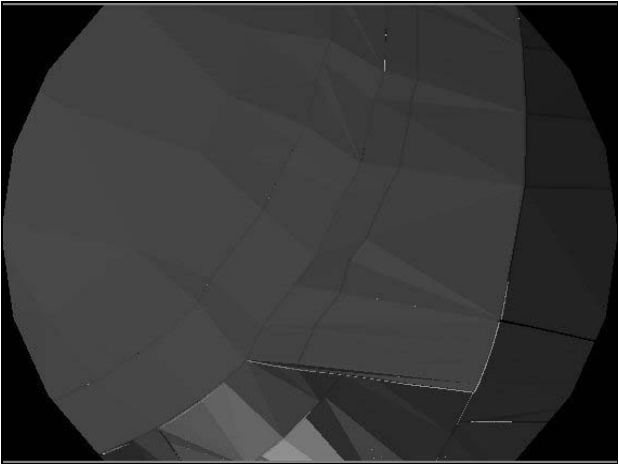
ELBOW (70,-60)



FRONT

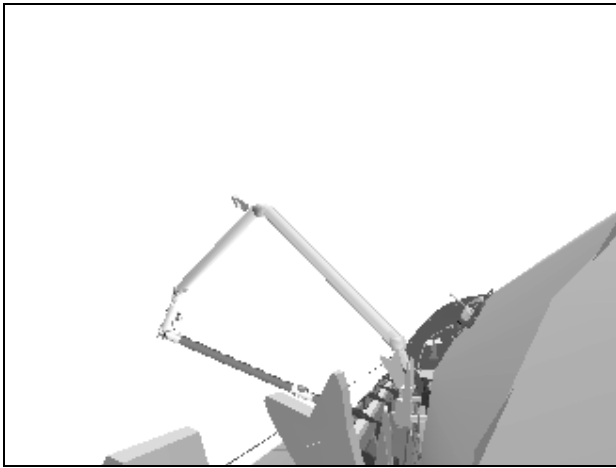


RSC

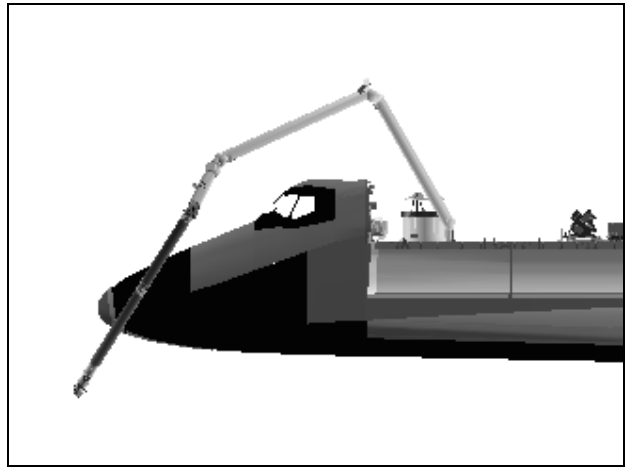


LDRI (75,-43)

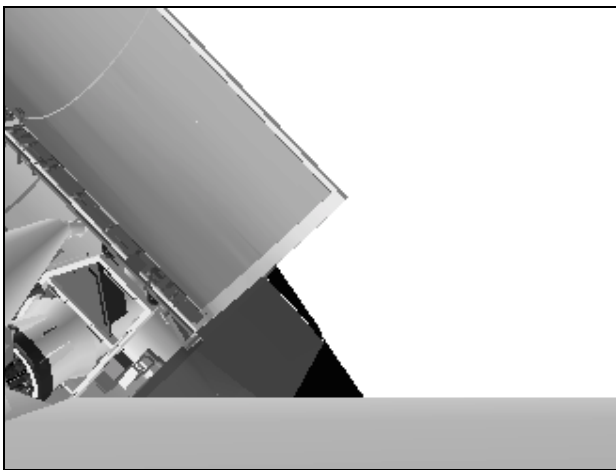
NOSE CAP LDRI RCC SURVEY – Pause Pt 131



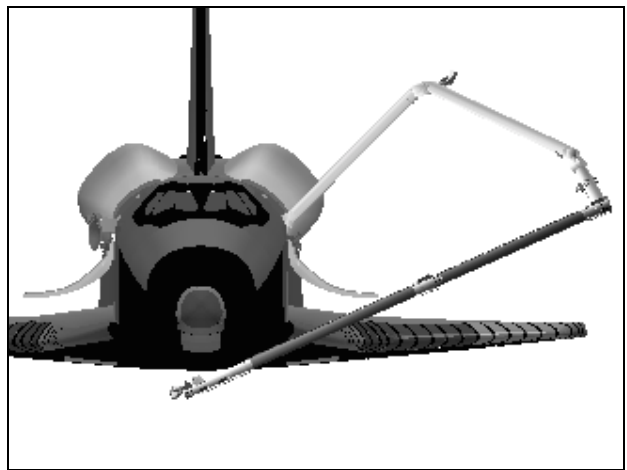
CCTV B (-10,10)



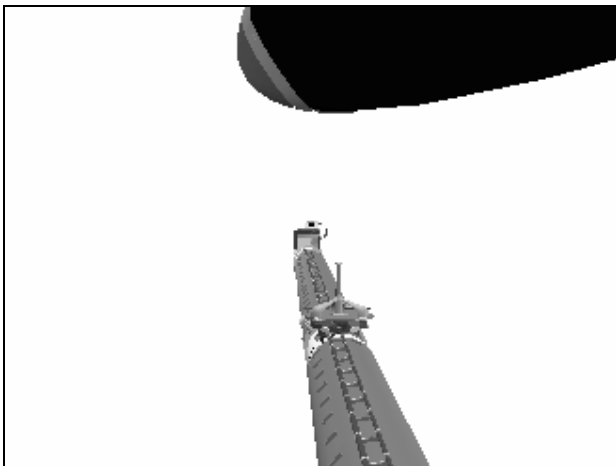
PORT



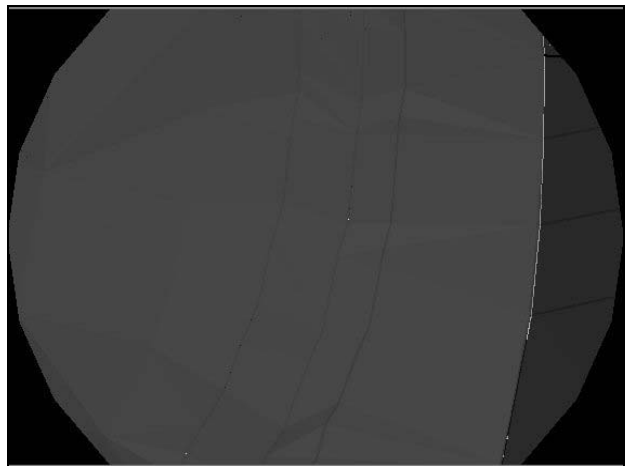
ELBOW (-90,-50)



FRONT

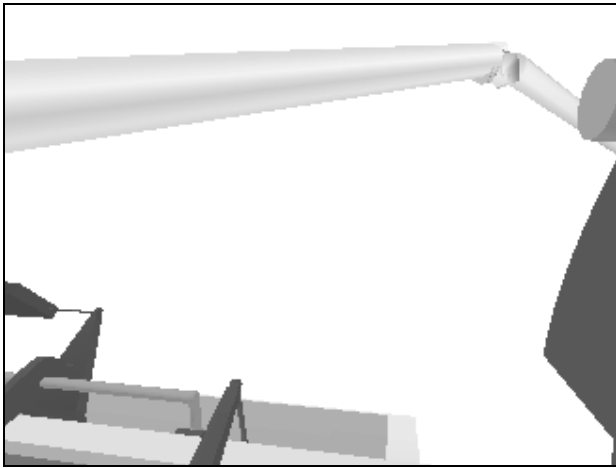


RSC

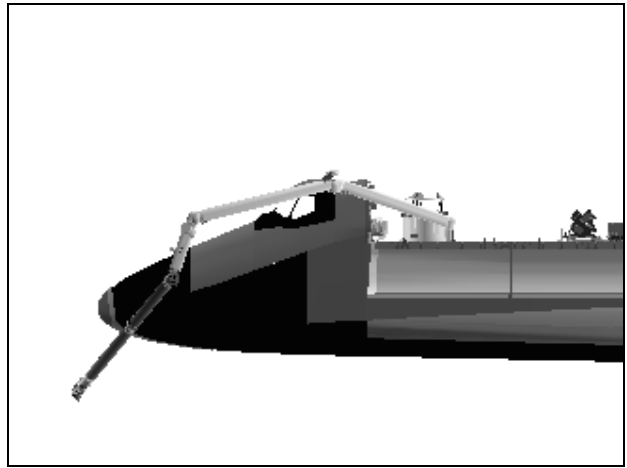


LDRI (75,-43)

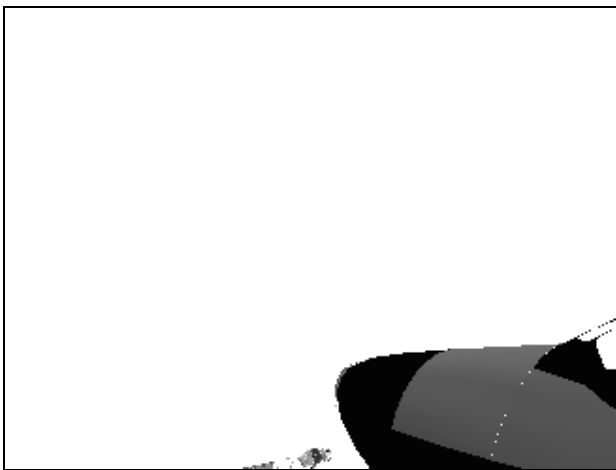
NOSE CAP LDRI RCC SURVEY – Pause Pt 132



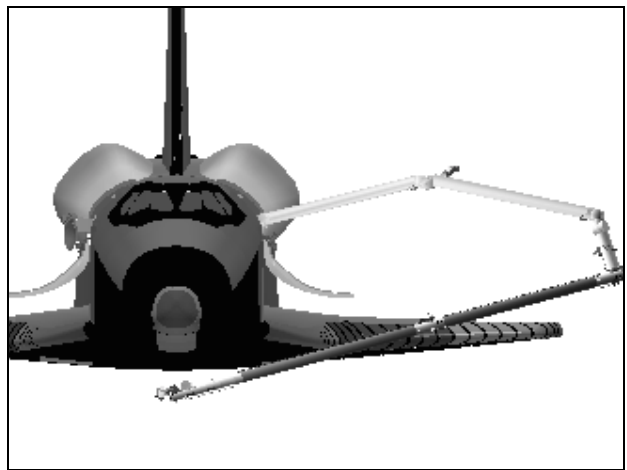
CCTV A (80,-10)



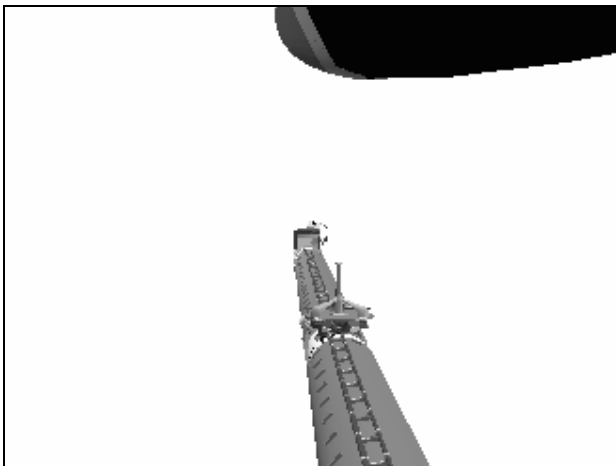
PORT



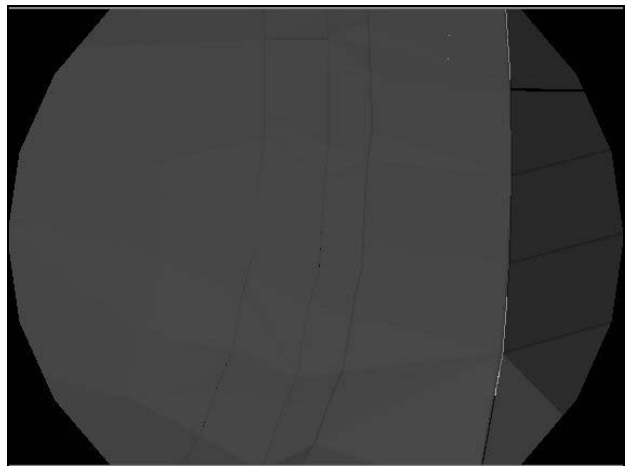
ELBOW (90,-60)



FRONT

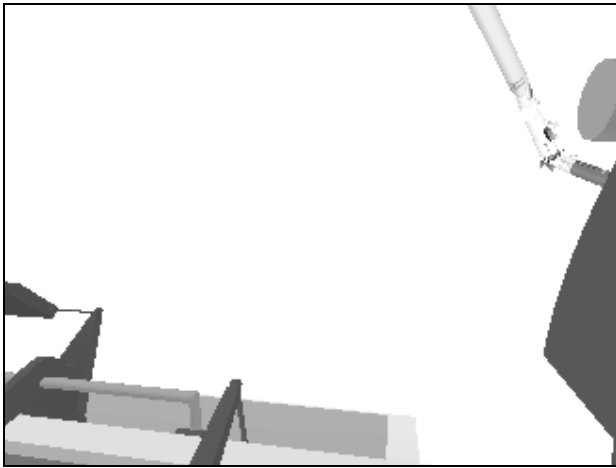


RSC

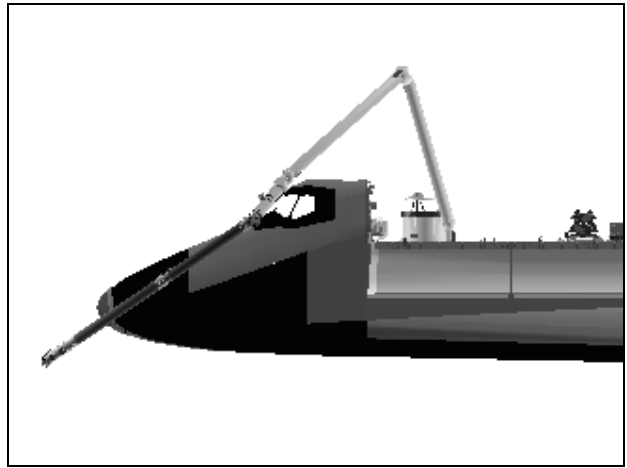


LDRI (65,-58)

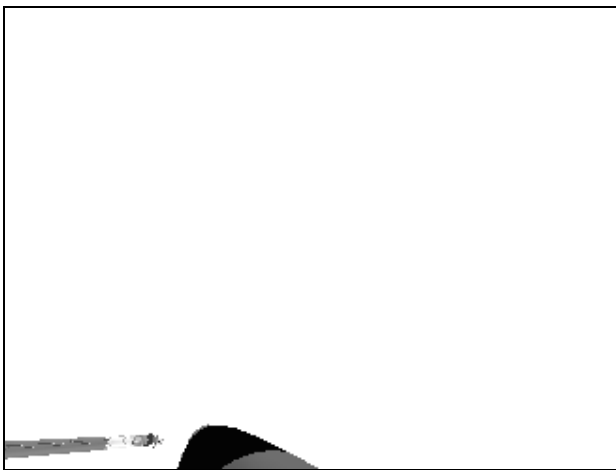
NOSE CAP LDRI RCC SURVEY – Pause Pt 136



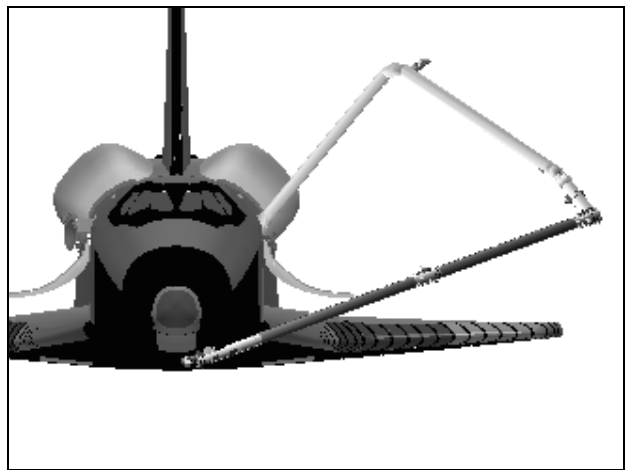
CCTV A (80,-10)



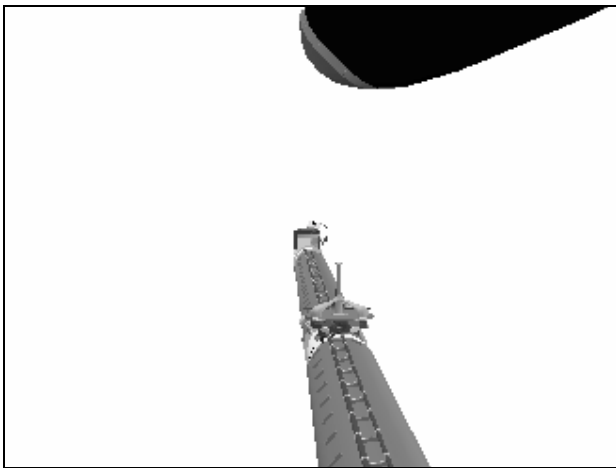
PORT



ELBOW (90,-60)



FRONT

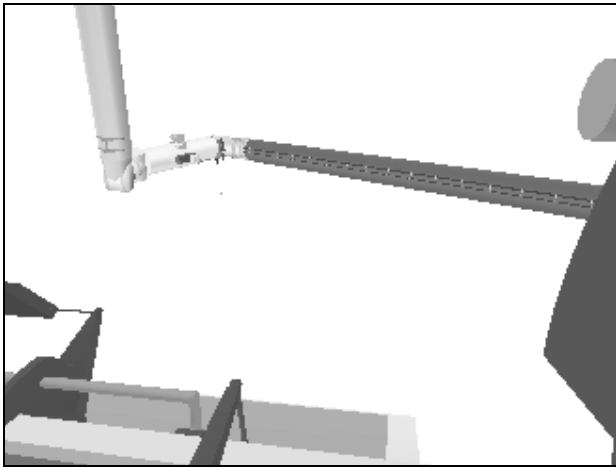


RSC

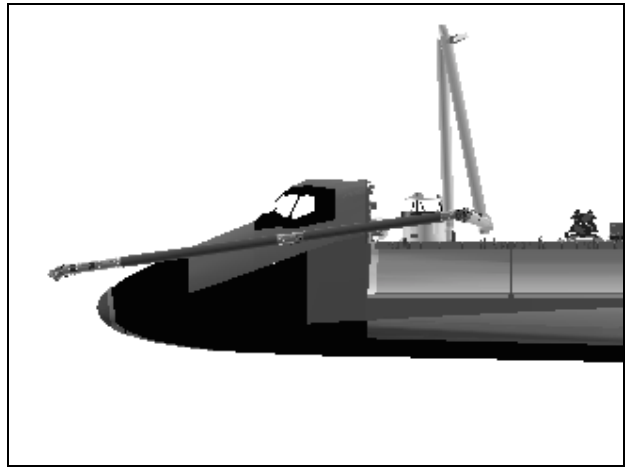


LDRI (65,-58)

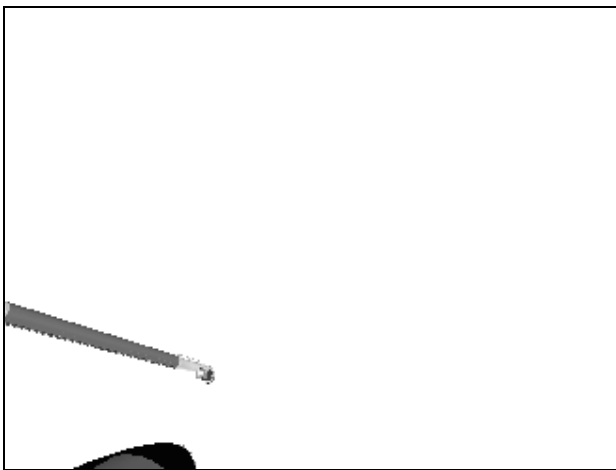
NOSE CAP LDRI RCC SURVEY – Pause Pt 139



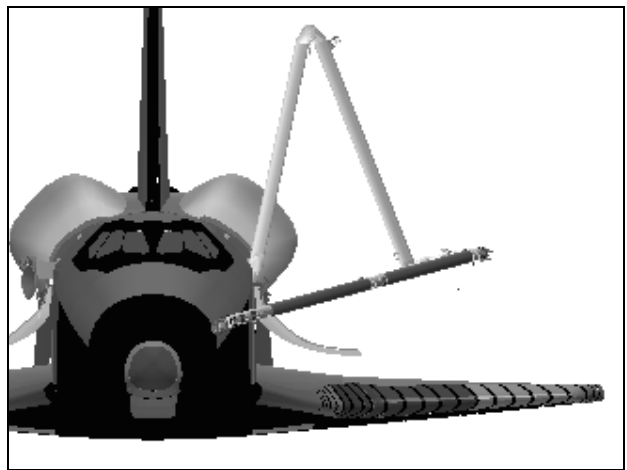
CCTV A (80,-10)



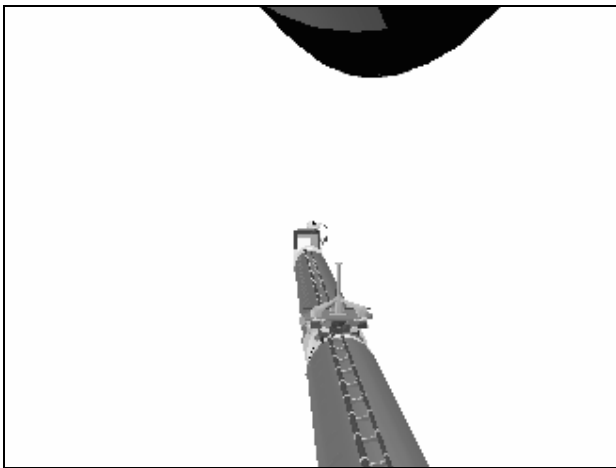
PORT



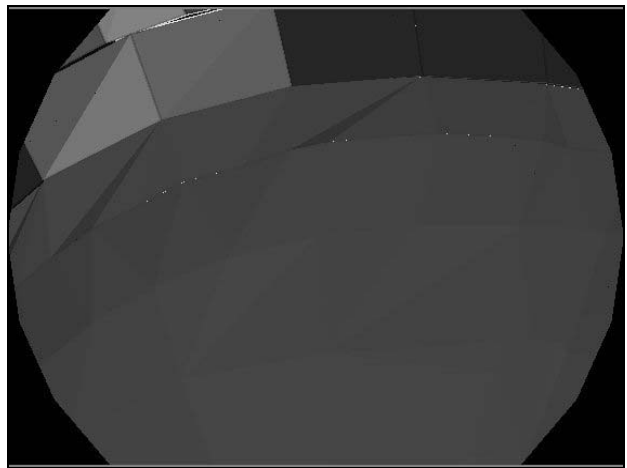
ELBOW (90,-60)



FRONT

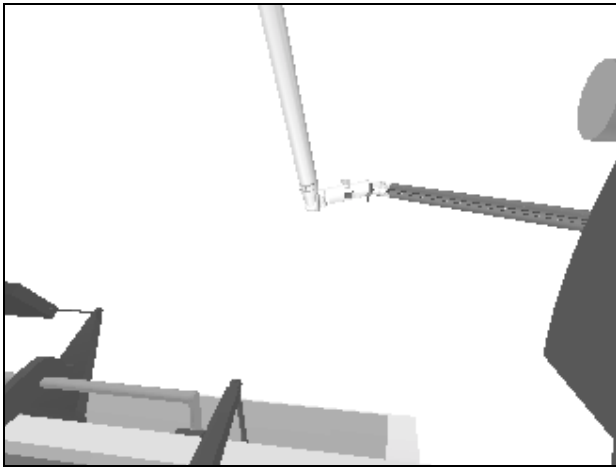


RSC

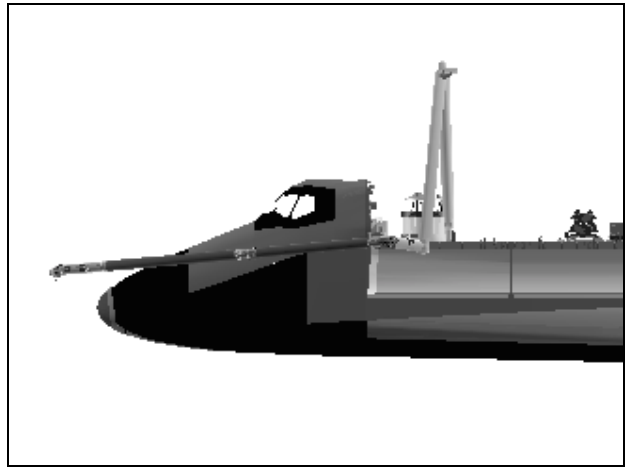


LDRI (65,-58)

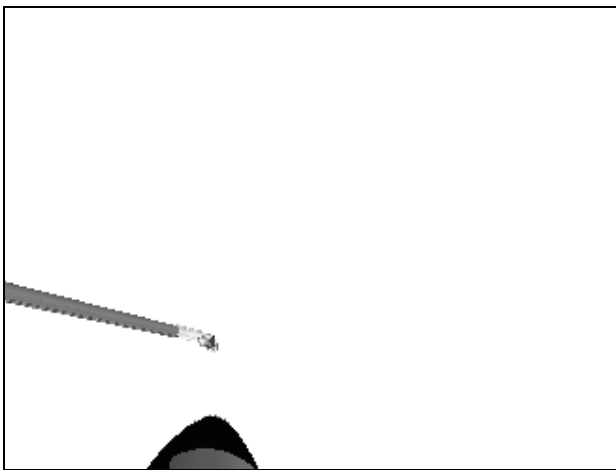
NOSE CAP LDRI RCC SURVEY – Pause Pt 140



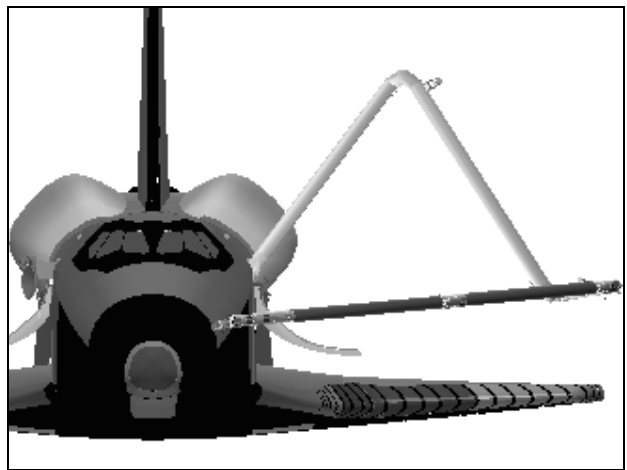
CCTV A (80,-10)



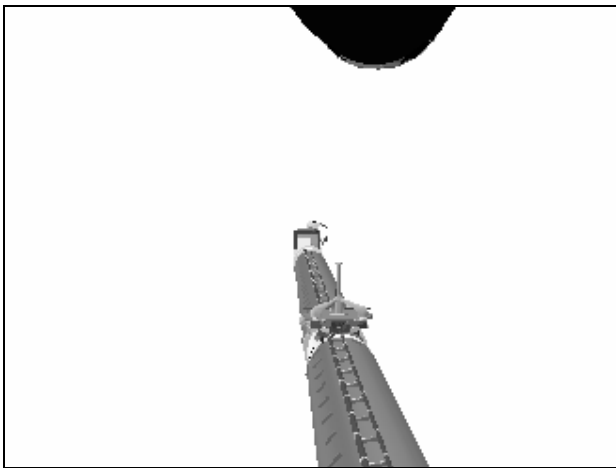
PORT



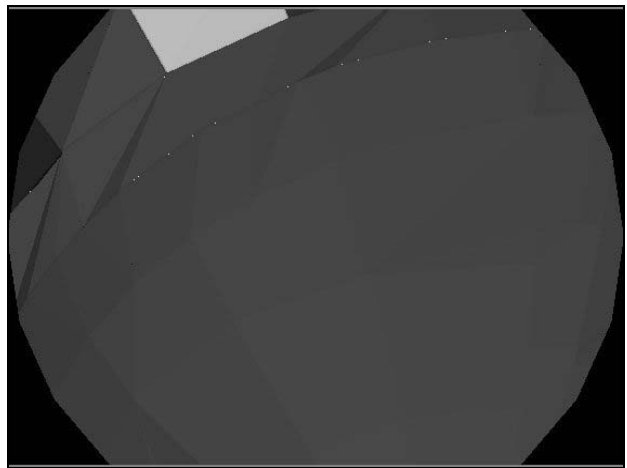
ELBOW (90,-60)



FRONT

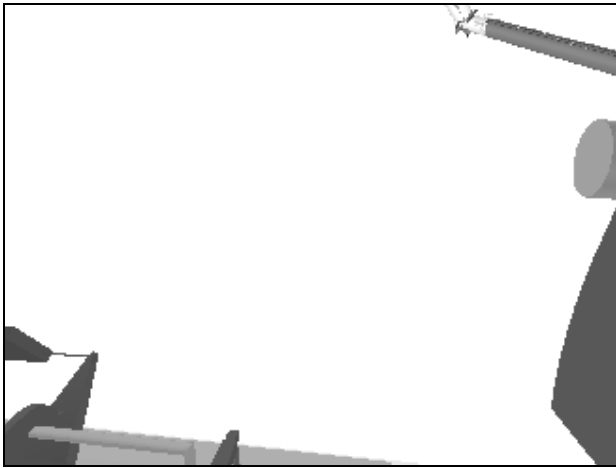


RSC

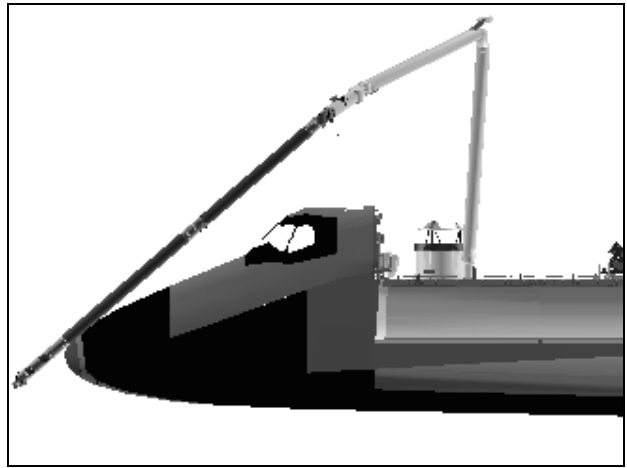


LDRI (65,-75)

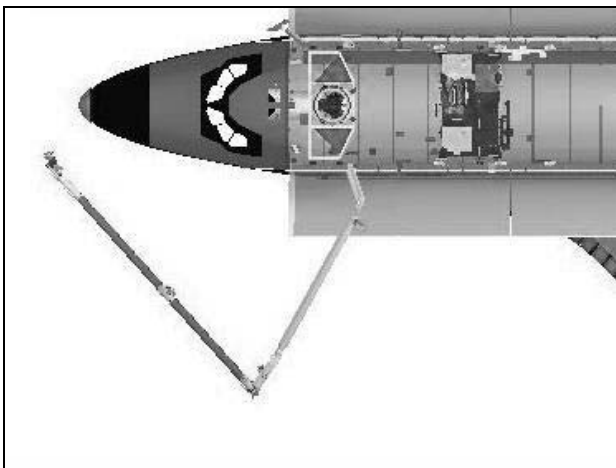
NOSE CAP LDRI RCC SURVEY – Pause Pt 142



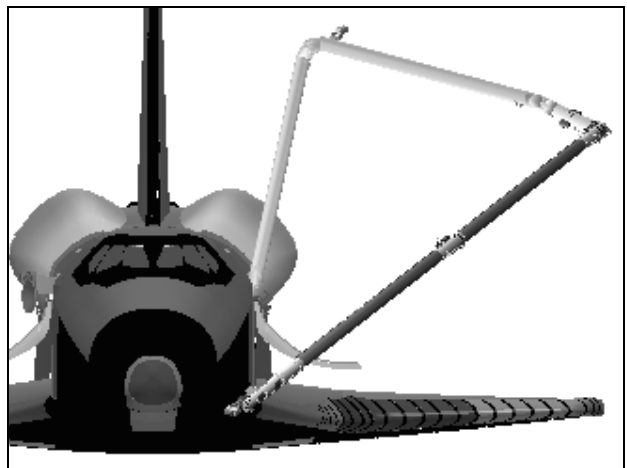
CCTV A (80,-5)



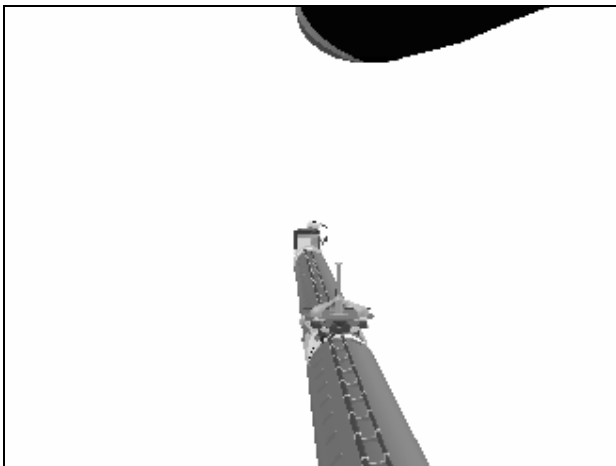
PORT



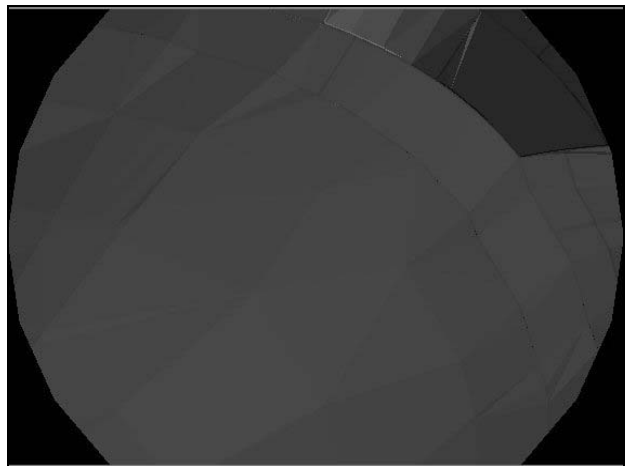
OVERHEAD



FRONT



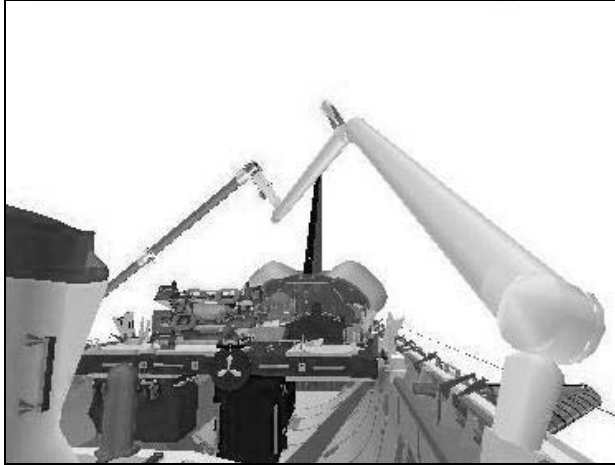
RSC



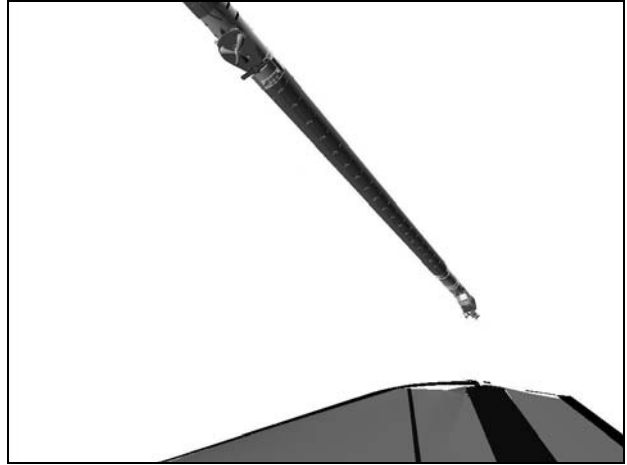
LDRI (65,-75)

OBSS LCS RCC SURVEY CAMERA VIEWS – STBD

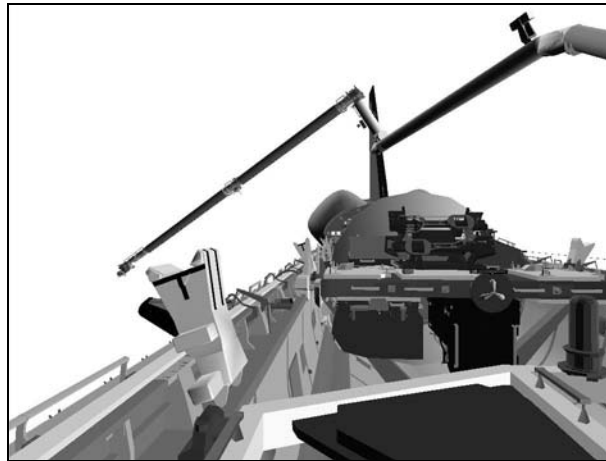
STBD LCS RCC SURVEY – Pause Pt 119



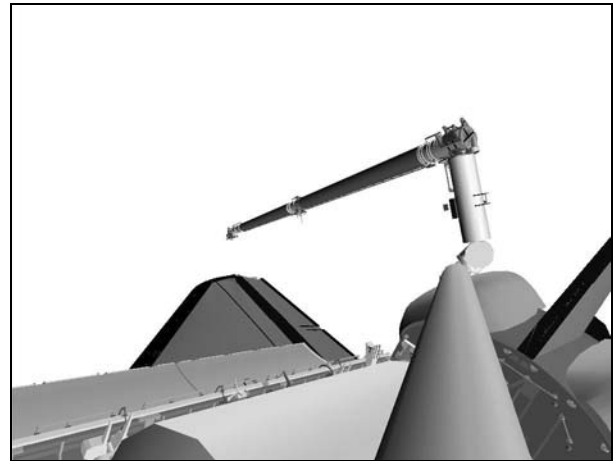
CCTV A (-5,10)



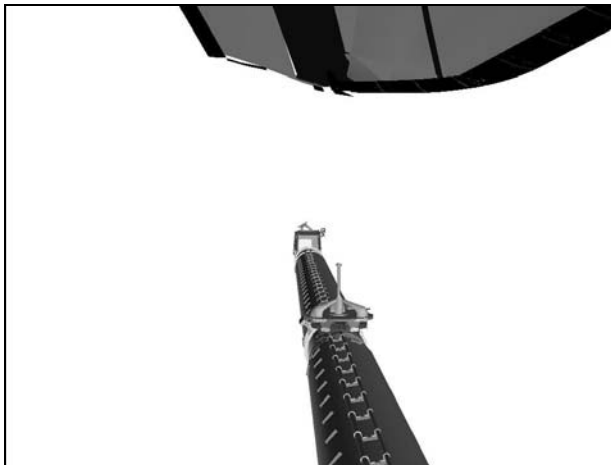
CCTV C (80,0)



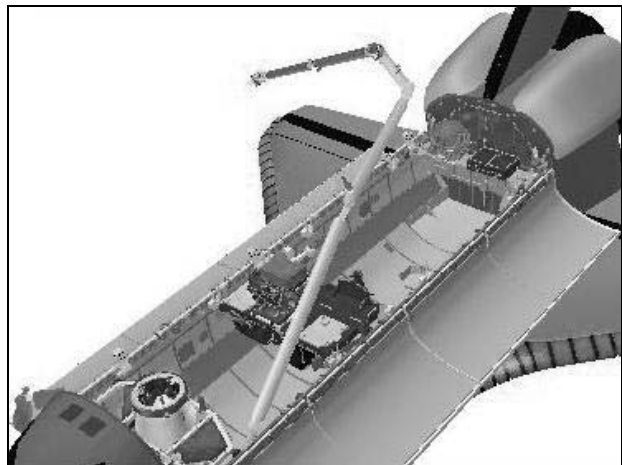
CCTV D (-5,0)



ELBOW (-20,0)

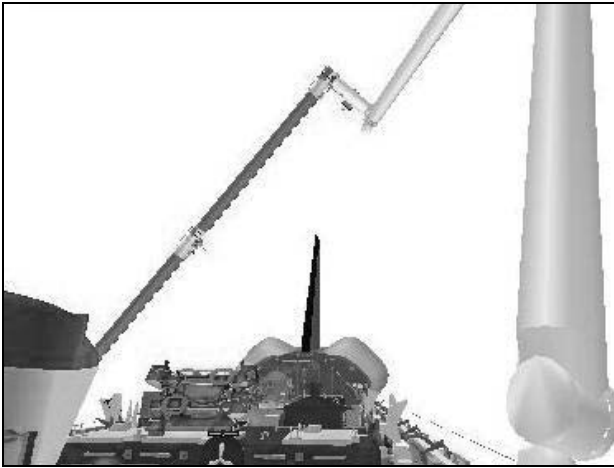


RSC

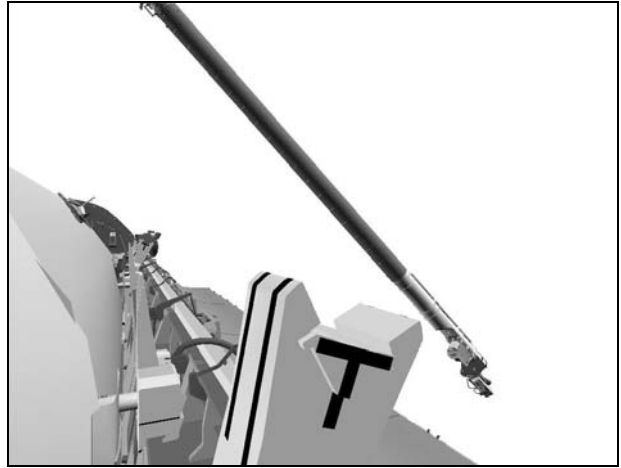


BIRD'S EYE

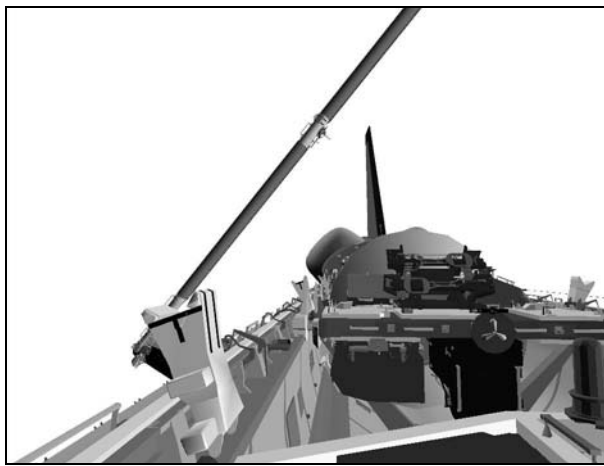
STBD LCS RCC SURVEY – Pause Pt 122



CCTV A (-5,20)



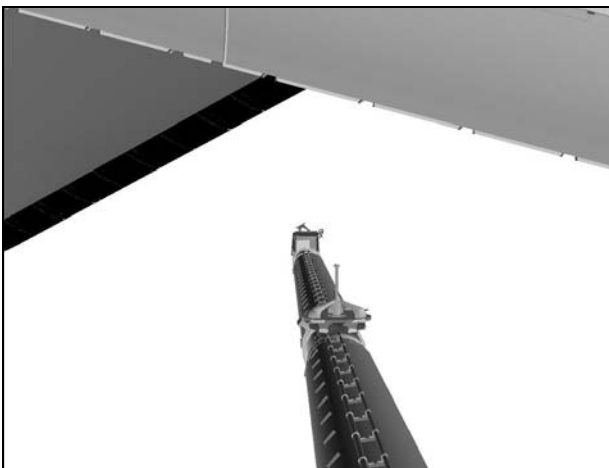
CCTV C (25,0)



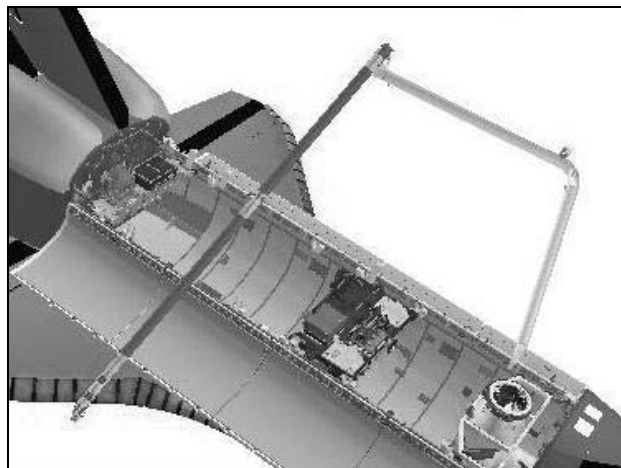
CCTV D (-5,5)



ELBOW (-25,-10)



RSC



BIRD'S EYE

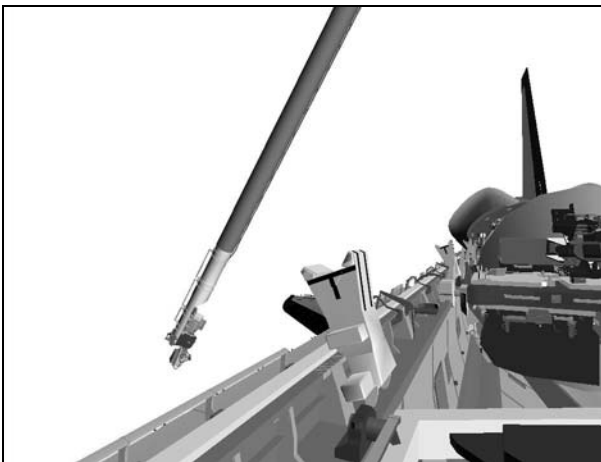
STBD LCS RCC SURVEY – Pause Pt 124



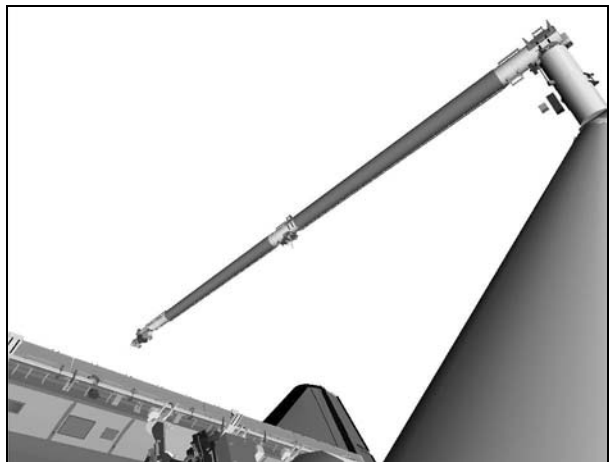
CCTV B (10,20)



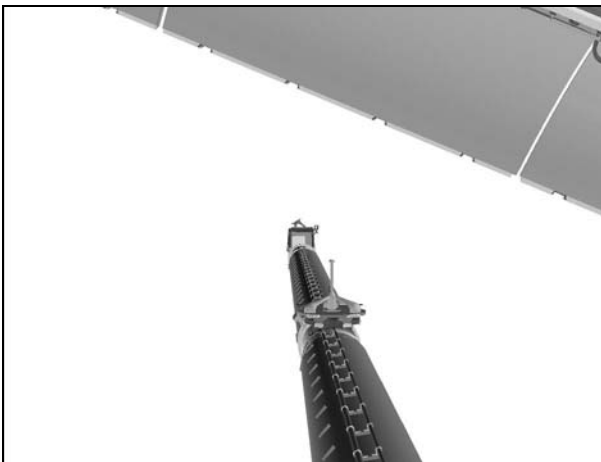
CCTV C (10,15)



CCTV D (-25,0)



ELBOW (-35,-20)

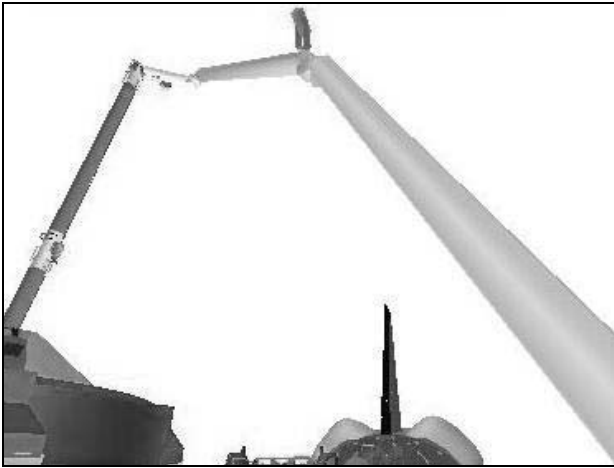


RSC



BIRD'S EYE

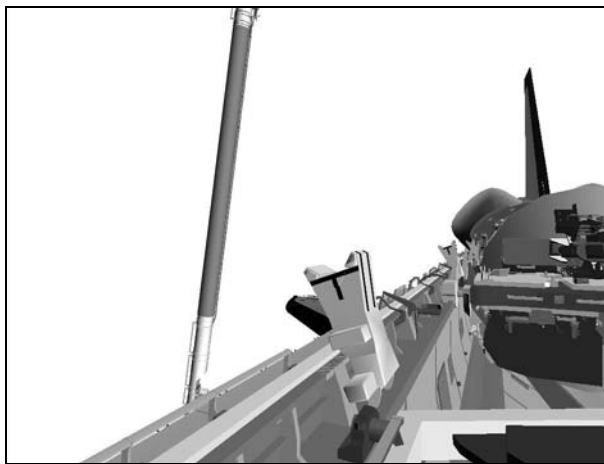
STBD LCS RCC SURVEY – Pause Pt 126



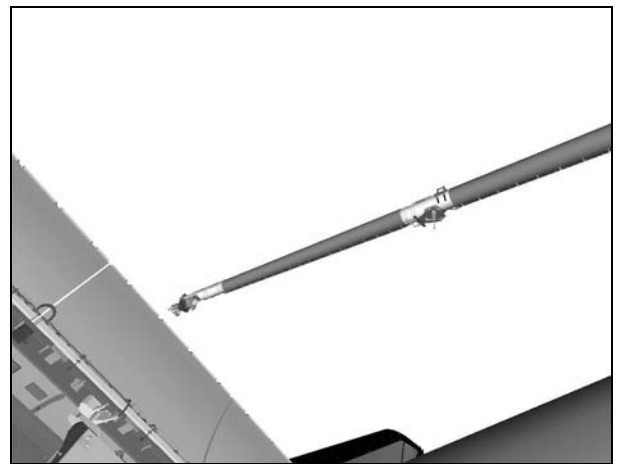
CCTV A (-15,30)



CCTV C (15,10)



CCTV D (-25,0)



ELBOW (-70,-40)

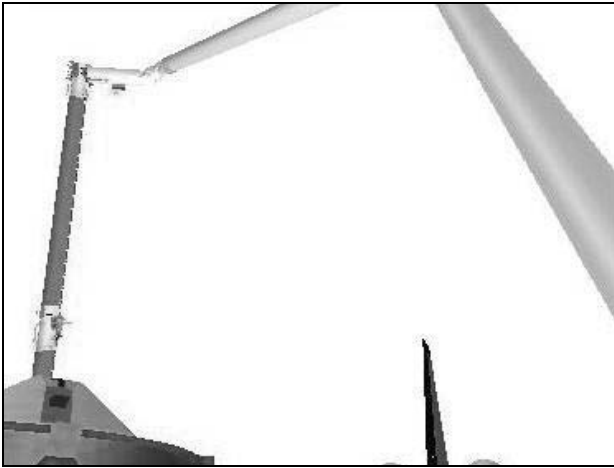


RSC



BIRD'S EYE

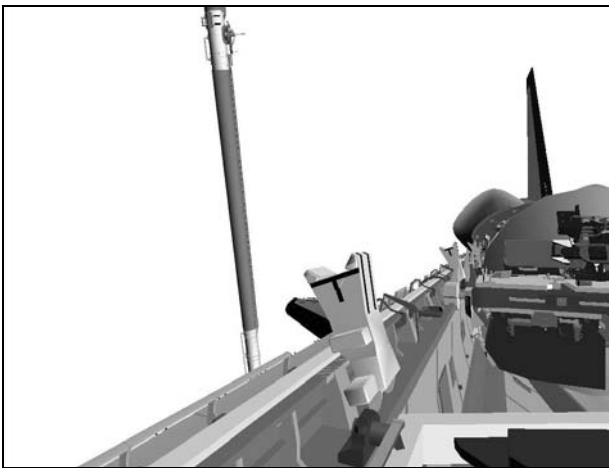
STBD LCS RCC SURVEY – Pause Pt 127



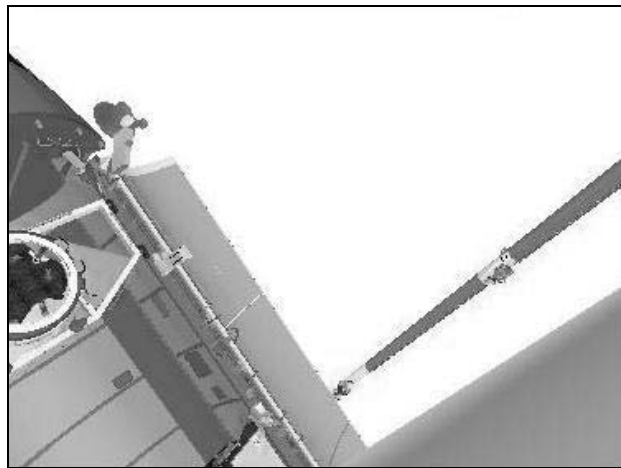
CCTV A (-20,35)



CCTV C (20,10)



CCTV D (-25,0)



ELBOW (-60,-40)

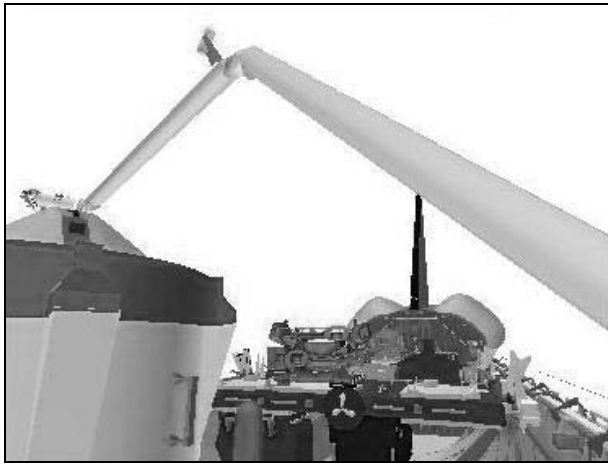


RSC

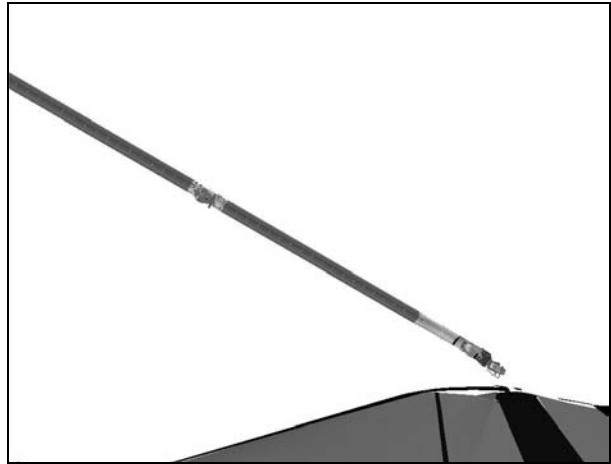


BIRD'S EYE

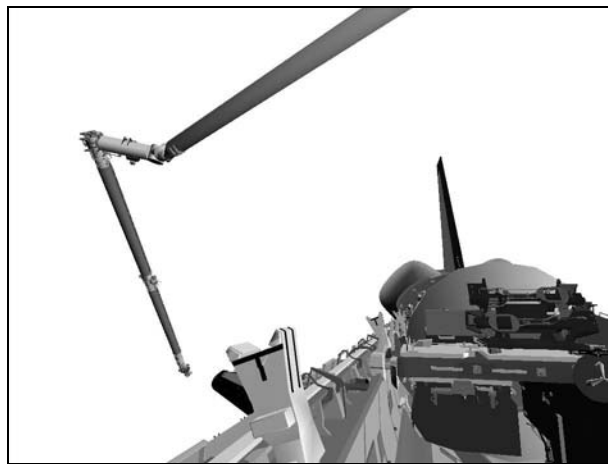
STBD LCS RCC SURVEY – Pause Pt 131



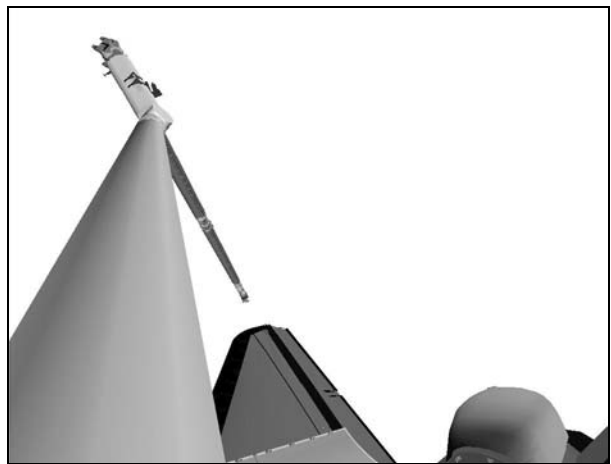
CCTV A (-20,15)



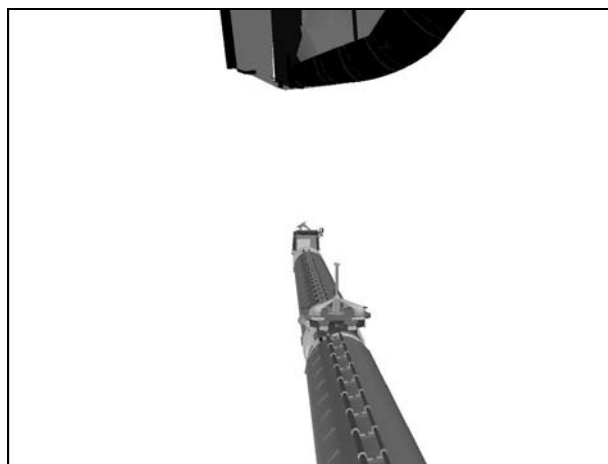
CCTV C (75,0)



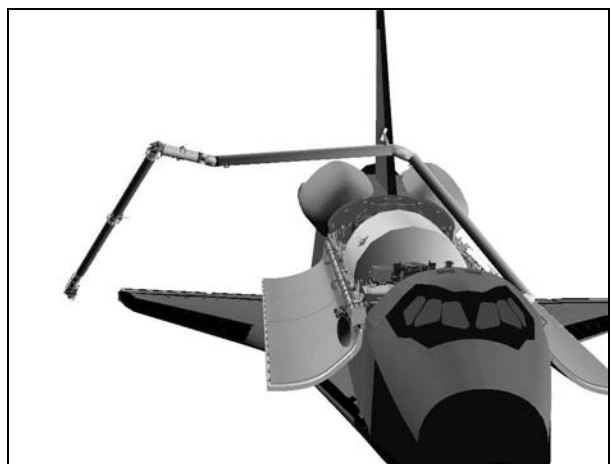
CCTV D (-15,10)



ELBOW (20,-20)

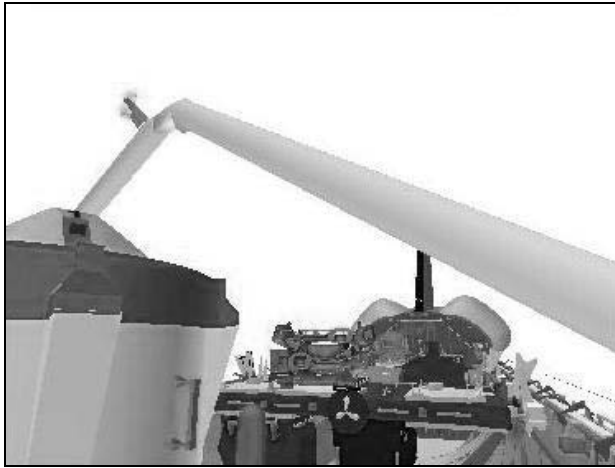


RSC

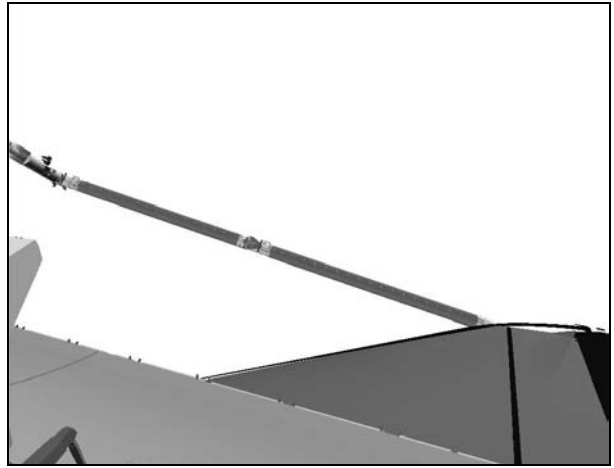


BIRD'S EYE

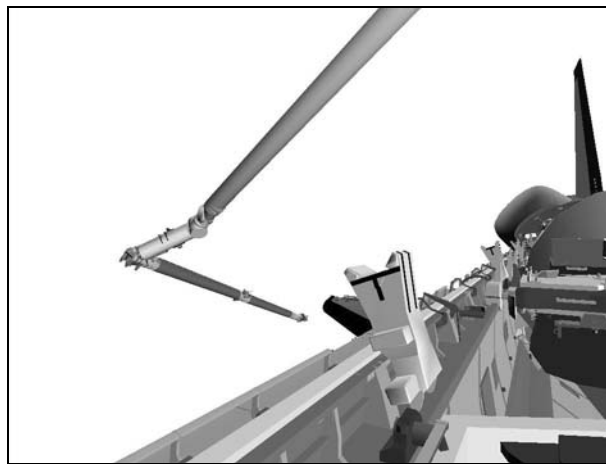
STBD LCS RCC SURVEY – Pause Pt 132



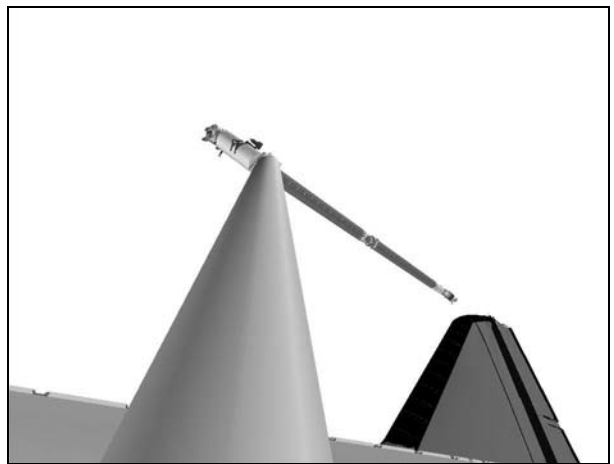
CCTV A (-20,15)



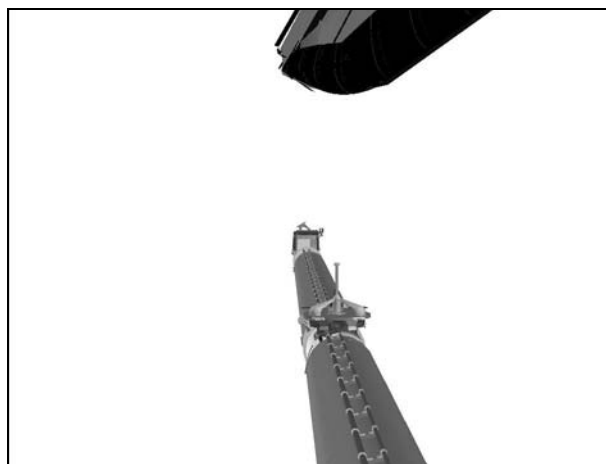
CCTV C (65,-10)



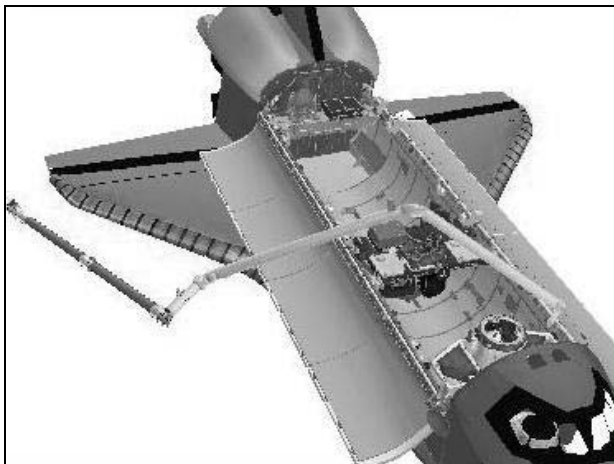
CCTV D (-30,0)



ELBOW (5,-15)

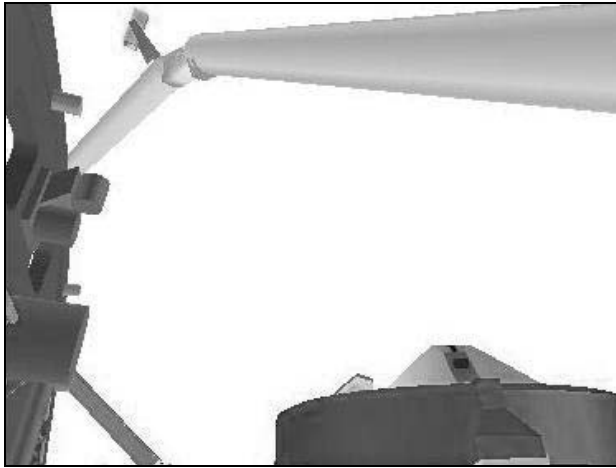


RSC

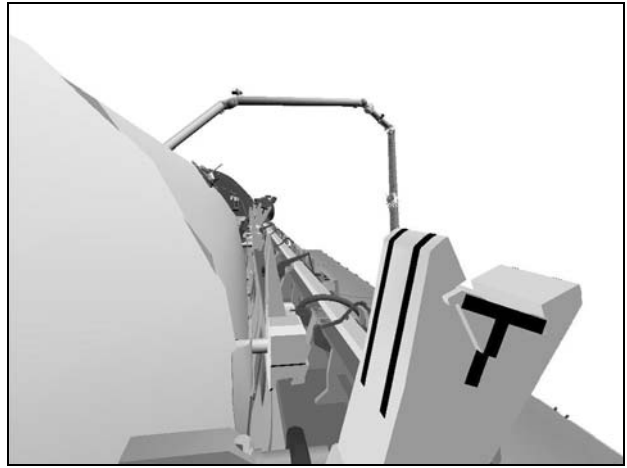


BIRD'S EYE

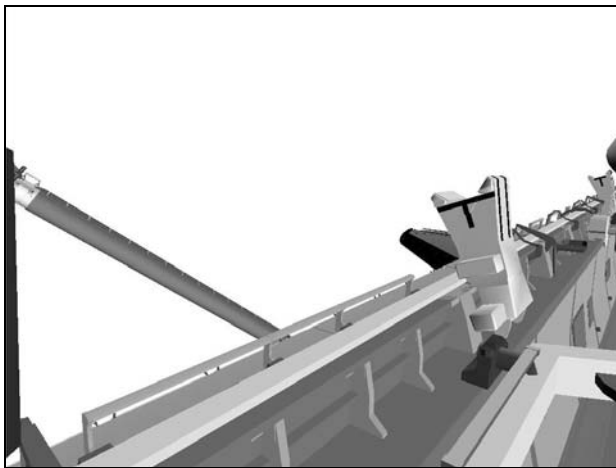
STBD LCS RCC SURVEY – Pause Pt 136



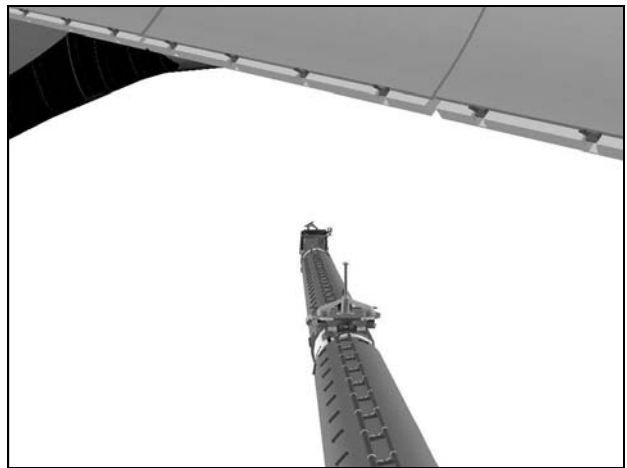
CCTV A (-65,30)



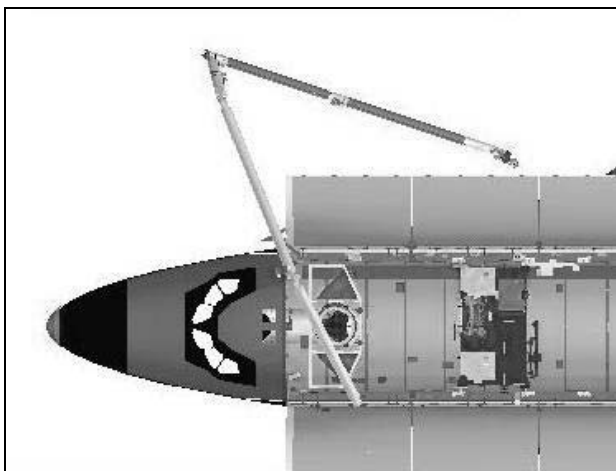
CCTV C (10,-5)



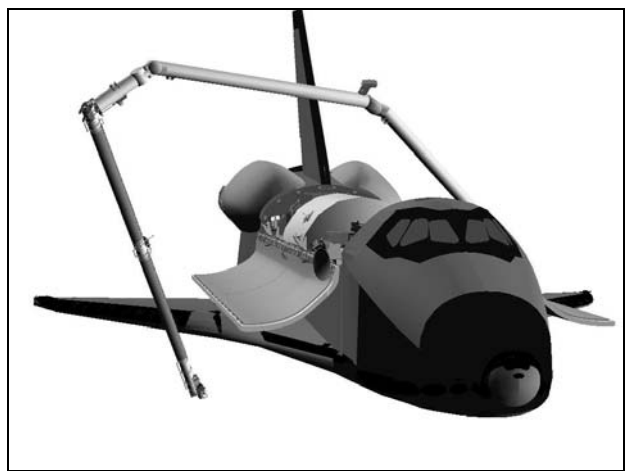
CCTV D (-40,-10)



RSC

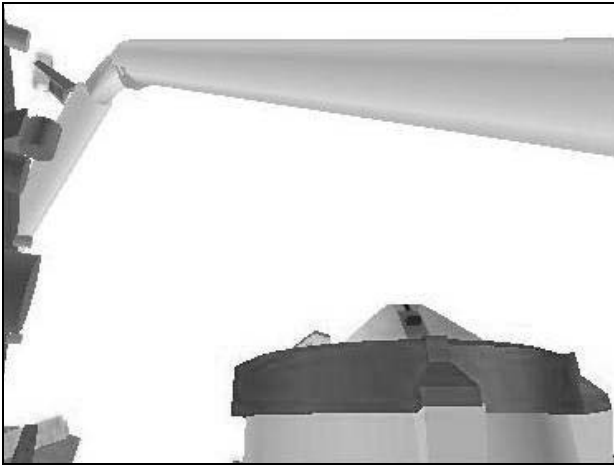


OVERHEAD

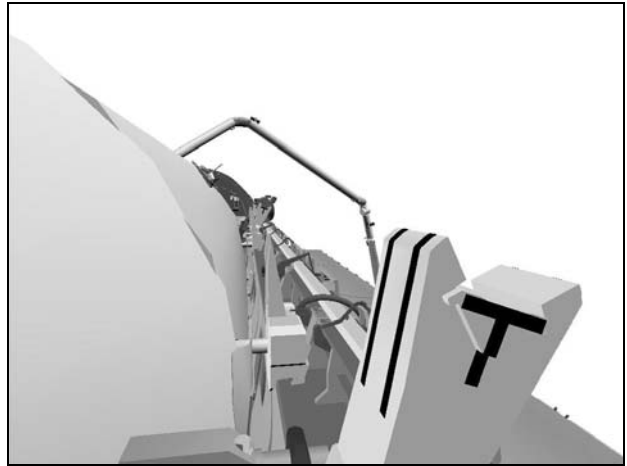


BIRD'S EYE

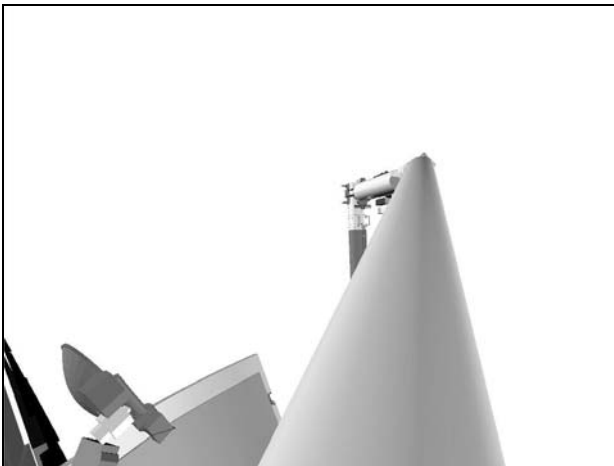
STBD LCS RCC SURVEY – Pause Pt 138



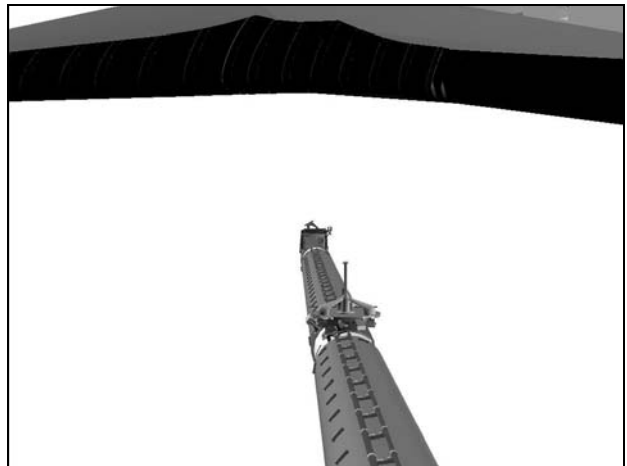
CCTV A (-60,25)



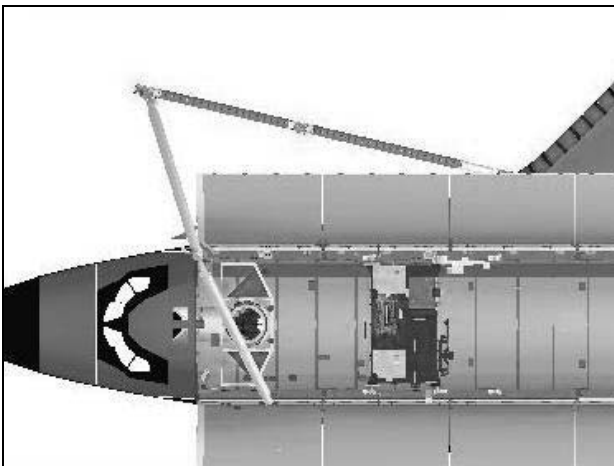
CCTV C (10,-5)



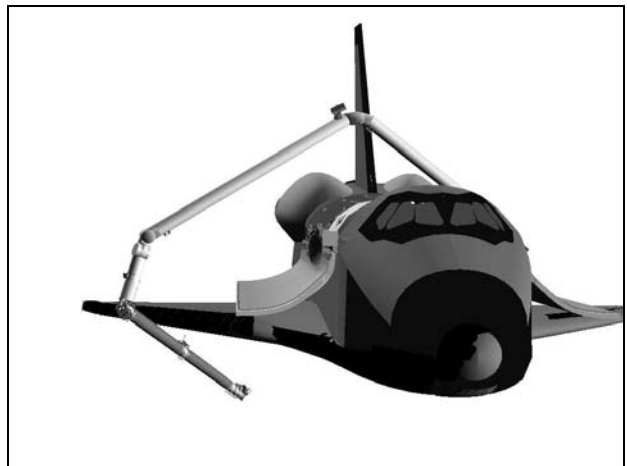
ELBOW (-15,-15)



RSC



OVERHEAD

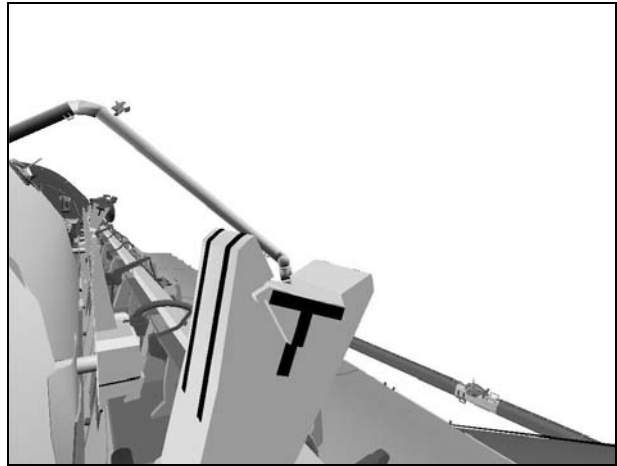


BIRD'S EYE

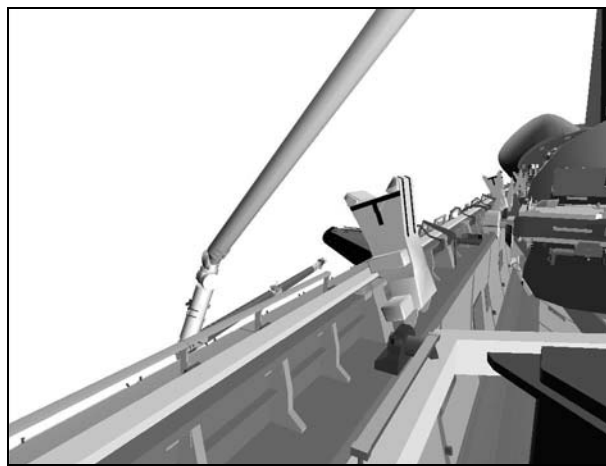
STBD LCS RCC SURVEY – Pause Pt 140



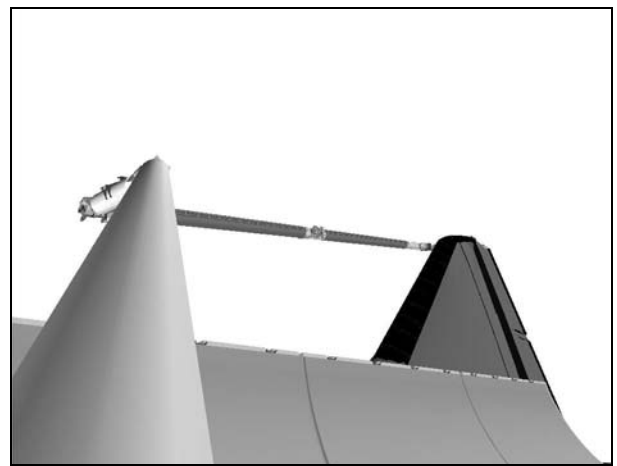
CCTV A (-15,10)



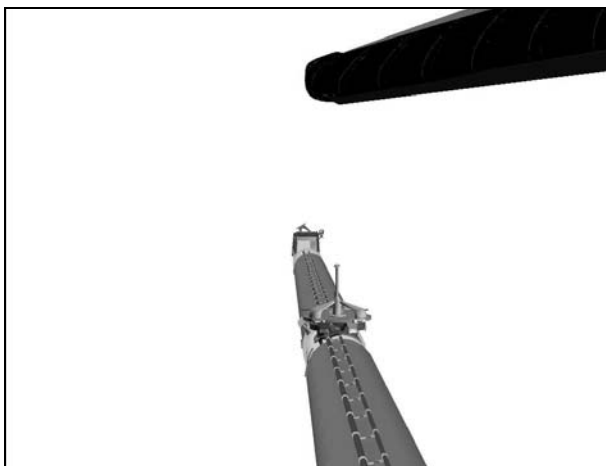
CCTV C (30,-5)



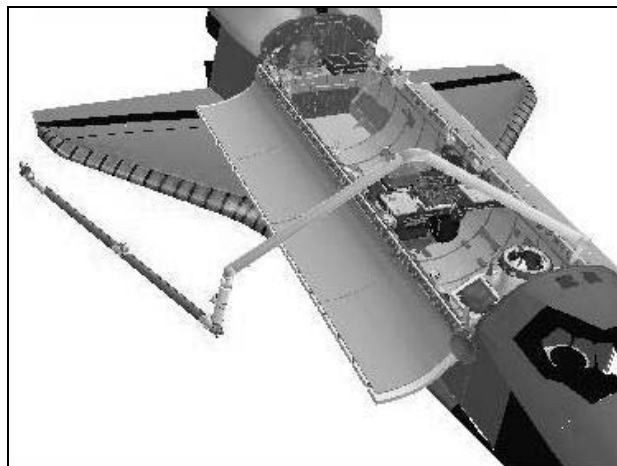
CCTV D (-30,-10)



ELBOW (20,-15)



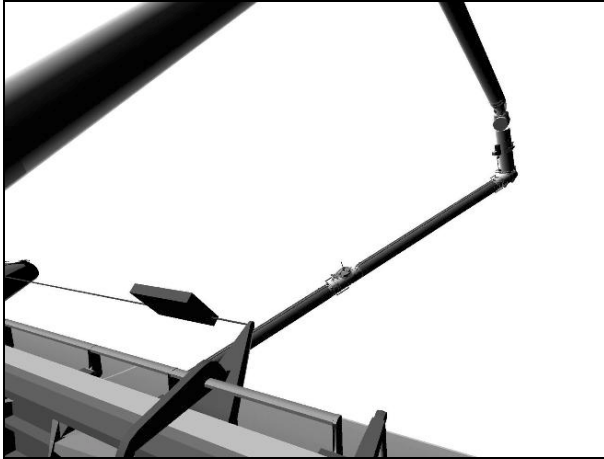
RSC



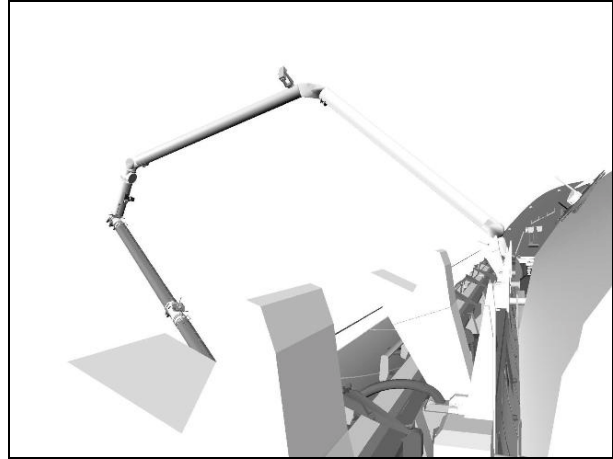
BIRD'S EYE

OBSS LCS RCC SURVEY CAMERA VIEWS – PORT

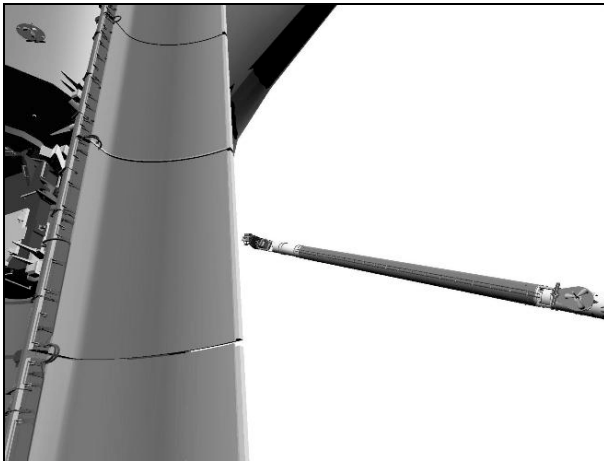
PORT LCS RCC SURVEY – Pause Pt 141



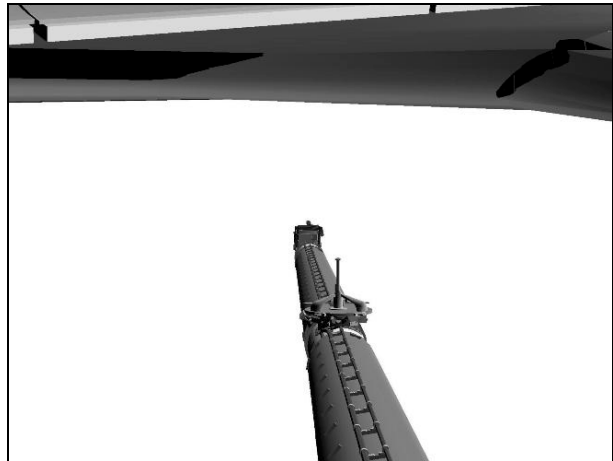
CCTV A (62,-6)



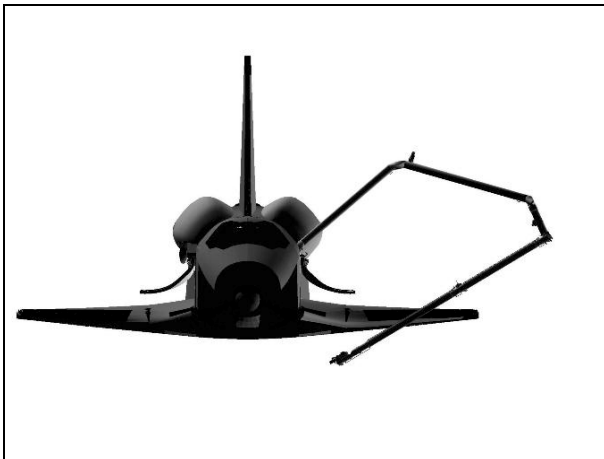
CCTV B (-19,0)



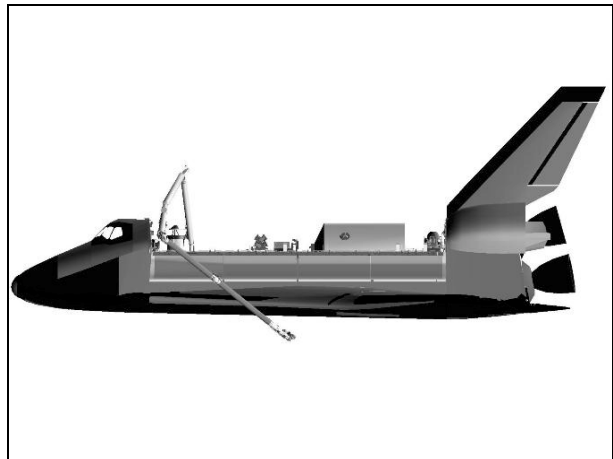
ELBOW (-92,-14)



RSC

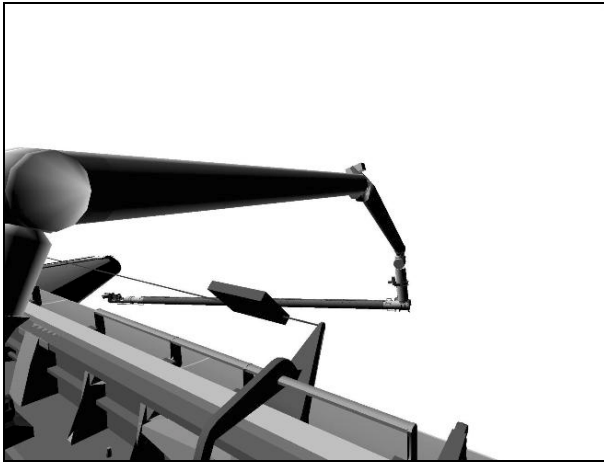


FRONT

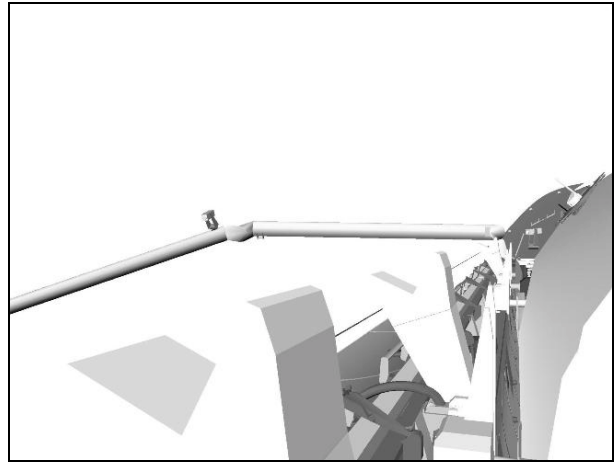


PORT

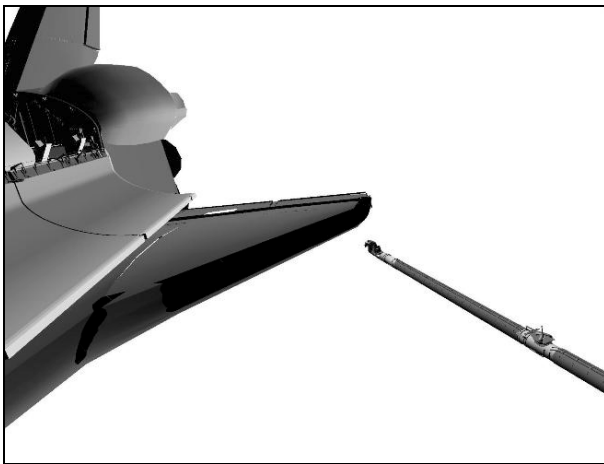
PORT LCS RCC SURVEY – Pause Pt 149



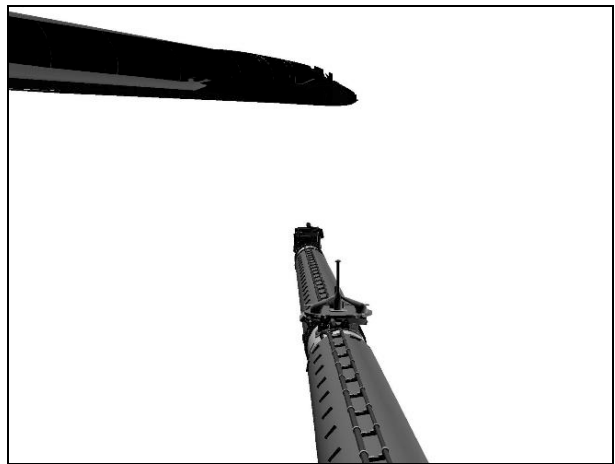
CCTV A (53,-6)



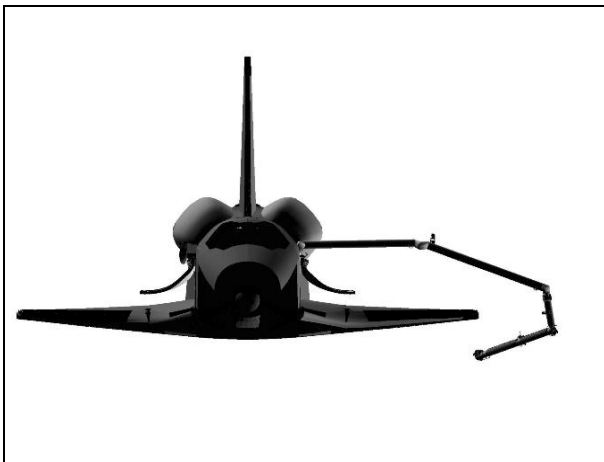
CCTV B (-19,0)



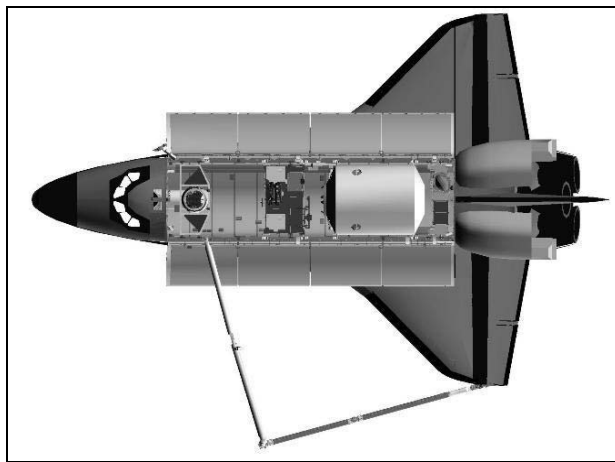
ELBOW (-68,24)



RSC

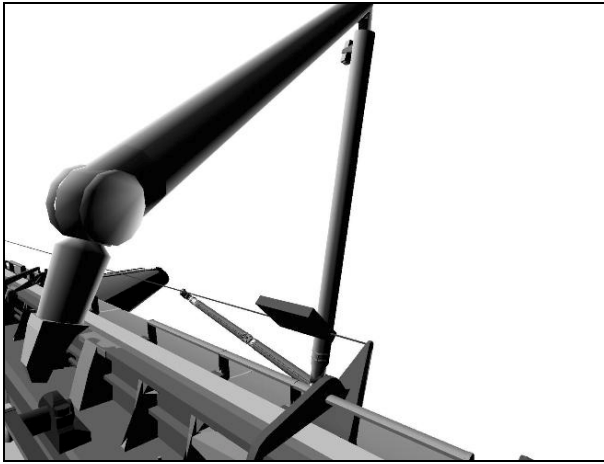


FRONT

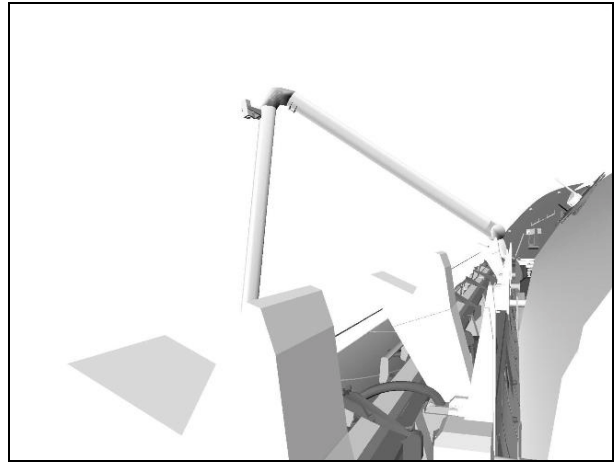


OVERHEAD

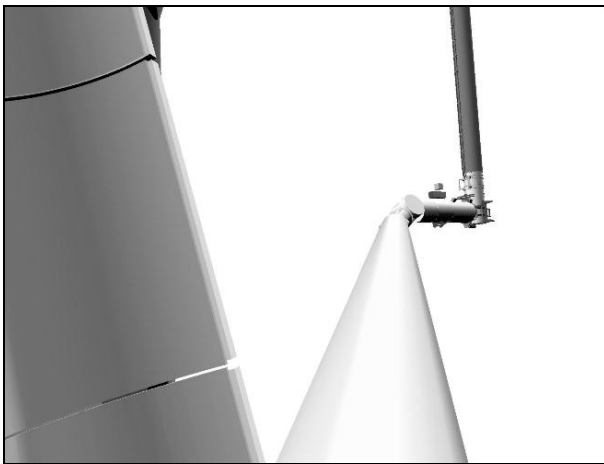
PORT LCS RCC SURVEY – Pause Pt 151



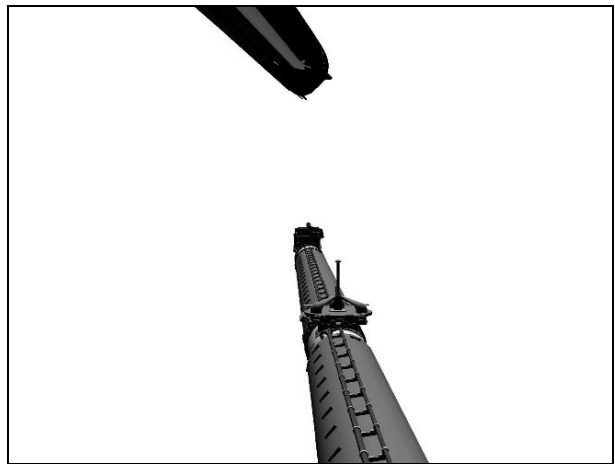
CCTV A (47,-4)



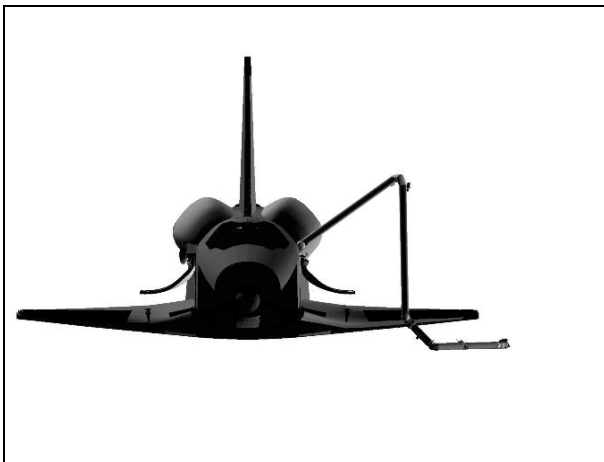
CCTV B (-10,0)



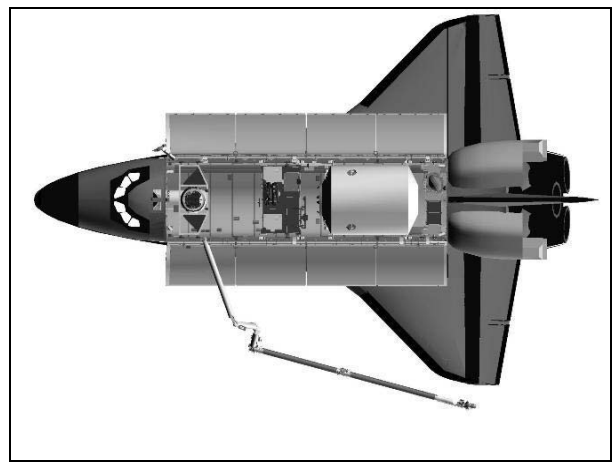
ELBOW (-13,-7)



RSC

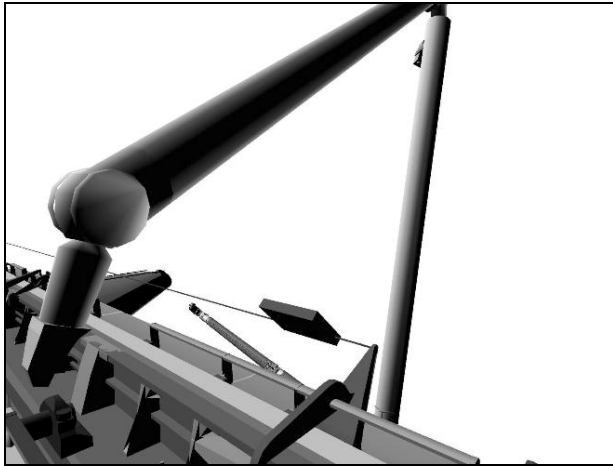


FRONT

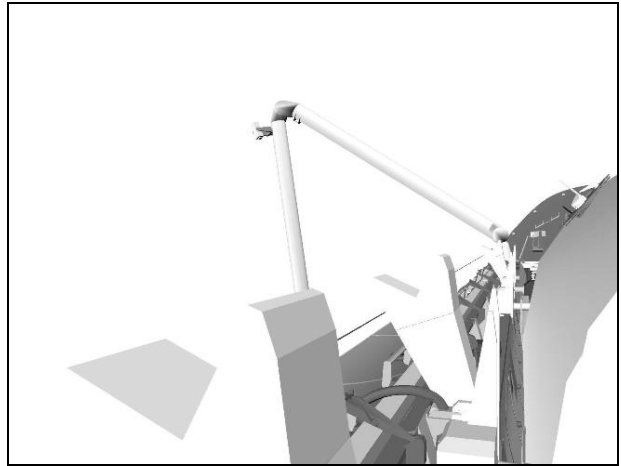


OVERHEAD

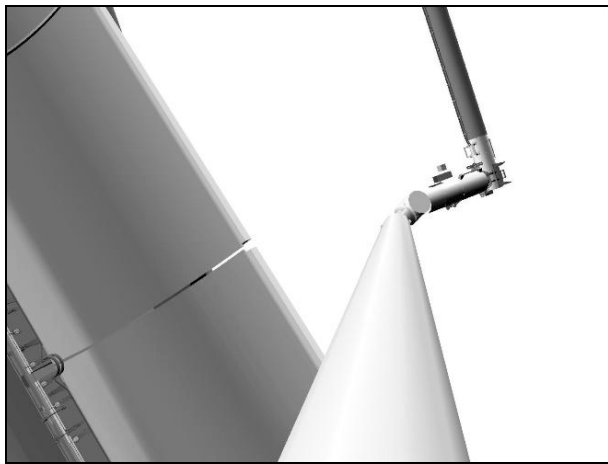
PORT LCS RCC SURVEY – Pause Pt 153



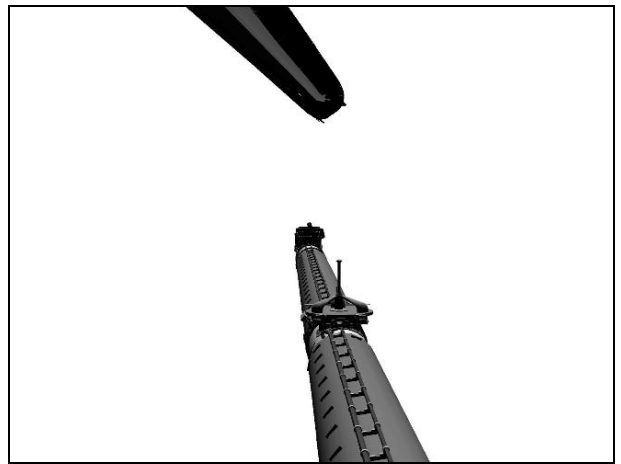
CCTV A (47,-4)



CCTV B (-19,0)



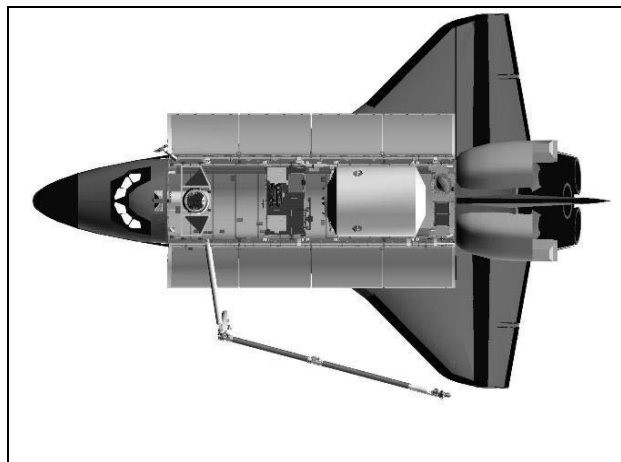
ELBOW (-13,-7)



RSC

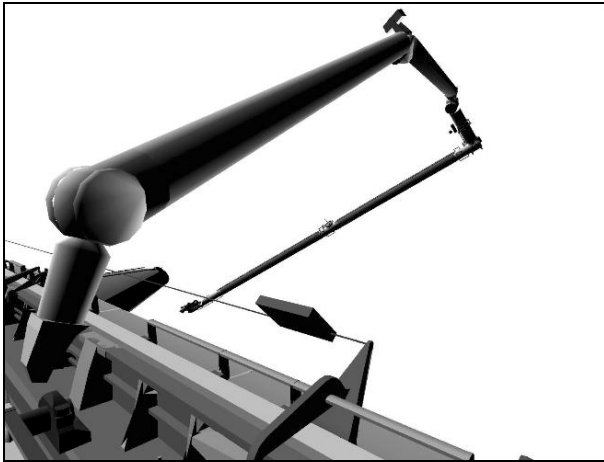


FRONT

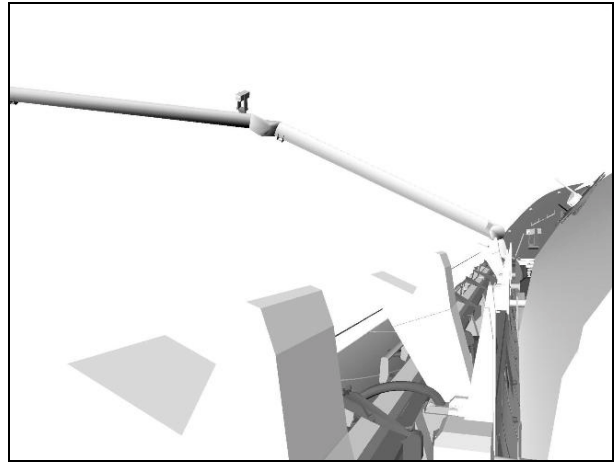


OVERHEAD

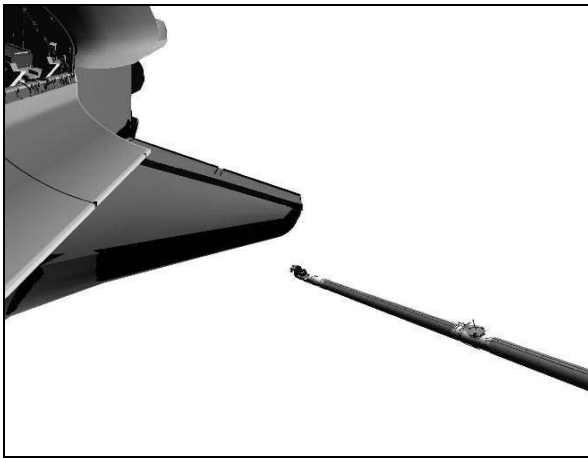
PORT LCS RCC SURVEY – Pause Pt 154



CCTV A (47,-4)



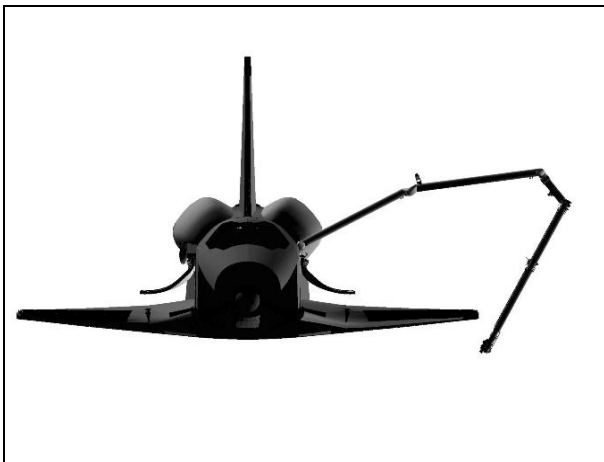
CCTV B (-19,0)



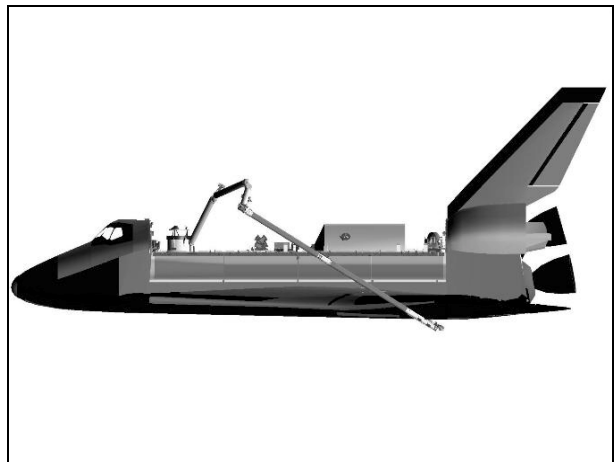
ELBOW (-68,6)



RSC

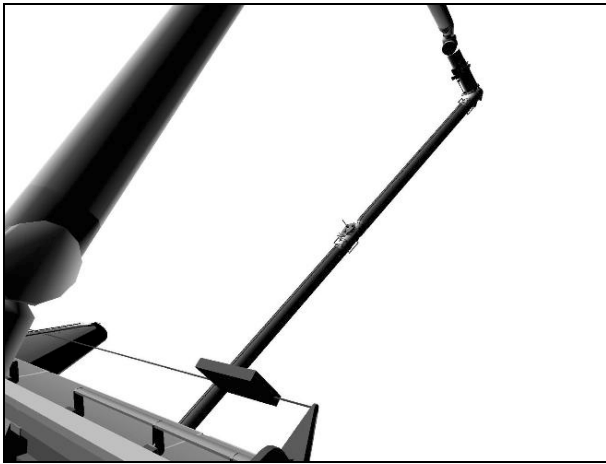


FRONT

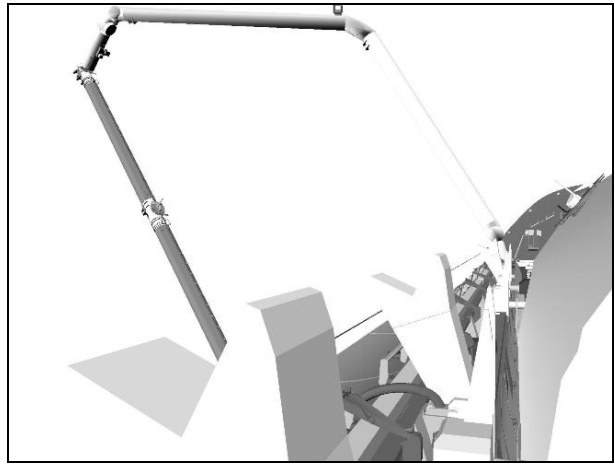


PORT

PORT LCS RCC SURVEY – Pause Pt 164



CCTV A (54,3)



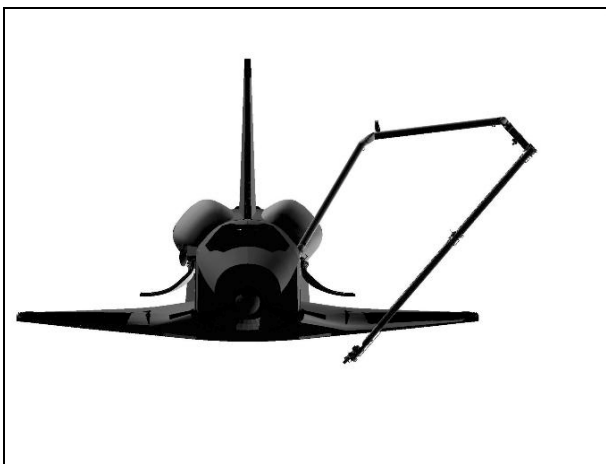
CCTV B (-19,0)



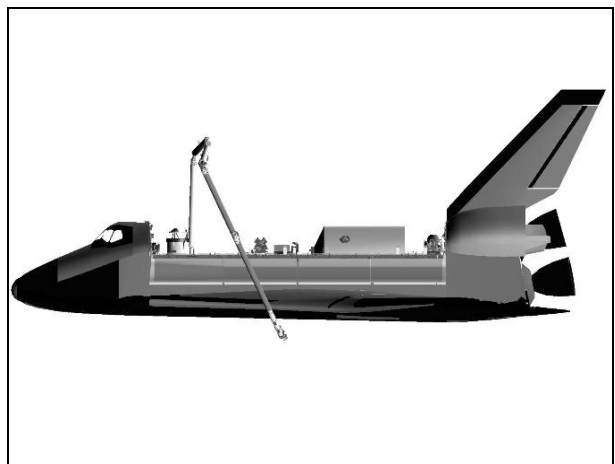
ELBOW (-95,-20)



RSC

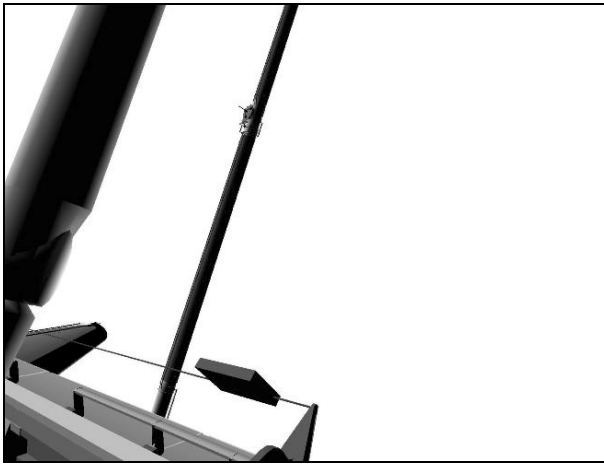


FRONT

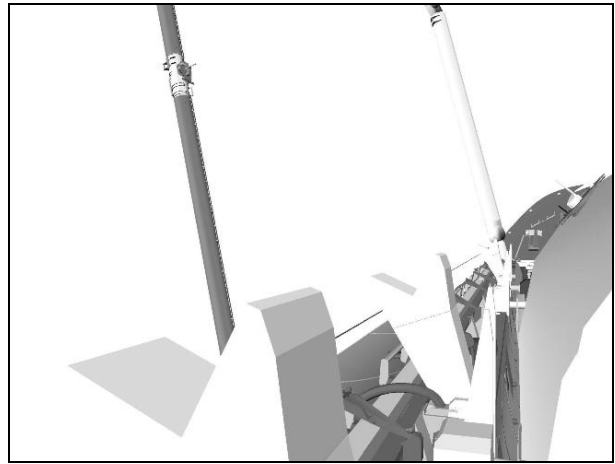


PORT

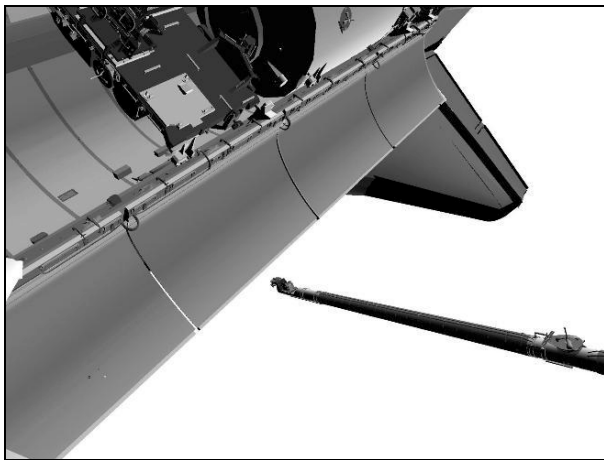
PORT LCS RCC SURVEY – Pause Pt 166



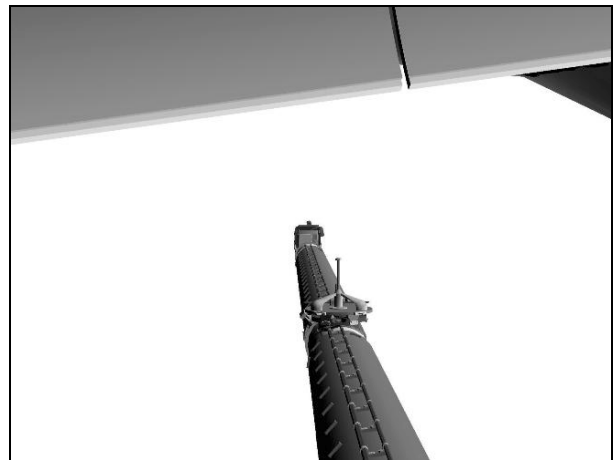
CCTV A (54,3)



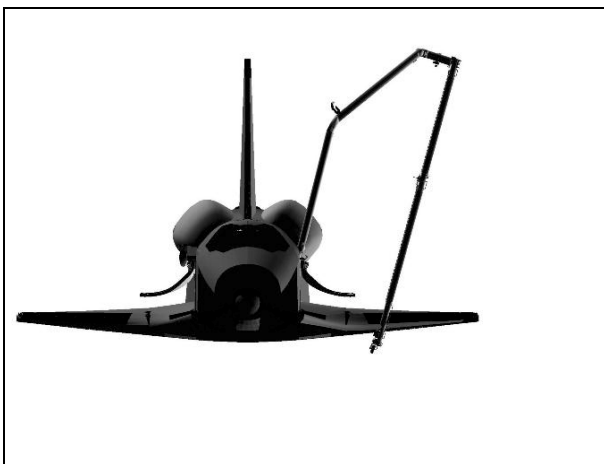
CCTV B (-19,0)



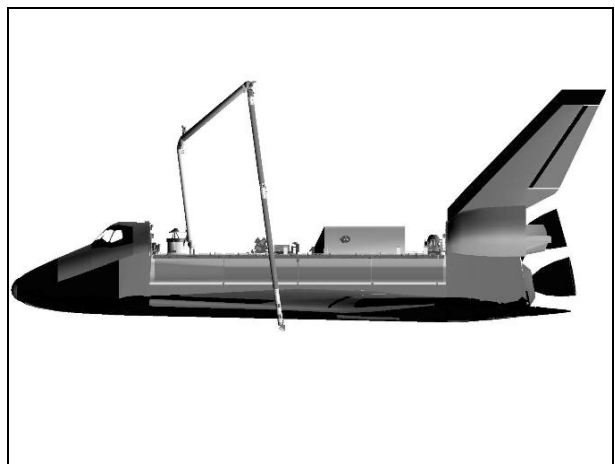
ELBOW (-90,-44)



RSC

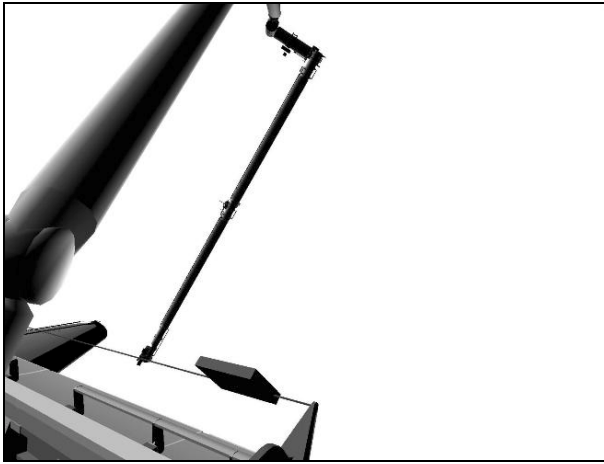


FRONT

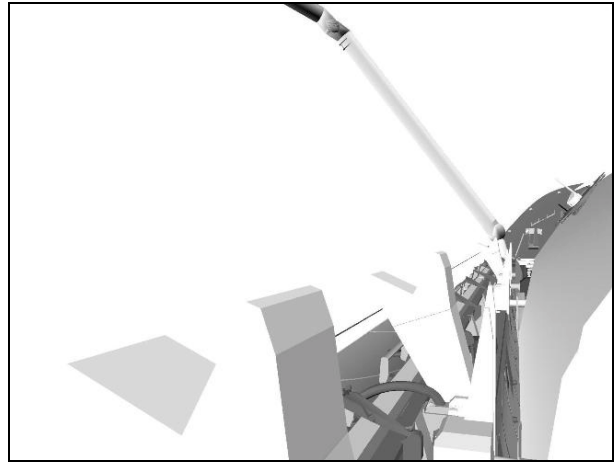


PORT

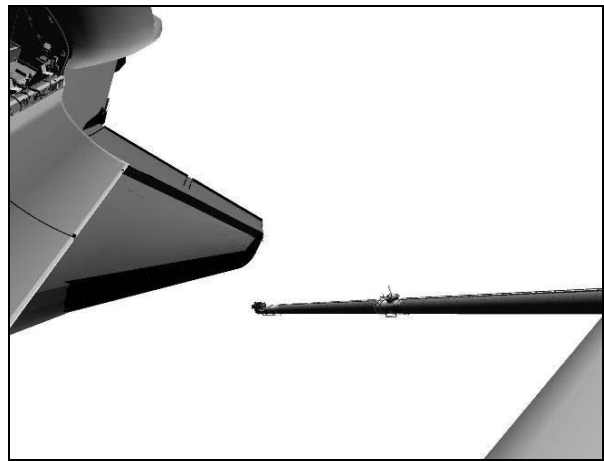
PORT LCS RCC SURVEY – Pause Pt 172



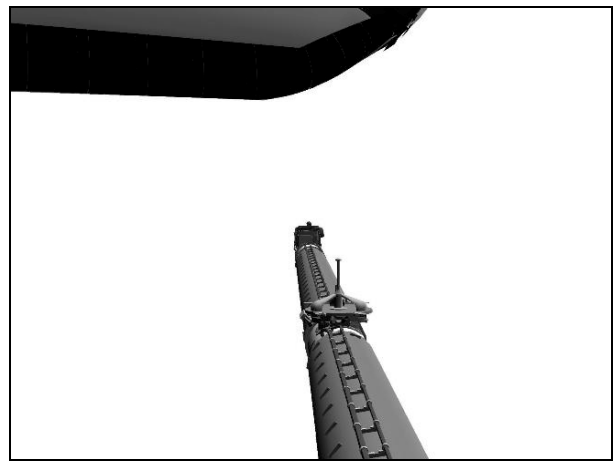
CCTV A (54,3)



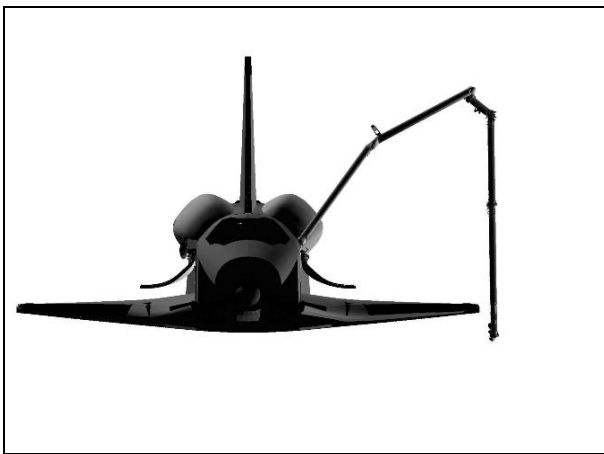
CCTV B (-19,0)



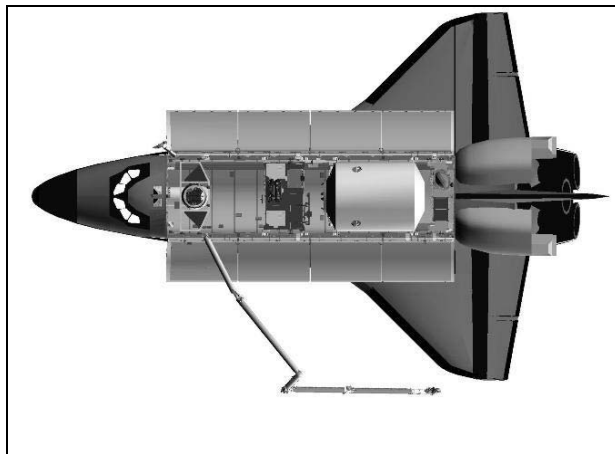
ELBOW (-50,-24)



RSC



FRONT

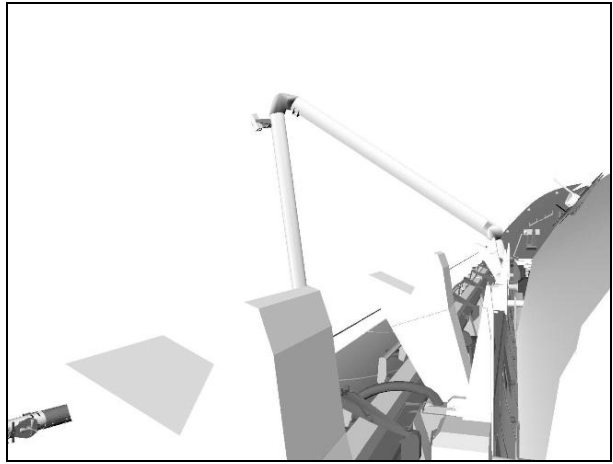


OVERHEAD

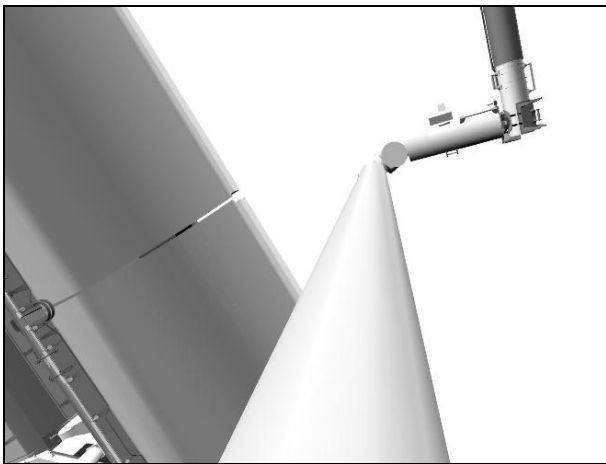
PORT LCS RCC SURVEY – Pause Pt 174



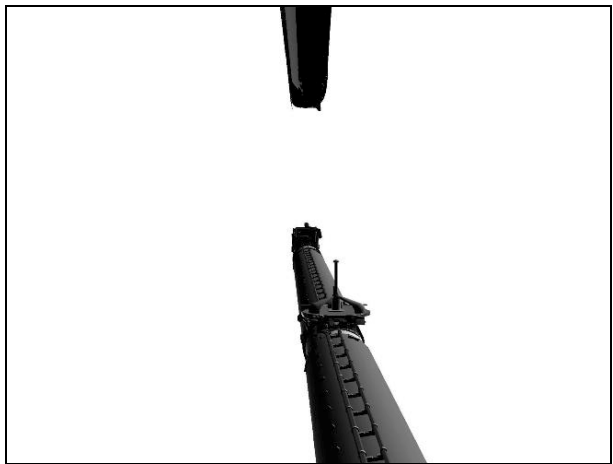
CCTV A (54,0)



CCTV B (-19,0)



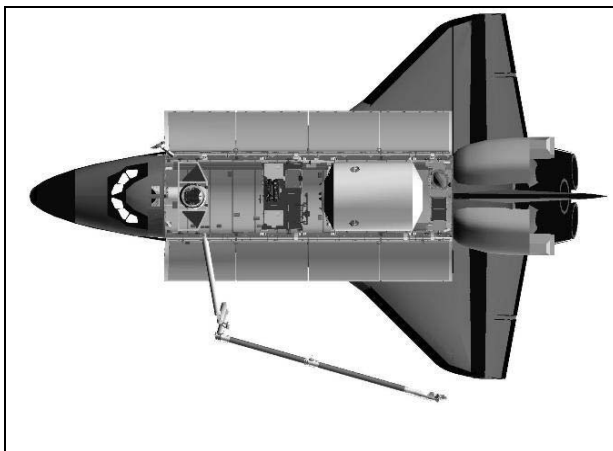
ELBOW (-10,14)



RSC

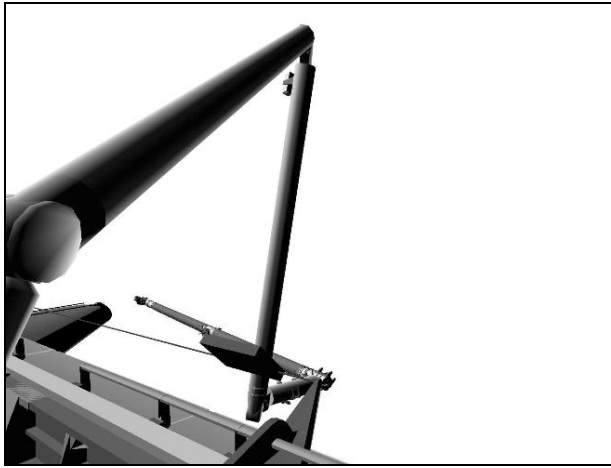


FRONT

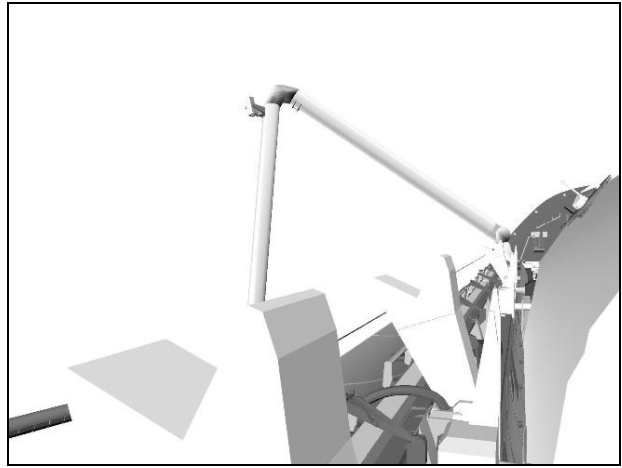


OVERHEAD

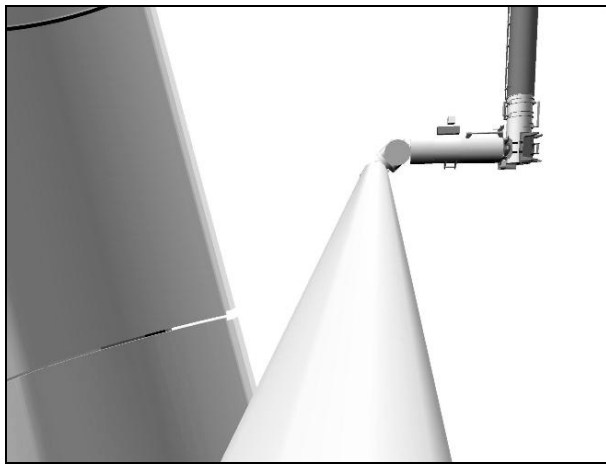
PORT LCS RCC SURVEY – Pause Pt 175



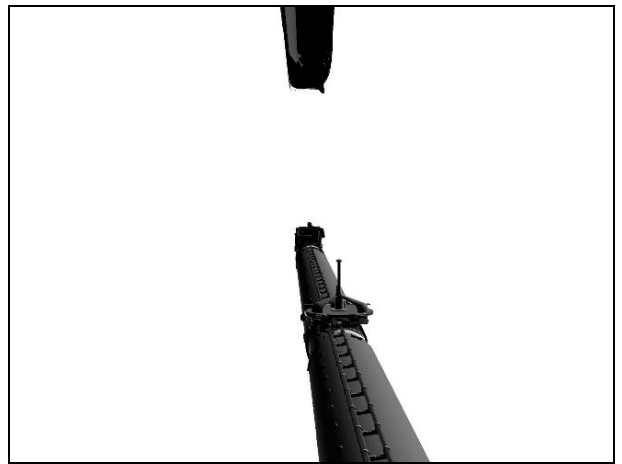
CCTV A (54,0)



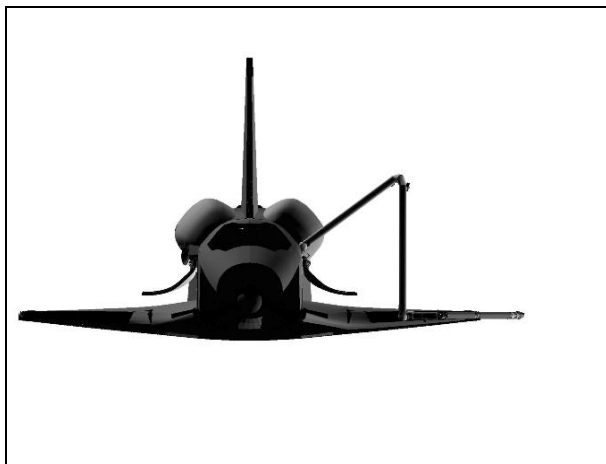
CCTV B (-19,0)



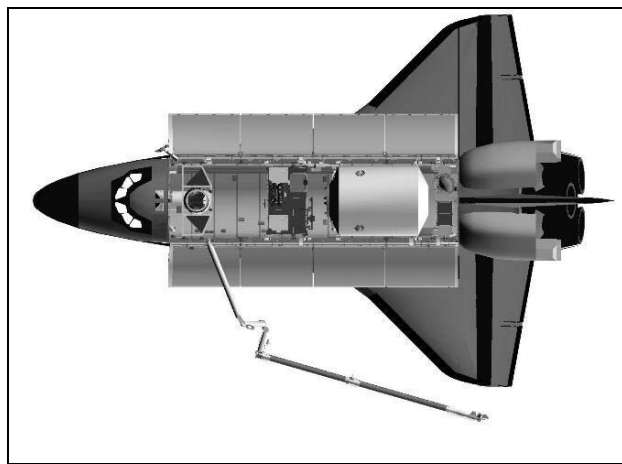
ELBOW (-10,-14)



RSC



FRONT

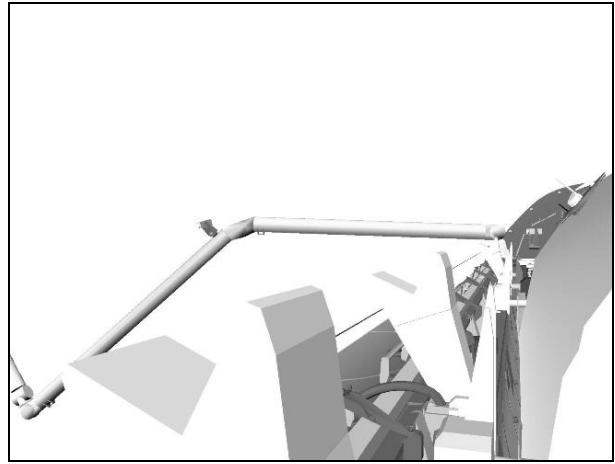


OVERHEAD

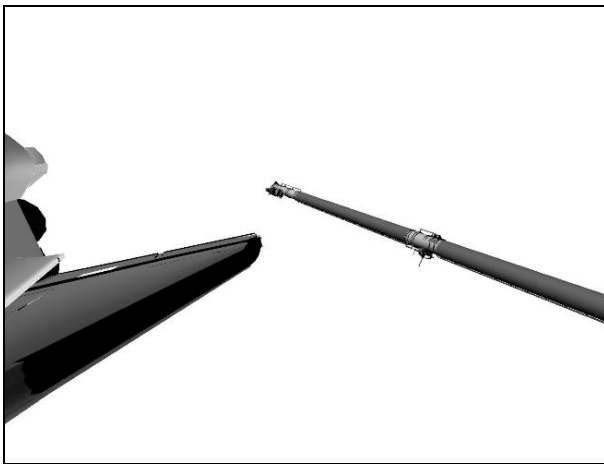
PORT LCS RCC SURVEY – Pause Pt 177



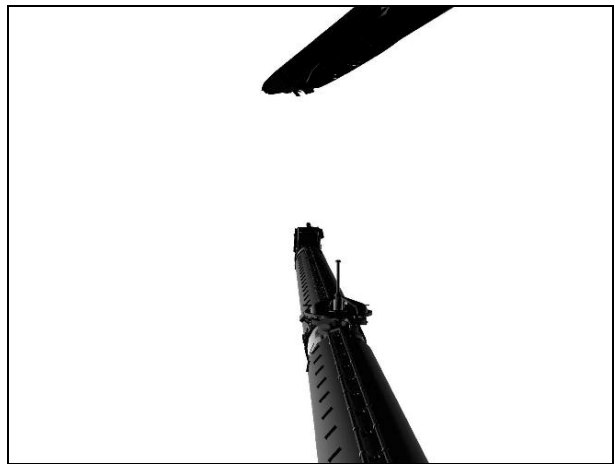
CCTV A (54,0)



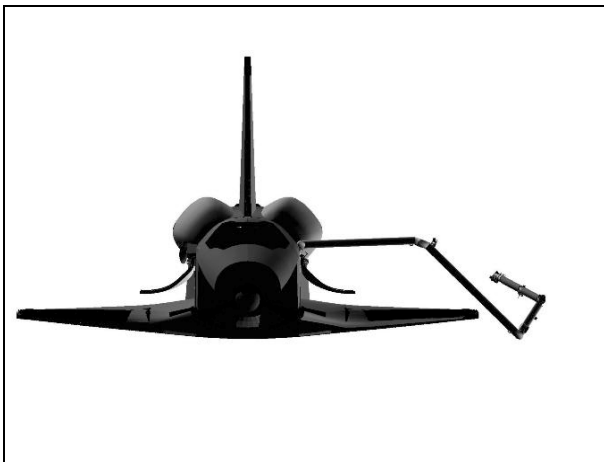
CCTV B (-19,0)



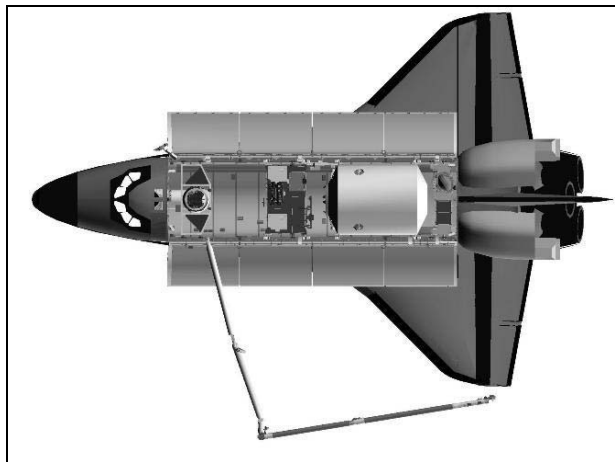
ELBOW (-43,40)



RSC

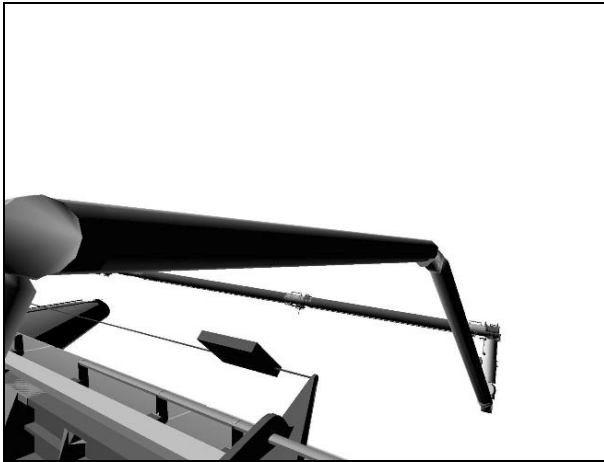


FRONT

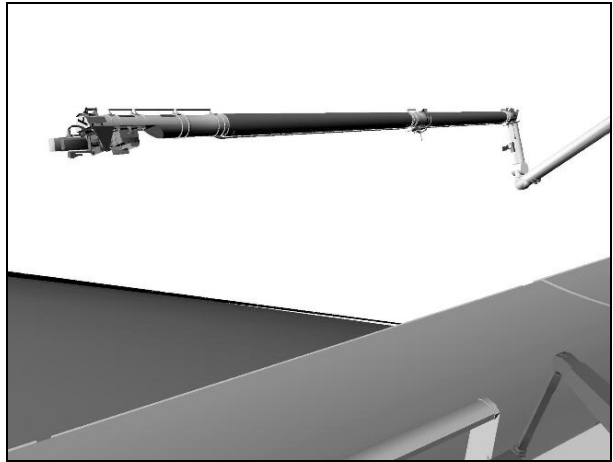


OVERHEAD

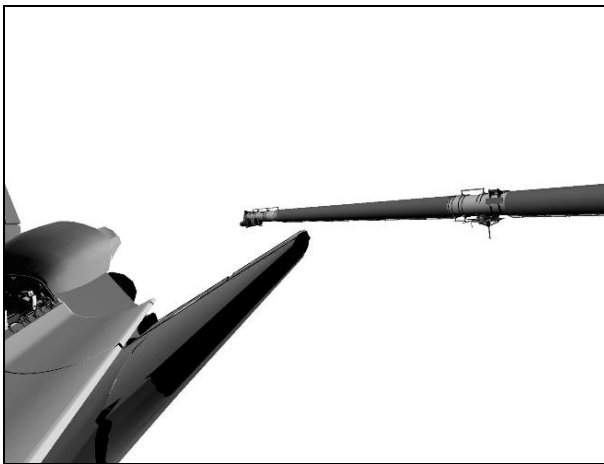
PORT LCS RCC SURVEY – Pause Pt 180



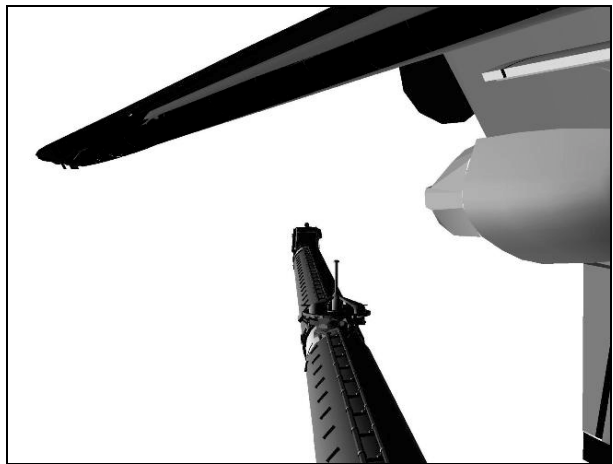
CCTV A (54,0)



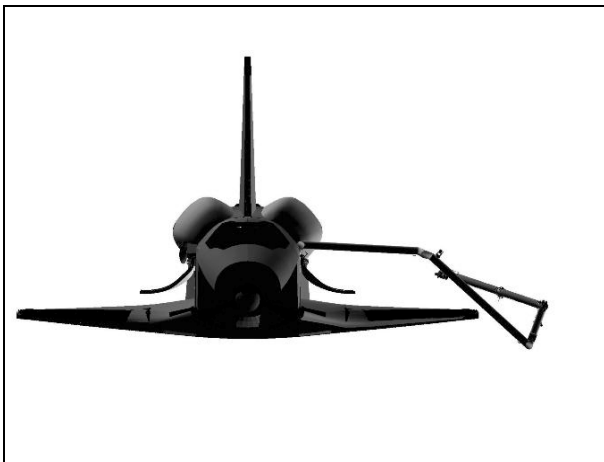
CCTV B (-59,-20)



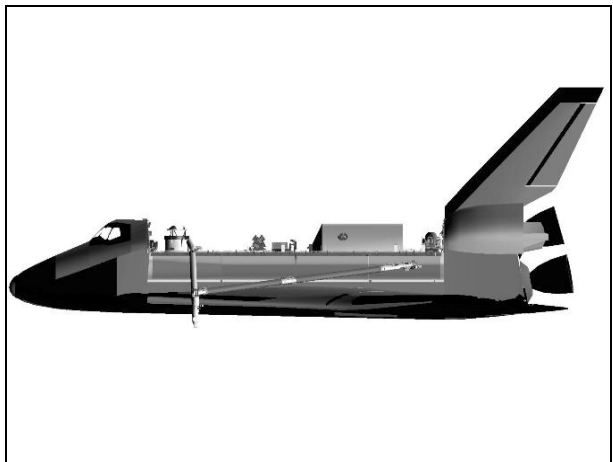
ELBOW (-73,40)



RSC

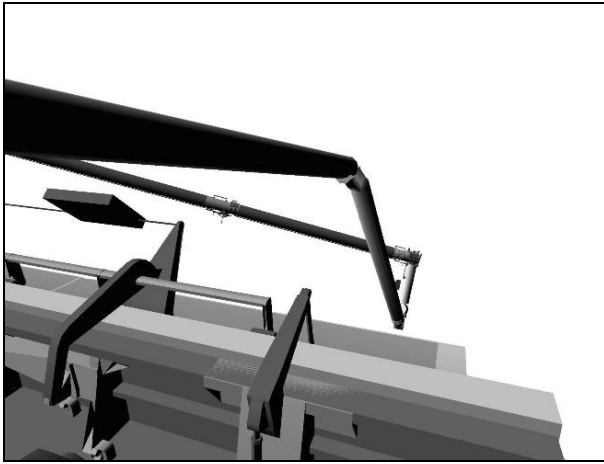


FRONT

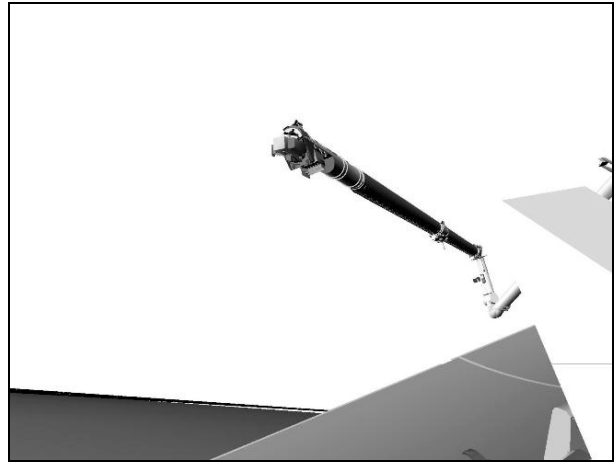


PORT

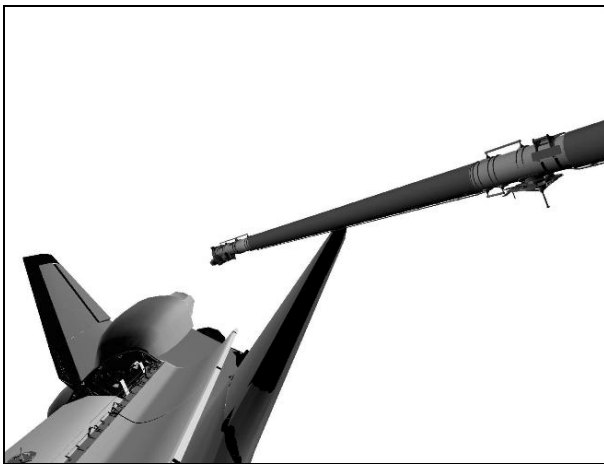
PORT LCS RCC SURVEY – Pause Pt 181



CCTV A (71,-19)



CCTV B (-51,-12)



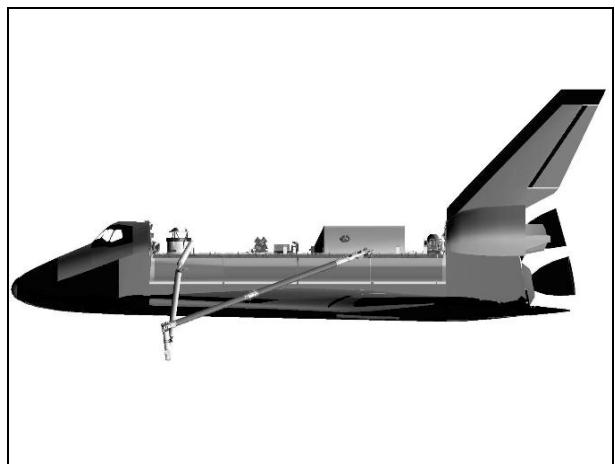
ELBOW (-93,40)



RSC

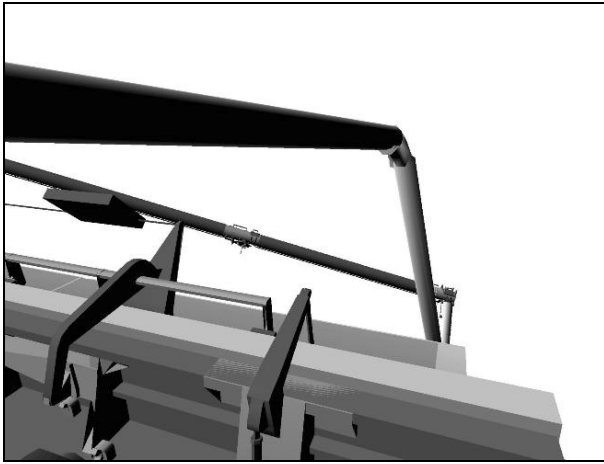


FRONT

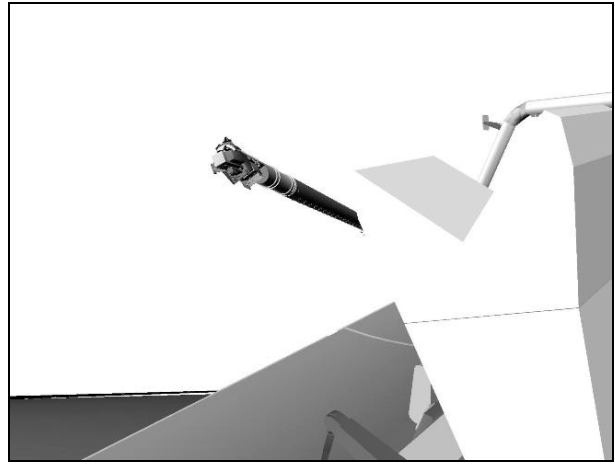


PORT

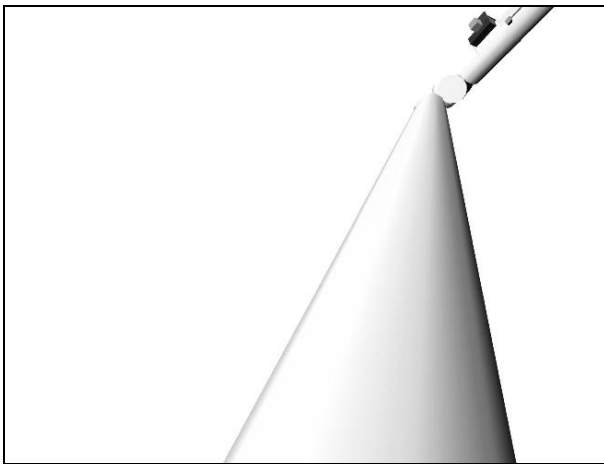
PORT LCS RCC SURVEY – Pause Pt 182



CCTV A (71,-19)



CCTV B (-33,-14)



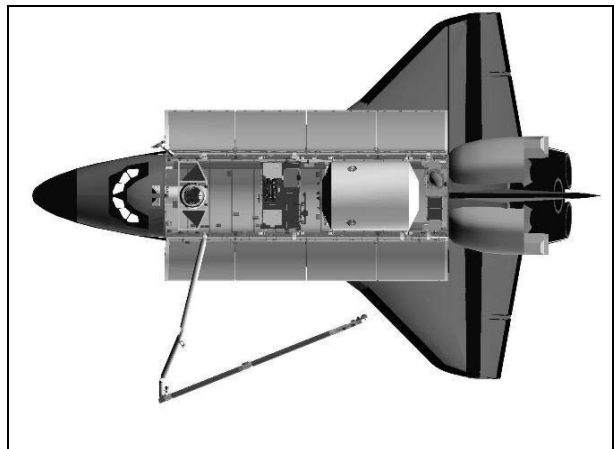
ELBOW (-17,-23)



RSC

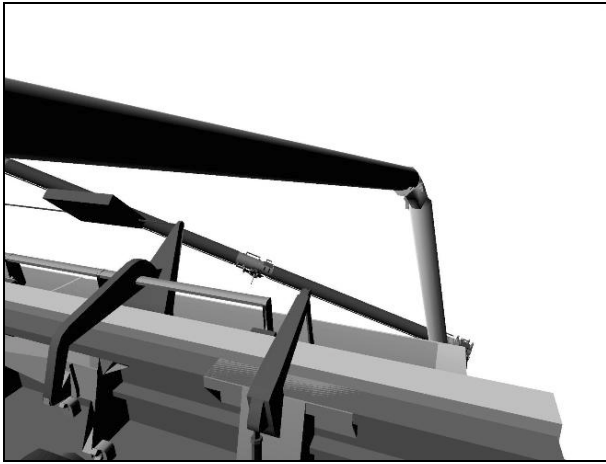


FRONT

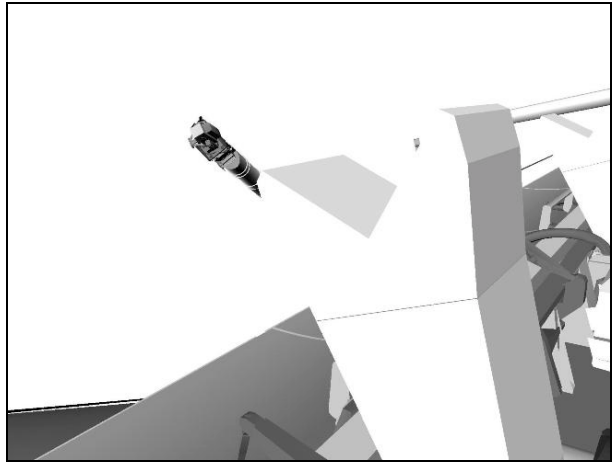


OVERHEAD

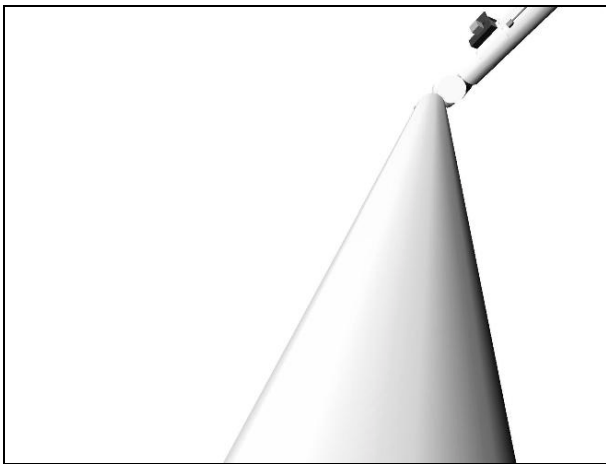
PORT LCS RCC SURVEY – Pause Pt 183



CCTV A (71,-19)



CCTV B (-33,-14)



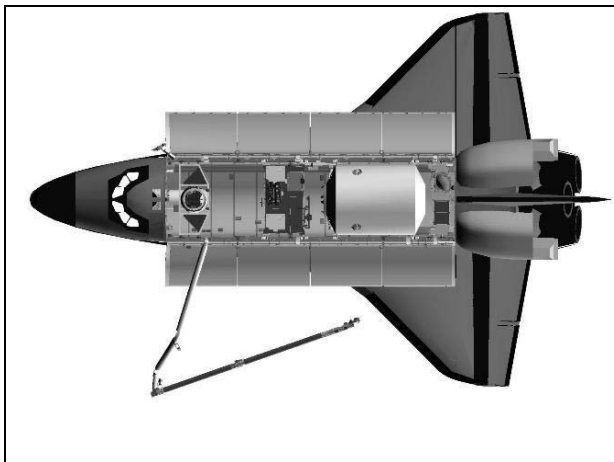
ELBOW (-17,-23)



RSC

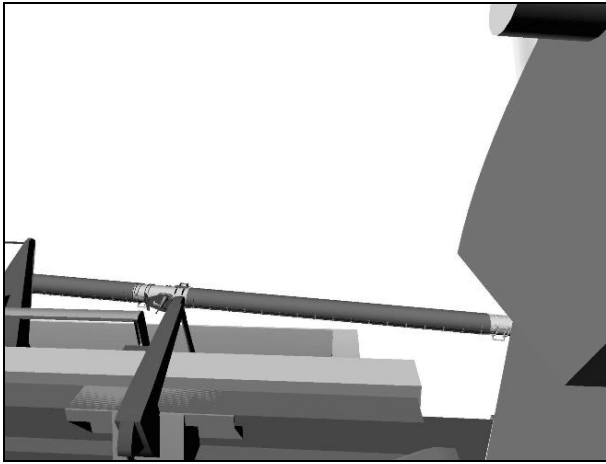


FRONT

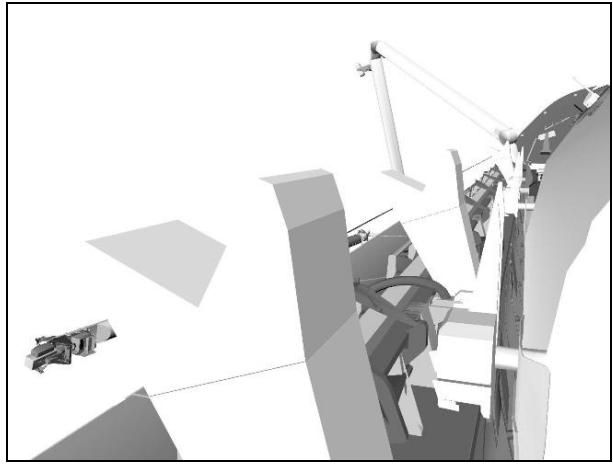


OVERHEAD

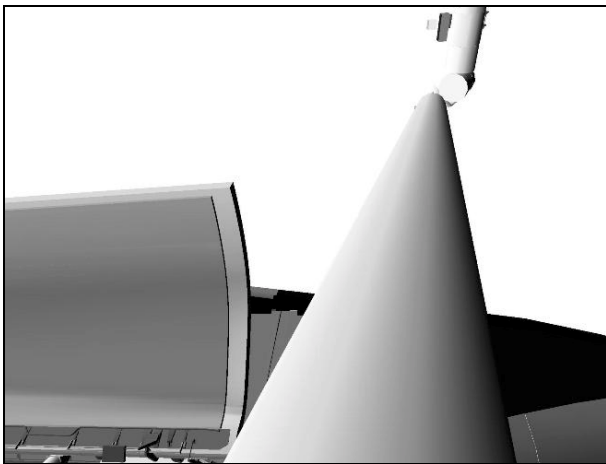
PORT LCS RCC SURVEY – Pause Pt 185



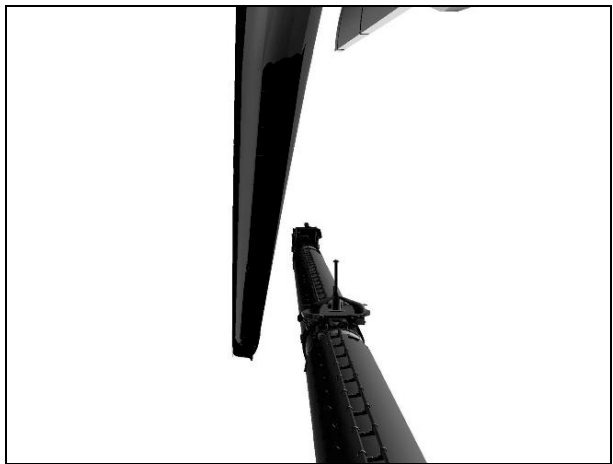
CCTV A (87,-19)



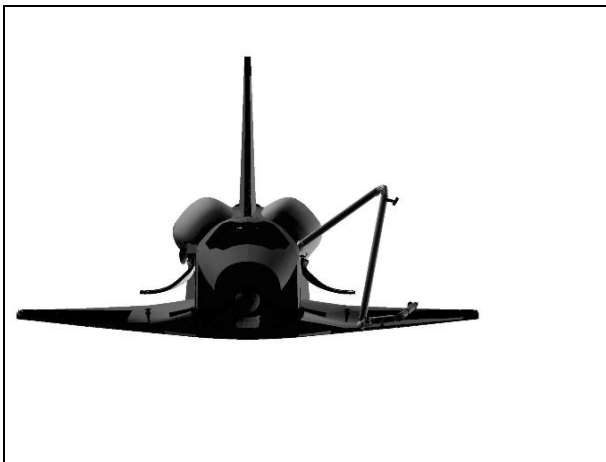
CCTV B (-20,-9)



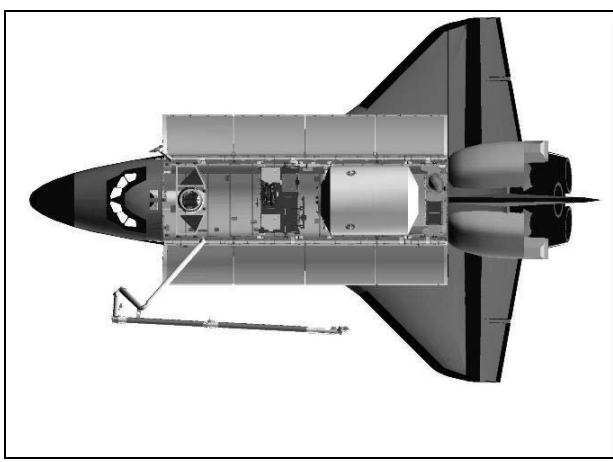
ELBOW (-17,-23)



RSC

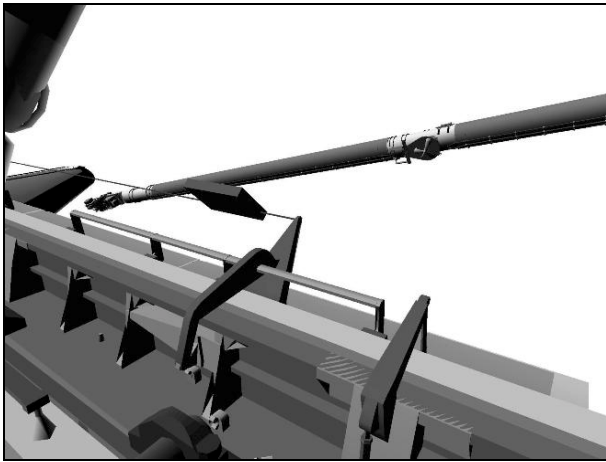


FRONT

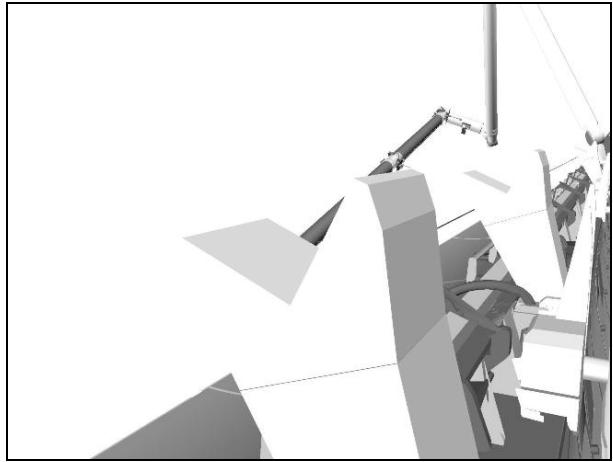


OVERHEAD

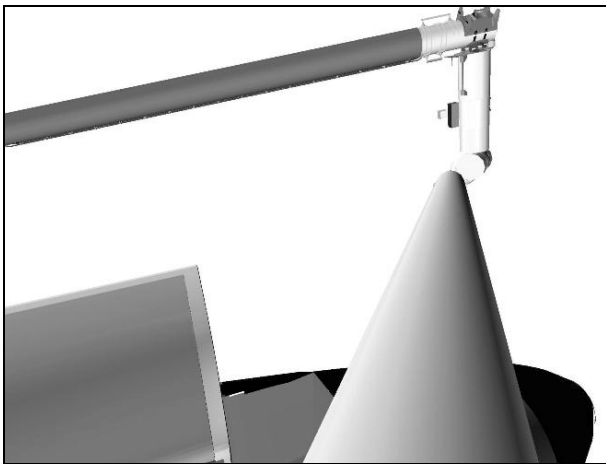
PORT LCS RCC SURVEY – Pause Pt 186



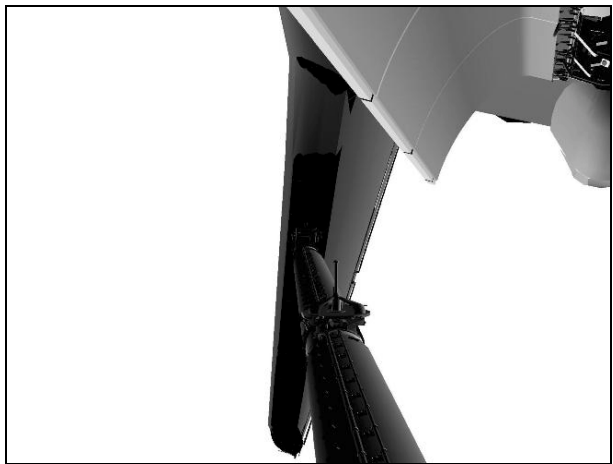
CCTV A (56,-19)



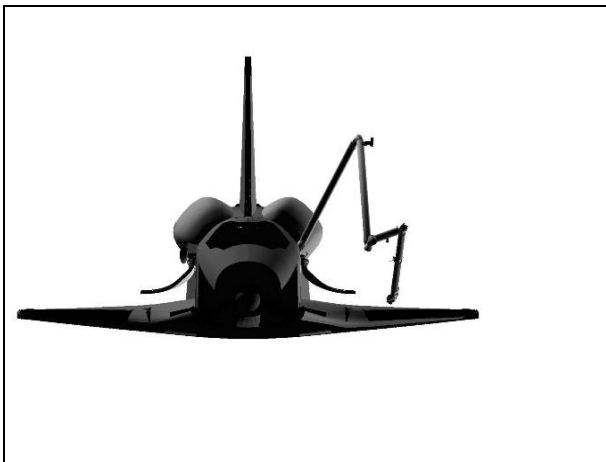
CCTV B (-27,-9)



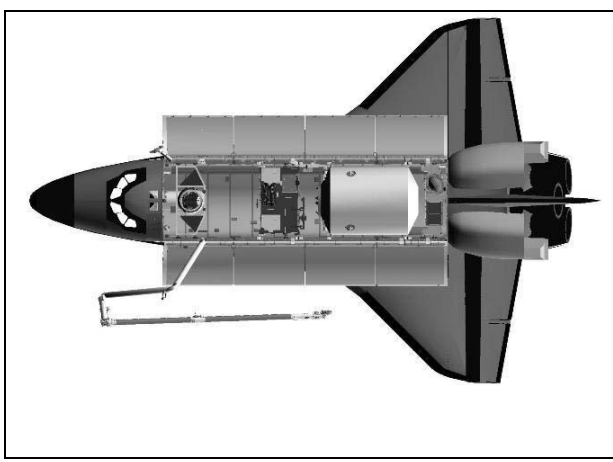
ELBOW (-20,-13)



RSC



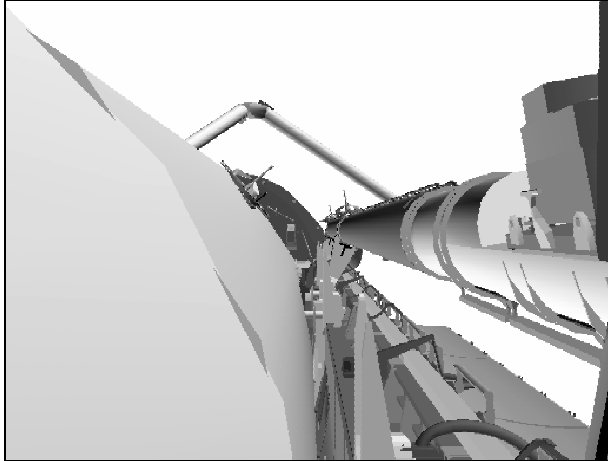
FRONT



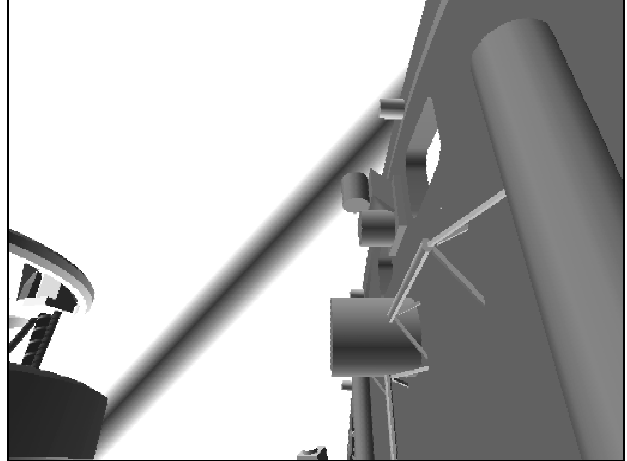
OVERHEAD

SRMS EE CAM CREW CABIN SURVEY CAMERA VIEWS

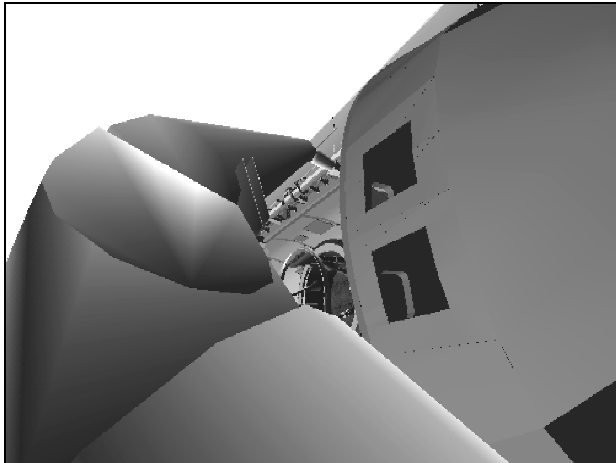
EE CREW CABIN SURVEY – Pause Pt 111



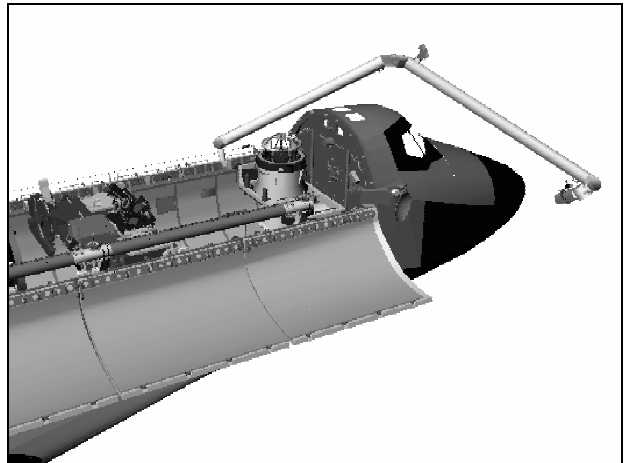
CCTV C (0,0)



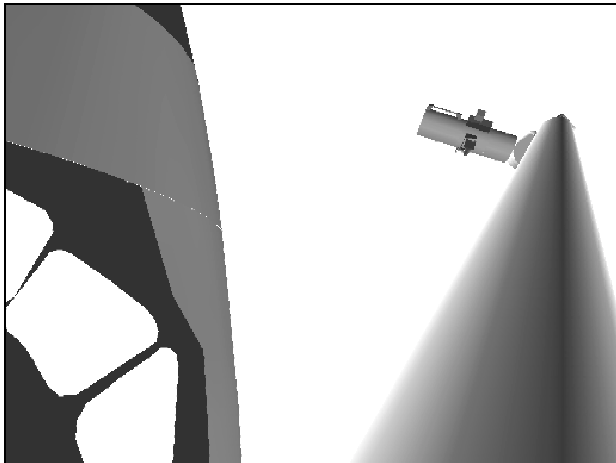
CCTV D (90,30)



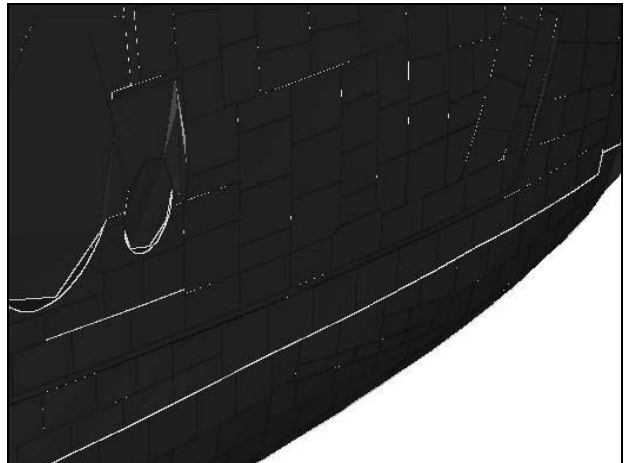
ELBOW (-135,-50)



BIRD'S EYE

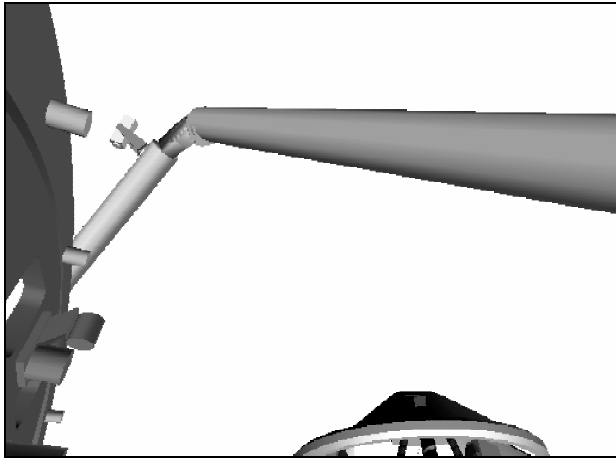


ELBOW (-30,-20)

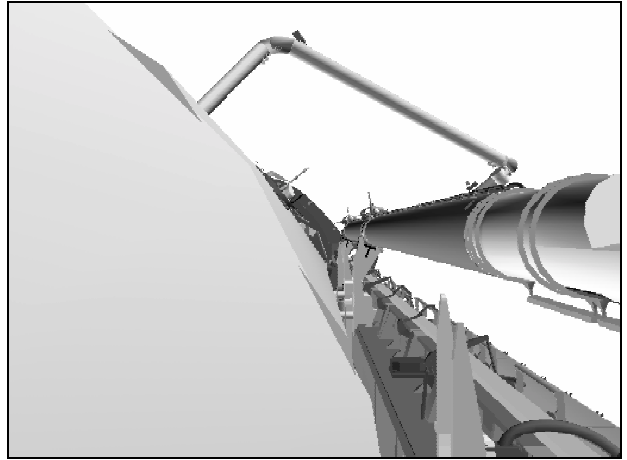


WRIST

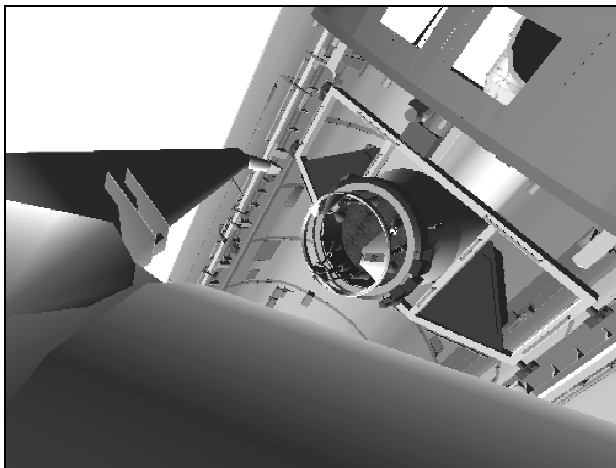
EE CREW CABIN SURVEY – Pause Pt 112



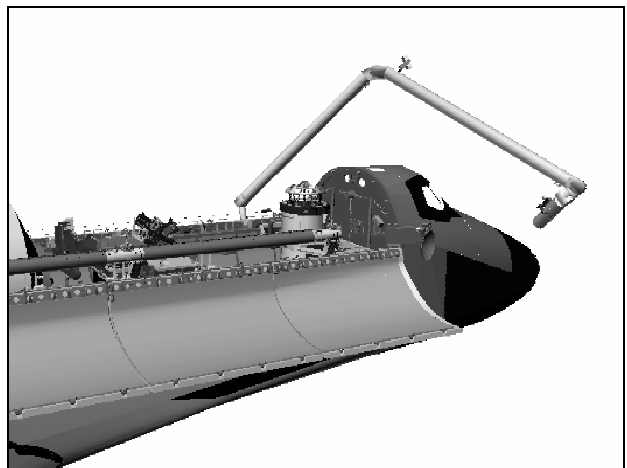
CCTV A (-65,45)



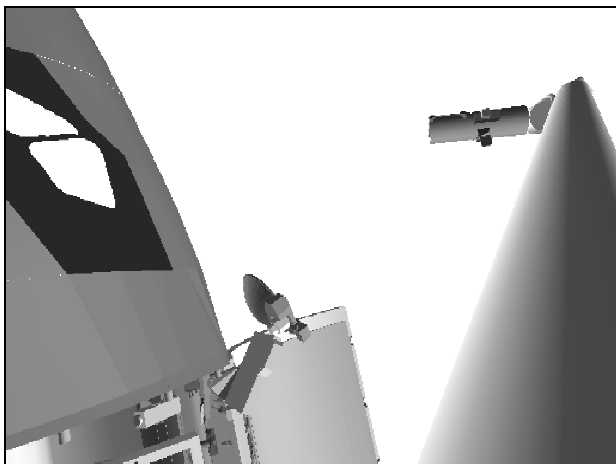
CCTV C (0,0)



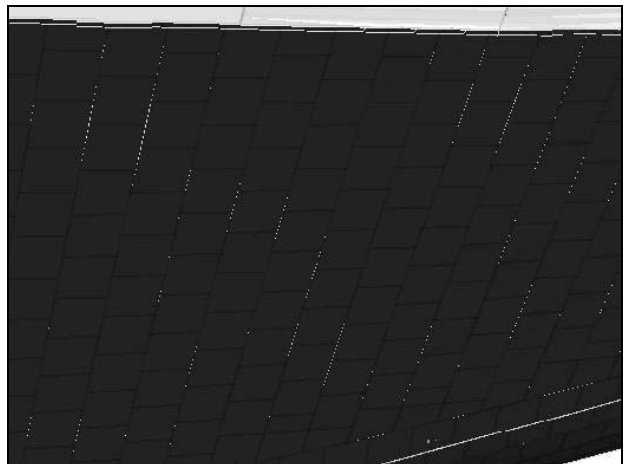
ELBOW (-110,-55)



BIRD'S EYE

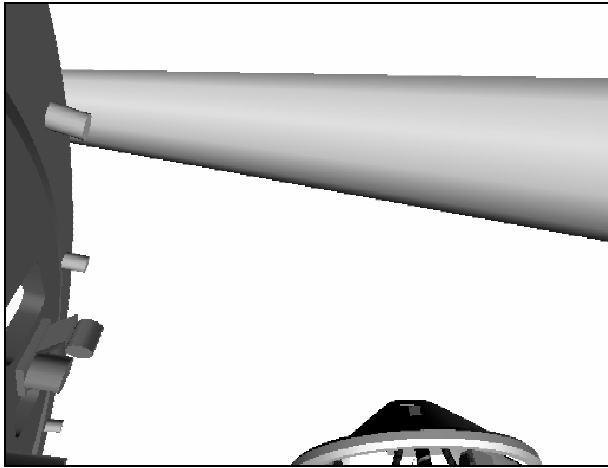


ELBOW (-30,-25)

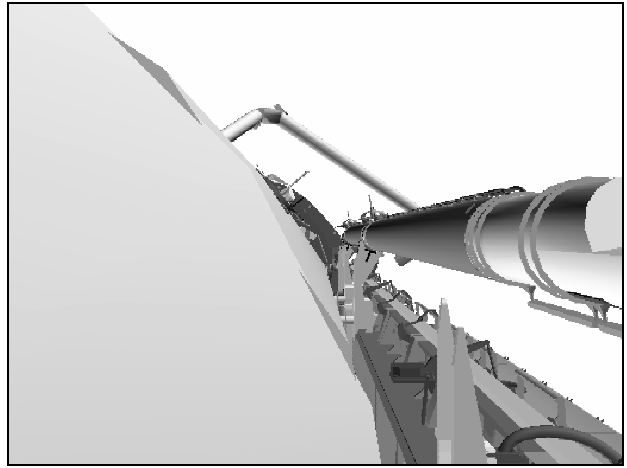


WRIST

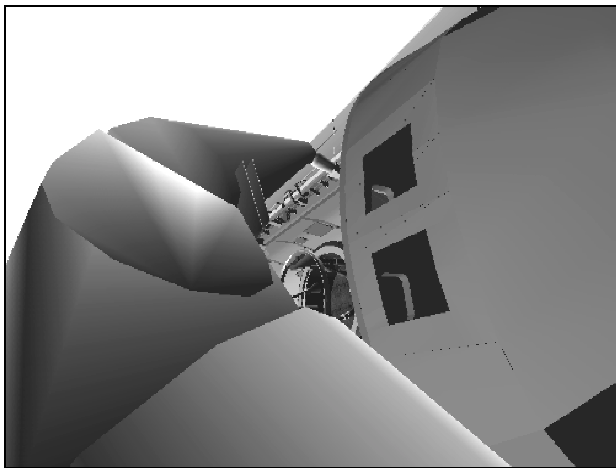
EE CREW CABIN SURVEY – Pause Pt 113



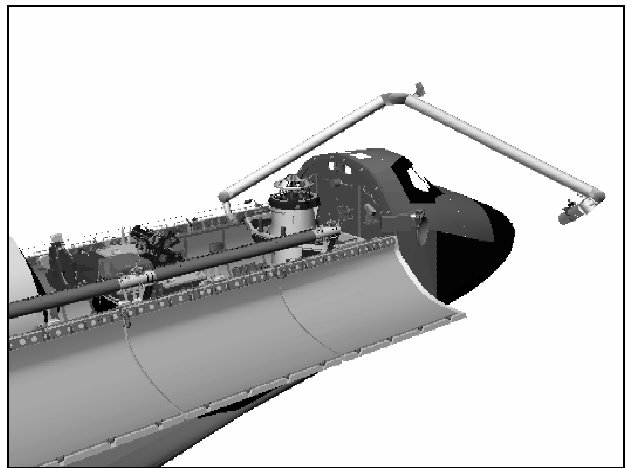
CCTV A (-65,45)



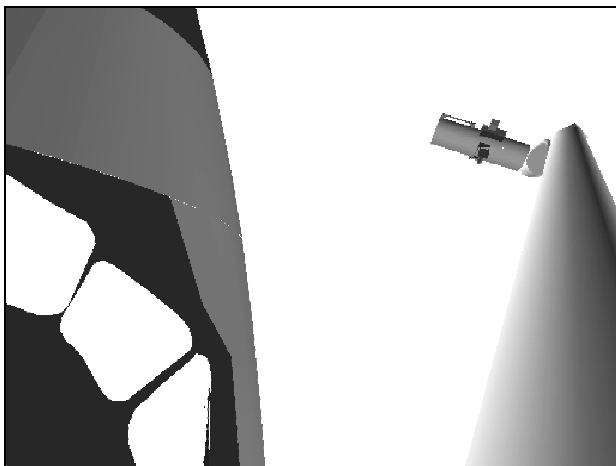
CCTV C (0,0)



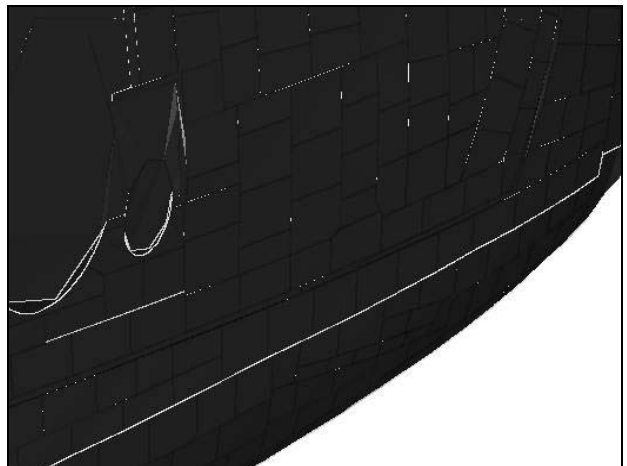
ELBOW (-135,-50)



BIRD'S EYE

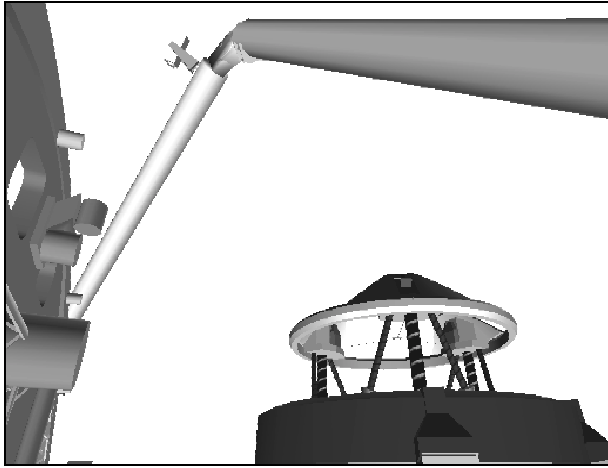


ELBOW (-30,-20)

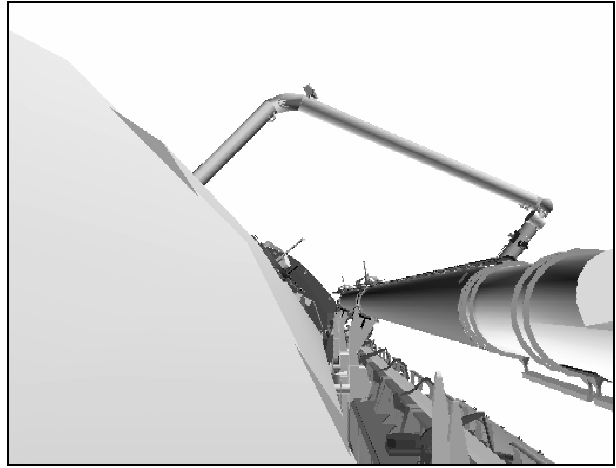


WRIST

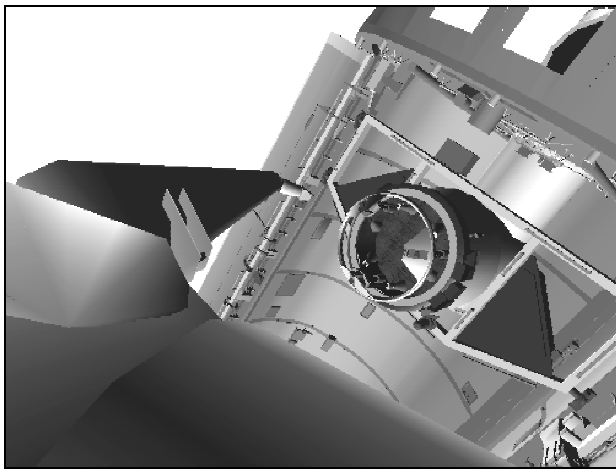
EE CREW CABIN SURVEY – Pause Pt 114



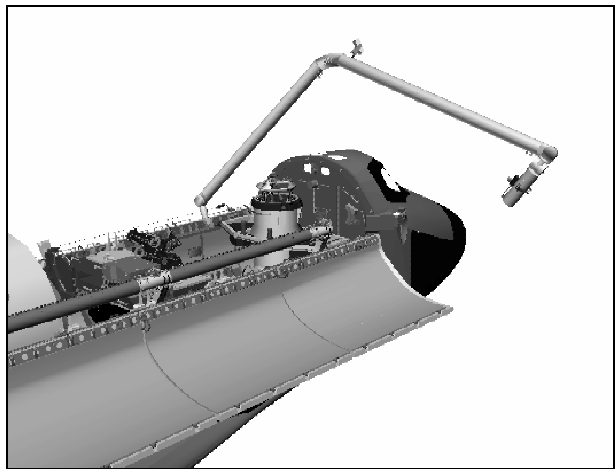
CCTV A (-65,30)



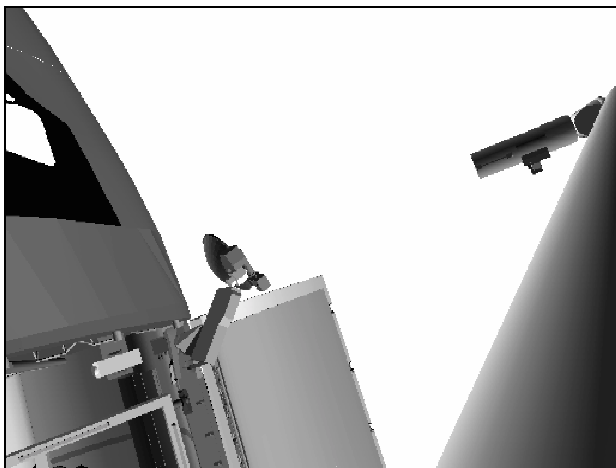
CCTV C (0,5)



ELBOW (-120,-50)



BIRD'S EYE

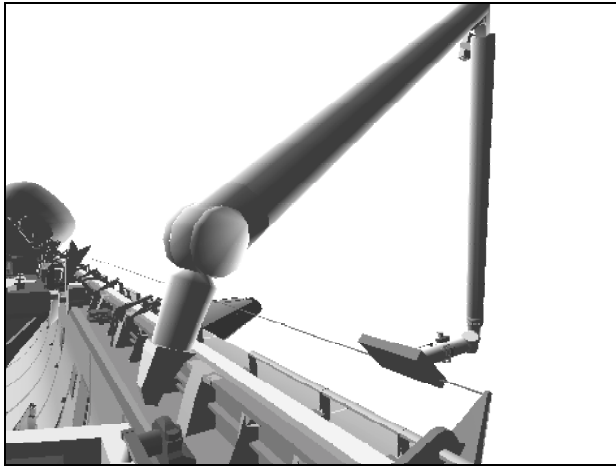


ELBOW (-35,-25)

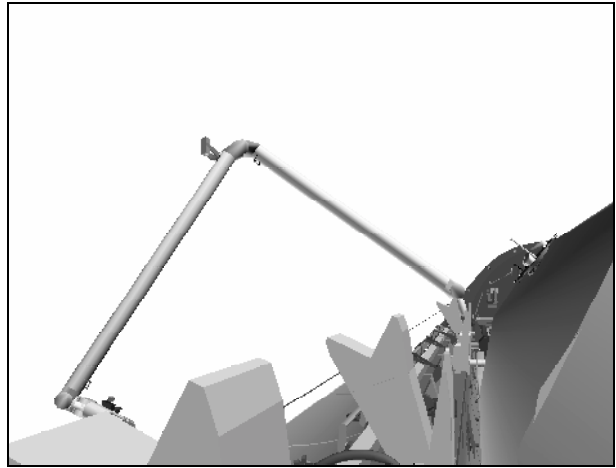


WRIST

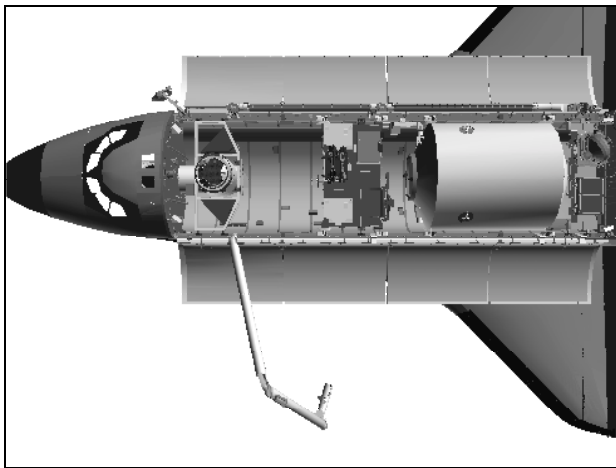
EE CREW CABIN SURVEY – Pause Pt 115



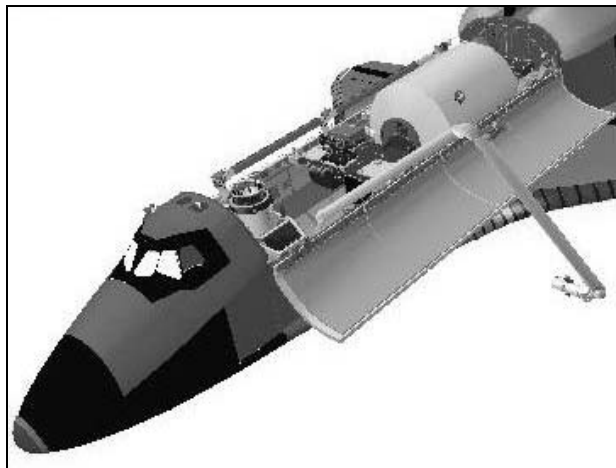
CCTV A (35,0)



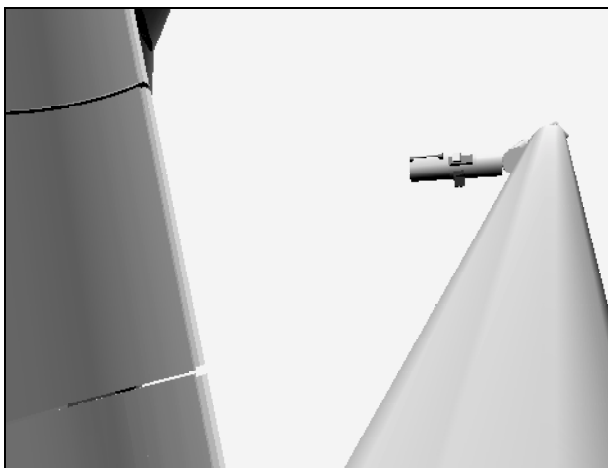
CCTV B (-15,5)



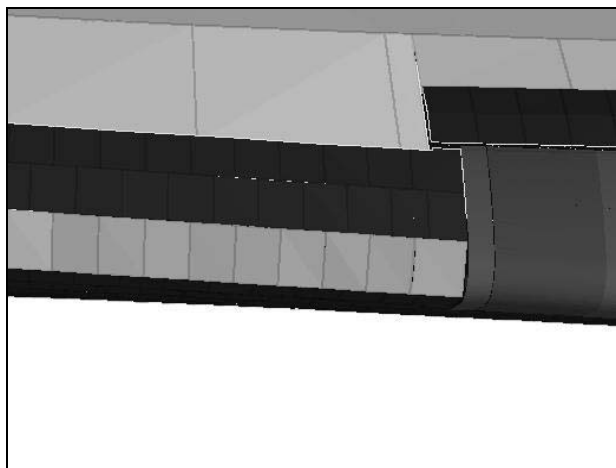
OVERHEAD



BIRD'S EYE

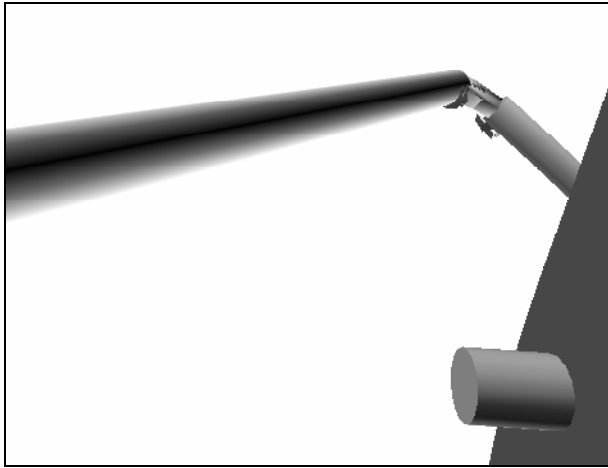


ELBOW (-30,-20)

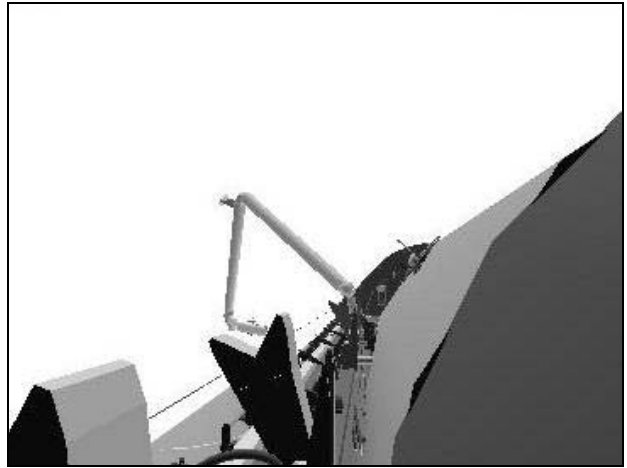


WRIST

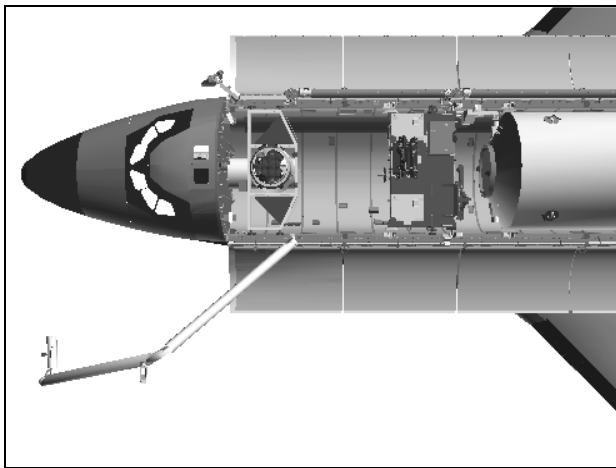
EE CREW CABIN SURVEY – Pause Pt 117



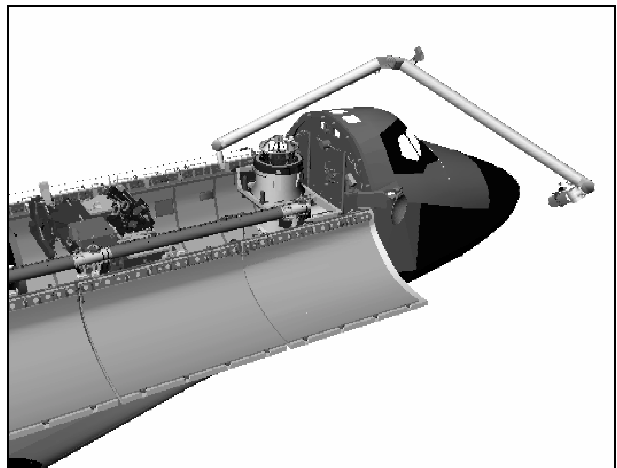
CCTV A (90,15)



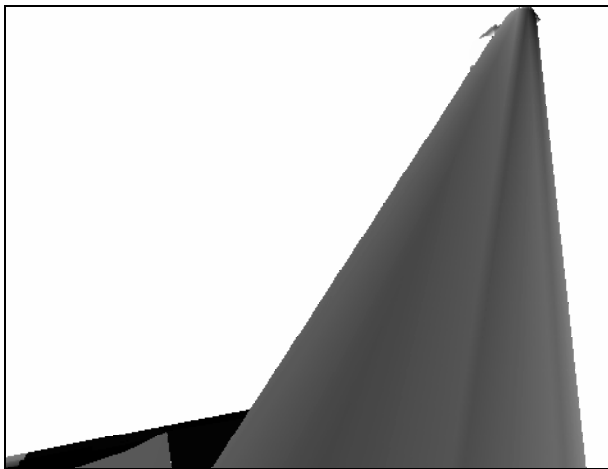
CCTV B (-5,5)



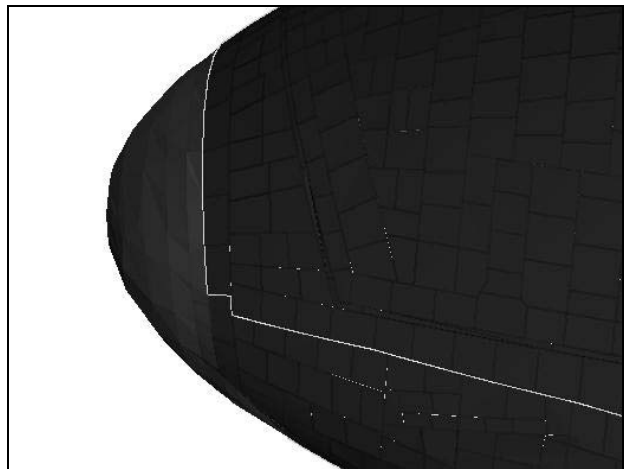
OVERHEAD



BIRD'S EYE

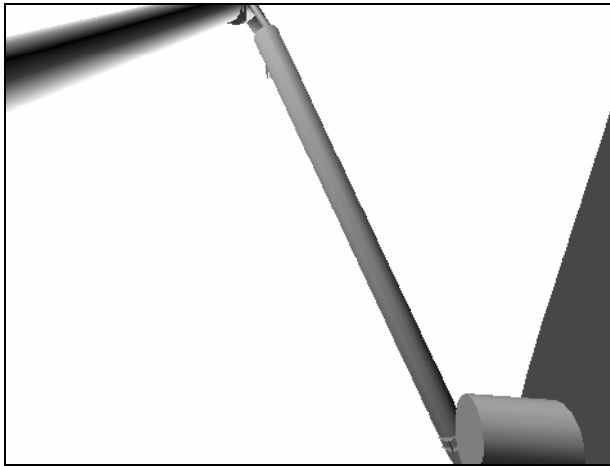


ELBOW (-25,-33)

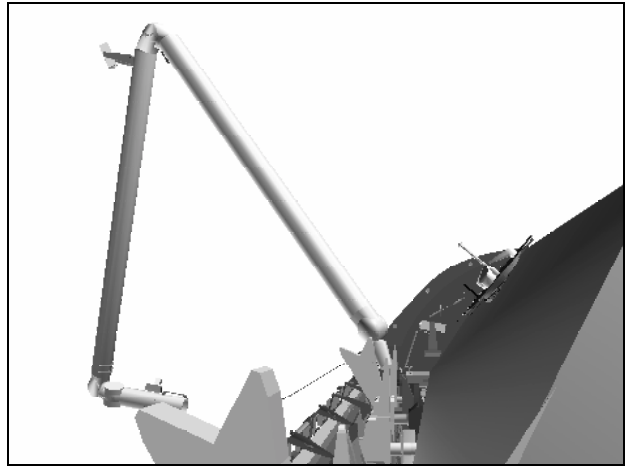


WRIST

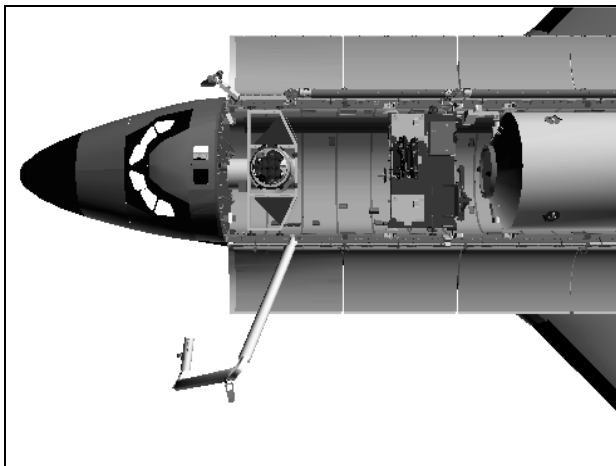
EE CREW CABIN SURVEY – Pause Pt 118



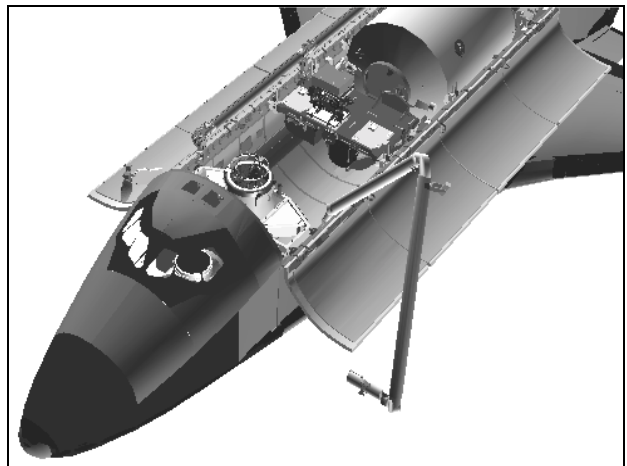
CCTV A (90,19)



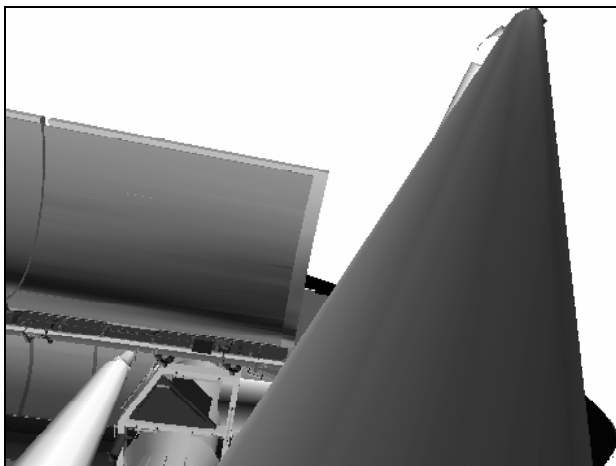
CCTV B (-5,5)



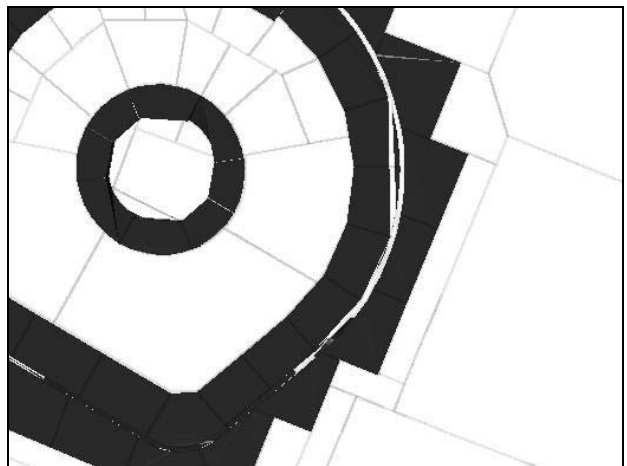
OVERHEAD



BIRD'S EYE



ELBOW (-25,-33)



WRIST

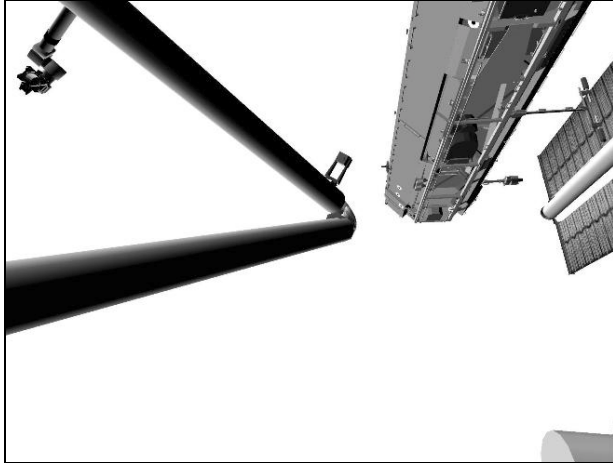
ORM CAMERA VIEWS

ORM CAMERA VIEWS..... FS 7-2

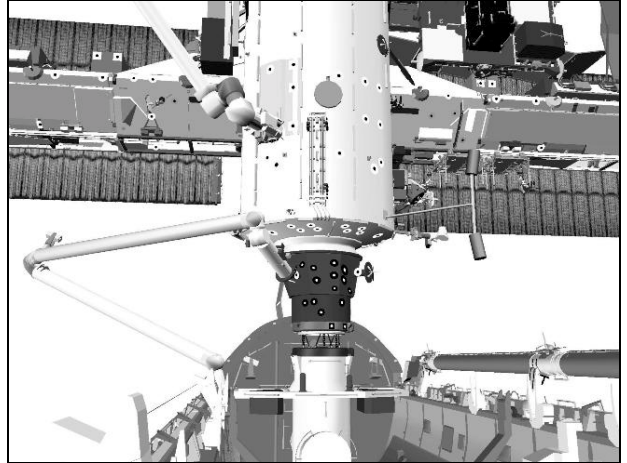
ORM CAMERA
VIEWS

ORM CAMERA VIEWS

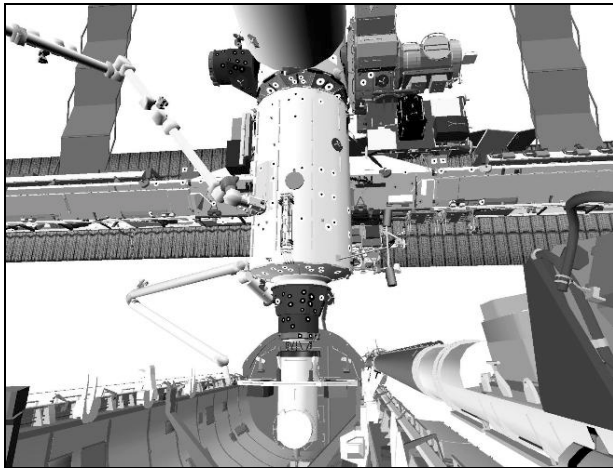
Docked Posn / PMA2 Grapple Posn



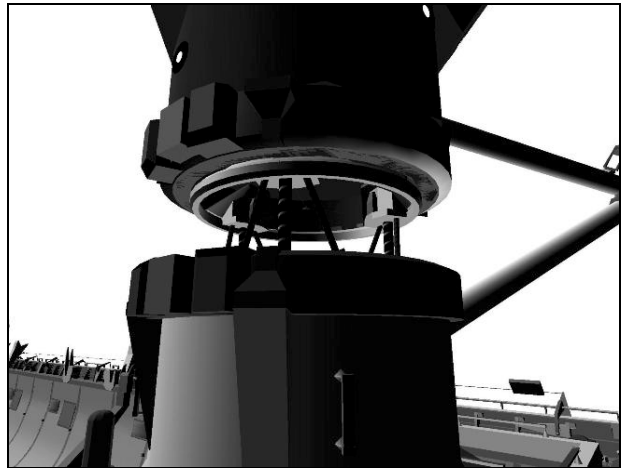
CCTV A (84,22)



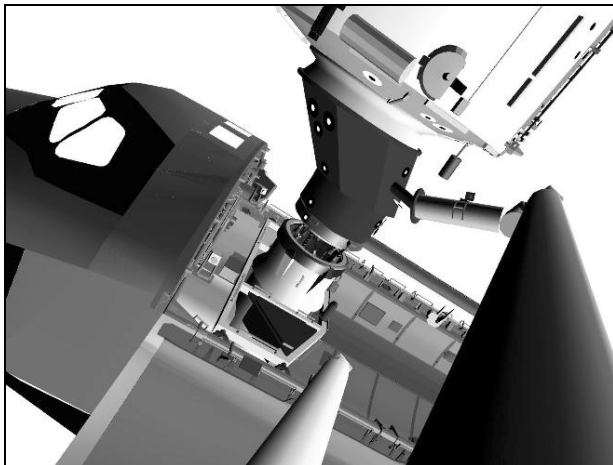
CCTV B (7,12)



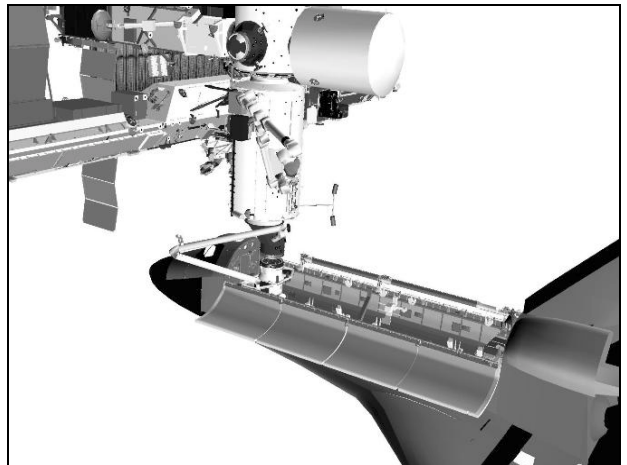
CCTV C (-6,17)



CCTV D (51,14)



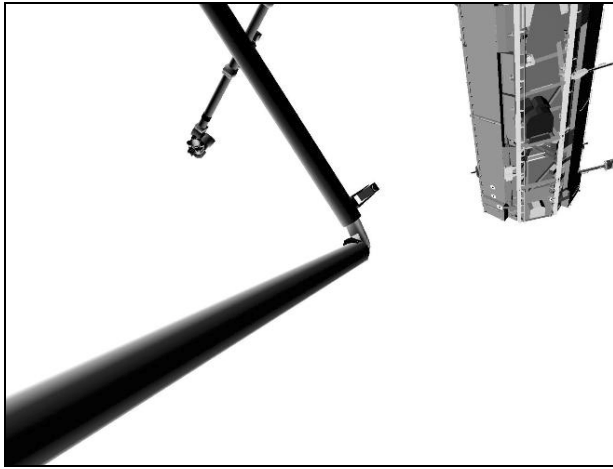
ELBOW (-30,-11)



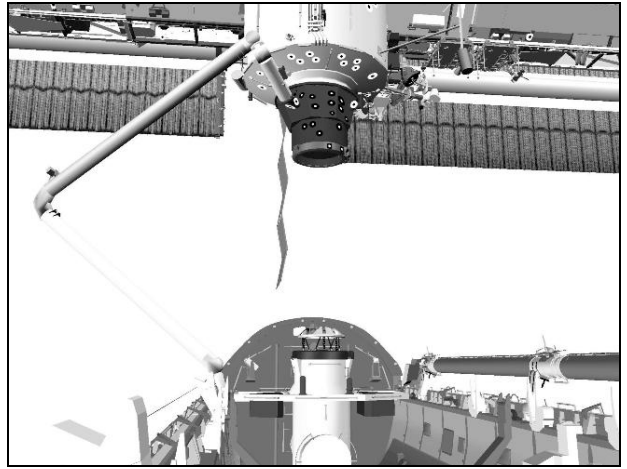
BIRD'S EYE

ORM CAMERA
VIEWS

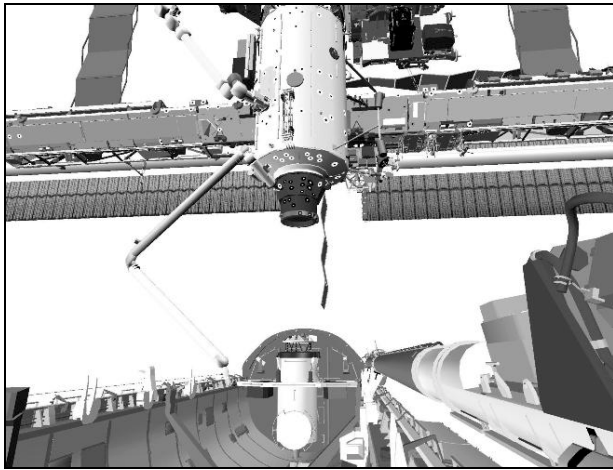
ORM: ACAS to Overnight Park Posn, Pt 1
Reverse ORM: ACAS to Undocked Posn, Pt 26



CCTV A (67,37)



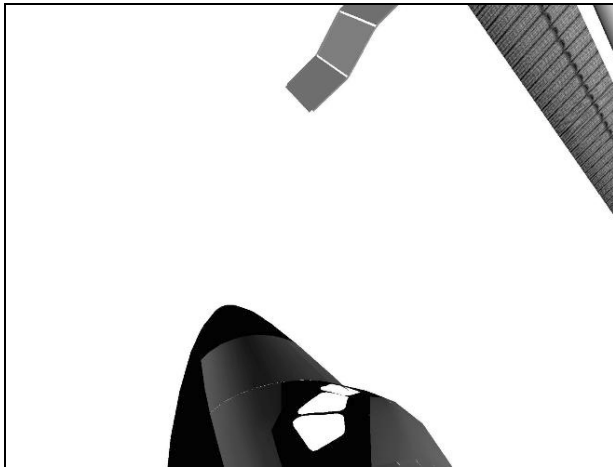
CCTV B (7,12)



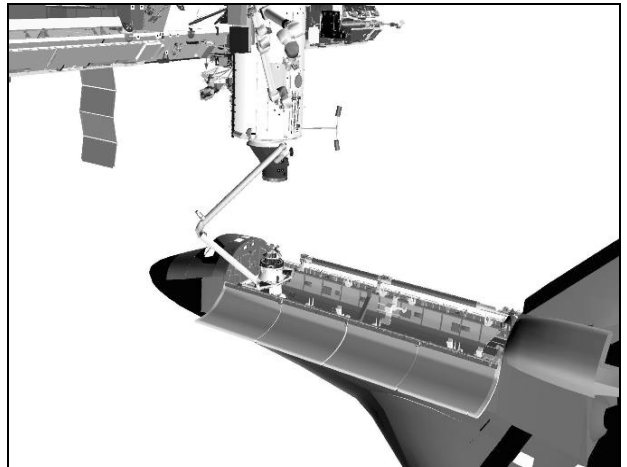
CCTV C (-6,17)



CCTV D (9,33)

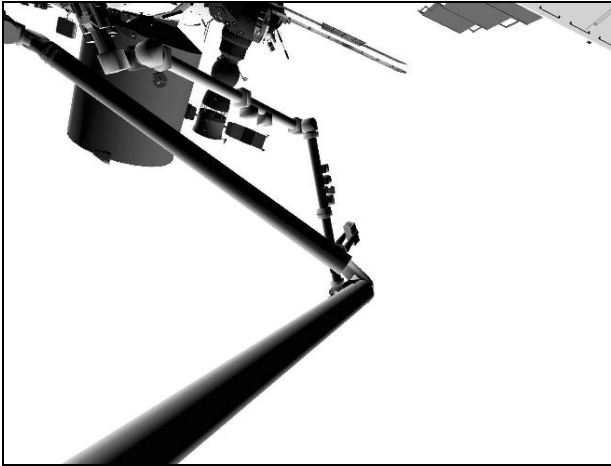


ELBOW (-84,13)

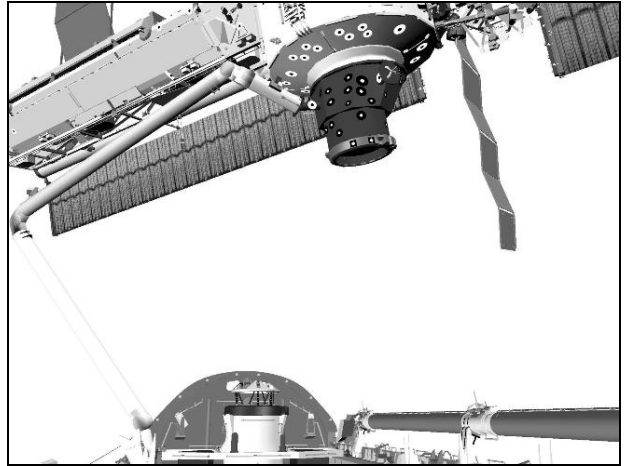


BIRD'S EYE

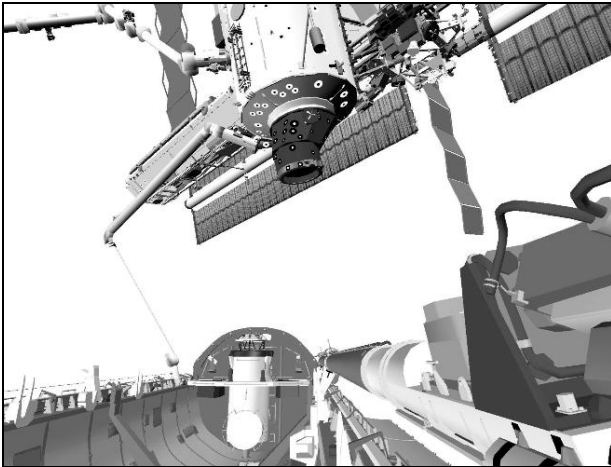
ORM: ACAS to Overnight Park Posn, Pt 2
Reverse ORM: ACAS to Undocked Posn, Pt 25



CCTV A (66,54)



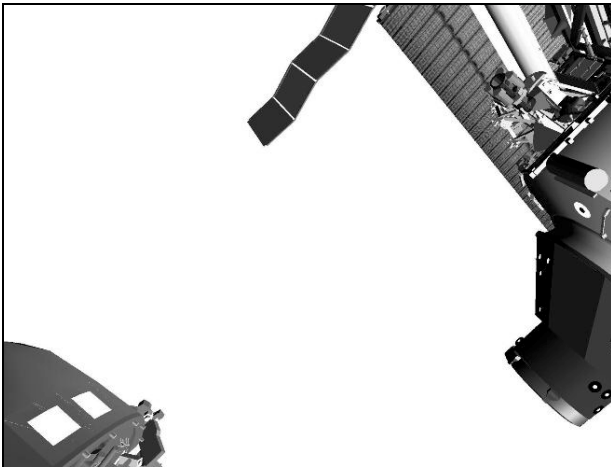
CCTV B (13,17)



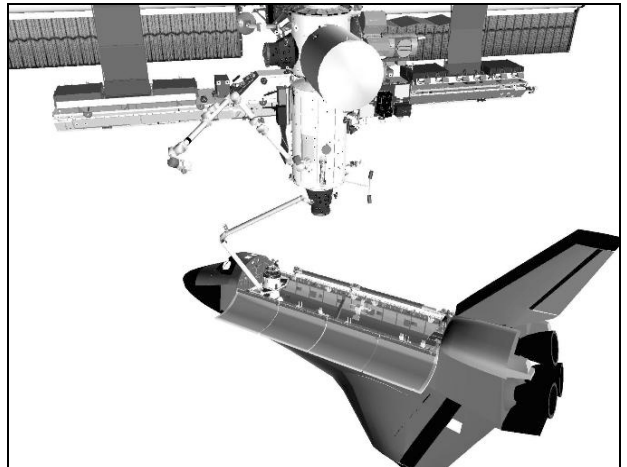
CCTV C (0,17)



CCTV D (9,33)



ELBOW (-50,7)

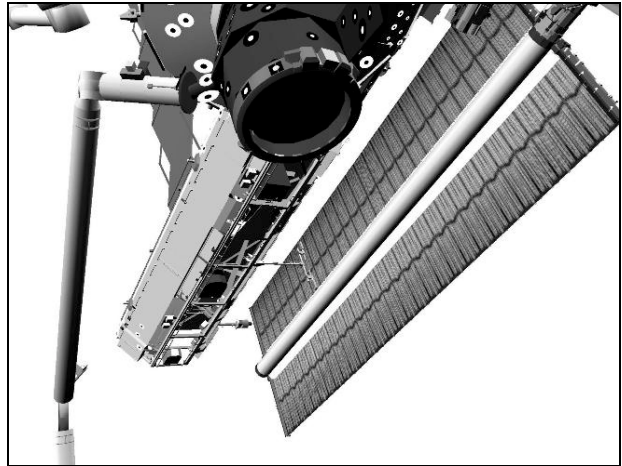


BIRD'S EYE

ORM: ACAS to Overnight Park Posn, Pt 3
Reverse ORM: ACAS to Undocked Posn, Pt 24



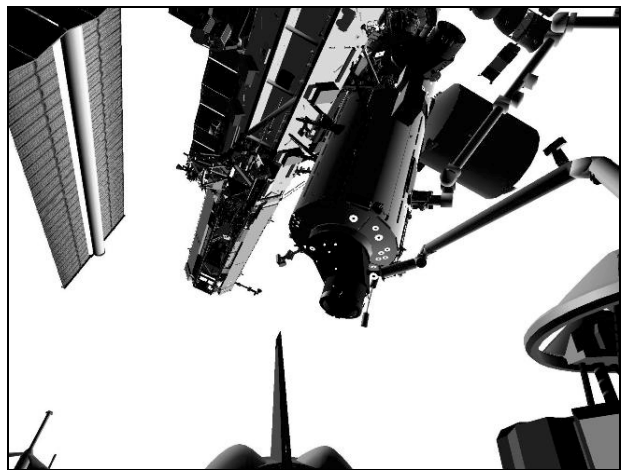
CCTV A (6,35)



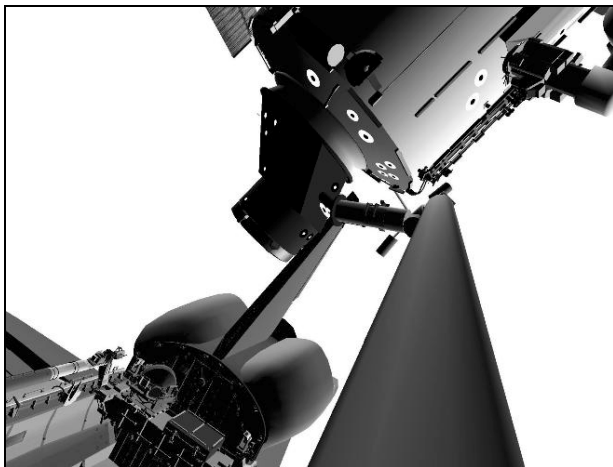
CCTV B (14,41)



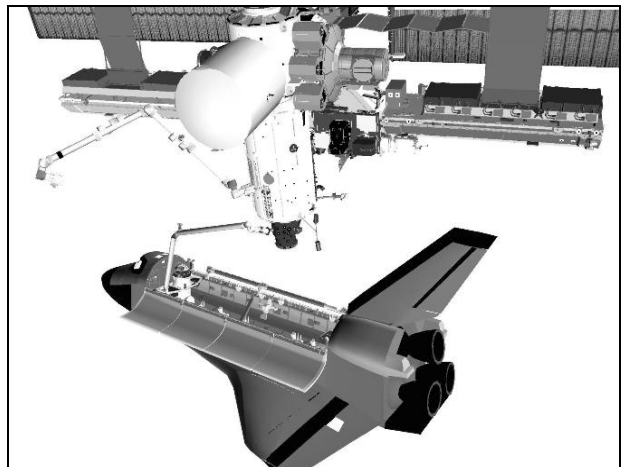
CCTV C (0,17)



CCTV D (9,33)

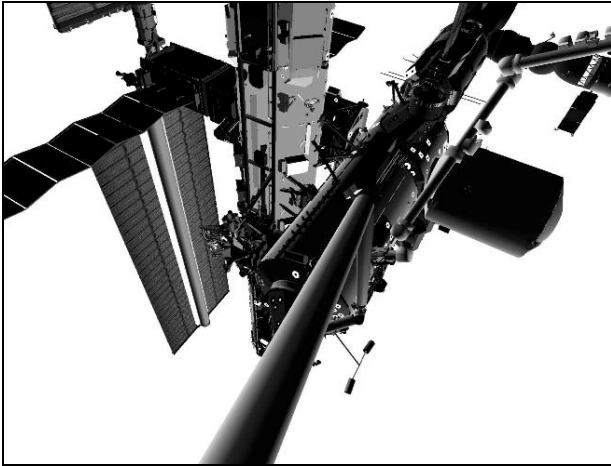


ELBOW (-18,-10)

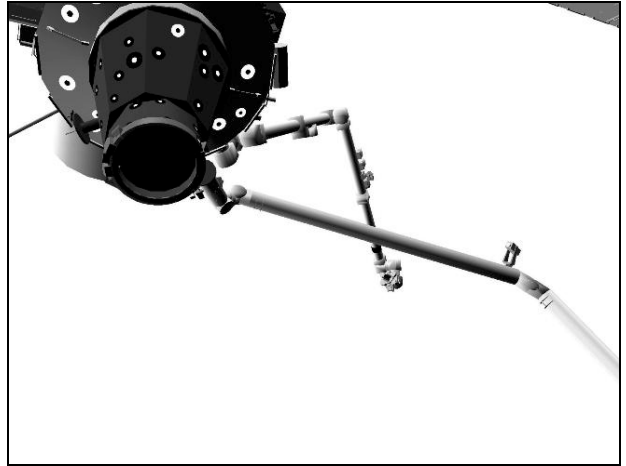


BIRD'S EYE

ORM: ACAS to Overnight Park Posn, Pt 4
Reverse ORM: ACAS to Undocked Posn, Pt 23



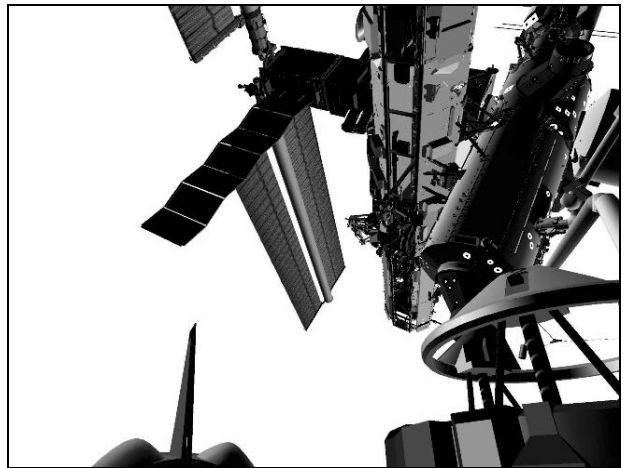
CCTV A (35,38)



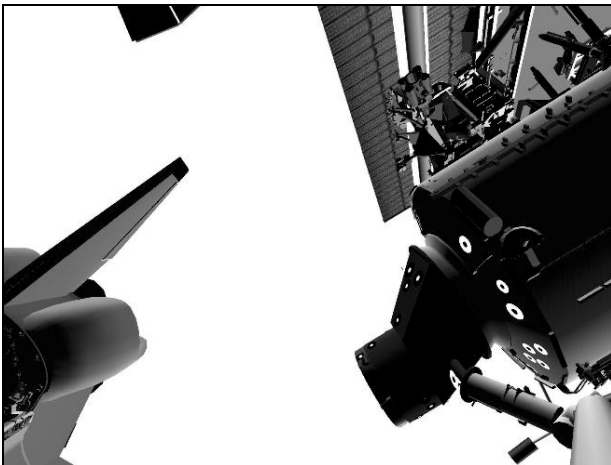
CCTV B (-36,26)



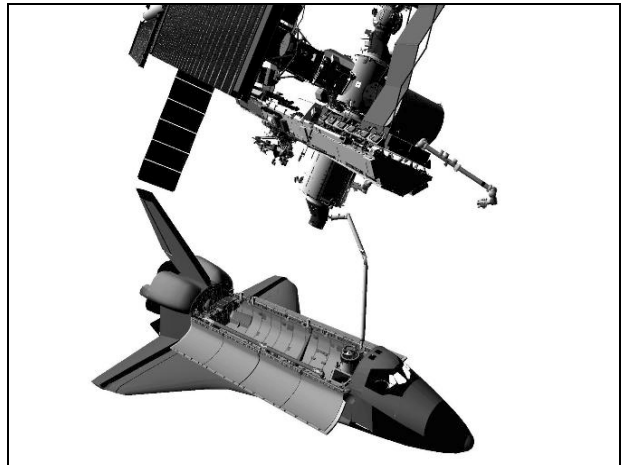
CCTV C (0,22)



CCTV D (21,33)



ELBOW (-33,16)

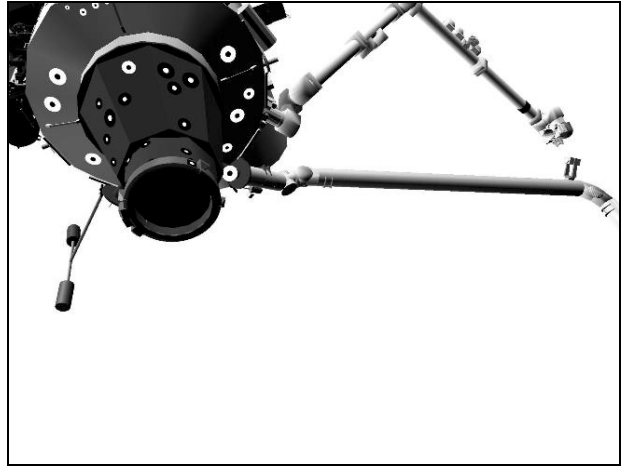


BIRD'S EYE

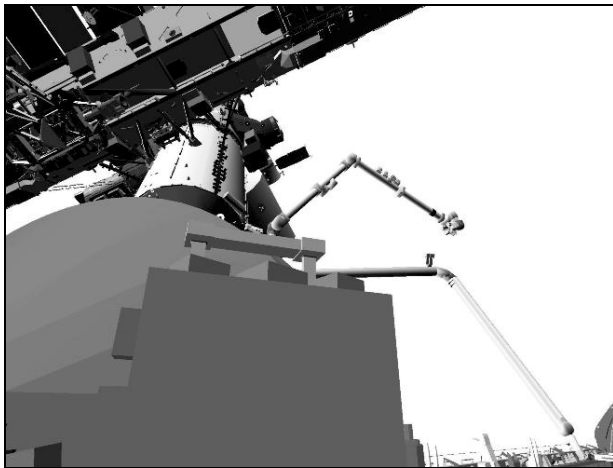
ORM: ACAS to Overnight Park Posn, Pt 5
Reverse ORM: ACAS to Undocked Posn, Pt 22



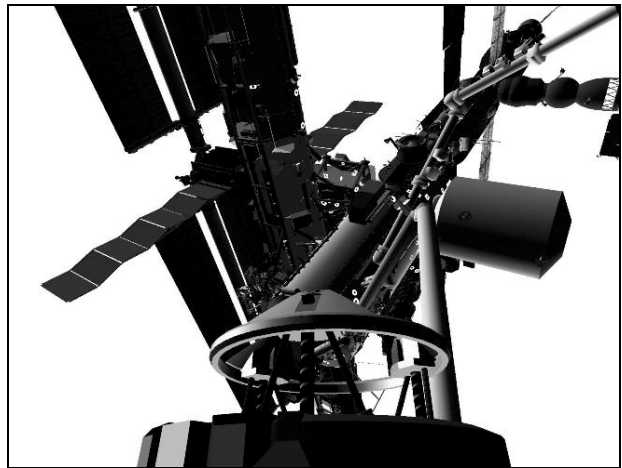
CCTV A (21,11)



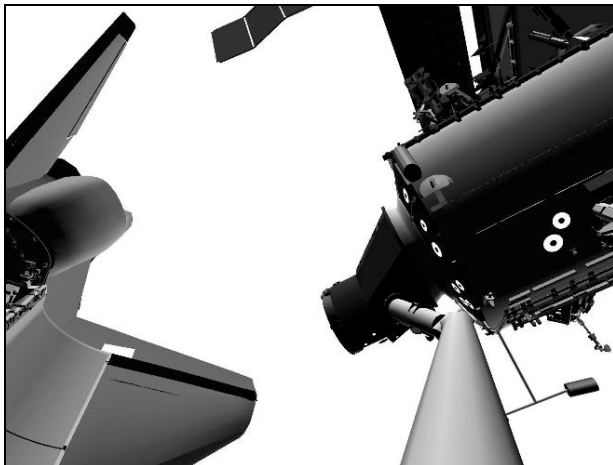
CCTV B (-39,19)



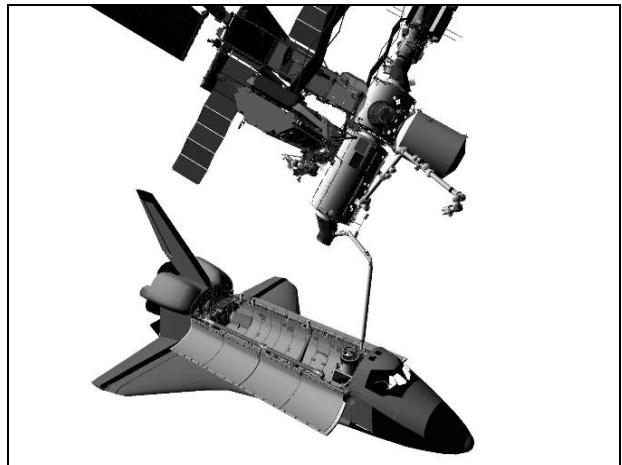
CCTV C (-47,25)



CCTV D (48,33)

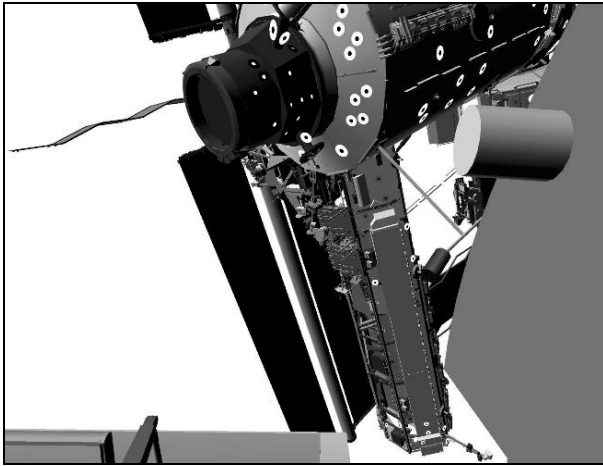


ELBOW (-20,6)

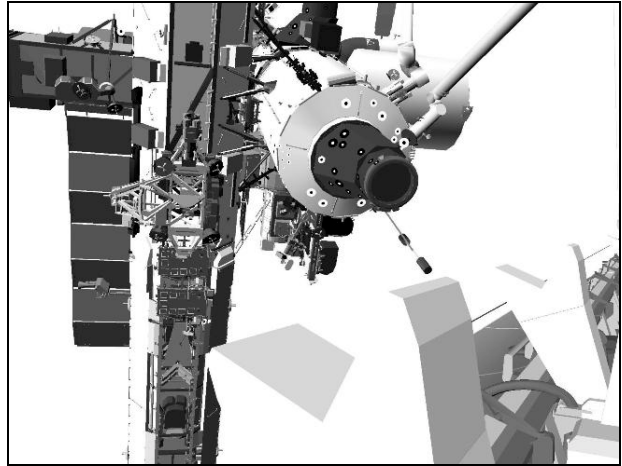


BIRD'S EYE

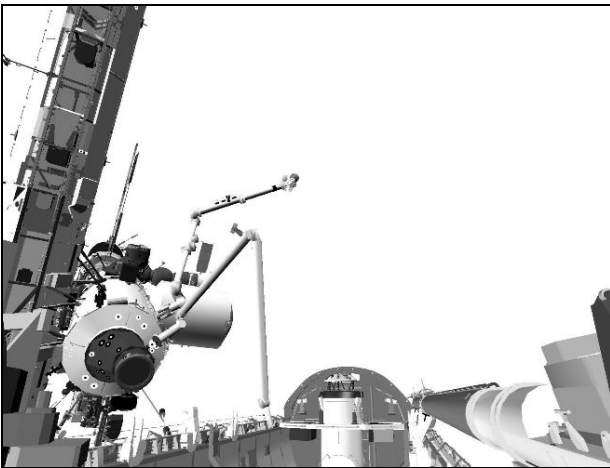
ORM: ACAS to Overnight Park Posn, Pt 6
Reverse ORM: ACAS to Undocked Posn, Pt 21



CCTV A (89,-7)



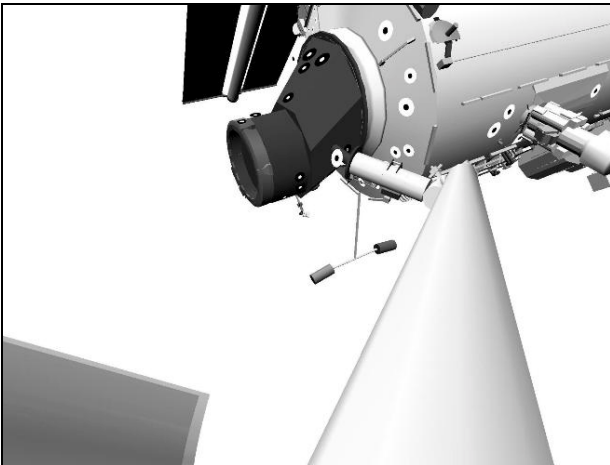
CCTV B (-29,-1)



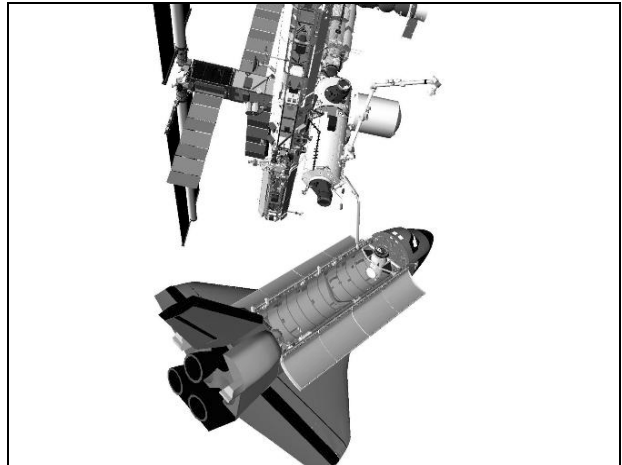
CCTV C (-12,22)



CCTV D (66,13)

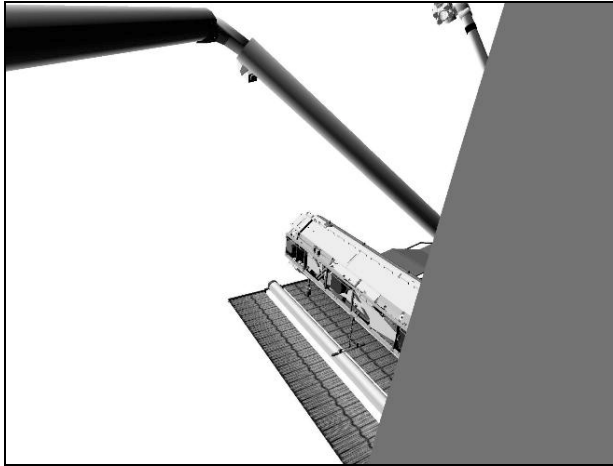


ELBOW (-21,-14)

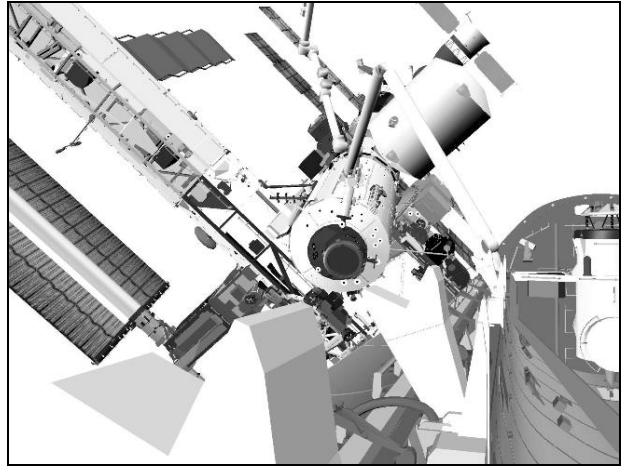


BIRD'S EYE

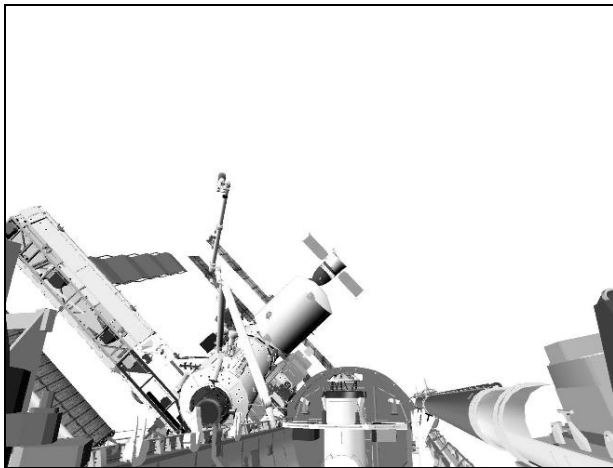
ORM: ACAS to Overnight Park Posn, Pt 7
Reverse ORM: ACAS to Undocked Posn, Pt 20



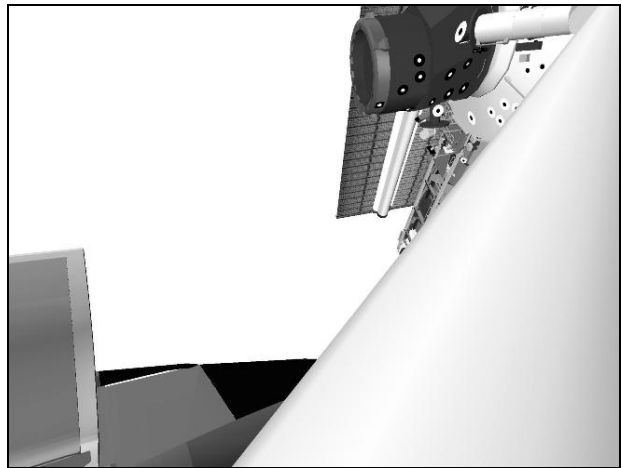
CCTV A (105,28)



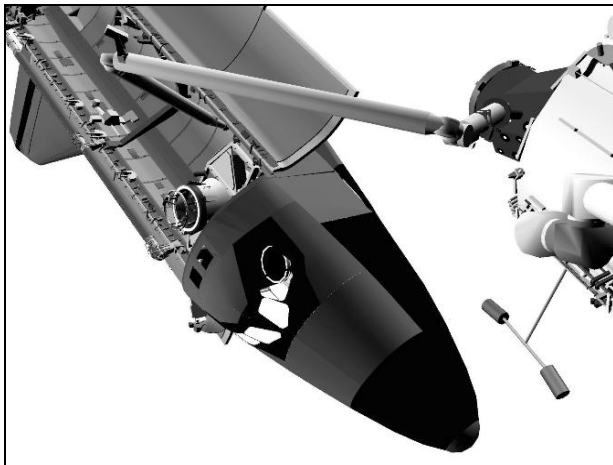
CCTV B (-18,1)



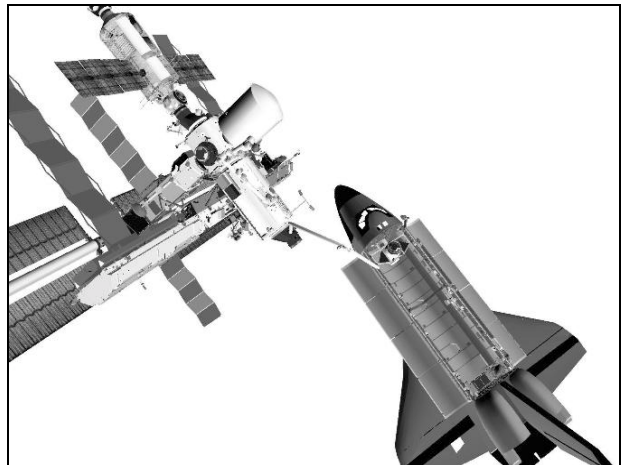
CCTV C (-12,22)



ELBOW (-34,-37)

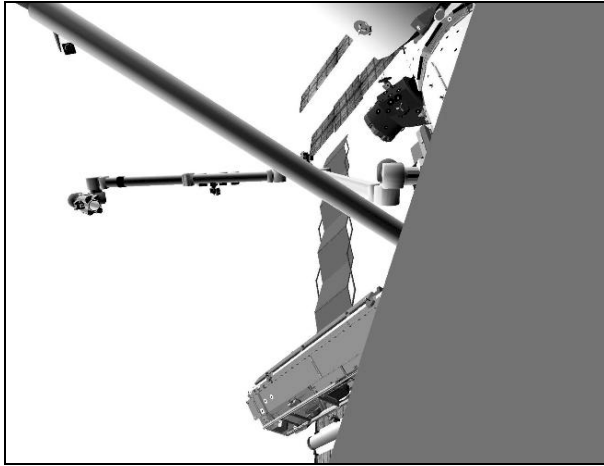


SSRMS TIP ELBOW (103,-11)

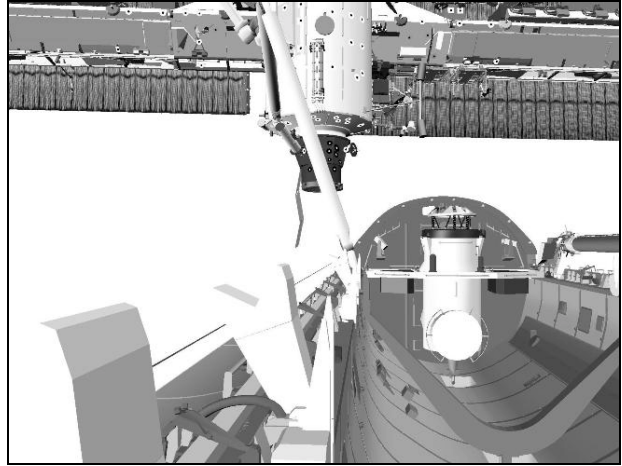


BIRD'S EYE

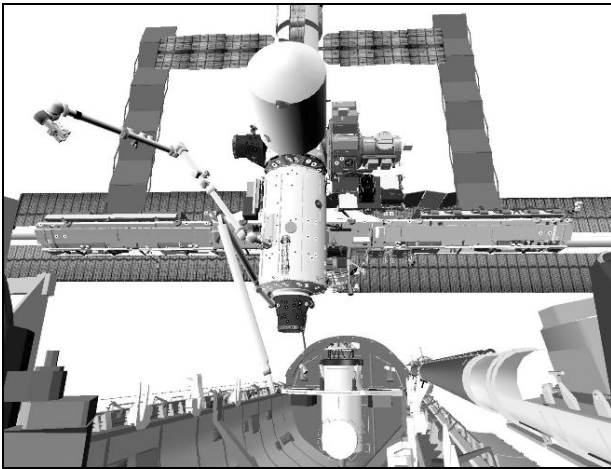
ORM: ACAS to Overnight Park Posn, Pt 8
Reverse ORM: ACAS to Undocked Posn, Pt 19



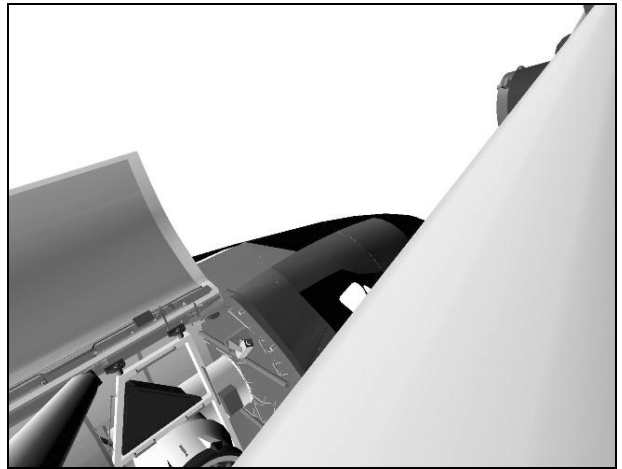
CCTV A (115,46)



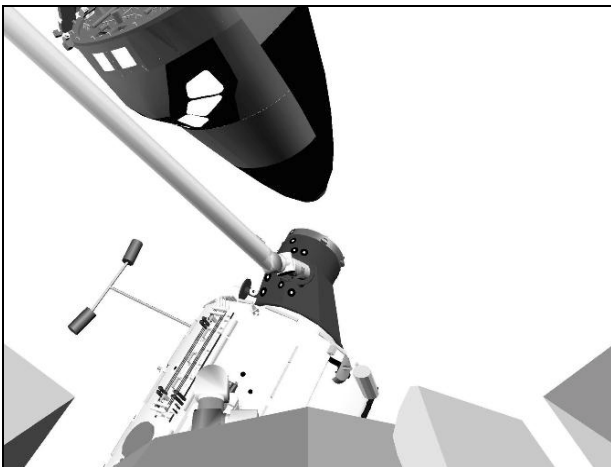
CCTV B (-5,1)



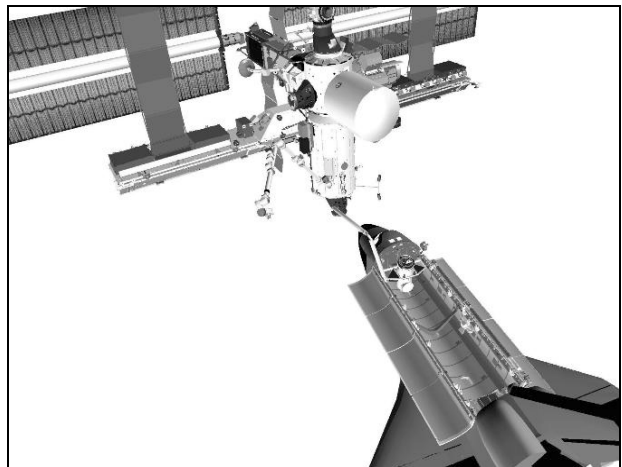
CCTV C (-12,18)



ELBOW (-34,-37)

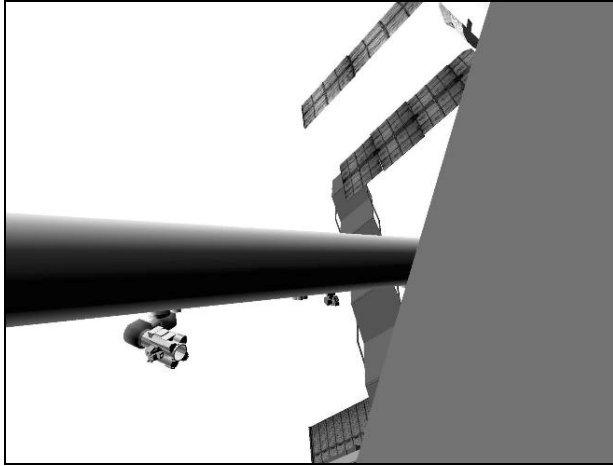


SSRMS TIP LEE

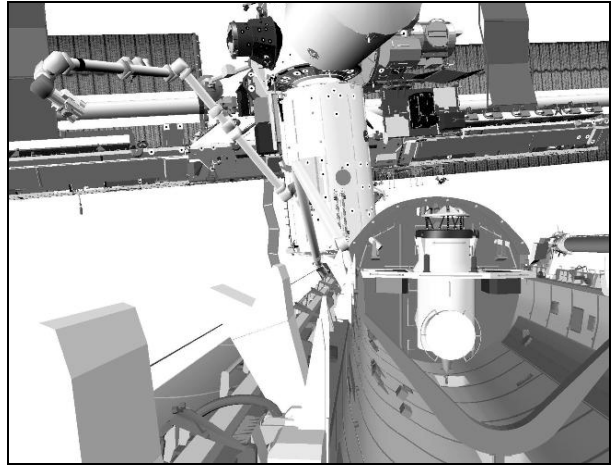


BIRD'S EYE

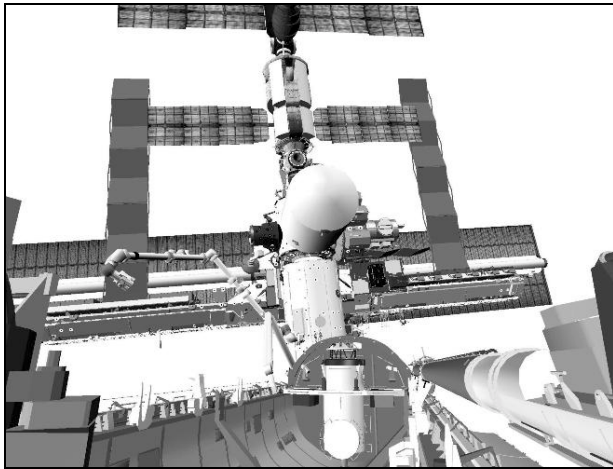
ORM: ACAS to Repair Posn, Pt 9
Reverse ORM: ACAS to Overnight Park Posn, Pt 18



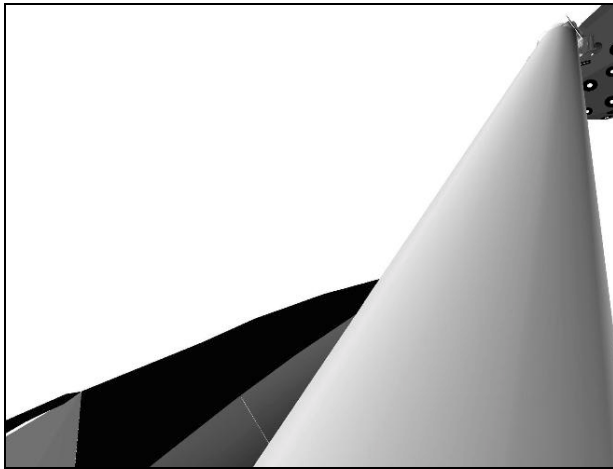
CCTV A (111,41)



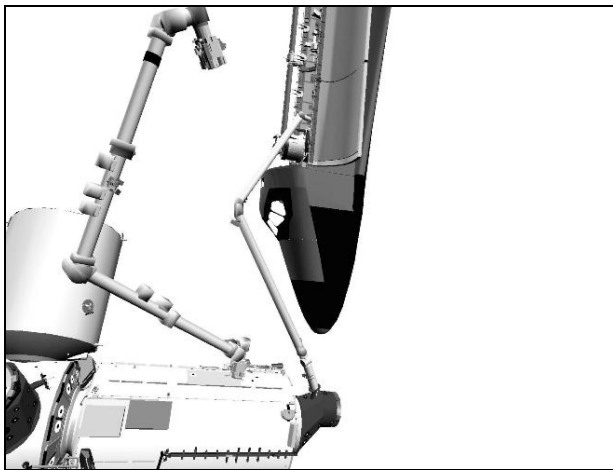
CCTV B (-5,1)



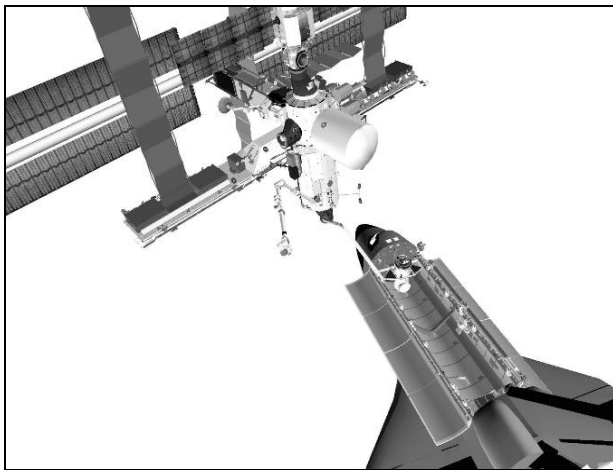
CCTV C (-12,18)



ELBOW (-29,-31)

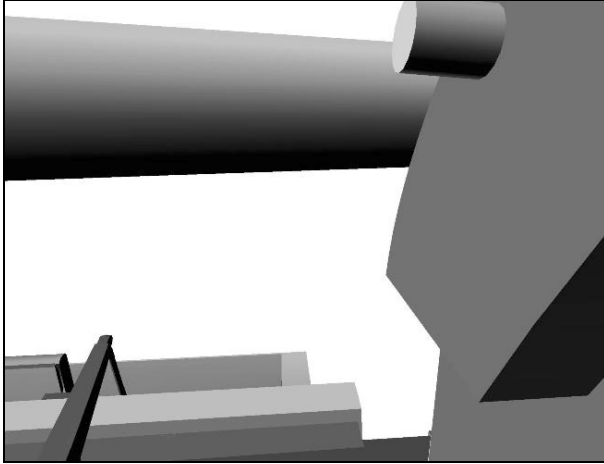


P1LOOB (21,27)

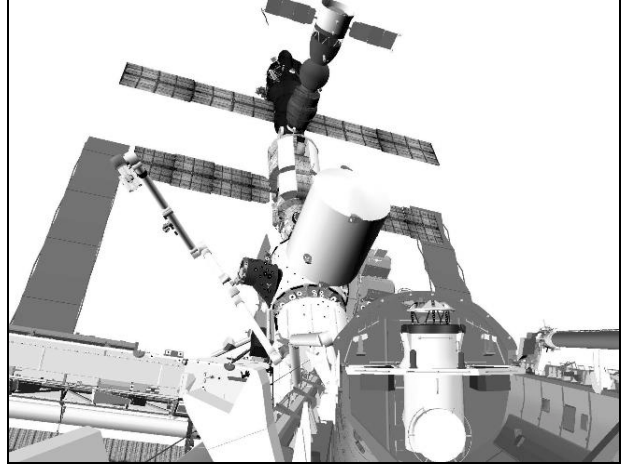


BIRD'S EYE

ORM: ACAS to Repair Posn, Pt 10
Reverse ORM: ACAS to Overnight Park Posn, Pt 17



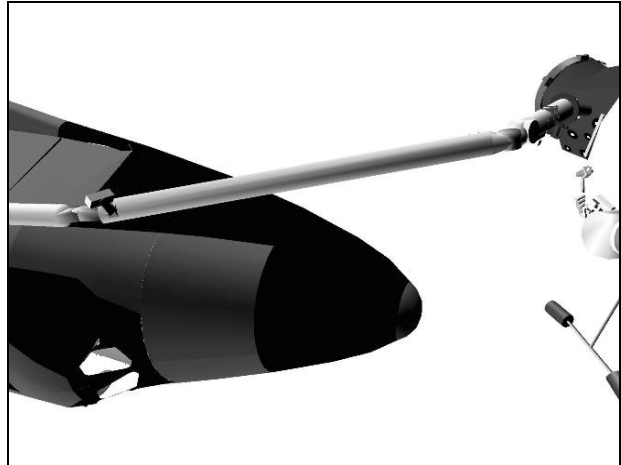
CCTV A (95,-16)



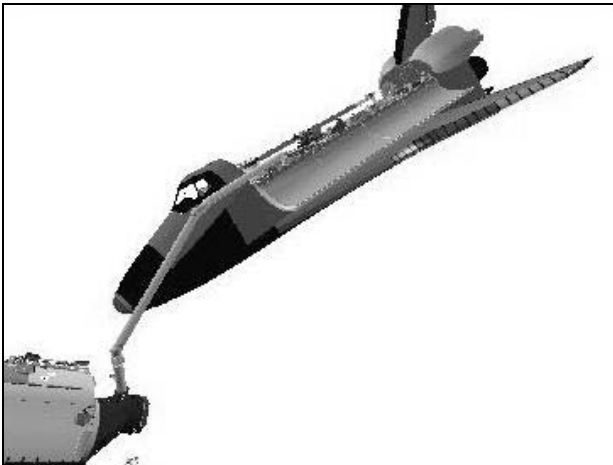
CCTV B (-3,10)



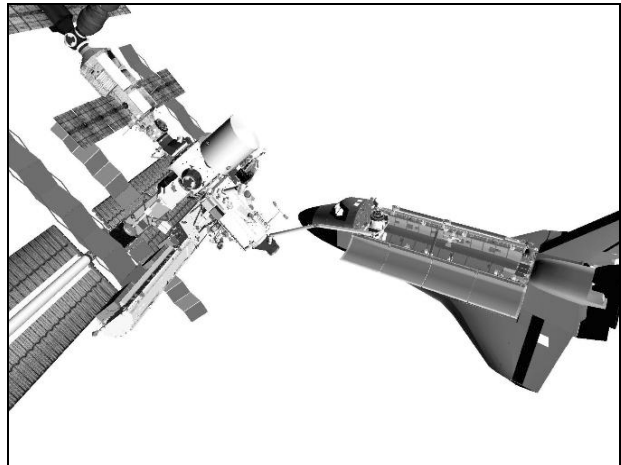
ELBOW (-34,-37)



SSRMS TIP ELBOW (98,-11)

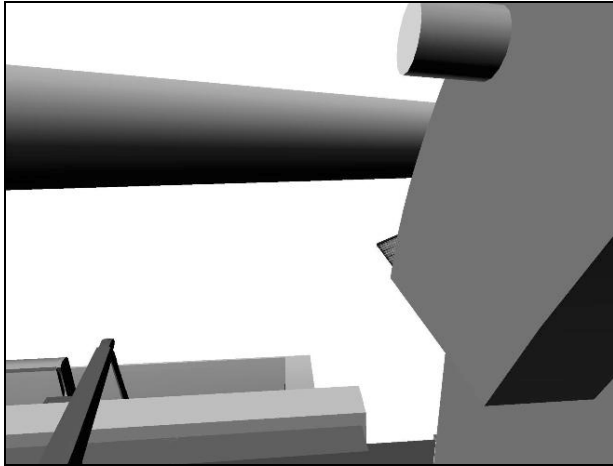


P1LOOB (45,28)

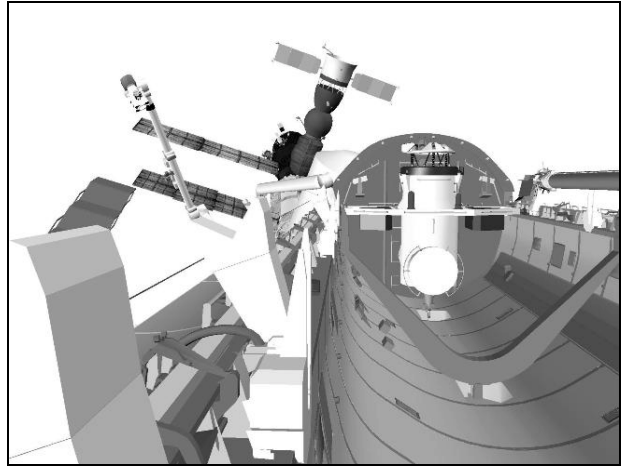


BIRD'S EYE

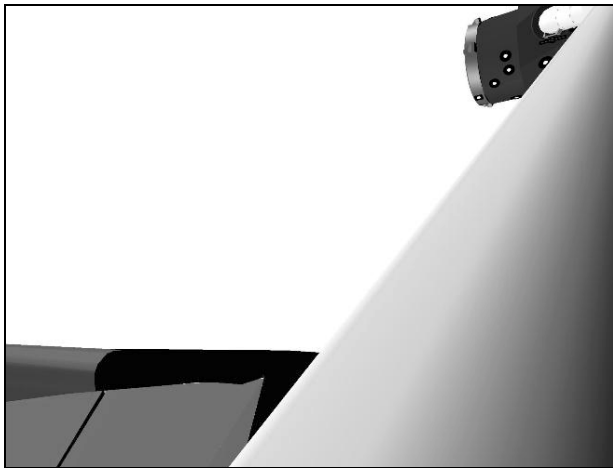
ACAS to Repair Posn, Pt 11
Reverse ORM: ACAS to Overnight Park Posn, Pt 16



CCTV A (95,-16)



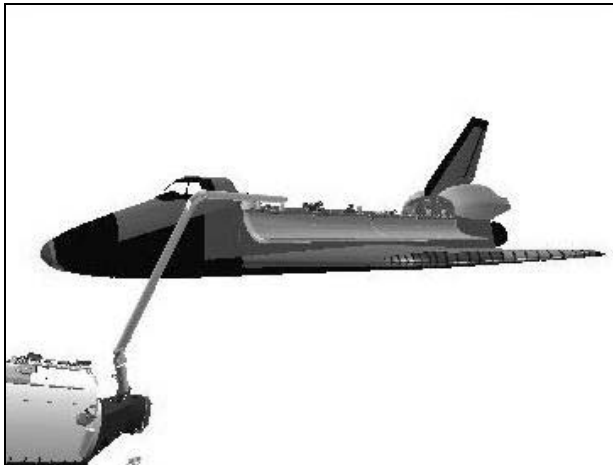
CCTV B (-3,-5)



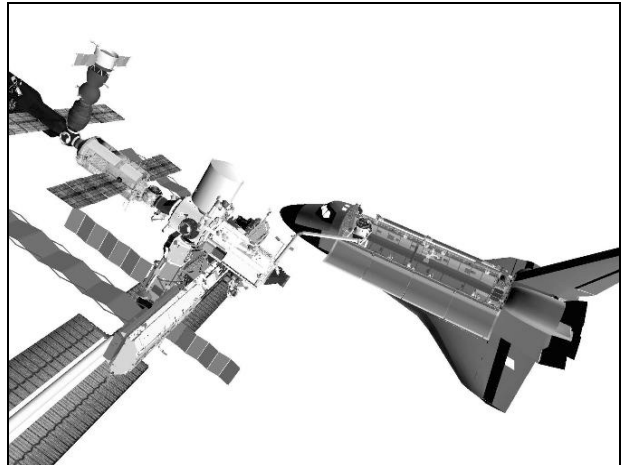
ELBOW (-34,-37)



SSRMS TIP ELBOW (100,-15)

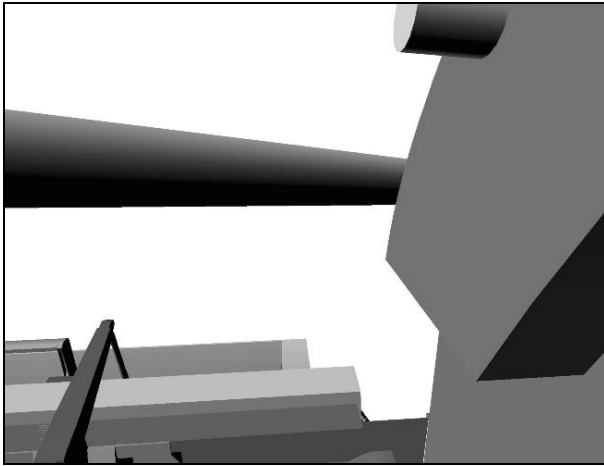


P1LOOB (45,28)

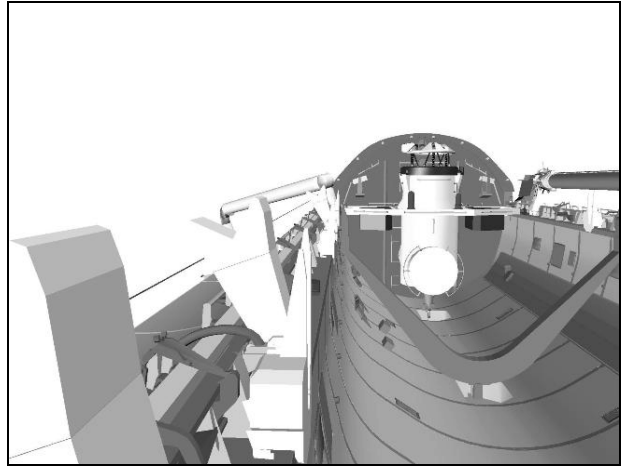


BIRD'S EYE

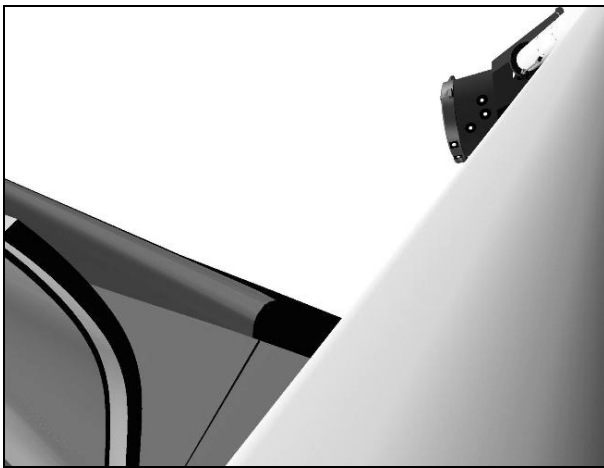
ACAS to Repair Posn, Pt 12
Reverse ORM: ACAS to Overnight Park Posn, Pt 15



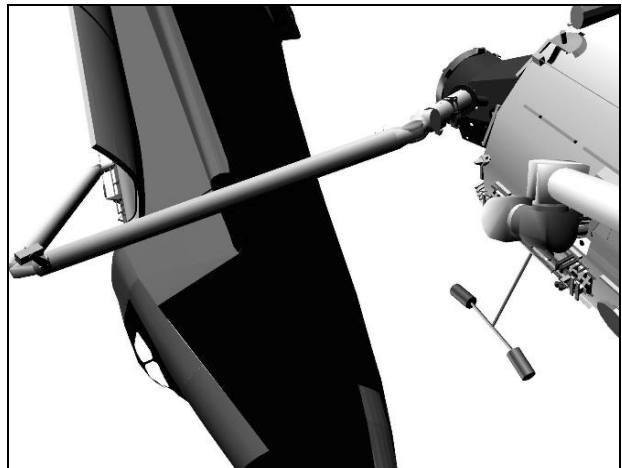
CCTV A (95,-18)



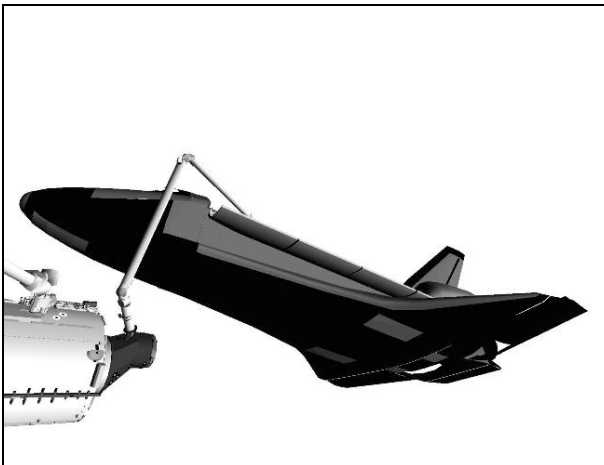
CCTV B (-3,-5)



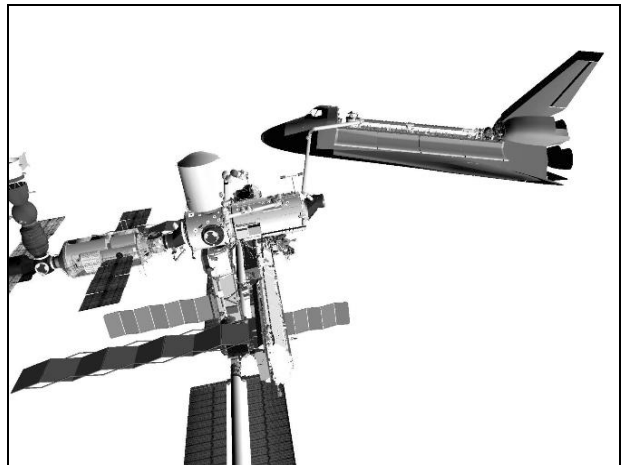
ELBOW (-34,-37)



SSRMS TIP ELBOW (106,-12)

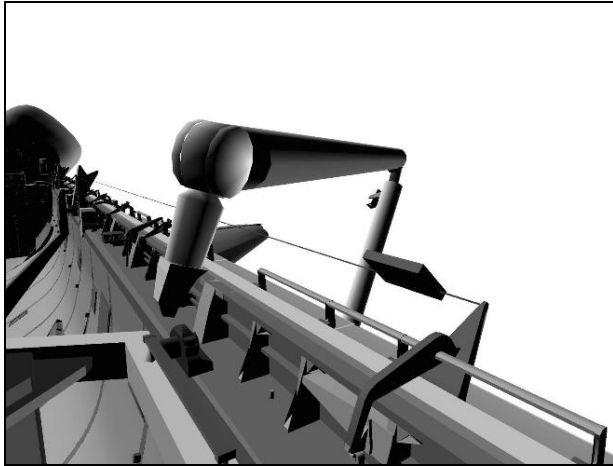


P1LOOB (45,20)

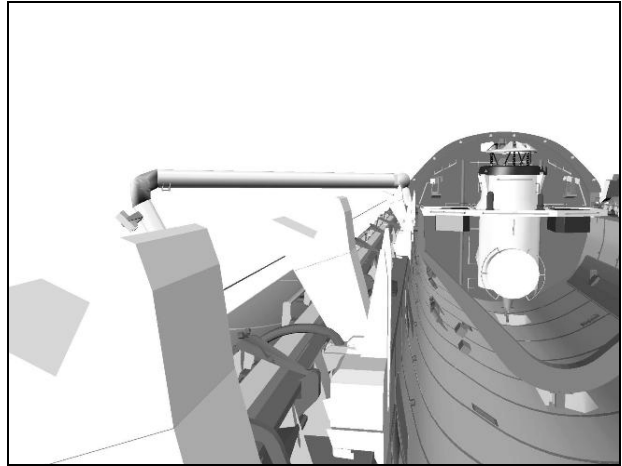


BIRD'S EYE

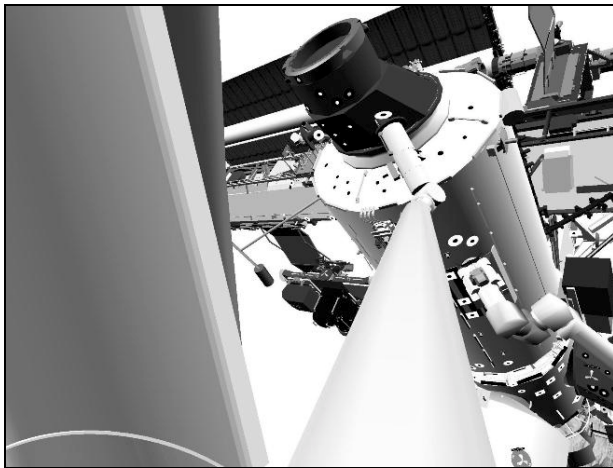
ACAS to Repair Posn, Pt 13
Reverse ORM: ACAS to Overnight Park Posn, Pt 14



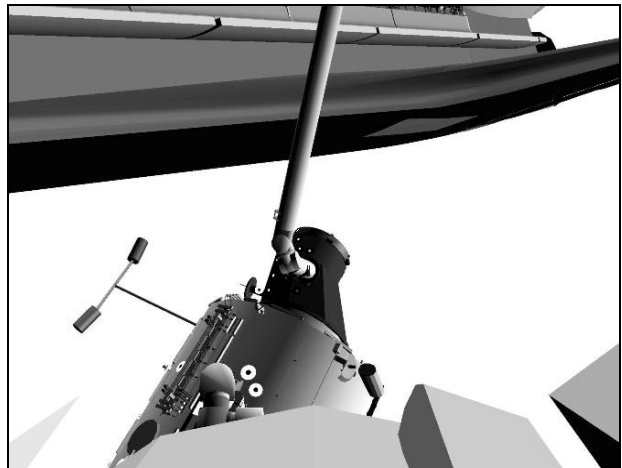
CCTV A (34,-10)



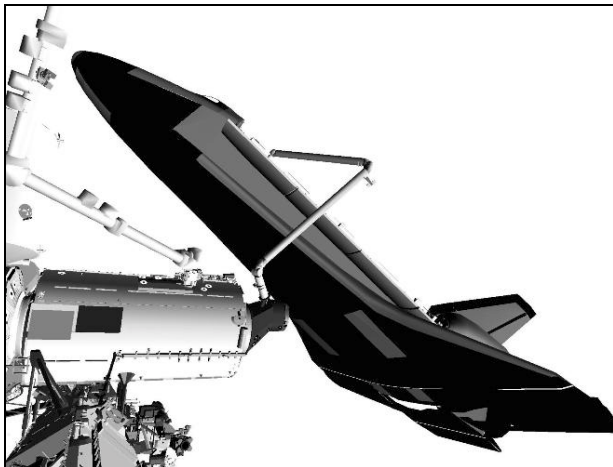
CCTV B (-10,-5)



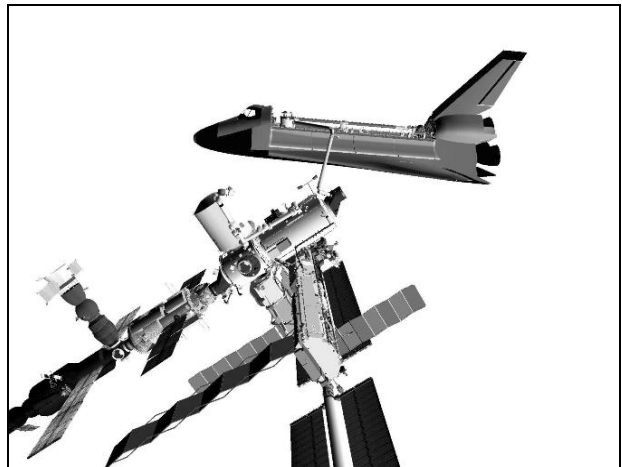
ELBOW (-15,-9)



SSRMS TIP LEE



P1LOOB (28,15)



BIRD'S EYE

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INSPECTION AND REPAIR REFERENCE DATA

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 GO/NO-GO CRITERIA FS 8-16
 ATTITUDE CONTROL CONSTRAINTS FS 8-17
SRMS EE CAM SURVEYS JOINT ANGLES VS POR COORDINATES..... FS 8-18
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INSPECT/REPAIR
REF DATA

OBSS JOINT ANGLES VS POR COORDINATES

OBSS PRE-GRAPPLE

SY	SP	EP	WP	WY	WR
-90.0	+87.6	-129.5	-57.5	0.0	+110.4

X	Y	Z	PITCH	YAW	ROLL	PL ID
-680	+96	-513	270	350	1	0
-680	+94	-495	0	1	340	1
-998	+95	-505	0	1	10	2

OBSS GRAPPLE/BERTH (Expected Values)

SY	SP	EP	WP	WY	WR
-90.0	+76.5	-134.6	-40.9	0.0	+110.0

X	Y	Z	PITCH	YAW	ROLL	PL ID
-680	+106	-454	270	350	1	0
-680	+105	-436	0	0	341	1
-998	+108	-446	0	0	11	2

OBSS HOVER

SY	SP	EP	WP	WY	WR
-90.0	+79.8	-123.1	-55.7	0.0	+110.0

X	Y	Z	PITCH	YAW	ROLL	PL ID
-680	+127	-514	270	350	1	0
-680	+126	-496	0	0	341	1
-998	+129	-507	0	0	11	2
-1271	+127	-511	0	0	11	3

FLAT FIELD START

SY	SP	EP	WP	WY	WR
-89.6	+44.5	-84.6	-45.4	0.0	+109.6

X	Y	Z	PITCH	YAW	ROLL	PL ID
-683	+300	-508	270	336	1	0
-683	+303	-490	0	0	354	1
-1001	+303	-501	0	0	24	2
-1273	+300	-505	0	0	24	3

OBSS SJ PRE-GRAPPLE

SY	SP	EP	WP	WY	WR
-90.0	+87.9	-129.8	-57.0	0.0	+110.0

X	Y	Z	PITCH	YAW	ROLL	PL ID
-680	+96	-513	270	350	1	0
-680	+94	-495	0	0	341	1
-998	+97	-506	0	0	11	2

INSPECT/REPAIR
REF DATA

STBD LDRI ACAS START

SY	SP	EP	WP	WY	WR
-126.0	+38.1	-54.2	-16.7	+25.9	+166.4

X	Y	Z	PITCH	YAW	ROLL	PL ID
-389	+294	-631	242	281	11	0
-385	+310	-625	322	2	49	1
-639	+291	-434	322	2	79	2
-854	+276	-266	322	2	79	3

NOSE CAP LCS ACAS START

SY	SP	EP	WP	WY	WR
-125.3	+127.0	-109.0	+31.6	-31.3	+242.7

X	Y	Z	PITCH	YAW	ROLL	PL ID
-564	-117	-808	138	4	350	0
-551	-123	-819	227	349	326	1
-347	-58	-583	227	349	356	2
-169	-7	-383	227	349	356	3
-191	-13	-400	250	78	158	4

NOSE CAP LCS ACAS PT 53

SY	SP	EP	WP	WY	WR
+102.6	+88.6	-114.7	+37.4	+31.3	+132.9

X	Y	Z	PITCH	YAW	ROLL	PL ID
-579	-454	-478	187	46	281	0
-569	-467	-472	201	317	250	1
-357	-242	-394	201	317	280	2
-174	-53	-322	201	317	280	3
-196	-69	-329	284	7	133	4

NOSE JET CLEAR POSN

SY	SP	EP	WP	WY	WR
+128.8	+30.3	-28.5	-2.0	+35.0	0.0

X	Y	Z	PITCH	YAW	ROLL	PL ID
-303	-547	-434	186	15	140	0
-285	-548	-435	83	39	170	1
-325	-748	-680	83	39	200	2
-355	-916	-892	83	39	200	3
-356	-897	-871	113	313	23	4

PORT LDRI ACAS START

SY	SP	EP	WP	WY	WR
+138.8	+24.6	-61.2	+36.9	-67.4	-74.2

X	Y	Z	PITCH	YAW	ROLL	PL ID
-340	-433	-265	315	63	314	0
-346	-450	-264	2	341	259	1
-643	-336	-272	2	341	289	2
-899	-243	-284	2	341	289	3

OBSS PRE-GRAPPLE AT HANDOFF

SY	SP	EP	WP	WY	WR
+23.5	+63.5	-29.6	-102.9	+11.5	-98.6

X	Y	Z	PITCH	YAW	ROLL	PL ID
-1015	-362	-688	284	0	270	0
-1024	-362	-672	314	270	270	1
-1014	-44	-680	284	270	270	2

*display singularity

OBSS GRAPPLE AT HANDOFF (Expected Values)

SY	SP	EP	WP	WY	WR
+25.8	+66.3	-49.0	-85.9	+10.7	-100.7

X	Y	Z	PITCH	YAW	ROLL	PL ID
-1031	-362	-618	284	0	270	0
-1041	-362	-602	314	270	270	1
-1031	-44	-610	284	270	270	2

*display singularity

OBSS MPLM VIEWING

SY	SP	EP	WP	WY	WR
+35.0	+38.7	-22.8	-0.5	-0.3	-40.0

X	Y	Z	PITCH	YAW	ROLL	PL ID
-1119	-483	-582	5	37	313	0
-1131	-496	-586	62	324	282	1
-1248	-301	-810	62	324	312	2
-1348	-141	-1006	62	324	312	3

OBSS CMG R&R VIEWING

SY	SP	EP	WP	WY	WR
+95.0	+38.7	-22.8	-0.5	-0.3	+22.3

X	Y	Z	PITCH	YAW	ROLL	PL ID
-633	-697	-506	222	84	140	0
-627	-714	-505	91	4	235	1
-627	-726	-823	91	4	265	2
-622	-740	-1095	91	4	265	3

TILE BOARD POSN 1

SY	SP	EP	WP	WY	WR
+56.2	+32.7	-27.3	+104.4	-14.6	-42.7

X	Y	Z	PITCH	YAW	ROLL	PL ID
-951	-543	-536	88	355	239	0
-947	-539	-553	350	302	141	1
-1115	-271	-515	350	302	171	2
-1255	-39	-487	350	302	171	3

TILE BOARD POSN 2

SY	SP	EP	WP	WY	WR
+52.8	+39.8	-41.3	+109.8	-16.3	-46.5

X	Y	Z	PITCH	YAW	ROLL	PL ID
-965	-513	-539	88	355	239	0
-962	-509	-556	350	302	141	1
-1132	-242	-517	350	302	171	2
-1273	-11	-487	350	302	171	3

OBSS JETTISON

SY	SP	EP	WP	WY	WR
-22.5	+38.7	-22.8	-0.5	-0.3	-5.0

X	Y	Z	PITCH	YAW	ROLL	PL ID
-1175	1	-753	23	345	1	0
-1192	1	-760	113	1	345	1
-1059	0	-1049	113	1	15	2

OBSS JETTISON WITH MPM

SY	SP	EP	WP	WY	WR
-29.5	+66.7	-68.5	+26.8	+18.9	-9.9

X	Y	Z	PITCH	YAW	ROLL	PL ID
-1078	0	-754	25	0	1	0
-1094	-5	-761	115	0	330	1
-950	0	-1045	115	0	0	2

OBSS AUTO SEQUENCES

OBSS LDRI RCC SURVEY – STBD (PL ID 3)

Auto Seq ID	Auto posn	X/ SY	Y/ SP	Z/ EP	PITCH/ WP	YAW/ WY	ROLL/ WR	Pause
1	1	-854	+276	-266	322	2	79	P
		-126.0	+38.1	-54.2	-16.7	+25.9	+166.4	
1	2	-941	+276	-261	322	2	73	
		-116.2	+49.3	-73.4	-10.6	+12.9	+161.9	
1	3	-1021	+282	-277	322	359	82	
		-107.6	+61.5	-89.7	+2.7	+10.2	+155.2	
1	4	-1228	+486	-281	326	354	69	
		-81.3	+23.0	-39.2	-19.8	-23.5	+135.5	
1	5	-1255	+502	-281	326	352	67	P
		-77.8	+22.1	-37.2	-23.0	-28.8	+131.8	
1	6	-1255	+502	-220	346	352	67	
		-87.2	+6.0	-61.2	+14.4	-14.8	+118.2	
1	7	-1358	+477	-220	346	347	16	P
		-71.2	+13.6	-64.0	-48.2	-15.1	+81.9	
1	8	-1316	+463	-220	346	347	16	
		-76.3	+18.3	-73.9	-41.6	-15.8	+87.2	
1	9	-1294	+464	-222	346	347	19	
		-79.3	+19.6	-76.6	-36.5	-17.1	+91.1	
1	10	-1061	+218	-201	334	12	22	
		-105.5	+27.8	-69.2	-39.9	-18.0	+147.3	
1	11	-1004	+200	-205	332	20	27	
		-107.1	+10.3	-36.1	-52.7	-13.6	+157.7	
1	12	-930	+220	-225	323	19	54	P
		-110.5	+9.7	-18.2	-49.6	+2.6	+167.7	
1	13	-1012	+246	-228	325	14	55	
		-105.0	+27.9	-52.3	-30.2	-1.0	+158.6	
1	14	-1016	+245	-221	309	13	38	
		-89.4	+26.9	-27.7	-64.2	-32.0	+153.2	
1	15	-1252	+472	-233	337	343	30	
		-78.0	+38.5	-88.8	-32.9	-30.3	+94.0	
1	16	-1281	+497	-240	338	341	38	
		-73.3	+36.6	-87.6	-26.6	-33.8	+90.8	
1	17	-1335	+540	-282	336	335	71	P
		-60.7	+40.2	-87.7	+3.1	-53.8	+104.2	
1	18	-1279	+527	-325	325	351	93	
		-76.3	+12.9	-16.5	-8.8	-19.0	+142.7	
1	19	-1227	+502	-300	329	344	74	
		-78.9	+45.3	-79.4	+6.0	-31.6	+132.0	
1	20	-1031	+303	-290	321	356	76	
		-104.2	+65.3	-89.6	-3.1	+0.8	+154.3	
1	21	-1002	+276	-288	329	8	85	
		-112.7	+35.4	-62.8	-3.4	+24.1	+153.1	
1	22	-915	+271	-282	311	10	81	P
		-106.3	+26.5	-20.3	-40.1	+13.3	+168.8	
1	23	-906	+285	-304	294	359	84	P
		-90.9	+52.8	-37.4	-36.5	-5.1	+176.2	
1	24	-733	+285	-299	289	357	84	
		-107.2	+48.7	-27.1	-40.4	+9.6	+186.5	

OBSS LDRI RCC SURVEY – STBD (PL ID 3) (Cont)

Auto Seq ID	Auto posn	X/ SY	Y/ SP	Z/ EP	PITCH/ WP	YAW/ WY	ROLL/ WR	Pause
1	25	-686	+288	-320	276	354	86	
		-96.8	+51.1	-20.0	-45.0	+2.0	+195.7	
1	26	-562	+299	-343	266	350	87	P
		-100.7	+54.1	-19.5	-43.9	+8.3	+205.7	
1	27	-563	+286	-369	266	343	86	
		-103.2	+75.8	-45.1	-33.0	+10.3	+204.4	
1	28	-678	+286	-373	270	339	86	
		-89.2	+88.1	-59.3	-27.2	-4.8	+200.0	
1	29	-906	+284	-379	294	332	98	
		-84.2	+112.0	-91.7	-10.8	-9.3	+179.9	
1	30	-963	+284	-381	295	322	87	
		-41.1	+124.3	-105.8	+14.5	-63.6	+205.1	
1	31	-1028	+291	-372	302	322	94	
		-36.1	+125.2	-114.6	+28.0	-65.0	+205.9	
1	32	-1051	+299	-359	302	322	92	P
		-32.1	+119.9	-115.1	+41.1	-69.9	+213.7	
1	33	-1047	+290	-358	291	336	83	P
		-50.6	+87.2	-69.6	-16.4	-54.4	+181.0	
1	34	-1235	+453	-381	300	316	97	
		-28.1	+62.8	-68.6	+67.0	-64.2	+231.1	
1	35	-1259	+495	-367	308	333	99	
		-54.4	+51.8	-52.6	+11.2	-44.0	+172.4	
1	36	-1280	+499	-373	305	329	97	
		-46.8	+46.5	-41.7	+12.4	-53.3	+181.9	
1	37	-1325	+515	-370	311	334	101	P
		-52.2	+36.7	-31.6	+5.6	-45.4	+170.0	
1	38	-1347	+480	-395	314	332	103	P
		-47.5	+48.4	-48.5	+15.7	-50.5	+172.2	
1	39	-1303	+474	-393	312	336	98	
		-54.4	+47.5	-42.6	+0.7	-45.1	+165.0	
1	40	-1282	+467	-390	312	337	94	
		-56.7	+50.7	-46.9	-2.9	-45.3	+161.5	
1	41	-1270	+448	-392	311	336	99	
		-55.5	+57.9	-56.3	+4.8	-42.7	+166.4	
1	42	-1077	+264	-408	305	335	94	
		-62.0	+106.0	-88.2	-13.3	-38.6	+170.2	
1	43	-1029	+272	-400	298	347	76	
		-73.5	+70.1	-41.0	-46.1	-34.3	+166.2	
1	44	-1002	+285	-385	305	355	72	
		-89.5	+57.1	-35.0	-48.2	-17.9	+163.0	
1	45	-970	+290	-365	316	4	65	
		-103.8	+30.9	-13.3	-56.7	-3.7	+161.1	
1	46	-875	+288	-365	322	1	69	P
		-120.8	+32.5	-23.7	-45.8	+12.8	+164.7	

OBSS LCS RCC SURVEY – NOSE CAP (PL ID 2)

Auto Seq ID	Auto posn	X/ SY	Y/ SP	Z/ EP	PITCH/ WP	YAW/ WY	ROLL/ WR	Pause
2	47	-347	-58	-583	227	349	356	P
		-125.3	+127.0	-109.0	+31.6	-31.3	+242.7	
2	48	-343	+88	-544	221	14	21	
		-100.6	+79.2	-100.2	+57.9	-34.5	+276.4	
2	49	-384	+198	-466	205	31	51	P
		-91.1	+34.6	-76.0	+52.8	-37.9	+287.2	
2	50	-379	+219	-431	206	33	71	
		-92.8	+29.6	-68.9	+25.1	-34.6	+272.2	
2	51	-406	+224	-349	203	37	114	P
		-92.2	+18.1	-59.1	-16.8	-19.2	+253.6	
2	52	-410	+221	-333	203	38	114	P
		-92.0	+15.9	-58.9	-15.4	-20.0	+252.8	

3	53	-357	-242	-394	201	317	280	P
		+102.6	+88.6	-114.7	+37.4	+31.3	+132.9	
3	54	-321	-263	-372	212	307	271	
		+114.7	+73.8	-87.6	+2.6	+19.2	+149.0	
3	55	-282	-269	-319	229	291	259	P
		+125.8	+33.8	-28.0	-46.5	+1.0	+159.2	
3	56	-243	-261	-339	224	290	280	
		+127.3	+32.2	-28.4	-27.3	+19.2	+153.6	
3	57	-219	-246	-371	219	288	302	P
		+128.8	+30.3	-28.5	-2.0	+35.0	+140.2	

OBSS LDRI RCC SURVEY – PORT (PL ID 3)

Auto Seq ID	Auto posn	X/ SY	Y/ SP	Z/ EP	PITCH/ WP	YAW/ WY	ROLL/ WR	Pause
4	58	-899	-243	-284	2	341	289	P
		+138.8	+24.6	-61.2	+36.9	-67.4	-74.2	
4	59	-958	-253	-278	2	341	293	
		+132.6	+32.0	-75.1	+35.2	-60.7	-81.4	
4	60	-1023	-277	-267	0	353	308	
		+137.2	+46.0	-105.8	+30.5	-49.2	-95.4	
4	61	-1057	-310	-267	0	356	307	
		+132.8	+48.4	-112.0	+39.0	-43.5	-88.9	
4	62	-1186	-442	-272	0	359	309	
		+104.6	+53.8	-108.0	+34.1	-14.5	-75.6	
4	63	-1265	-509	-274	0	350	309	
		+90.5	+36.5	-61.6	+5.1	-8.3	-76.5	
4	64	-1324	-523	-274	0	348	315	P
		+83.6	+27.0	-40.2	-12.7	-2.7	-75.7	
4	65	-1345	-496	-232	345	352	262	P
		+77.7	+52.1	-81.0	+53.7	+1.4	-89.2	
4	66	-1268	-456	-230	345	352	262	
		+88.0	+59.4	-96.4	+62.1	-7.9	-84.8	
4	67	-1175	-357	-219	345	345	262	
		+101.6	+58.8	-101.1	+67.7	-27.1	-78.2	
4	68	-1134	-315	-218	345	345	262	
		+109.9	+60.7	-108.7	+75.7	-34.5	-73.9	

OBSS LDRI RCC SURVEY – PORT (PL ID 3) (Cont)

Auto Seq ID	Auto posn	X/ SY	Y/ SP	Z/ EP	PITCH/ WP	YAW/ WY	ROLL/ WR	Pause
4	69	-1097	-277	-214	345	345	262	
		+118.3	+60.1	-113.1	+83.9	-41.8	-68.6	
4	70	-1061	-238	-210	345	345	262	
		+127.4	+57.8	-115.3	+93.5	-49.4	-61.5	
4	71	-998	-216	-214	345	345	259	
		+138.2	+51.6	-106.7	+105.8	-56.4	-45.3	
4	72	-972	-211	-216	345	345	259	
		+141.7	+49.1	-101.8	+107.8	-58.5	-40.2	
4	73	-935	-206	-219	345	345	259	
		+145.8	+44.9	-93.5	+109.7	-60.7	-33.2	
4	74	-906	-204	-220	345	345	259	P
		+148.4	+40.9	-85.9	+110.2	-61.9	-28.4	
4	75	-898	-214	-230	347	348	259	P
		+151.6	+37.4	-83.2	+112.5	-60.5	-24.5	
4	76	-979	-231	-226	347	348	259	
		+142.8	+47.3	-102.3	+109.1	-56.1	-39.1	
4	77	-1034	-262	-231	347	348	259	
		+133.0	+54.0	-109.7	+100.1	-49.7	-51.4	
4	78	-1110	-338	-234	347	348	259	
		+115.4	+57.6	-106.2	+82.6	-35.9	-66.5	
4	79	-1183	-406	-238	353	356	254	
		+105.4	+47.4	-108.3	+97.8	-18.3	-66.4	
4	80	-1244	-467	-242	354	356	254	
		+94.2	+43.7	-95.2	+86.8	-8.9	-72.3	
4	81	-1312	-504	-245	359	0	254	
		+83.9	+33.3	-88.5	+90.8	+4.7	-74.5	
4	82	-1343	-511	-246	359	0	254	P
		+79.6	+32.4	-85.3	+88.9	+8.1	-77.0	
4	83	-1323	-537	-315	346	348	282	P
		+80.9	+49.1	-50.2	+5.9	+0.6	-87.1	
4	84	-1244	-513	-305	353	357	287	
		+93.4	+63.0	-95.3	+34.6	-4.2	-77.4	
4	85	-1176	-450	-298	352	2	290	
		+107.4	+76.4	-122.8	+46.3	-12.9	-76.9	
4	86	-1106	-380	-295	352	4	291	
		+129.7	+77.1	-134.2	+56.0	-33.1	-76.8	
4	87	-1023	-300	-288	354	357	289	
		+143.2	+59.7	-116.9	+57.7	-54.0	-76.3	
4	88	-989	-275	-294	350	350	282	
		+141.9	+62.4	-105.9	+54.8	-59.0	-73.1	
4	89	-965	-263	-294	350	350	282	
		+145.7	+59.5	-102.4	+55.6	-62.7	-71.4	
4	90	-933	-253	-289	358	347	283	
		+143.2	+37.8	-83.6	+59.1	-64.9	-64.1	
4	91	-887	-248	-287	4	341	282	P
		+138.7	+16.1	-50.9	+54.8	-67.1	-54.1	
4	92	-887	-285	-287	4	341	282	
		+135.8	+11.3	-38.1	+44.8	-64.3	-56.4	
4	93	-897	-285	-331	2	336	302	P
		+131.8	+25.2	-40.2	-13.0	-60.8	-101.1	

OBSS LDRI RCC SURVEY – PORT (PL ID 3) (Cont)

Auto Seq ID	Auto posn	X/ SY	Y/ SP	Z/ EP	PITCH/ WP	YAW/ WY	ROLL/ WR	Pause
4	94	-910	-285	-330	2	340	302	
		+134.6	+32.1	-56.2	-2.8	-60.3	-98.7	
4	95	-926	-285	-325	1	340	298	
		+133.5	+35.2	-62.3	+8.1	-60.4	-92.4	
4	96	-950	-287	-335	359	340	292	
		+132.0	+42.7	-71.3	+20.8	-59.9	-84.2	
4	97	-978	-289	-352	357	345	287	
		+135.7	+55.0	-89.7	+37.0	-59.1	-75.7	
4	98	-1020	-286	-332	350	350	297	
		+138.4	+76.6	-109.9	+18.9	-51.8	-94.3	
4	99	-1074	-329	-341	342	1	292	
		+144.5	+110.9	-131.3	+18.5	-47.0	-87.9	
4	100	-1148	-401	-346	340	357	289	
		+111.3	+106.5	-115.8	+9.9	-17.6	-89.7	
4	101	-1229	-475	-357	333	359	289	
		+82.7	+103.5	-95.1	-6.4	+14.9	-96.3	
4	102	-1280	-503	-363	327	1	285	
		+63.2	+97.6	-79.2	-9.6	+35.4	-106.0	
4	103	-1328	-517	-364	327	1	285	P
		+55.8	+89.2	-69.8	-9.5	+42.7	-107.5	
4	104	-1338	-476	-389	345	357	254	P
		+74.7	+86.1	-101.8	+49.9	+5.8	-92.3	
4	105	-1283	-453	-391	343	350	243	
		+85.0	+78.6	-87.6	+51.5	-12.6	-84.7	
4	106	-1166	-340	-392	343	350	243	
		+110.2	+97.3	-115.5	+67.9	-30.3	-65.2	
4	107	-1113	-285	-388	342	337	239	
		+109.8	+80.0	-93.2	+69.6	-41.1	-56.1	
4	108	-1071	-284	-378	352	332	270	
		+112.1	+61.9	-80.6	+39.3	-48.8	-70.4	
4	109	-1050	-279	-387	357	332	272	
		+114.9	+55.2	-78.4	+45.7	-51.5	-63.9	
4	110	-985	-279	-386	1	331	281	P
		+120.7	+42.9	-62.9	+32.8	-58.9	-67.5	

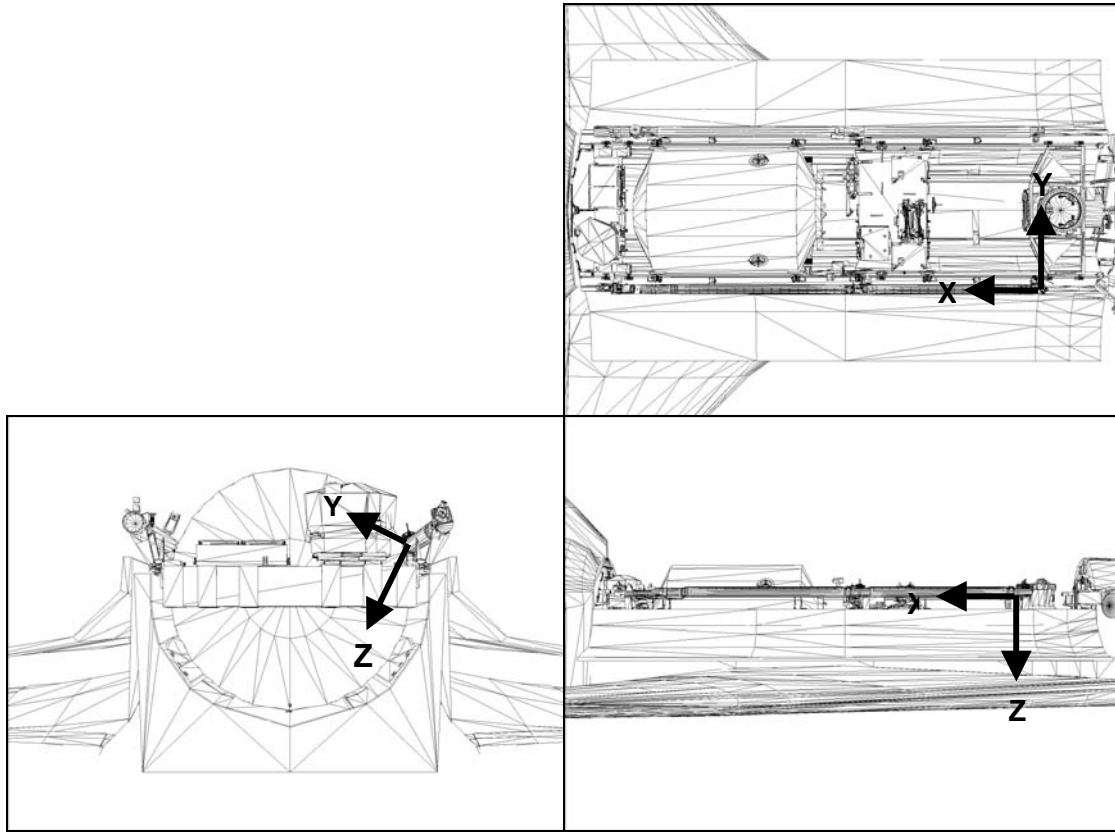
OBSS LDRI RCC SURVEY – NOSE CAP (PL ID 3)

Auto Seq ID	Auto posn	X/ SY	Y/ SP	Z/ EP	PITCH/ WP	YAW/ WY	ROLL/ WR	Pause
7	119	-195	+107	-338	248	320	331	P
		+173.4	+95.8	-78.6	-7.7	-13.2	+175.8	
7	120	-195	+103	-351	241	320	329	
		+169.8	+107.2	-91.5	-1.0	-9.4	+173.4	
7	121	-185	+88	-386	215	320	315	P
		+133.6	+136.6	-130.1	+23.7	+16.5	+146.5	
7	122	-176	+77	-422	188	299	289	
		+120.6	+74.0	-105.5	+56.3	+34.0	+117.8	
7	123	-174	+61	-437	158	293	260	
		+125.8	+39.7	-71.8	+53.0	+33.8	+108.2	
7	124	-157	+50	-383	139	292	240	P
		+125.5	+9.1	-35.6	+44.8	+37.7	+103.1	

OBSS LDRI RCC SURVEY – NOSE CAP (PL ID 3) (Cont)

Auto Seq ID	Auto posn	X/ SY	Y/ SP	Z/ EP	PITCH/ WP	YAW/ WY	ROLL/ WR	Pause
7	125	-171	+27	-411	141	298	261	
		+120.6	+13.4	-50.7	+77.9	+31.2	+87.1	
7	126	-171	-19	-417	144	314	269	P
		+110.6	+12.9	-73.4	+102.2	+21.9	+81.1	
7	127	-164	-16	-395	147	318	263	
		+107.6	+12.8	-82.5	+102.2	+24.2	+84.9	
7	128	-135	+4	-337	169	306	250	
		+112.9	+41.4	-89.5	+48.4	+31.3	+119.3	
7	129	-159	+37	-300	233	297	309	
		+134.3	+57.1	-60.5	+0.5	+22.7	+150.9	
7	130	-184	+68	-273	184	282	237	P
		+128.5	+19.2	-32.2	-20.5	+22.6	+147.4	
7	131	-209	+31	-231	238	298	266	P
		+133.9	+57.2	-61.3	-32.3	-11.2	+157.4	
7	132	-207	+18	-230	230	289	249	P
		+130.0	+25.0	-56.4	+56.4	-8.9	+156.5	
7	133	-206	-20	-231	235	302	258	
		+129.9	+57.7	-55.9	-38.6	-14.5	+157.6	
7	134	-216	-59	-248	251	321	272	
		+150.5	+73.4	-49.7	-47.4	-43.6	+163.8	
7	135	-191	-58	-267	234	322	268	
		+138.2	+97.2	-85.8	-26.2	-27.4	+159.0	
7	136	-168	-13	-270	214	303	256	P
		+122.6	+66.1	-78.5	-13.9	+3.9	+151.1	
7	137	-161	-40	-287	231	317	283	
		+135.4	+90.3	-83.6	-13.4	-8.7	+159.2	
7	138	-166	-60	-348	189	326	271	
		+89.3	+89.9	-134.7	+59.6	+34.4	+119.9	
7	139	-179	-69	-380	188	333	285	P
		+73.9	+97.8	-146.0	+86.9	+41.2	+99.9	
7	140	-179	-70	-381	185	316	280	P
		+96.4	+71.7	-109.3	+63.5	+38.5	+111.1	
7	141	-178	-80	-345	204	319	278	
		+101.9	+94.9	-109.1	+22.1	+28.8	+137.0	
7	142	-182	-84	-305	221	320	274	P
		+118.3	+98.2	-94.2	-9.3	+3.9	+154.1	

OBSS COORDINATE SYSTEM – PL ID 1

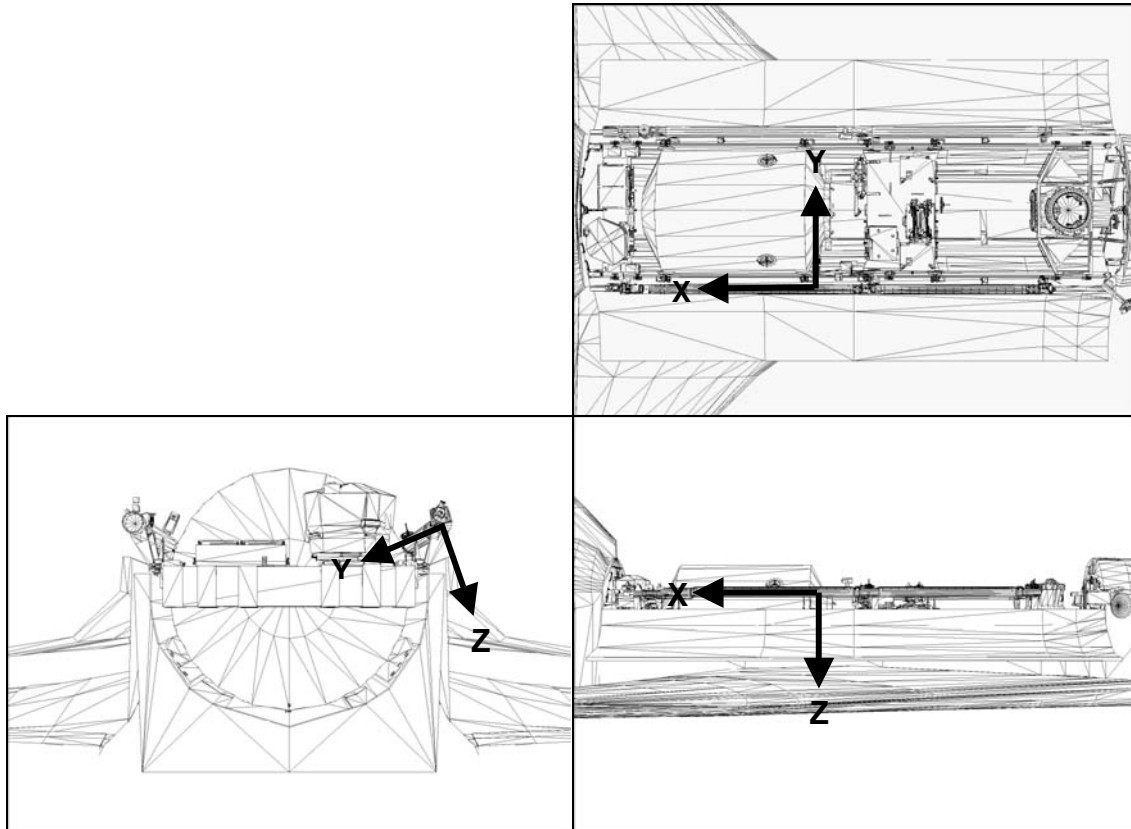


POR: POR at OBSS fwd striker bar

PURPOSE: OBSS unberth/berth

RATES:	COARSE	VERN
TRANS LIM ft/sec	0.20	0.10
ROT LIM deg/sec	0.88	0.08

OBSS COORDINATE SYSTEM – PL ID 2

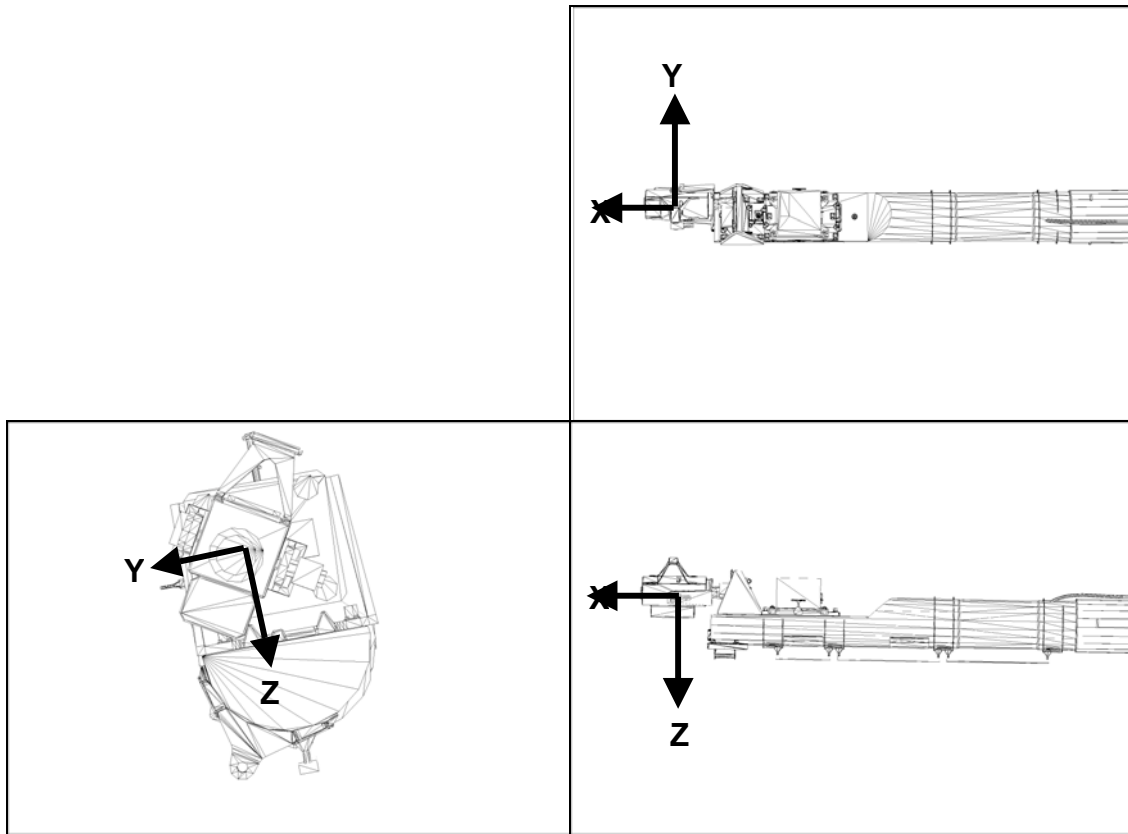


POR: POR at OBSS center of mass

PURPOSE: Large, non-survey boom maneuvers

RATES:	COARSE	VERN
TRANS LIM ft/sec	0.70	0.23
ROT LIM deg/sec	2.64	0.88

OBSS COORDINATE SYSTEM – PL ID 3

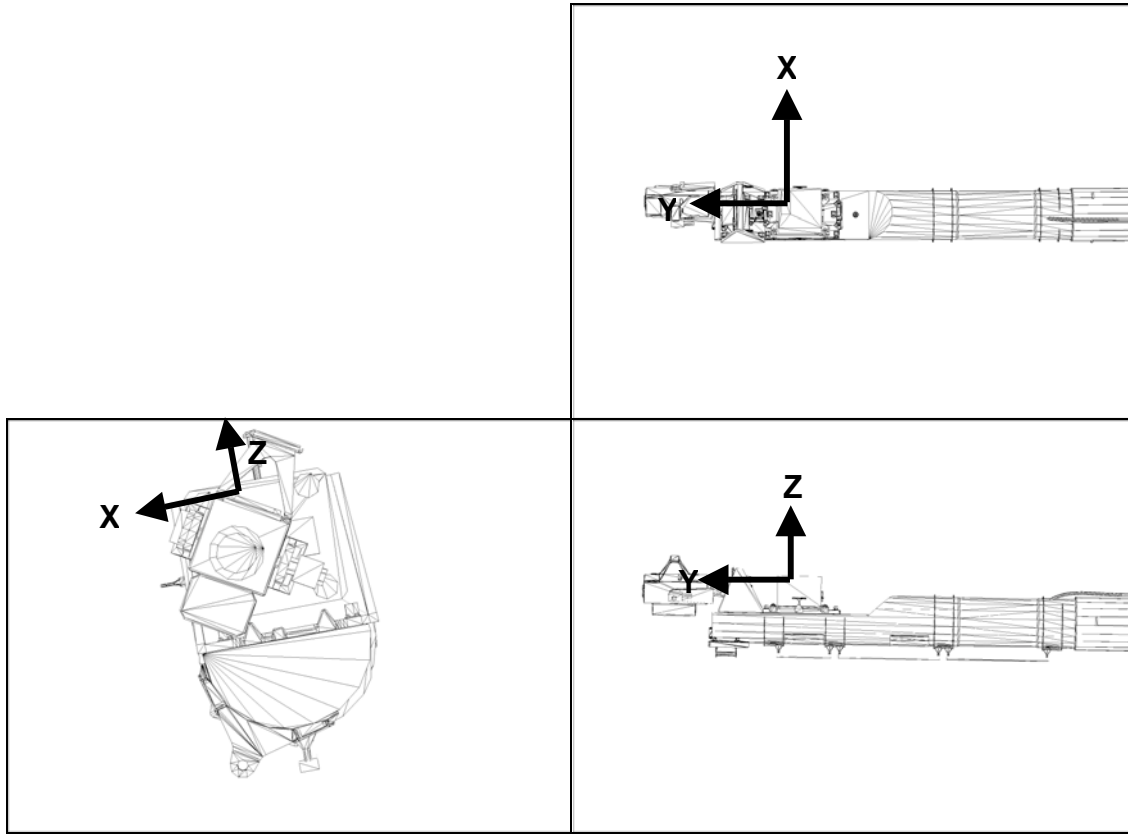


POR: POR at OBSS ITVC/LDRI PTU Pivot

PURPOSE: OBSS Surveys using LDRI

RATES:	COARSE	VERN
TRANS LIM ft/sec	0.23	0.05
ROT LIM deg/sec	2.64	0.88

OBSS COORDINATE SYSTEM – PL ID 4



POR: POR at LCS Eyepoint

PURPOSE: OBSS Surveys using LCS

RATES:	COARSE	VERN
TRANS LIM ft/sec	0.15	0.05
ROT LIM deg/sec	2.64	0.88

OBSS GO/NO-GO CRITERIA

CONTINUE OPERATIONS IF:							
	DAMAGE DETECT GRAPPLE UNBERTH	DAMAGE DETECT SURVEY	FOCUSED INSP/REPAIR GRAPPLE/HAND OFF (HIGH PRIORITY)	CONTINUE FOCUSED INSP/REPAIR (HIGH PRIORITY)	ENTRY	FLT RULE REF	
A. STBD MPM STOW MOTORS (2)	2 ↓ [1]	2 ↓ [1]	2 ↓ [1]	2 ↓ [1]		{LF1_A12-11}	
B. STBD MPM (3) STOWED INDICATIONS (6)					[2]	{LF1_A12-11}	
C. STBD MPM (3) DEP INDICATIONS (6)	FORWARD 1 ↓	FORWARD 1 ↓	FORWARD 1 ↓	FORWARD 1 ↓		{LF1_A12-11}	
D. STBD MRL LAT CAP (3)	1 ↓ [6]	3 ↓ [7]	3 ↓ [7]	3 ↓ [7]	0 ↓ [6]	{LF1_A12-12}	
E. STBD JETTISON (2)	1 ↓ [10]	1 ↓ [10]	1 ↓	1 ↓		{LF1_A12-31}	
F. PORT MPM STOW MOTORS (2)	2 ↓ [1]	2 ↓ [1]	2 ↓ [1]	2 ↓ [1]		{A12-72}	
G. PORT MPM (4) DEP INDICATIONS (8)	SHOULDER 1 ↓	SHOULDER 1 ↓	SHOULDER 1 ↓	SHOULDER 1 ↓		{A12-72}	
H. PORT MRL LAT CAP (3)	[8]	[8]	[9]	[9]		{A12-73}	
I. PORT JETTISON (2)	1 ↓ [10]	1 ↓ [10]	1 ↓	1 ↓		{A12-181}	
J. AUTO MODE (1)			1 ↓	1 ↓		{LF1_A12-22}	
K. MANUAL AUG MODE (1)			2 ↓ [3]	3 ↓ [3]		{A12-111}	
L. DIRECT MODE (1)	1 ↓	1 ↓					{A12-111}
M. SINGLE MODE (1)							
N. BACKUP MODE (1)	0 ↓	0 ↓			0 ↓		{A12-111}
O. BRAKES (6)	0 ↓	0 ↓	0 ↓	0 ↓		{A12-115}	
P. AUTO BRAKES (1)	0 ↓ [4]	0 ↓ [4]	0 ↓ [4]	0 ↓ [4]		{A12-116}	
Q. CAPTURE & RIGIDIZE (2)	1 ↓		1 ↓			{A12-161}	
R. DERIGIDIZE (2)	1 ↓	1 ↓	2 ↓	2 ↓		{A12-161}	
S. RELEASE (2)	1 ↓ [1]	1 ↓ [1]	3 ↓ [1]	3 ↓ [1]		{A12-161}	
T. BACKUP RELEASE (1)	0 ↓ [1]	0 ↓ [1]					{A12-161}
U. SRMS THERMAL	REQUIRED	REQUIRED	REQUIRED	REQUIRED		{A12-3}	
V. SENSOR THERMAL	REQUIRED	REQUIRED	REQUIRED [5]	REQUIRED [5]		{LF1_A12-2}	

NOTES:

- [1] EVA CAPABILITY EXISTS FOR THE FOLLOWING CONTINGENCIES:
- MPM DEPLOY/STOW
 - SRMS STRAPDOWN
 - OBSS BERTHING
 - GRAPPLE FIXTURE (GF) RELEASE
- [2] ONE AT THE FORWARD AND ONE AT EITHER THE MID OR AFT PEDESTAL IS REQUIRED
- [3] ONE OF MANUAL, SINGLE, DIRECT, OR BACKUP REQUIRED FOR POSITIONING FOR DAMAGE ASSESSMENT/REPAIR AND JETTISON
- [4] COMPUTER-SUPPORTED MODES UNAVAILABLE WITH LOSS OF AUTOBRAKES, BUT OPERATIONS IN DIRECT AND BACKUP CAN CONTINUE WITH THE LOSS OF AUTOBRAKES
- [5] SENSOR THERMAL NOT REQUIRED FOR REPAIR OR HANDOFF FOR SSRMS CLEARANCES
- [6] THREE MRLs LATCHED REQUIRED FOR ENTRY. TWO MRLs LATCHED REQUIRED FOR DOCK/UNDOCK (ONE OF WHICH MUST BE THE FWD MRL) OR OBSS LEFT ON SRMS DURING DOCK/UNDOCK. GO WITH CONFIRMED CAPABILITY TO DOCK AND UNDOCK WITH THE OBSS ON THE SRMS
- [7] WITH THREE MRL'S FAILED, BOOM JETTISON OR CONTINGENCY STOW ON ISS WILL BE REQUIRED
- [8] CONTINUE OPERATIONS IF ONE FAILURE WILL NOT RESULT IN THE INABILITY TO LATCH AT LEAST TWO MRLs
- [9] CONTINUE OPERATIONS EVEN IF ONE FAILURE WILL RESULT IN THE INABILITY TO LATCH AT LEAST TWO MRLs (ASSUMES CURRENTLY HAVE TWO-LATCH CAPABILITY). EVA CAPABILITY REQUIRED
- [10] SYSTEM REDUNDANCY OR JETTISON REDUNDANCY IFM REQUIRED

OBSS ATTITUDE CONTROL CONSTRAINTS

ATTITUDE CONTROL & OPS [1][3][4] OBSS CONFIG [2]		STS ATTITUDE CONTROL		ISS ATTITUDE CONTROL [6] [9] [11]			OPERATIONS				
		VRCS	PRCS	CMG - TA [5]		THRUSTERS ONLY	CREW EXERCISE (ISOLATED OR UN-ISOLATED) [13]	EVA OPS [14]	REBOOST (STS, SM, PROG) [7] [11]	UNDOCKING (STS/RS) [8]	DOCKING (STS/RS) [8]
				MOM MGMT OR ATT HOLD	DESAT REQUEST						
OBSS SRMS OPS	OBSS AT HANDOFF POSITION	A12	B12, LO Z	OK	ENA	OK	OK	OK	OK	TBD	TBD
	OBSS MNVR TO MPLM VIEWING POSITION	A12	B12, LO Z	OK	ENA	NOT OK	OK	OK	NOT OK	NOT OK	NOT OK
	OBSS AT MPLM VIEWING POSITION	A12	B12, LO Z	OK	ENA	OK	OK	OK	OK	TBD	TBD
	OBSS MNVR TO CMG R&R VIEWING POSITION	A12	B12, LO Z	OK	ENA	NOT OK	OK	OK	NOT OK	NOT OK	NOT OK
	OBSS AT CMG R&R VIEWING POSITION	A12	B12, LO Z	OK	ENA	OK	OK	OK	OK	TBD	TBD
	MANEUVER TO OBSS DOCKED SURVEY POSITIONS (WITHOUT EVA CREWMEMBER)	A12	B12, LO Z	OK	ENA	NOT OK	OK	OK	NOT OK		
	IN DOCKED SURVEY POSITIONS (WITHOUT EVA CREWMEMBER)	A12	B12, LO Z	OK	ENA	OK	OK	OK	OK		
	MANEUVER TO OBSS DOCKED SURVEY POSITIONS (W/ EVA CREWMEMBER)										
	IN DOCKED SURVEY POSITIONS (W/ EVA CREWMEMBER)										
	OBSS MNVR TO HANDOFF POSITION	A12	B12, LO Z	OK	ENA	NOT OK	OK	OK	NOT OK	NOT OK	NOT OK
AFTER OBSS LATCHING		A12	B12, LO Z	OK	ENA	OK	OK	OK	OK	OK	OK

NOTES:

- [1] KEY: – ACS OR OPS ALLOWED. – ACS OR OPS NOT ALLOWED – NOT ANALYZED
- [2] SSRMS/OBSS POSITIONS DEFINED IN REF DATA
- [3] REFERENCE CSA-SS-MOA-LF1-003, CSA-SS-MOA-LF1-004 REV C, CSA-SS-MOA-LF1-006 REV B, MOA.79103 REV A
- [4] CONSTRAINTS APPLY TO BOTH BRAKES ON AND POSITION HOLD UNLESS OTHERWISE NOTED
- [5] SINGLE PULSE MODE FOR CMG-TA
- [6] REFERENCE RULE {B12-105}, SSRMS ATTITUDE CONTROL CONSTRAINTS FOR ISS [HC] [RC], FOR USE OF AUTOMATIC ATTITUDE CONTROL IN UNPLANNED CONTINGENCY
- [7] SHUTTLE REBOOST (CONFIG 1-4), SM AND PROGRESS REBOOST
- [8] DOCKING AND UNDOCKING VEHICLES INCLUDE ORBITER, SOYUZ, AND PROGRESS
- [9] CONSTRAINTS APPLY TO ISS ATTITUDE HOLD AND MANEUVERS
- [10] 5 FT OF CLEARANCE REQUIRED FOR ALT
- [11] SSRMS CONSTRAINTS APPLY TO MATED AS WELL AS STAGE OPERATIONS
- [12] THESE OPERATIONS ARE PERMITTED IF THE OBSS IS IN BRAKES ON AT THE UHF CLEAR OR AFT POSITIONS
- [13] IF THERE IS AN EVA WHILE THE ORBITER IS CONTROLLING ATTITUDE WITH PRCS JETS, ONLY TVIS EXERCISE IS ALLOWED DURING THE EVA
- [14] MAXIMUM EVA LOADS ARE NOT PERMITTED DURING ORBITER PRCS MANEUVER OF THE ISS OR DURING PRCS TWO OR THREE-JET ATTITUDE HOLD. MAXIMUM EVA LOADS INCLUDE APFR INGRESS, VIGOROUS APFR MOTIONS, AND CREW KICK-OFFS

SRMS EE CAM SURVEYS JOINT ANGLES VS POR COORDINATES

WSB VENT SURVEY

SY	SP	EP	WP	WY	WR
-22.6	+28.8	-29.8	-33.7	+33.2	+12.5

X	Y	Z	PITCH	YAW	ROLL	PLID
-1203	+39	-582	328	4	357	0

STBD CREW CABIN SURVEY

SY	SP	EP	WP	WY	WR
-134.9	+17.2	-57.5	-112.6	-59.5	+228.2

X	Y	Z	PITCH	YAW	ROLL	PLID
-351	+180	-411	241	53	123	0
-351	+180	-411	241	53	123	5

PORT CREW CABIN SURVEY

SY	SP	EP	WP	WY	WR
+65.9	+53.3	-94.3	-99.6	-36.5	+216.5

X	Y	Z	PITCH	YAW	ROLL	PLID
-840	-364	-333	324	291	323	0
-840	-364	-333	324	291	323	5

SRMS EE CAM CREW CABIN SURVEY AUTO SEQUENCES

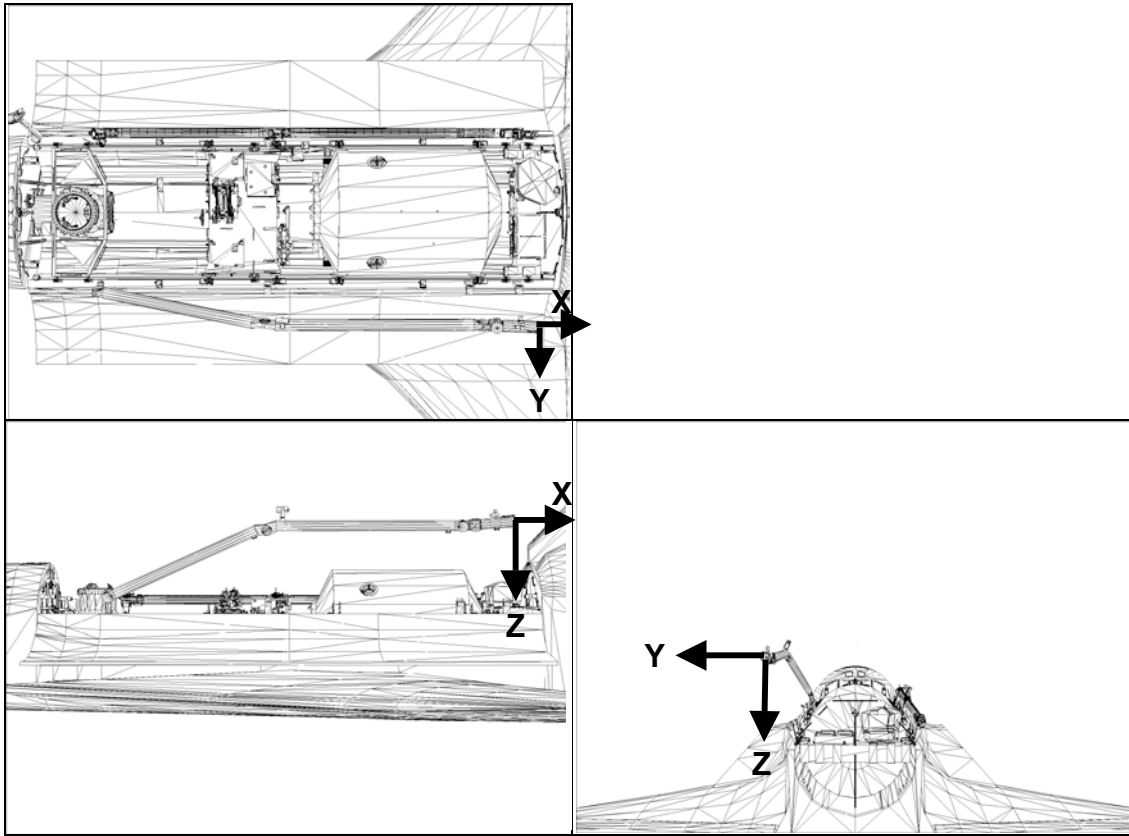
Stbd Crew Cabin Survey (PL ID 5)

Auto Seq ID	Auto posn	X/ SY	Y/ SP	Z/ EP	PITCH/ WP	YAW/ WY	ROLL/ WR	Pause
5	111	-351	+180	-411	241	53	123	P
		-134.9	+17.2	-57.5	-112.6	-59.5	+228.2	
5	112	-484	+230	-465	255	48	103	P
		-116.2	+28.3	-69.7	-112.7	-33.9	+212.2	
5	113	-351	+180	-411	241	53	123	P
		-134.9	+17.2	-57.5	-112.6	-59.5	+228.2	
5	114	-548	+266	-478	270	38	45	P
		-107.7	+28.3	-66.4	-108.1	-14.9	+164.2	

Port Crew Cabin Survey (PL ID 5)

6	115	-840	-364	-333	324	291	323	P
		+65.9	+53.3	-94.3	-99.6	-36.5	+216.5	
6	116	-523	-296	-354	298	285	302	
		+122.3	+61.7	-109.1	-97.6	+20.3	+186.2	
6	117	-298	-252	-375	241	283	237	P
		+151.1	+40.8	-70.8	-91.9	+53.1	+146.4	
6	118	-518	-252	-385	300	281	271	P
		+129.1	+70.1	-118.9	-97.9	+28.4	+150.5	

SRMS EE CAM CREW CABIN SURVEY COORDINATE SYSTEM – PL ID 5



POR: POR at center of EE

PURPOSE: Crew Cabin Surveys using SRMS EE Camera

RATES:	COARSE	VERN
TRANS LIM ft/sec	0.61	0.33
ROT LIM deg/sec	2.64	0.88

ORM JOINT ANGLES VS POR COORDINATES

PMA2 PRE-GRAPPLE POSN

SY	SP	EP	WP	WY	WR
-33.9	+131.6	-141.8	-114.0	-41.0	-4.1

X	Y	Z	PITCH	YAW	ROLL	PL ID
-724	-71	-562	214	330	291	0
-692	-30	-504	0	0	0	4A
-724	-71	-562	214	330	291	5A

PMA2 GRAPPLED POSN (Expected Values)

SY	SP	EP	WP	WY	WR
-61.2	+138.2	-151.3	-84.0	-51.1	+32.9

X	Y	Z	PITCH	YAW	ROLL	PL ID
-681	-41	-533	214	330	290	0
-649	0	-475	0	0	0	4A
-681	-41	-533	214	330	290	5A

SEPARATION POSN

SY	SP	EP	WP	WY	WR
-70.1	+129.5	-124.7	-90.7	-51.3	+47.2

X	Y	Z	PITCH	YAW	ROLL	PL ID
-681	-41	-652	214	330	290	0
-649	0	-595	0	0	0	4A
-681	-41	-652	214	330	290	5A

UNDOCKED POSN

SY	SP	EP	WP	WY	WR
-74.3	+120.9	-105.2	-96.4	-50.0	+53.3

X	Y	Z	PITCH	YAW	ROLL	PL ID
-679	-42	-729	215	330	290	0
-648	-1	-671	1	0	0	4A
-679	-42	-729	215	330	290	5A

REPAIR POSN

SY	SP	EP	WP	WY	WR
+53.4	+16.4	-115.3	+32.1	-61.9	+237.3

X	Y	Z	PITCH	YAW	ROLL	PL ID
-852	-165	-158	341	330	290	0
-917	-124	-167	127	0	0	4A
-852	-165	-158	341	330	290	5A

CAPTURE POSN

SY	SP	EP	WP	WY	WR
-60.6	+138.3	-152.4	-83.7	-51.0	+32.0

X	Y	Z	PITCH	YAW	ROLL	PL ID
-681	-41	-529	214	330	290	0
-649	0	-471	0	0	0	4A
-681	-41	-529	214	330	290	5A

ORM AUTO SEQUENCES

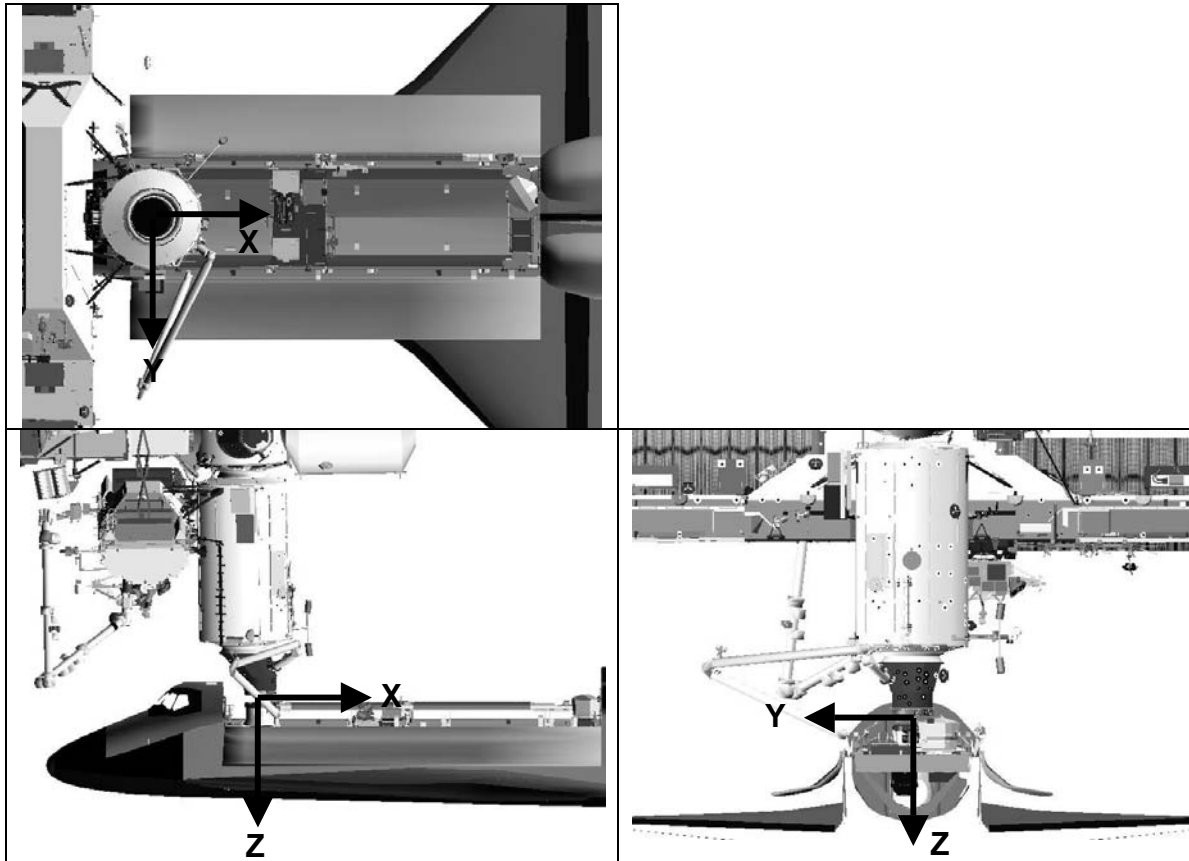
Maneuver to Repair posn (PL ID 5A)

Auto Seq ID	Auto posn	X/ SY	Y/ SP	Z/ EP	PITCH/ WP	YAW/ WY	ROLL/ WR	Pause
1	1	-679	-42	-729	215	330	290	P
		-74.3	+120.9	-105.2	-96.4	-50.0	+53.3	
1	2	-783	+15	-732	236	291	327	
		-55.7	+110.9	-103.9	-55.0	-37.3	+83.9	
1	3	-1082	-104	-722	324	293	66	
		-7.7	+65.4	-50.4	-66.3	-47.9	+69.7	
1	4	-1017	-394	-694	354	331	107	
		+36.1	+70.4	-46.4	-52.7	-59.0	+87.2	
1	5	-1003	-394	-637	347	356	124	
		+37.3	+80.4	-71.8	-25.5	-35.6	+115.0	
1	6	-605	-340	-548	318	23	193	
		+126.6	+112.5	-116.9	-78.9	-63.0	+92.2	
1	7	-364	-340	-489	280	10	257	
		+151.5	+69.3	-80.4	-73.4	-30.6	+126.2	
1	8	-375	-194	-589	215	338	284	P
		+170.7	+96.7	-105.9	-31.8	+17.2	+146.3	
1	9	-158	-151	-381	206	345	273	
		+171.9	+31.0	-61.0	+0.1	+13.0	+134.6	
1	10	-158	-151	-248	248	345	273	
		+168.4	+3.7	-28.8	-43.5	+1.1	+131.0	
1	11	-340	-151	-109	279	345	273	
		+156.9	+5.2	-68.6	-32.9	-7.3	+133.0	
1	12	-498	-120	-97	315	315	287	
		+143.5	+2.7	-89.3	-48.1	+6.0	+140.5	
1	13	-852	-165	-158	341	330	290	P
		+53.4	+16.4	-115.3	+32.1	-61.9	+237.3	

Maneuver to Undock posn (PL ID 5A)

Auto Seq ID	Auto posn	X/ SY	Y/ SP	Z/ EP	PITCH/ WP	YAW/ WY	ROLL/ WR	Pause
2	14	-852	-165	-158	341	330	290	P
		+53.4	+16.4	-115.3	+32.1	-61.9	+237.3	
2	15	-498	-120	-97	315	315	287	
		+143.5	+2.7	-89.3	-48.1	+6.0	+140.5	
2	16	-340	-151	-109	279	345	273	
		+156.9	+5.2	-68.6	-32.9	-7.3	+133.0	
2	17	-158	-151	-248	248	345	273	
		+168.4	+3.7	-28.8	-43.5	+1.1	+131.0	
2	18	-158	-151	-381	206	345	273	
		+171.9	+31.0	-61.0	+0.1	+13.0	+134.6	
2	19	-375	-194	-589	215	338	284	P
		+170.7	+96.7	-105.9	-31.8	+17.2	+146.3	
2	20	-364	-340	-489	280	10	257	
		+151.5	+69.3	-80.4	-73.4	-30.6	+126.2	
2	21	-605	-340	-548	318	23	193	
		+126.6	+112.5	-116.9	-78.9	-63.0	+92.2	
2	22	-1003	-394	-637	347	356	124	
		+37.3	+80.4	-71.8	-25.5	-35.6	+115.0	
2	23	-1017	-394	-694	354	331	107	
		+36.1	+70.4	-46.4	-52.7	-59.0	+87.2	
2	24	-1082	-104	-722	325	293	66	
		-7.7	+65.5	-50.7	-65.6	-48.0	+69.1	
2	25	-783	+15	-732	236	291	327	
		-55.7	+110.9	-103.9	-55.0	-37.3	+83.9	
2	26	-679	-42	-729	215	330	290	P
		-74.3	+120.9	-105.2	-96.4	-50.0	+53.3	

ORM COORDINATE SYSTEM – PL ID 4A (UPLINK)

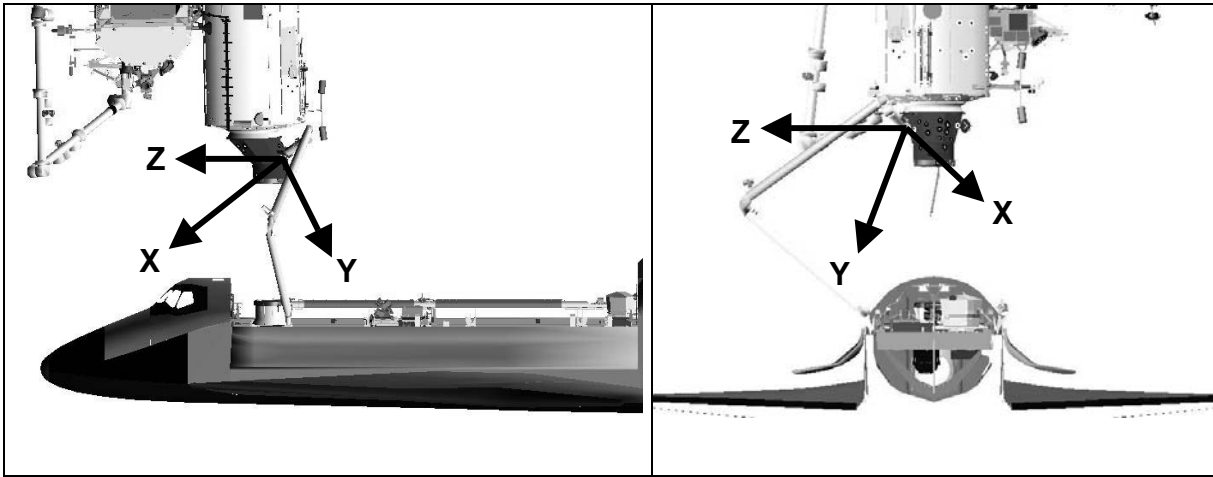


POR: POR at center of mating interface

PURPOSE: Undock/Dock of Orbiter/ISS

RATES:	COARSE	VERN
TRANS LIM ft/sec	0.14	0.042
ROT LIM deg/sec	0.14	0.042

ORM COORDINATE SYSTEM – PL ID 5A (UPLINK)



POR: POR at PMA 2 Port Grapple Fixture

PURPOSE: Maneuvering ISS Payload

RATES:	COARSE	VERN
TRANS LIM ft/sec	0.14	0.042
ROT LIM deg/sec	0.14	0.042

ORM GO/NO-GO CRITERIA

	CONTINUE OPERATIONS IF:		
	GRAPPLE PMA2	CONTINUE ORM (HIGH PRIORITY)	FLIGHT RULES REF
A. PORT JETTISON (2)	1 ↓	1 ↓	{A12-181}
B. PORT MPM (4) DEP INDICATIONS (8)	SHOULDER 1 ↓	SHOULDER 1 ↓	{A12-72}
C. PORT MPM STOW MOTORS (2)	2 ↓ [4]	2 ↓ [4]	{A12-72}
D. PORT MRL LAT CAP (3)	[2]	[2]	{A12-73}
E. AUTO MODE (1)	1 ↓	1 ↓	{LF1_A12-22}
F. MANUAL AUG MODE (1)	2 ↓ [1]	3 ↓	{A12-111}
G. SINGLE MODE (1)			
H. DIRECT MODE (1)			
I. BACKUP MODE (1)	0 ↓		{A12-111}
J. BRAKES (6)	0 ↓	0 ↓	{A12-115}
K. AUTO BRAKES (1)	0 ↓ [3]	0 ↓ [3]	{A12-116}
L. CAPTURE & RIGIDIZE (2)	1 ↓		{A12-161}
M. DERIGIDIZE (2)	2 ↓	2 ↓	{A12-161}
N. RELEASE (2)	3 ↓ [4]	3 ↓ [4]	{A12-161}
O. BACKUP RELEASE (1)			
P. SRMS THERMAL	REQUIRED	REQUIRED	{A12-3}

NOTES:

- [1] ASSUMES VEHICLE SEP CAN BE PERFORMED IN A SINGLE JOINT MODE OR JUST OPEN HOOKS FOR RELEASE
- [2] CONTINUE OPERATIONS EVEN IF ONE FAILURE WILL RESULT IN THE INABILITY TO LATCH AT LEAST TWO MRLs (ASSUMES CURRENTLY HAVE TWO-LATCH CAPABILITY). EVA CAPABILITY REQUIRED FOR SRMS STRAPDOWN
- [3] COMPUTER-SUPPORTED MODES UNAVAILABLE WITH LOSS OF AUTOBRAKES, BUT OPERATIONS IN DIRECT AND BACKUP CAN CONTINUE WITH THE LOSS OF AUTOBRAKES
- [4] EVA CAPABILITY EXISTS FOR THE FOLLOWING CONTINGENCIES
 - GRAPPLE FIXTURE (GF) RELEASE
 - MPM DEPLOY/STOW

ORM ATTITUDE CONTROL CONSTRAINTS

ORM CONFIG	STS ATTITUDE CONTROL		ISS ATTITUDE CONTROL			OPERATIONS				
	VRCS	PRCS	CMG - TA		THRUSTERS ONLY	CREW EXERCISE (ISOLATED OR UN-ISOLATED)	EVA OPS	REBOOST (STS, SM, PROG)	UNDOCK-ING (STS/RS)	DOCK-ING (STS/RS)
			MOM MGMT OR ATT HOLD	DESAT REQUEST						
SRMS MNVR TO ORBITER UNDOCK POSITION	NOT OK	NOT OK	OK	ENA	NOT OK [5]	OK		NOT OK		
SRMS IN ORBITER UNDOCK POSITION	NOT OK	NOT OK	OK [2]	ENA [2]	NOT OK [5]	OK [3]		NOT OK	OK	
SRMS MNVR TO ORBITER REPAIR POSITION	NOT OK	NOT OK	OK [2]	ENA [2]	NOT OK [5]	OK [3]		NOT OK		
SRMS IN ORBITER REPAIR POSITION	NOT OK	NOT OK	OK [2]	ENA [2]	NOT OK [5]	OK [3] [4]	OK	NOT OK		
SRMS MNVR TO ORBITER OVERNIGHT PARK POSITION	NOT OK	NOT OK	OK [2]	ENA [2]	NOT OK [5]	OK [3]		NOT OK		
SRMS IN ORBITER OVERNIGHT PARK POSITION	NOT OK	NOT OK	OK [2]	ENA [2]	NOT OK [5]	OK [3]		NOT OK	OK	

NOTES:

- [1] KEY: – ACS OR OPS ALLOWED. – ACS OR OPS NOT ALLOWED – NOT ANALYZED. @[DN 59]
- [2] ATTITUDE CONTROL ALLOWED USING ORM-SPECIFIC THRUSTER FIRING CRITERIA
- [3] THE FOLLOWING EXERCISE EQUIPMENT MAY BE USED:
CEVIS, TVIS, SM ERGOMETER, RUSSIAN RED, ORBITER ERGOMETER
- [4] EXERCISE NOT OK DURING EVA DUE TO EXCESSIVE VIBRATION. OK FOR CEVIS PRE-BREATHE ACTIVITY
- [5] RS THRUSTER CONTROL IS NOT OK DUE TO EXCESSIVE SRMS MOTION. REFERENCE RULE {LF1_C2-TBD} FOR ORM GO/NO-GO CRITERIA. @[CR 6889]

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CUE CARD CONFIGURATION

OBSS LDRI SCAN PATTERN CUE CARD – STBD & PORT	FS CC 9-2
OBSS LCS SCAN PATTERN CUE CARD – NOSE CAP	FS CC 9-3
OBSS LCS SCAN PATTERN CUE CARD – STBD & PORT	FS CC 9-4
OBSS LDRI SCAN PATTERN CUE CARD – NOSE CAP	FS CC 9-5
OBSS SJ GRAPPLE AT HANDOFF OVERLAY	FS CC 9-6
OBSS SJ UNGRAPPLE AT HANDOFF OVERLAY	FS CC 9-7
MPLM BERTH OVERLAY	FS CC 9-8
MPLM CBCS CCTV OVERLAY	FS CC 9-9
OVERLAY FOR ROEU PL SEL POSITION.....	FS CC 9-10

CUE CARD
CONFIG

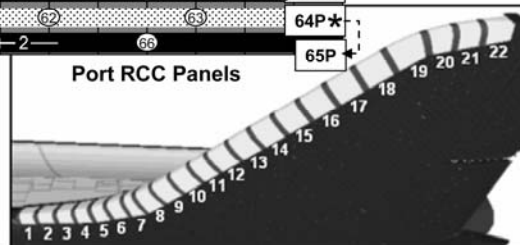
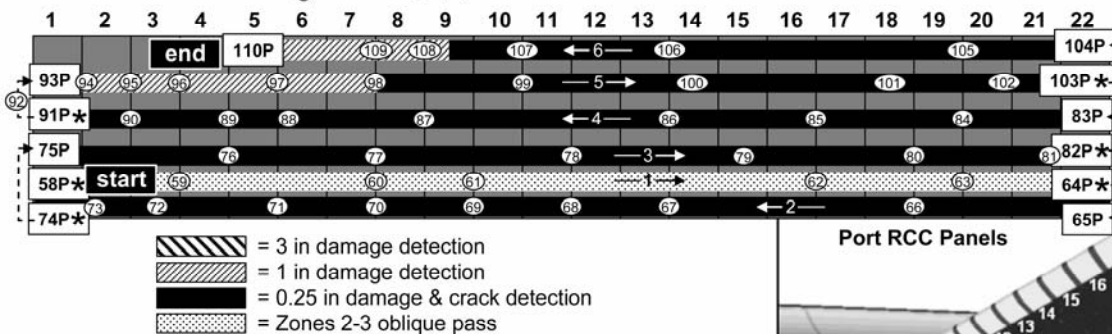
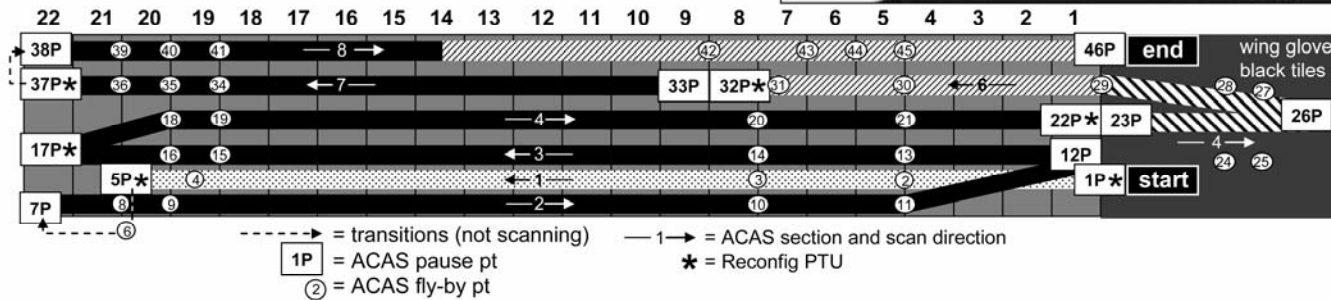
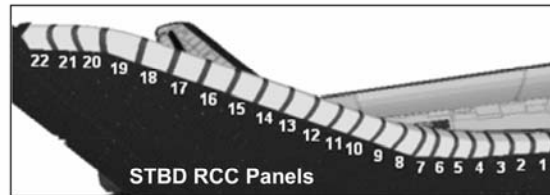
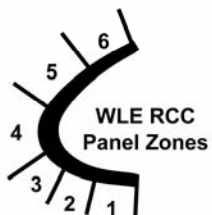
CUE CARD CONFIG

TOP

HOOK
VELCRO

OBSS LDRI SCAN PATTERN CUE CARD – STBD & PORT

LDRI



PDRS-15a/114/O/A

FAB USE ONLY

FS CC 9-2

PDRS/114/FIN

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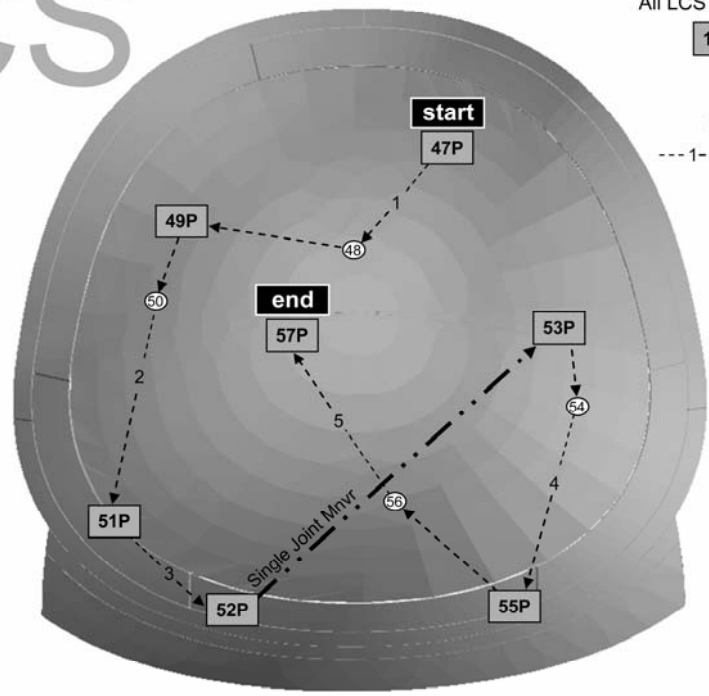


TOP
Back of 'OBSS LDRI SCAN PATTERN CUE CARD - STBD & PORT'

HOOK
VELCRO

OBSS LCS SCAN PATTERN CUE CARD - NOSE CAP

LCS



All LCS scans are stop-and-stare

- 1P** = ACAS pause pt and 0.25 in coating detection scan location
- ② = ACAS fly-by pt
- 1--> = ACAS section and motion (not scanning)

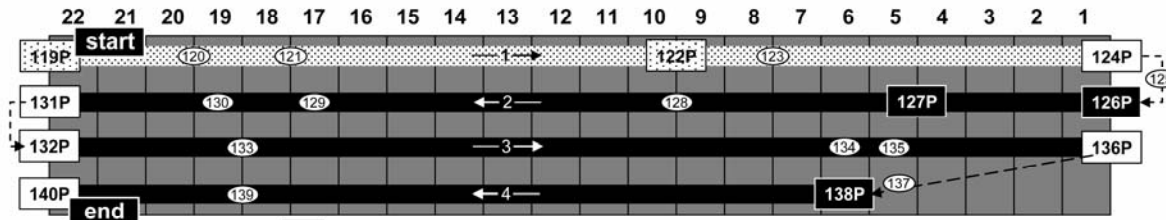
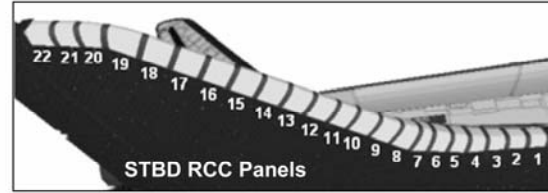
PDRS-15b/114/O/A

TOP

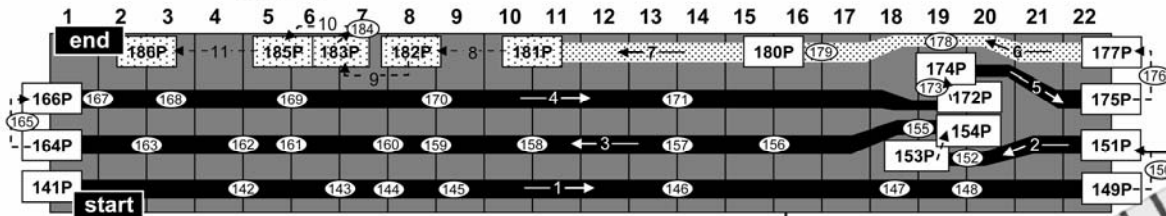
HOOK
VELCRO

OBSS LCS SCAN PATTERN CUE CARD – STBD & PORT

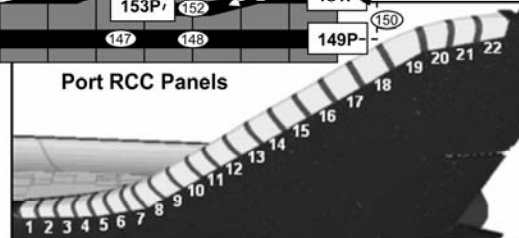
LCS



- 1P = ACAS pause pt
- 100 = ACAS fly-by pt
- 1P 1P = ACAS pause and scan pt
- > = transitions (not scanning)
- 1 —> = ACAS section and scan direction
- 1 ---> = non-scan transitions and ACAS section



- [Dotted pattern] = 1 in damage detection
- [Solid black] = 0.25 in damage



PDRS-18a/114/O/A

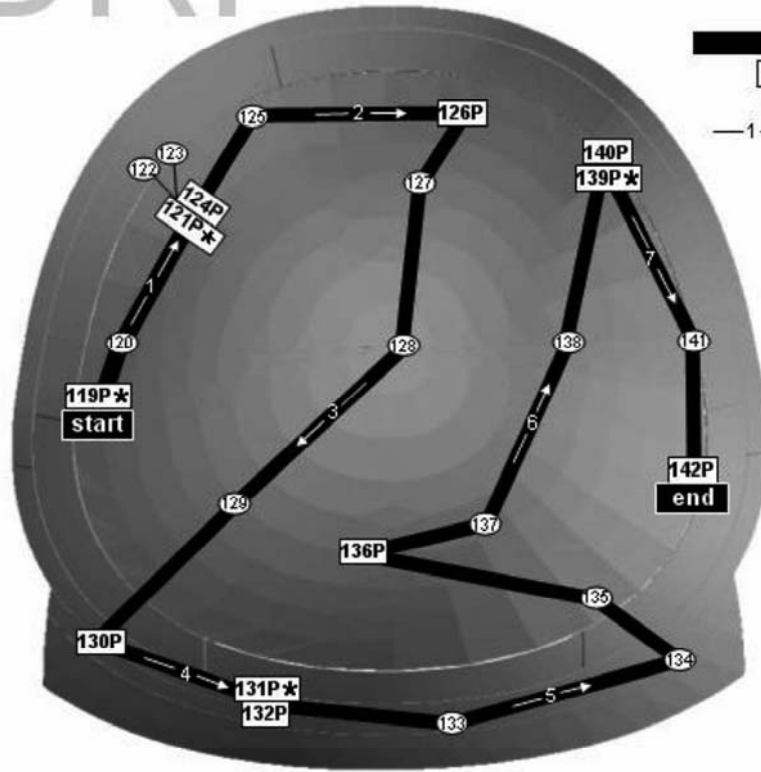
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TOP
Back of 'OBSS LCS SCAN PATTERN CUE CARD - STBD & PORT'

HOOK
VELCRO

OBSS LDRI SCAN PATTERN CUE CARD - NOSE CAP

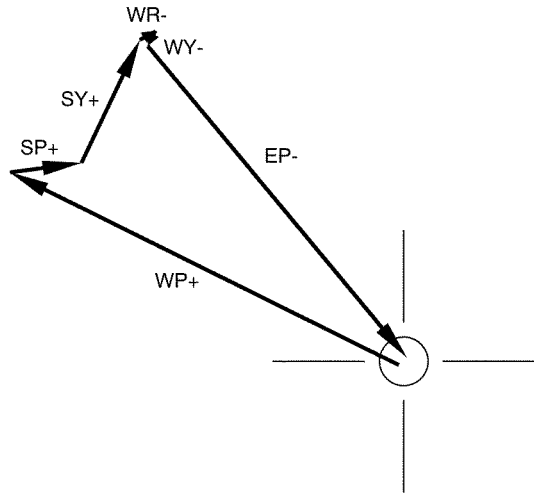
LDRI



- █** = 0.25 in damage criteria
- 1P** = ACAS pause pt
- ②** = ACAS fly-by pt
- 1→** = ACAS section and scan direction
- *** = Reconfig PTU

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Fabricate as transparency



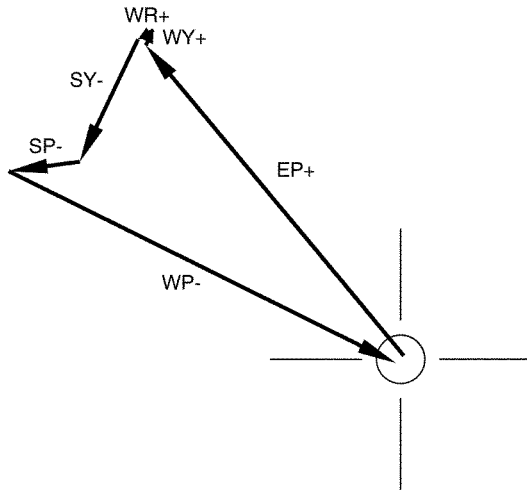
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OBSS SJ GRAPPLE AT HANDOFF OVERLAY

PDRS-16a/114/O/A

|

Fabricate as transparency

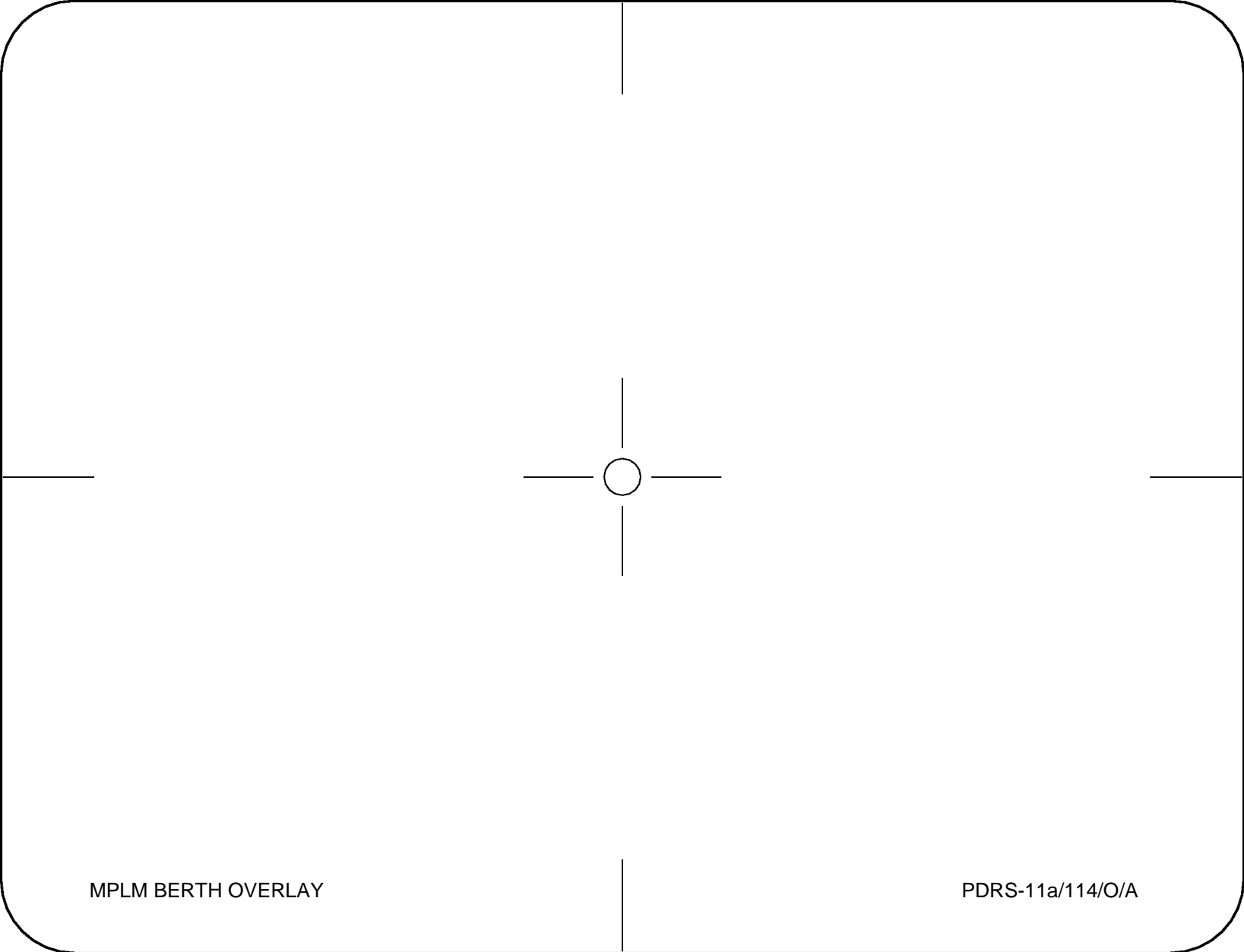


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OBSS SJ UNGRAPPLE AT HANDOFF OVERLAY

PDRS-17a/114/O/A

Fabricate as transparency



MPLM BERTH OVERLAY

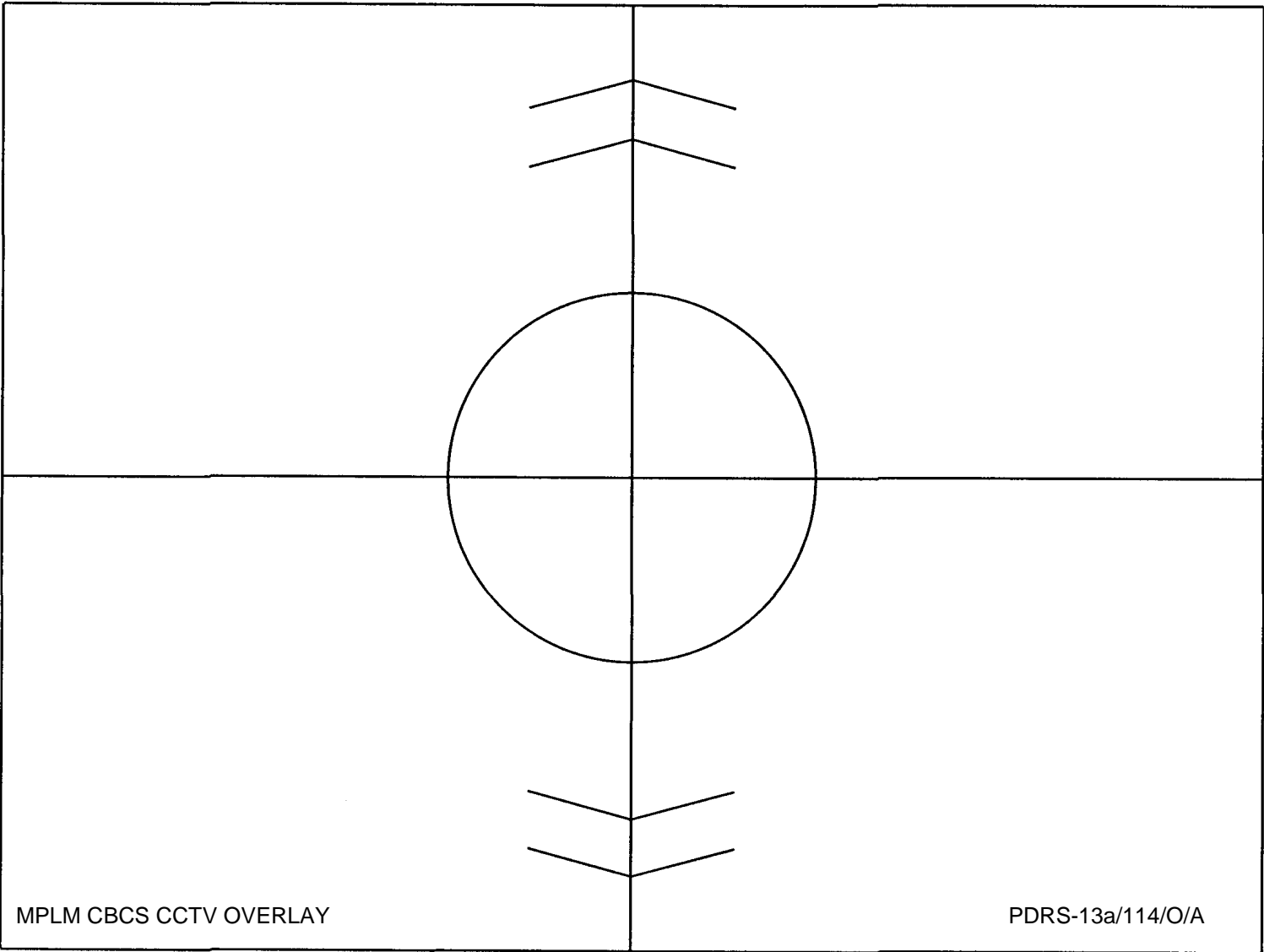
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FAB USE ONLY

FS CC 9-8

PDRS/114/FIN



MPLM CBCS CCTV OVERLAY

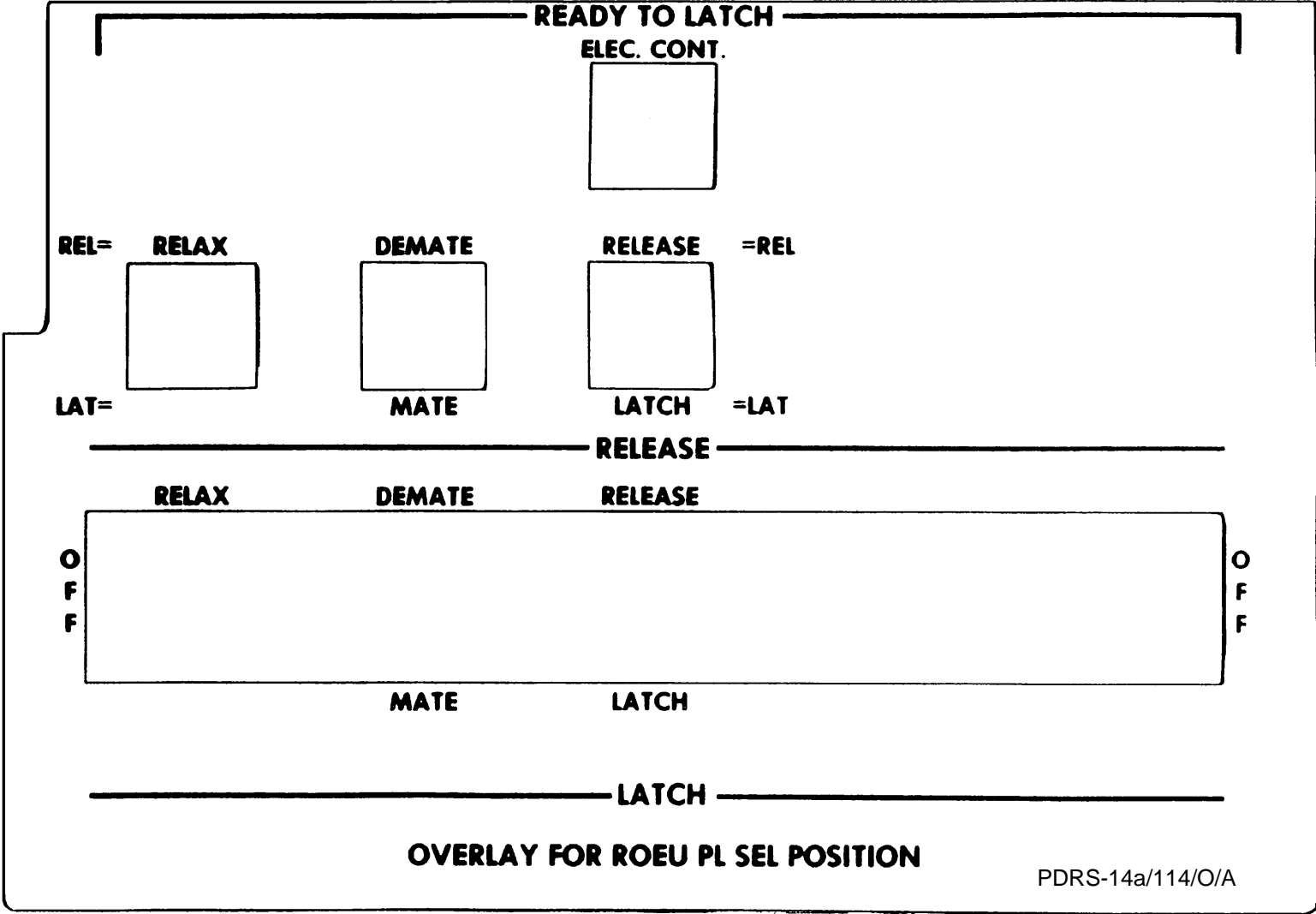
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FAB USE ONLY

FS CC 9-9

PDRS/114/FIN



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PDRS OPS C/L

**STS
114**