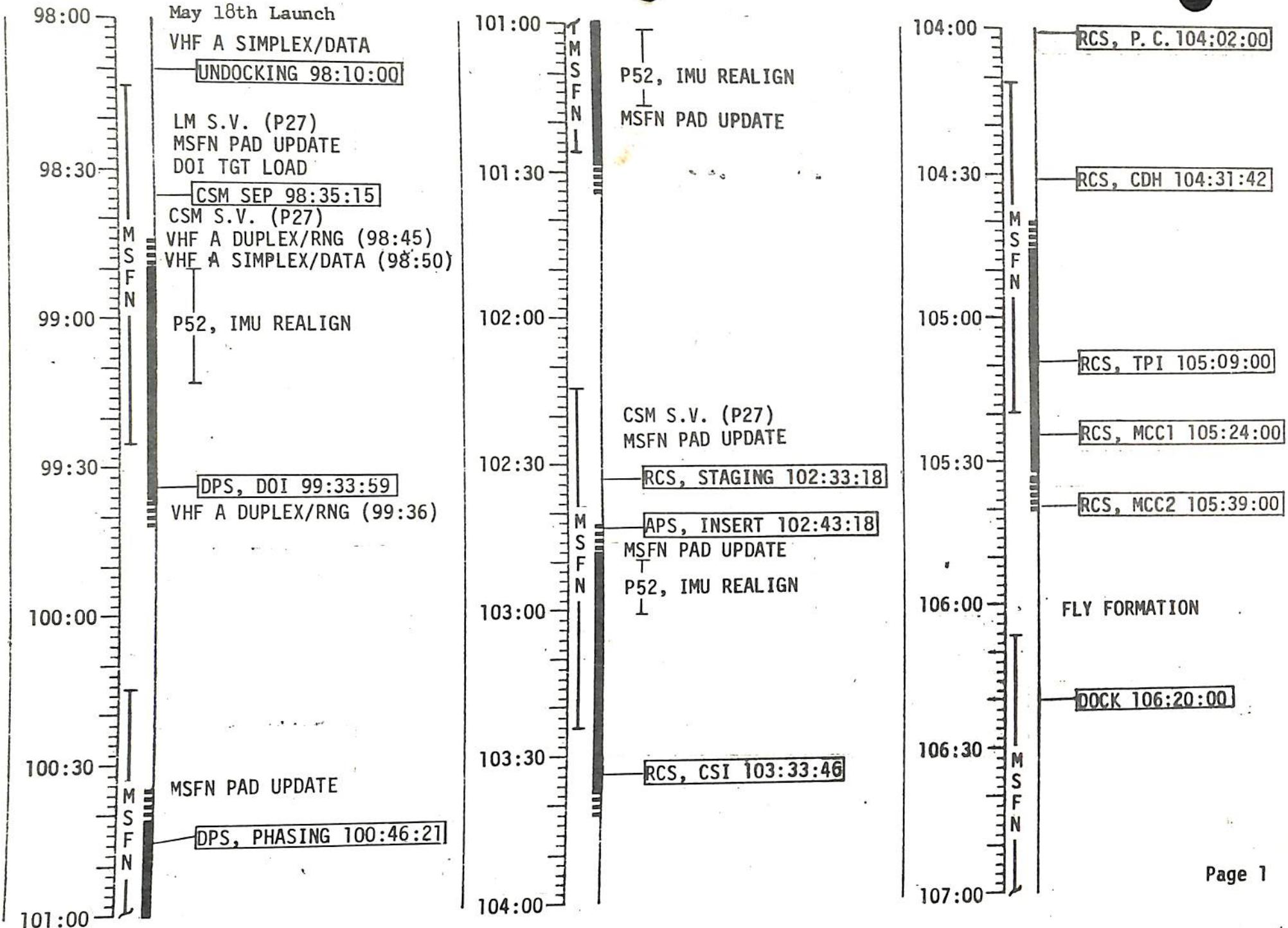
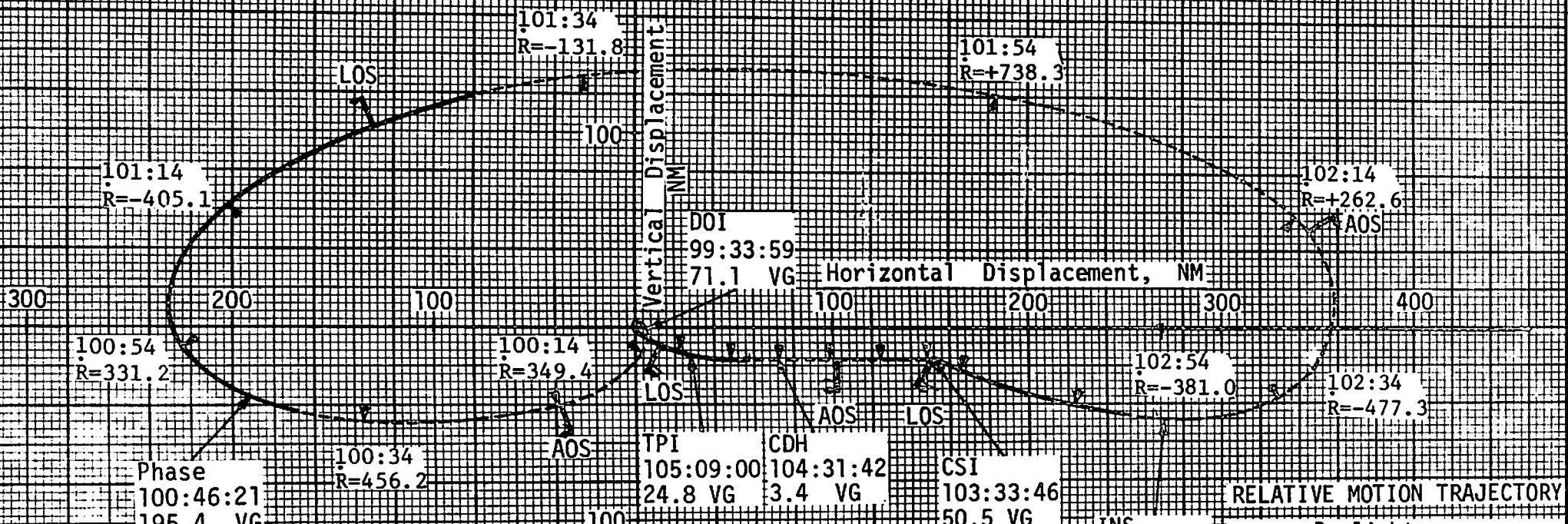


APOLLO 10	
LM RENDEZVOUS	
PART NO.	S/N
SKB32100079-390	1002



APRIL 21



RELATIVE MOTION TRAJECTORY  
Daylight  
Darkness  
20 Minute time marks  
(starting at DOI)  
MSFN Coverage

MISSION F

RELATIVE MOTION TRAJECTORY  
CSM CENTERED CURVILINEAR CO-ORD

NOMINAL

P30 LM MANEUVER

																				PURPOSE				
+ 0 0		+ 0 0			+ 0 0			+ 0 0		+ 0 0			+ 0 0		+ 0 0			+ 0 0		HR	N33			
+ 0 0 0		+ 0 0 0			+ 0 0 0			+ 0 0 0		+ 0 0 0			+ 0 0 0		+ 0 0 0			+ 0 0 0		MIN	TIG			
+ 0		+ 0		o	+ 0		o	+ 0		+ 0		o	+ 0		+ 0		o	+ 0		SEC				
				o			o					o								ΔVX	N81			
				o			o					o								ΔVY	LOCAL			
				o			o					o								ΔVZ	VERT			
+ 0		+ 0			+ 0			+ 0		+ 0			+ 0		+ 0			+ 0		ΔVR				
X X X o		X X X o			X X X o			X X X o		X X X o			X X X o		X X X o			X X X o		BT				
X X X		X X X			X X X			X X X		X X X			X X X		X X X			X X X		R	FDAI			
X X X		X X X			X X X			X X X		X X X			X X X		X X X			X X X		P	INER			
				o			o					o								ΔVX	AGS	N86		
				o			o					o								ΔVY	AGS			
				o			o					o								ΔVZ	AGS			
X X X		X X X			X X X			X X X		X X X			X X X		X X X			X X X		COAS				
X X		X X			X X			X X		X X			X X		X X			X X		AZ				
X X		X X		o	X X		o	X X		X X		o	X X		X X		o	X X		EL				
REMARKS:																								

P30 LM MANEUVER

APOLLO 10 May 1, 1969

Page 3

## P32 CSI UPDATE

Page 4

+ 0 0	+ 0 0	HR TIG N11
+ 0 0 0	+ 0 0 0	MIN CSI
+ 0	+ 0	SEC
+ 0 0	+ 0 0	HR TIG N37
+ 0 0 0	+ 0 0 0	MIN TPI
+ 0	+ 0	SEC
	0	Δ VX LOCAL N81
0 0	0 0	Δ VY VERT
X X X	X X X	PLM FDAI
0 0	0 0	Δ VX AGS N86
0 0	0 0	Δ VY AGS
0 0	0 0	Δ VZ AGS
ONBOARD LOG		
0 0	0 0	Δ VX PGNCS N81
0 0	0 0	Δ VY LOCAL
0 0	0 0	VERT
0 0	0 0	Δ VX CHARTS N81
X X X X X X	X X X X X X	Δ VY LOCAL
X X X X X X	X X X X X X	VERT

REMARKS:

MISSION APOLLO 10

MAY 1, 1969

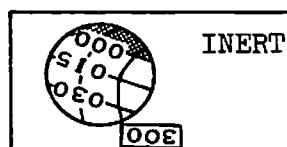
May 18th Launch

SEP 1 COMM - VHF A SIMPLEX/DATA  
PCM - LO

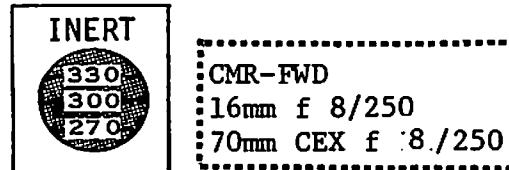
SEP 2 V48E  
N46 21002

N47 LM WT (31793)  
CSM WT (37700)  
N48 PITCH (501)  
ROLL (547)

V34E



: : CSM UNDK (98:10:00)



SEP 3 WHEN CLEAR OF CSM  
YAW RT 120°  
PITCH UP 90°

\*\*\*\*\*  
\* AOS - 98:13:36 \*  
\*\*\*\*\*

SEP 4 YAW 360° FOR INSPECTION

SEP 5 V64E  
N51 PITCH, YAW  
VERIFY VOICE, TLM  
PCM - HI  
PRO

SEP 6 POO  
UPDATA LINK - DATA  
MSFN PAD DATA  
MSFN P27 UPLINK LM S.V.

98:47:16

: : CSM SEP (98:35:15)

CSM SEP THROUGH DOI

DOI 1 MSFN P27 UPLINK CSM S.V.  
VOICE AGS CALIB RESULTS  
TO MSFN

DOI 2 V47E AGS UPDATE  
\*414+1  
\*414R+0  
\*400+3

DOI 3 P30E  
LOAD DOI PAD

N33 : : TIG DOI  
(99:33:59)

N81 : : ΔVX(LV)  
(-70.6)

ΔVY(LV)  
(0)

ΔVZ(LV)  
(-.3)

N42 : : HA  
(59.5)

HP  
(8.8)

ΔV  
(71.1)

N45 M,TFI,MGA  
SET ET  
PRO  
POO

-50:00 CB(11) AC BUS A: RNDZ RDR-  
(98:44) CLOSE  
WAIT 30 SEC  
CB(11) PGNS: RNDZ RDR - CLOSE

DOI 4 MANUAL RR LOCK ON  
\*507+0 +Z BODY TO CSM  
\*400+2 ACQ STEERING  
AGS MODE CONT - AUTO

DOI 5

V63E  
N12 00004 SPECIFY RDR  
00001 RNDZ RDR

N25 00201

PRO  
N72 TRUN, SHFT  
N78 R,R DOT

DOI 6 AT CSM REQUEST  
COMM - VHF A DUPLEX/RNG

\*\*\*\*\*  
\* SS - 98:49:58 \*  
\*\*\*\*\*

DOI 7 VERIFY DSKY WITH CSM VHF  
VALUES

V34E  
✓ COMM - VHF A SIMPLEX/DATA

DOI 8 V41N72E  
N73 000.00 TRUNNION  
283.00 SHAFT  
N12 00006 DESIGNATE  
00002 CONTINUOUS

PRO  
V16N72E VERIFY ANGLES  
CB(11) PGNS: RNDZ RDR - OPEN  
AC BUS A: RNDZ RDR -  
OPEN

V44E

-40:00 EXT LTG -OFF  
 (98:54) CB(11) AC BUS B: AOT LAMP-CLOSE  
 AOT - DETENT F & 0.0°  
 P52E  
 N06 00001 ALIGNMENT  
 00003 REFSMMAT  
 N25 00015  
 ENTER

DOI 9 N70 00233 ANTARES  
 AUTO MANEUVER  
 N71 00233 ANTARES  
 F 54 71 MARK FIRST STAR

DOI 10 N70 00225 ACRUX  
 AUTO MANEUVER  
 N71 00225 ACRUX  
 F 54 71 MARK SECOND STAR  
 N05 ANGLE DIFF  
 N93 X,Y,Z TORQUING ANGLES

DOI 11 N25 00014 ALIGNMENT CHECK  
 PRO  
 N25 00015 SELECT STAR  
 ENTER

DOI 12 N70 00230 MENKENT  
 AUTO MANEUVER  
 N71 00230 MENKENT  
 VERIFY ALIGNMENT VIA AOT  
 PRO  
 F 54 71  
 POO  
 CB(11) AC BUS B: AOT LAMP-OPEN  
 EXT LTG - TRACK

-20:00 PROP, ECS, EPS SYSTEM CHECKS  
 PRPLNT QTY MON - DES 1

-15:00 CB(11) PGNS: LDG RDR - CLOSE X-POINTERS (BOTH) - HI MULT TEMP MON - LDG RDR(+50° to +70°F)  
 RNG/ALT MON - ALT/ALT RATE  
 LDG ANT - DES +145°  
 MODE SEL - LDG RDR

DOI 13 RADAR TEST - LDG (ALT & ALT RT TAPES DRIVE)  
 TEST MONITOR - ALT XMTR  
 (2.1 to 5.0)(3.6)  
 - VEL XMTR  
 (2.1 to 5.0)(3.6)  
 - AGC  
 ALT/ALT RT MON- +7913 tc +8050 ft/-237 to -243 fps

DOI 14 V63E  
 N12 00004 SPECIFY RDR  
 00002 LDG RDR  
 N66 +08195 to +08357 RANGE  
 00001 ANT POS  
 N67 -00244 to -00250 VX(LR)  
 -00918 to -00940 VY(LR)  
 +00658 to +00672 VZ(LR)

V34E

DOI 15 LDG ANT - AUTO  
 V60E (22 SEC)

DOI 16 V63E  
 N12 00004 SPECIFY RDR  
 00002 LDG RDR  
 N66 +08195 to +08357 RANGE  
 00002 ANT POS

DOI 17 LDG ANT - DES (10 SEC)  
 N66 R2 00001 (PROG LT ON,  
 V05N09, 00522)

DOI 18 LDG ANT - AUTO  
 N66 R2 00001

DOI 19 V34E  
 RDR TEST - OFF  
 CMR-DWN  
 16mm f 8/250  
 70mm CEX f 8/250  
 BW f 4/250

DOI 20 HI GAIN P=90°, Y=0°  
 S-BD TRACKMODE - SLEW  
 PCM - OFF/HI  
 ANT - OMNI, FWD  
 S-BAND-DN VOICE BU

\*\*\*\*\*  
 \* LOS - 99:25:31 \*

-7:00 V47E AGS UPDATE  
 (99:27)\*414 + 1  
 \*414R + 0  
 \*400 + 3 AGS ALIGN  
 \*411 + 0 DPS  
 \*410 + 5 EXT AV  
 PCM-LO

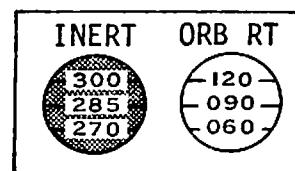
-6:00 P40E  
 V06N86E - ΔVX(LV)  
 - ΔVY(LV)  
 - ΔVZ(LV)

DOI 21 AUTO MANEUVER  
 N40 TFI, VG, ΔVM

DOI 22 \*450 LOAD  
 \*451 LOAD  
 \*452 LOAD  
 \*400+1 GUIDANCE STEERING  
 \*407+0 REF FRAME

DOI 23 CB(16)INST: CWEA - OPEN THEN CLOSE  
V78E

-4:00 ENG GIMBAL - ENABLE  
THR TOTTLE - MIN  
THR CONT - AUTO  
MAN THROT - CDR  
BAL CPL - ON  
DES ENG CMD OVRD - OFF  
ENG STOP PB (BOTH) - RESET  
ABORT/ABORT STAGE PB'S - RESET  
TEMP MON - LDG RDR  
Record TEMP \_\_\_\_\_ LDG RDR



DPS PRESS  
100% - 160psi  
40% - 120

- :07.5 AUTO ULLAGE

- :05 F 99 40  
PRO

46-02

:	:	DOI (99:32-59)
---	---	----------------

DOI 24 N40 TFC, VG, ΔVM

+ :15 THROTTLE RAPIDLY TO 40%

+ :27.5 ENG STOP PB - PUSH

APOLLO 10, · MAY 1, 1969

DOI 25 PRO  
N85 ΔVX, ΔVY, ΔVZ  
BURN RESIDUALS  
N85 \_\_\_\_\_ ΔVX  
\_\_\_\_\_ ΔVY  
\_\_\_\_\_ ΔVZ  
\*500 \_\_\_\_\_ ΔVX  
\*501 \_\_\_\_\_ ΔVY  
\*502 \_\_\_\_\_ ΔVZ  
PRO  
POO

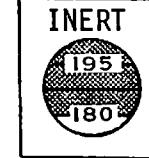
DOI 26 V82E  
N12 00002 SPECIFY VEHICLE  
00001 LM  
N44 \_\_\_\_\_ APO ALT  
\_\_\_\_\_ (59.5)  
\_\_\_\_\_ PER ALT  
\_\_\_\_\_ (8.8)  
PRO  
V79E

DOI 27 ENG ARM - OFF  
MASTER ARM - OFF  
PRPLNT QTY MON - OFF  
RECORD TEMP \_\_\_\_\_ LDG RDR

\*\*\*\*\*  
\* SR - 99:36:22 \*  
\*\*\*\*\*

DOI 28 CB(11) AC BUS A: RNDZ RDR - CLOSE  
WAIT 30 SEC  
CB(11) PGNS: RNDZ RDR-CLOSE

Pitch Dwn 90° (MAN R LOCK)



DOI 29 COMM - VHF A DUPLEX/RNG

DOI 30 CB(11) PGNS: LDG RDR - OPEN  
STAB/CONT: DECA PWR - OPEN  
EPS - INV 1 - OPEN  
RNG/ALT MON - RNG/RNG RT

+2:30 RECORD TEMP \_\_\_\_\_ LDG RDR

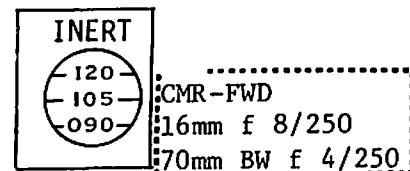
DOI THROUGH PHASING

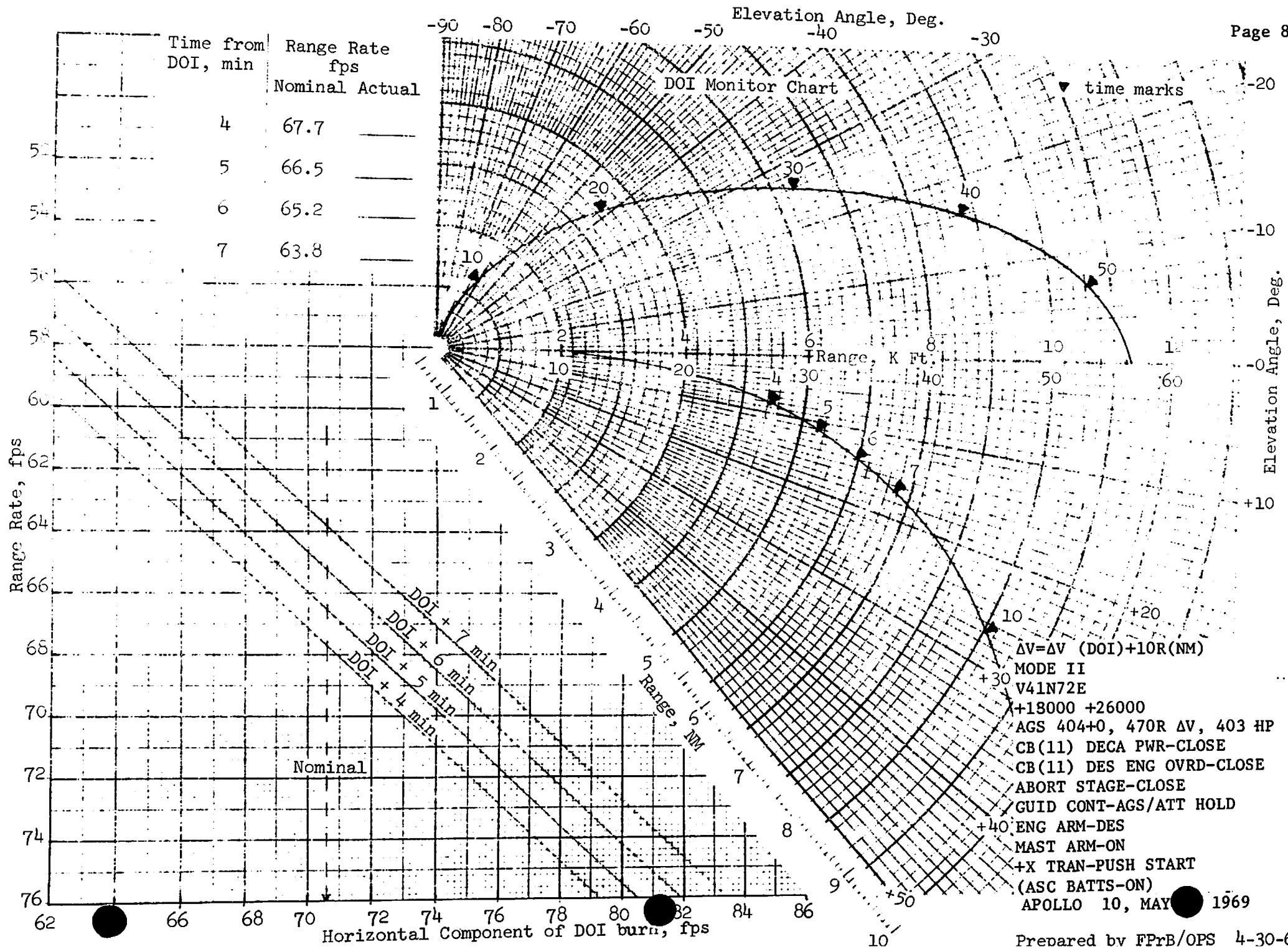
PHAS 1 \*400 + 2 ACQ STEERING  
AGS MODE CONT - AUTO

PHAS 2 V63E  
N12 00004 SPECIFY RDR  
00001 RNDZ RDR  
N25 00201  
PRO  
N72 TRUN, SHFT  
N78 R, R DOT

+10:00 V34E  
CB(11) PGNS: RNDZ RDR - OPEN  
AC BUS A: RNDZ RDR - OPEN

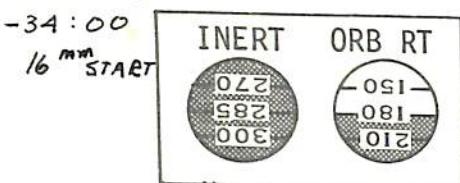
-47:00 PITCH DOWN - 90°  
(99:59)





-42:00 YAW LEFT 180°

(100:04)



-32:00 \*\*\*\*\*<sup>26</sup>\*\*\*\*\*

\* AOS - 100:14:16 \*

-28:00 V64E

N51 PITCH, YAW

VERIFY VOICE, TLM

PCM - HI

PRO

BIOMED - LEFT (CDR)

PHAS 3 TRANSMIT DOI POSTBURN PAD TO  
MSFN

ΔTIG 0:0 61 X 9.2

ΔVX - 1 AOS 8.6

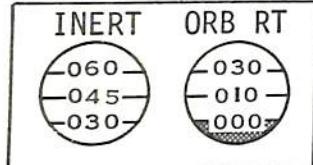
ΔVY - .3

ΔVZ - .5

NEW 16MM MAG - START

-25:00 YAW RIGHT 180° (FACE UP)

Pitch Dwn 60°



PROP, ECS, EPS SYSTEM CHECKS  
PRPLNT QTY MON - DES 1

-24:00 P30E

(100:22) LOAD PHASING PAD

N33   :   : TIG PHAS  
(100:46:21)

3.8/23 N81 ΔVX (LV)  
6/65 (+170.6)

ΔVY (LV)  
(0)

ΔVZ (LV)  
(-94.8)

N42 (195.1 x 9.2)

ΔV (195.2)

N45 M, TFI, MGA

SET ET

PRO

POO

-22:30 CONNECT ASC BATTS  
CB(11) PGNS: LDG RDR - CLOSE

PHAS 4 GUID CONT - PGNS  
LDG ANT - HOVER  
V78E

-21:40 MAINTAIN ORB RT +10°  
H= ~~FULL SCALE~~ <sup>+70 f/s</sup>  
  
NEG  
H=42K ft

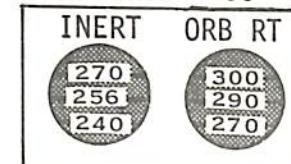
-18:20 Pitch Dwn 10° (LOCAL VERT)  
Observe surface washout

NEW 16 mm MAG  
ORB RT H= ~~350~~ f/s <sup>+550</sup>  
  
H=35.8 K ft

-15:00 PERICYNTHON (PDI ABORT)  
(100:31)

CMR-FWD  
16mm f 8-2/250  
70mm BW f 4-2.8/500

-11:40 Pitch Dwn - 60° (Face Dwn)



PHAS 5 MSFN PAD DATA IF REQ'D

-10:35 8.20 LANDING SITE

-7:00 V79E  
(100:39)V47E AGS UPDATE

\*414 + 1  
\*414R + 0  
\*400 + 3 AGS ALIGN  
\*411 + 0 DPS  
\*410 + 5 EXT ΔV

-6:00 P40E  
V06N86E + ΔVX(LV)

\_\_\_\_\_ ΔVY(LV)

\_\_\_\_\_ ΔVZ(LV)

V78E

\*\*\*\*\*

\* SS - 100:41:31 \*

\*\*\*\*\*

PHAS 6 AUTO MANEUVER  
N40 TFI, VG, ΔVM  
\*450 LOAD  
\*451 LOAD  
\*452 LOAD  
\*400+1 Guidance Steering  
\*407+0 REF FRAME

PHAS 7 CB(16)INST: CWEA - OPEN THEN  
CLOSE

-4:00

ENG GIMBAL - ENABLE

THROTTLE - MIN

THR CONT - AUTO

MAN THROT - CDR

BAL CPL - ON

DES ENG CMD OVRD - OFF

ENG STOP PB (BOTH) - RESET

ABORT/ABORT STAGE PB'S - RESET

~~DPS FAIL~~

ΔV TO GO &lt;5 RCS TO 0 (3 MAX)

25&gt;ΔV TO GO &gt;5 STAGE/RCS TO 0

ΔV TO GO &gt;25 STAGE/APS TO 0

~~APS FAIL~~

ΔVT&lt;40 RCS TO 40

ΔVT&gt;40 NO RCS

-1:00

CB(11) STAB/CONT:DECA PWR -

CLOSE

:AELD - CLOSE

CB(16) STAB/CONT: DES ENG OVRD

-CLOSE

:AELD - CLOSE

:ABORT STAGE-

CLOSE  
CB(11) EPS - INV 1 - CLOSE

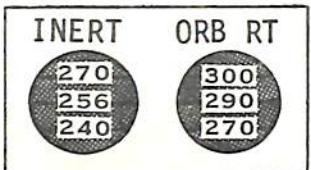
- :35

ENG ARM-DES

DB - MIN

AGS MODE CONT - AUTO

\*500 ΔVX



- :07.5 AUTO ULLAGE

APOLLO 10, MAY 1, 1969 9

- :05 F 99 40

PRO

58:25

PHAS (100:46.21)

PHAS 8 N40 TFC, VG, ΔVM

+ :41.3 ENG STOP PB - PUSH

GUID CONT - AGS/AUTO  
 MASTER ARM - ON  
 ASC He - Both/FIRE  
 +X TRANS/STAGE FIRE  
 MASTER ARM - OFF  
 ENG ARM - ASC  
 ABORT PB - PUSH  
 +X TRANS - PUSH

PHAS 9 PRO

N85 ΔVX, ΔVY, ΔVZ

BURN RESIDUALS

N85 2 ΔVX- 5 ΔVY- 8 ΔVZ

Des gty \*500

       ΔVX

GMDft. \*501

       ΔVY\*502        ΔVZ

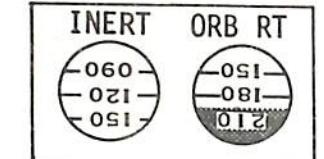
PRO

P00

194.8X11.8

PHAS 10 V82E (195.1 x 9.2)

V79E

PHAS 11 ENG ARM - OFF  
PRPLNT QTY MON - OFF

PHAS 12 YAW RT 180° PITCH DWN 90°

PHAS 13 CB (11) AC BUS A: RNDZ RDR-  
CLOSE  
 WAIT 30 SEC  
 CB(11) PGNS: RNDZ RDR-CLOSE ✓

-1:53:35  
 (100:50) P20E  
 V81E  
 AUTO MANEUVER

PHAS 14\*400+2 ACQ STEERING  
AGS MODE CONT-AUTO

PHAS 15 CB(11) PGNS: LDG RDR-OPEN ✓  
 STAB CONT: DECA PWR-OPEN ✓  
 : AELD - OPEN  
 EPS - INV 1 - OPEN ✓  
 CB(16) STAB CONT: DES ENG OVRD-  
OPEN  
 : AELD - OPEN  
 : ABORT STAGE -  
OPEN

DISCONNECT ASC BATTERIES  
RNG/ALT MON - RNG/RNG RT

RCS A        % (93)RCS B        % (89)

PHASING THROUGH INSERTION

-1:46:35  
(100:56)PRO (5 marks)  
101:08 V56  
POO

INS 1 V41N72E  
N73 000.00 TRUNNION  
283.00 SHAFT  
N12 00006 DESIGNATE  
00002 CONTINUOUS  
PRO  
V16N72E Verify Angles  
CB(11) PGNS: RNDZ RDR-OPEN  
AC BUS A: RNDZ RDR -  
OPEN  
V44E

-1:42:35  
(101:00)Ext LTG-OFF  
101:12 CB(11) AC BUS B: AOT LAMP  
CLOSE  
AOT-DETENT F & 0.0°

P52E  
N06 00001 ALIGNMENT  
00003 REFSMMAT  
N25 00015  
ENTER

INS 2 N70 00225 ACRUX ✓  
AUTO MANEUVER  
N71 00225 ACRUX  
F 54 71 MARK FIRST STAR

INS 3 N70 00233 ANTARES  
AUTO MANEUVER  
N71 00233 ANTARES  
F 54 71 MARK SECOND STAR  
\* 00002

INS 4 N05 ANGLE DIFF  
N93 Y, Z TORQUING ANGLES +000066  
-000169 +000050

INS 6 N25 00014 ALIGNMENT CHECK

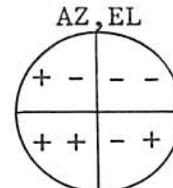
PRO

COAS CALIBRATION

N25 00015 SELECT STAR  
ENTER

INS 6 N70 00526 SPICA  
N87 000.00 AZIMUTH  
000.00 ELEVATION  
AUTO MANEUVER  
N71 00526 SPICA

INS 7 OBSERVE STAR IN COAS  
COPY ANGLES  
AZ \_\_\_\_\_ °  
EL \_\_\_\_\_ °  
POO \_\_\_\_\_ °  
\*400 +3 AGS ALIGN  
CB(11)AC BUS B:AOT LAMP-OPEN  
EX LTG - TRACK



INS 8 CB (11) AC BUS A: RNDZ RDR-  
CLOSE  
WAIT 30 SEC  
CB(11) PGNS: RNDZ RDR-CLOSE

-1:29:00  
(101:14)P20E  
V81E  
AUTO MANEUVER

INS 9 COPY MSFN INSERT PAD

INS 10 \*400+2 ACQ STEERING  
AGS MODE CONT - AUTO

-1:27:00  
(101:16)P30E  
28 LOAD INSERTION PAD

N33 \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ TIG INSERT  
(102:43:18)  
N82 \_\_\_\_\_ ΔVX(LV)  
(-189.5)  
\_\_\_\_\_ ΔVY (LV)  
(0.1)  
\_\_\_\_\_ ΔVZ (LV)  
(-82.8)  
N42 HA,HP,ΔV  
N45 M,TFI,MGA

-1:23:00  
(101:20)V93 (4 MARKS)

INS 11 HI GAIN P=90° , Y=0°  
S-BD TRACKMODE - SLEW  
ANT - OMNI, FWD  
S-BAND-DN VOICE BU

\*\*\*\*\*  
\* LOS - 101:25:57 \*  
\*\*\*\*\*

101:40:  
\*\*\*\*\*  
\* SR - 101:28:59 \*  
\*\*\*\*\*

-1:12:00  
(101:31)PRO (11 MARKS)  
POO  
CB(11) PGNS: RNDZ RDR - OPEN  
AC BUS A: RNDZ RDR -  
OPEN

70 mm STRIP  
P4/250 - 30 sec Intv

Page 11

-40:00 SET ET  
 (102:03) CONNECT ASC BATS  
 BAT 1&3 HI VOLT-OFF/RESET

INS 12 CB (11) AC BUS A: RNDZ RDR-CLOSE  
 WAIT 30 SEC  
 CB (11) PGNS: RNDZ RDR-CLOSE

INS 13 MONITOR ASC He - PRPLNT TEMP /  
 PRESS DURING PRESSURIZATION  
 ASC He REG 1&2-OPEN,  
 tb(2) Gray  
 ASC He SEL-BOTH  
 MASTER ARM-ON  
 ASC He PRESS-FIRE  
 MASTER ARM - OFF

-36:00 P20E  
 (102:07) V81E  
 AUTO MANEUVER

INS 14 \*400 + 2 ACQ Steering  
 AGS MODE CONT - AUTO

-30:00 P30E  
 N33 102:53:01 TIG INSERT  
 (102:43:18)  
 N82 -183.2 ΔVX(LV)  
(-189.5)  
0 ΔVY(LV)  
(0.1)  
-123.5 ΔVZ(LV)  
(-82.8)  
 N42 HA, HP, ΔV  
 N45 M, TFI, MGA  
 SET ET

INS 15 S-BAND +Z P=0°, Y=0°  
 \*\*\*\*  
 \* AOS 102:44:05 \*  
 \*\*\*\*

-25:00 BAT 2&4 HI VOLT-OFF/RESET

-23:00 PRO (13 MARKS)  
 POO  
 CB(11)PGNS: RNDZ RDR-OPEN  
 AC BUS A: RNDZ RDR-OPEN

INS 16 P27 MSFN UPDATE S.V.

INS 17 INSERT PAD DATA IF REQ'D  
 CMR - DWN  
 16mm f 8/250  
 70mm BW f 4/250

-17:00 START 16mm - 6 FR/mini  
 INS 18 SUIT GAS DIVERTER-PULL/EGRESS  
 ✓CABIN REPRESS-CLOSE  
 ✓DES O2-CLOSE  
 ✓ASC #1 O2-OPEN  
 ✓PRESS REGS A&B-EGRESS  
 ✓H2O TANK SELECT-ASC  
 ✓ASCENT H2O-OPEN  
 ✓DES H2O-CLOSE  
 ✓CHECK ASC BAT & BUS VOLTS  
 DES BATS - DEADFACE

-16:00 ✓CB(11) AC BUS A: DECA GMBL-OPEN  
 ✓FLT DISP: THRUST - OPEN  
 ✓PROPUL: DES He REG/VENT-OPEN  
 ✓HTR: LDG RDR-OPEN  
 ✓STAB/CONT: DECA PWR-OPEN  
 ✓PGNS: LDG RDR-OPEN  
 ✓VERIFY RCS APS TEMP & PRESS

-14:00 MASTER ARM - ON  
 X-TRANSL- 2 JETS  
 GUID CONT - AGS  
 A

INS 19 YAW 180°, Pitch 90° UP

-12:00 V48E  
 N46 12002  
 N47 \_\_\_\_\_ LM WT (8510)  
 PRO \_\_\_\_\_ CSM WT (37700)  
 P47E  
 N83

INERT	ORB RT
300	270
295	240
270	270
300	240

: : STAGING(102:33:18) 145

-10:00 TTCA -X (2fps)  
 STAGE-FIRE  
~~MASTER ARM OFF~~  
 PRO  
 POO

INS 20 PRESS REGS A&B-CABIN  
 SUIT GAS DIVERTER-PUSH/CABIN

INS 21 P30E

LOAD INSERTION PAD

N33 : : TIG INSERT  
(102:43:18)

N81 \_\_\_\_\_ ΔVX(LV)  
(-189.5)

\_\_\_\_\_ ΔVY(LV)  
(0.1)

\_\_\_\_\_ ΔVZ(LV)  
(-82.8)

N42 HA,HP,ΔV  
N45 M,TFI,MGA  
PRO

**CMR - FWD**  
 16mm f 2/250  
 70mm BW f 2.8/500

*tool off*

-7:00 V47E AGS UPDATE

(102:36) \*414+1  
 \*414R+0  
 \*400+3 AGS ALIGN  
 \*411+1 APS ENGINE  
 \*410+5 EXT ΔV  
 \*514+0  
 \*515+4  
 \*516+0  
 \*623+1

-6:00 P42E

V06 N86E - ΔVX(LV)  
\_\_\_\_\_ ΔVY(LV)  
\_\_\_\_\_ ΔVZ(LV)

AUTO MANEUVER

\*450 LOAD  
 \*451 LOAD  
 \*452 LOAD  
 \*400+1 GUIDANCE STEERING  
 \*407+0 REF FRAME  
 N40 TFI,VG,ΔVM

-4:00

HELIUM MON-ASC PRESS 1,2  
 ENG STOP P.B. (BOTH)-RESET  
 X TRANS - 4 JET

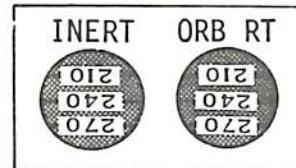
170> ΔV to GO RCS 0 REMAINING  
 (55 sec MAX)  
 ΔV to GO >170 RCS BACK TO PAD  
 ΔV  
 OVER BURN >45 USE APS

-1:00

✓ CB(11) STAB/CONT: AELD-CLOSE  
 ✓ CB(16) STAB/CONT: AELD-CLOSE

- :35

ENG ARM - ASC  
 DB - MIN  
 AGS MODE CONT - AUTO  
 \*500 ΔVX



- :05

F 99 40  
PRO

- :03.5 AUTO ULLAGE

: : INSERT(102:43:18)

INS 22 N40 TFC, VG, ΔVM

+15.5 ENG STOP PB - Push

GUID CONT - AGS/AUTO  
 ABORT PB - PUSH  
 +X TRANS - PUSH

INS 23 PRO

N85 \_\_\_\_\_ ΔVX

- 1 ΔVY

- 3 ΔVZ

\*500 \_\_\_\_\_ ΔVX

\*501 \_\_\_\_\_ ΔVY

\*502 \_\_\_\_\_ ΔVZ

\*623+0

PRO

POO

*46.7X11.0*

INS 24 V82E (45.8 x 8.6)

INS 25 ENG ARM - OFF

CB(11) STAB/CONT: AELD-OPEN

CB(16) STAB/CONT: AELD-OPEN

MASTER ARM - OFF

CB(16) EPS: INV 1 - OPEN

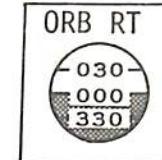
RCS A 80 % (85)

RCS B 28 % (82)

INSERTION THROUGH CSI

CSI 1 SET ET

YAW RT 180°, P DN 90°



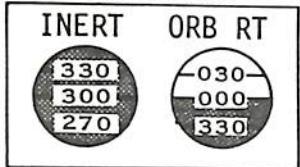
CSI 2 CB(11) AC BUS A: RNDZ RDR-CLOSE

WAIT 30 SEC

CB(11) PGNS: RNDZ RDR-CLOSE

CSI 3 COPY MSFN CSI PADS

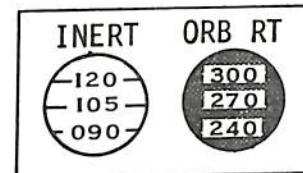
CSI 4 V41N72E  
 N73 000.00 TRUNNION  
283.00 SHAFT  
 N12 00006 DESIGNATE  
00002 CONTINUOUS  
 PRO  
 V16N72E VERIFY ANGLES  
 CB(11) PGNS: RNDZ RDR-OPEN  
 AC BUS A: RNDZ RDR-  
 OPEN  
 V44E  
 \*\*\*\*  
 \* SS 102:47:53 \*  
 \*\*\*\*  
 CSI 5 EXT LTG-OFF  
 CB(11) AC BUS B: AOT LAMP-  
 CLOSE  
 AOT-DETENT F & 0.0°  
 P52E  
 N06 00001 ALIGNMENT  
 00003 REFSMMAT  
 N25 00015  
 ENTER  
 CSI 6 N70 00233 ANTARES  
 AUTO MANEUVER  
 N71 00233 ANTARES  
 F 54 71 MARK FIRST STAR  
 CSI 7 N70 00240 ALTAIR  
 AUTO MANEUVER  
 N71 00240 ALTAIR  
 F 54 71 MARK SECOND STAR  
 CSI 8 N05 ANGLE DIFF  
 N93 X,Y,Z TORQUING ANGLES  
 CSI 9 N25 00014 ALIGNMENT CHECK  
 PRO  
 N25 00015 SELECT STAR  
 ENTER

CSI 10 N70 00236 VEGA  
 AUTO MANEUVER  
 N71 00236 VEGA  
 VERIFY ALIGNMENT VIA AOT  
 PRO  
 F 54 71  
 POO.  
 \*400+3 AGS ALIGN  
 CB(11) AC BUS B: AOT LAMP-OPEN  
 EXT LTG-TRACK  
 CSI 11 CB(11) AC BUS A: RNDZ RDR-CLOSE  
 WAIT 30 SEC  
 CB(11) PGNS: RNDZ RDR-CLOSE  
 BIOMED - RIGHT (LMP)  
 -33:00 P20E  
 (103:03) 15 V93E (Before 1st MARK)  
 AUTO MANEUVER  
  
 \*400+2 ACQ STEERING  
 AGS MODE CONT-AUTO  
 -30:00 COPY RANGE RATE FOR CSI CHARTS  
 CSI 12 P32E  
 N11 : : TIG CSI  
 (103:33:46)  
 N55 +00001 APSIDAL  
 CROSSING  
+026.60 ELEV ANGLE  
+130.00 CENT ANGLE  
 N37 : : TIG TPI  
 (105:09:00)  
 N45 M,TFI,-00001  
 SET ET

CSI 13 V32E (5 MARKS)  
 N75 ΔH,ΔT CSI/CDH,ΔT CDH/TPI  
 N81 \_\_\_\_\_ ΔVX(LV)CSI  
 (50.5)  
 \_\_\_\_\_ ΔVY(LV)CSI  
 (0.0)  
 \_\_\_\_\_ ΔVZ(LV)CSI  
 (-0.7)  
 ✓ N82 0.0 ΔVX(LV)CDH  
 (-0.8)  
 \_\_\_\_\_ ΔVY(LV)CDH  
 (0.0)  
 \_\_\_\_\_ ΔVZ(LV)CDH  
 (+3.3)  
 ✓ N45 M,TFI,-00001  
 -23:00 V32E (10 MARKS)  
 N75 ΔH,ΔT CSI/CDH,ΔT CDH/TPI  
 N81 \_\_\_\_\_ ΔVX(LV)CSI  
 (50.5)  
 \_\_\_\_\_ ΔVY(LV)CSI  
 (0.0)  
 \_\_\_\_\_ ΔVZ(LV)CSI  
 (-0.7)  
 ✓ N82 0.0 ΔVX(LV)CDH  
 (-0.8)  
 \_\_\_\_\_ ΔVY(LV)CDH  
 (0.0)  
 \_\_\_\_\_ ΔVZ(LV)CDH  
 (-0.7)  
 ✓ N45 0.0 M,TFI,-00001  
 -20:00 COPY RANGE RATE FOR CSI CHARTS  
 N82 \_\_\_\_\_ ΔVX(LV)CDH  
 (-0.8)  
 \_\_\_\_\_ ΔVY(LV)CDH  
 (0.0)  
 \_\_\_\_\_ ΔVZ(LV)CDH  
 (+3.3)  
 N45 M,TFI,-00001  
 SET ET

CSI 14 V90E (out of plane comp)  
 N16 : : TIG CSI  
 (103:33:46)  
 N90 R2 \_\_\_\_\_ YDOT  
 PRO +6.4 CSM YDOT  
 N45 M,TFI,-00001  
  
 -12:00 PRO-FINAL COMP  
 N75 ΔH,ΔT CSI/CDH,ΔT CDH/TPI  
 N81 \_\_\_\_\_ ΔVX(LV)CSI  
 (50.5)  
 \_\_\_\_\_ ΔVY(LV)CSI  
 (0.0)  
 \_\_\_\_\_ ΔVZ(LV)CSI  
 (-0.7)  
 (0.0)  
  
 CSI 15 COPY Y DOT FROM CSM  
  
 CSI 16 LOAD NEGATIVE Y DOT IN R2  
 PRO  
 N82 \_\_\_\_\_ ΔVX(LV)CDH  
 (-0.8)  
 \_\_\_\_\_ ΔVY(LV)CDH  
 (0.0)  
 \_\_\_\_\_ ΔYZ(LV)CDH  
 (+3.3)  
 N45 M,TFI,MGA  
  
 CSI 17 HI GAIN P=90° , Y=0°  
 S-BD TRACKMODE - SLEW  
  
 ANT - OMNI, FWD  
 S-BAND-DN VOICE BU  
  
 \*\*\*\*  
 \* LOS - 103:24:02 \*  
 \*\*\*\*

-10:00 COPY RANGE & RANGE RATE FOR  
 CSI CHARTS  
 COMPUTE CSI BU  
 SET ET  
 PRO  
  
 -7:00 V47E AGS UPDATE  
 (103:27)\*414+1  
 \*414R+0  
 \*400+3 AGS ALIGN  
 \*411+0 RCS ENGINE  
 \*410+5 EXT ΔV  
 PRO  
 P00  
  
 -6:00 P41E  
 V06N86E \_\_\_\_\_ ΔVX(BU)  
 \_\_\_\_\_ ΔVX(LV)  
 \_\_\_\_\_ ΔVY(LV)  
 \_\_\_\_\_ ΔVZ(LV)  
  
 CSI 18 AUTO MANEUVER  
 \*450 LOAD  
 \*451 LOAD  
 \*452 LOAD  
 \*400+1 GUIDANCE STEERING  
 \*407+0 REF FRAME  
 TRANSMIT TGT ΔV's to CSM  
 AND SYNC COUNTDOWN  
  
 CSI 19 N85 ΔV (Body)



- :35 DB - MIN  
 AGS MODE CONT - AUTO  
 \*500 ΔVX  
 45:33

: : CSI (103:33:46)

USE ASC FEED

CSI 20 VERIFY RESIDUALS

N85 \_\_\_\_\_ ΔVX  
 \_\_\_\_\_ ΔVY  
 \_\_\_\_\_ ΔVZ  
 \*500 \_\_\_\_\_ ΔVX  
 \*501 \_\_\_\_\_ ΔVY  
 \*502 \_\_\_\_\_ ΔVZ  
 PRO  
 P00

CSI 21 V82E (45.2 x 45.0)

RCS A \_\_\_\_\_ % (79)  
 RCS B \_\_\_\_\_ % (75)  
 ASC 02(1) \_\_\_\_\_ % (86)

\*\*\*\*\*  
 \* SR - 103:36:54 \*  
 \*\*\*\*\*

CSI THROUGH CDH

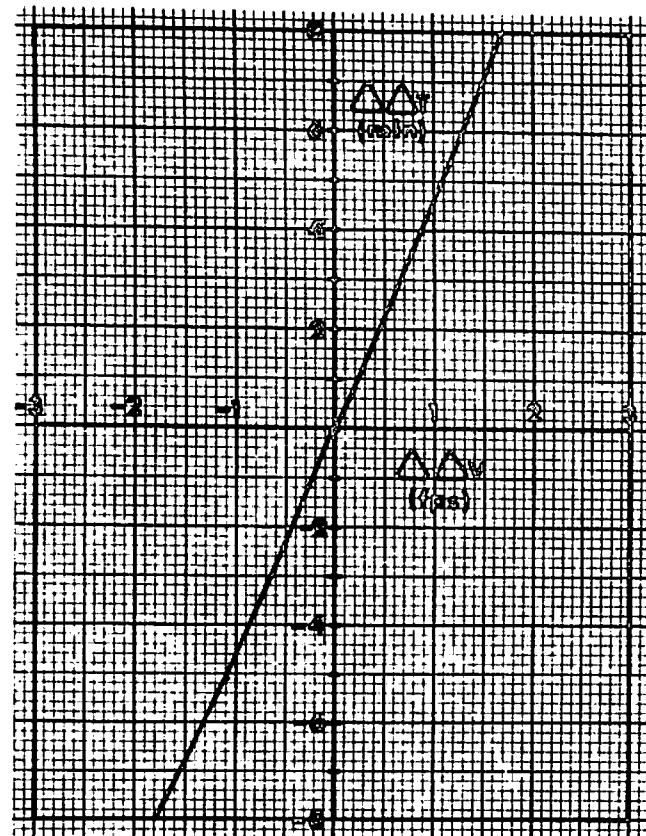
CDH 1 LOAD W-MATRIX  
 V21N01E  
 2000E  
 1142E  
 N15E  
 144E,E  
 5075E,E  
 5075E

-240.0	247.3	-140.0	254.7	-70.0	72.4	120.0	15.2
-241.0	248.4	-141.0	256.6	-71.0	73.4	121.0	15.5
-242.0	249.4	-142.0	258.4	-72.0	74.4	122.0	15.7
-243.0	250.5	-143.0	260.2	-73.0	75.5	123.0	15.9
-244.0	251.5	-144.0	262.1	-74.0	76.5	124.0	16.1
-245.0	252.5	-145.0	263.9	-75.0	77.5	125.0	16.3
-246.0	253.6	-146.0	265.7	-76.0	78.6	126.0	16.5
-247.0	254.6	-147.0	267.6	-77.0	79.6	127.0	16.7
-248.0	255.7	-148.0	269.4	-78.0	80.6	128.0	16.9
-249.0	256.7	-149.0	271.3	-79.0	81.7	129.0	17.1
-250.0	257.8	-150.0	273.1	-80.0	82.7	130.0	17.3
-251.0	258.8	-151.0	274.9	-81.0	83.7	131.0	17.5
-252.0	259.9	-152.0	276.8	-82.0	84.8	132.0	17.7
-253.0	260.9	-153.0	278.6	-83.0	85.8	133.0	17.9
-254.0	262.0	-154.0	280.4	-84.0	86.9	134.0	18.1
-255.0	263.0	-155.0	282.3	-85.0	87.9	135.0	18.4
-256.0	264.1	-156.0	284.1	-86.0	88.9	136.0	18.6
-257.0	265.1	-157.0	286.0	-87.0	90.0	137.0	18.8
-258.0	266.2	-158.0	287.8	-88.0	91.0	138.0	19.0
-259.0	267.2	-159.0	289.7	-89.0	92.0	139.0	19.2
-260.0	268.3	-160.0	291.5	-90.0	93.1	140.0	19.4
-261.0	269.3	-161.0	293.4	-91.0	94.1	141.0	19.6
-262.0	270.4	-162.0	295.2	-92.0	95.2	142.0	19.8
-263.0	271.4	-163.0	297.0	-93.0	96.2	143.0	20.0
-264.0	272.5	-164.0	298.9	-94.0	97.2	144.0	20.2
-265.0	273.5	-165.0	300.7	-95.0	98.3	145.0	20.5
-266.0	274.6	-166.0	302.6	-96.0	99.3	146.0	20.7
-267.0	275.7	-167.0	304.4	-97.0	100.4	147.0	20.9
-268.0	276.7	-168.0	306.3	-98.0	101.4	148.0	21.1
-269.0	277.8	-169.0	308.1	-99.0	102.4	149.0	21.3
-270.0	278.8	-170.0	310.0	-100.0	103.5	150.0	21.5
-271.0	279.9	-171.0	311.9	-101.0	104.5	151.0	21.7
-272.0	281.0	-172.0	313.7	-102.0	105.6	152.0	21.9
-273.0	282.0	-173.0	315.6	-103.0	106.6	153.0	22.1
-274.0	283.1	-174.0	317.4	-104.0	107.7	154.0	22.4
-275.0	284.2	-175.0	319.3	-105.0	108.7	155.0	22.6
-276.0	285.2	-176.0	321.1	-106.0	109.7	156.0	22.8
-277.0	286.3	-177.0	323.0	-107.0	110.8	157.0	23.0
-278.0	287.4	-178.0	324.9	-108.0	111.8	158.0	23.2
-279.0	288.4	-179.0	326.7	-109.0	112.9	159.0	23.4
-280.0	289.5	-180.0	328.6	-110.0	113.9	160.0	23.6
-281.0	290.6	-181.0	330.4	-111.0	115.0	161.0	23.8

CSI BACKUP TABLE  
MISSION F

TIME (Min).	NOMINAL
-30 R1	_____ (-283.3)
-20 R2	_____ (-173.9)
-10 R3	_____ (- 94.0)
-10 R3	_____ ( 154.1)
F1	_____ ( 293.0)
+F3	_____ ( 97.2)
	_____ ( 390.2)
-F2	_____ (-317.3)
	_____ ( 72.9)
-F4	_____ (- 22.4)
	_____ ( 50.5)
+ΔΔVCSI	_____ ( 0.0)
Δ VCSI	_____ ( 50.5)

R1	F1	R2	F2	R3	F3	R3	F4
- 282.0	291.6	- 182.0	332.3	- 112.0	116.0	162.0	24.0
- 283.0	292.7	- 183.0	334.2	- 113.0	117.0	163.0	24.2
- 284.0	293.8	- 184.0	336.0	- 114.0	118.1	164.0	24.5
- 285.0	294.8	- 185.0	337.9	- 115.0	119.1	165.0	24.7
- 286.0	295.9	- 186.0	339.8	- 116.0	120.2	166.0	24.9
- 287.0	297.0	- 187.0	341.6	- 117.0	121.2	167.0	25.1
- 288.0	298.1	- 188.0	343.5	- 118.0	122.3	168.0	25.3
- 289.0	299.2	- 189.0	345.4	- 119.0	123.3	169.0	25.5
- 290.0	300.2	- 190.0	347.2	- 120.0	124.4	170.0	25.7
- 291.0	301.3	- 191.0	349.1	- 121.0	125.4	171.0	25.9
- 292.0	302.4	- 192.0	351.0	- 122.0	126.5	172.0	26.1
- 293.0	303.5	- 193.0	352.9	- 123.0	127.5	173.0	26.3
- 294.0	304.6	- 194.0	354.7	- 124.0	128.6	174.0	26.5
- 295.0	305.6	- 195.0	356.6	- 125.0	129.6	175.0	26.7
- 296.0	306.7	- 196.0	358.5	- 126.0	130.7	176.0	26.9
- 297.0	307.8	- 197.0	360.4	- 127.0	131.7	177.0	27.1
- 298.0	308.9	- 198.0	362.2	- 128.0	132.8	178.0	27.3
- 299.0	310.0	- 199.0	364.1	- 129.0	133.8	179.0	27.3
- 300.0	311.1	- 200.0	366.0	- 130.0	134.9	180.0	27.7
- 301.0	312.2	- 201.0	367.9	- 131.0	135.9	181.0	27.9
- 302.0	313.2	- 202.0	369.8	- 132.0	137.0	182.0	28.1
- 303.0	314.3	- 203.0	371.6	- 133.0	138.0	183.0	28.3
- 304.0	315.4	- 204.0	373.5	- 134.0	139.1	184.0	28.5
- 305.0	316.5	- 205.0	375.4	- 135.0	140.1	185.0	28.7
- 306.0	317.6	- 206.0	377.3	- 136.0	141.2	186.0	28.9
- 307.0	318.7	- 207.0	379.2	- 137.0	142.2	187.0	29.1
- 308.0	319.8	- 208.0	381.1	- 138.0	143.3	188.0	29.3
- 309.0	320.9	- 209.0	383.0	- 139.0	144.3	189.0	29.5
- 310.0	322.0	- 210.0	384.9	- 140.0	145.4	190.0	29.7
- 311.0	323.1	- 211.0	386.8	- 141.0	146.4	191.0	29.9
- 312.0	324.2	- 212.0	388.7	- 142.0	147.5	192.0	30.1
- 313.0	325.3	- 213.0	390.5	- 143.0	148.5	193.0	30.3
- 314.0	326.4	- 214.0	392.4	- 144.0	149.6	194.0	30.5
- 315.0	327.5	- 215.0	394.3	- 145.0	150.7	195.0	30.7
- 316.0	328.6	- 216.0	396.2	- 146.0	151.7	196.0	30.9
- 317.0	329.7	- 217.0	398.1	- 147.0	152.8	197.0	31.0
- 318.0	330.8	- 218.0	400.0	- 148.0	153.8	198.0	31.2
- 319.0	331.9	- 219.0	401.9	- 149.0	154.9	199.0	31.4
- 320.0	333.0	- 220.0	403.8	- 150.0	155.9	200.0	31.6
- 321.0	334.1	- 221.0	405.7	- 151.0	157.0	201.0	31.8
- 322.0	335.3	- 222.0	407.7	- 152.0	158.1	202.0	32.0
- 323.0	336.4	- 223.0	409.6	- 153.0	159.1	203.0	32.2



TIG TPI \_\_\_\_ : \_\_\_\_ : \_\_\_\_

- TIG CSI \_\_\_\_ : \_\_\_\_ : \_\_\_\_

$\Delta T$  \_\_\_\_ : \_\_\_\_ : \_\_\_\_

- NOM $\Delta T$  \_\_\_\_ : \_\_\_\_ : \_\_\_\_

$\Delta \Delta T$  \_\_\_\_ : \_\_\_\_ : \_\_\_\_

$\Delta \Delta VCSI$  \_\_\_\_\_

CDH 2 P20E  
AUTO MANEUVER  
\*400+2 ACQ STEERING  
AGS MODE CONT-AUTO

CDH 3 P33E  
N13 : : TIG CDH  
(104:31:42)

N45 M,TFI,-00001

-52:00 V93E, (4 MARKS)  
SET ET

-46:00 V32E (5 MARKS)  
N75 ΔH,ΔT CDH/TPI,ΔT TPI

SLIP  
N81 \_\_\_\_\_ ΔVX CDH  
(-0.8)

ΔVY CDH  
(0.0)

ΔVZ CDH  
(+3.3)

N45 M,TFI,-00001  
SET ET

-39:00 V34E  
P30E  
N33 : : TIG PLANE  
(104:02:00) CHG

N81 \_\_\_\_\_ ΔVX(LV)  
(0.0)

ΔVY(LV)  
(0.0)

ΔVZ(LV)  
(0.0)

CDH 4 V90E  
N16 : : TIG PLANE  
(104:02:00) CHG  
N90 \_\_\_\_\_ YDOT  
PRO \_\_\_\_\_ CSM YDOT

CDH 5 F 06 81  
COPY Y DOT From CSM  
LOAD NEGATIVE Y DOT IN R2  
PRO

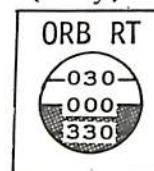
-36:00 COPY RANGE RATE FOR CDH CHARTS

CDH 6 \*410+5 EXT ΔV  
\*450 LOAD  
\*451 LOAD  
\*452 LOAD  
\*407+0 REF FRAME

CDH 7 N42 HA,HP,ΔV  
N45 0,TFI,MGA

-6:00\* PRO  
POO

CDH 8 P41E  
BYPASS AUTO MANEUVER  
N85 ΔV (Body)



-:35\* DB-MIN  
AGS MODE CONT-ATT HOLD  
\*407+1 FREEZE REF FRAME

: : PC(104:02:00)

CDH 9 NULL ΔV's  
PRO  
POO

CDH 10 P20  
AUTO MANEUVER

CDH 11 \*400+2 ACQ STEERING  
AGS MODE CONT - AUTO

CDH 12 P33E  
N13 : : TIG CDH  
(104:31:42)  
N45 M,TFI,-00001

CDH 13 V93E (4 MARKS)

-23:00 COPY RANGE RATE FOR CDH CHARTS

CDH 14 S-BAND +Z P=0°, Y=0°

\*\*\*\*\*  
\* AOS - 104:11:04 \*  
\*\*\*\*\*

-18:00 V32E (5 MARKS)  
N75 ΔH,ΔT CDH/TPI,ΔT TPI  
SLIP

N81 \_\_\_\_\_ ΔVX(LV)CDH  
(-0.8)

ΔVY(LV)CDH  
(0.0)

ΔVZ(LV)CDH  
(+3.3)

N45 M,TFI,-00001

*get CS1 residuals*

~~PC~~

N81

ΔVx = 45.3

ΔVx = 0

ΔVy = 0

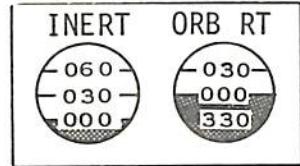
ΔVy = -1.4

ΔVz = 0

ΔVz = 0

CDH 15 V90E  
 N16 104:43:53 TIG CDH  
 (104:31:42)  
 N90 R2 YDOT  
 PRO CSM YDOT  
 N45 M,TFI,-00001  
 -12:00 PRO - FINAL COMP  
 N75 ΔH,ΔT CDH/TPI,ΔT TPI  
 +14.9 39 28 SLIP22 20  
 CDH 16 N81 - ΔVX(LV)CDH  
 (-0.8)  
 ΔVY(LV)CDH  
 (0.0)  
 +3.0 ΔVZ(LV)CDH  
 (+3.3)  
 CDH 17 COPY Y DOT FROM CSM  
 LOAD NEGATIVE Y DOT IN R2  
 PRO  
 N45 M,TFI,MGA  
 -10:00 COPY RANGE RATE FOR CDH CHARTS  
 TRANSMIT TGT ΔV's to CSM  
 AND SYNC COUNTDOWN  
 -7:00 V47E AGS UPDATE  
 (104:25)\*414+1  
 \*414R+0  
 CDH 18 \*400+3 AGS ALIGN  
 \*411+0 RCS ENGINE  
 \*410+5 EXT ΔT  
 PRO  
 P00

105 23 20

-6:00 P41E  
 V06N86E ΔVX(BU)  
 ΔVX(LV)  
 ΔVY(LV)  
 ΔVZ(LV)  
 ΔVZ(BU)  
 CDH 19 BYPASS AUTO MANEUVER  
 \*450 LOAD  
 \*451 LOAD  
 \*452 LOAD  
 \*407+0  
 CDH 20 N85 ΔV (Body)  
  
 - :35 DSKY BLANKS  
 DB-MIN  
 AGS MODE CONT - ATT HOLD  
 GUID CONT - AGS  
 \*407+1 FREEZE REF FRAME  
 \*500 ΔVX  
 : : CDH(104:31:42)  
 NULL ΔV's  
 PRO  
 CDH 21 VERIFY RESIDUALS  
 N85 +1 ΔVX  
 0 ΔVY  
 +1 ΔVZ

\*500 -.2 ΔVX  
 \*501 -.1 ΔVY  
 \*502 00 ΔVZ  
 PRO  
 P00  
 RCS A \_\_\_\_\_ % (75)  
 RCS B \_\_\_\_\_ % (71)  
 ASC 02(1) \_\_\_\_\_ % (74)  
 CDH THROUGH TPI

TPI 1 P20E  
 AUTO MANEUVER  
 TPI 2 \*400 + 2 ACQ STEERING  
 AGS MODE CONT - AUTO  
 TPI 3 P34E  
 N37 \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ TIG TPI  
 (105:09:00)  
 N55 026.60 ELEV ANGLE  
 130.00 CENT ANGLE  
 N45 M,TFI,-00001  
 -32:00 SET ET  
 -30:00 V93E (4 MARKS)  
 BIOMED - LEFT (CDR)  
 -25:00 V47 AGS UPDATE  
 414+1  
 414 R+0

RDOT	X1	Z1	X2	Z2	X3	Z3	
-75.	29.7	52.6	30.6	132.0	.9	79.2	
-76.	30.1	53.4	31.0	133.9	.9	80.3	
-77.	30.5	54.3	31.3	135.9	.9	81.5	
-78.	30.8	55.1	31.7	137.9	.9	82.6	CDH BACKUP TABLE
-79.	31.2	55.9	32.1	139.9	.9	83.8	MISSION F
-80.	31.6	56.8	32.5	141.8	.9	84.9	
-81.	32.0	57.6	32.8	143.8	.9	86.1	
-82.	32.4	58.4	33.2	145.8	.9	87.2	
-83.	32.7	59.3	33.6	147.8	.8	88.4	TIME
-84.	33.1	60.1	33.9	149.8	.8	89.6	(MIN) NOMINAL
-85.	33.5	61.0	34.3	151.8	.8	90.7	-36 R1 _____ (-122.21)
-86.	33.9	61.8	34.7	153.8	.8	91.9	
-87.	34.2	62.7	35.0	155.9	.8	93.1	-23 R2 _____ (-122.68)
-88.	34.6	63.5	35.4	157.9	.8	94.2	
-89.	35.0	64.4	35.8	159.9	.8	95.4	-10 R3 _____ (-122.87)
-90.	35.4	65.3	36.1	161.9	.8	96.6	
-91.	35.7	66.1	36.5	164.0	.8	97.8	
-92.	36.1	67.0	36.9	166.0	.8	98.9	
-93.	36.5	67.9	37.2	168.1	.7	100.1	ΔVX: X1 _____ ( 47.2 )
-94.	36.9	68.8	37.6	170.1	.7	101.3	
-95.	37.2	69.6	38.0	172.2	.7	102.5	+X3 _____ ( 0.1 )
-96.	37.6	70.5	38.3	174.2	.7	103.7	
-97.	38.0	71.4	38.7	176.3	.7	104.9	_____ ( 47.3 )
-98.	38.3	72.3	39.0	178.4	.7	106.1	
-99.	38.7	73.2	39.4	180.5	.6	107.3	-X2 _____ ( -47.7 )
-100.	39.1	74.1	39.8	182.6	.6	108.5	
-101.	39.5	75.0	40.1	184.7	.6	109.7	ΔVX _____ ( - 0.4 ) FPS
-102.	39.8	75.9	40.5	186.7	.6	110.9	
-103.	40.2	76.8	40.8	188.9	.6	112.1	
-104.	40.6	77.7	41.2	191.0	.6	113.3	
-105.	40.9	78.6	41.5	193.1	.5	114.5	ΔVZ: Z2 _____ ( 231.3 )
-106.	41.3	79.5	41.9	195.2	.5	115.7	
-107.	41.7	80.4	42.2	197.3	.5	116.9	-Z1 _____ ( -94.8 )
-108.	42.0	81.4	42.6	199.4	.5	118.2	
-109.	42.4	82.3	42.9	201.6	.5	119.4	_____ ( 136.5 )
-110.	42.8	83.2	43.3	203.7	.4	120.6	
-111.	43.1	84.2	43.6	205.9	.4	121.8	-Z3 _____ (-136.5 )
-112.	43.5	85.1	44.0	208.0	.4	123.0	
-113.	43.9	86.0	44.3	210.2	.4	124.3	ΔVZ _____ ( 0.0 )
-114.	44.2	87.0	44.7	212.3	.4	125.5	
-115.	44.6	87.9	45.0	214.5	.3	126.7	
-116.	45.0	88.9	45.4	216.7	.3	128.0	
-117.	45.3	89.8	45.7	218.8	.3	129.2	

DT	X1	Z1	X2	Z2		Z3
-118.	45.7	90.8	46.1	221.0	.3	130.5
-119.	46.1	91.7	46.4	223.2	.2	131.7
-120.	46.4	92.7	46.7	225.4	.2	132.9
-121.	46.8	93.6	47.1	227.6	.2	134.2
-122.	47.1	94.6	47.4	229.8	.2	135.4
-123.	47.5	95.6	47.8	232.0	.1	136.7
-124.	47.9	96.5	48.1	234.2	.1	137.9
-125.	48.2	97.5	48.4	236.4	.1	139.2
-126.	48.6	98.5	48.8	238.6	.0	140.5
-127.	48.9	99.5	49.1	240.9	.0	141.7
-128.	49.3	100.5	49.5	243.1	-.0	143.0
-129.	49.7	101.5	49.8	245.3	-.0	144.3
-130.	50.0	102.4	50.1	247.6	-.1	145.5
-131.	50.4	103.4	50.5	249.8	-.1	146.8
-132.	50.7	104.4	50.8	252.1	-.1	148.1
-133.	51.1	105.4	51.1	254.4	-.2	149.3
-134.	51.5	106.4	51.4	256.6	-.2	150.6
-135.	51.8	107.4	51.8	258.9	-.2	151.9
-136.	52.2	108.5	52.1	261.2	-.3	153.2
-137.	52.5	109.5	52.4	263.4	-.3	154.5
-138.	52.9	110.5	52.8	265.7	-.3	155.8
-139.	53.2	111.5	53.1	268.0	-.4	157.0
-140.	53.6	112.5	53.4	270.3	-.4	158.3
-141.	53.9	113.6	53.7	272.6	-.4	159.6
-142.	54.3	114.6	54.1	274.9	-.5	160.9
-143.	54.6	115.6	54.4	277.2	-.5	162.2
-144.	55.0	116.6	54.7	279.6	-.5	163.5
-145.	55.3	117.7	55.0	281.9	-.6	164.8
-146.	55.7	118.7	55.3	284.2	-.6	166.1
-147.	56.1	119.8	55.7	286.5	-.7	167.4
-148.	56.4	120.8	56.0	288.9	-.7	168.8
-149.	56.8	121.9	56.3	291.2	-.7	170.1
-150.	57.1	122.9	56.6	293.6	-.8	171.4
-151.	57.5	124.0	56.9	295.9	-.8	172.7
-152.	57.8	125.0	57.3	298.3	-.9	174.0
-153.	58.2	126.1	57.6	300.7	-.9	175.3
-154.	58.5	127.2	57.9	303.0	-.9	176.7
-155.	58.8	128.2	58.2	305.4	-1.0	178.0
-156.	59.2	129.3	58.5	307.8	-1.0	179.3
-157.	59.5	130.4	58.8	310.2	-1.1	180.7
-158.	59.9	131.5	59.1	312.6	-1.1	182.0
-159.	60.2	132.6	59.4	315.0	-1.2	183.3

PREPARED BY FPRB/OPS

Page 21

\*\*\*\*\*  
\* SS - 104:45:46 \*  
\*\*\*\*\*

TPI 4 \*410 +3 TPI SEARCH ROUTINE  
 \*307 +043.00 ΔT XFER  
 \*310 +021.00 TFI TPI  
 \*303R THETA AT TPI

-21:00 \*410+4 (When ET= -21 or  
 when 303=+26.60)

*flashing light  
 from CSM  
 at 60 n.m.*

-20:00 V32E (11 MARKS)

AOS \*370 \_\_\_\_\_ ΔV TPI

ΔV 55.9 \*371 \_\_\_\_\_ ΔV TPI+ΔV TPF

N37 : : TIG TPI  
 (105:09:00)

TPI 105:23:06.01 N58 HP,ΔV TPI,ΔV TPF 105+23

TPI 5 N59 + 23.4 ΔV F/A(LOS)

- 6.0 ΔV R/L(LOS)

+ 1.6 ΔV D/U(LOS)

52.3 n.m. N45 M,TFI,-00001  
 SET ET

TPI 6 TRANSMIT TIG OF TPI TO CSM

-15:00 V47E AGS UPDATE

\*414+1

\*414R+0

\*400+3 AGS ALIGN

\*411+0 RCS ENGINE

\*410+5 EXT ΔV

-12:00 PRO-FINAL COMP

N37 105:23:56.19 TIG TPI  
 (105:09:00)

-9:00 \*304 THETA

TPI 7

+48.0 +244 315  
 N58 HP,ΔV TPI,ΔV TPF

N81 + 21.7 ΔVX(LV)

- 5.7 ΔVY(LV)

- 9.6 ΔVZ(LV)

N59 + 23.6 ΔV F/A(LOS)

- 4.7 ΔV R/L(LOS)

- 1.2 ΔV D/U(LOS)

N45 M,TFI,MGA

SET ET

PRO

P00

-6:00 P41E

(105:03) V06N86E \_\_\_\_\_ ΔVX(LV)

\_\_\_\_\_ ΔVY(LV)

\_\_\_\_\_ ΔVZ(LV)

-5:00 \*304 THETA

COPY R, R DOT FROM TM FOR  
 CHARTS

TPI 8 AUTO MANEUVER

\*450 LOAD

\*451 LOAD

\*452 LOAD

\*400+1 Guidance Steering

\*407+0 REF FRAME

CALCULATE BU SOLUTION

COPY CSM TPI SOLUTION

SYNC COUNTDOWN WITH CSM

TPI 9 N85 ΔV Body

+ 24.0

-

APOLLO 10, . MAY 1, 1969

- :35 DB-MIN  
 AGS MODE CONT-AUTO  
 \*500 ΔVX

: : TPI(105:09:00)

TPI 10 USE ASC FEED

TPI 11 VERIFY RESIDUALS

N85 + 0 ΔVX

- 1 ΔVY

1 ΔVZ

\*500 - 2 ΔVX

\*501 - 3 ΔVY

\*502 + 2 ΔVZ

PRO

P00

RCS A 91 % (69)

RCS B 58 % (65)

ASC 02(1) % (67)

105 22 56 19  
 29

0-28-68  
P/B/OPS

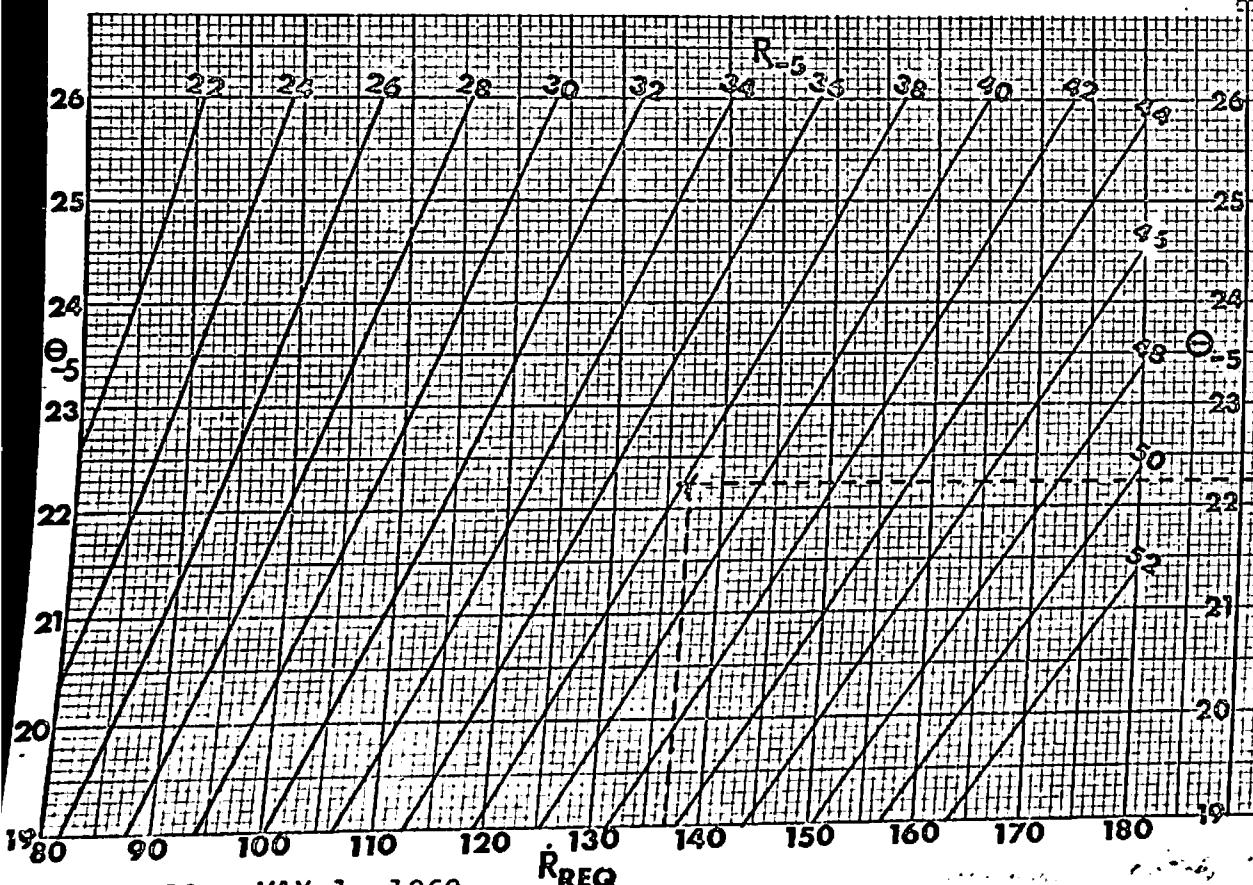
# TERMINAL PHASE INITIATION

$\Theta_{-5}$  22.24 R<sub>-5</sub>

$\Theta_{-9}$  19.54

$\Delta\Theta$  2.70

PNGS (N59)	GND	CHARTS	AT
+F/A	_____	_____	_____
+R/L	_____	_____	_____
+D/U	_____	_____	_____

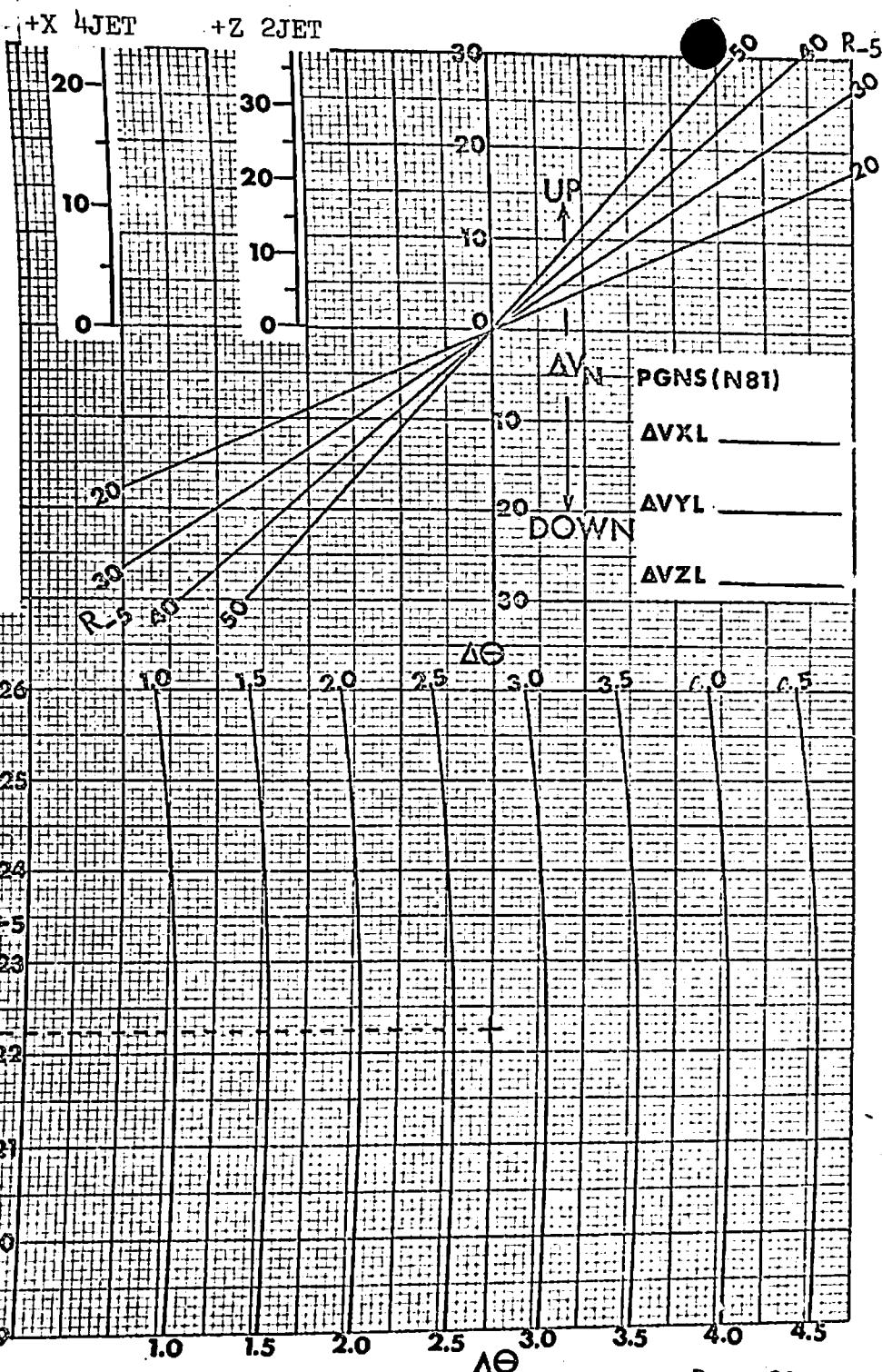


APOLLO 10, MAY 1, 1969

R<sub>REQ</sub> 136.9

R<sub>-5</sub> 112.3

$\Delta R$  24.6



TPI THROUGH TPF

+2:00 P20E  
 V93E (BEFORE 1st MARK)  
 AUTO MANEUVER  
 \*400+2 ACQ STEERING  
 AGS MODE CONT-AUTO  
 P35E  
 N45 M,TFI,-00001

TPF 1 V48E  
 N46 11002  
 N47 LM WT, CSM WT  
 PRO  
 N45 M,TFI,-00001

TPF 2 AGS EXT ΔV  
 \*407+0 REF FRAME  
 \*410+5 EXT ΔV  
 \*450+0  
 \*451+0  
 \*452+0  
 \*407+1  
 (MONITOR 500,501,502)

+9:00 \*304R THETA

TPF 3 HI GAIN P=90°, Y=0°  
 S-BD TRACKMODE - SLEW  
 ANT - OMNI, FWD  
 S-BAND-DN VOICE BU

\*\*\*\*\*  
 \* LOS - 105:19:44 \*  
 \*\*\*\*\*

+12:00 PRO-FINAL COMP  
 N81 ΔV's (LV)  
 N59 ΔV's (LOS)  
 N45 M,TFI,MGA

+13:00 \*304R THETA, R, RDOT  
 COMPUTE BU MCC  
 PRO  
 POO

TPF 4 P41E  
 BYPASS AUTO MANEUVER  
 N85 ΔV (Body)

: : MCC1(105:24:00)

+15:00 NULL ΔV'S  
 PRO  
 POO

NOTES

" Page 24

\* 563+0 DWNLK INIT FLAG RESET

70 mm

LUN SURF

BW F4/250  
 CEX F8/250

LUNAR SURF TERM

BW F4/250  
 CEX F4/250

VEH to VEH

CEX F8/250

16 mm

CIN F2.8/60

CEY

LUN SURF OBLIQ

F8/250

LUNAR SURF VERT

F2/250

VEH to VEH

F8/250

EARTH DIST

F11/250

LUNAR DIST

F5.6/250

"F" MISSION

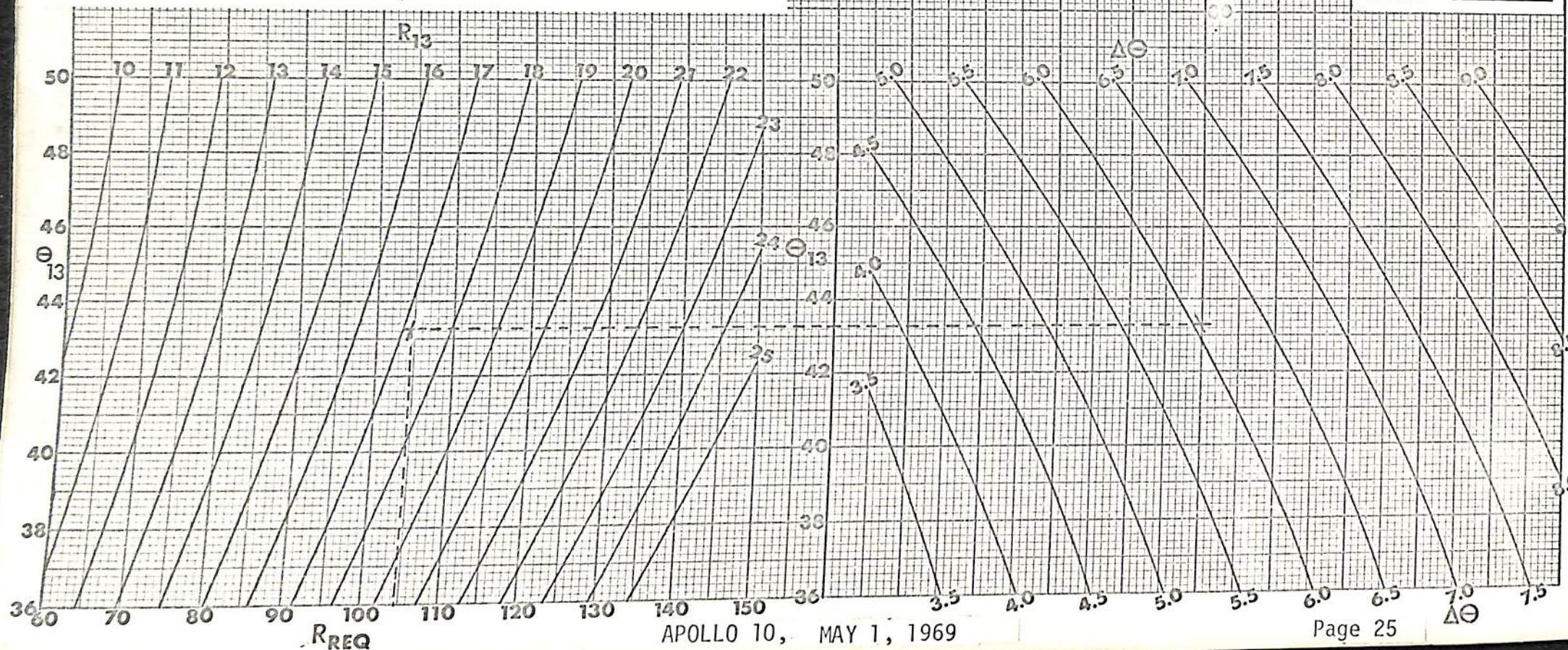
10-28-68  
FPRB/OPS

FIRST MIDCOUSE CORRECTION

+X 4JET      +Z 2JET

$\dot{R}_{13}$  \_\_\_\_\_ 43.28  $R_{13}$  \_\_\_\_\_ 17.23  $\dot{R}_{13}$  \_\_\_\_\_ 104.5  
 $\Theta_9$  \_\_\_\_\_ 37.24       $\Delta R$  \_\_\_\_\_ 0.0  
 $\Delta\Theta$  \_\_\_\_\_ 6.04

PNGS (N59)	GND	CHARTS	AT
+ F/A	_____	_____	_____
+ R/L	_____	_____	_____
+ D/U	_____	_____	_____



+16:00 P20E  
V93E (BEFORE 1st MARK)

P35E  
N45 M,TFI,-00001

TPF 5 AGS EXT ΔV  
\*407+0  
\*450+0  
\*451+0  
\*452+0  
\*407+1  
(MONITOR 500,501,502)

\*\*\*\*\*  
\* SR - 105:32:22 \*  
\*\*\*\*\*

+24:00 \*304R THETA

+27:00 PRO-FINAL COMP  
N81 ΔV's (LV)  
N59 ΔV's (LOS)

+28:00 \*304R THETA,R,RDOT  
COMPUTE BU MCC

TPF 6 PRO  
N45 M,TFI,MGA  
PRO  
POO

TPF 7 P41  
BYPASS AUTO MANEUVER  
N85 ΔV (Body)

: : MCC2 (105:39:00)

+30:00 NULL ΔV's  
PRO

TPF 8 P00  
V63E  
N12 00004  
00001  
N72 TRUN, SHFT  
N78 R, RDOT  
VERIFY TAPE METER WITH DSKY

TPF 9 BRAKING GATES 6000' - 30 FPS  
3000' - 20 FPS  
1500' - 10 FPS  
500' - 5 FPS

CMR - FWD  
16mm f 8/250  
70mm CEX f 8/250

TPF 10 Fly Formation and Photograph CSM  
EXT LTG - DOCK  
V41N72E

N73 000.00 TRUNNION  
325.00 SHAFT  
N12 00006 DESIGNATE  
00002 CONTINUOUS

PRO

CB(11) PGNS: RNDZ RDR - OPEN  
AC BUS A : RNDZ RDR - OPEN

V44E

\*\*\*\*\*  
\* AOS - 106:06:32 \*  
\*\*\*\*\*

TPF 11 S-BAND -X P=  $\text{ }^{\circ}$ , Y=  $\text{ }^{\circ}$

TPF 12 MNVR to Docking Att and  
Translate To Capture Latch

NOTES

Page 26

ALARM TRIGS:

ΔR 2000 FT (.33 NM)

ΔV 2 fps

PRE CS1 12 KFT (2.0 NM), 12 Fps ] OK

Post CS1 5KFT (1.0 NM), 5 Fps ]

STEADY STATE

ΔR, ΔV < 1NM, 5 Fps

1. REJECT (V32) 1<sup>ST</sup> MARK

2. ACCEPT 2<sup>ND</sup>, 3<sup>RD</sup> MARK

3, 4<sup>TH</sup> MK OUT OF LIMIT  
DO INITIALIZATION

ΔR, ΔV > 1NM, 5 Fps

1. REJECT 3 CONSEC MKS  
ABOVE LIMIT

2. DO INITIALIZATION

INITIALIZATION

1. V93

2. ACCEPT 5 MKS

RECOVERY FROM BAD MK

1. RECORD N49 ΔR

2. V95

3. V67 LOAD R,  
R<sub>2</sub> 6xAR  
R<sub>3</sub> +00001

4. RR BIAS ZERO - PGNS 57

5. V80

"F" MISSION

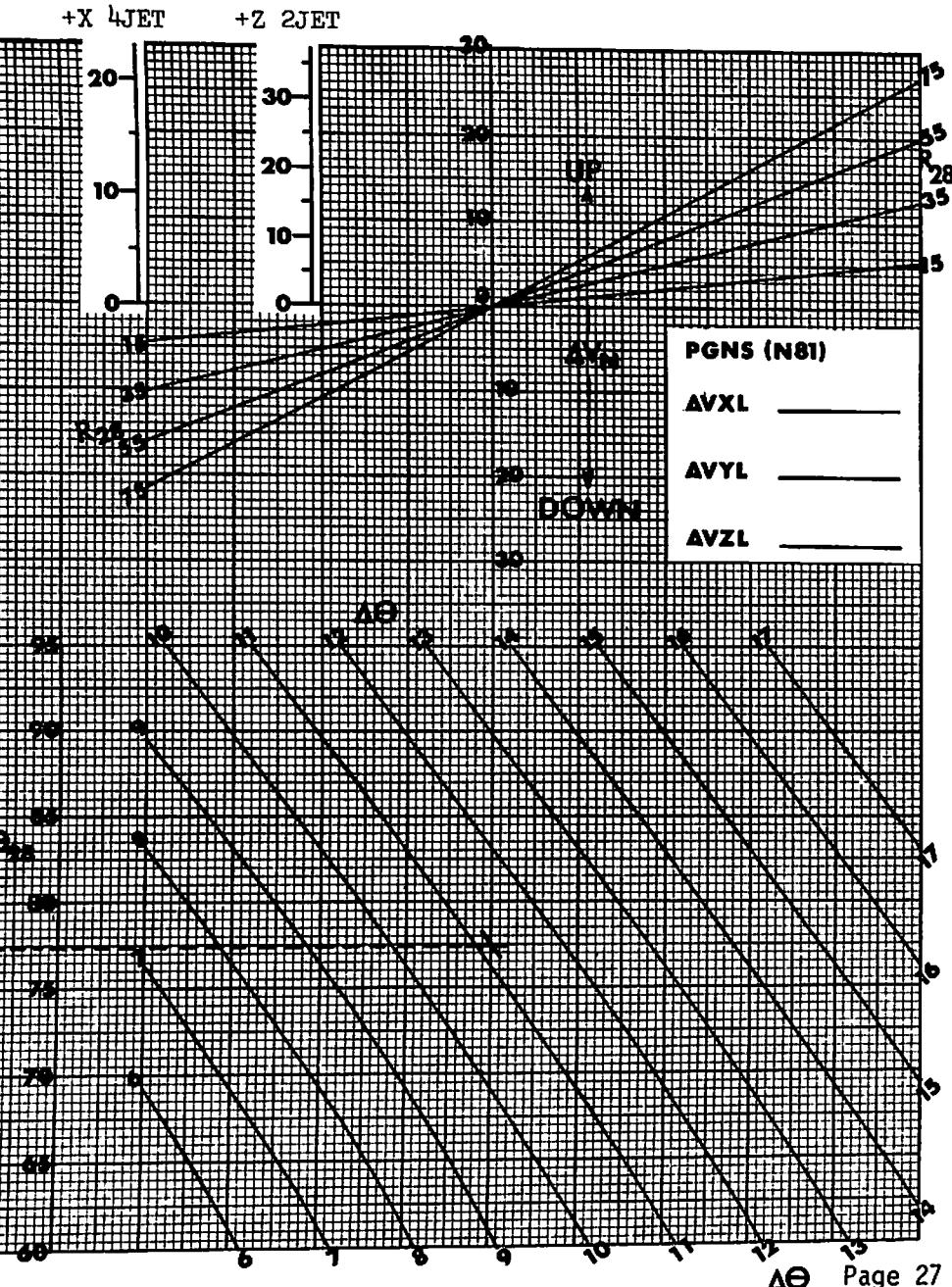
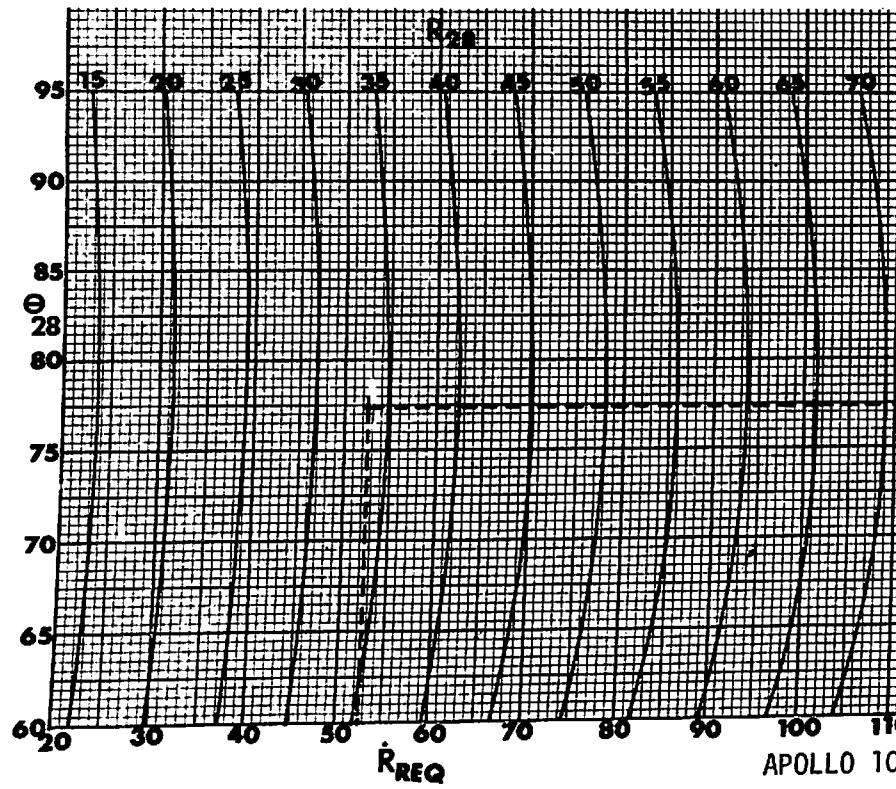
10-28-68

FPRB/OPS

SECOND MIDCOURSE CORRECTION

$\dot{R}_{REQ}$	52.4		
$\Theta_{28}$	7741 $R_{28}$	34.3 $\dot{R}_{28}$	52.4
$\Theta_{24}$	66.22	$\Delta R$	0.0
$\Delta\Theta$	11.19		

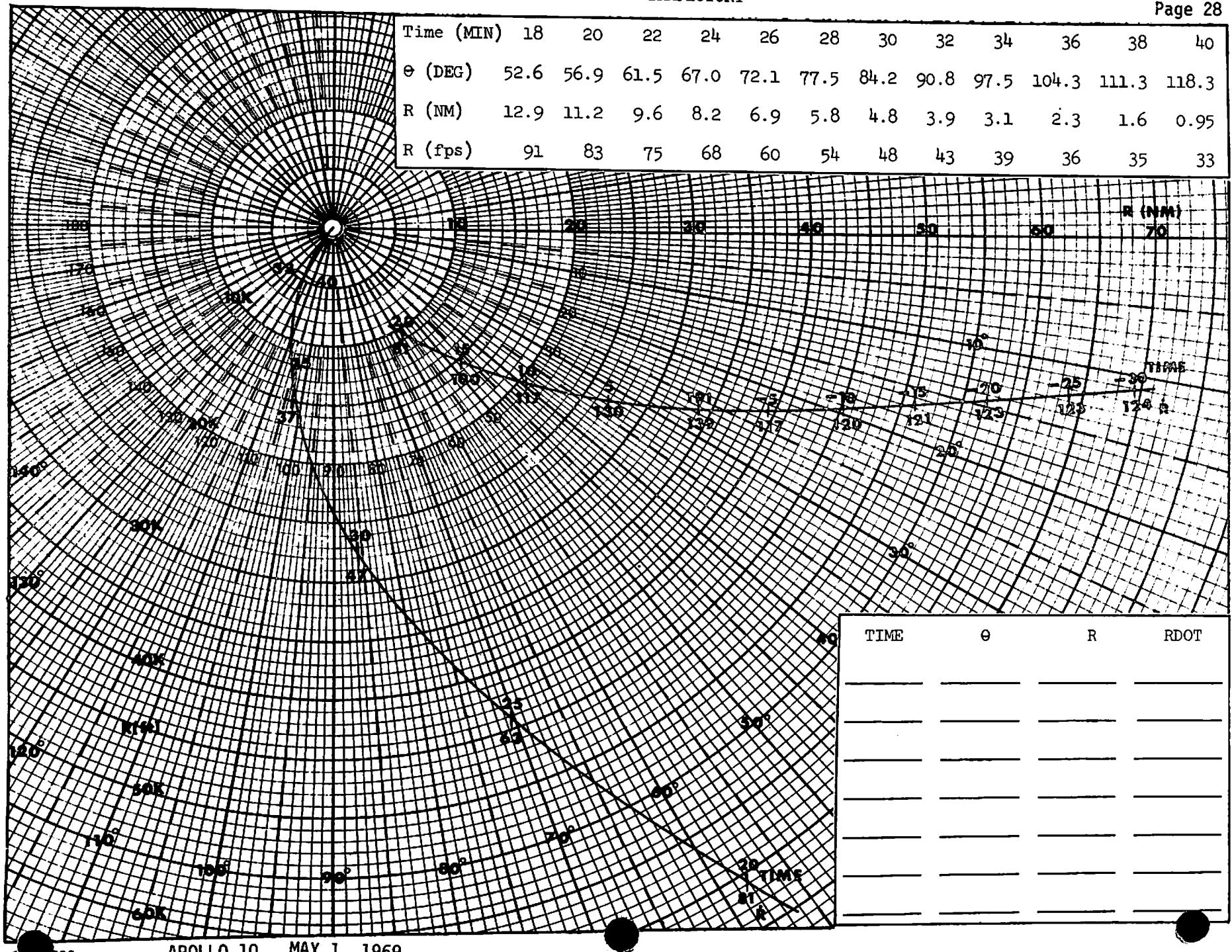
PNGS (N59)	GND	CHARTS	AT
+ F/A	_____	_____	_____
+ R/L	_____	_____	_____
+ D/U	_____	_____	_____

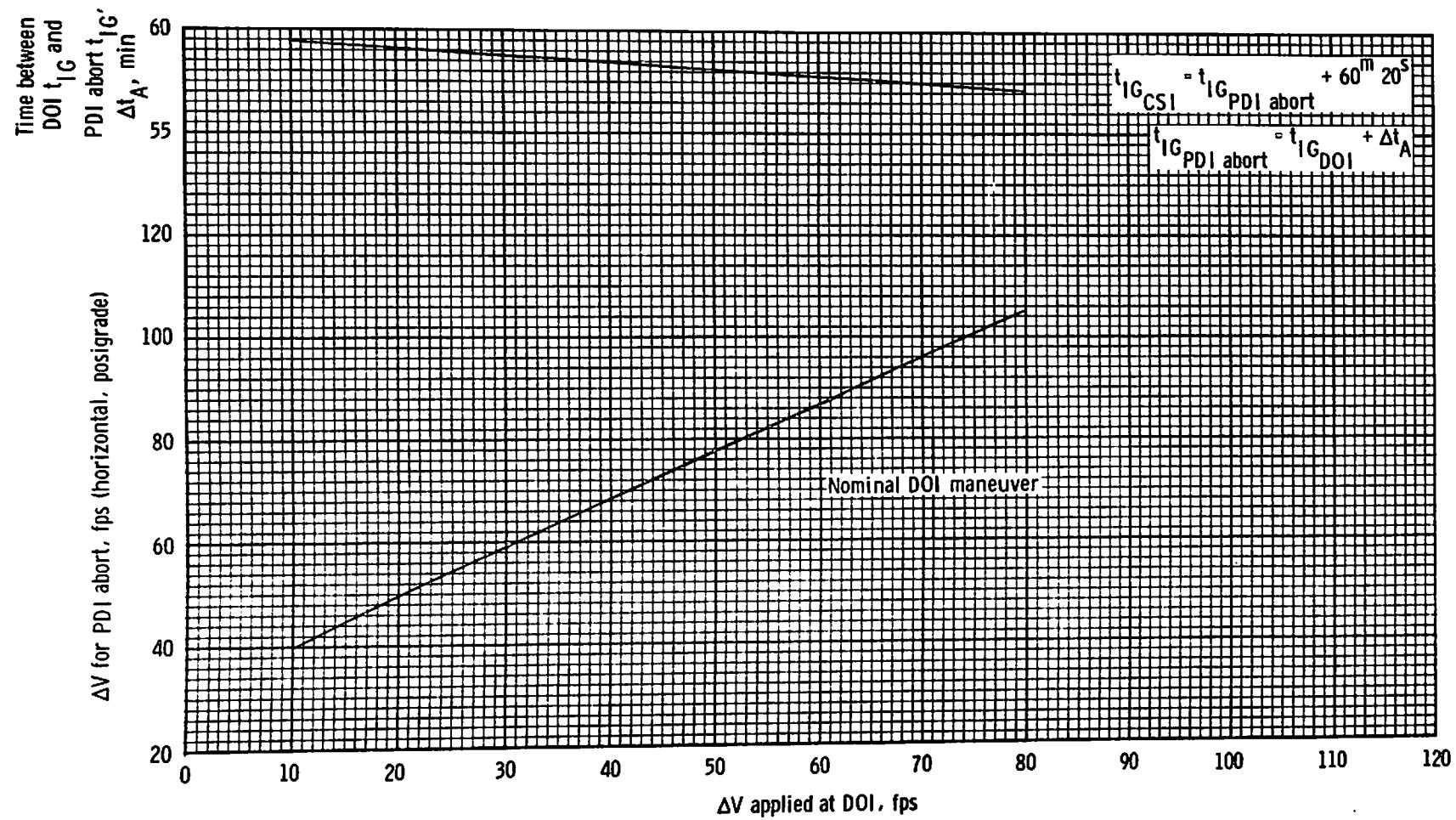


## F MISSION-RELATIVE REFERENCE TRAJECTORY

Page 28

Time (MIN)	18	20	22	24	26	28	30	32	34	36	38	40
e (DEG)	52.6	56.9	61.5	67.0	72.1	77.5	84.2	90.8	97.5	104.3	111.3	118.3
R (NM)	12.9	11.2	9.6	8.2	6.9	5.8	4.8	3.9	3.1	2.3	1.6	0.95
R (fps)	91	83	75	68	60	54	48	43	39	36	35	33





LM PDI abort maneuver.