



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

APOLLO 17

ALL LAUNCH DATES

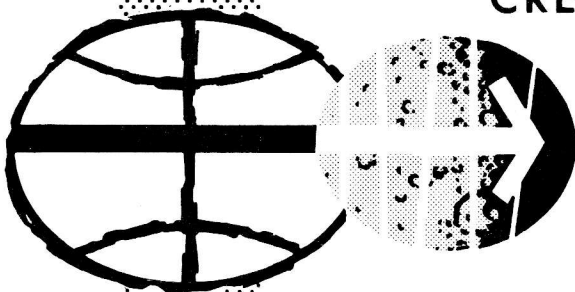
BASIC

CSM

RESCUE BOOK

PREPARED BY

FLIGHT PROCEDURES BRANCH
CREW PROCEDURES DIVISION



MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SEPTEMBER 18, 1972

APOLLO 17

CSM RESCUE BOOK

SEPTEMBER 18, 1972

PREPARED BY: DC Wammack
D. C. WAMMACK
BOOK MANAGER

APPROVED BY: Paul C Kramer
PAUL C. KRAMER, CHIEF
FLIGHT PROCEDURES BRANCH
CREW PROCEDURES DIVISION

It is requested that any organization having comments, questions, or suggestions concerning this document contact D. C. Wammack, Flight Procedures Branch, CG413, Building 35, room 219, telephone 483-6101.

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CSM RESCUE BOOK

LIST OF EFFECTIVE PAGES

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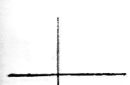
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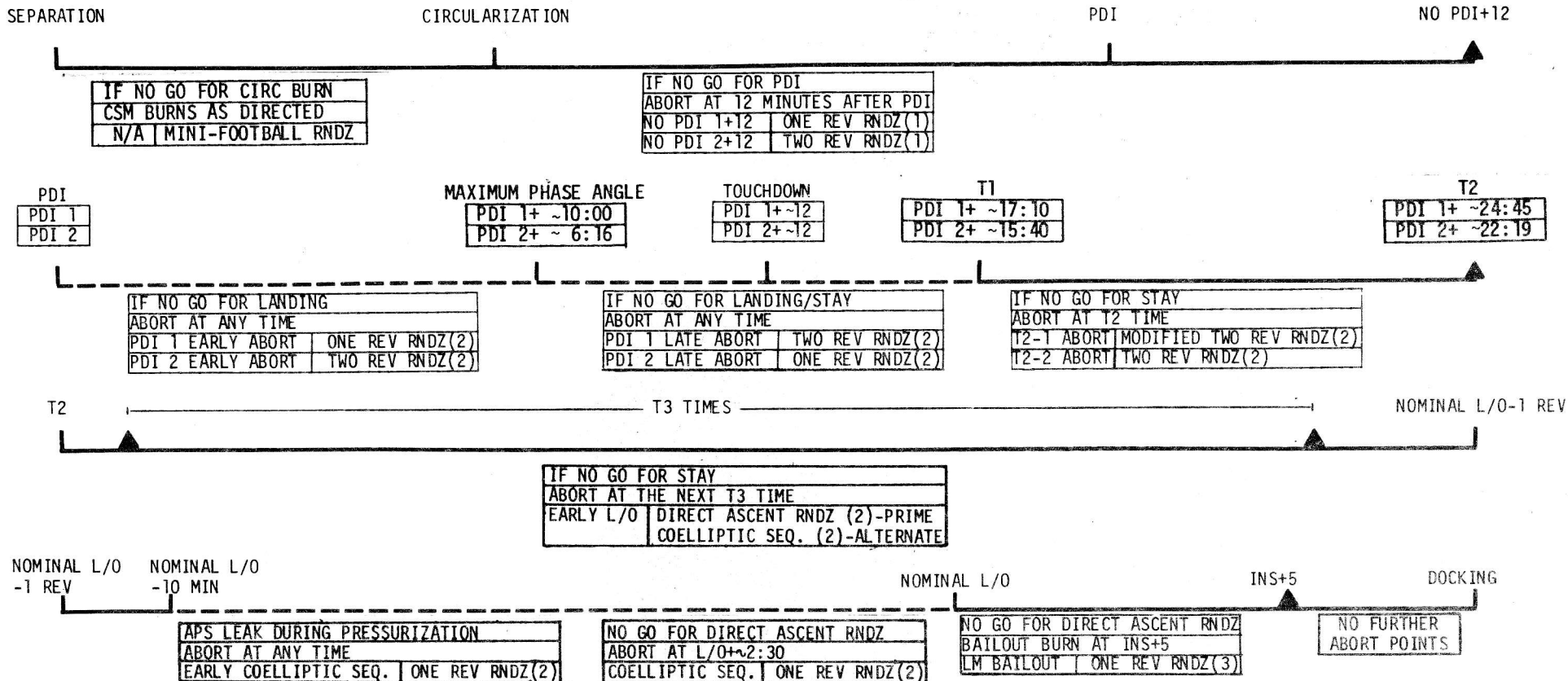
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LM ABORT POINTS

DATE 9/18/72



LEGEND:

ABORT CONDITION	
ABORT POINT/REGION	
ABORT NAME	RNDZ TECHNIQUE(n)

(n) CSM ACTIVE RESCUE RNDZ

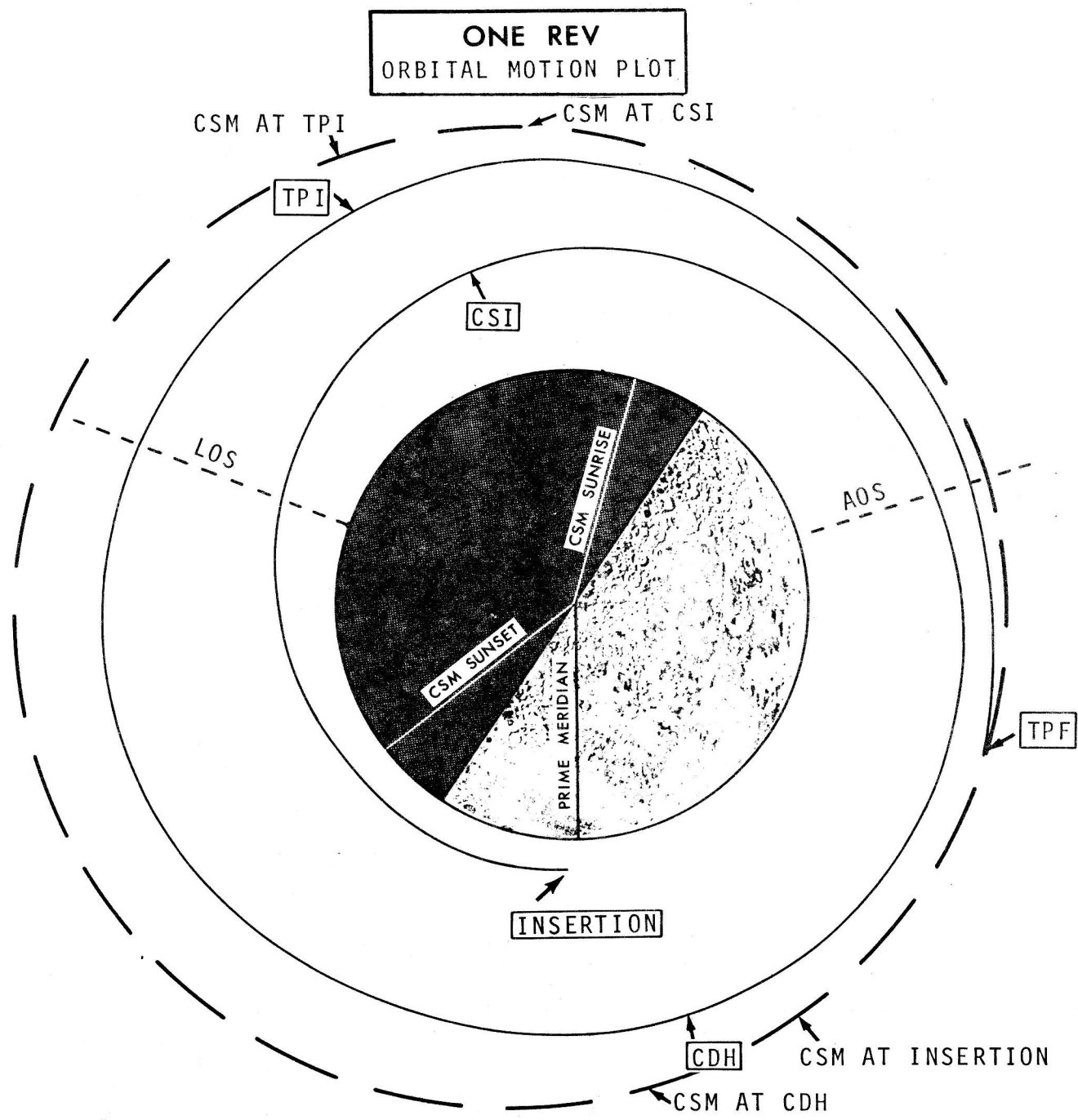
- ▲ ABORT POINTS
- ABORT REGIONS

CSM RESCUE CASES

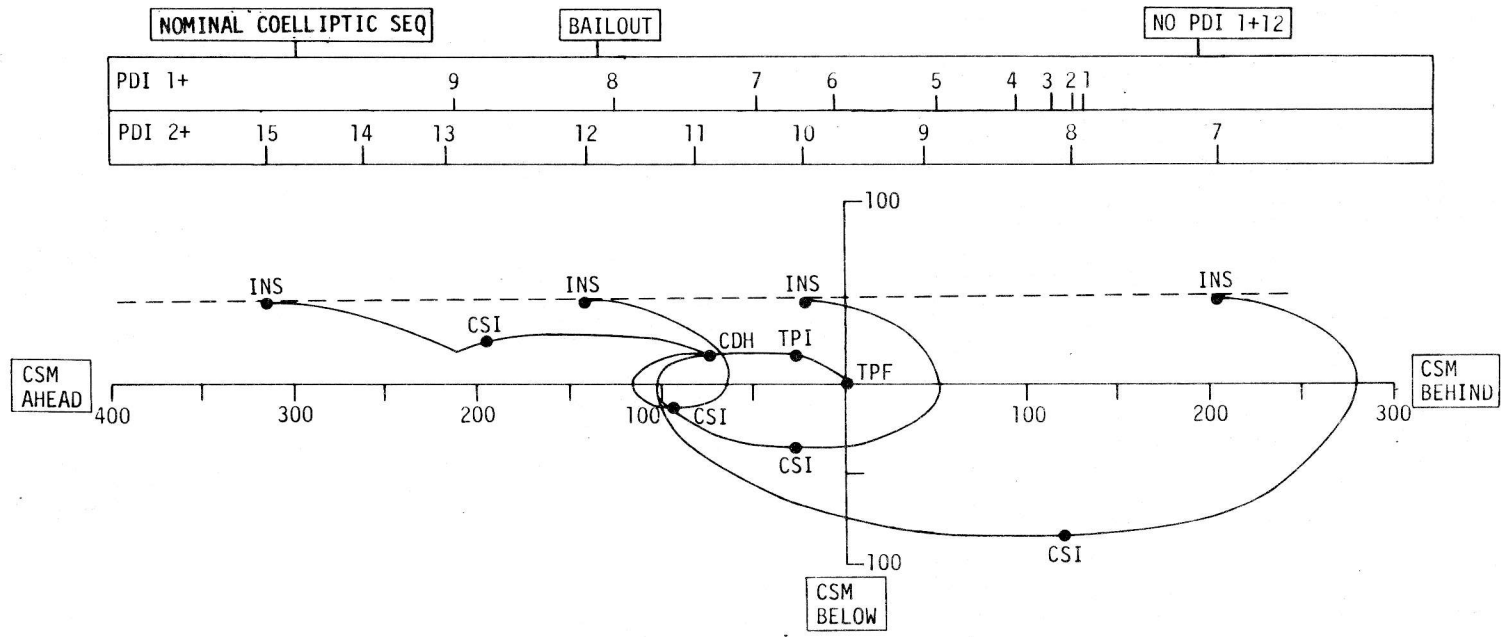
IF THE CSM BECOMES ACTIVE AFTER:

- | | |
|---|--|
| (1) AN ACCURATE LM ABORT INITIATION MANEUVER
A PARTIAL LM ABORT INITIATION MANEUVER
(2) THE LM INSERTS INTO THE DESIRED ORBIT
THE LM INSERTS WITH AN UNDERSPEED OR OVERSPEED
(3) AN ACCURATE LM BAILOUT MANEUVER
A PARTIAL LM BAILOUT MANEUVER | .COMPLETE THE ONE REV OR TWO REV RENDEZVOUS
.INITIATE THE RESCUE TWO RENDEZVOUS
.COMPLETE THE EARLY, ONE REV, OR TWO REV RENDEZVOUS
.INITIATE A CSM BAILOUT, MANUAL INSERTION, CSM DWELL, OR RESCUE TWO RNDZ AS DIRECTED
.COMPLETE THE ONE REV RENDEZVOUS
.PERFORM THE P30 CSM BAILOUT BURN AND COMPLETE THE ONE REV RENDEZVOUS |
|---|--|

PAGE 1



ONE REV
RELATIVE MOTION PLOT
LM CENTERED



ONE REV
BURN TIMES

NO PDI 1+12 ABORT
CSI AT PDI TIME+67 MIN

PDI 1, EARLY ABORT
CSI AT INS +55 MIN

NOMINAL COELLIPTIC SEQUENCE
CSI AT INS +50 MIN

LM BAILOUT
CSI AT INS +55 MIN

PDI 2, LATE ABORT
CSI AT INS +55 MIN

EARLY COELLIPTIC SEQ.
FOR APS LEAK
CSI AT INS +60 MIN

CSM BAILOUT
CSI AT INS +55 MIN

ONE REV
RENDEZVOUS

**ONE REV
TIMELINE**

POWER DOWN SIM (SEE EXPS/EVA CHECKLIST)
P00; V48 (11102,X1111)

INSERTION OR A.I.M.

MSFN UPLINK: LM S.V.
OBTAIN LM CSI AND TPI GETI'S (COPY)

P32 (SEE INPUT)

BEFORE STEADY STATE
N49>(+00200,+00120):REJECT/REPEAT
AFTER STEADY STATE
N49>(+00030,+00020):REJECT/REPEAT

RECYCLE(COPY)

FINAL COMP(COPY); OBTAIN LM CSI DV(COPY); P40m

CSI BURN

P76m; OBTAIN LM PC GETI(COPY); P36m WITH LM GETI

BEFORE STEADY STATE
N49>(+00080,+00050):REJECT/REPEAT
AFTER STEADY STATE
N49>(+00030,+00020):REJECT/REPEAT

FINAL COMP (COPY) **TO BYPASS P52m AND P4Xm, ZERO DVY**

OBTAIN LM PC DV (COPY)

P52m; P4Xm

TO BYPASS GYRO TORQUE: ENTER ON F 50 25
TO GYRO TORQUE: SEE P. 38

PLANE CHANGE

P76m

OBTAIN LM CDH GETI(COPY); P33m WITH LM GETI

RECYCLE(COPY)

FINAL COMP(COPY); OBTAIN LM CDH DV(COPY); P40m

CDH BURN

P76m

INSERTION		LM INSERTION TIME	:	:	.
A.I.M.	33	LM A.I.M.GETI	:	:	.
P76	84	LM A.I.M.DV-LV	.	.	.

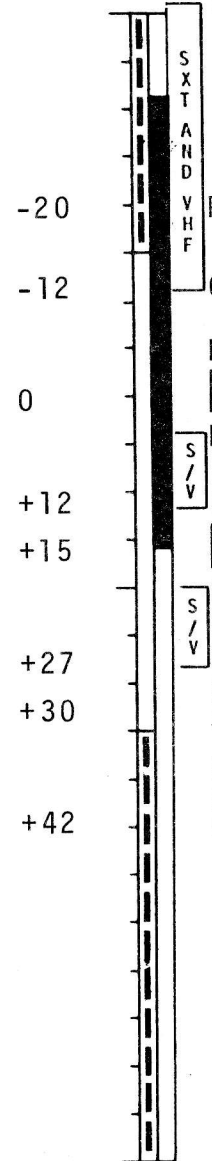
CSI COMPUTATION					
INPUT	11	LM CSI GETI	:	:	.
	55	N +00001	ELEVATION ° +208.30	180° OPT +130.00	
	37	LM TPI GETI	:	:	.
RECYCLE	90	Y	Y DOT	LM Y DOT	
	81	CSI ΔV-LV	.	.	+0000.0
FINAL COMP	90	Y	Y DOT	LM Y DOT	
	81	CSI ΔV-LV	.	.	+0000.0
P76	84	LM CSI ΔV-LV	.	.	.

PLANE CHANGE COMPUTATION					
INPUT	33	LM PC GETI	:	:	.
FINAL COMP	90	Y	Y DOT	LM Y DOT	
	81	PC ΔV-LV	+0000.0	.	+0000.0
P76	84	LM PC ΔV-LV	+0000.0	.	+0000.0

CDH COMPUTATION					
INPUT	13	LM CDH GETI	:	:	.
RECYCLE	90	Y	Y DOT	LM Y DOT	
	81	CDH ΔV-LV	.	.	.
FINAL COMP	90	Y	Y DOT	LM Y DOT	
	81	CDH ΔV-LV	.	.	.
P76	84	LM CDH ΔV-LV	.	.	.

P34m, OVERWRITE N55 R2.

BEFORE STEADY STATE
 N49>(+00080,+00050):REJECT/REPEAT
 AFTER STEADY STATE
 N49>(+00030,+00020):REJECT/REPEAT



RECYCLE(COPY)

OBTAIN LM TPI GETI AND DV(COPY); FINAL
 COMP, OVERWRITE N37 WITH LM TPI GETI

P40m

TPI BURN

P76m; P35m

FINAL COMP(COPY); OBTAIN LM MCC1 DV(COPY);P41m

MCC1

P76m; P35m

FINAL COMP(COPY); OBTAIN LM MCC2 DV(COPY); P41m

MCC2

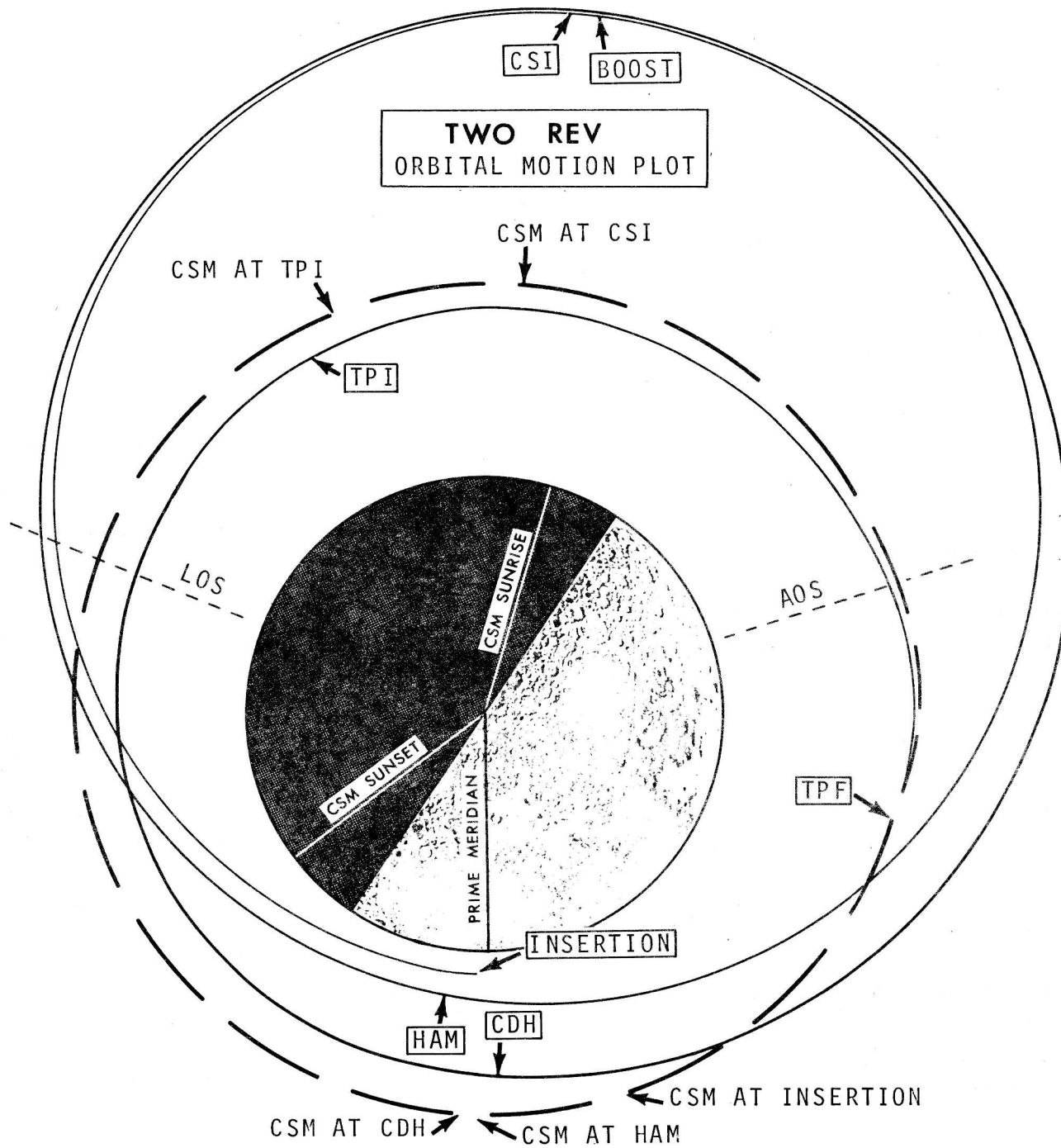
GO TO TPF ACTIVITIES(PAGE 36)

TPF

TPI-ELEVATION OPTION			
INPUT	37	TPI GETI	
	55	INTEG OPT +00000	ELEVATION +208.30
RECYCLE	37	TPI GETI	
	58	PERILUNE ALT	TPI ΔV
	81	TPI ΔV-LV	
FINAL COMP	37	LM TPI GETI	
	55	INTEG OPT +00000	ELEVATION +130.00
	58	PERILUNE ALT	TPI ΔV
P76	33	LM TPI GETI	
	84	LM TPI ΔV-LV	

MCC COMPUTATION			
FIN COMP	81	MCC1 ΔV-LV	
P76	84	LM MCC1 ΔV-LV	

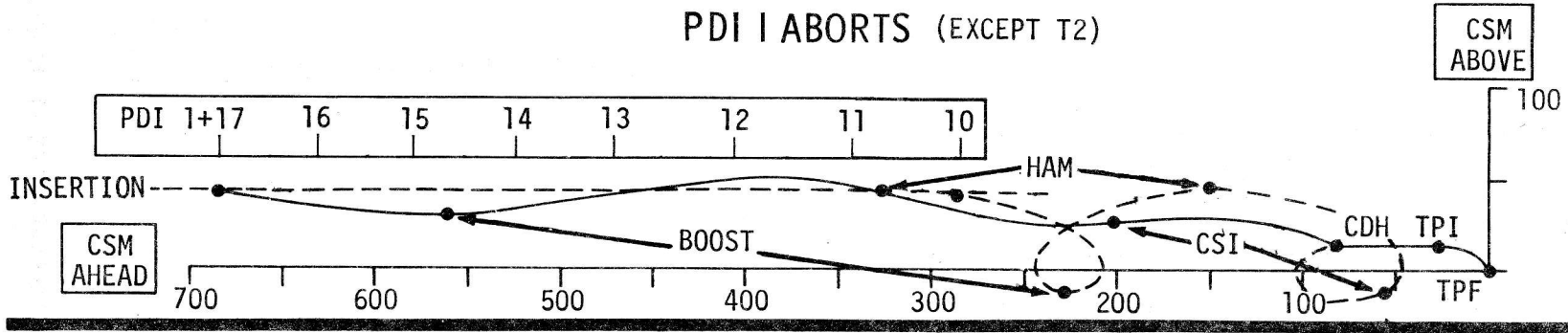
MCC COMPUTATION			
FIN COMP	81	MCC2 ΔV-LV	
P76	84	LM MCC2 ΔV-LV	



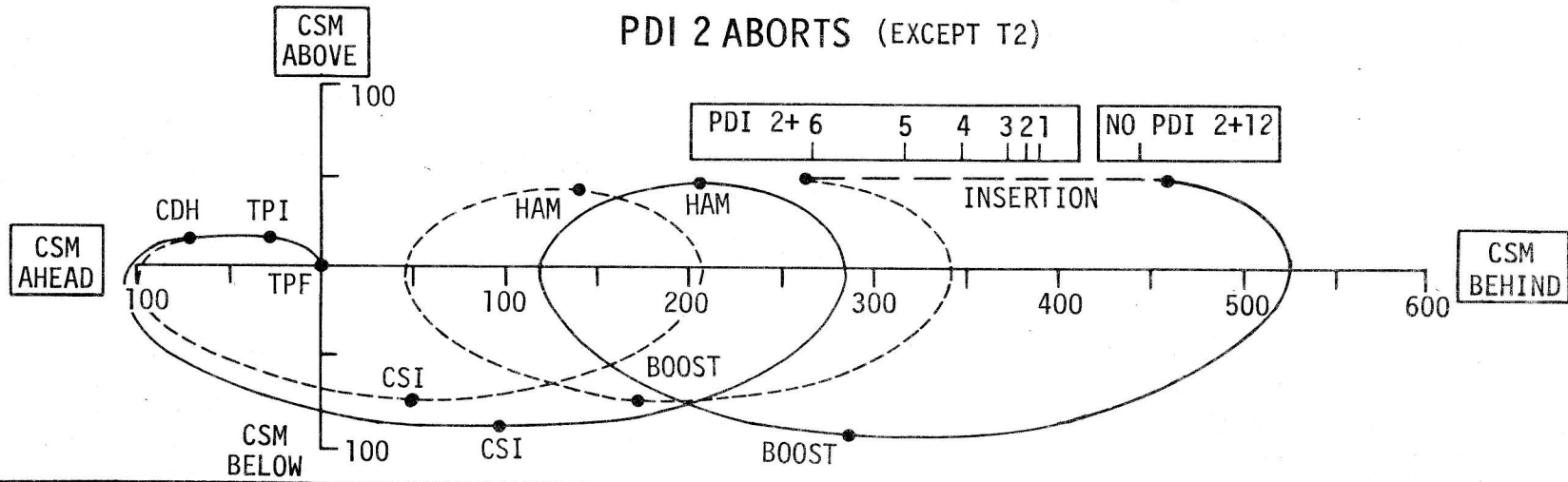
**TWO REV
RELATIVE MOTION PLOT**

LM CENTERED

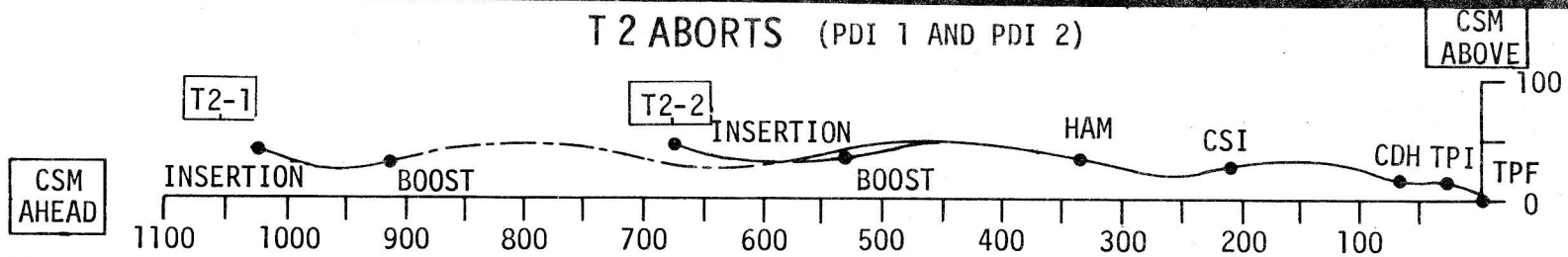
PDI 1 ABORTS (EXCEPT T2)



PDI 2 ABORTS (EXCEPT T2)



T 2 ABORTS (PDI 1 AND PDI 2)



NOTE: (-----) INDICATES THE ADDITIONAL REV NECESSARY TO MODIFY THE TWO REV TECHNIQUE FOR A T2-1 ABORT.

TWO REV
RENDEZVOUS

**TWO REV
BURN TIMES**

PDI 1, LATE ABORT

BOOST AT INS + 50 MIN
HAM AT BOOST + 60 MIN
CSI AT HAM + 50 MIN

T2 ABORT, 1ST OPP

BOOST AT INS +50 MIN
HAM AT BOOST +180 MIN
CSI AT HAM + 50 MIN

NO PDI 2+12 ABORT

BOOST AT PDI TIME +72 MIN
HAM AT BOOST +60 MIN
CSI AT HAM +60 MIN

PDI 2, EARLY ABORT

BOOST AT INS +60 MIN
HAM AT BOOST +60 MIN
CSI AT HAM +60 MIN

T2 ABORT, 2ND OPP

BOOST AT INS +50 MIN
HAM AT BOOST +60 MIN
CSI AT HAM +50 MIN

**TWO REV
TIMELINE**

POWER DOWN SIM (SEE EXPS/EVA CHECKLIST)
POO; V48(11102,X1111)

INSERTION OR A. I. M.
MSFN UPLINK: LM S.V.

INSERTION		LM INSERTION TIME		:	:
A.I.M.	33	LM AIM GETI		:	:
P76	84	LM AIM ΔV-LV		.	.

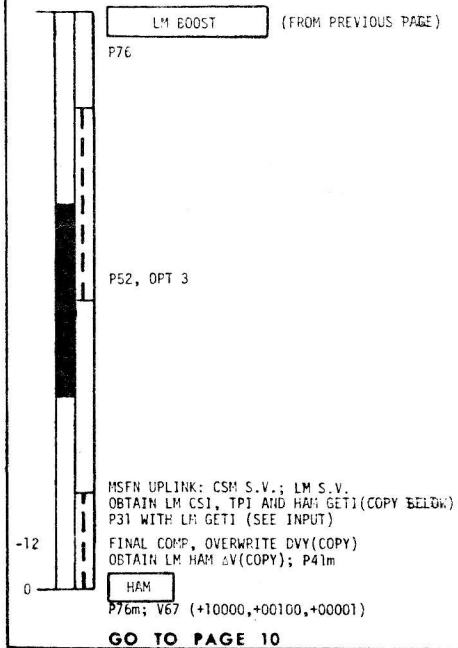
LM	33	LM BOOST GETI		:	:
BOOST	84	LM BOOST ΔV-LV		.	.
P76			+0000.0		+0000.0

OBTAIN LM BOOST GETI AND DV(COPY)

LM BOOST

P76

MODIFIED TWO REV RNDZ (FOR T2-1 ABORT ONLY)



DATE 9/18/72



MSFN UPLINK: CSM S.V.; LM S.V.
OBTAIN LM CSI, TPI AND HAM GETI (COPY)
P31 WITH LM GETI

IF 15 VHF MARKS CAN NOT
BE TAKEN PRIOR TO FINAL
COMP:
V88

BEFORE STEADY STATE
N49>(+00200,+00120): REJECT/REPEAT
AFTER STEADY STATE
N49>(+00030,+00020): REJECT/REPEAT

RECYCLE (COPY)

FINAL COMP, OVERWRITE DVY (COPY);
OBTAIN LM HAM ΔV (COPY)
P41m

HAM

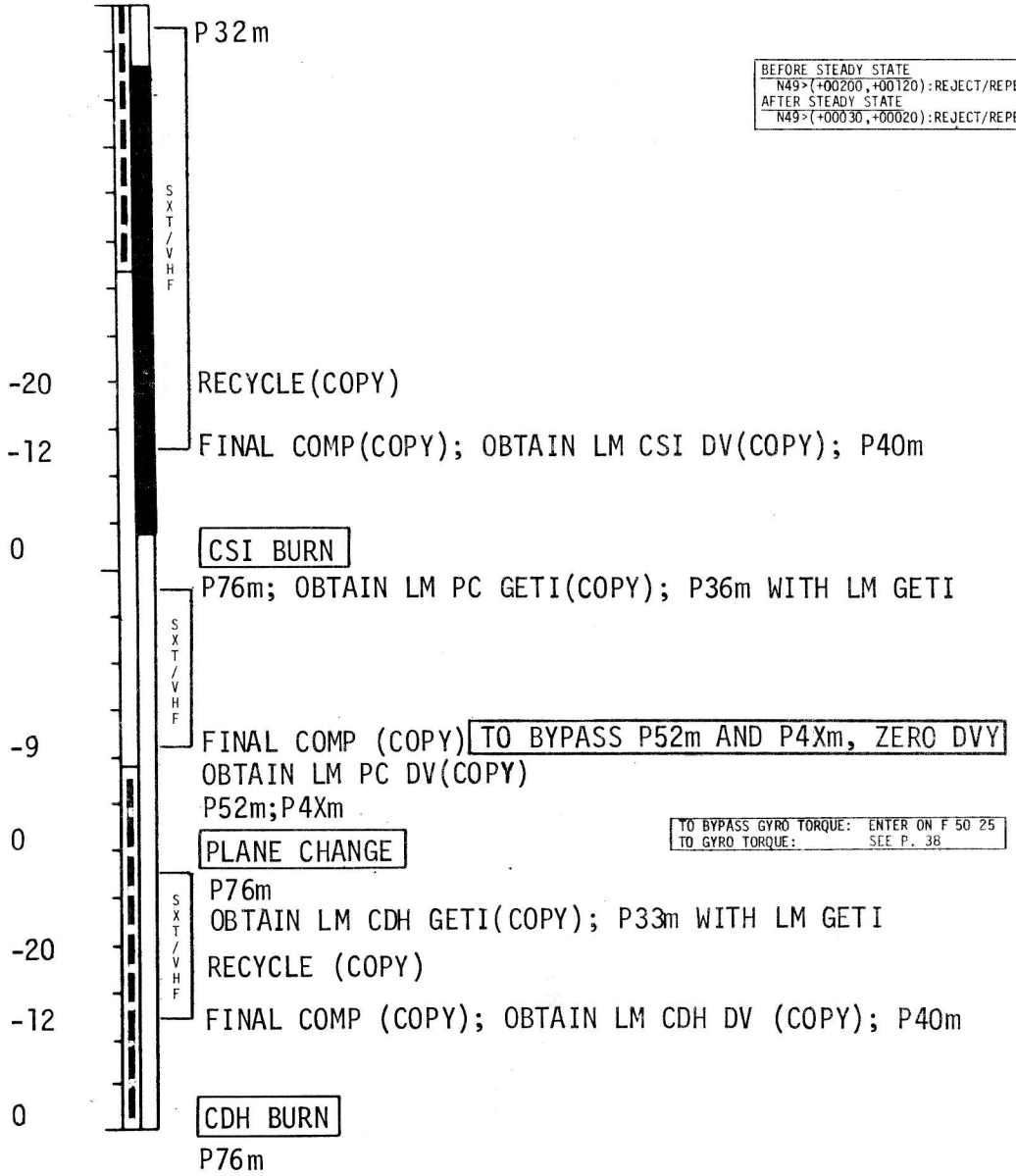
P76m; V67(+10000,+00100,+00001)

IF NO MARKS HAVE BEEN TAKEN:
V87

HAM COMPUTATION

		LM CSI GETI	:	:
INPUT	11	:	:	.
	55	N +00001	ELEVATION ↘ +208.30	180° OPT +130.00
	37	LM TPI GETI	:	.
	33	LM HAM GETI	:	.
RECYCLE	90	Y	Y DOT	LM Y DOT
	81	HAM ΔV-LV	.	+0000.0
FINAL COMP	90	Y	Y DOT	LM Y DOT
	81	HAM ΔV-LV	+0000.0	+0000.0
P76	84	LM HAM ΔV-LV	.	+0000.0

PAGE 9



BEFORE STEADY STATE
 N49>(+00200,+00120):REJECT/REPEAT
 AFTER STEADY STATE
 N49>(+00030,+00020):REJECT/REPEAT

TO BYPASS GYRO TORQUE: ENTER ON F 50 25
 TO GYRO TORQUE: SEE P. 38

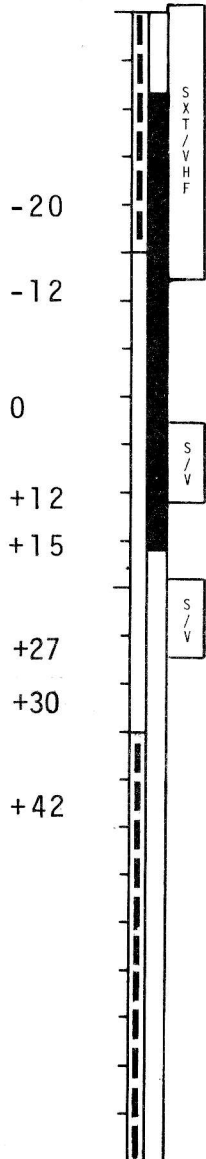
CSI COMPUTATION			
INPUT	11	LM CSI GETI	PROCEED ON DISPLAYED GETI
	55	N +00001	ELEVATION 9 +208.30 180° OPT +130.00
	37	LM TPI GETI	PROCEED ON DISPLAYED GETI
RECYCLE	90	Y .	Y DOT . LM Y DOT .
	81	CSI ΔV-LV .	+0000.0
FINAL COMP	90	Y .	Y DOT . LM Y DOT .
	81	CSI ΔV-LV .	+0000.0
P76	84	LM CSI ΔV-LV .	.

PLANE CHANGE COMPUTATION			
INPUT	33	LM PC GETI	PROCEED ON DISPLAYED GETI
FINAL COMP	90	Y .	Y DOT . LM Y DOT .
	81	PC ΔV-LV +0000.0	+0000.0
P76	84	LM PC ΔV-LV +0000.0	+0000.0

CDH COMPUTATION			
INPUT	13	LM CDH GETI	PROCEED ON DISPLAYED GETI
RECYCLE	90	Y .	Y DOT . LM Y DOT .
	81	CDH ΔV-LV .	.
FINAL COMP	90	Y .	Y DOT . LM Y DOT .
	81	CDH ΔV-LV .	.
P76	84	LM CDH ΔV-LV .	.

P34m, OVERWRITE N55 R2

BEFORE STEADY STATE
 N49>(+00080,+00050):REJECT/REPEAT
 AFTER STEADY STATE
 N49>(+00030,+00020):REJECT/REPEAT



RECYCLE(COPY)

OBTAIN LM TPI GETI AND DV(COPY); FINAL
 COMP, OVERWRITE N37 WITH LM TPI GETI

P40m

TPI BURN

P76m; P35m

FINAL COMP(COPY);OBTAIN LM MCC1 DV(COPY); P41m

MCC1

P76m; P35m

FINAL COMP(COPY); OBTAIN LM MCC2 DV(COPY); P41m

MCC2

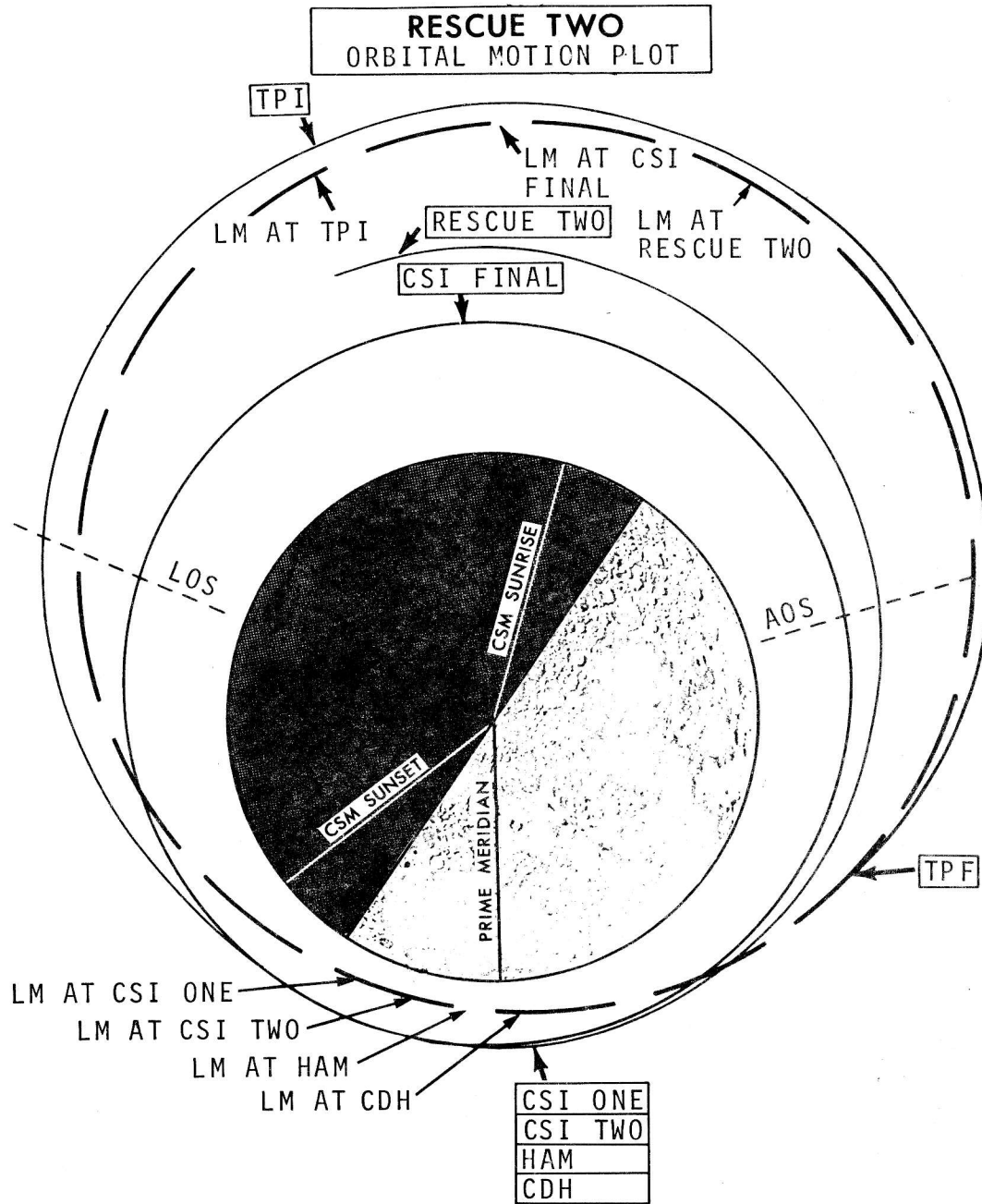
GO TO TPF ACTIVITIES(PAGE 36)

TPF

TPI-ELEVATION OPTION			
INPUT	37	TPI GETI	
	55	INTEG OPT +00000	ELEVATION +208.30
RECYCLE	37	PROCEED ON DISPLAYED GETI	
	58	PERILUNE ALT	TPI ΔV
	81	TPI ΔV-LV	TRANSFER Δ
FINAL COMP	37	LM TPI GETI	
	55	INTEG OPT +00000	ELEVATION +130.00
	58	PERILUNE ALT	TPI ΔV
	81	TPI ΔV-LV	TRANSFER Δ
P76	33	LM TPI GETI	
	84	LM TPI ΔV-LV	

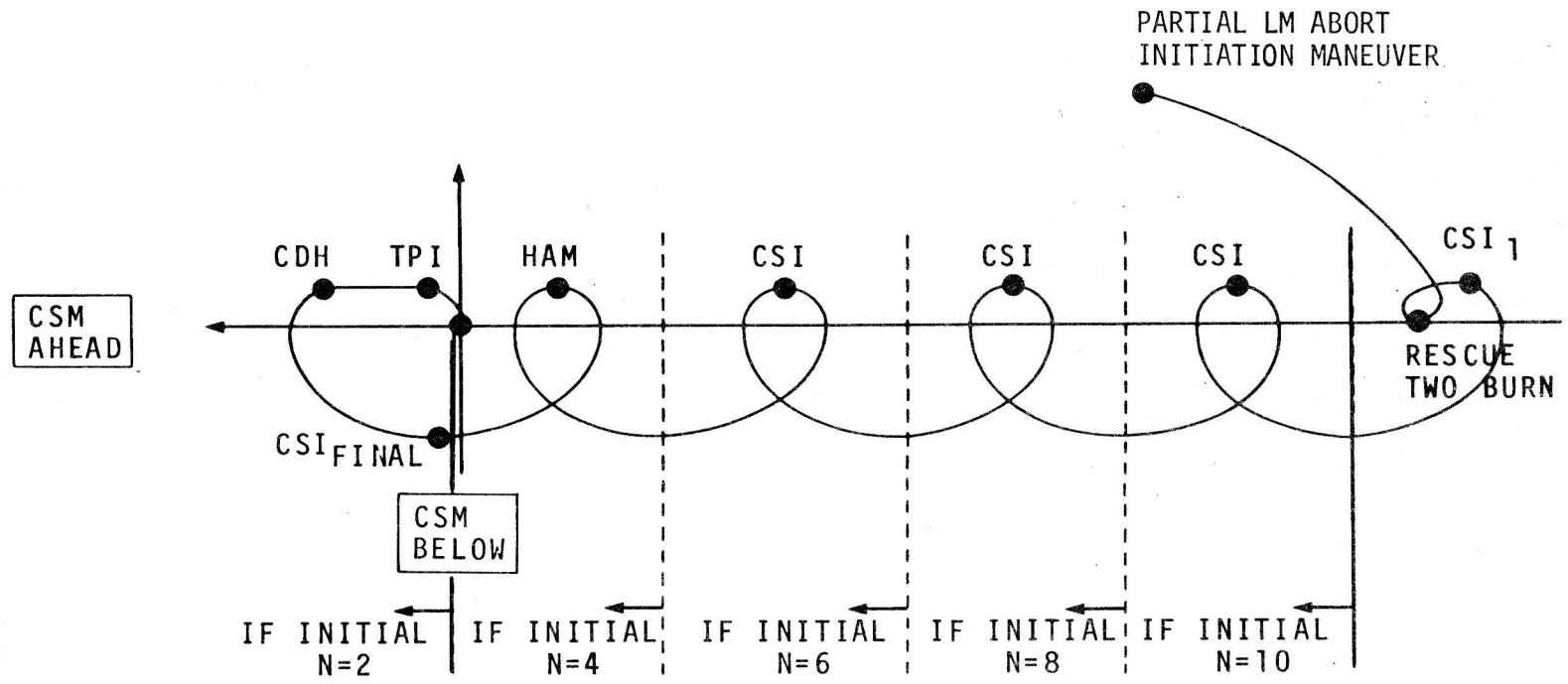
MCC COMPUTATION			
FIN COMP	81	MCC1 ΔV-LV	
P76	84	LM MCC1 ΔV-LV	

MCC COMPUTATION			
FIN COMP	81	MCC2 ΔV-LV	
P76	84	LM MCC2 ΔV-LV	



RESCUE TWO
RELATIVE MOTION PLOT

LM CENTERED



RESCUE TWO
RENDEZVOUS

**RESCUE TWO
TIMELINE**

POWER DOWN SIM (SEE EXPS/EVA CHECKLIST)
P00; V48 (11102,X1111)

INSERTION OR A.I.M.

MSFN UPLINK: LM S.V.
MSFN UPDATE: RESCUE TWO P30 PAD
P32 INITIALIZATION PAD

-12

0

P30; P40

RESCUE TWO BURN

P00

RESCUE TWO P30 PAD

	R	2	N	=			PURPOSE
SET STARS	S	P	S	G	&	N	PROP/GUID
	+						WT N47
R ALIGN		0	0				P TRIM N48
P ALIGN		0	0				Y TRIM
Y ALIGN	+	0	0				HRS GETI
	+	0	0	0			MIN N33
	+	0					SEC
ULLAGE							ΔV_x N81
	+	0	0	0	0	0	ΔV_y
	+	0	0	0	0	0	ΔV_z
	X	X	X				R
	X	X	X				P
OTHER	X	X	X				Y
	+						H _A N44
							H _P
	+						ΔVT
	X	X	X				BT
	X						ΔVC

P32 INITIALIZATION PAD

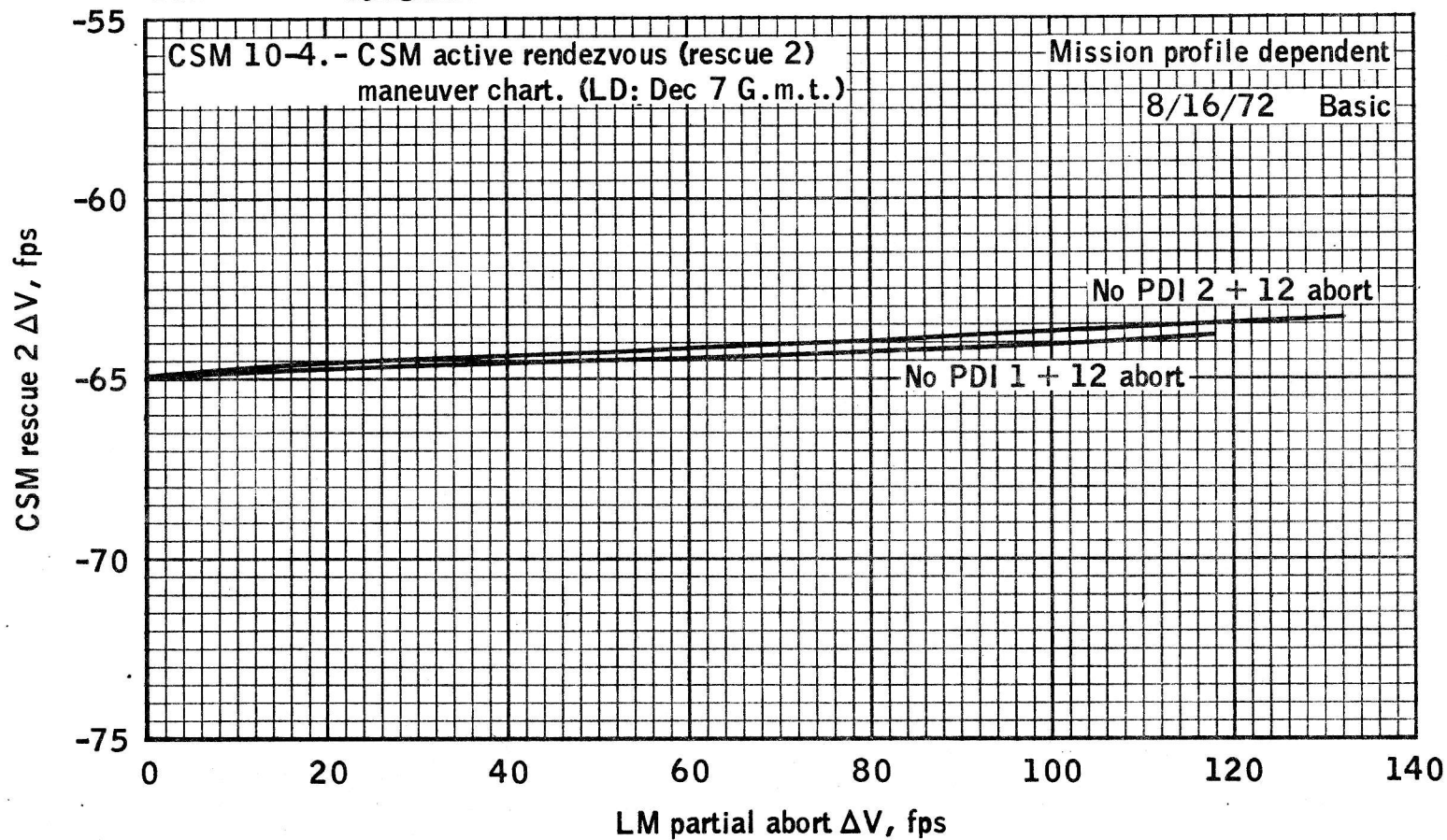
N11	CSI GETI	+		:	:	.
	N	+	0	0	0	
N55	ELEV ↗	+	2	0	8	3 0
	180° OPT	+	1	3	0	0 0
N37	TPI GETI	+		:	:	.

RESCUE TWO BURN INFORMATION

DuPont/MAB/MPAD (for CSM Rescue)

Data source Spacecraft O.T.

Data confirmed LD

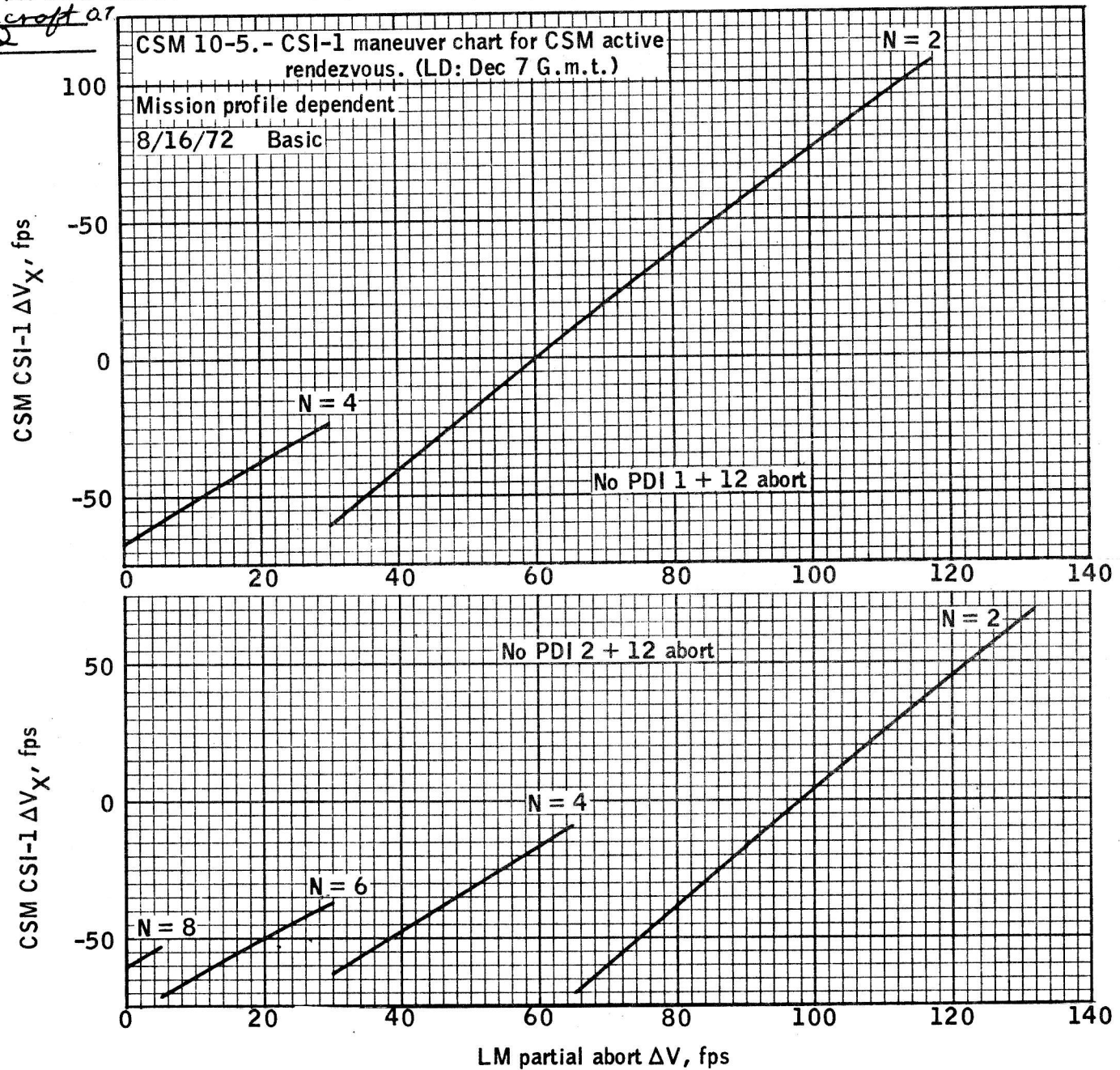


DuPont/MAB/MPAD (for CSM Rescue)

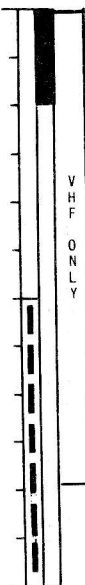
Data source Spacecraft 07

Data confirmed CSO

CSI ONE BURN INFORMATION



P32 (LOAD P32 INITIALIZATION PAD ON PAGE 14)



BEFORE STEADY STATE
 N49>(+00200,+00120):REJECT/REPEAT
 AFTER STEADY STATE
 N49>(+00030,+00020):REJECT/REPEAT

P32	90	Y	Y DOT	LM Y DOT
FINAL		.	.	.
COMP	81	CSI 3V-LV	+0000.0	+0000.0

FINAL COMP, OVERWRITE DVY(COPY); P40m

CSI ONE BURN

P76m; V67(+10000,+00100,+00001)

IF INITIAL N>4, CONTINUE ON PAGE 18
 IF INITIAL N=4, CONTINUE ON PAGE 19
 IF INITIAL N=2, CONTINUE ON PAGE 20

GROUND
 $\Delta V X$



COMPARISON
 LIMIT=±3 FPS

(A)

P32m, **REDUCE PREVIOUS N BY 2**, OVERWRITE N55 R1(COPY)

P52,OPT 3; P32

BEFORE STEADY STATE
N49>(+00200,+00120):REJECT/REPEAT
AFTER STEADY STATE
N49>(+00030,+00020):REJECT/REPEAT

FOR N=8

CSI <input type="checkbox"/> COMPUTATION				
INPUT	11	CSI GETI		
	55	PROCEED ON DISPLAYED GETI		
	37	N	ELEVATION °	180° OPT
FINAL COMP	90	TPI GETI		
	81	Y	Y DOT	LM Y DOT
		CSI ΔV-LV		

FOR N=6

CSI <input type="checkbox"/> COMPUTATION				
INPUT	11	CSI GETI		
	55	PROCEED ON DISPLAYED GETI		
	37	N	ELEVATION °	180° OPT
FINAL COMP	90	TPI GETI		
	81	Y	Y DOT	LM Y DOT
		CSI ΔV-LV		

FOR N=4

CSI <input type="checkbox"/> COMPUTATION				
INPUT	11	CSI GETI		
	55	PROCEED ON DISPLAYED GETI		
	37	N	ELEVATION °	180° OPT
FINAL COMP	90	TPI GETI		
	81	Y	Y DOT	LM Y DOT
		CSI ΔV-LV		

VHF ONLY

VHF ONLY

VHF ONLY

IF NECESSARY: MSFN UPLINK-LM S.V.
CSM S.V.

FINAL COMP, OVERWRITE DVY(COPY);

P41m

CSI BURN

P76m; V67(+10000,+00100,+00001)

RECYCLE TO (A) UNTIL N=4 WAS INPUT FOR THE PREVIOUS CSI BURN, THEN CONTINUE TO PAGE 19.
--

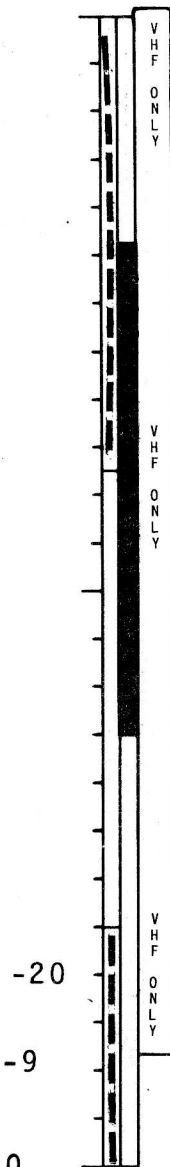
-9

0

P31m (COPY), LOAD ΔH = 10.0

V24 N1E
2367E
0E
22062E

BEFORE STEADY STATE
N49>(+00200,+00120):REJECT/REPEAT
AFTER STEADY STATE
N49>(+00030,+00020):REJECT/REPEAT



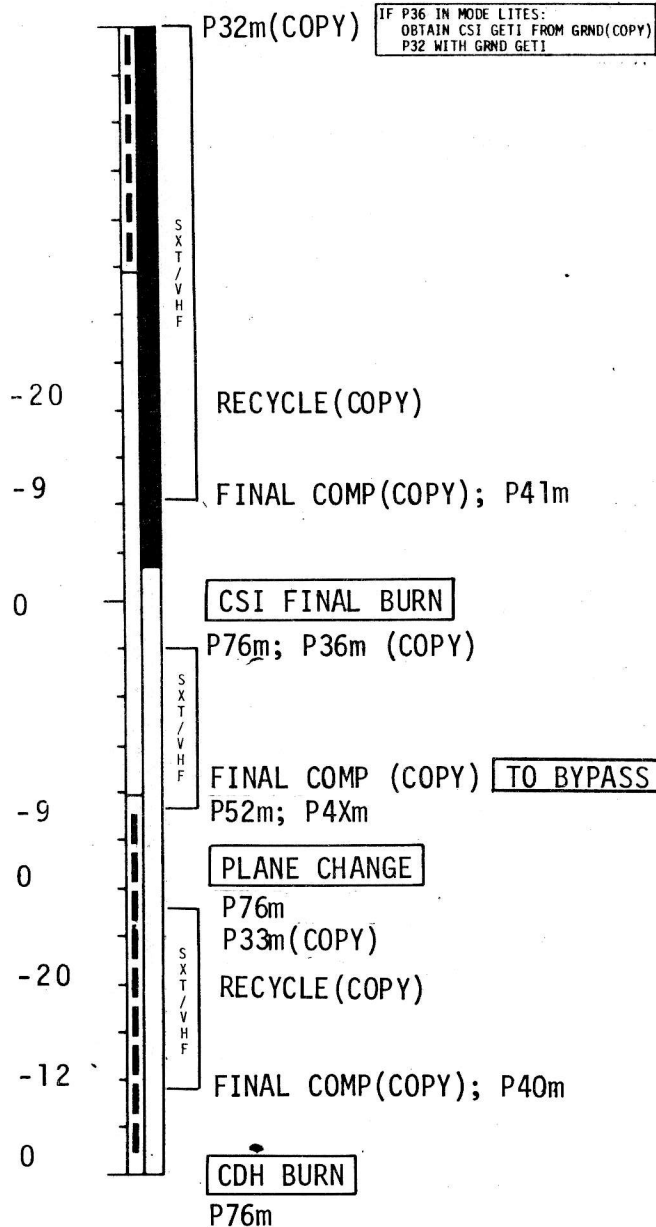
RECYCLE (COPY)

FINAL COMP, OVERWRITE DVY(COPY); P41m

HAM

P76m; V67(+10000,+00100,+00001)

HAM COMPUTATION			
INPUT	11	CSI GETI	
		PROCEED ON DISPLAYED GETI	
	55	N +00001	ELEVATION 2 +208.30 180° OPT +130.00
	37	TPI GETI	
RECYCLE	33	HAM GETI	
		PROCEED ON DISPLAYED GETI	
	90	Y	Y DOT LM Y DOT
	81	HAM ΔV-LV	+0000.0
FINAL COMP	90	Y	Y DOT LM Y DOT
	81	HAM ΔV-LV	+0000.0 +0000.0



BEFORE STEADY STATE
N49>(+00200,+00120):REJECT/REPEAT
AFTER STEADY STATE
N49>(+00030,+00020):REJECT/REPEAT

TO BYPASS GYRO TORQUE: ENTER ON F 50 25
TO GYRO TORQUE: SEE P. 38

CSI COMPUTATION				
INPUT	11	CSI GETI		
	55	PROCEED ON DISPLAYED GETI		
	37	N +00001	ELEVATION +208.30	ISO OPT +130.00
RECYCLE	90	TPI GETI		
	81	PROCEED ON DISPLAYED GETI		
	81	Y	Y DOT	LM Y DOT
FINAL COMP	90	CSI DV-LV		+0000.0
	81	Y	Y DOT	LM Y DOT
	81	CSI DV-LV		+0000.0

PLANE CHANGE COMPUTATION				
INPUT	33	PC GETI		
	90	PROCEED ON DISPLAYED GETI		
FINAL COMP	81	Y	Y DOT	LM Y DOT
	81	PC DV-LV		+0000.0

CDH COMPUTATION				
INPUT	13	LM CDH GETI		
	90	PROCEED ON DISPLAYED GETI		
RECYCLE	81	Y	Y DOT	LM Y DOT
	81	CDH DV-LV		
FINAL COMP	90	Y	Y DOT	LM Y DOT
	81	CDH DV-LV		

P34m, OVERWRITE N55 R2

SXT/VHF

-20 RECYCLE (COPY)

-12 FINAL COMP (COPY); P40m

0 TPI BURN
P76m; P35m

S/V

+12 P35 FINAL COMP (COPY); P41m

+15 MCC1
P76m, P35m

S/V

+27 P35 FINAL COMP (COPY); P41m

+30 MCC2
GO TO TPF ACTIVITIES (PAGE 36)

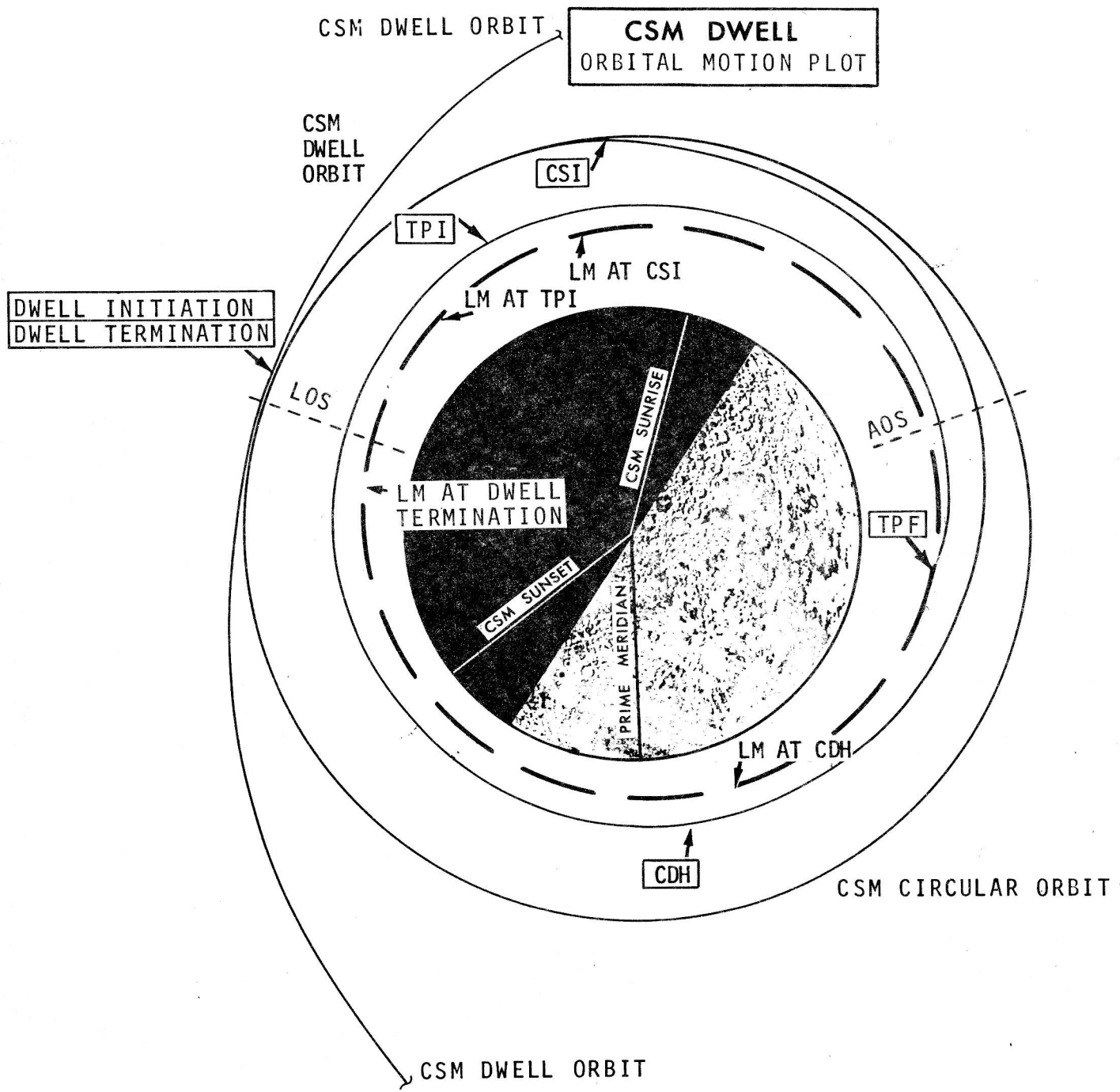
+42 TPF

BEFORE STEADY STATE
N49>(+00080,+00050):REJECT/REPEAT
AFTER STEADY STATE
N49>(+00030,+00020):REJECT/REPEAT

TPI-ELEVATION OPTION			
INPUT	37	TPI GETI	
	55	PROCEED ON DISPLAYED GETI	
		INTEG OPT +00000	ELEVATION +208.30
RECYCLE	37	TPI GETI	
	58	PROCEED ON DISPLAYED GETI	
		PERILUNE ALT	TPI ΔV
81	TPI ΔV-LV		
FINAL COMP	37	TPI GETI	
	55	PROCEED ON DISPLAYED GETI	
		INTEG OPT +00000	ELEVATION +130.00
58	PERILUNE ALT	TPI ΔV	TPF ΔV
81	TPI ΔV-LV		

MCC COMPUTATION			
FIN COMP	81	MCC1 ΔV-LV	

MCC COMPUTATION			
FIN COMP	81	MCC2 ΔV-LV	



CSM DWELL
ORBITAL MOTION PLOT

DWELL INITIATION
DWELL TERMINATION

CSM DWELL ORBIT

CSM
DWELL
ORBIT

CSI

TPI

LM AT CSI

LM AT TPI

LOS

LM AT DWELL
TERMINATION

CSM SUNSET

PRIME MERIDIAN

CSM SUNRISE

AOS

TPF

LM AT CDH

CDH

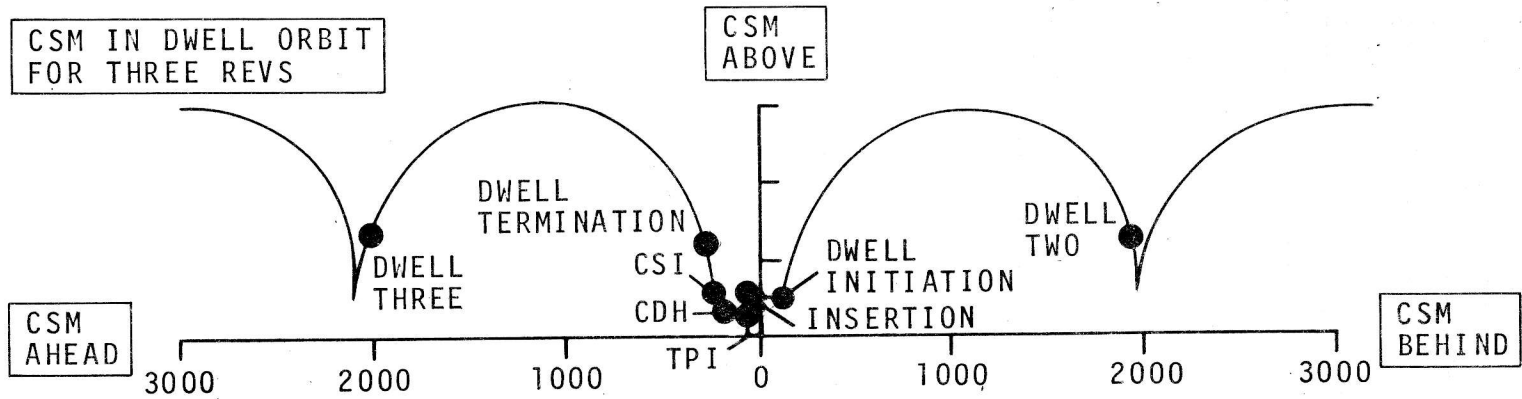
CSM CIRCULAR ORBIT

CSM DWELL ORBIT

CSM DWELL
RELATIVE MOTION PLOT

LM CENTERED

DATE 9/18/72



CSM DWELL
RENDEZVOUS

**CSM DWELL
TIMELINE**

DWELL INITIATION P30 PAD

SET STARS	D	W	E	L	L	I	PURPOSE
	S	P	S/G	&	N		PROP/GUID
	+						WT N47
R ALIGN		0	0				P TRIM N48
P ALIGN		0	0				Y TRIM
Y ALIGN	+	0	0				HRS GETI
	+	0	0	0			MIN N33
	+	0					SEC
ULLAGE							ΔV_x N81
							ΔV_y
							ΔV_z
	X	X	X				R
	X	X	X				P
	X	X	X				Y
OTHER							
REMAIN IN	+						H _A N44
THE DWELL							H _P
ORBIT FOR	+						ΔV_T
<input type="checkbox"/> REVS	X	X	X				BT
	X						ΔV_C

P32 INITIALIZATION PAD

N11	CSI GETI	+	:	:	:	:
	N	+	0	0	0	0 1
N55	ELEV &	+	2	0	8	3 0
	180° OPT	+	1	3	0	0 0
N37	TPI GETI	+	:	:	:	:

POWER DOWN SIM (SEE EXPS/EVA CHECKLIST)

INSERTION

MSFN UPLINK: LM S.V.
MSFN UPDATE: DWELL INITIATION P30 PAD (COPY)
P32 INITIALIZATION PAD (COPY)

P30; P40

DWELL INITIATION BURN

P00

-15

0

DWELL TWO P30 PAD

	D	W	E	L	L	2	PURPOSE
SET STARS				G	&	N	PROP/GUID
	+						WT N47
R ALIGN		0	0				P TRIM N48
P ALIGN		0	0				Y TRIM
Y ALIGN	+	0	0				HRS GETI
	+	0	0	0			MIN N33
	+	0					SEC
ULLAGE							ΔV_X N81
							ΔV_Y
							ΔV_Z
	X	X	X				R
	X	X	X				P
	X	X	X				Y
	+						H _A N44
							H _P
	+						ΔVT
	X	X	X				BT
	X						ΔVC

MSFN UPDATE: DWELL TWO P30 PAD (COPY)
 P32 INITIALIZATION PAD (COPY)

P32 INITIALIZATION PAD

N11	CSI GETI	+		:	:	.
	N	+	0	0	0	1
N55	ELEV \downarrow	+	2	0	8	3
	180° OPT	+	1	3	0	0
N37	TPI GETI	+		:	:	.

P52, OPT 3
 P00

P30; P41

DWELL TWO BURN

P00

-9

0

**THIS PAGE IS FOR A
THREE REV DWELL
ONLY.**

**IF DWELL TERMINATION
IS THE NEXT BURN,
GO TO PAGE 27.**

MSFN UPDATE: DWELL THREE P30 PAD(COPY)
P32 INITIALIZATION PAD(COPY)

P52, OPT 3
P00

P30; P41

DWELL THREE BURN

P00

DWELL THREE P30 PAD

	D	W	E	L	L	3	PURPOSE
SET STARS			/G	&	N		PROP/GUID
	+						WT N47
R ALIGN		0	0	.			P TRIM N48
P ALIGN		0	0	.			Y TRIM
Y ALIGN	+	0	0				HRS GETI
	+	0	0	0			MIN N33
	+	0		.			SEC
ULLAGE					.		ΔV_x N81
					.		ΔV_y
					.		ΔV_z
	X	X	X				R
	X	X	X				P
	X	X	X				Y
	+				.		H _A N44
					.		H _P
	+				.		ΔV_T
	X	X	X	.			BT
	X						ΔV_C

P32 INITIALIZATION PAD

N11	CSI GETI	+		:	:	.
	N	+	0	0	0	0 1
N55	ELEV 4	+	2	0	8	3 0
	180° OPT	+	1	3	0	0 0
N37	TPI GETI	+		:	:	.

DWELL TERMINATION PAD

	D	W	E	L	L	T	PURPOSE
	S	P	S	G	&	N	PROP/GUID
SET STARS	+						WT N47
R ALIGN		0	0				P TRIM N48
P ALIGN		0	0				Y TRIM
Y ALIGN	+	0	0				HRS GETI
	+	0	0	0			MIN N33
	+	0					SEC
ULLAGE							ΔV_X N81
							ΔV_Y
							ΔV_Z
	X	X	X				R
	X	X	X				P
OTHER	X	X	X				Y
BURN INCLUDES	+						H _A N44
PLANE CHANGE							H _P
COMPONENT	+						ΔVT
	X	X	X				BT
	X						ΔVC

MSFN UPDATE: DWELL TERMINATION
 P30 PAD INCLUDING
 OUT OF PLANE COMPONENT (COPY)
 P32 INITIALIZATION PAD (COPY)

P32 INITIALIZATION PAD

N11	CSI GETI	+		:	:	:	:
	N	+	0	0	0	0	1
N55	ELEV *	+	2	0	8	3	0
	180° OPT	+	1	3	0	0	0
N37	TPI GETI	+		:	:	:	:

P52, OPT 3
 P00
 V48(11102,X1111)
 P30; P40

DWELL TERMINATION BURN

-15

0

P32 (LOAD P32 INITIALIZATION PAD)

BEFORE STEADY STATE
 N49>(+00200,+00120):REJECT/REPEAT
 AFTER STEADY STATE
 N49>(+00030,+00020):REJECT/REPEAT

FINAL COMP(COPY); P40m

CSI BURN

P76m; P36m(COPY)

BEFORE STEADY STATE
 N49>(+00080,+00050):REJECT/REPEAT
 AFTER STEADY STATE
 N49>(+00030,+00020):REJECT/REPEAT

FINAL COMP(COPY), **TO BYPASS P52m AND P4Xm, ZERO DVY**
 P52m; P4Xm

PLANE CHANGE

TO BYPASS GYRO TORQUE: ENTER ON F 50 25
 TO GYRO TORQUE: SEE P. 38

P76m
 P33m(COPY)

RECYCLE(COPY)

FINAL COMP(COPY); P40m

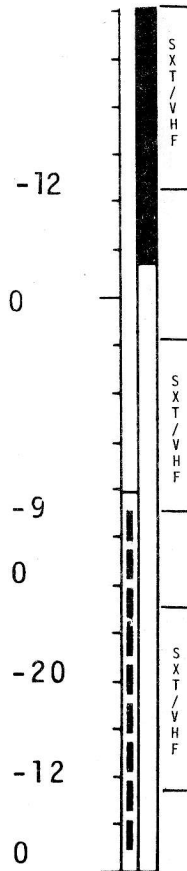
CDH BURN

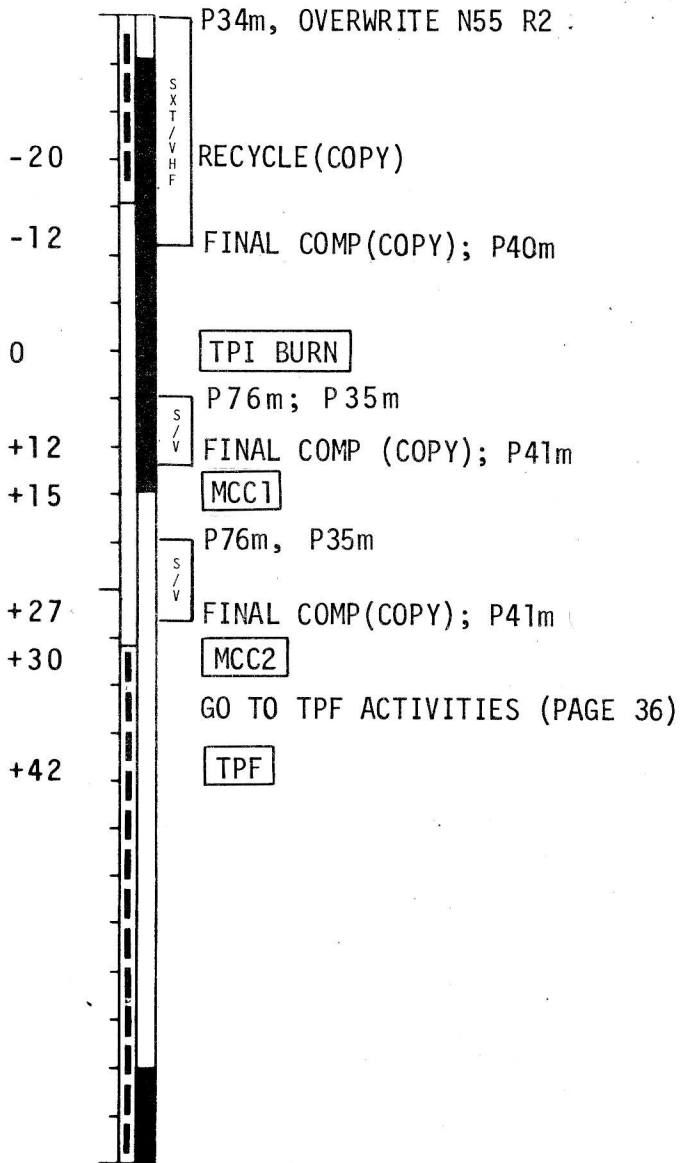
P76m

CSI COMPUTATION			
FINAL COMP	90	Y	Y DOT
	81	CSI ΔV-LV	LM Y DOT
		.	.
		.	+0000.0

PLANE CHANGE COMPUTATION			
INPUT	33	PC GETI	PROCEED ON DISPLAYED GETI
FINAL COMP	90	Y	Y DOT
	81	PC ΔV-LV	LM Y DOT
		.	.
		+0000.0	+0000.0

CDH COMPUTATION			
INPUT	13	CDH GETI	PROCEED ON DISPLAYED GETI
RECYCLE	90	Y	Y DOT
	81	CDH ΔV-LV	LM Y DOT
		.	.
FINAL COMP	90	Y	Y DOT
	81	CDH ΔV-LV	LM Y DOT
		.	.
		.	.





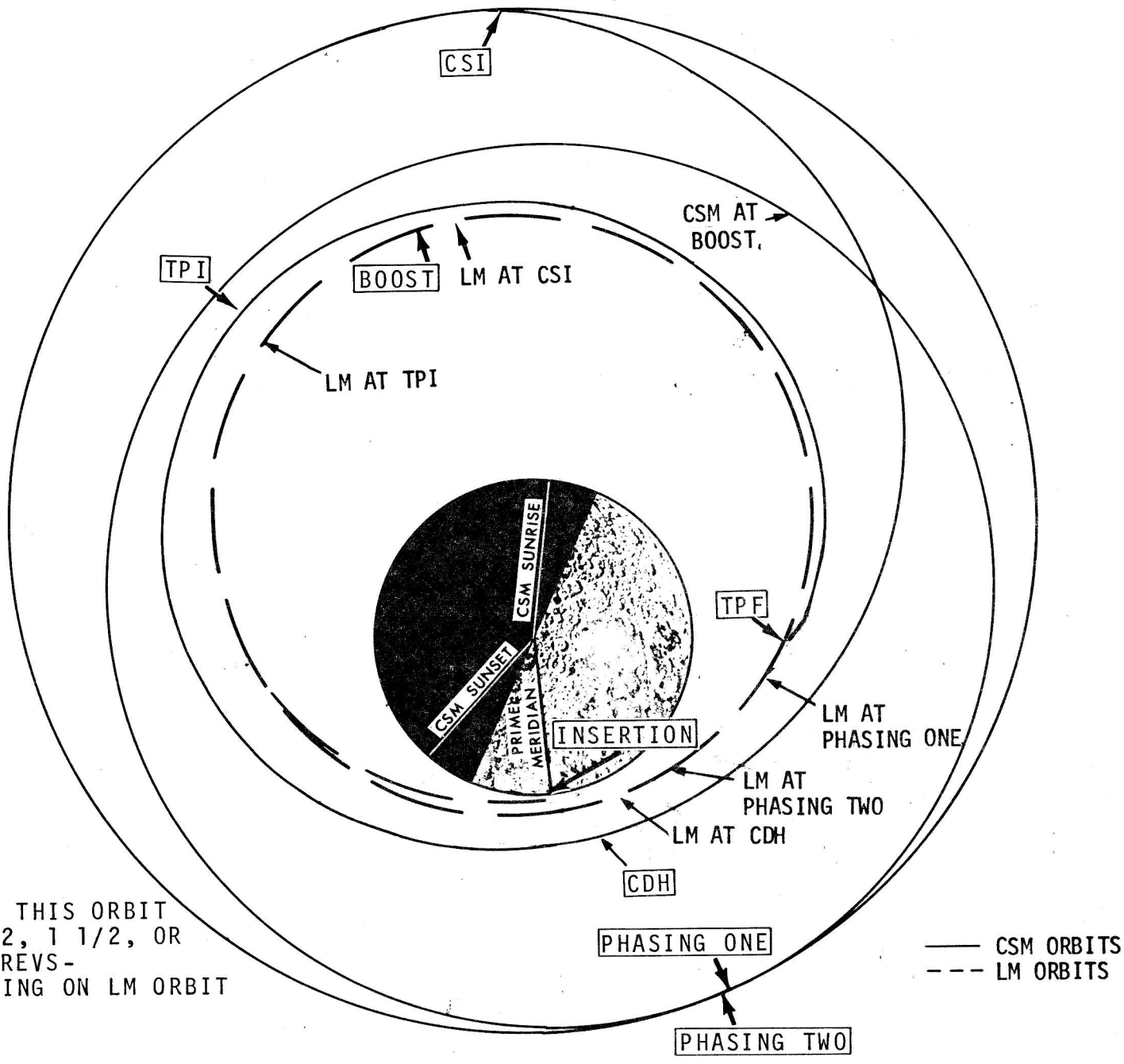
BEFORE STEADY STATE
N49>(+00080,+00050):REJECT/REPEAT
AFTER STEADY STATE
N49>(+00030,+00020):REJECT/REPEAT

TPI ELEVATION OPTION			
INPUT	37	TPI GETI PROCEED ON DISPLAYED GETI	
	55	INTEG OPT +00000	ELEVATION +208.30
RECYCLE	37	TPI GETI PROCEED ON DISPLAYED GETI	
	58	PERILUNE ALT	TPI ΔV
	81	TPI ΔV-LV	TPF ΔV
FINAL COMP	37	TPI GETI PROCEED ON DISPLAYED GETI	
	55	INTEG OPT +00000	ELEVATION +130.00
	58	PERILUNE ALT	TPI ΔV
	81	TPI ΔV-LV	TPF ΔV

MCC COMPUTATION			
FIN COMP	81	MCC1 ΔV-LV	

MCC COMPUTATION			
FIN COMP	81	MCC2 ΔV-LV	

**MANUAL INSERTION
ORBITAL MOTION PLOT**

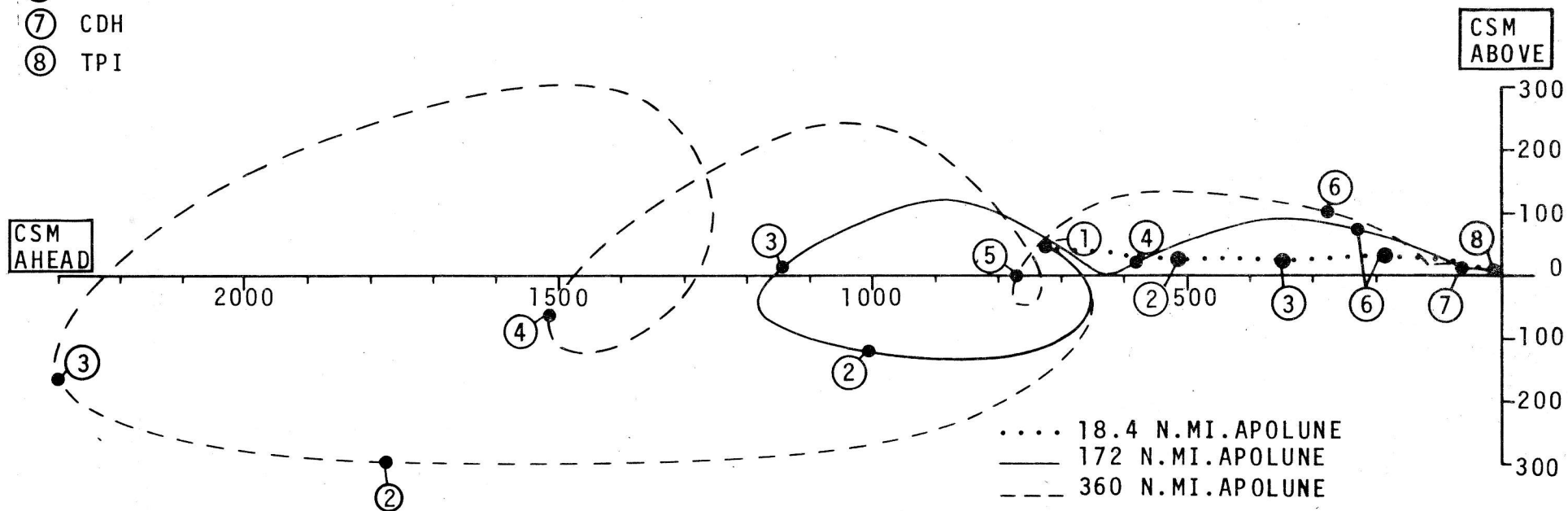


CSM IN THIS ORBIT
FOR 1/2, 1 1/2, OR
2 1/2 REVS-
DEPENDING ON LM ORBIT

**MANUAL INSERTION
RELATIVE MOTION PLOTS**

LM CENTERED

- ① INSERTION
- ② LM BOOST
- ③ PHASING ONE
- ④ PHASING TWO (NOMINALLY ZERO)
- ⑤ PHASING THREE (NOMINALLY ZERO)
- ⑥ CSI
- ⑦ CDH
- ⑧ TPI



MANUAL INS
RENDEZVOUS

**MANUAL INSERTION
TIMELINE**

POWER DOWN SIM (SEE EXPS/EVA CHECKLIST)

INSERTION

MSFN UPLINK: LM S.V.

P52, OPT 3
P00

LM BOOST P76	33 84	LM GETI-BOOST : : .	LM BOOST ΔV-LV +0010.0	+0000.0	+0000.0
-----------------	----------	---------------------	---------------------------	---------	---------

LM BOOST

VERIFY LM BOOST BURN
P76

MSFN UPDATE: PHASING P30 PAD (COPY)
P32 INITIALIZATION PAD (COPY)

P30; P40

PHASING ONE

PHASING P30 PAD

SET STARS	P H A S E 1					PURPOSE
	S	P	S/G	&	N	PROP/GUID
	+					WT N47
R ALIGN		0	0	.		P TRIM N48
P ALIGN		0	0	.		Y TRIM
Y ALIGN	+	0	0			HRS GETI
	+	0	0	0		MIN N33
	+	0		.		SEC
ULLAGE				.		ΔV _X N81
				.		ΔV _Y
				.		ΔV _Z
	X	X	X			R
	X	X	X			P
OTHER	X	X	X			Y
	+			.		H _A N44
				.		H _P
	+			.		ΔVT
	X	X	X	.		BT
	X			.		ΔVC

P32 INITIALIZATION PAD

N11	CSI GETI	+		:	:	.
	N	+	0	0	0	0 1
N55	ELEV ↙	+	2	0	8	3 0
	180° OPT	+	1	3	0	0 0
N37	TPI GETI	+		:	:	.

-110

-15

0

Ⓐ

P52, OPT 3
P00

MSFN UPDATE:
PHASING P30 PAD
(COPY)
P32 INITIALIZATION
PAD (COPY)

P30; P41

PHASING

P00

IF THE NEXT BURN IS NOT CSI,
RETURN TO Ⓐ

PHASING TWO P30 PAD

SET STARS	P H A S E 2					PURPOSE
			/G	&	N	PROP/GUID
	+					WT N47
R ALIGN		0	0	.		P TRIM N48
P ALIGN		0	0	.		Y TRIM
Y ALIGN	+	0	0			HRS GETI
	+	0	0	0		MIN N33
	+	0		.		SEC
ULLAGE				.		ΔV_X N81
				.		ΔV_Y
				.		ΔV_Z
	X	X	X			R
	X	X	X			P
	X	X	X			Y
	+			.		H _A N44
				.		H _P
	+			.		ΔVT
	X	X	X	.		BT
	X			.		ΔVC

PHASING THREE P30 PAD

SET STARS	P H A S E 3					PURPOSE
			/G	&	N	PROP/GUID
	+					WT N47
R ALIGN		0	0	.		P TRIM N48
P ALIGN		0	0	.		Y TRIM
Y ALIGN	+	0	0			HRS GETI
	+	0	0	0		MIN N33
	+	0		.		SEC
ULLAGE				.		ΔV_X N81
				.		ΔV_Y
				.		ΔV_Z
	X	X	X			R
	X	X	X			P
	X	X	X			Y
	+			.		H _A N44
				.		H _P
	+			.		ΔVT
	X	X	X	.		BT
	X			.		ΔVC

P32 INITIALIZATION PAD

N11	CSI GETI	+	:	:	.
	N	+	0	0	0 0 1
N55	ELEV \downarrow	+	2	0	8 3 0
	180° OPT	+	1	3	0 0 0
N37	TPI GETI	+	:	:	.

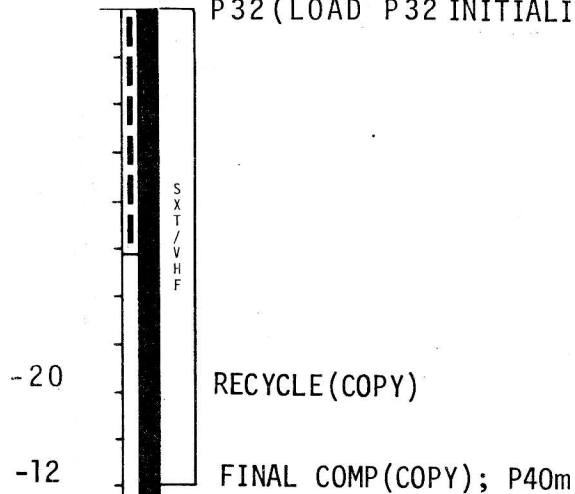
P32 INITIALIZATION PAD

N11	CSI GETI	+	:	:	.
	N	+	0	0	0 0 1
N55	ELEV \downarrow	+	2	0	8 3 0
	180° OPT	+	1	3	0 0 0
N37	TPI GETI	+	:	:	.

-9
0

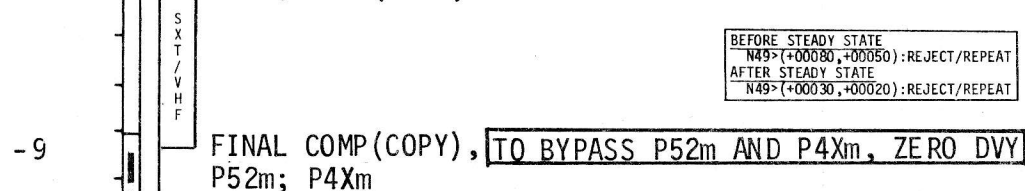
V48(11102,X1111)
P32 (LOAD P32 INITIALIZATION PAD)

BEFORE STEADY STATE
N49>(+00200,+00120):REJECT/REPEAT
AFTER STEADY STATE
N49>(+00030,+00020):REJECT/REPEAT



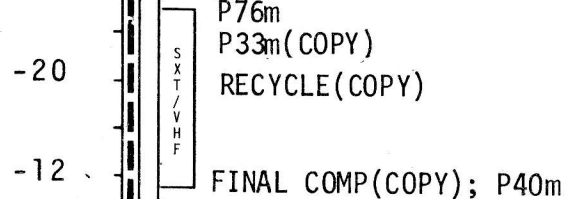
CSI BURN
P76m; P36m (COPY)

BEFORE STEADY STATE
N49>(+00080,+00050):REJECT/REPEAT
AFTER STEADY STATE
N49>(+00030,+00020):REJECT/REPEAT



PLANE CHANGE
P76m
P33m (COPY)

TO BYPASS GYRO TORQUE: ENTER ON F 50 25
TO GYRO TORQUE: SEE P. 38

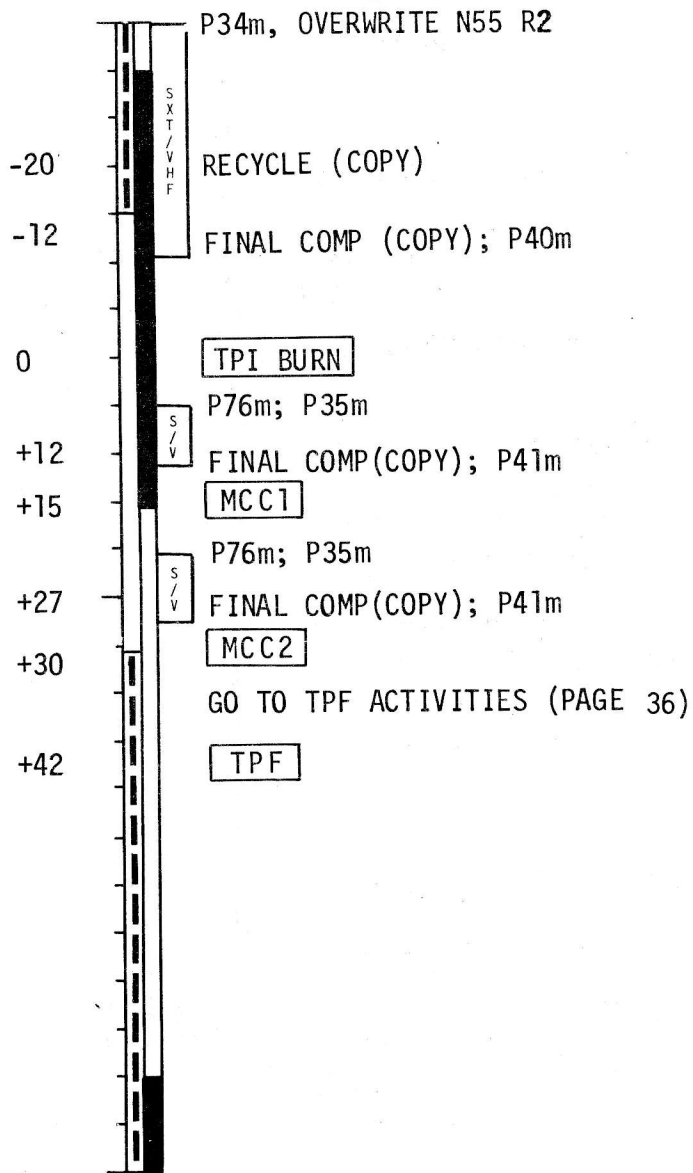


CDH BURN
P76m

CSI COMPUTATION				
RECYCLE	90	Y	Y DOT	LM Y DOT
	81	CSI ΔV-LV	.	+0000.0
FINAL COMP	90	Y	Y DOT	LM Y DOT
	81	CSI ΔV-LV	.	+0000.0

PLANE CHANGE COMPUTATION				
INPUT	33	PC GETI	PROCEED ON DISPLAYED GETI	
FINAL COMP	90	Y	Y DOT	LM Y DOT
	81	PC ΔV-LV	.	+0000.0

CDH COMPUTATION				
INPUT	13	CDH GETI	PROCEED ON DISPLAYED GETI	
RECYCLE	90	Y	Y DOT	LM Y DOT
	81	CDH ΔV-LV	.	.
FINAL COMP	90	Y	Y DOT	LM Y DOT
	81	CDH ΔV-LV	.	.



BEFORE STEADY STATE
 N49>(+00080,+00050):REJECT/REPEAT
 AFTER STEADY STATE
 N49>(+00030,+00020):REJECT/REPEAT

TPI-ELEVATION OPTION			
INPUT	37	TPI GETI	
	55	INTEG OPT +00000	ELEVATION * +208.30
RECYCLE	37	PROCEED ON DISPLAYED GETI	
	58	PERILUNE ALT	TPF ΔV
	81	TPI ΔV-LV	
FINAL COMP	37	TPI GETI	
	55	INTEG OPT +00000	ELEVATION * +130.00
	58	PERILUNE ALT	TPF ΔV
	81	TPI ΔV-LV	

MCC COMPUTATION			
FIN COMP	81	MCC1 ΔV-LV	

MCC COMPUTATION			
FIN COMP	81	MCC2 ΔV-LV	

TPF ACTIVITIES

+30

(11102)
(X1111)

MCC2

P76m; P79m; P00
V49 MNVR TO X-AXIS TRACK ATTITUDE

ACQ MSFN

PERFORM PRE-DOCK CHECKLIST

IF CSM ACTIVE

P47 AT 1.25 N.M.

SEC PRPLNT FUEL PRESS(4)-OPEN

V83E ←

N83E

KEY REL

UTILITY PWR-ON (VERIFY)
TV-ON
DAC-ON
LM PHOTOS WITH DAC/TV

TPF

EMS MODE-STBY
EMS FUNC-OFF

EXT RNDZ LT-OFF
LM STATION KEEP

DAC/TV-OFF

+42

PRE-DOCK CHECKLIST

MAN ATT(3)-RATE CMD(VERIFY)
LIMIT CYCLE-OFF(VERIFY)
ATT DB-MIN
RATE-LOW(VERIFY)
TRANS CONTR PWR-ON(UP)
ROT CONTR PWR DIRECT(BOTH)-MNA/MNB
SC CONT-CMC(VERIFY)

AUTO RCS SEL(16)-MNA/MNB
CB DOCK PROBE(2)-CLOSED
PROBE RETR(2)-OFF(VERIFY)
PROBE EXTD/REL-RETR
PROBE EXTD/REL TB(2)-GRAY(VERIFY)
(IF TB NOT GRAY, GO TO PG S/2-13,E)
CB SECS LOGIC(2)-CLOSED(VERIFY)
CB SECS ARM(2)-CLOSED
EXT LIGHTS RUN/EVA-ON(UP)(VERIFY)
COAS PWR-ON(UP)(VERIFY)

BRAKING GATES

R,NM	R,FPS	RETICLE ANG,DEG	R,FT
1.50	45	.08	9000
1.00	30	.13	6000
.50	20	.26	3000
.25	10	.54	1500
.08	5	1.60	500
.05		2.70	300
.03		4.00	200
.02		8.50	100.

V49 MNVR TO SIM BAY INSPECTION ATTITUDE (319,254,000)

V49 MNVR TO DOCKING ATTITUDE (180,285,0)

DOCKING ATTITUDE
VERIFY HGA

CUE MSFN FOR LOGIC ARM
SECS LOGIC (BOTH)-ON(UP)
MSFN GO FOR PYRO ARM
SECS PYRO ARM (2)-ON(UP)

P47
DAC/TV-ON
LM MNVR TO DOCKING ATTITUDE
TRANSLATE TO CAPTURE LATCH
PERFORM DOCKING CHECKLIST

DOCKING

DAC/TV-OFF
POO

V48 (61111)
(X1111)

CMC MODE-AUTO
RNDZ XPONDER-OFF
GO TO VOLUME II OF THE FLIGHT PLAN

DOCKING CHECKLIST

AT CAPTURE

PROBE EXT/REL TB(2)-BP(VERIFY)
(IF TB NOT BP, GO TO PG S/2-11, A)
REPORT CAPTURE TO LM
SC CONT-CMC(VERIFY)
CMC MODE-FREE
ALLOW PROBE TO DAMP S/C MOTION(10 SEC)
WHEN WITHIN $\pm 3^\circ$ OF DOCKING ATTITUDE
PROBE RETRACT SEC-1 (PRIM-2 IF REQ)

AT DOCK LATCH

PROBE EXT/REL TB(2)-GRAY

AT HARD DOCK

SECS PYRO ARM (2) - SAFE
SECS LOGIC (BOTH) - OFF
CB SECS ARM (2) - OPEN
CB DOCK PROBE (2) - OPEN
THC - LOCKED
RHC - LOCKED
BMAG MODE (3) - RATE 2(VERIFY)
PROBE EXT/REL - OFF
PROBE RETRACT (2) - OFF
EXT RUN/EVA LIGHT - OFF
EXT RNDZ LIGHT - OFF
COAS PWR - OFF
AUTO RCS SEL ROLL (4)-OFF
TRANS CONTR PWR-OFF
ROT CONTR PWR DIRECT (BOTH)-OFF
VHF RANGING OFF

(61111)
(X1111)

SPS PLANE CHANGE
(G&C CHECKLIST P. G/4-2)

36.1 P52 F 06 22
 PRO
 F 50 25 (00020)
 ALIGN GDC TO 90° OR 270° ROLL
 0° OR 180° PITCH
 0° YAW
 LIMIT CYCLE-ON
 ATT DB-MIN
 RATE LOW
 BMAG MODE(3)-ATT1/RATE2
 SC CONT-SCS
 PRO
 16 20
 MONITOR TORQUING
 * * * * *
 IF RESTART OCCURS: CONTINUE
 JN P. 39
 * * * * *
 P40 F 50 18
 BMAG MODE(3)-RATE2
 SC CONT-CMC
 PRO
 06 18
 MONITOR MNVR
 PERFORM P40, STARTING AT STEP 5

36.2 P76 F 06 33
 PRO
 F 06 84
 PRO
 36.4 P20 F 50 18
 SC CONT-CMC
 PRO
 06 18
 MONITOR MNVR
 * * * * *
 IF AUTO MNVR INTERRUPTED:
 MNVR TO 0° YAW ON GDC
 V32E
 * * * * *
 36.5 P52 F 06 22
 PRO
 F 50 25 (00020)
 SC CONT-SCS
 BMAG MODE(3)-ATT1/RATE2
 PRO
 16 20
 MONITOR TORQUING
 * * * * *
 IF RESTART OCCURS: CONTINUE
 ON P. 39
 * * * * *
 P33 F 06 13
 BMAG MODE(3)-RATE2
 SC CONT-CMC
 CONTINUE IN P33, STEP 3

PRE-PLANE CHANGE PULSE TORQUING
RESTART RECOVERY (EMP 518)

P52 F 50 25 (00020)
V41 N20E
F 21 22
V33E
41 NO ATT LITE-ON
F 50 25 (00020)
V40E
NO ATT LITE-OFF
V21 N1E 1214E E
V71E 24E 1733E
V21E 303E 24E
V33E
F 50 25 (00020)
V21 N46E 11103E
V46E
PRO
P40 F 50 18
BMAG MODE(3)-RATE2
SC CONT-CMC
PRO
PERFORM P40, STARTING AT
STEP 5
P76 F 06 33
PRO
F 06 84
PRO
P20 F 50 18
SC CONT-CMC
PRO
06 18
MONITOR MNVR

P52 F 06 22
PRO
F 50 25 (00020)
V37E 52E
MNVR TO ACQUIRE STARS
PERFORM P52, OPT 1,
COURSE ALIGN
F 37
33E
P33 F 50 25 00017
PRO
F 50 18
PRO
06 18
MONITOR MNVR
F 06 13
V21 N46E 11102E
V46E
CONTINUE IN P33, STEP 3

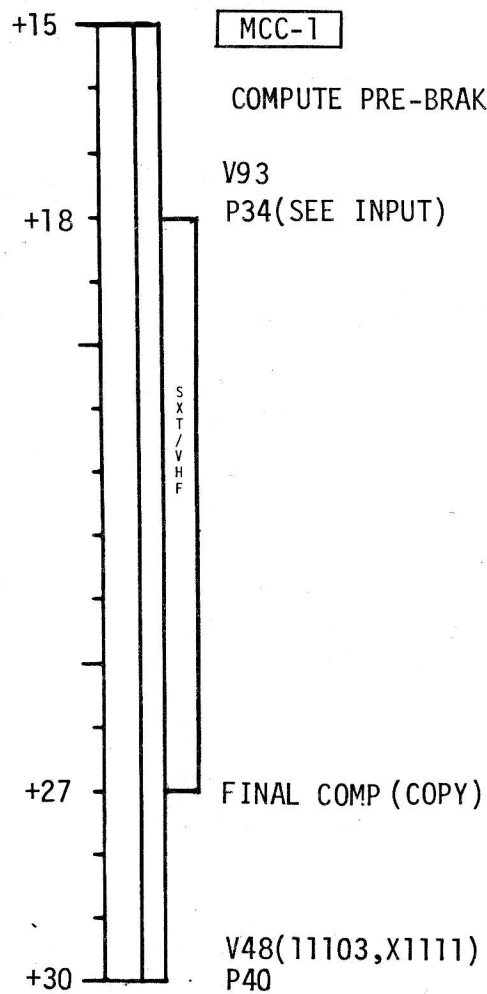
POST-PLANE CHANGE PULSE TORQUING
RESTART RECOVERY (EMP 518)

P52 F 50 25 (00020)
V41 N20E
F 21 22
V33E
41 NO ATT LITE-ON
F 50 25 (00020)
V40E
NO ATT LITE-OFF
V21 N1E 1214E E
V71E 24E 1733E
V21E 303E 24E
V33E
F 50 25 (00020)
BMAG MODE(3)-RATE2
SC CONT-CMC
PRO
P33 06 13
V37E 52E
P52
PERFORM P52, OPT 3
F 37
33E
P33
CONTINUE IN P33

DATE 9/18/72

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PRE-BRAKING SPS BURN PROCEDURES



GETI-TPI	:	:	:
ΔT: TPI-PRE-BRAKING	:	+37	00.00
GETI- PRE-BRAKING	:	:	:

TRANSFER } COMPUTATION
OBTAIN TPF ΔV FROM N58 OF TPI SOLUTION

$$\text{TRANSFER } \} = \frac{\text{TPF } \Delta V}{2}$$

TRANSFER } =

LOAD INTO N55 (R3)

PRE-BRAKING BURN COMPUTATION			
INPUT	37	COMPUTED P34 GETI	
	55	INTEG OPT +00000	ELEVATION +0000.0
FINAL COMP	55	INTEG OPT +00000	COMPUTED TRANSFER
	58	PERILUNE ALT	P34 ΔV
	81	P34 ΔV-LV	TPF ΔV

+30

P40

SPS CHECKLIST

+37

PRE-BRAKING BURN

P79; P00; V49 MNVR TO X-AXIS TRACK ATTITUDE
 ACQ MSFN HGA
 V48(11102,X1111)
 PERFORM PRE-DOCK CHECKLIST

P47 AT R=1.25 NM
 SEC PRPLNT FUEL PRESS(4)-OPEN
 V83E
 N83E] KEY REL

UTIL PWR-ON (VERIFY)
 DAC/TV-ON
 LM PHOTOS WITH DAC/T V

TPF

EMS MODE-STBY
 EMS FUNC-OFF
 EXT RNDZ LT-OFF
 LM STATION KEEP
 GO TO VOL II OF FLIGHT PLAN

PRE-DOCK CHECKLIST	
MAN ATT(3)-RATE CMD(VERIFY)	
LIMIT CYCLE-OFF(VERIFY)	
ATT DB-MIN	
RATE-LOW(VERIFY)	
TRANS CONTR PWR-ON(UP)	
ROT CONTR PWR DIRECT(BOTH)-MNA/MNB	
SC CONT-CMC(VERIFY)	
AUTO RCS SEL(16)-MNA/MNB	
CB DOCK PROBE(2)-CLOSED	
PROBE RETR(2)-OFF(VERIFY)	
PROBE EXTD/REL-RETR	
PROBE EXTD/REL TB(2)-GRAY(VERIFY)	
(IF TB NOT GRAY, GO TO PG S/2-13,E)	
CB SECS LOGIC(2)-CLOSED(VERIFY)	
CB SECS ARM(2)-CLOSED	
EXT LIGHTS RUN/EVA-ON(UP)(VERIFY)	
COAS PWR-ON(UP)(VERIFY)	

BRAKING GATES			
R,NM	Ṙ,FPS	RETICLE ANG,DEG	R,FT
1.50	45	.08	9000
1.00	30	.13	6000
.50	20	.26	3000
.25	10	.54	1500
.08	5	1.60	500
.05		2.70	300
.03		4.00	200
.02		8.50	100

IMU FAILURE RENDEZVOUS

WHEN IMU FAILURE KNOWN:
 PERFORM IMU FAILURE SWITCH CHECKLIST
 PERFORM GDC REFSMMAT DETERMINATION PROCEDURE(G/7-13)
 (IF REQD: PERFORM GDC REFSMMAT REALIGN(P52-OPT 4)(G/7-15)

MNVR TO TRACK/STAR FIELD ATT (180,280,0), ACQ HGA
 LOAD N20 AND ATT SET TW'S TO (180,280,0)
 MNVR BY NULLING ERROR NEEDLES

SET REFSMMAT FLAG(VERIFY)
 V25 N7E,77E,10000E,1E

PRE-SPS BURN SIM PREP (CUE CARD)

IMU FAILURE SWITCH CHECKLIST

IMU POWER-OFF
 FDAI SELECT-1
 FDAI SOURCE-ATT SET
 ATT SET-GDC
 ATT DB-MIN
 RATE-LOW
 SC CONT-SCS
 BMAG MODE(3)-ATT 1/RATE 2

DIRECT ASCENT RNDZ PAD				UPDATE (IF REQ'D)			
GETI	HRS	+ 0 0			+ 0 0		
LIFT-OFF	MIN	+ 0 0 0			+ 0 0 0		
	SEC	+ 0			+ 0		
GETI	HRS	+ 0 0			+ 0 0		
TPI	MIN	+ 0 0 0			+ 0 0 0		
N37	SEC	+ 0			+ 0		

COELLIPTIC RNDZ PAD				UPDATE (IF REQ'D)			
GETI	HRS	+ 0 0			+ 0 0		
LIFT-OFF	MIN	+ 0 0 0			+ 0 0 0		
	SEC	+ 0			+ 0		
GETI	HRS	+ 0 0			+ 0 0		
CSI	MIN	+ 0 0 0			+ 0 0 0		
N11	SEC	+ 0			+ 0		
GETI	HRS	+ 0 0			+ 0 0		
TPI	MIN	+ 0 0 0			+ 0 0 0		
N37	SEC	+ 0			+ 0		

MSFN UPDATE:
GO/NO GO FOR LIFT-OFF

LM LIFT-OFF
: : .

VHF RNG-RESET

LM INSERTION
: : .

P52(OPTION 3)
RECORD STAR NO. SHAFT TRUNNION

P00
MSFN UPLINK:
LM S.V.

P34(Accept MNKY)(BYPASS MNVR)
V57-LOAD R2=1

BEFORE STEADY STATE
PRE-TPI: N49 > (+00200,+00120) REJECT/REPEAT
POST-TPI: N49 > (+00080,+00050) REJECT/REPEAT
AFTER STEADY STATE
ANYTIME: N49 > (+00030,+00020) REJECT/REPEAT

VERIFY LM TRACKER LT-ON
ALIGN GDC TO N20
PERFORM GDC REFSMMAT DETERMINATION PROCEDURE
V37E00E; V96E; V21 N1E,1214E,63E;
V25 N26E,13001E,3425E,30005E; V30E

SCS BURN MANEUVER

N/A SET STARS	C	S	M	B	/	O	PURPOSE
	S	P	S	G	&	N	PROP/GUID
	+			N	/	A	WT N47
R ALIGN N / A		0	0	N	/	A	P TRIM N48
P ALIGN N / A		0	0	N	/	A	Y TRIM
Y ALIGN N / A	+	0	0				HRS GETI
	+	0	0	0			MIN N33
	+	0					SEC
ULLAGE							ΔV_X N81
4 JET, 11 SEC							ΔV_Y
							ΔV_Z
	X	X	X				R ..
	X	X	X				P
	X	X	X				Y
ΔVC	+			N	/	A	H _A N44
				N	/	A	H _P

 *IF LM BAILOUT REQ'D: *IF CSM BAILOUT REQ'D:
 * COPY P76 DATA FROM LM
 * *MSFN UPDATE:
 *33 : : . * CSM BAILOUT P30 PAD
 * *P30
 *84 . . . *P40; SET UP EMS
 * *SPS BURN CUE CARD
 *GO TO RESCUE BOOK PG 4 *CSM BAILOUT BURN
 ***** *GO TO RESCUE BOOK PG 4

P34 INPUT

37	LM GETI-TPI	: : .
55	INTEG OPT	ELEVATION J TRANSFER J
	+00000	+000.00 +130.00

IMU FAILURE
RENDEZVOUS

-25
VHF ONLY
P34 (ACCEPT MNKY)(NO SXT MARKS UNTIL TPI - 17)
V25 N7E,76E,20000E,0E
V21 N1E,301E,37777E
(V86E TO REJECT MARK)

MNVR TO SXT TRACK ATT (180,334,0)
LOAD N20 AND ATT SET TW'S TO(180,334,0)
MNVR BY NULLING ERROR NEEDLES

-17
VHF AND SXT
BEGIN SXT MARKS

* IF MARK REJECT BUTTON INADVERTENTLY PUSHED: *
* BEFORE PROCEEDING ON F 51 *
* V21 N1E,1336E,31264E *

VERIFY DSE TAPE MOTION(LBR/RCD/FWD/CMD RESET)

-10
P34 FINAL COMP
COMPARE SOLUTIONS

-8
P40
LOAD N18 VALUES IN N20 AND ATT SET TW'S
MNVR BY NULLING ERROR NEEDLES

-6
SPS CHECKLIST

P00

TPI

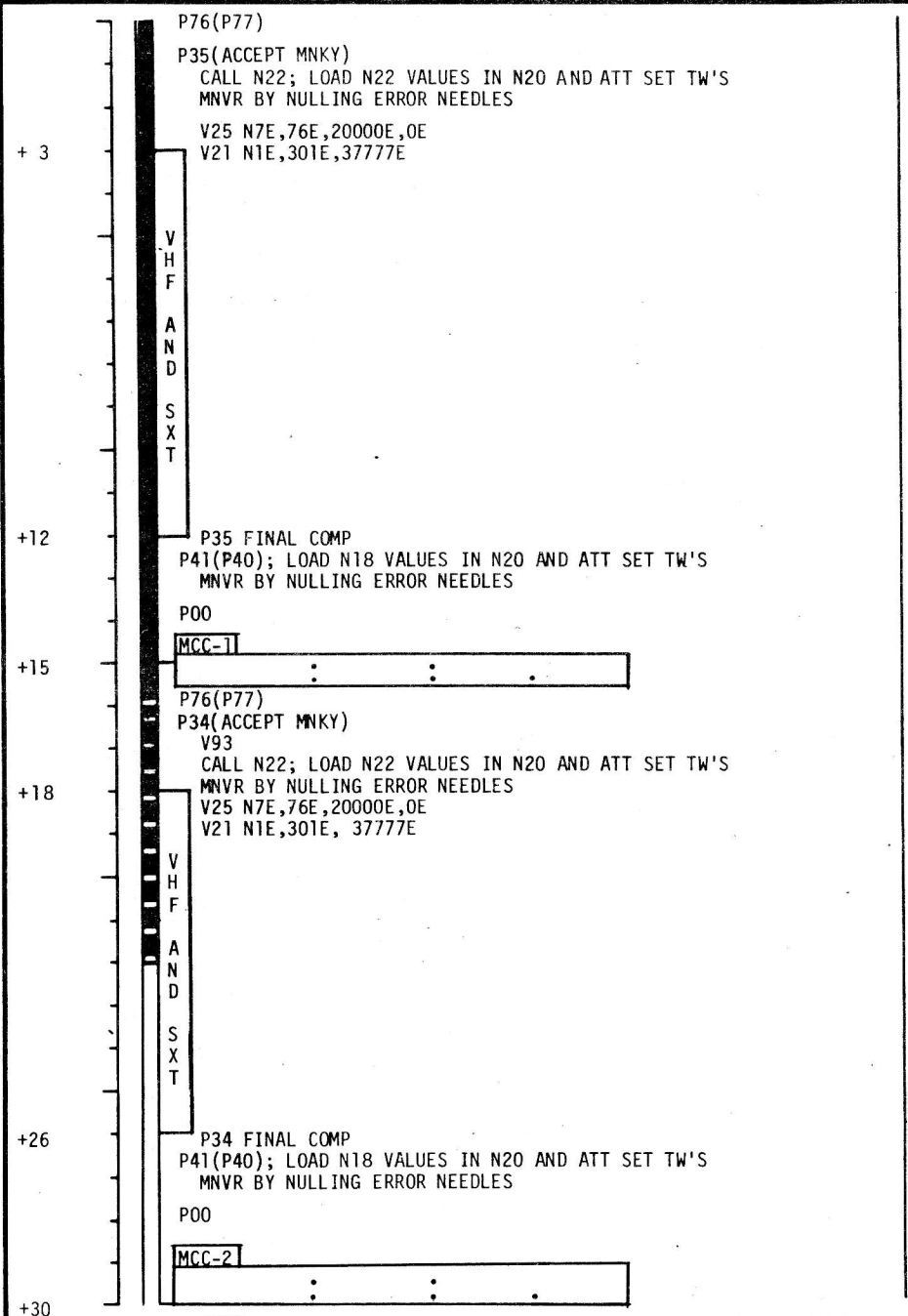
LM +75.1,-0.5,+14.1
CSM -76.1,+0.5,-12.1
(180,279,0)

GROUND TPI FOR LM

					ΔV_X
					ΔV_Y
					ΔV_Z

P34 FINAL COMP

	INTEG OPT	ELEVATION §	TRANSFER §
55	+00000	.	+130.00
58	PERILUNE ALT	TPI ΔV	TPF ΔV
81	TPI ΔV -LV	.	.
84	LM TPI ΔV -LV	.	.
P76 84	LM TPI ΔV -LV	.	.



P35 FINAL COMP

81	MCC1 ΔV-LV	.	.	.
84	LM MCC1 ΔV-LV	.	.	.
P76 84	LM MCC1 ΔV-LV	.	.	.

P34 INPUT

37	GETI-MCC2		
55	INTEG OPT +00000	ELEVATION § +000.00	TRANSFER § +040.00

P34 FINAL COMP

55	INTEG OPT +00000	ELEVATION § .	TRANSFER § +040.00
58	PERILUNE ALT	MCC2 ΔV	TPF ΔV
81	MCC2 ΔV-LV	.	.
84	LM MCC2 ΔV-LV	.	.
P76 84	LM MCC2 ΔV-LV	.	.

P76(P77)

P79

LOAD N22 VALUES IN ATT SET TW'S
MNVR BY NULLING ERROR NEEDLES

ACQ MSFN HGA

PERFORM PRE-DOCK CHECKLIST

CENTER LM IN COAS
CYCLE BMAG MODE SWITCHES-RATE 2/ATT 1 RATE 2
FDAI SOURCE-GDC(VERIFY)

IF CSM ACTIVE:

AT R=1.25 NM; LOAD EMS WITH -(100+TPFΔV)
FOR DSKY DISPLAY OF VHF RANGE:
V25 N7E,75E,100E,1E; V87E; V16 N2E,3703E
SEC PRPLNT FUEL PRESS(4)-OPEN
EMS FUNC-AV
EMS MODE-NORMAL

TPF

LM 30.9 (TOTAL)
CSM 32.7 (TOTAL)
180,285,0

EMS MODE-STBY
EMS FUNC-OFF
EXT RNDZ LT-OFF

LM STATION KEEP

P00

CUE MSFN FOR LOGIC ARM
SECS LOGIC(BOTH)-ON(UP)
MSFN GO FOR PYRO ARM
SECS PYRO ARM(2)-ON(UP)

LM MNVR TO DOCKING ATTITUDE

TRANSLATE TO CAPTURE LATCH
PERFORM DOCKING CHECKLIST

DOCKING

PRE-DOCK CHECKLIST

FDAI SOURCE-GDC
LIMIT CYCLE-OFF(VERIFY)
TRANS CONTR PWR-ON(UP)
ROT CONTR PWR DIRECT(BOTH)-MNA/MNB
AUTO RCS SEL(16)-MNA/MNB
CB DOCK PROBE(2)-CLOSED
PROBE RETRACT(2)-OFF(VERIFY)

PROBE EXTD/REL - RETR
PROBE EXTD/REL TB (2) - GRAY (VERIFY)
(IF TB NOT GRAY, GO TO PG S/2-13,E)
CB SECS LOGIC (2) - CLOSED (VERIFY)
CB SECS ARM (2) - CLOSED
EXT-LIGHTS RUN/EVA - ON (UP) (VERIFY)
COAS PWR - ON (UP) (VERIFY)

BRAKING GATES

R,NM	R,FPS	RETICLE ANG,DEG	R,FT
1.50	45	.08	9000
1.00	30	.13	6000
.50	20	.26	3000
.25	10	.54	1500
.08	5	1.60	500
.05		2.70	300
.03		4.00	200
.02		8.50	100

DOCKING CHECKLIST

AT CAPTURE

PROBE EXTD/REL TB (2) - BP (VERIFY)
(IF TB NOT BP, GO TO PG S/2-11, A)
REPORT CAPTURE TO LM
BMAG MODE (3) - RATE 2
ALLOW PROBE TO DAMP SC MOTION (10 SEC)
WHEN WITHIN ± 3° OF DOCKING ATTITUDE
PROBE RETRACT SEC - 1 (PRIM - 2 IF REQ'D)

AT DOCK LATCH

PROBE EXTD/REL TB (2) - GRAY.

AT HARD DOCK

SECS PYRO ARM (2) - SAFE
SECS LOGIC (BOTH) - OFF
CB SECS ARM (2) - OPEN
CB DOCK PROBE (2) - OPEN
THC - LOCKED
RHC - LOCKED
EXT RUN/EVA LIGHT - OFF
EXT RNDZ LIGHT - OFF
COAS PWR - OFF
LIMIT CYCLE - ON
ATT DB - MAX
BMAG MODE (3) - ATT 1/RATE 2
AUTO RCS SEL ROLL(4)-OFF
THC PWR - OFF
RHC PWR DIR (2) - OFF
PROBE EXTD/REL - OFF
PROBE RETRACT (2) - OFF
VHF RANGING-OFF

+42

SPS RESCUE BURN TABLE

ENGINE LIMITS	P OR Y RATES	ATT DEVIATION	MANUAL START ACTION	RESIDUALS
LOOSE	10°/SEC COMPLETE	±10° COMPLETE	START IF ΔV TO GO >12 FPS	TRIM ALL AXES TO 0.2 FPS

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SPS RESCUE
BURN TABLE