

# **PDRS Operations Checklist**

**Mission Operations Directorate  
Flight Design and Dynamics Division  
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National Aeronautics and  
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Lyndon B. Johnson Space Center  
Houston, Texas



## **NOTES**

1. This Checklists is made by Johan Meza Bracamontes (Johan2011 on Orbiter Forum).
2. The Design of the Checklists Will be the same of the Original NASA Checklists as possible.
3. This Checklists is made for the Space Shuttle Vessel (SSV) Addon by GLS.

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RMS

## **RMS ON-ORBIT INITIALIZATION**

### **1.RMS SHOULDER BRACE RELEASE**

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

### **2. CONFIGURE POWER**

R13L	PL BAY MECH PWR SYS (two)	– ON
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### **3. PORT MPM DEPLOY**

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

### **4. STBD MPM DEPLOY**

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

### **5. RECONFIGURE POWER**

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

## 1. PLB LTS, CCTV ACT

A7U PL BAY FLOOD (six) – as reqd  
Perform ACTIVATION, OPERATIONS (TV Cue Card) for desired camrs  
Perform ILLUMINATOR OPS (TV Cue Card) as reqd

√Physical integrity of arm, EE, blankets  
√PORT RMS HTR (two) – AUTO

## 2. RMS SEL (IDLE MODE)

A8U √MODE – not DIRECT

A8L RMS SEL – PORT (MA, SM ALERT)  
√SAFING tb – gray

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

R13L PL BAY MECH PWR SYS (two) – ON

## 3. PORT MPM DEPLOY

If MPM stowed:  
(68 sec max) PORT RMS – DPY (tb-DPY)  
PORT RMS – OFF

A6U DAP: VERN(FREE)

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

## 4.. RECONFIGURE POWER

R13L      PL BAY MECH PWR SYS (two)                      – OFF

## 5. ARM UNCRADLE

A8U              RATE                      – as reqd (VERN  
within 10 ft)

PARAM                      – JOINT ANGLE  
**BRAKES**                      – **√OFF (tb-OFF)**  
MODE                      – SINGLE,

**ENTER**

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

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

BRAKES – ON (tb-ON)  
DAP: as reqd

# RMS PWRDWN

## 1. RMS PRECRADLE

RATE – as reqd (VERN within 10 ft)

MODE – as desired

Drive to PRE-CRADLE position (within 1"/1°):

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	

If parking SRMS at Pre-Cradle overnight,

PARAM – PORT TEMP

JOINT – CRIT TEMP

## 2. RMS CRADLE

DAP: VERN(FREE)

PARAM

BRAKES

MODE

– JOINT ANGLE

– OFF (tb-OFF)

– SINGLE, **ENTER**

SINGLE DR to CRADLE position:

Pre-cradle ✓

1: EP +

2: SP –

3: EP –

4: WP –

Cradle

SY	SP	EP	WP	WY	WR	NOTES
0.0	+25.0	-25.0	+5.0	0.0	0.0	✓WR RANGE = 3(4)
		+1.0				MA, SING, REACH, S/W STOP
	0.0					MA
		0.0				
			0.0			
0.0	0.0	0.0	0.0	0.0	0.0	
X	Y	Z	PITCH	YAW	ROLL	PL ID
-1282	-108	-445	0	0	0	0

A8L

F6

RMS PWR

FLT CTRL PWR

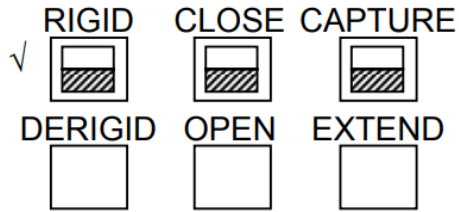
– OFF

– ON



## EE CHECKOUT

### EE MODE sw CAP/REL Check

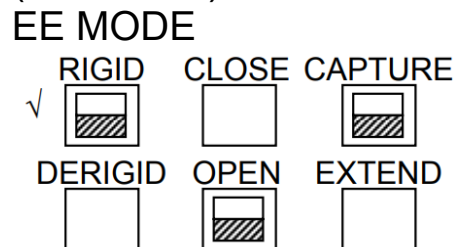


√EE MODE  
EE CAPTURE sw  
√OPEN tb

- OFF
- depress (3 sec)
- gray, no motion

### EE MAN CLOSE Checkout

EE MODE  
EE CAPTURE sw  
closed or CLOSE tb  
(3 sec max)



- MAN
- depress until snares
- gray
- OFF







If snares not closed:  
EE MODE  
EE CAPTURE sw  
After 3 sec max,  
EE MODE

- AUTO
- depress (mom)
- OFF

## EE AUTO OPEN Checkout

EE MODE	– AUTO
EE RELEASE sw	– depress (mom)
After 3 sec max,	
EE MODE	– OFF

✓	RIGID	CLOSE	CAPTURE
			
DERIGID	OPEN	EXTEND	
			

## EE BACKUP RELEASE Checkout

If snares open (expected condition):

EE MODE – AUTO

EE CAPTURE sw – depress (mom)

After 3 sec max, EE MODE – OFF

If snares remain open:

EE MODE – MAN

EE CAPTURE sw – depress until snares

closed or CLOSE tb – gray

(3 sec max)

EE MODE – OFF

RMS SEL – OFF

RMS PWR – B/U (SM ALERT, BCE

BYP MCIU)

RMS SEL – PORT

✓Snares remain closed

If snares not open:

EE MODE – MAN

EE RELEASE sw – depress until snares open

or OPEN tb – gray

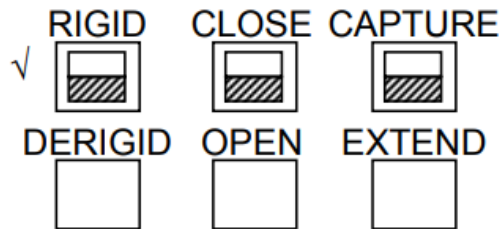
(3 sec max)

EE MODE – OFF

## EE MODE SW RIG/DERIG Check

√EE MODE  
EE MAN CONTR  
√EXTEND tb

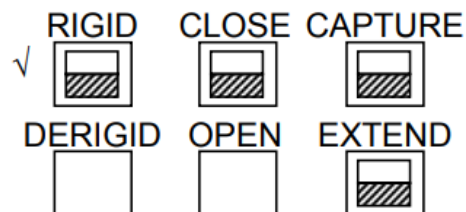
– OFF  
– RIGID (1 sec max)  
– gray, no motion



## EE CARRIAGE DRIVE CHECKOUT – RETRACT

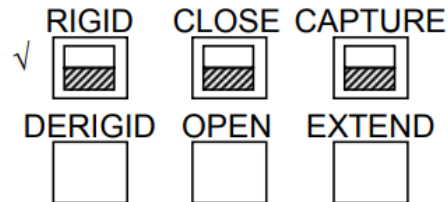
EE MODE  
EE MAN CONTR  
tb – bp (1 sec max)  
EE MODE

– MAN  
– RIGID until EXTEND  
– OFF



## EE CARRIAGE DRIVE CHECKOUT – EXTEND

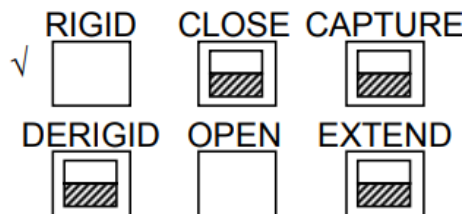
EE MODE – MAN  
 EE MAN CONTR – DERIGID until  
 EXTEND tb – gray (1 sec max)  
 EE MODE – OFF



If EXTEND tb – bp:  
 EE MODE – AUTO  
 EE RELEASE sw – depress (mom)  
 After EXTEND tb – gray, EE MODE –  
 OFF (1 sec max)

## EE MAN RIGIDIZE Checkout

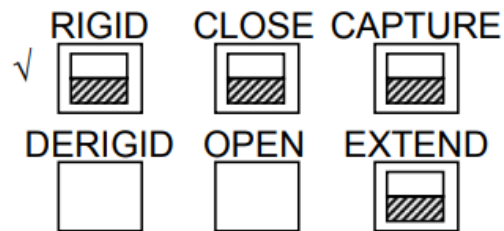
EE MODE – MAN  
 EE MAN CONTR – RIGID until RIGID tb  
 – gray (25 sec max)  
 EE MODE – OFF



## EE MAN DERIGIDIZE Checkout

EE MODE  
 EE MAN CONTR  
 DERIGID tb – gray (5 sec max)  
 EE MODE

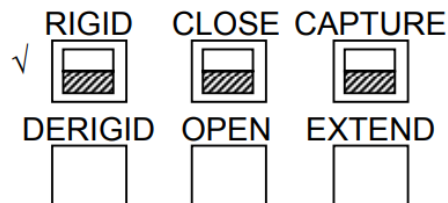
– MAN  
 – DERIGID until  
 – OFF



## EE AUTO EXTEND Checkout

EE MODE  
 EE RELEASE sw  
 After EXTEND tb  
 MODE  
 max, 25 if RIGID)

– AUTO  
 – depress (mom)  
 – gray, EE  
 – OFF (20 sec



If DERIGID tb  
 EXTEND tb – bp:  
 EE MODE  
 EE MAN CONTR  
 EXTEND tb  
 max)  
 EE MODE

– gray and  
 – MAN  
 – DERIGID until  
 – gray (25 sec  
 – OFF

## OBSS OPERATIONS

# OBSS UNBERTH

## 1. MNVR TO OBSS PRE-GRAPPLE

RHC RATE – as reqd (VERN within 10 ft)

BRAKES – OFF (tb-OFF)

MODE – ORB UNL, **ENTER**

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	

RATE – COARSE

MODE – SINGLE, **ENTER**

Adjust Wrist Roll:

Pre-Grapple  
1: WR –  
Pre-Grapple

SY	SP	EP	WP	WY	WR	
-90.0	+87.6	-129.5	-57.5	0.0	+110.4	
					<b>-249.6*</b>	
-90.0	+87.6	-129.5	-57.5	0.0	-249.6	
X	Y	Z	PITCH	YAW	ROLL	PL ID
-680	+96	-513	270	350	1	0

\* WR RANGE = 2

A6U

EVENT TIMER MODE – UP

EVENT TIMER CNTL – START

## 2. OBSS GRAPPLE


A6U      DAP: VERN(FREE)  
RHC RATE  
BRAKES  
MODE

- VERN (RATE MIN tb-ON)
- OFF (tb-OFF)
- END EFF, **ENTER**

## Mnvr to grapple envelope

EE MODE  
EE CAPTURE

- AUTO
- depress (mom)



## EE MODE

– OFF

CRITICAL TIMES (28 sec total):

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

Record POSN/ATT and Joint Angles in table below and in OBSS BERTH, step 4:

	X	Y	Z	PITCH	YAW	ROLL	PL ID
Expected							1
	-680	+105	-436	0	0	341	1
	SY	SP	EP	WP	WY	WR	
Expected	-90.0	+76.5	-134.6	-40.9	0.0	-250.0	

### 3. CONFIGURE POWER

R13L PL BAY MECH PWR SYS (two) – ON



#### 4. STBD MRL RELEASE

A7U CCTV – config for unberth

A6U DAP: FREE

CRT4: SM SPEC 94 PRO (PDRS CONTROL)  
RMS STBD – ITEM 2 EXEC

A6U STBD RMS RETEN LAT – REL (tb-REL) (18 sec  
max)  
STBD RMS RETEN LAT – OFF

#### 5. RECONFIGURE POWER

R13L PL BAY MECH PWR SYS (two) – ON

Record joint angles:

SY	SP	EP	WP	WY	WR

#### 6. MNVR TO OBSS HOVER

RHC RATE – COARSE (RATE MIN tb-  
OFF)  
BRAKES – OFF (tb-OFF)  
MODE – PL, **ENTER**

Mnvr OBSS up (-Z) to OBSS HOVER, Z = -517

X	Y	Z	PITCH	YAW	ROLL	PL ID
-680	+133	-517	0	0	341	1
SY	SP	EP	WP	WY	WR	
-89.9	+80.2	-118.8	-59.8	+0.0	-250.1	

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



**CCTV D (-15,15)**

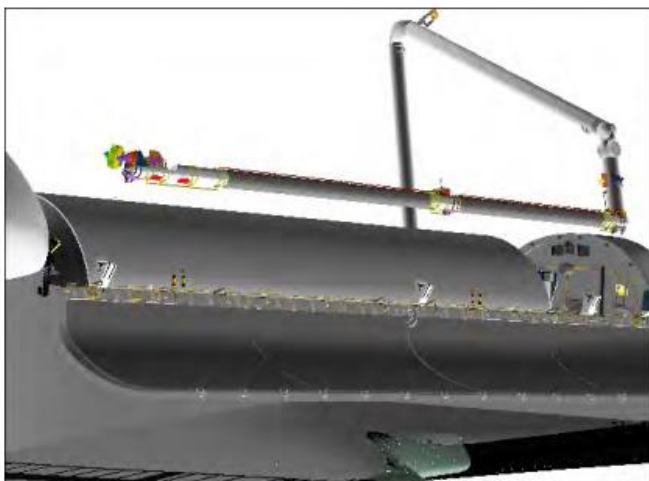


**CCTV C (25,25)**

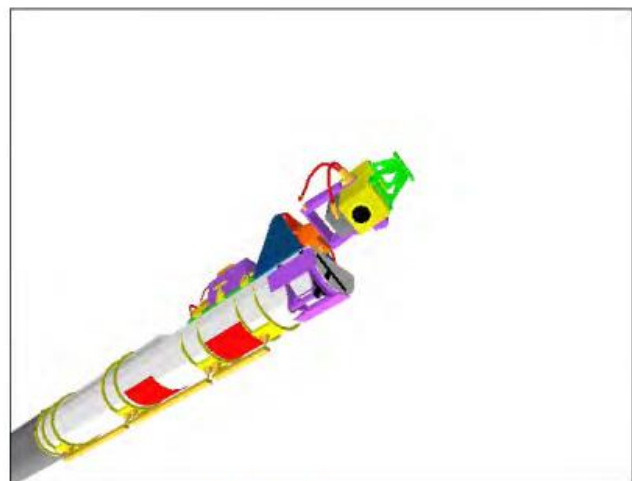
A6U      DAP: A14/AUTO/VERN(ALT)

## 8. RESET PTU

A7U	DTV ← PL2	
	CAMR CMD PAN/TILT	– HI RATE
	CAMR CMD PAN	– L (to hard stop)
	CAMR CMD TILT	– UP (to hard stop)
	CAMR CMD PAN/TILT	– RESET, HI RATE (LO
	within 10°)	
	CAMR CMD PAN:	+103 (right)
	CAMR CMD TILT:	-260 (down)



**BIRD'S EYE**



**CCTV C (50,50)**

## OBSS LDRI/IDC RCC SURVEY – STBD

## 1. SETUP

A7U       $\sqrt{\text{DTV}} \leftarrow \text{PL2}$   
 $\sqrt{\text{LDRI MODE 6 pb}}$       – lit (flickering LDRI video)  
 $\sqrt{\text{Pan and tilt for LDRI/ITVC are +103, -260}}$

## 2. MNVR TO FLAT FIELD POSN

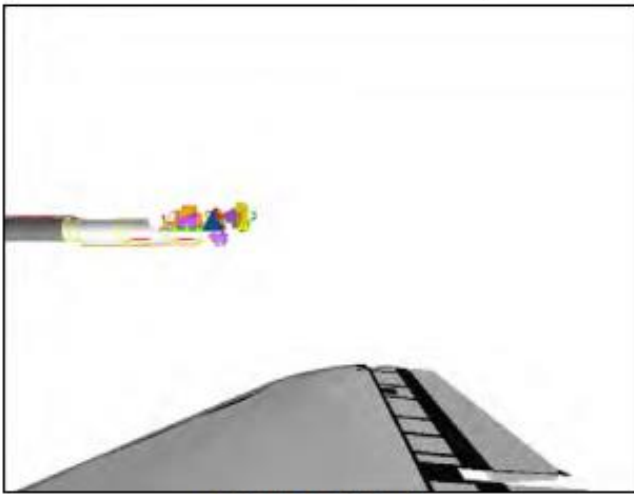
<b>Mnvr to Flat Fields Clearance Views</b>	<b>Cameras</b>
OBSS-to-Wing	C, ELBOW
OBSS-to-PLBD	C, D
RMS-to-Orbiter	ELBOW, A

√RATE	– COARSE (RATE MIN tb-
OFF)	
BRAKES	– OFF (tb-OFF)
MODE	– OPR CMD, <b>ENTER</b>

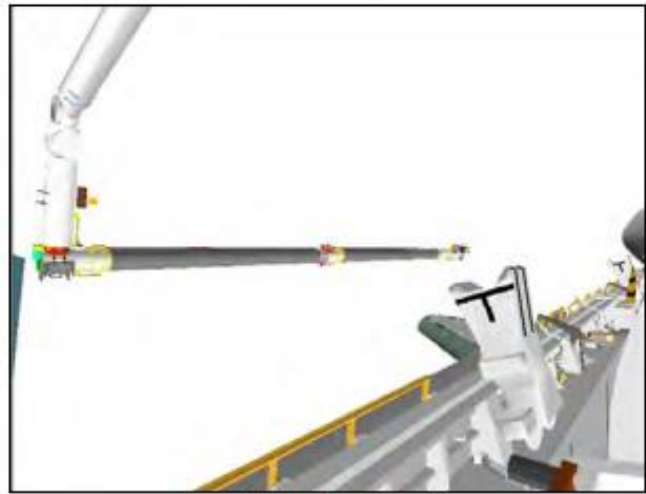
A7U	$\sqrt{\text{DTV}} \leftarrow \text{PL2}$	
	VID OUT	– not DTV
	VID IN	– not PL2

Verify FLAT FIELD posn:

X	Y	Z	PITCH	YAW	ROLL	PL ID
-1270	+350	-445	0	0	11	2
SY	SP	EP	WP	WY	WR	
-90.1	+25.0	-65.8	-57.6	0.0	-249.9	



**CCTV C (95,-4)**



**CCTV D (-40,0)**



**ELBOW (25,-40)**





**BIRD'S EYE**

### 3. MNVR TO STBD LDRI ACAS START POSN

Mnvr to Stbd ACAS Clearance Views	Cameras
OBSS-to-Wing	RSC [1], C[2], ELBOW[3]
OBSS-to-PLBD	RSC, C, D[4]
RMS-to-Orbiter	ELBOW, A
[1] Wing enters FOV after X ~ -1106(pt 5) [2] No good at X ~ -1036(pt 5)	[3] No good after X ~ -972(pt 5) [4] No good after X ~ -920(pt 6)

ACAS, pause pts **shaded in bold**, ● col indicates data recording (black = VTR on) (05:05)

Pt	X	Y	Z	PITCH	YAW	ROLL	●
<b>1P</b> ▲	<b>-1270</b> -70	<b>+350</b> +85	<b>-445</b> 0	<b>0</b> 0	<b>0</b> 0	<b>11</b> 0	
2 ▲	-1200 +90	+265 -55	-445 0	0 0	0 0	11 0	
3 ▲	-1290 -150	+320 +55	-445 0	0 0	0 0	11 0	
4 ▲	-1140 +15	+265 -25	-445 +45	0 0	0 0	11 0	
5 ▲	-1155 -229	+290 -10	-490 -220	0 +9	0 -37	11 -75	
6 ▲	-926 -17	+300 +45	-270 +4	322 -14	0 -6	89 +10	
<b>7P</b> ▲	<b>-909</b> +75	<b>+255</b> -5	<b>-274</b> +2	<b>337</b> +15	<b>10</b> -8	<b>82</b> 0	

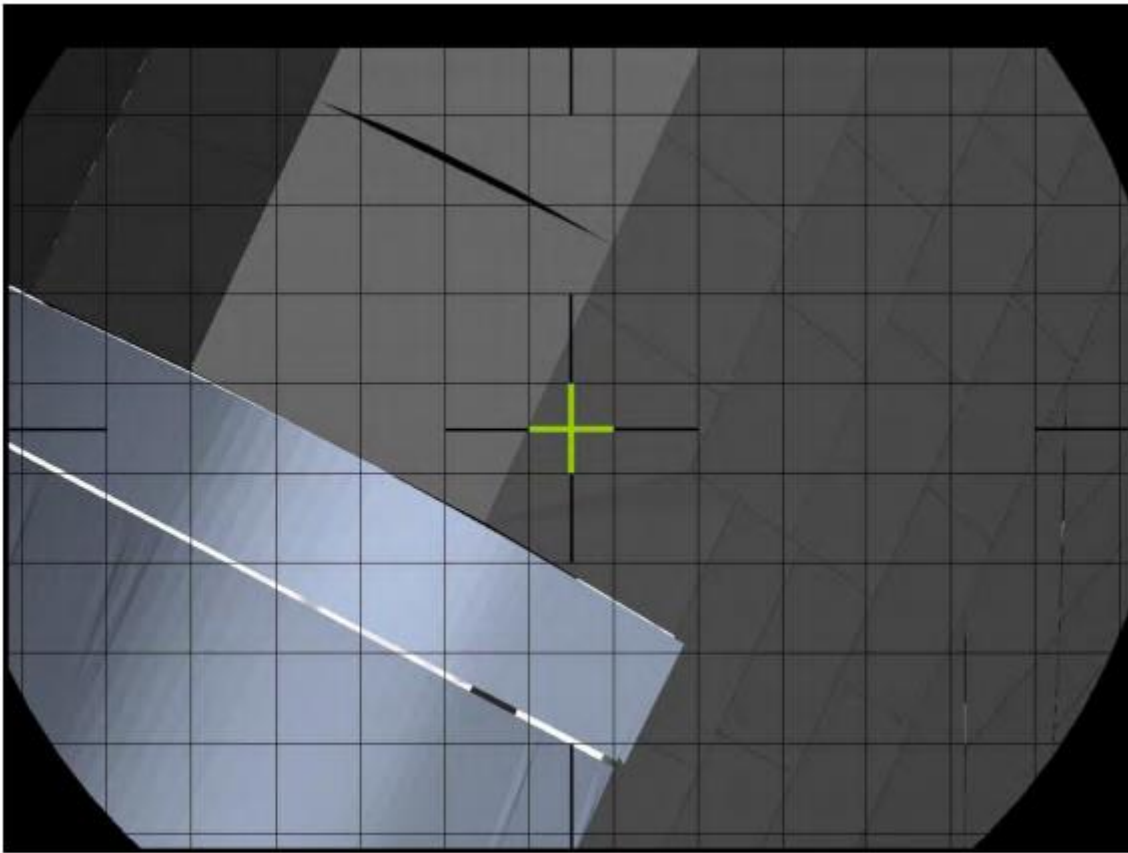


BIRD'S EYE



OVERHEAD

#### 4. STBD LDRI ACAS, SECTION 1



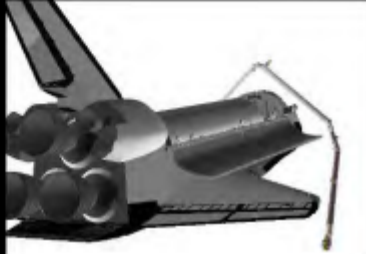


LDRI: +85 (left),-93 (up)

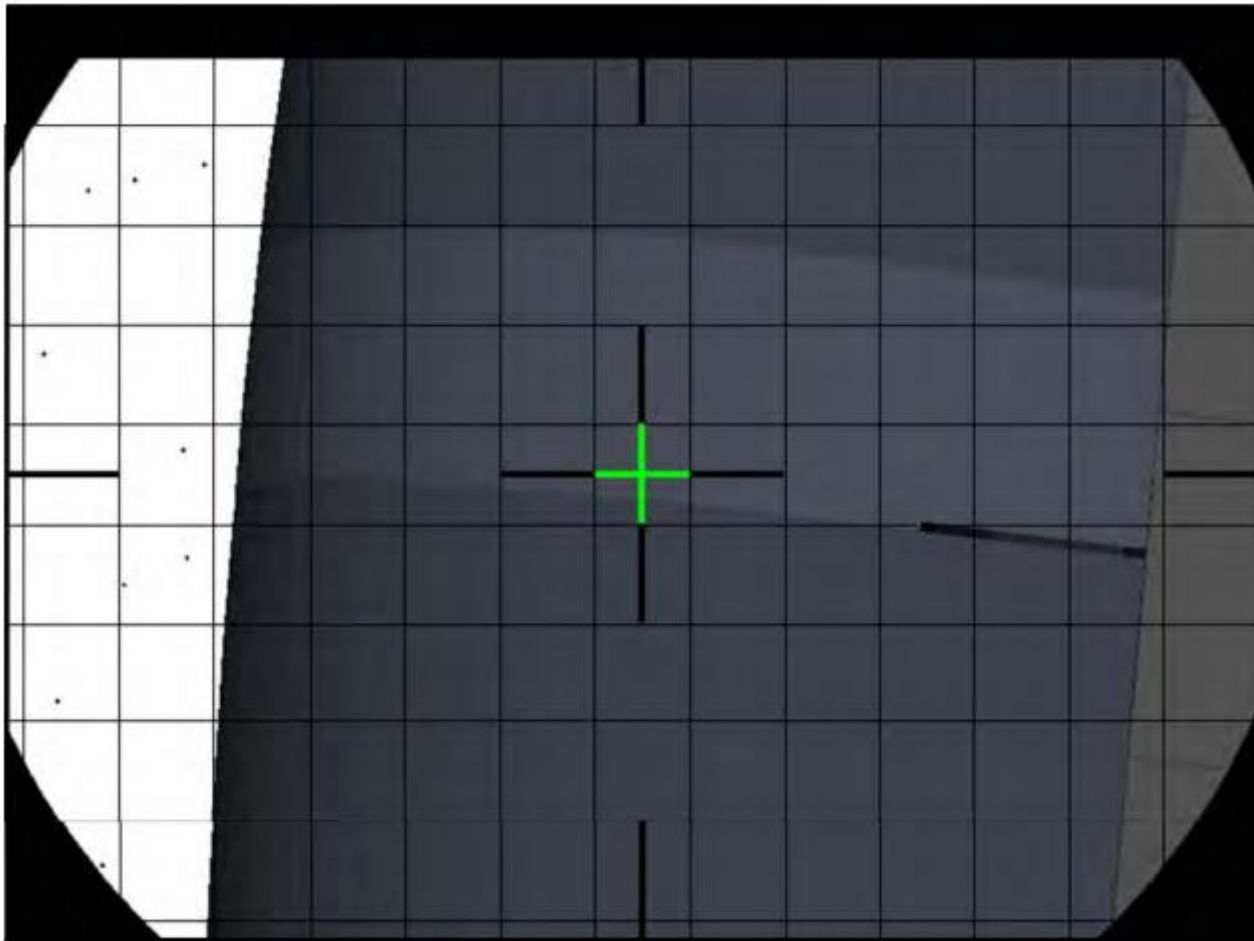
Section 1 Clearance Views	Cameras
OBSS-to-Wing	RSC, D, C
OBSS-to-PLBD	C, RSC, D[1]
RMS-to-Orbiter	A, ELBOW
[1] Good after X ~ -939(pt 7)	

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

(06:50)

Pt	X	Y	Z	PITCH	YAW	ROLL	●
<b>7P</b> Δ	<b>-909</b> +75	<b>+255</b> -5	<b>-274</b> +2	<b>337</b> +15	<b>10</b> -8	<b>82</b> 0	
8 Δ	-984 +41	+260 -25	-276 -3	321 +21	16 +26	87 +5	
9 Δ	-1025 +208	+285 -223	-273 +20	304 -10	6 +13	62 -16	
10 Δ	-1233 +67	+508 -8	-293 -21	316 -12	346 +2	64 +9	
11 Δ	-1300 -2	+516 +34	-272 -53	326 -21	349 +6	55 +29	
12 Δ	-1298 +30	+482 +18	-219 +2	340 -11	352 +8	25 +12	
<b>13P</b> Δ	<b>-1328</b> -18	<b>+464</b> +16	<b>-221</b> -1	<b>348</b> -1	<b>346</b> +3	<b>12</b> +4	








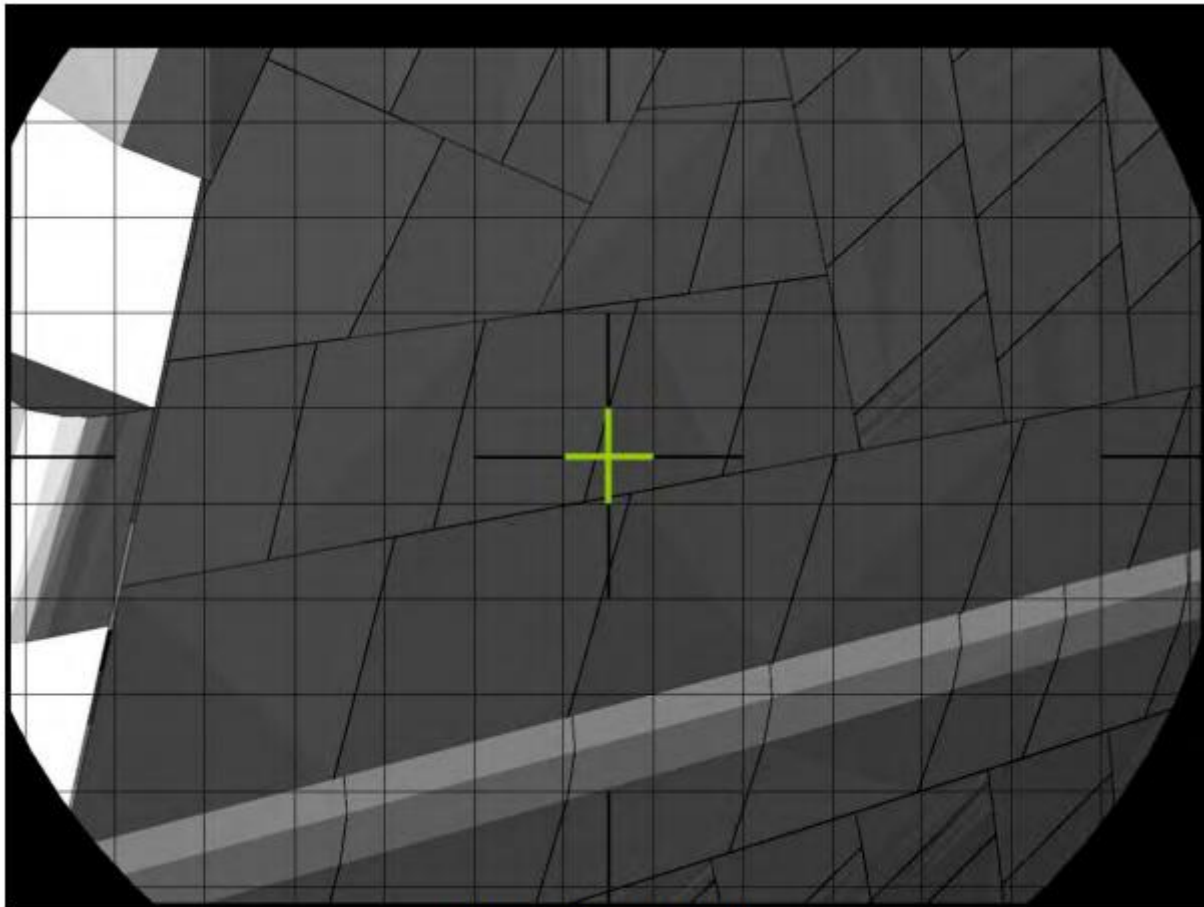
LDRI: +84,-60 (up)

## 5. STBD LDRI ACAS, CONTINUE WITH SECTION 2 AND 3

Section 2 & 3 Clearance Views	Cameras
OBSS-to-PLBD	ELBOW[1], D[2], RSC, C[3]
OBSS-to-Wing	ELBOW[1], D[2], RSC, C[3]
RMS-to_Orbiter	C, A, ELBOW[4]
[1] No good after X ~ -1120(pt 14)	[3] Good after X ~ -1024(pt 15)
[2] No good between X ~ -962(pt 16) and X ~ -1014(pt 17)	[4] Good after X ~ -1041(pt 19)






Pt	X	Y	Z	PITCH	YAW	ROLL	•
13P Δ	-1328 -18	+464 +16	-221 -1	348 -1	346 +3	12 +4	
14 Δ	-1310 -244	+448 +215	-220 -21	348 +12	344 -31	7 -9	
15 Δ	-1066 -45	+233 +22	-199 +7	335 -7	9 -4	28 -4	
16 Δ	-1021 -102	+211 -2	-206 +16	341 +1	12 -9	33 -13	
17 Δ	-919 +100	+213 -14	-222 -12	335 -2	15 +8	49 +9	
18 Δ	-1019 +19	+227 -40	-210 +19	339 +15	11 -18	37 -24	
19 Δ	-1038 +230	+267 -216	-229 +7	315 -24	9 +27	67 +14	
20 Δ	-1268 +66	+483 -48	-236 +16	335 +9	350 -2	44 -16	
21P Δ	-1334 +4	+531 -7	-252 +66	329 +18	343 -20	59 -21	



LDRI: +85,-75 (down)

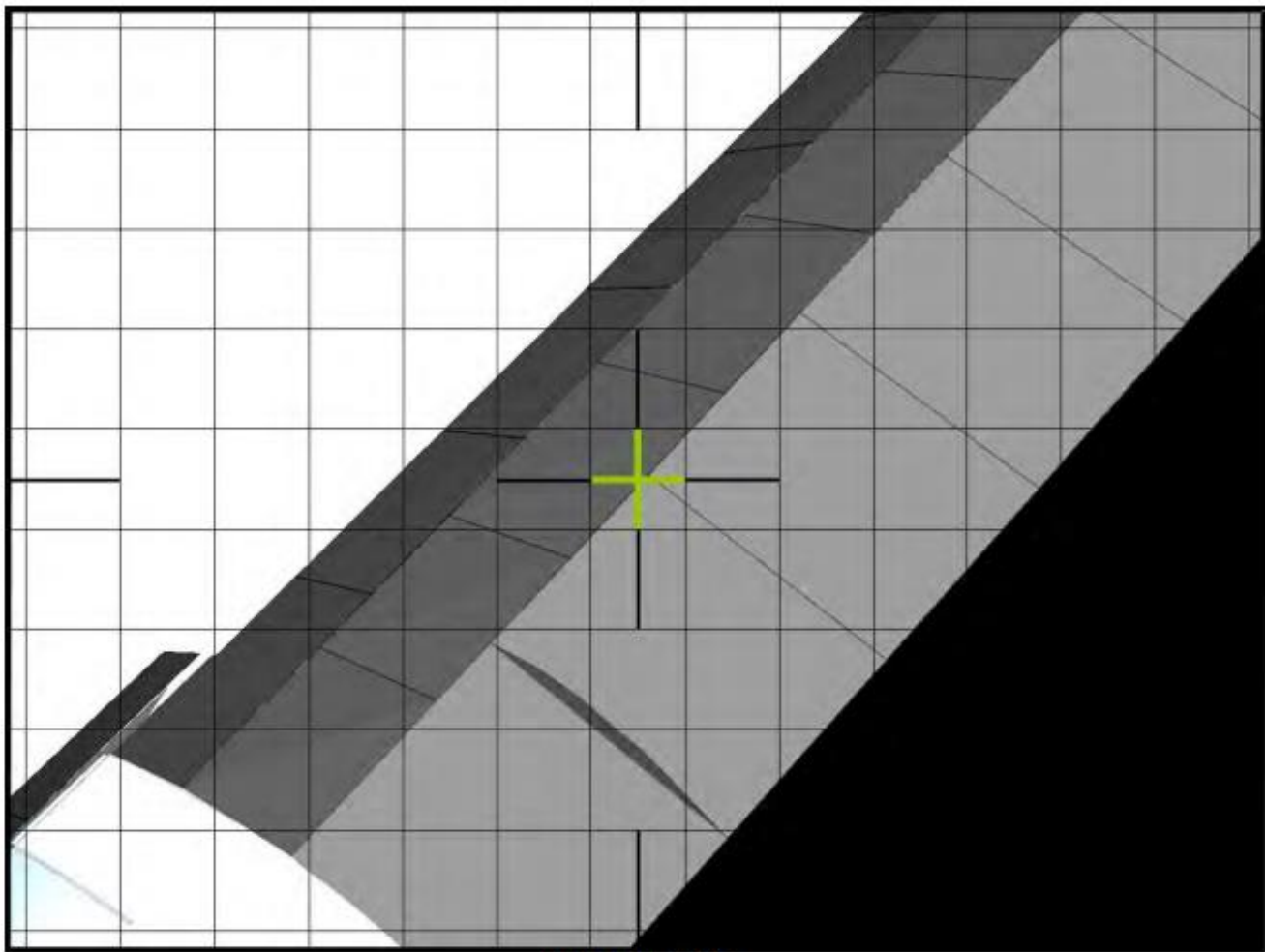
## 6. STBD LDRI ACAS, SECTION 4

Section 4 Clearance Views	Cameras
OBSS-to-PLBD	RSC[1], C, D
OBSS-to-Wing	RSC, D, C
RMS-to-Orbiter	A, ELBOW
[1] PLBD enters FOV after X ~ -1086(pt 24)	




Pt	X	Y	Z	PITCH	YAW	ROLL	•
21P Δ	-1334 +4	+531 -7	-252 +66	329 +18	343 -20	59 -21	
22 Δ	-1338 -64	+538 +16	-318 -1	317 +9	342 +1	89 -3	
23 Δ	-1274 -52	+522 +43	-317 +24	308 +13	339 +12	90 -10	
24 Δ	-1222 -193	+479 +175	-341 -26	292 +11	325 +8	82 +16	
25 Δ	-1029 -20	+304 +20	-315 -33	275 -9	340 -23	71 +13	
26 Δ	-1009 -32	+284 +21	-282 -21	290 -18	359 -6	89 +14	
27 Δ	-977 -54	+263 +14	-261 -8	309 -12	13 +2	85 +8	
28P Δ	-923 -61	+249 -70	-253 -11	323 +41	16 +8	77 -15	

## 7. STBD ITVC ACAS, WING GLOVE AND CREW CABIN (SECTION 5)

Wing Glove and Crew Cabin Clearance Views	Cameras
OBSS-to-PLBD	RSC[1], C, D
OBSS-to-Crew Cabin	C, D, RSC
RMS-to-Orbiter	A, ELBOW
[1] PLBD leaves FOV at X ~ -396(pt 33) and re-enters at X ~ -378(pt 34)	

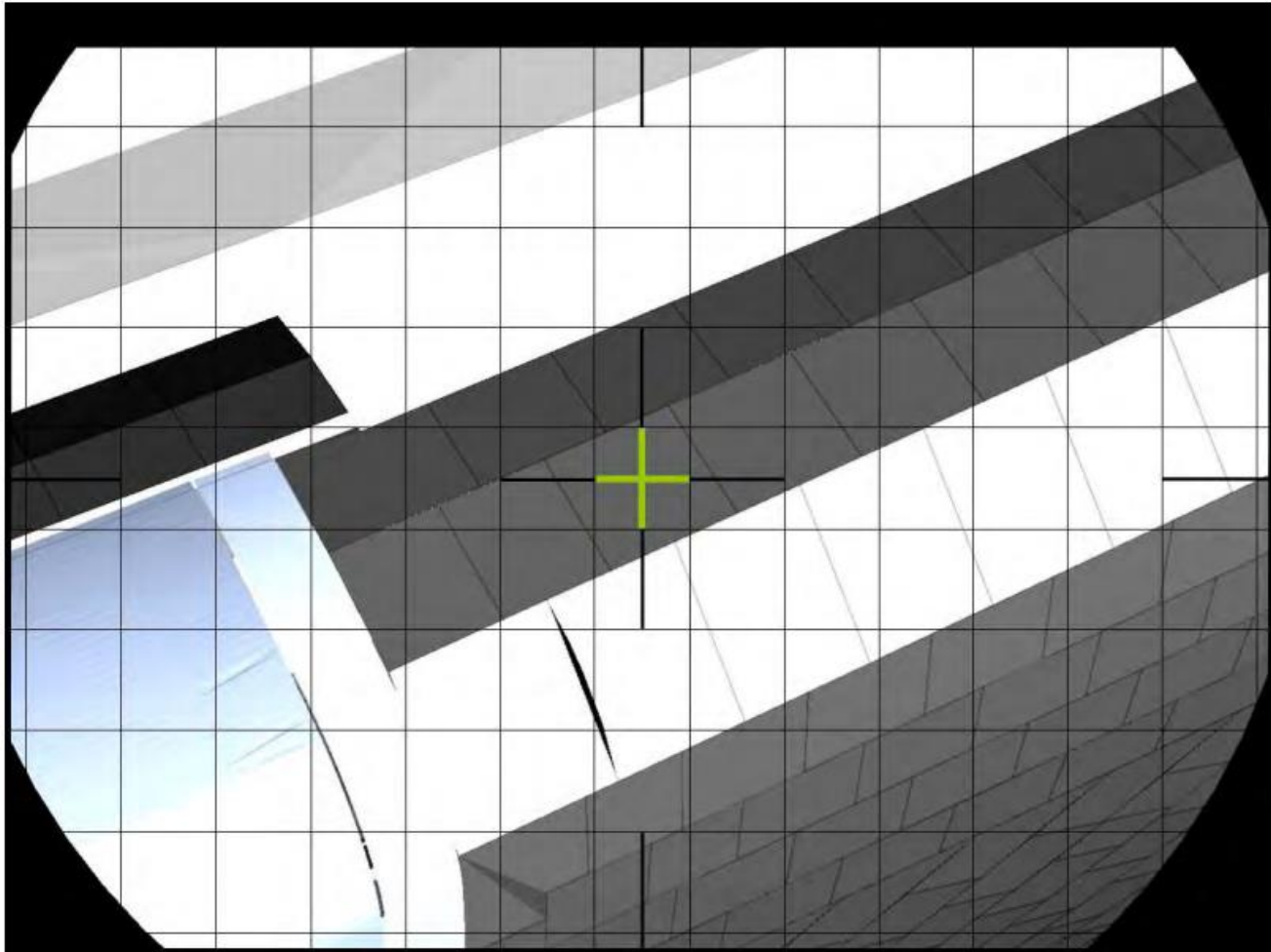


ITVC (85,-75)

Pt	X	Y	Z	PITCH	YAW	ROLL	•
<b>28P</b> <b>Δ</b>	<b>-923</b> <b>-61</b>	<b>+249</b> <b>-70</b>	<b>-253</b> <b>-11</b>	<b>323</b> <b>+41</b>	<b>16</b> <b>+8</b>	<b>77</b> <b>-15</b>	
29 <b>Δ</b>	-862 <b>-45</b>	+319 <b>+24</b>	-242 <b>+23</b>	284 <b>-4</b>	0 <b>-12</b>	73 <b>-2</b>	
30 <b>Δ</b>	-817 <b>-77</b>	+295 <b>0</b>	-265 <b>+14</b>	288 <b>+2</b>	2 <b>-2</b>	85 <b>-5</b>	
31 <b>Δ</b>	-740 <b>-151</b>	+295 <b>+5</b>	-279 <b>+15</b>	286 <b>+19</b>	358 <b>0</b>	88 <b>-1</b>	
32 <b>Δ</b>	-589 <b>-39</b>	+290 <b>-3</b>	-294 <b>+16</b>	267 <b>-1</b>	357 <b>-1</b>	88 <b>-4</b>	
33 <b>Δ</b>	-550 <b>-352</b>	+293 <b>+116</b>	-310 <b>-58</b>	268 <b>+58</b>	353 <b>+16</b>	89 <b>+31</b>	
<b>34</b> <b>Δ</b>	<b>-198</b> <b>+251</b>	<b>+177</b> <b>-93</b>	<b>-252</b> <b>+144</b>	<b>203</b> <b>-2</b>	<b>21</b> <b>-12</b>	<b>109</b> <b>-26</b>	<b>3</b> 
35 <b>Δ</b>	-449 <b>+3</b>	+270 <b>-2</b>	-396 <b>-43</b>	205 <b>-3</b>	359 <b>+3</b>	90 <b>-9</b>	
36 <b>Δ</b>	-452 <b>+70</b>	+272 <b>0</b>	-353 <b>-36</b>	208 <b>-63</b>	357 <b>+9</b>	81 <b>-5</b>	
37 <b>Δ</b>	-522 <b>+28</b>	+272 <b>-21</b>	-317 <b>-7</b>	270 <b>+5</b>	352 <b>-17</b>	72 <b>+2</b>	
38 <b>Δ</b>	-550 <b>+35</b>	+293 <b>+2</b>	-310 <b>+10</b>	268 <b>-3</b>	353 <b>0</b>	89 <b>0</b>	
39 <b>Δ</b>	-585 <b>+49</b>	+291 <b>0</b>	-320 <b>-8</b>	271 <b>-4</b>	353 <b>-2</b>	89 <b>+1</b>	
40 <b>Δ</b>	-634 <b>+288</b>	+291 <b>-46</b>	-312 <b>-22</b>	275 <b>-17</b>	354 <b>-8</b>	91 <b>+1</b>	
<b>41P</b> <b>Δ</b>	<b>-922</b> <b>+42</b>	<b>+337</b> <b>+40</b>	<b>-290</b> <b>+56</b>	<b>293</b> <b>+5</b>	<b>358</b> <b>-13</b>	<b>98</b> <b>-24</b>	




## 7. STBD LDRI ACAS, SECTIONS 6 AND 7

Sections 6 & 7 Clearance Views	Cameras
OBSS-to-PLBD	RSC[1], C, D
OBSS-to-Wing	C, D, RSC
RMS-to-Orbiter	A, ELBOW, B[2]
[1] PLBD leaves FOV at X ~ -1122(pt 44) and re-enters at X ~ -1151(pt 49)	[2] Good after X ~ -1380(pt 46)



LDRI: +85,-75





Pt	X	Y	Z	PITCH	YAW	ROLL	●	
<b>41P</b> Δ	<b>-922</b> <b>+42</b>	<b>+337</b> <b>+40</b>	<b>-290</b> <b>+56</b>	<b>293</b> <b>+5</b>	<b>358</b> <b>-13</b>	<b>98</b> <b>-24</b>	<b>1</b>	
42 Δ	-964 <b>+65</b>	+297 <b>-5</b>	-346 <b>-16</b>	289 <b>-1</b>	339 <b>+40</b>	118 <b>+4</b>		
43 Δ	-1029 <b>+25</b>	+302 <b>-2</b>	-330 <b>+23</b>	271 <b>+3</b>	335 <b>-5</b>	75 <b>-13</b>		
44 Δ	-1054 <b>+222</b>	+304 <b>-206</b>	-353 <b>+11</b>	271 <b>-22</b>	322 <b>-6</b>	81 <b>-17</b>		
45 Δ	-1276 <b>+52</b>	+510 <b>-19</b>	-364 <b>-1</b>	305 <b>-4</b>	310 <b>-7</b>	100 <b>+2</b>		
46 Δ	-1328 <b>+63</b>	+529 <b>+51</b>	-363 <b>+32</b>	313 <b>+34</b>	316 <b>-30</b>	105 <b>-28</b>		
47 Δ	-1391 <b>-99</b>	+478 <b>+2</b>	-395 <b>-5</b>	320 <b>-20</b>	306 <b>+21</b>	166 <b>+13</b>	<b>1/4</b>	
48 Δ	-1292 <b>-125</b>	+476 <b>+109</b>	-390 <b>-5</b>	299 <b>-2</b>	298 <b>+12</b>	121 <b>+5</b>		
49 Δ	-1167 <b>-71</b>	+367 <b>+67</b>	-385 <b>-9</b>	277 <b>+6</b>	299 <b>+1</b>	94 <b>+8</b>		
50 Δ	-1096 <b>-36</b>	+300 <b>+19</b>	-376 <b>+13</b>	269 <b>+2</b>	307 <b>+4</b>	92 <b>+6</b>		
51 Δ	-1060 <b>-82</b>	+281 <b>-2</b>	-389 <b>-5</b>	263 <b>-6</b>	313 <b>+8</b>	87 <b>+6</b>		
52 Δ	-978 <b>-79</b>	+283 <b>-1</b>	-384 <b>+2</b>	262 <b>+12</b>	320 <b>+3</b>	77 <b>-2</b>		
<b>53P</b> Δ	<b>-899</b> <b>0</b>	<b>+284</b> <b>0</b>	<b>-386</b> <b>0</b>	<b>247</b> <b>0</b>	<b>319</b> <b>0</b>	<b>72</b> <b>0</b>	<b>1</b>	

# OBSS LDRI/IDC RCC SURVEY – NOSE CAP

## 1. MNVR TO NOSE CAP LDRI ACAS START POSN

Mnvr to Nose Cap ACAS Clearance Views	Cameras
OBSS-to-PLBD	ELBOW, C
OBSS-to-Orbiter	C[1], ELBOW[2], A, B[3], RSC[4]
RMS-to-Orbiter	A
OBSS-to-SRMS	B[5], ELBOW, A[6]
[1] No good after X ~ -778(pt 54)	[4] Nose Cap enter FOV at X ~ -257(pt 55)
[2] No good after X ~ -182(pt 55)	[5] No good after X ~ -464(pt 55)
[3] Good after X ~ -342(pt 55)	[6] Good after X ~ -357(pt 55)

(09:05)

Pt	X	Y	Z	PITCH	YAW	ROLL	•
54P Δ	-899 -349	+284 +334	-386 +514	247 +59	319 -45	72 -31	
55 Δ	-550 -400	-50 -70	-900 -545	100 -138	295 +6	345 +16	
56 Δ	-150 +14	+20 0	-355 0	241 0	312 0	350 0	
57P Δ	-164 0	+20 0	-355 0	241 0	312 0	350 0	





**CCTV B (3,1)**



**CCTV A (90,42)**

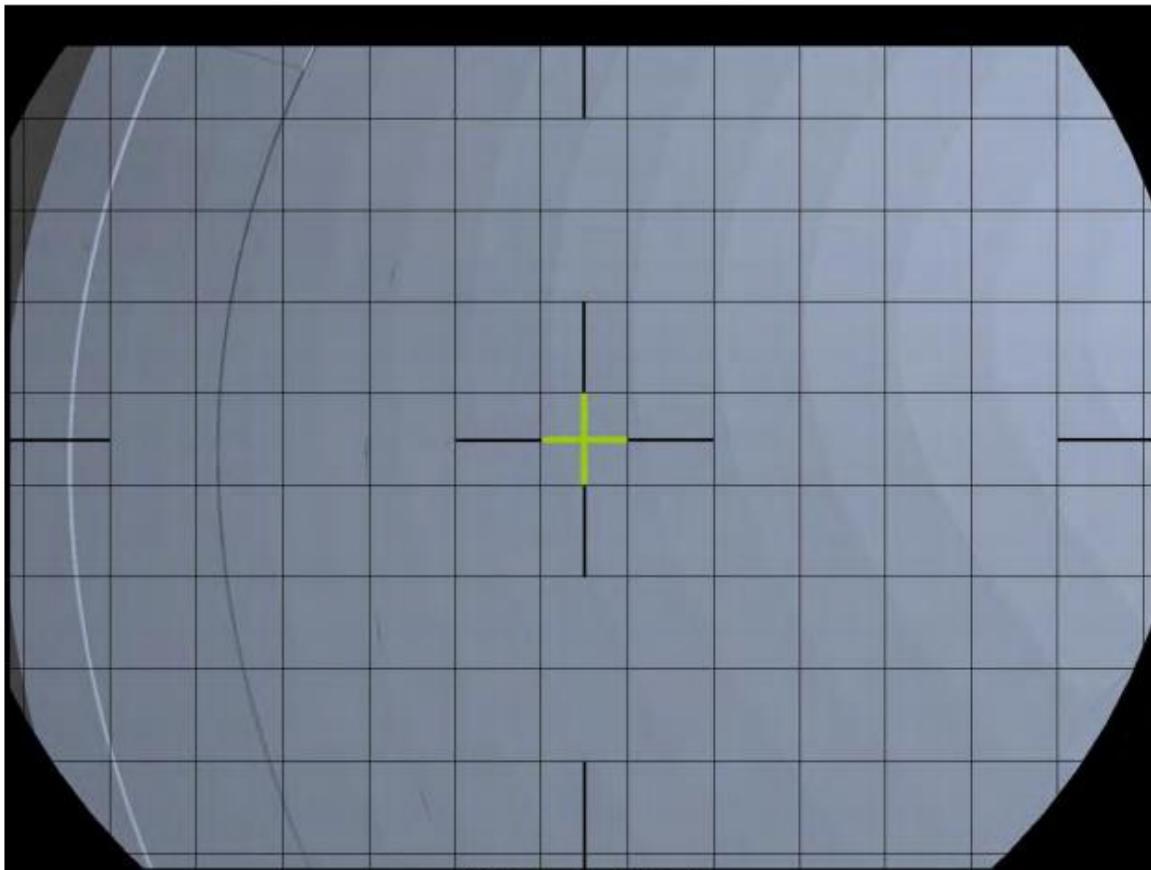


**RSC**



**FLY CAM**

## 2. NOSE CAP LDRI ACAS, SECTION 1









LDRI: +85,-60 (up)

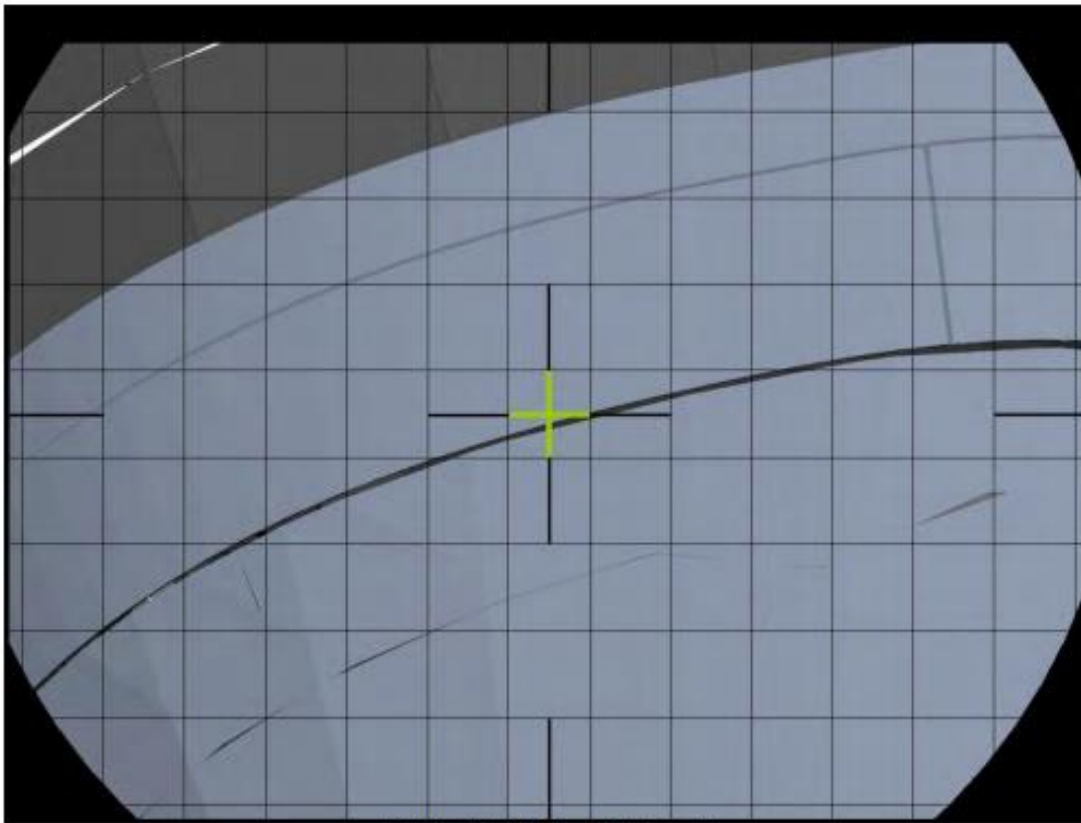
Section 1 Clearance Views	Cameras
OBSS-to-Nose Cap	RSC, ELBOW[1], B, C[2] [3] [4]
RMS-to-Orbiter	B, ELBOW, A
[1] Elbow Cam is necessary to resolve clearances between OBSS and RMS between X ~ -181(pt. 74) and X ~ -185 (pt. 81)	[3] Window views may help to resolve clearances between X ~ -163(pt. 59) and X ~ -156(pt. 61)
[2] Cam C helps to resolve clearances between X ~ -162(pt. 58) and X ~ -163 (pt. 59)	[4] Elbow Cam is necessary to resolve clearances between X ~ -185(pt. 81) and X ~ -167(pt. 82)

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



(23:30)

Pt	X	Y	Z	PITCH	YAW	ROLL	●
<b>58P</b> Δ	<b>-164</b> -9	<b>+20</b> -30	<b>-355</b> +18	<b>241</b> +9	<b>312</b> -5	<b>350</b> +6	
59 Δ	-155 +15	+50 -13	-373 -68	240 -11	314 -9	1 +17	
60 Δ	-170 0	+63 +18	-305 +25	262 +2	328 0	17 0	
61 Δ	-170 -25	+45 +30	-330 -15	260 -8	328 +25	17 -35	
62 Δ	-145 +12	+15 -21	-315 +4	240 -5	300 -2	330 -15	
63 Δ	-157 -2	+36 +44	-319 +17	228 0	286 +11	312 0	
64 Δ	-155 +9	-8 -18	-336 -48	209 -25	295 0	292 -8	
65 Δ	-164 -6	+10 +5	-288 +32	222 +18	289 -2	279 +8	
66 Δ	-158 +12	+5 -10	-320 +60	224 +52	292 -5	300 +22	
67 Δ	-170 -15	+15 -15	-380 -45	226 -9	295 +6	357 +8	
68 Δ	-155 +5	+30 -40	-335 +5	235 +16	305 -9	357 +36	
69 Δ	-160 +42	+70 -22	-340 -10	249 -4	330 -12	35 0	
70 Δ	-202 -22	+92 +22	-330 +30	260 +1	327 +16	49 -3	
71 Δ	-180 +1	+70 +10	-360 +35	249 -2	329 -5	30 -33	
72 Δ	-181 -2	+60 +27	-395 +10	238 -4	297 +5	15 -6	
73 Δ	-179 +6	+33 +68	-405 -5	226 +6	295 +12	357 -18	
74 Δ	-185 -6	-35 +35	-400 -40	180 -12	300 +14	310 -27	
75 Δ	-179 -8	-70 -45	-360 +10	161 +2	316 -5	268 +5	

Pt	X	Y	Z	PITCH	YAW	ROLL	•
76	-171	-25	-370	163	310	273	
Δ	-1	+25	-70	-21	+2	-19	
77	-170	-50	-300	163	314	245	
Δ	+35	-45	-55	-34	-20	-12	
78	-205	-5	-245	182	292	230	
Δ	+5	-25	+10	-4	+1	-15	
79	-210	+20	-255	154	296	195	
Δ	-2	-41	+10	0	-4	-1	
80	-208	+61	-265	147	293	187	
Δ	-33	+26	-13	-2	+8	-4	
81	-175	+35	-252	151	302	189	
Δ	+9	+63	+4	+15	-14	+59	
82	-184	-28	-256	254	308	309	
Δ	-19	-88	+39	+10	+4	-52	
83	-165	+60	-295	140	295	195	
Δ	0	+65	+10	+10	+10	+24	
84	-165	-5	-305	186	295	258	
Δ	0	+70	+35	0	0	0	
85	-165	-75	-340	186	295	258	
Δ	+16	0	0	0	0	0	
86P	-181	-75	-340	186	295	258	
Δ	+35	-10	-67	-15	+5	-20	





LDRI: +64 (left), -93 (down)

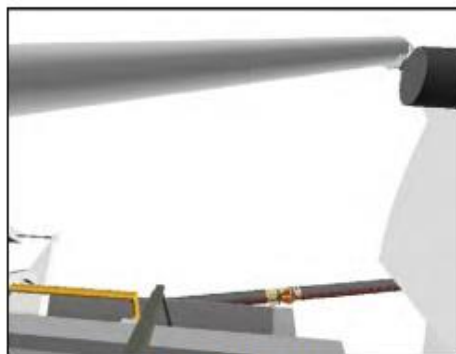
Pt	X	Y	Z	PITCH	YAW	ROLL	•	
86P Δ	-181 +35	-75 -10	-340 -67	186 -15	295 +5	258 -20		
87 Δ	-216 -1	-65 -30	-273 -26	162 -12	300 +2	213 -13		
88 Δ	-215 -50	-35 +10	-247 +73	155 +26	305 +5	190 +20	1/4	
89P Δ	-165 0	-45 0	-320 0	160 0	297 0	227 0		

# OBSS LDRI/IDC RCC SURVEY – PORT

## 1. MNVR TO PORT LDRI ACAS START POSN

Mnvr to Port ACAS Clearance Views	Cameras
OBSS-to-PLBD	ELBOW
OBSS-to-Nose Cap	ELBOW, RSC
RMS-to-Orbiter	B[1], A, ELBOW
OBSS-to-SRMS	B, ELBOW
[1] Good after X ~ -194(pt 90)	

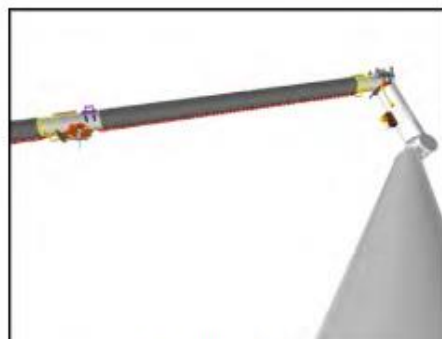
Pt	X	Y	Z	PITCH	YAW	ROLL	
90P Δ	-165 +335	-45 +235	-320 +480	160 +135	297 +15	227 -59	
91 Δ	-500 +270	-280 +10	-800 -100	80 +40	341 0	289 0	
92 Δ	-770 +129	-290 0	-700 -416	40 +38	341 0	289 0	
93 Δ	-899 0	-290 -38	-284 0	2 0	341 0	289 0	
94P Δ	-899 0	-252 0	-284 0	2 0	341 0	289 0	



CCTV A (83,-11)



CCTV B (5,-7)

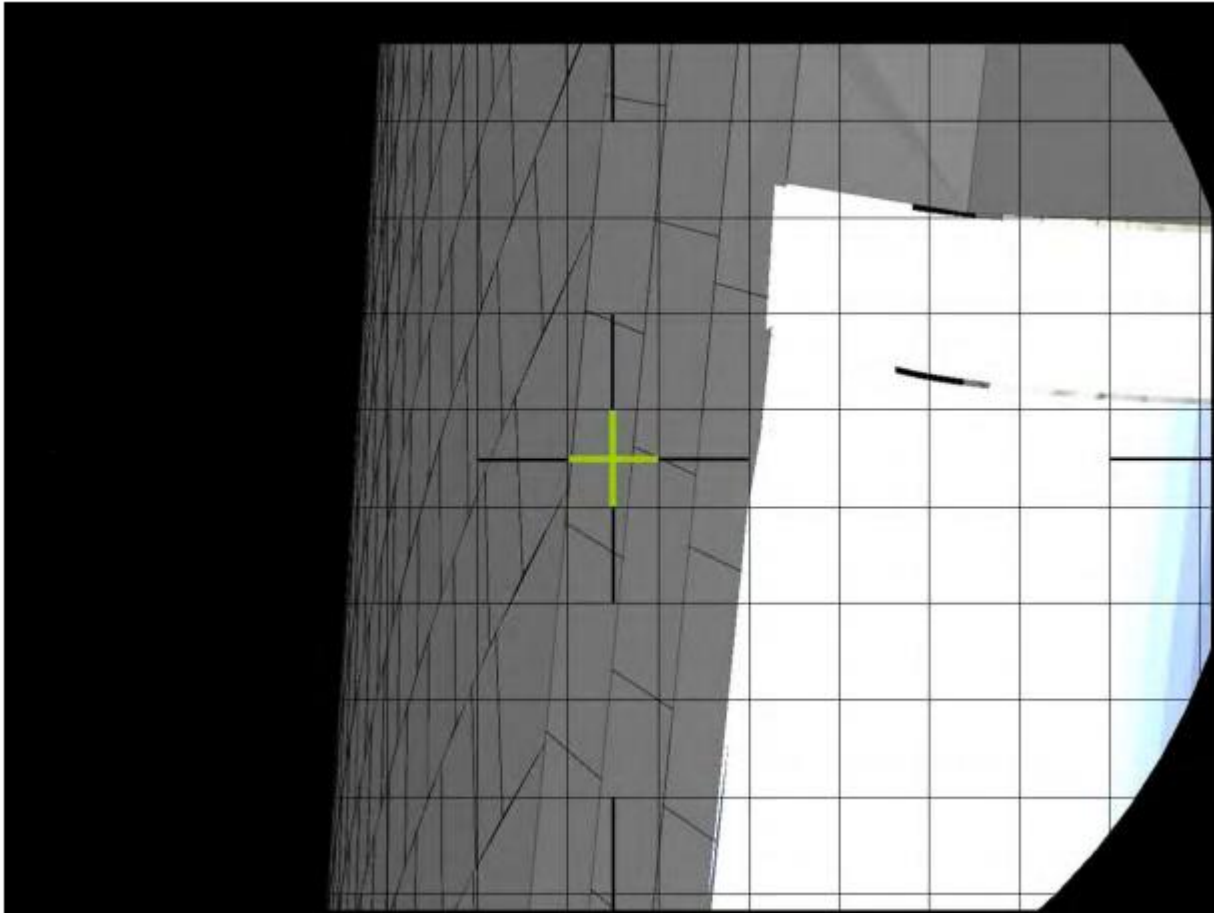


ELBOW (-32,-11)



FLY CAM



## 2. PORT LDRI ACAS, SECTION 1



LDRI: +100 (right), -120 (down)

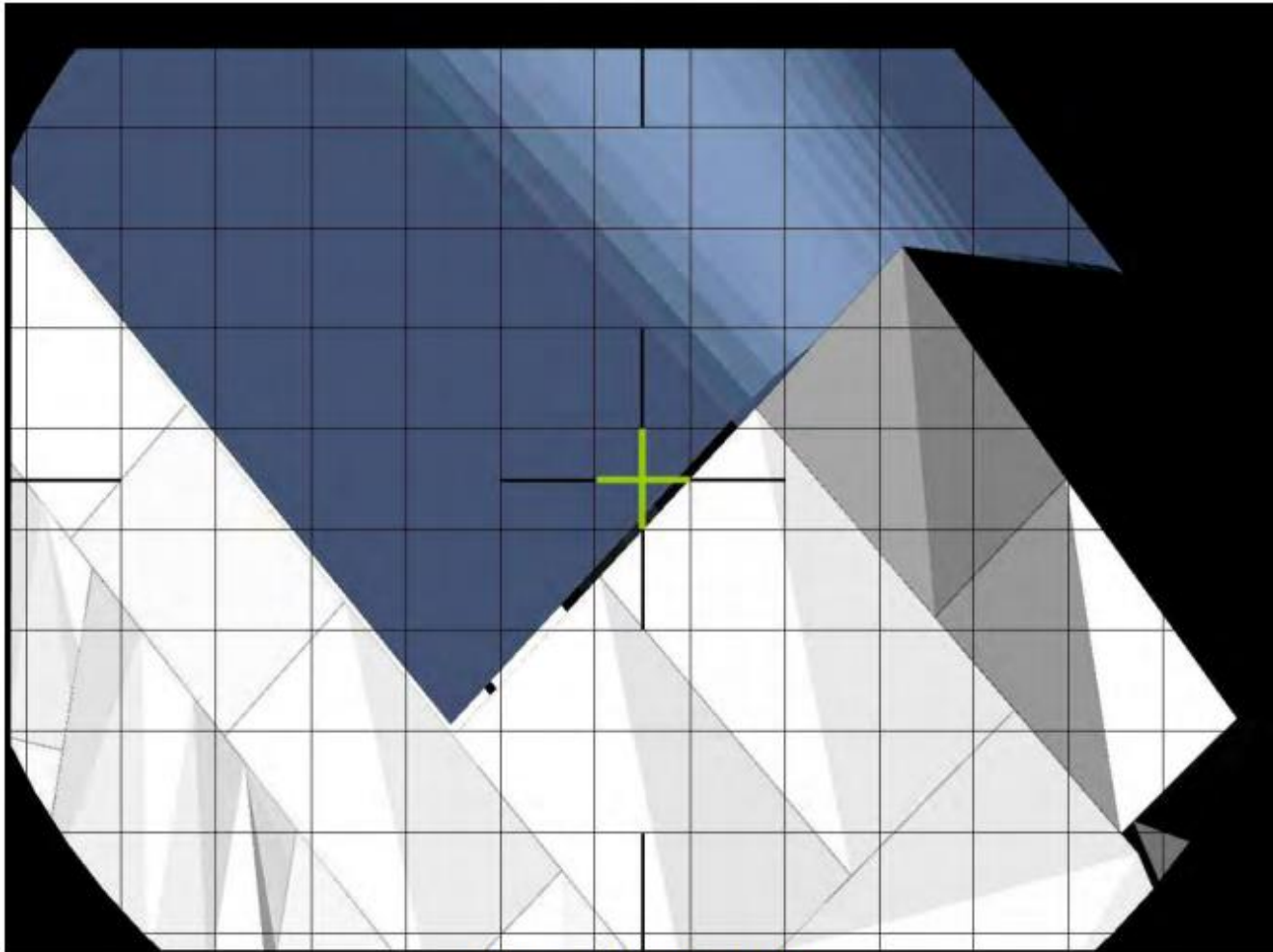
Section 1 Clearance Views	Cameras
RMS-to-Orbiter	B, ELBOW, A
OBSS-to-PLBD	ELBOW, A[1]
OBSS-to-Wing	ELBOW, A[1]
[1] Good after X ~ -1323(pt 101)	



Pt	X	Y	Z	PITCH	YAW	ROLL	•
<b>95P</b> Δ	<b>-899</b> <b>+65</b>	<b>-252</b> <b>+2</b>	<b>-284</b> <b>-3</b>	<b>2</b> <b>-6</b>	<b>341</b> <b>-1</b>	<b>289</b> <b>-8</b>	
96 Δ	-964 <b>+63</b>	-254 <b>+27</b>	-281 <b>-14</b>	10 <b>-1</b>	343 <b>-3</b>	297 <b>-7</b>	
97 Δ	-1027 <b>+46</b>	-281 <b>+41</b>	-267 <b>-5</b>	13 <b>-3</b>	347 <b>-7</b>	304 <b>-6</b>	
98 Δ	-1073 <b>+135</b>	-322 <b>+128</b>	-262 <b>-5</b>	16 <b>0</b>	355 <b>-9</b>	308 <b>-14</b>	
99 Δ	-1208 <b>+47</b>	-450 <b>+50</b>	-257 <b>+9</b>	15 <b>+1</b>	7 <b>+3</b>	319 <b>+4</b>	1/4
100 Δ	-1255 <b>+53</b>	-500 <b>+18</b>	-266 <b>+3</b>	14 <b>+2</b>	3 <b>-1</b>	316 <b>+3</b>	
101 Δ	-1308 <b>+59</b>	-518 <b>-18</b>	-269 <b>-39</b>	12 <b>+38</b>	3 <b>+6</b>	313 <b>-17</b>	
<b>102P</b> Δ	<b>-1367</b> <b>-64</b>	<b>-500</b> <b>-19</b>	<b>-230</b> <b>-1</b>	<b>336</b> <b>+6</b>	<b>350</b> <b>+4</b>	<b>326</b> <b>+5</b>	




### 3. PORT LDRI ACAS, SECTIONS 2 AND 3

Sections 2 & 3 Clearance Views	Cameras
OBSS-to-PLBD	A, B, ELBOW, RSC
OBSS-to-Wing	A, B, ELBOW, RSC
RMS-to-Orbiter	A, B



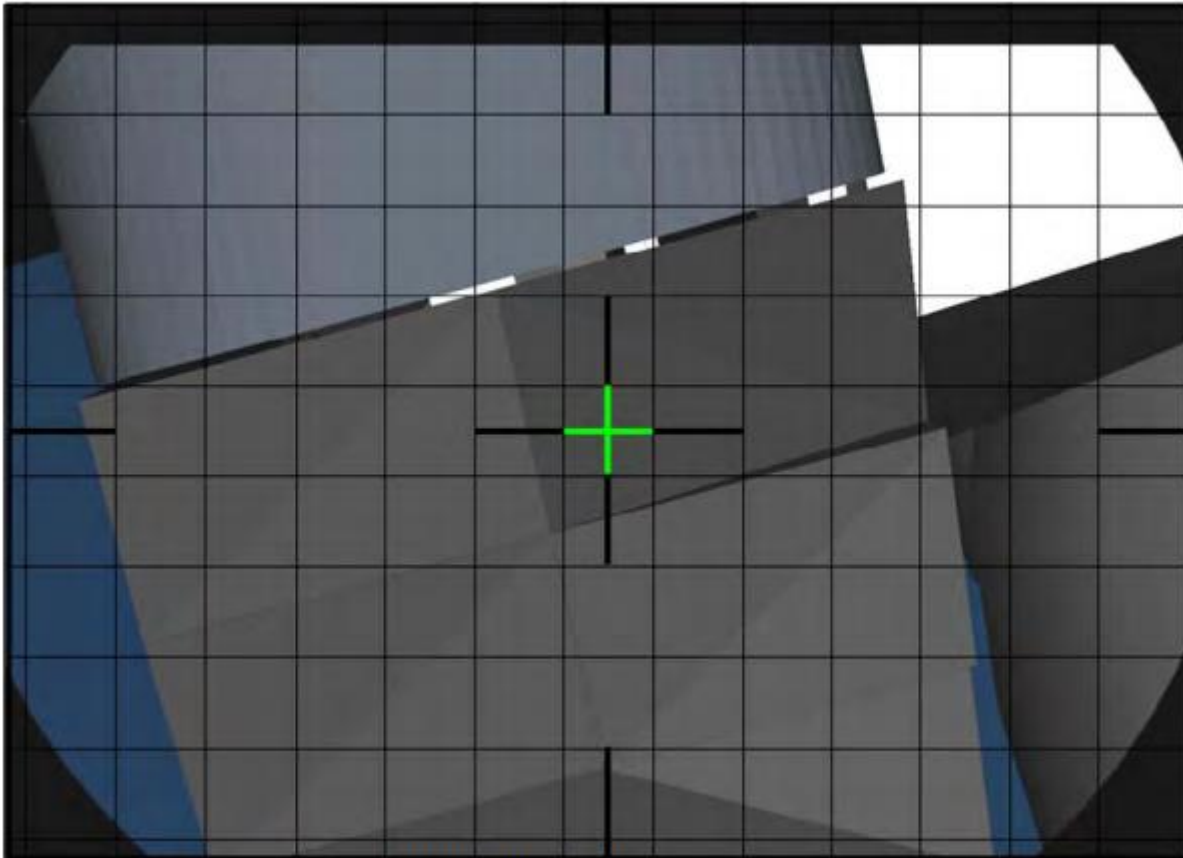
LDRI: +85 (left), -60 (up)

(12:40)



Pt	X	Y	Z	PITCH	YAW	ROLL	•
<b>102P</b> Δ	<b>-1367</b> <b>-64</b>	<b>-500</b> <b>-19</b>	<b>-230</b> <b>-1</b>	<b>336</b> <b>+6</b>	<b>350</b> <b>+4</b>	<b>326</b> <b>+5</b>	
103 Δ	-1303 <b>-251</b>	-481 <b>-269</b>	-229 <b>-32</b>	329 <b>+19</b>	349 <b>+6</b>	320 <b>-32</b>	
104 Δ	-1052 <b>-61</b>	-212 <b>-26</b>	-197 <b>+4</b>	320 <b>+5</b>	322 <b>+2</b>	340 <b>-3</b>	
105 Δ	-991 <b>-101</b>	-186 <b>+2</b>	-201 <b>+7</b>	316 <b>-9</b>	319 <b>+5</b>	341 <b>+12</b>	
<b>106</b> Δ	<b>-890</b> <b>+81</b>	<b>-188</b> <b>+27</b>	<b>-208</b> <b>+3</b>	<b>315</b> <b>+16</b>	<b>323</b> <b>-12</b>	<b>326</b> <b>0</b>	
107 Δ	-971 <b>+47</b>	-215 <b>+38</b>	-211 <b>+7</b>	306 <b>-3</b>	329 <b>+17</b>	338 <b>+14</b>	
108 Δ	-1018 <b>+29</b>	-253 <b>0</b>	-218 <b>-7</b>	294 <b>-16</b>	332 <b>-21</b>	313 <b>-9</b>	
109 Δ	-1047 <b>+125</b>	-253 <b>+144</b>	-211 <b>+19</b>	318 <b>+3</b>	340 <b>+15</b>	336 <b>+19</b>	
110 Δ	-1172 <b>+127</b>	-397 <b>+87</b>	-230 <b>+6</b>	305 <b>-26</b>	345 <b>-10</b>	311 <b>-13</b>	
111 Δ	-1299 <b>+18</b>	-484 <b>+22</b>	-236 <b>+16</b>	334 <b>+5</b>	348 <b>+3</b>	328 <b>+12</b>	
112 Δ	-1317 <b>+39</b>	-506 <b>+40</b>	-252 <b>+40</b>	327 <b>+10</b>	352 <b>+11</b>	316 <b>+31</b>	
113 Δ	-1356 <b>-33</b>	-546 <b>-9</b>	-292 <b>+23</b>	314 <b>-32</b>	6 <b>+19</b>	287 <b>+1</b>	
<b>114P</b> Δ	<b>-1323</b> <b>-79</b>	<b>-537</b> <b>-24</b>	<b>-315</b> <b>-10</b>	<b>346</b> <b>-7</b>	<b>348</b> <b>-10</b>	<b>282</b> <b>-4</b>	

#### 4. PORT LDRI ACAS, SECTION 4

Section 4 Clearance Views	Cameras
OBSS-to-PLBD	A[1], B[2], ELBOW, RSC
OBSS-to-Wing	A[1], B[2], ELBOW, RSC
RMS-to-Orbiter	A, B
[1] No good after X ~ -1028(pt 118)	[2] No good between X ~ -1028(pt 118) and X ~ -923(pt 121)

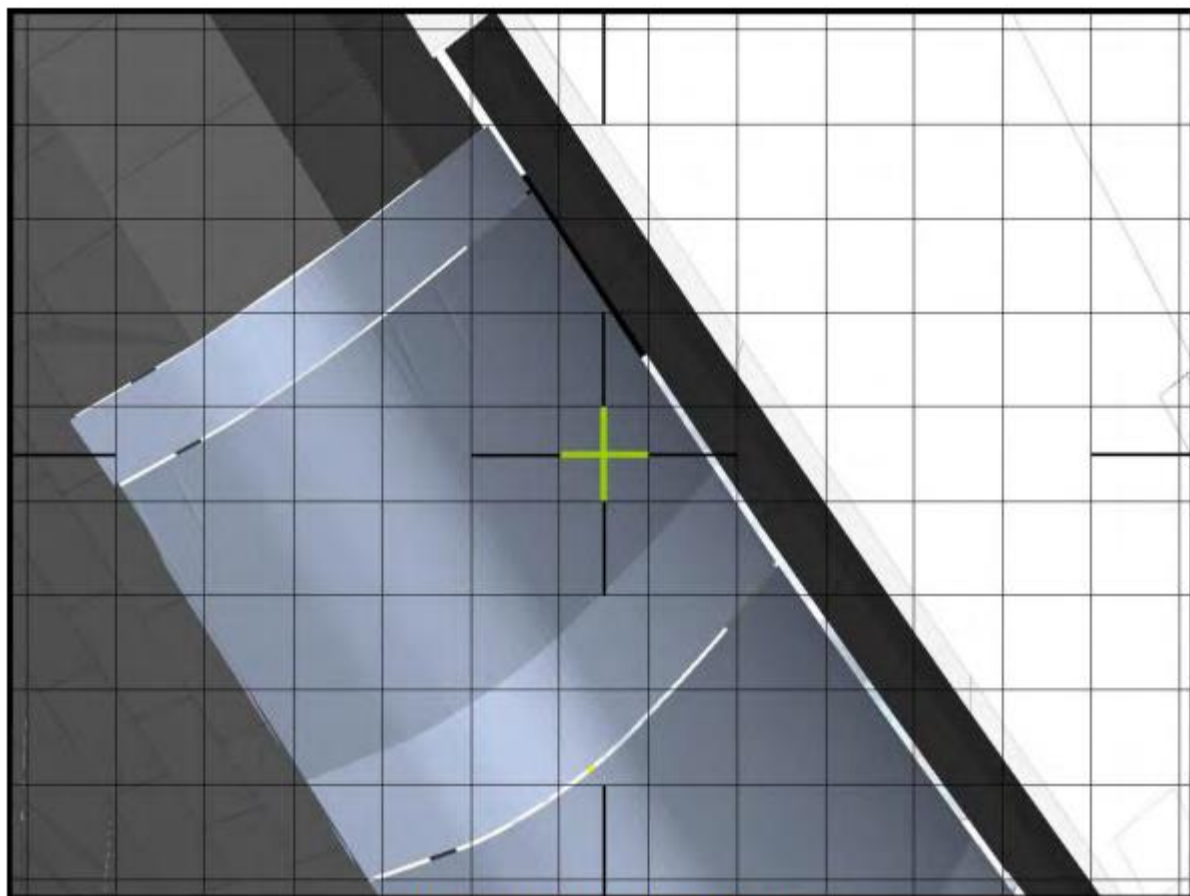


LDRI: +89 (right),-120 (down)



Pt	X	Y	Z	PITCH	YAW	ROLL	•
<b>114P</b> <b>Δ</b>	<b>-1323</b> <b>-79</b>	<b>-537</b> <b>-24</b>	<b>-315</b> <b>-10</b>	<b>346</b> <b>-7</b>	<b>348</b> <b>-10</b>	<b>282</b> <b>-4</b>	
115 Δ	-1244 -68	-513 -63	-305 -7	353 +1	357 -5	287 -2	
116 Δ	-1176 -70	-450 -70	-298 -3	352 0	2 -2	290 -1	
117 Δ	-1106 -83	-380 -80	-295 -7	352 -2	4 +7	291 +1	
118 Δ	-1023 -34	-300 -25	-288 +6	354 +3	357 +8	289 +6	
119 Δ	-989 -24	-275 -8	-294 0	350 0	350 0	282 0	1/4
120 Δ	-965 -32	-267 -6	-294 -5	350 -8	350 +3	282 -1	
121 Δ	-933 -13	-261 -5	-289 -1	358 +24	347 +19	283 -10	
122 Δ	-920 -29	-256 +54	-288 -39	336 +12	326 -36	284 -17	
<b>123P</b> <b>Δ</b>	<b>-891</b> <b>-316</b>	<b>-310</b> <b>-23</b>	<b>-249</b> <b>+71</b>	<b>333</b> <b>+57</b>	<b>349</b> <b>+24</b>	<b>319</b> <b>+5</b>	

## 5. PORT ITVC ACAS, WING GLOVE AND CREW CABIN (SECTION 5)

Wing Glove & Crew Cabin Clearance Views	Cameras
OBSS-to-PLBD	ELBOW, RSC[1], B
OBSS-to-Crew Cabin	ELBOW[2], B, RSC[3]
RMS-to-Orbiter	B, A
<p>[1] PLBD leaves FOV at X ~ -417(pt 124) and re-enters at X ~ -408(pt 125)</p> <p>[2] Only Cam B can resolve clearances between X ~ -356(pt 125) and X ~ -513 (pt 126), and between X ~ -556 (pt 128) and X ~ -740(pt 130)</p> <p>[3] Nose Cap enters FOV at X ~ -384(pt 125)</p>	



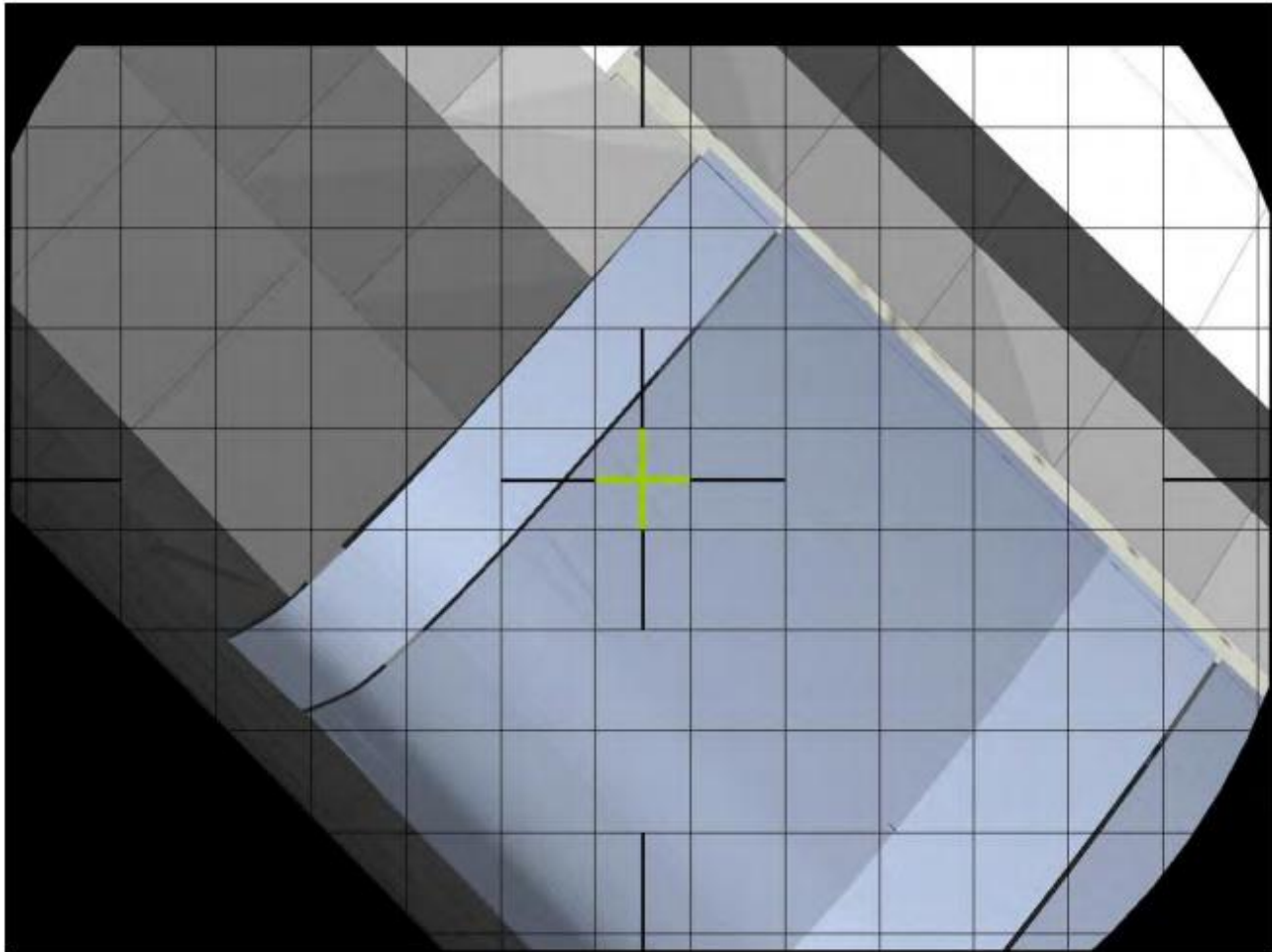
ITVC: +100 (right), -100 (up)

Pt	X	Y	Z	PITCH	YAW	ROLL	•
123P Δ	-891 -316	-310 -23	-249 +71	333 +57	349 +24	319 +5	
124 Δ	-575 -320	-287 -82	-320 +15	271 +21	352 +2	294 -9	
125 Δ	-255 +270	-205 +78	-335 +11	249 +25	344 -3	289 -7	
126 Δ	-525 -66	-283 -8	-346 -39	223 +5	337 -8	286 0	
127 Δ	-459 +97	-275 +8	-307 +20	221 -15	331 -4	292 +12	
128 Δ	-556 +17	-283 +5	-327 -7	241 -24	339 +3	303 +9	3
129 Δ	-573 +129	-288 0	-320 0	264 -6	348 0	301 0	
130 Δ	-702 +202	-288 +30	-320 +12	270 -52	348 +5	301 +10	
131 Δ	-904 -15	-318 -24	-332 -16	319 +2	350 +4	290 -1	
132P Δ	-889 +101	-294 -22	-316 -13	317 -3	347 +5	288 +3	






## 6. PORT LDRI ACAS, SECTIONS 6 AND 7

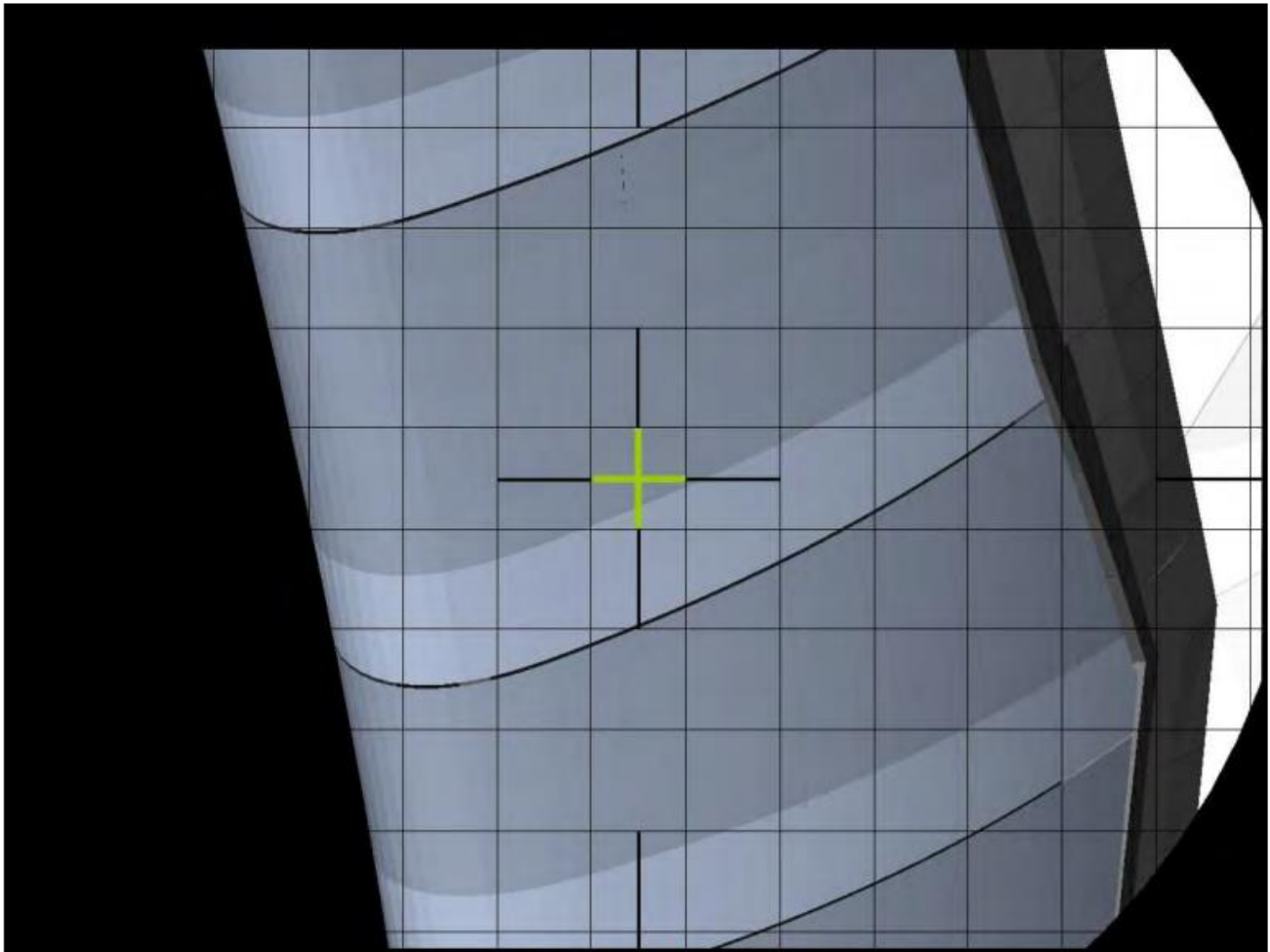
Sections 6 & 7 Clearance Views	Cameras
OBSS-to-PLBD	B[1], A[2], ELBOW [3], RSC
OBSS-to-Wing	B[1], A[2], ELBOW, RSC
RMS-to-Orbiter	A, B
[1] No good between X ~ -1047(pt 133) and X ~ -1129(pt 134)	[2] Good between X ~ -1068(pt 134) and X ~ -903(pt 143)
	[3] No good after X ~ -1198(pt 139)



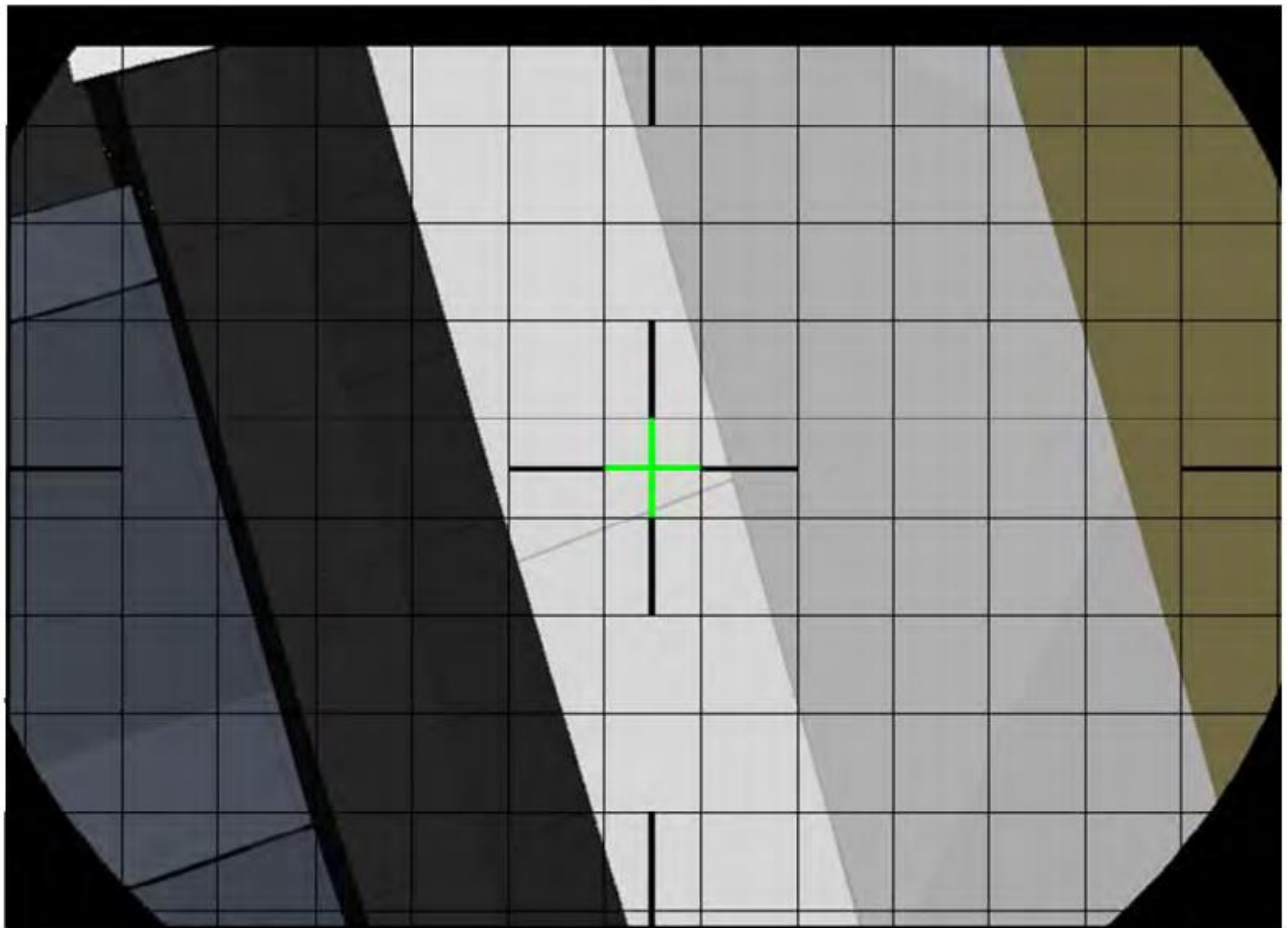
LDRI: +89 (left), -112 (down)



Pt	X	Y	Z	PITCH	YAW	ROLL	•	
<b>132P</b> Δ	-889 +101	-294 -22	-316 -13	317 -3	347 +5	288 +3	1	
133 Δ	-990 +91	-272 +46	-303 +57	318 -35	345 +2	282 +41		
134 Δ	-1081 +177	-318 +173	-360 +8	344 +10	352 -5	241 0		
135 Δ	-1258 +87	-491 +34	-368 +1	334 -5	357 -3	243 -1		
136 Δ	-1345 -3	-525 -45	-369 +27	339 +3	359 +13	245 +26	1/4	
137 Δ	-1342 -52	-480 -17	-396 0	333 +4	359 +1	216 0		
138 Δ	-1290 -54	-463 -36	-396 -6	329 -4	358 +1	215 -4		
139 Δ	-1236 -116	-427 -108	-390 0	333 -5	355 +2	218 -5		
140 Δ	-1120 -46	-319 -14	-390 0	339 -7	351 +11	222 -10		
141 Δ	-1074 -34	-305 -16	-390 0	349 -1	338 -10	230 -5		
142 Δ	-1040 -32	-289 -2	-390 -23	352 +49	347 -25	237 -6		
143 Δ	-1008 -116	-287 +7	-367 -3	305 -38	356 +5	261 +5		
<b>144P</b> Δ	-892 0	-294 0	-364 0	342 0	353 0	255 0	1	



**LDRI: +74,-151 (down)**





LDRI: +74 (left),-112

## 7. MNVR TO OBSS HOVER

Mnvr to OBSS Hover Clearance Views	Cameras
OBSS-to-PLBD	ELBOW, B, A[1]
OBSS-to-Tail	A, ELBOW, RSC[2], B
RMS-to-Orbiter	C, B, A
OBSS-to-RMS	B, ELBOW
[1] Good after X ~ -1014(pt 145)	
[2] Tail leaves FOV at X ~ -1505(pt 145) and re-enters at X ~ -1541(pt 146)	

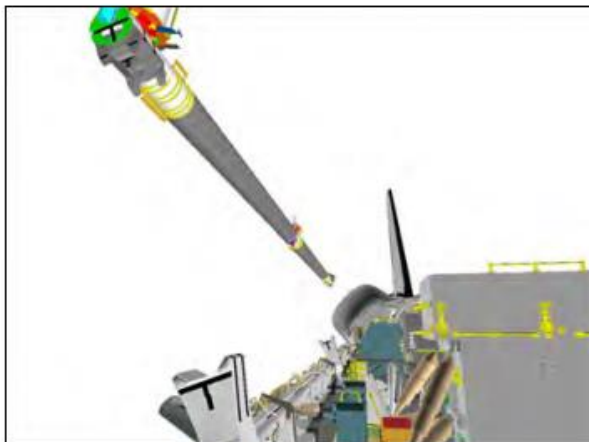
(10:05)

Pt	X	Y	Z	PITCH	YAW	ROLL	•
145P Δ	-892 +708	-294 -319	-364 +621	342 +1	353 +29	255 -120	
146 Δ	-1600 -329	+25 -109	-985 -453	40 +40	0 0	11 0	
147P Δ	-1271 0	+134 0	-532 0	0 0	0 0	11 0	

When AUTO SEQ IN PROG It – off:

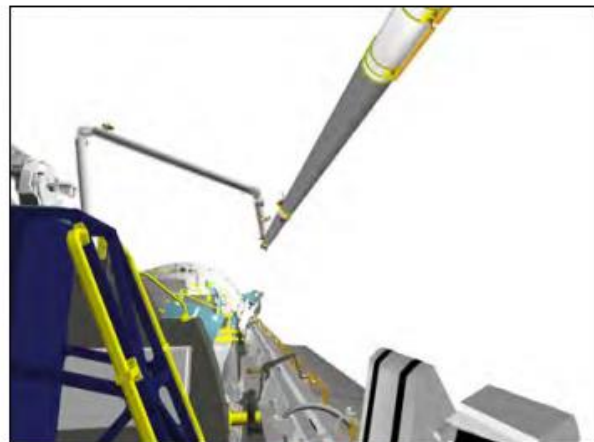
Verify mnvr to OBSS HOVER posn complete:

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-1271	+134	-532	0	0	11	2
	SY	SP	EP	WP	WY	WR	
√	-89.9	+80.2	-118.8	-59.8	+0.0	+109.9	



**CCTV D (-10,15)**

Go to OBSS BERTH



**CCTV C (10,10)**

# OBSS BERTH

## 1. OBSS HOVER

Verify mnvr to OBSS HOVER posn complete:

	X	Y	Z	PITCH	YAW	ROLL	PL ID
√	-680	+133	-517	0	0	341	1
	SY	SP	EP	WP	WY	WR	
√	-89.9	+80.2	-118.8	-59.8	+0.0	+109.9	

A7U      √STBD RMS HTR A,B (two)      – OFF



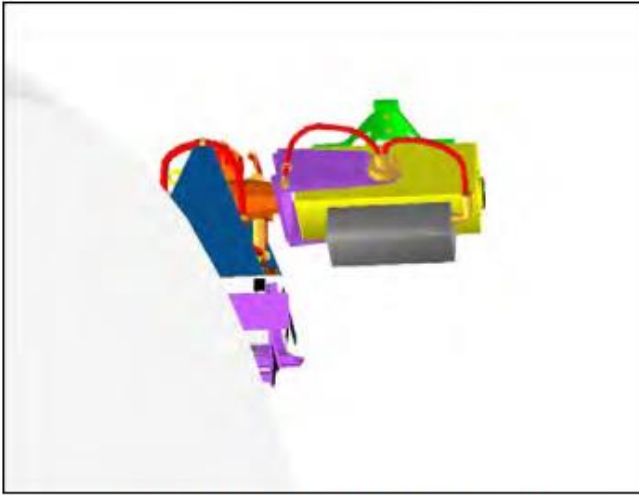
CCTV D (-15,15)



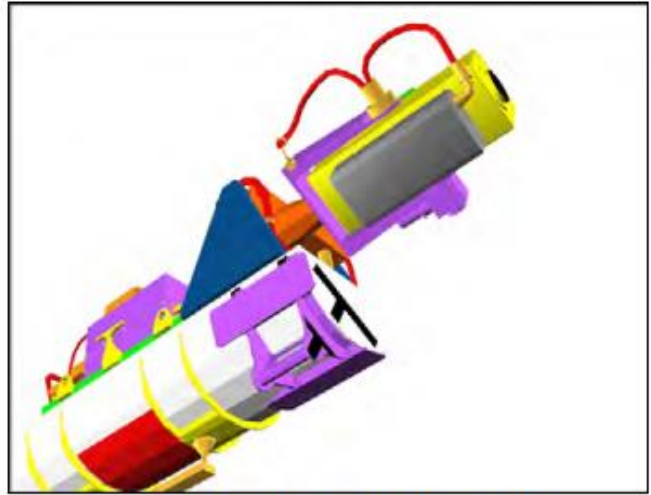
CCTV C (25,25)

## 2. STOW PTU

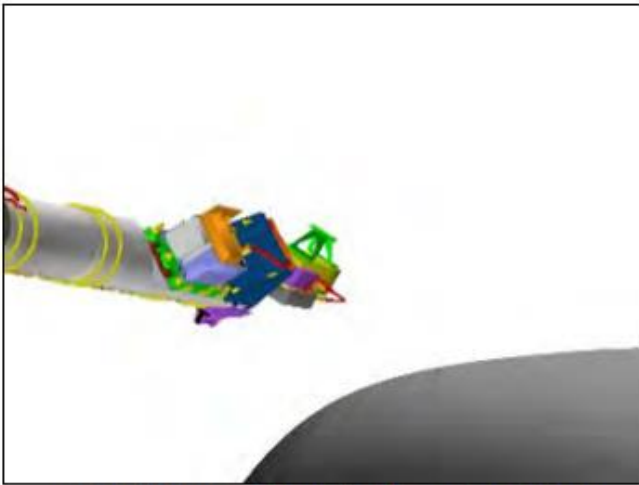
A7U      √DTV ← PL2  
          CAMR CMD PAN/TILT      – HI RATE  
          CAMR CMD PAN      – L (to hard stop)  
          CAMR CMD TILT      – UP (to hard  
 stop)  
          CAMR CMD PAN/TILT      – RESET, HI  
 RATE (LO within 10°)  
          CAMR CMD PAN:      +108 (right)  
          CAMR CMD TILT:      -175 (down)



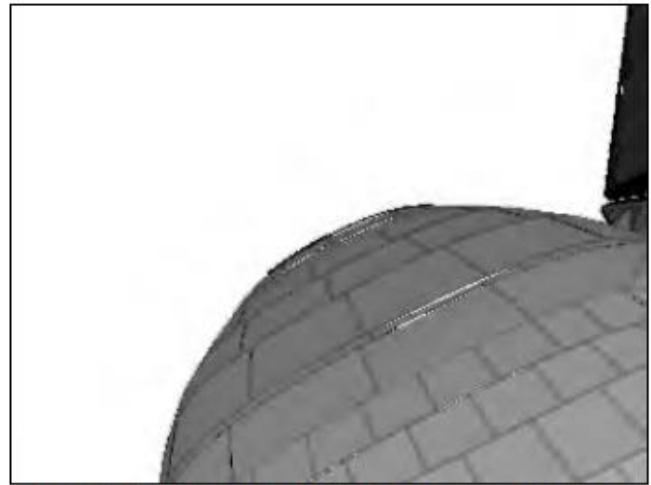
**CCTV B (82,16) HFOV: 15.0**



**CCTV C (50,50) HFOV: 40.0**



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

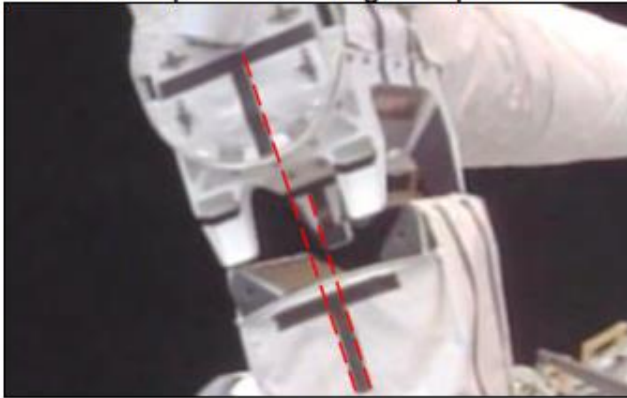


**OBSS ITVC (108,-175) HFOV: 53.8 (full-out)**



### 3. OBSS BERTH

OBSS at 6" up with 0.2° negative pitch bias

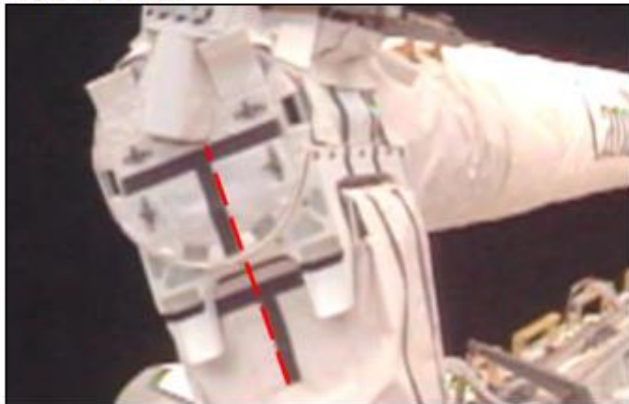


STBD FWD MPM – CCTV D



STBD AFT MPM – CCTV C

OBSS Latched



STBD FWD MPM – CCTV D



STBD AFT MPM – CCTV C

CRT4: SM SPEC 94 PRO (PDRS CONTROL)  
RMS STBD – ITEM 2 EXEC

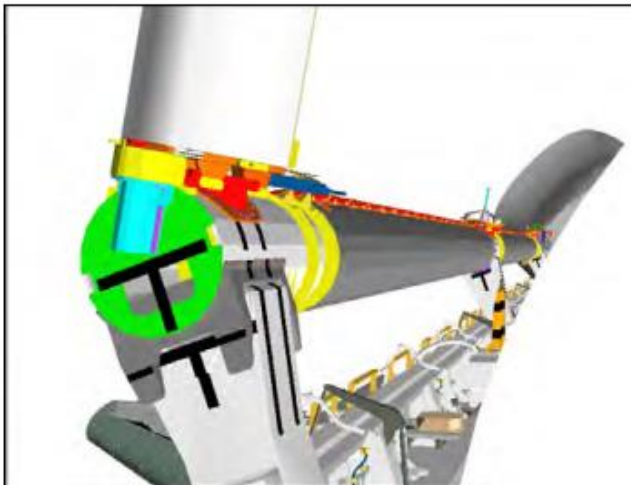
RHC RATE  
BRAKES  
MODE – VERN (RATE MIN tb-ON)  
– OFF (tb-OFF)  
– PL, ENTER



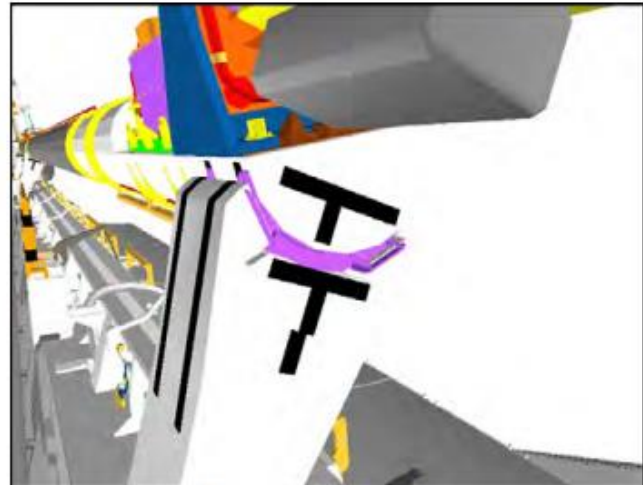
Mnvr OBSS down (+Z) to OBSS BERTH:

	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	

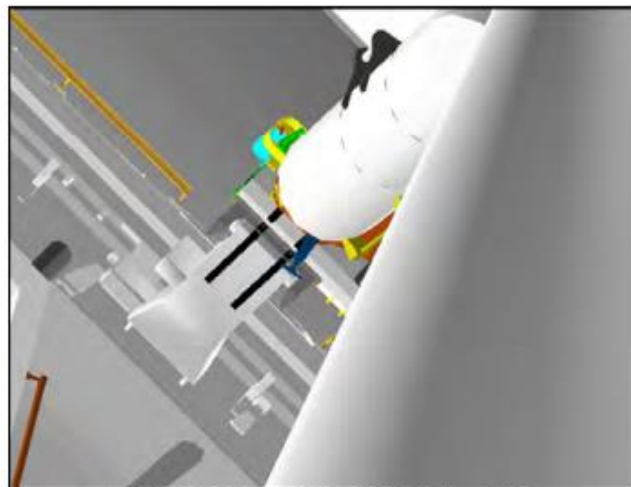
√STBD R-F-L tb (three) – gray



CCTV D (-15,0) HFOV: 35.0



CCTV C (30,-10) HFOV: 60.0



ELBOW (-7,-12) HFOV: 15.0

#### 4. CONFIGURE POWER

R13L PL BAY MECH PWR SYS (two) – ON

## 5. STBD MRL LATCH

	RATE	– COARSE (RATE
	MIN tb-OFF)	
	STBD RMS RETEN LAT	– LAT (tb-LAT) (18
	sec max)	
	STBD RMS RETEN LAT	– OFF
CRT4:	SM SPEC 94 PRO (PDRS CONTROL)	
	RMS PORT	– ITEM 1 EXEC (*)

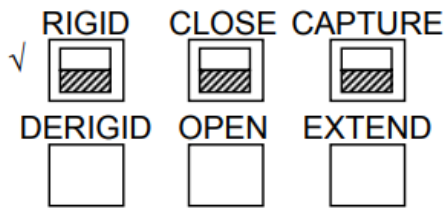
## 6. RECONFIGURE POWER

R13L	PL BAY MECH PWR SYS (two)	– OFF
------	---------------------------	-------

## 7. OBSS UNGRAPPLE

A7U	CCTV	– config for ungrapple
	CCTV	– RMS WRIST,
	ZOOM: 34.0 HFOV	
	CCTV	– RMS WRIST,
	FOCUS: 5 ft	
RHC	RATE	– VERN (RATE MIN
tb-ON)		
	BRAKES	– OFF (tb-OFF)
	MODE	– END EFF, ENTER
A6U	DAP: VERN(FREE)	

EE MODE – AUTO  
 EE RELEASE sw – REL (mom)  
 When OPEN tb – gray, mnvr arm clear of grapple



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  
 EE MAN CONTR – DERIGID (hold until  
 DERIGID tb-gray, 5 sec max)  
 EE 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)  
 EE MODE – OFF

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	

## 8. ARM PRE-CRADLE

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 PRE-GRAPPLE	-90.0	+87.6	-129.5	-57.5	0.0	+110.4	
1: WP +				+5.0			
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

## REFERENCE DATA

## PORT MPM/MRL MOTOR AND CONTROL REQUIREMENTS

MRL		LOGIC POWER			MOTOR POWER					CMD PWR	DATA MDM
		RPC	CNTL	SW LOGIC	AC BUS PWR		PLB MECH	AC BUS ENA 1	AC BUS ENA 2		
FWD	SYS 1	MNB MPC2	BC3	MNB MMC2	AC2	AC2 PBM MMC2	SYS 1	BC1	BC2	AB1	OA2
	SYS 2	MNC MPC3	CA3	MNC MMC4	AC3	AC3 PBM MMC4	SYS 2	AB1 + CA1	AB2 + CA2	CA1	OA2
MID	SYS 1	MNA MPC1	AB3	MNA MMC1	AC1	AC1 PBM MMC1	SYS 1	AB1 + CA1	AB2 + CA2	AB1	OF4
	SYS 2	MNB MPC2	BC3	MNB MMC4	AC2	AC2 PBMMMC4	SYS 2	BC2	BC1	CA1	OA1
AFT	SYS 1	MNC MPC3	CA3	MNC MMC2	AC3	AC3 PBM MMC2	SYS 1	AB1 + CA1	AB2 + CA2	CA1	OA3
	SYS 2	MNA MPC1	AB3	MNA MMC3	AC1	AC1 PBM MMC3	SYS 2	AB1 + CA1	AB2 + CA2	AB1	OF1

<sup>a</sup>Loss of any one bus (some dual) will cause loss of motor drive capability

MPM	LOGIC POWER			MOTOR POWER					CMD PWR	DATA MDM			
	RPC	CNTL	SW LOGIC	AC BUS PWR		PLB MECH	AC BUS ENA 1	AC BUS ENA 2		SHLD	FWD	MID	AFT
SYS 1	MNC MPC3	CA3	MNC MMC4	AC3	AC3 PBM MMC4	SYS 2	AB1 + CA1	AB2 + CA2	CA2	OA2	OF1	OA1	OF1
SYS 2	MNB MPC2	BC3	MNB MMC2	AC2	AC2 PBM MMC2	SYS 1	BC1	BC2	BC1	OA2	OA3	OF4	OA3

<sup>a</sup>Loss of any one bus (some dual) will cause loss of motor drive capability

## STBD MPM/MRL MOTOR AND CONTROL REQUIREMENTS

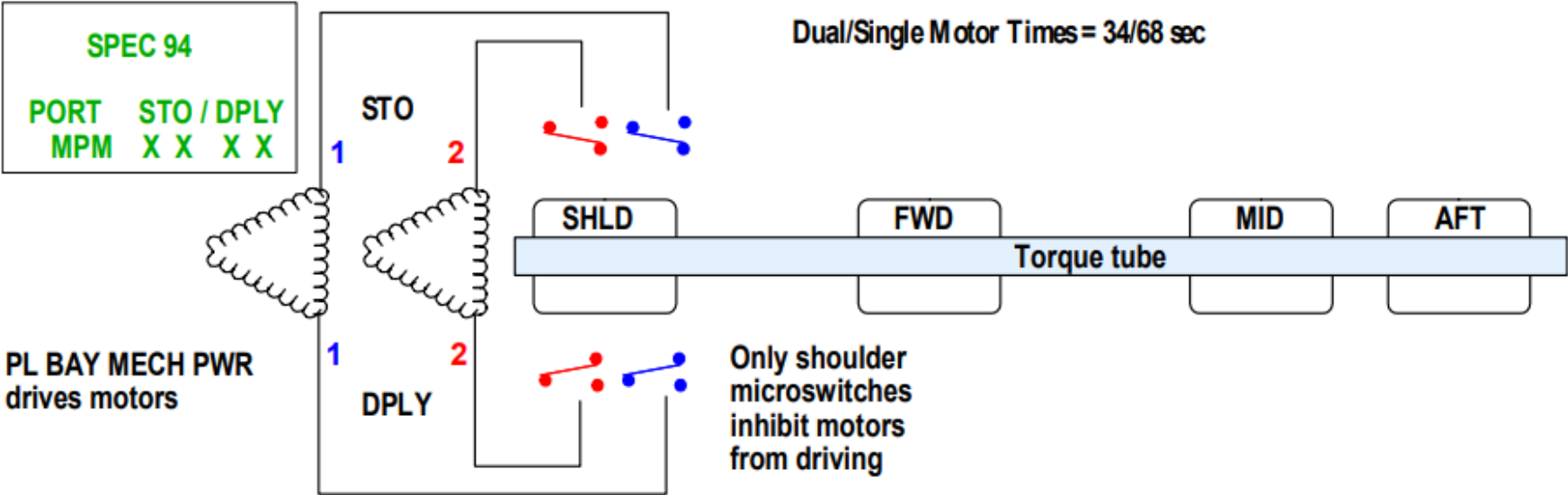
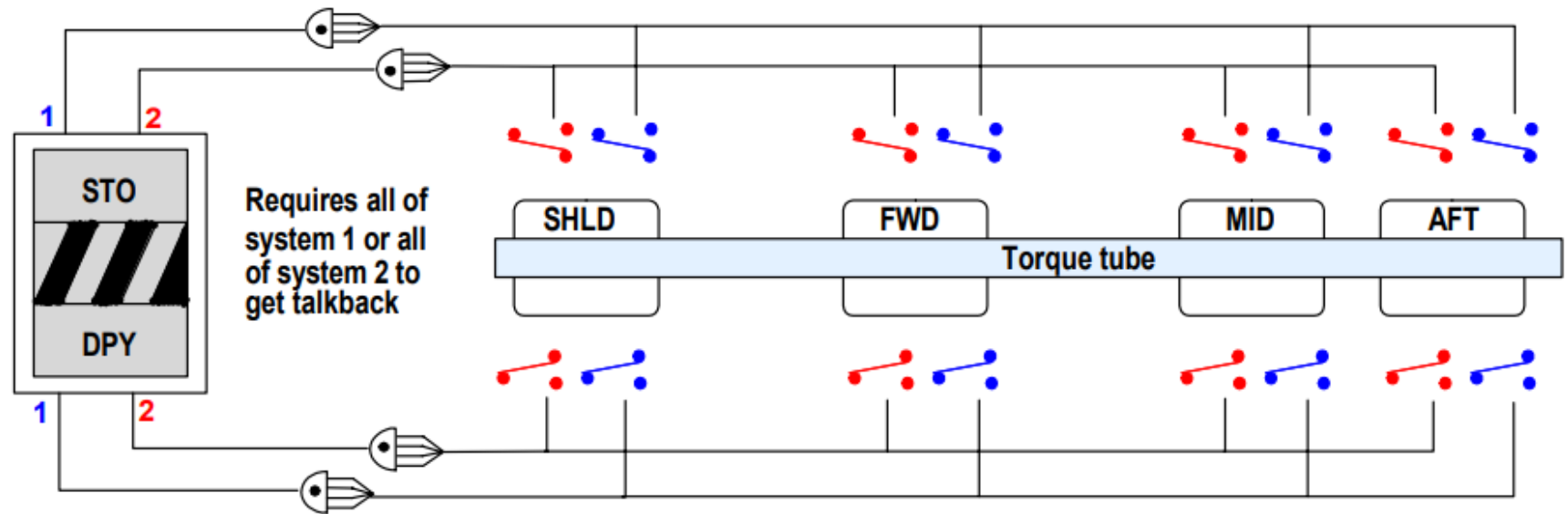
MRL		LOGIC POWER			MOTOR POWER					CMD PWR	DATA MDM
		RPC	CNTL	SW LOGIC	AC BUS PWR		PLB MECH	AC BUS ENA 1	AC BUS ENA 2		
FWD	SYS 1	MNB MPC2	BC3	MNB MMC4	AC3	AC3 PBM MMC4	SYS 2	AB1 + CA1	AB2 + CA2	CA1	OA2
	SYS 2	MNA MPC1	AB3	MNA MMC1	AC1	AC1 PBM MMC1	SYS 1	AB1 + CA1	AB2 + CA2	AB1	OF4
MID	SYS 1	MNB MPC2	BC3	MNB MMC4	AC2	AC2 PBM MMC4	SYS 2	BC2	BC1	AB1	OA1
	SYS 2	MNC MPC3	CA3	MNC MMC2	AC3	AC3 PBM MMC2	SYS 1	AB1 + CA1	AB2 + CA2	CA1	OA3
AFT	SYS 1	MNA MPC1	AB3	MNA MMC3	AC1	AC1 PBM MMC3	SYS 2	AB1 + CA1	AB2 + CA2	AB1	OF1
	SYS 2	MNB MPC2	BC3	MNB MMC2	AC2	AC2 PBM MMC2	SYS 1	BC1	BC2	CA1	OA2

<sup>a</sup>Loss of any one bus (some dual) will cause loss of motor drive capability

MPM	LOGIC POWER			MOTOR POWER					CMD PWR	DATA MDM		
	RPC	CNTL	SW LOGIC	AC BUS PWR		PLB MECH	AC BUS ENA 1	AC BUS ENA 2		FWD	MID	AFT
SYS 1	MNB MPC2	BC3	MNB MMC2	AC2	AC2 PBM MMC2	SYS 1	BC1	BC2	BC1	OA2	OA3	OF4
SYS 2	MNC MPC3	CA3	MNC MMC4	AC3	AC3 PBM MMC4	SYS 2	AB1 + CA1	AB2 + CA2	CA2	OA2	OF1	OA2

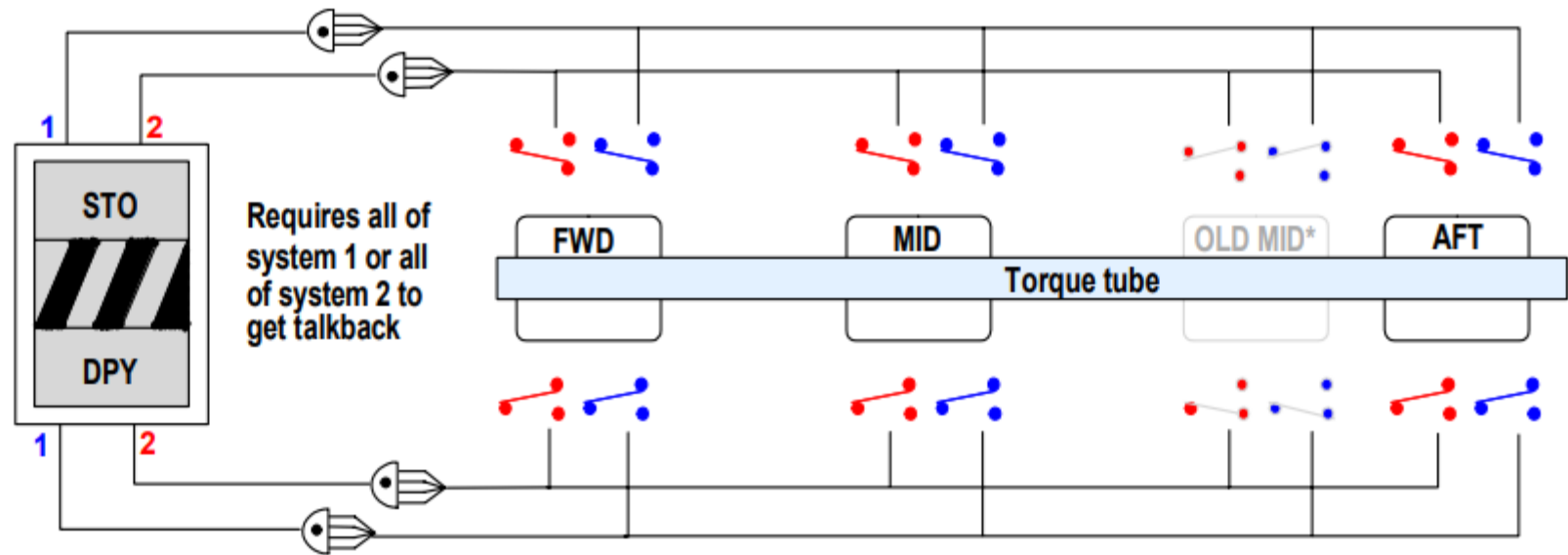
<sup>a</sup>Loss of any one bus (some dual) will cause loss of motor drive capability

PORT MPM TALKBACKS AND MICROSWITCHES

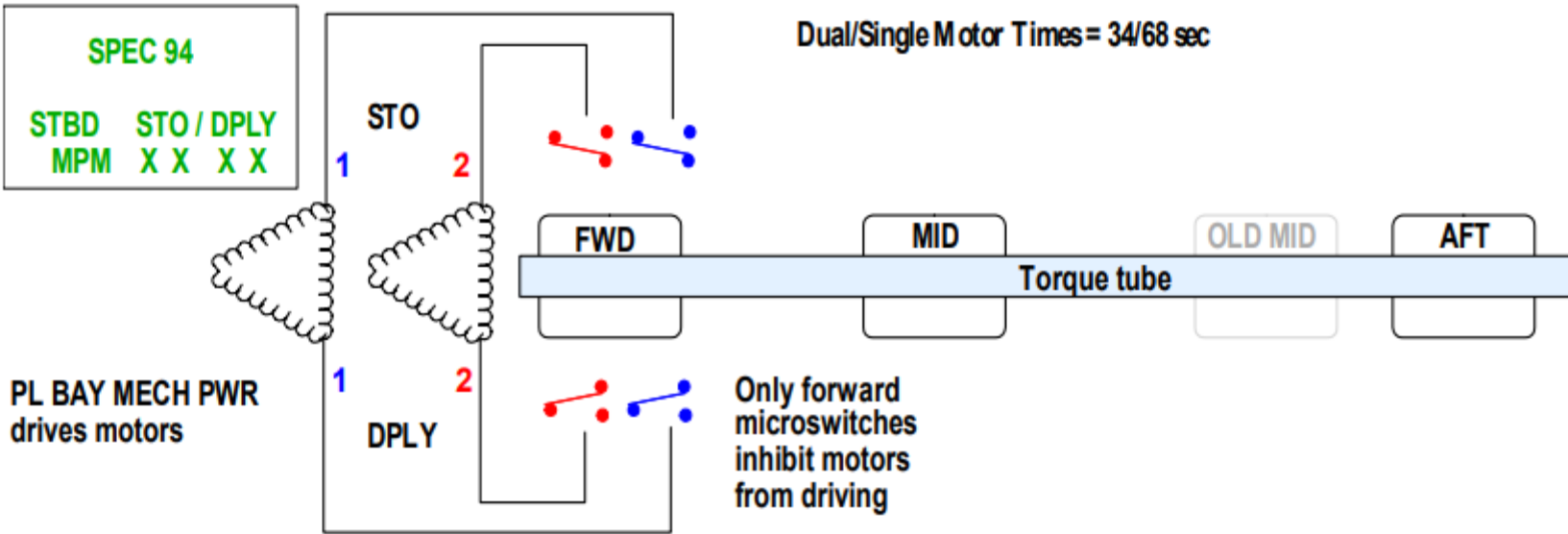




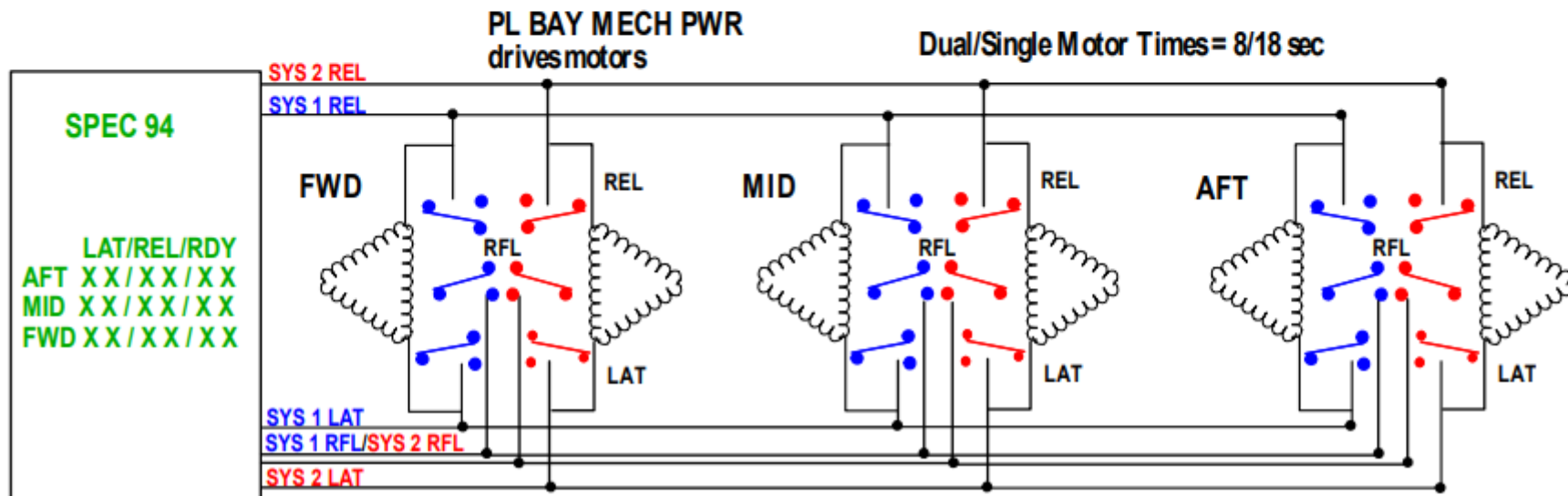
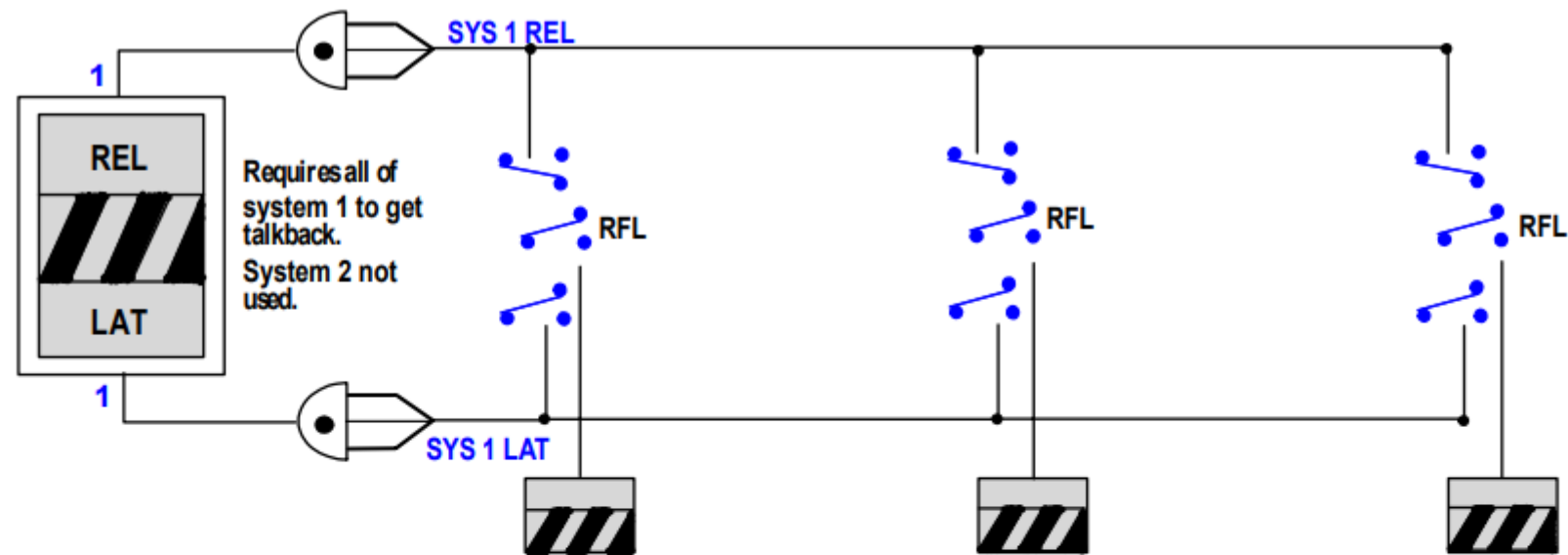
STBD MPM TALKBACKS AND MICROSWITCHES



\*Pins have been shorted together to simulate inputs from unused "Old Mid" MPM location to maintain accuracy of Stbd MPM tb



## PORT/STBD MRL TALKBACKS AND MICROSWITCHES



## RMS EE C/O FAILURE MATRIX

### General notes:

1. Table is designed for a single failure only
2. Rows #1 through #29 are for steps where the expected motor function does not start, does not complete, or takes longer than expected time
3. Row #30 is for C&W that occurs during the procedure, but does not affect motor function
4. Rows #31 through #36 are for microswitch failures where motor function is not affected
5. Rows #37 through #41 are for uncommanded motion that occurs when the EE MODE sw is taken out of OFF

#	Problem	Failure	Impacts	Workaround	Notes
1	Step a	EE Mode sw Man Cap/Rel contact or pole shorted to Man	Auto Close/Open lost for pole failure. Otherwise, full EE functionality remains. However, Auto Rig/Derig will not start until RHC Cap/Rel sw is released. EE snares will drive (or stall) as long as RHC Cap/Rel sw is out of detent. Motor burnout could occur	EE Manual modes. Backup release. Trigger guard provides protection from uncommanded PL release	
2	Steps b, c, and j	(1) EEEU logic ckt, (2) EE mech, (3) EE motor module, (4) EE mode sw "fly-apart"	All EE functions lost	D&C IFM Kit for (4)	For (1), may receive 'S96 PDRS CKCRT EE.' For (4), crew can detect switch feels loose, and ground can detect loss of 10V pole
3	Steps b, c, k, and l	EEU logic ckt	Close and derigidize lost	None. EE non-functional	
4	Steps b, c, and o	RHC Cap/Rel sw "fly-apart" or stuck	Close, Open, and Auto Rig/Derig lost	D&C IFM Kit	Crew should be able to detect that switch feels loose or stuck, and ground can detect loss of 10V pole
5	Steps b and c	(1) EE Mode sw Cap/Rel pole, (2) K2 relay, (3) EEEU logic ckt, (4) snare mech, (5) RHC Cap/Rel sw mech "hangup"	EE Auto and Man Close lost. Auto and Man Open may be lost. Direct Drive down for K2 relay (both poles)	D&C IFM Kit for (1), (2), or (5)	For (3), may receive 'S96 PDRS CKCRT EE.' For (5), crew can feel and ground can detect loss of 10V pole
6	Steps b, d, and j	(1) EE Man Contr sw derig contact short, (2) EE Man Zener diode stack, (3) D&C panel 28V filter	All EE Man functions lost. Direct drive lost and Safing tb – bp for (3)	Auto capture/release. Backup Release. D&C IFM Kit	EE Man Derig remains for (1) by using EE Mode sw to initiate. For (2), Man Open may be available with Close cmd and Man Derig may be available with Rigid cmd
7	Steps b and d	(1) RHC Cap/Rel sw Manual pole open, (2) EE Mode sw Manual Cap/Rel contact open	EE Man Close and Open lost	Auto capture/release. D&C IFM Kit	
8	Steps b and j	EE Man Zener diode	EE Man Close and Man Rigid lost	Auto Capture. D&C IFM Kit	Closing snares in Man will drive snares Open or stall motor. Rigidizing in Man will Extend carriage or stall motor
9	Step b	RHC Cap/Rel sw Manual Cap contact open	EE Manual Close lost	Auto capture. D&C IFM Kit	

## RMS EE C/O FAILURE MATRIX

#	Problem	Failure	Impacts	Workaround	Notes
10	Steps d, g, and j	EEEU logic ckt	Auto/Man Open and Rigid lost	None. EE non-functional	
11	Steps d, g, and k	EEEU logic ckt	Auto/Man Open and Derigid lost	None. One grapple remains with carriage partially retracted	Commanding open will close the snares or stall motor, and commanding derigidize will rigidize or stall motor. PL alignment is critical due to smaller capture envelope
12	Steps d, g, k, and l	EEEU logic ckt	Auto/Man Open and Derigid lost	None. One grapple remains with carriage partially retracted	PL alignment is critical due to smaller capture envelope
13	Steps d, g, and o	RHC Cap/Rel sw mechanical hangup	Auto/Man Open and Auto Derig lost	Manual Derigidize. Backup Release. D&C IFM Kit	Crew should be able to feel that sw does not go into detent
14	Steps d and g	EEEU logic ckt	EE Auto and Man Open lost	Backup Release	May receive 'S96 PDRS CKCRT EE'
15	Steps d and k	EE Man Zener diode	EE Man Open and Derig lost	Auto release. D&C IFM Kit	Opening snares in Man will Close snares or stall motor. Derigidizing in Man will Rigidize carriage or stall motor
16	Step d	RHC Cap/Rel sw Manual Rel contact open	EE Manual Open lost	Auto/Backup release. D&C IFM Kit	
17	Steps e, g, and o	(1) RHC Cap/Rel sw Auto pole open, (2) EE Mode sw 10V pole or contact open, (3) MCIU auto logic, (4) D&C-to-MCIU word comm	All EE Auto functions lost. No limping in EE Man mode for (2) pole, or (4). For (1) and (4), RELEASE It cannot be extinguished using Capture switch. For (4), DERIGIDIZE It cannot be extinguished using MAN CONTR sw	Manual EE ops. Backup release. MCIU changeout for (3). Cycle I/O or RMS Select sw to extinguish RELEASE or DERIGIDIZE Its and to reset software checks	For (1), manual payload release will be accompanied by 'PDRS REL.' For (4), manual payload release will be accompanied by 'PDRS REL' and 'PDRS DERIG.' For (1), (2), or (4) ground can detect. For (3), 'S96 PDRS CKCRT EE'. For (4), step k accompanied by 'PDRS DERIG'
18	Steps e and g	EE Mode sw Auto Cap/Rel contact open	EE Auto Close and Open lost	Manual close/open. Backup release	
19	Step e	(1) RHC Cap/Rel sw Auto Cap contact open, (2) Close MSW failed to CLOSE, (3) MCIU auto logic	EE Auto Close lost. Auto Rigidize lost for (1) and possibly (3) No limping in EE MAN mode during Close for (1)	Manual close/rigidize. MCIU changeout for (3)	For (2) or (3), 'S96 PDRS CKCRT EE.' For (2), Derig MSW could also be affected if failure is in WR SPA. Ref rows #21 or #34 for impacts to Derig MSW
20	Steps g and o	(1) RHC Cap/Rel sw Auto Rel contact open, (2) MCIU auto logic	EE Auto Open and Derig lost	Manual open/derigidize. Backup release. MCIU changeout for (2)	For (1), manual payload release will be accompanied by 'PDRS REL.' For (2), 'S96 PDRS CKCRT EE'
21	Step g	(1) Open MSW failed OPEN, (2) Derig MSW failed to not DERIG, (3) MCIU auto logic	EE Auto Open lost. For (2), unable to clear Loaded Rate Limit Flag after PL Capture	Manual open. Backup release. For (2), to get unloaded rates after PL release, use SM94 PL ID 0. MCIU changeout for (3)	'S96 PDRS CKCRT EE.' For (1), Rigid MSW may also be affected if failure is in WY SPA. Ref row #35 for impacts to Rigid MSW
22	Step h	(1) Backup PL Release sw, (2) Backup Release clutch, (3) Backup drive mech failure	Backup PL release lost. One failure from loss of PL release capability	Auto/Man release	



## RMS EE C/O FAILURE MATRIX

#	Problem	Failure	Impacts	Workaround	Notes
23	Steps i and o	EE Mode sw Rig/Derig pole shorted to Man	EE Auto Rigid/Derigid lost. EE carriage will drive or stall as long as EE Man Contr sw is out of detent. Motor burnout could occur	Manual Rigid/Derigid	
24	Step i	EE Mode sw Man Rig/Derig contact short	Full EE functionality remains. EE carriage will drive or stall as long as EE Man Contr sw is out of detent. Motor burnout could occur	Use EE Auto modes to minimize cycles on EE Man Contr sw	
25	Step j	(1) EE Man Contr sw contact or pole, (2) EE Mode sw Rig/Derig contact or pole, (3) EEEU logic ckt, (4) K1 relay, (5) carriage mech	EE Man Rigid lost (unable to test Derig, Auto Rigid)	Auto rigidize remains for (1) or (2) contact. D&C IFM Kit for (1), (2), or (4). None for (3) or (5)	Need GF to test Auto Rigid and Derigid function. Safing tb bp for (4) if both poles
26	Steps k and l	EEU logic ckt	EE Auto and Man Derig lost	None. One grapple remains with carriage partially retracted	May receive 'S96 PDRS CKCRT EE.' PL alignment is critical due to smaller capture envelope
27	Steps k and n	EE Man Contr sw contact open	EE Man Derig lost	Auto release. D&C IFM kit	
28	Step o	(1) EE Mode sw Auto Rig/Derig contact open, (2) Extend MSW failed to EXTEND, (3) Open MSW failed to not OPEN, (4) MCIU auto logic	EE Auto Derig lost. Auto rigidize lost for (1) and possibly (4). For (3), motor will continue to drive until EE Mode sw OFF	Manual rig/derig. MCIU changeout for (4)	For (2) or (4), 'S96 PDRS CKCRT EE.' For (2), auto PL release lost if carriage retracted beyond Derig. Also, Capture MSW may also be affected if failure in WP SPA and may additionally receive 'PDRS REL.' For (3), only Derig-to-Extend lost. Also, Rigid MSW may also be affected if failure is in WY SPA. Ref row # 35 for impacts to Rigid MSW
29	Steps m, n, o, and p	(1) Carriage mechanical jam, (2) motor failure during motion	For (1) Auto/Man rigidize/derigidize lost. For (2) all EE functions lost	None. EE non-functional	
30	'PDRS DERIG' during Man Derigid	Man Contr sw 10V contact or pole	For pole failure, no limping during Man Rigidize and DERIGIDIZE It cannot be extinguished using MAN CONTR sw	EE Auto to prevent nuisance alarm and allow limping. Cycle I/O or RMS Select sw to extinguish DERIGIDIZE It and to reset software check	Ground can tell if pole failed
31	Capture MSW always indicating CAPTURE	Capture MSW logic circuit	CK CRT It when snares open. Auto Capture will continue and rigidize carriage without grapple fixture present. Loss of EE Release C/W. Inability to reset loaded rate limit flag	Use SM 94 PL ID 0 for unloaded rates	CK CRT It and 'S96 PDRS CKCRT EE' when snares Open
32	Close MSW always indicating 'not CLOSED'	Close MSW logic circuit	Loss of EE Auto rigidize function	EE Manual Rigidize. Terminate EE snare close function after 3 sec	
33	Extend MSW always indicating 'not EXTENDED'	Extend MSW logic circuit	Carriage will continue to drive (and stall) until EE mode sw OFF for EE Auto Release. Motor burnout possible	Time derigidize-to-extend function and terminate after 20 sec	

## RMS EE C/O FAILURE MATRIX

#	Problem	Failure	Impacts	Workaround	Notes
34	Derig MSW always indicating DERIGID	Derig MSW logic circuit	EE Auto PL Release will open snares from fully Rigid position	EE Man modes. Derigidize carriage in EE Man (5 sec) prior to performing Auto PL release	CK CRT It and 'S96 PDRS CKCRT EE' when carriage is Rigid
35	Rigid MSW always indicating 'not RIGID'	Rigid MSW logic circuit	Carriage will continue to drive (and stall) during auto capture until EE Mode sw OFF. Motor burnout possible. Loss of Loaded Rate Limit Flag. Uncommanded Derigidize Warning lost	Time rigidize function and terminate after 25 sec. SM 95 available to set loaded rates after capture	
36	Rigid MSW always indicating RIGID	Rigid MSW logic circuit	Auto Rigid lost. Uncommanded Derigidize Warning lost	EE Man modes. Time manual rigidize function and terminate after 25 sec. PL ID 0 available for unloaded rates after PL release	CK CRT It and 'S96 PDRS CKCRT EE' when carriage is Derigid or Extend
37	Snares Close w/o cmd in EE Mode Man	RHC Cap/Rel sw contact or pole short	All EE Man functions lost except Close. If contact short, Open also available while holding sw. Motor burnout can occur while EE Mode sw – Man	EE auto modes. Backup release. D&C IFM Kit	
38	Snares Open w/o cmd in EE Mode Man	RHC Cap/Rel sw contact or pole short	All EE Man functions lost except Open. Motor burnout can occur while EE Mode sw – Man	EE auto modes. D&C IFM Kit	
39	Carriage rigidizes w/o cmd in EE Mode Man	EE Man Contr sw contact or pole short	All EE Man functions lost except Rigid. If contact short, Derigid available while holding sw. Motor burnout can occur while EE Mode sw – Man	EE auto modes. Backup release. D&C IFM Kit	
40	Snares Close w/o cmd in EE Mode Auto	RHC Cap/Rel sw contact or pole short	EE Auto Release lost. Auto Capture available using EE Mode sw to initiate. Limping present while EE Mode sw in Man unless Rigid	EE Man modes. Backup release	Ground can detect if contact or pole short. Uncommanded Release warning unavailable
41	Snares Open and carriage derigidizes w/o cmd in EE Mode Auto	RHC Cap/Rel sw contact or pole short	For contact short, all EE Auto functions remain, but Auto Capture will reverse after completion. If pole short, loss of Auto Cap and limping during Man Close	EE Man modes	Ground can detect if contact or pole short



**PDRS OPS  
CHECKLIST**

**STS  
ALL**

Flight Cover (trim bottom to expose tabs)