

# Entry Checklist

## Mission Operations Directorate Flight Design and Dynamics Division Final July 23, 2024

National Aeronautics and  
Space Administration

Lyndon B. Johnson Space Center  
Houston, Texas



## OMS/RCS $\Delta V$

OMS% GAGE	OMS He Press *	OMS V	RCS V	RCS BURN MIN:SEC
50	3300	244	202	7:19
40	2900	190	158	5:42
38	2820	180	150	5:23
36	2740	169	141	5:04
34	2660	158	132	4:45
32	2580	147	123	4:26
30	2500	137	114	4:06
28	2420	126	105	3:47
26	2340	115	96	3:28
24	2260	104	87	3:09
22	2180	93	79	2:49
20	2100	83	70	2:30
18	2020	72	61	2:11
16	1940	61	51	1:51
14	1860	50	42	1:31
12	1780	39	33	1:12
10	1700	28	24	0:52
8	1620	17	15	0:32
6	1540	6	5	0:12
<b>5</b>	<b>1500</b>	<b>1</b>	<b>1</b>	<b>0:03</b>

\* He pressure not valid until 1 hr after last burn

V CAPABILITY	
ARCS V fps = 0.8 x [ L% + R% - AFT QTY 1 ]	
FRCS V fps =	0.8 x FRCS %
OMS V fps =	5.4 x OMS %

NOTE: Uses assumed vehicle weight of 245,158 lb

# DEORBIT MNVR PAD

OMS BOTH 1	<input type="text"/>	BURN ATT	<input type="text"/>	VTOT	<input type="text"/>
L 2	<input type="text"/>	R 24	<input type="text"/>	TGO	<input type="text"/>
R 3	<input type="text"/>	P 25	<input type="text"/>	VGO X	( <input type="text"/> ) <input type="text"/>
RCS SEL 4	<input type="text"/>	Y 26	<input type="text"/>	VGO Y	( <input type="text"/> ) <input type="text"/>
TV ROLL 5	<input type="text"/>	REI	<input type="text"/>	VGO Z	( <input type="text"/> ) <input type="text"/>
TRIM LOAD		TXX	<input type="text"/>	HA	<input type="text"/>
P 6	( <input type="text"/> ) <input type="text"/>			TGT	( <input type="text"/> ) <input type="text"/>
LY 7	( <input type="text"/> ) <input type="text"/>				
RY 8	( <input type="text"/> ) <input type="text"/>				
WT 9	<input type="text"/>				
TIG 10	<input type="text"/>				
TGT PEG 4					
C1 14					
C2 15	( <input type="text"/> ) <input type="text"/>				
HT 16					
BT 17					
PRPLT18	( <input type="text"/> ) <input type="text"/>				

**NOTES**

RCS I'CNCT:

L OMS → RCS

R OMS → RCS

NONE

# DEL PAD

<u>PRE-DEORBIT</u>																													
APU START: SINGLE APU START, ATTEMPT					APU(s)																								
APU START SEQUENCE					THEN																								
<u>DEORBIT</u>																													
BURN CUE CARD:																													
OMS TIG SLIP – NO EXEC > TIG +					<table border="1" style="display: inline-table; width: 100px; height: 20px;"> <tr><td></td><td>:</td><td></td><td></td></tr> </table>						:																		
	:																												
RCS DOWNMODING					<table border="1" style="display: inline-table; width: 100px; height: 20px;"> <tr><td></td><td>:</td><td></td><td></td></tr> </table>						:																		
	:																												
STOP/CONTINUE CUES: L OMS FAIL HP																													
R OMS FAIL HP																													
OMS ENG FAIL XFEED QTY CUE					%L		<table border="1" style="display: inline-table; width: 40px; height: 20px;"> <tr><td></td><td></td></tr> </table>				%R																		
ENG FAIL HP																													
SAFE HP																													
TOT AFT QTY 1 (%)																													
TOT AFT QTY 2 (%)																													
CAPTURE HP		<table border="1" style="display: inline-table; width: 40px; height: 20px;"> <tr><td></td><td></td></tr> </table>				PB/FLIP HP		<table border="1" style="display: inline-table; width: 40px; height: 20px;"> <tr><td></td><td></td></tr> </table>				AFT HP		<table border="1" style="display: inline-table; width: 40px; height: 20px;"> <tr><td></td><td></td></tr> </table>				B/U SITE		<table border="1" style="display: inline-table; width: 40px; height: 20px;"> <tr><td></td><td></td></tr> </table>									
FRCS: DUMP TO % (USE TIME AS CUE)										OX		FU																	
<u>ENTRY/LANDING</u>																													
EI - 5 MM303 INRTL ATT					R		<table border="1" style="display: inline-table; width: 40px; height: 20px;"> <tr><td></td><td></td><td></td><td></td></tr> </table>						P		<table border="1" style="display: inline-table; width: 40px; height: 20px;"> <tr><td></td><td></td><td></td><td></td></tr> </table>						Y								
MM304 PREBANK (ENT MNVR Cue Card)										L		R																	
ALTM SET																													
CLG INIT										<table border="1" style="display: inline-table; width: 40px; height: 20px;"> <tr><td></td><td></td><td>:</td><td></td></tr> </table>				:															
		:																											
EXPECTED AIL TRIM										L		R																	
VREL 1ST REVERSAL																													
XCG AT TD																													
LAND SITE		<table border="1" style="display: inline-table; width: 40px; height: 20px;"> <tr><td></td><td></td></tr> </table>				RWY		<table border="1" style="display: inline-table; width: 80px; height: 20px;"> <tr><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table>								50K		/											
L		OVHD		<table border="1" style="display: inline-table; width: 40px; height: 20px;"> <tr><td></td><td></td></tr> </table>				deg		<table border="1" style="display: inline-table; width: 40px; height: 20px;"> <tr><td></td><td></td></tr> </table>				MLS		38K		/											
R		STRT		<table border="1" style="display: inline-table; width: 40px; height: 20px;"> <tr><td></td><td></td></tr> </table>				TAC		28K		/																	
T MACH < 1 TO HAC				MAX Nz		<table border="1" style="display: inline-table; width: 40px; height: 20px;"> <tr><td></td><td></td></tr> </table>				Nz LIMIT		<table border="1" style="display: inline-table; width: 40px; height: 20px;"> <tr><td></td><td></td></tr> </table>				20K		/											
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		:																											
T HAC INIT to H = 20K										7K		/																	
<table border="1" style="display: inline-table; width: 40px; height: 20px;"> <tr><td></td><td></td><td>:</td><td></td></tr> </table>												:		<table border="1" style="display: inline-table; width: 40px; height: 20px;"> <tr><td></td><td></td></tr> </table>				<table border="1" style="display: inline-table; width: 40px; height: 20px;"> <tr><td></td><td></td></tr> </table>				3K		/					
		:																											
AIMPOINT		SPEEDBRAKE		%		@ 3K		1K		/																			
NOM		NOM		<table border="1" style="display: inline-table; width: 40px; height: 20px;"> <tr><td></td><td></td></tr> </table>						SURFACE		/																	
CLOSE-IN		S.F.																											
REMARKS:																													

## DEORBIT BURN

**LANDING SITE TABLE**  
**(50° to 63.5° INCLINATION)**

S I T E	LOCATION	RWY	TACANS		MLS CH	LG	+ OVR RUN
				ITEM 5			
1	KSC	KSC 15 KSC 33	TTS 59Y	COF 97	8 6	15000 15000	1000 1000
2	BEN GUERIR	BEN 36 BEN 18	MAK 80 ■	CBA 116 ■	- -	13720 13220	0 1000
3	MORON AB	MRN 20 MRN 02	MRN 100	AOG 23	◆6 -	11730 11730	1000 1000
4	ZARAGOZA	ZZA 30L ZZA 12R	ZZA 64	ZAR 77 ■	◆6 -	12200 12200	1000 1010
5	MYRTLE BEACH	MYR 36 MYR 18	ILM 117	FLO 99	- -	9500 9500	1000 1000
6	WILMINGTON	ILM 06 ILM 24	ILM 117	DIW 107 ■	- -	7500 7500	0 0
7	CHERRY POINT	NKT 32L NKT 23R	EWN 83 ■	NCA 101	- -	7110 7100	800 880
8	OCEANA NAS	NTU 32R NTU 23L	NGU 86Y	ORF 116	- -	7500 11500	0 0
9	WALLOPS	WAL 28 WAL 04	SBY 49	SWL 71	- -	7510 8750	0 0
10	DOVER AFB	DOV 32 DOV 19	SIE 95	CYN 81	- -	12400 9100	0 0
11	ATLANTIC CITY	ACY 31 ACY 13	CYN 81	SIE 95	- -	9500 9500	0 0
12	BEN GUERIR	BEN 36 BEN 18	MAK 80 ■	CBA 116 ■	- -	13720 13220	0 1000
13	*MORON AB	MRN 20 MRN 02	MRN 100	AOG 23	◆6 -	11730 11730	1000 1000
14	*ZARAGOZA	ZZA 30L ZZA 12R	ZZA 64	ZAR 77 ■	◆6 -	12200 12200	1000 1010
15	GABRESKI	FOK 06 FOK 24	HTO 83	GON 45Y■	- -	8500 8500	1000 1000

◆ Available for TAL Only  
\* LO XRNG TAL Site

■ DME  
Length after displaced threshold

**LANDING SITE TABLE**  
(50° to 63.5° INCLINATION)

S I T E	LOCATION	RWY	TACANS		MLS CH	LG	+ OVR RUN
				ITEM 5			
16	CAPE COD CGAS	FMH 32 FMH 23	PVD 103	ACK 109 ■	- -	9000 7500	0 0
17	PEASE INT'L	PSM 34 PSM 16	ENE 118	BOS 74 ■	- -	10020 10020	0 0
18	HALIFAX INT'L	YHZ 23 YHZ 32	UAW 38	YHZ 98 ■	- -	8800 7700	0 0
19	STEPHENVILLE	YJT 09 YJT 27	YJT 78	YDF 80 ■	- -	9500 9500	0 0
20	ST JOHNS INT'L	YYT 29 YYT 11	UYT 23	YYT 82 ■	- -	8500 8500	0 0
21	GANDER INT'L	YQX 21 YQX 31	YQX 74	IQX 32 ■	- -	9700 8900	0 0
22	GOOSE BAY	YYR 26 YYR 34	UYR 40	YYR 120 ■	- -	10550 9080	0 0
23	LAJES AB	LAJ 15 LAJ 33	TRM 109	LAJ 45	- -	10870 10870	970 990
24	BEJA AB	BEJ 01L BEJ 19R	MOJ 37	BEJ 105	- -	10820 10820	0 900
25	KEFLAVIK INT'L	IKF 20 IKF 29	KEF 57	HL 44 ■	- -	9520 9560	0 0
26	SHANNON	INN 06 INN 24	SHA 80 ■	CRK 93 ■	- -	9540 9540	0 0
27	FAIRFORD	FFA 27 FFA 09	FFA 81	BZN 56	- -	9490 9490	990 970
28	KOLN-BONN	KBO 14L KBO 32R	GIX 18	DOR 23Y ■	- -	12020 12020	0 0
29	ISTRES AB	FMI 33 FMI 15	◆FMI 16	NIM 53	◆6 -	11300 12300	3960 0
30	ESSENBOGA	ESN 03R ESN 21L	BAG 76 ■	BUK 90 ■	- -	11800 11800	0 0

◆ Available for TAL Only

■ DME

Length after displaced threshold

**LANDING SITE TABLE**  
**(50° to 63.5° INCLINATION)**

S I T E	LOCATION	RWY	TACANS		MLS CH	LG	+ OVR RUN
				ITEM 5			
31	KING KHALED	KKI 15R KKI 33L	RIY 92	KIA 80	- -	13300 13300	0 0
32	DIEGO GARCIA	JDG 31 JDG 13	NKW 57	NKW 57	- -	12000 12000	950 950
33	AMBERLEY TINDAL RAAF	AMB 15 PTN 14	AMB 94 -	- TDL 70	- -	9500 8500	0 0
34	YOKOTA AB	JTY 36 JIY 18	SHT 19	NJA 98	- -	11000 11000	1000 1000
35	ANDERSEN AFB	GUA 06L GUA 24R	UAM 54	UNZ 105	- -	10560 10560	1050 1000
36	WAKE ISLAND	WAK 28 WAK 10	AWK 82	AWK 82	- -	9340 9340	0 0
37	HONOLULU	HNL 08R HNL 26L	HNL 95	NGF 93	- -	11500 11500	0 0
38	ELMENDORF	EDF 24 EDF 06	EDF 81	BGQ 72	- -	9500 9500	0 0
39	HAO ATOLL	HAO 12 HAO 30	HAO 85 ■	HAO 85 ■	- -	10690 10690	0 0
40	EDW TEMP	EDT 22R EDT 04L	EDW 111	LHS 21	8 6	12000 12000	1000 1000
41	ASCENSION	HAW 13 HAW 31	ASI 59	ASI 59	- -	9520 9520	0 0
42	NORTHROP	NOR 17 NOR 23	SNG 121Y	HMN 92	6 6	15000 15000	Lkbd Lkbd
43	NORTHROP	NOR 05 NOR 35	SNG 121Y	HMN 92	- -	15000 15000	Lkbd Lkbd
44	EDWARDS AFB	EDW 15 EDW 18L	EDW 111	LHS 21	- -	16300 15000	Lkbd Lkbd
45	EDWARDS AFB	EDW 22 EDW 04	EDW 111	LHS 21	8/† 6	15020 14020	0 1800

† MSBLS Jr. Ch 8 - Requires Uplink

■ DME  
Length after displaced threshold



TIG-45      CRT1      GNC OPS 301 PRO (DEORB MNVR COAST)

CRT3      GNC BFS SPEC 50 PRO (HORIZ SIT)

√LAND SITE per DEL PAD

CRT1      LOAD – ITEM 22 EXEC

TIMER – ITEM 23 EXEC

CRT1,3      √PASS & BFS TGTs per MNVR PAD:

BURN ATT

VTOT

TGO

HA HP

APU PRE START (GLS √ @ T-5:25)

R2	√BLR N2 SPLY (three)	– ON
	√BL RPWR (three)	– ON
	√BLR CNTLR/HTR (three)	– B
	√APU FU TK VLV (three)	– CL
	√APU OPER (three)	– OFF
	√HYD MN PUMP PRESS (three) – LO	
	APU CNTLR PWR (three)	– ON
	APU FU TK VLV (three)	– OP
	√APU/HYD RDY tb (three)	– gray
	APU FU TK VLV (three)	– CL

## HORIZ SIT CONFIG

		<u>PASS ITEM</u>		<u>BFS ITEM</u>
PTI	INH	1		
LAND SITE (DEL PAD)		41		41
RWY (DEL PAD)		3		3
		4		4
TAEM TGT				
G&N	OVHD	6	blank	
HSI	blank		blank	
XEP	NEP	7	NEP	7
AIM (DEL PAD)	NOM	8	NOM	8
	(or CLSE)		(or CLSE)	
SPDBK	NOM	39		
TAC	INH	20	INH	20
GPS	INH	43	INH	43
DRAG H	AUT	22	AUT	22
ADTA H	INH	26	INH	26
ADTA TO G&C	INH	29	AUT	28
DES any failed TACANs				
TAC	DELTA	35		
AIF_G	INH	48		

## OMS BURN PREP

CRT1,2,3      GNC OPS 301 PRO (DEORB MNVR COAST)

CRT2      OMS ENG TRIMS

2 ENG BURN:

√TRIM LOAD per MNVR PAD or:

L,R – ITEM 6 +0.0 -5.7 +5.7 EXEC

1 ENG BURN:

√TRIM LOAD per MNVR PAD or:

P – ITEM 6 +0.0 EXEC

Good eng Y:

LY – ITEM 7 +5.2 EXEC

RY – ITEM 8 -5.2 EXEC

CRT1,2,3      GNC OPS 302 PRO (DEORB MNVR EXEC)

If NO-GO for DEORBIT BURN:

R2              HYD MN PUMP PRESS (three)              – NORM

CRT1              GNC OPS 301 PRO (DEORB MNVR COAST)

TIG-20              MANVR TO DEORBIT BURN ATT

C3              √DAP: AUTO

F6/F8              √ADI ATT (two)              – INRTL

                    √ERR (two)              – MED

                    √RATE (two)              – MED

CRT1              MNVR – ITEM 27 EXEC (\*)  
                    (√ADI ATT with CRT BURN ATT)

CRT3              GNC SYS SUMM2

TIG-5

PERFORM GMBL CK

CRT1

GMBL CK – ITEM 34 EXEC

SINGLE APU START

R2

APU FU TK VLV

– OP

OPER

– START/RUN

MDU

√HYD PRESS ind

– LO green

√BURN ATT  $\pm 5^\circ$

Go to **DEORBIT BURN** (Cue Card)

## DEORBIT BURN CUECARDS

## DEORBIT BURN (2 ENG)

CRT	√MM302	
	√OMS BOTH (ITEM 1)	
	Enter TGO + 5 sec	
	TRIM per MNVR PAD or P +0.0, LY -5.7, RY +5.7t	
C3	DAP – AUTO(PASS)/DISC	
F6/F8	ADI – LVLH(REF)/HI/MED	
	FLT CNTLR PWR (two)	– ON
TIG -02:00		
C3	OMS ENG (two)	– ARM/PRESS
TIG -00:15	EXEC (NO EXEC > TIG + ____ / ____ : ____)	
	If OMS AFT QTY < 11%, THC +X to OMS IGN + 1	
sec		
TIG		
00:00	Start watch ( Pc, VTOT, ENG VLVs)	
	If no OMS ignition: APUs – SHUT DN	

RCS COMPLETION (If reqrd)

THC +X to TGT HP or TOT AFT QTY 1 %

FRCS COMPLETION (if applicable):

MNVR to -X Att (pitch up at 3°/sec to VGOz = +1/4)

THC -X to TGT HP or FRCS depletion (JETS FAIL

OFF)

CUTOFF

+00 :02

- |       |   |       |
|-------|---|-------|
| C3    | OMS ENG(s)  | – OFF |
|       | Trim X,Z residuals < 2 fps (< 0.5 fps if shallow) |       |
| F6/F8 | FLT CNTLR PWR (two)                               | – OFF |
| C3    | √DAP: AUTO  |       |

## DEORBIT BURN (1 ENG)

CRT     √MM302  
         √OMS L or R (ITEM 2/3)  
         Enter TGO + 10 sec  
         √TRIM per MNVR PAD or P +0.0, LY +5.2, RY -5.2  
C3       √DAP – AUTO(PASS)/DISC  
F6/F8     ADI – LVLH(REF)/HI/MED  
           FLT CNTLR PWR (two)                      – ON  
TIG-00:02     Good OMS ENG – ARM/PRESS : )  
- 00:15       EXEC (NO EXEC > TIG + \_\_\_\_ / \_\_\_\_ : \_\_\_\_)  
  
              If OMS AFT QTY < 11%, THC +X to OMS IGN + 1  
sec  
TIG  
00:00       Start watch (√Pc, VTOT, ENG VLVs)  
              \* If no OMS ignition: APUs – SHUT DN \*



RCS COMPLETION (If reqrd)

THC +X to TGT HP or TOT AFT QTY 1 %

FRCS COMPLETION (if applicable):

MNVR to -X Att (pitch up at 3°/sec to VGOz = +1/4

THC -X to TGT HP or FRCS depletion (JETS FAIL

OFF)

CUTOFF

+00 :02

C3                      OMS ENG                                      – OFF

Trim X,Z residuals < 2 fps (< 0.5 fps if shallow)

F6/F8                      FLT CNTLR PWR (two)                                      – OFF

C3                      √DAP: AUTO

## DEORBIT BURN (RCS)

√MM302

√RCS SEL (ITEM 4)

C3      L,R OMS He PRESS/VAP ISOL A (two)      – OP

Wait 2 sec

L,R OMS He PRESS/VAP ISOL B (two)      – OP

√DAP – INRTL/DISC

F6/F8      ADI – LVLH(REF)/MED/MED  
FLT CNTLR PWR (two)      – ON

TIG      THC +X to TGT HP  
Maintain PITCH ATT ERR  $\pm 3$   
CUTOFF: VGOx = 0, release THC

If no OMS IGNITION at TIG:

C3	OMS ENG (two)	– OFF
R2	√APU – SHUT DN	

CRT	GNC OPS 301 PRO (DEORB MNVR COAST)
-----	------------------------------------

F6/F8	FLT CNTLR PWR (two)	– OFF
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C3	√DAP: AUTO
----	------------

If burn terminated with HP > SAFE HP:

C3	√OMS ENG (two)	– OFF
----	----------------	-------

R2	√APU – SHUT DN
----	----------------

CRT	GNC OPS 301 PRO (DEORB MNVR COAST)
-----	------------------------------------

## UNDERBURN

Determine HP (CUR HP – TGT HP)

Record prebank on ENTRY MANEUVERS Cue Card

### **PREBANK TABLE EDW (HA = 201 NM)**

<b>EDW</b>										
$\Delta$ HP	0	3	6	9	12	REDES.		13	(14)	REDES.
PREBANK	0	70	100	115	135	NOR ELS		150	170	YYR
<b>NOR</b>								IF NOR NOGO		
<b>G50</b> ITEM 41 +4 2. $\sqrt$ RWY 17 SET TACAN tw (three) 121Y										
$\Delta$ HP		10	11	12	13	15	17	(18)	REDES.	
PREBANK		105	105	110	120	135	165	180	YYR	
<b>YYR</b>										
<b>G50</b> ITEM 41 +2 2. $\sqrt$ RWY 26 SET TACAN tw (three) 040X										
$\Delta$ HP					15	19	22	24	(26)	28
PREBANK					65	90	105	125	145	180

### **PREBANK TABLE KSC (HA = 201 NM)**

KSC										
ΔHP	0	2	5	7	9	12	14	(15)	REDES. YQX	
PREBANK	0	50	90	105	110	130	155	175		
YQX										
G50 ITEM 41 +2 1. √RWY 21 SET TACAN tw (three) 074X										
ΔHP							16	22	(25)	RED.
PREBANK							95	135	170	INN
INN										
G50 ITEM 41 +2 6. √RWY 06 SET TACAN tw (three) 080X										
ΔHP								26	28	
PREBANK								135	180	

CRT1,2      GNC OPS 303 PRO (DEORB MNVR EXEC)

CRT3          GNC SYS SUMM 2

CRT1          Enter INRTL EI-5 MM303 ATT from DEL PAD

Mnvr to EI-5 ATT – ITEM 27 EXEC (\*)

R – ITEM 24 + \_\_\_\_\_

P – ITEM 25 + \_\_\_\_\_

Y – ITEM 26 + \_\_\_\_\_

If UNDERBURN or no DEL PAD, manually mnvr to

LVLH R = 001  
Y = 358  
P = per table →

TIME to EI (min)	LVLH PITCH (deg)
20	339
	343
	347
	351
	355
15	359
	3
	7
	11
	15
10	19
	23
	27
	31
	35
5	39

### OMS GMBL PWRDN

CRT1          LEFT – ITEM 32 EXEC

RIGHT – ITEM 33 EXEC

## ENTRY SW CHECK

CRTX      GNC SPEC 51 PRO (OVERRIDE)  
            VENT DR CL – ITEM 44 EXEC

C3	SRB SEP	– AUTO
	ET SEP	– AUTO
F6/F8	ADI ERR	– MED
	RATE	– MED
O8	RADAR ALTM (two)	– ON

### EI-13      REMAINING APUs START

R2	APU FU TK VLV (two)	– OP
	√APU/HYD RDY tb (two)	– gray
	APU OPER (two)	– START/RUN
MDU	√HYD PRESS ind (two)	– LO green
R2	√APU/HYD RDY tb (two)	– bp

If two APUs operating: CONDITIONING

Delay following until EI-6:

R2	HYD MN PUMP PRESS (two)	– NORM
	√PRESS ind (two)	– HI green

If only one APU operating:

R2            **APU AUTO SHTDN (one)**            – INH

Delay MM304 trans until EI-2

Immediately prior to MM304 trans:

R2            HYD MN PUMP PRESS (one)            – NORM

MDU          √PRESS ind (one) – HI green

MDU          HYD MN PUMP PRESS (three)            – NORM

√PRESS ind (three) – HI green

F6,F8        FLT CNTLR PWR (two)            – ON

EI-6            Go to ENTRY MANEUVERS (Cue Card)

## ENTRY MANUEVERS

FLIGHT CONDITIONS	MANEUVER
	<p>EI-5 <math>\sqrt{\text{LVLH ATT}}</math>  GNC, OPS 304 PRO</p> <div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;"> <p>If PREBANK, R/Y – CSS  Roll at 1°/sec to  <u>1 8 0</u> → if HP ≥ 46 (not AOA), else  <u>---</u> → (from <u>Prebank Table</u>)  Maintain PREBANK ±5°</p> </div> <p>(AOA) SPI When SB position – 0%:  <math>\sqrt{\text{HYD MN PUMP PRESS (three) – LO}}</math></p>
qbar = 1	(AOA) HYD MN PUMP PRESS (three) – NORM
'Guidance Box' @ qbar ~ 8 or D ~ 3	<p>CLOSED LOOP GUIDANCE ____:____:____  If PREBANK: P,R/Y – AUTO</p> <p>Begin ALL trim monitoring</p>
D = 11	$\sqrt{\text{DRAG H}}$
Az = 10.5°	FIRST ROLL REVERSAL
V = 19K	$\sqrt{\text{HYD MPS/TV C ISOL VLV SYS (three) – CL}}$
V = 15K	$\sqrt{\text{NAVAIDS (I/O RESET if reqd)}}$
V = 12K	<p><b>RAD BYP VLV MODE (two) – AUTO</b>  <b>CNTRLR LOOP (two) – AUTO B(A)</b></p>
V = 10K	$\sqrt{\text{SPDBK to 81\%}}$



FLIGHT CONDITIONS	MANEUVER
V = 5K	ADTA PROBES – DEPLOY ( HEAT)
M = 2.7	√APUs HUD PWR (two) – ON
M = 2.0	Ensure ADTA to G&C else √Theta limits
M < 1.0	√R FLT CNTLR – ON P,R/Y – CSS as reqd √SPDBK CMD vs POS
M = 0.7	√LND GEAR EXTD ISO VLV – OP
h = 15K	√MLS
h = 10K	√A/L (Tabs)
h = 2K	LDG GEAR ARM pb – push (ARM lt on)
h = 300	LDG GEAR DN pb – push (DN lt on)
MAIN GEAR TD	√SPDBK – 100%
V = 195 KEAS	DRAG CHUTE ARM, DPY pb (two) – push (simo) (All lts on)
V = 185 KEAS	DEROTATE
NOSE GEAR TD	SRB SEP – MAN/AUTO and depress pb √HYD BK ISOL VLV (three) – OP
V < 120 KGS or 5K' remaining	BRAKE as required (8-10 fps <sup>2</sup> , -0.25 to -0.3G)
If 5K' remaining and V > 140 KGS – MAX BRAKING	
V = 60 KGS	DRAG CHUTE JETT pb – push (JETT1,JETT2 lt on)
V = 40 KGS	BRAKE < 6 fps <sup>2</sup> (-0.2G) (Antiskid cutout)
WHEEL STOP	Go to ENT C/L, <u>POST LANDING PROCEDURES</u>

## DRAG CHUTE DEPLOY

MCC Call	Flight Condition
Early	Main Gear TD
NOMINAL	195 KEAS
Late	Post-Nose Gear TD Xwind DTO
Emergency Only	No Deploy Except CDR call
NO DEPLOY prior to MGTD >230 KEAS < 80 KGS Xwind > 15 kts	

## ENTRY ALPHA

VR	$\alpha$	ref	R	H	Href	Rref
25	HI	40	LO 4404	400		
24	HI	40	LO 2596	248	-47	L79
23	43	40	37 2134	240	-64	69
22	43	40	37 1782	233	-84	63
21	43	40	37 1509	227	-106	60
20	43	40	37 1288	222	-124	R59
19	43	40	37 1114	214	-146	60
18	43	40	37 976	207	-169	62
17	43	40	37 862	200	-188	63
16	43	40	37 764	193	-201	65

## KSC 15

MAX L/D	
M	$\alpha$
3	17
2	15
1	12

(133 OCF CY)

HOOK  
VELCRO

ASC-14b/133/A,E/A

HOOK  
VELCRO

HOOK  
VELCRO

15	43	40	37	686	187	-118	64
14	43	40	37	613	183	-127	63
13	43	40	37	546	180	-136	60
12	43	40	37	484	175	-152	59
11	42	39	36	429	171	-192	L56
10	41	38	35	376	166	-174	47
9	39	36	33	327	160	-206	43
8	37	34	31	278	153	-238	39
7	33	30	27	230	143	-267	38
6	30	27	24	185	132	-272	40
5	26	23	20	142	119	-273	41
4	23	20	18	107	106	-262	R38
3	19	16	15	74	91	-248	35
2.5		14		61	83	-251	
2		13		50	78	-257	
1.5		10		39	69	-311	
1		8		28	54	-261	

## POST LANDING

00:00

After orbiter stops:

Report, "WHEELS STOP"

### ET UNBILICAL DOOR OPENING

R2      ET UMB DR  
MODE – GPC/MAN  
R LAT      – REL (tb-bp, REL ~6 sec)  
R LAT      – OFF  
R DR      – OP (tb-bp)  
Wait 12 sec,  
R DR      – OFF (tb-bp)  
L LAT      – REL (tb-bp, REL ~6 sec)  
L LAT      – OFF  
L DR      – OP (tb-bp)  
Wait 12 sec,  
L DR      – OFF (tb-bp)  
MODE      – GPC

R1	√AC BUS SNSR (three)	– AUTO
F6,F8	FLT CNTLR PWR	– OFF
F3	HUD PWR (two)	– OFF

CRT1	GNC OPS 901 PRO (GPC MEMORY)
CRT2	GNC OPS 901 PRO (GPC MEMORY)
CRT3	GNC OPS 901 PRO (GPC MEMORY)

#### RCS, OMS SAFING

C3	√OMS ENG (two)	– OFF
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#### DEACT AIR DATA PROBE HTRS

C3	√AIR DATA PROBE (two)	– DPY
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#### APU/HYD SHUTDN

R2	BLR PWR (three)	– OFF
	BLR N2 SPLY (three)	– OFF
	APU OPER	
	(1,2,3; 5 sec interval)	– OFF (MA)
	APU FU TK VLV (three)	– CL
	√Shutdn (HYD PRESS < 200)	
	APU CNTLR PWR (three)	– OFF

## POST LANDING MPS RECONFIG

(After APU/HYD shutdn + 1 min)

R2	MPS He ISOL (six)	– CL
	MPS He I'CNCT L	– OUT OP
	MPS PNEU L ENG He XOVR	– CL

## GPC DEACT

O6	GPC MODE 1,2,3,4,5 (five)	– STBY (tb-bp)
	GPC MODE 1,2,3,4,5 (five)	– HALT

## MDU's PWRDN

F6	CDR1, 2	– OFF
F7	CRT1, 2, 3	– OFF
	MFD1, 2	– OFF
F8	PLT1, 2	– OFF

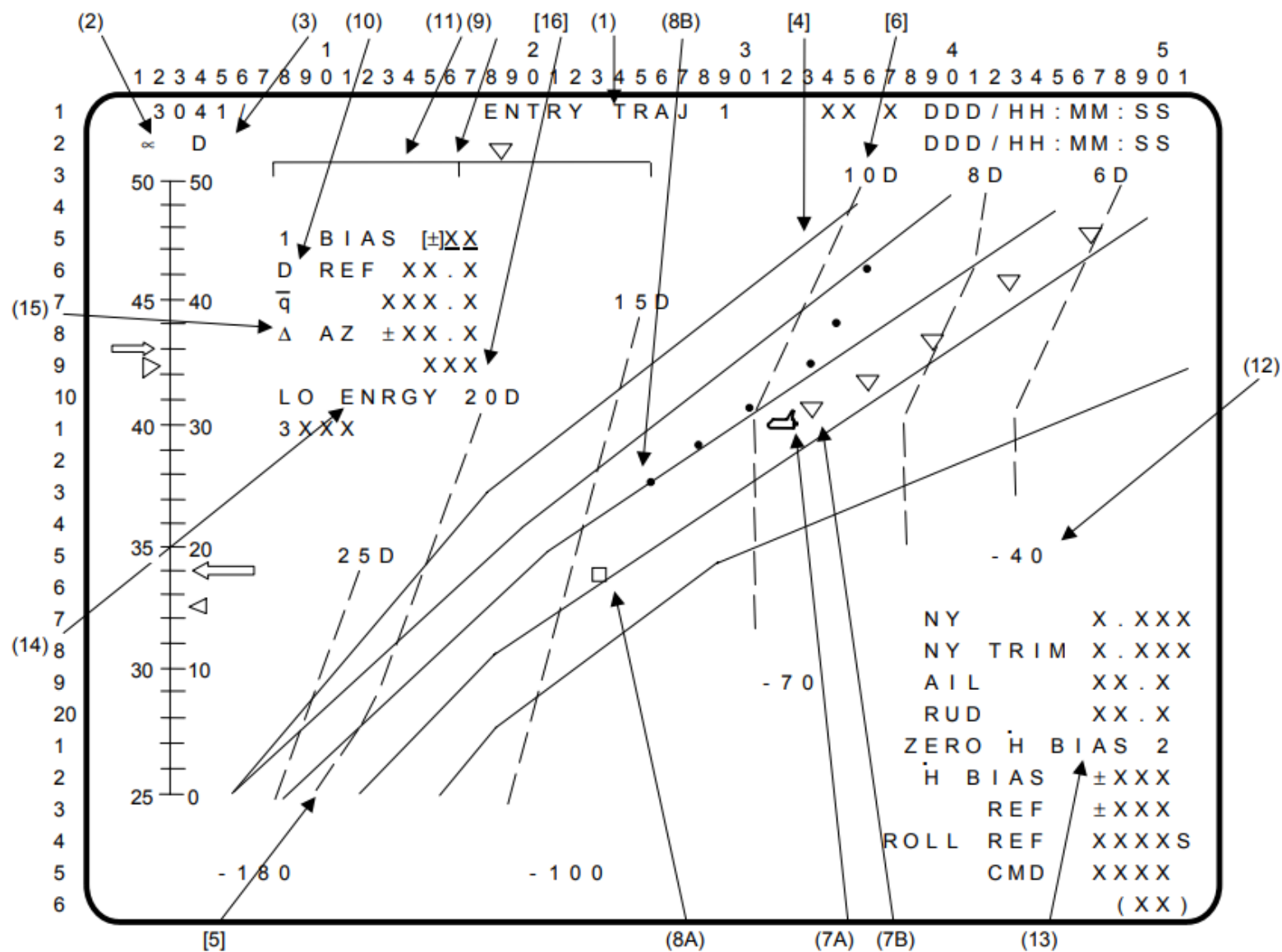
## VEHICLE PWRDN

R1	MN BUS TIE (three)	– OFF
	FC/MN BUS (three)	– OFF
	ESS BUS SOURCE FC (three)	– OFF

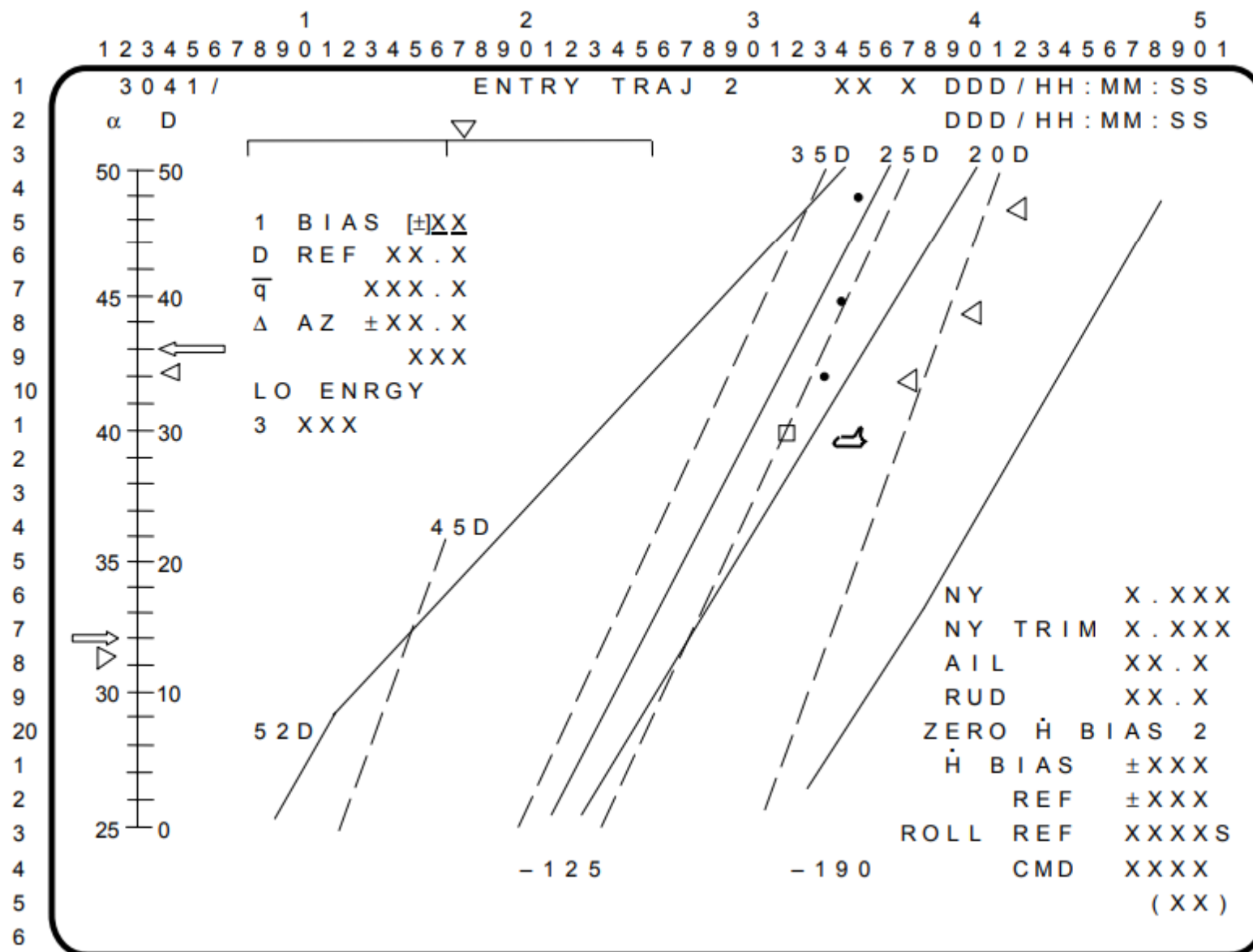
## GPC PWRDN

O6	GPC PWR 2,3,4 (three)	– OFF
C2	IDP/CRT 1,2,3 PWR	– OFF
R12	IDP/CRT 4 PWR	– OFF
O8	RADAR ALTM (two)	– OFF

# ENTRY TRAJ 1 DISPLAY

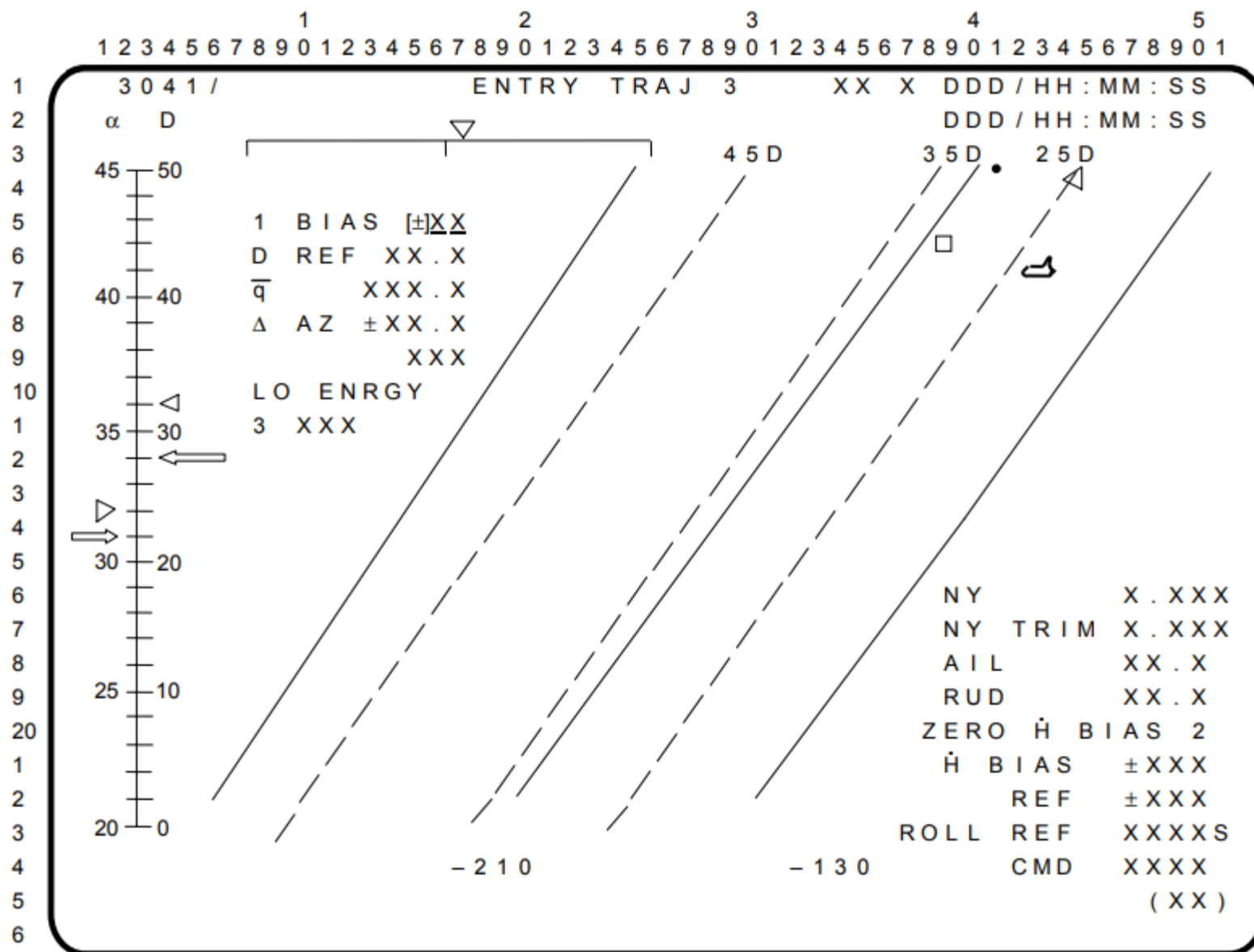


# ENTRY TRAJ 2 DISPLAY

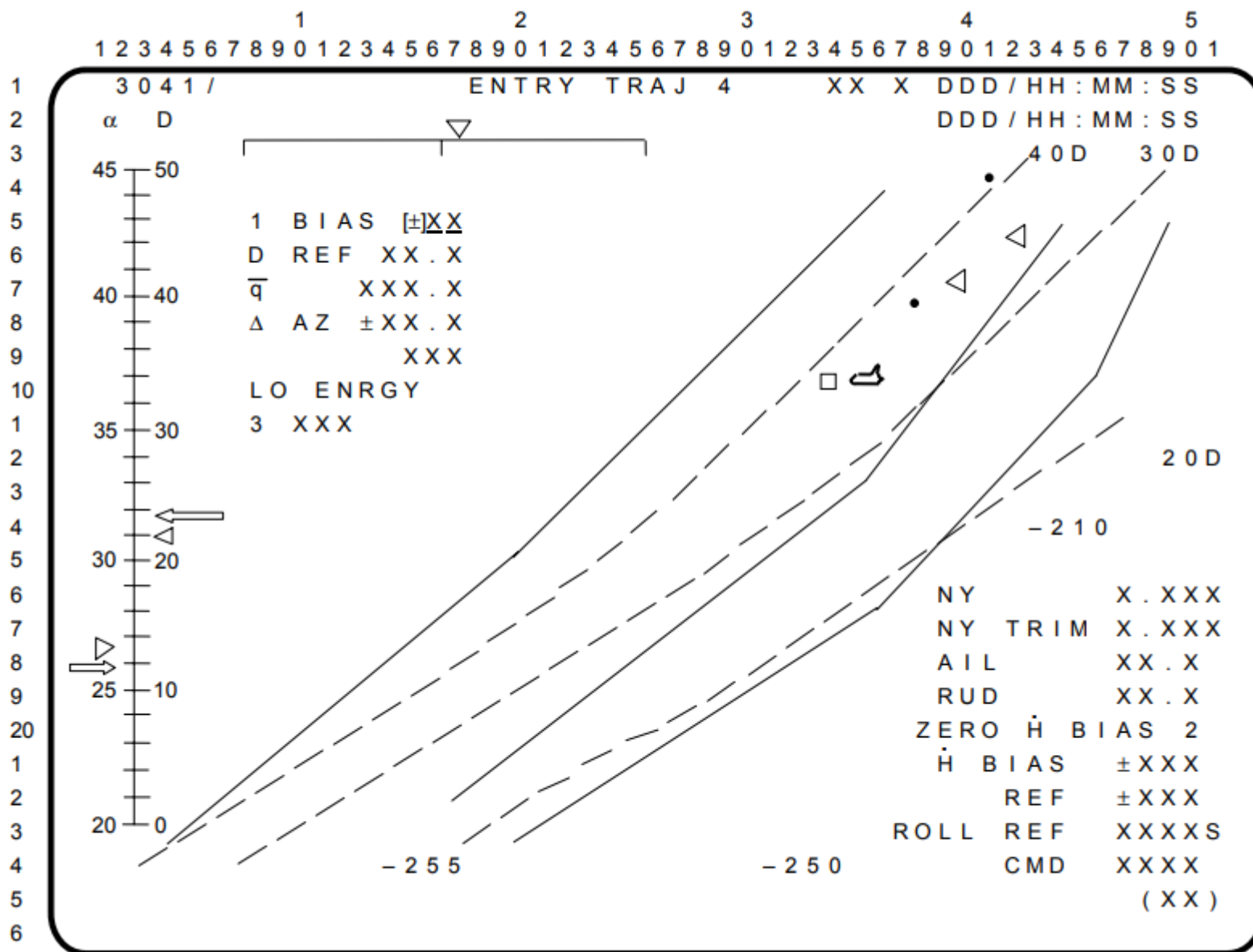




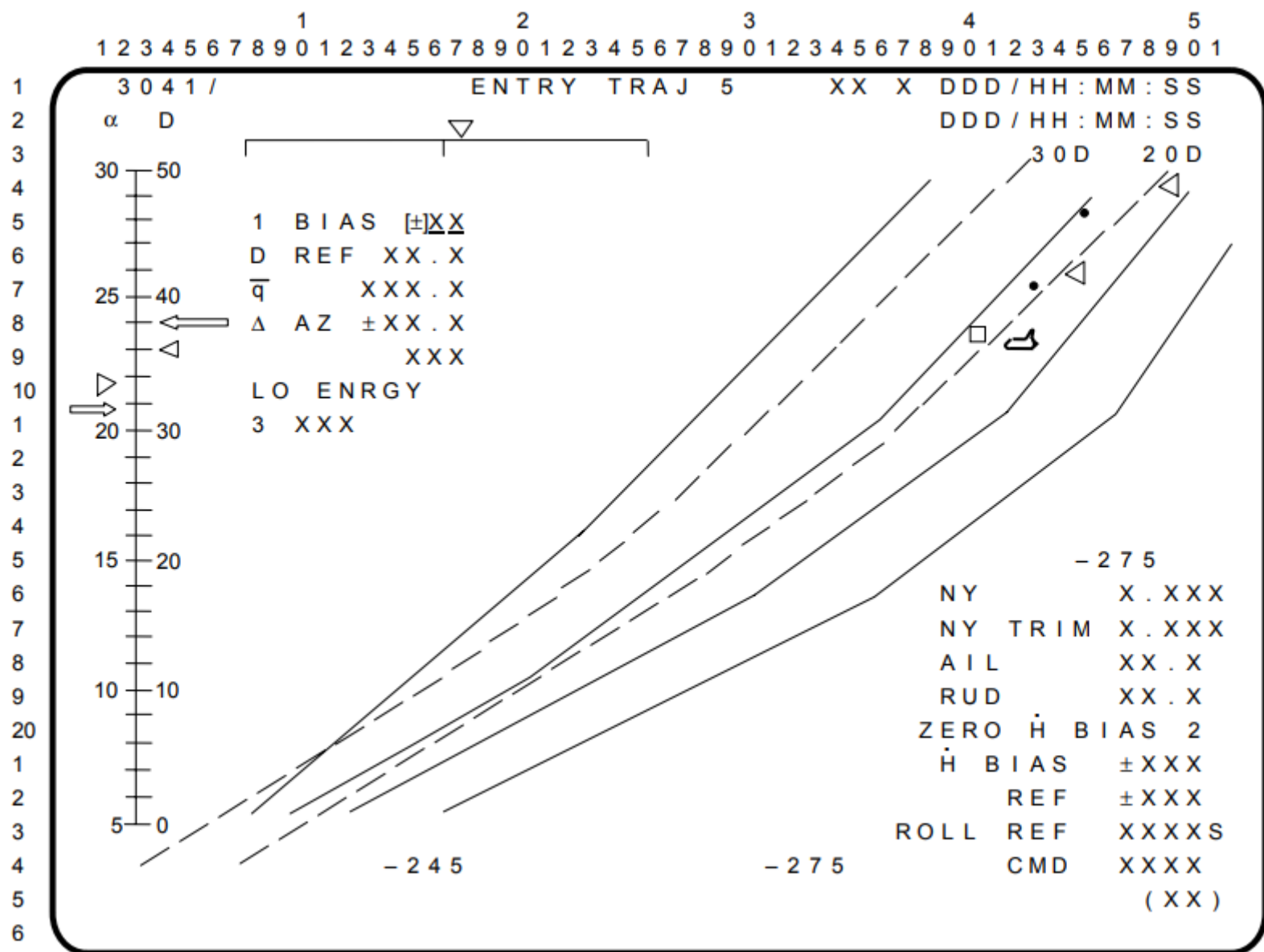
# ENTRY TRAJ 3 DISPLAY



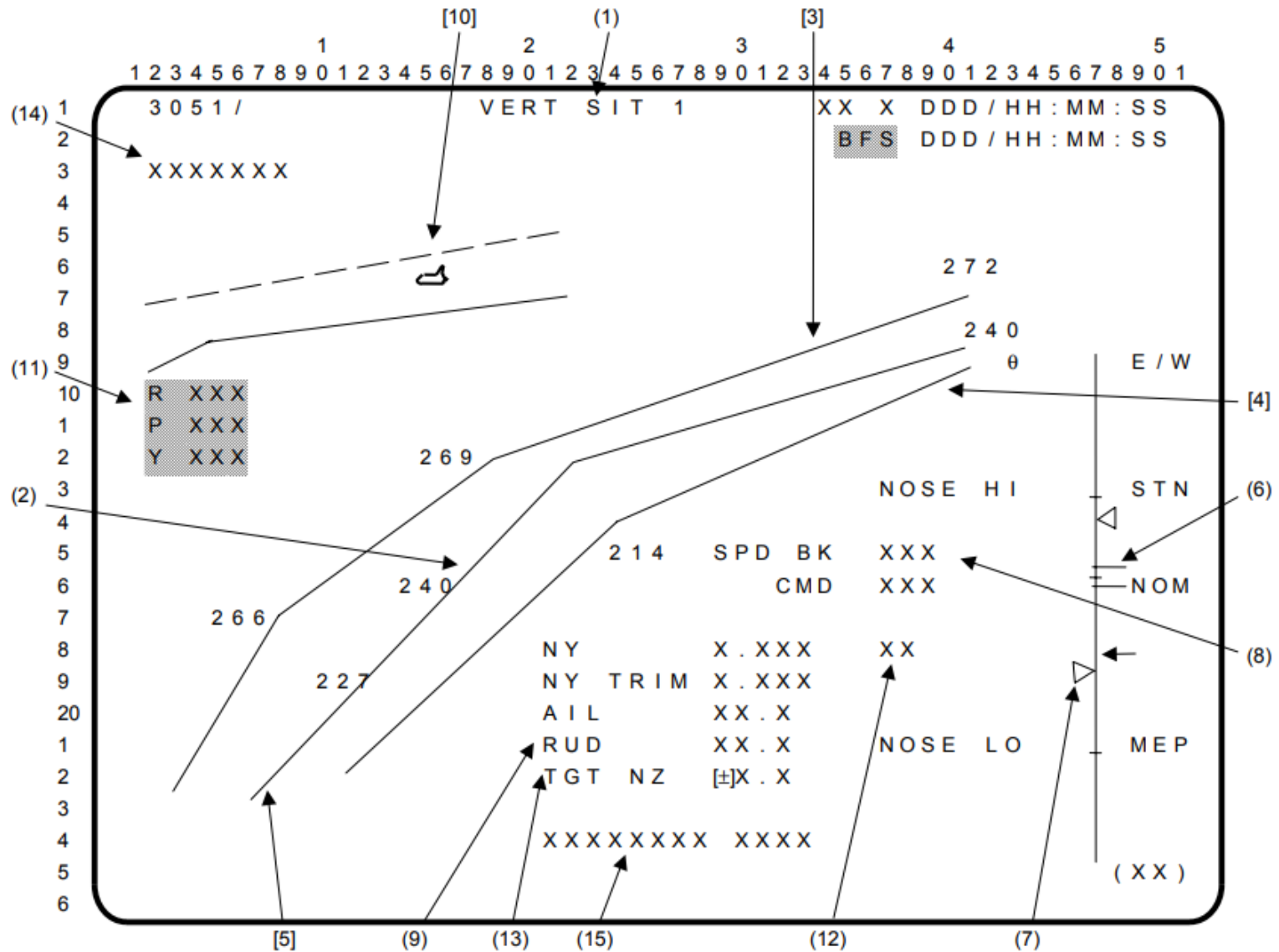
# ENTRY TRAJ 4 DISPLAY



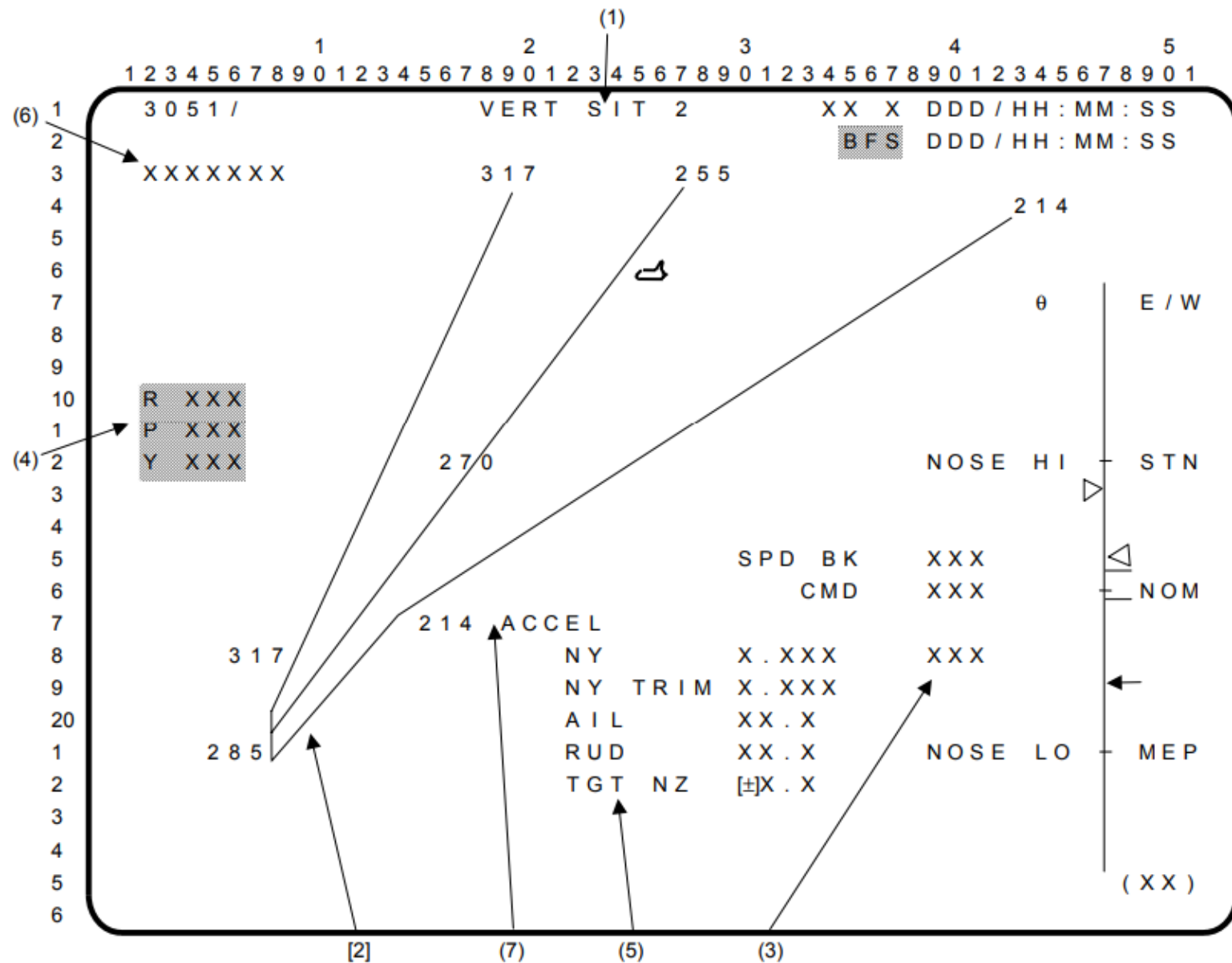
# ENTRY TRAJ 5 DISPLAY



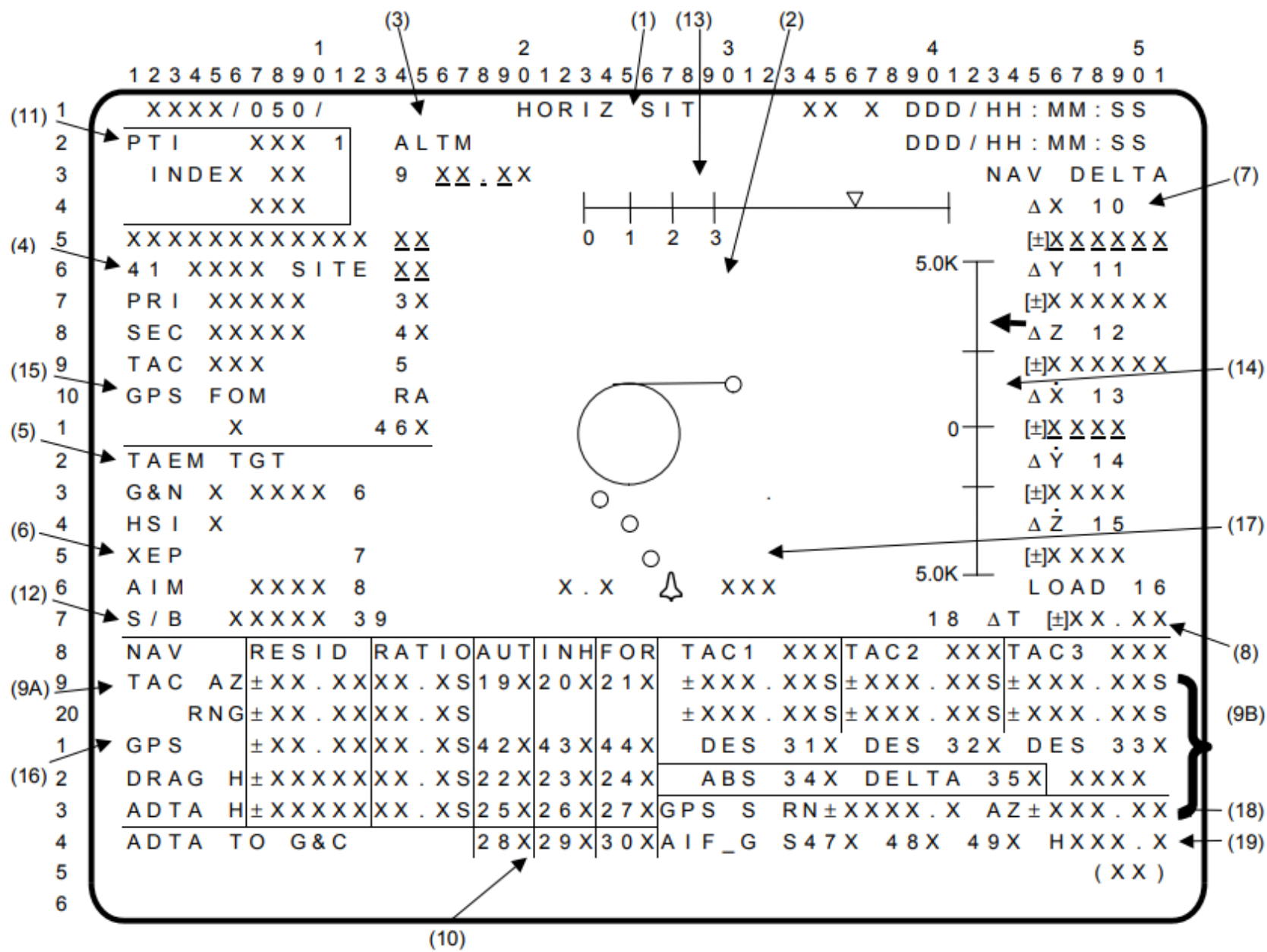
# VERT SIT 1 DISPLAY



# VERT SIT 2 DISPLAY



# HORIZ SIT DISPLAY



(1)

39



**ENTRY  
CHECKLIST**

**STS  
ALL**

BACK COVER