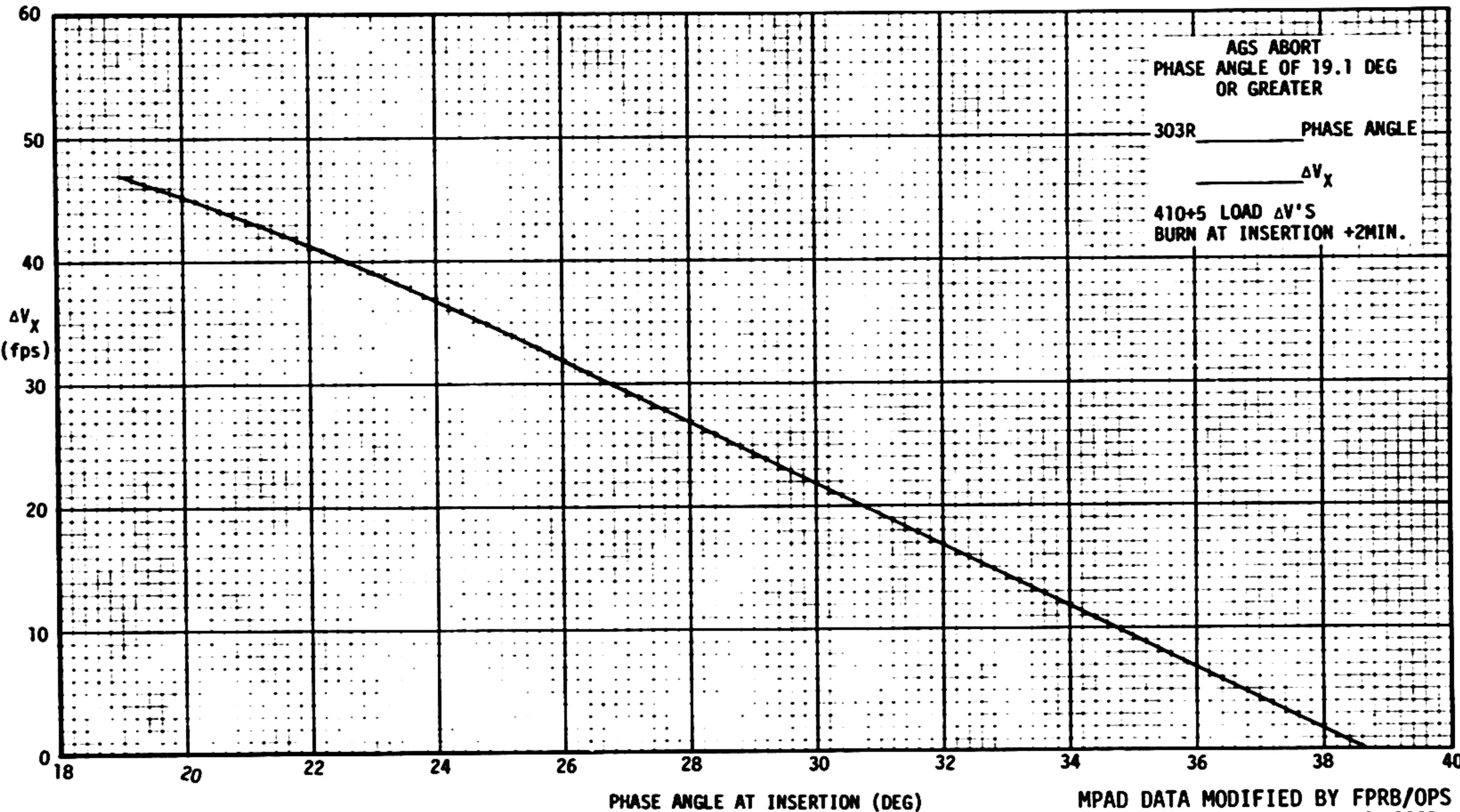


FAO

APOLLO 12	
LM RENDEZVOUS/ABORT BOOK	
PART NO	S/N
SKB32100081-393	1002

AGS INSERTION CHART

APOLLO 12 FLIGHT DATA FILE



MPAD DATA MODIFIED BY FPRB/OPS MISSION APOLLO 12, OCTOBER 6, 1969

INSERTION TWEAK MANEUVER FOR AGS ABORT FOR 10<PDI 1<16:20

PAGE 1

PDI 1 & PDI 2 DATA CARD

ABORT TIME	INS TIME	VH N76	HA/HP	BOOST TIG	CSI1 TIG	CSI2 TIG	ΔVX	TIG	CDH ΔVX	ΔVZ	TPI TIG
PDI1 DATA											
+20	+54	5655.4	132.3/51415	N/R	N/R	111+10+55	41.8	112+12+30	-102.0	-136.6	112+57+15
1+00	2+02	5653.7	131.4/52271	N/R	N/R	111+12+03	41.3	112+13+38	-102.2	-135.8	112+57+15
2+00	3+54	5647.9	129.9/57658	N/R	N/R	111+13+55	40.0	112+15+25	-99.9	-131.2	112+57+15
3+00	5+36	5640.5	125.3/60019	N/R	N/R	111+15+37	40.0	112+16+57	-95.3	-121.6	112+57+15
4+00	7+10	5632.2	118.7/60023	N/R	N/R	111+17+11	40.8	112+18+15	-88.1	-108.5	112+57+15
5+00	8+38	5620.6	109.5/60030	N/R	N/R	111+18+39	42.2	112+19+21	-78.0	-91.3	112+57+15
6+00	10+34	5603.8	97.9/62648	N/R	N/R	111+20+35	43.0	112+20+48	-64.9	-70.2	112+57+15
7+00	12+50	5576.3	81.6/71191	N/R	N/R	111+22+51	42.8	112+22+24	-45.5	-42.4	112+57+15
8+00	14+39	5547.9	64.0/78066	N/R	N/R	111+24+40	42.7	112+23+28	-23.8	-15.8	112+57+15
9+00	15+58	5527.0	49.1/78987	N/R	N/R	111+25+58	43.5	112+24+09	-4.7	3.2	112+57+15
10+00	17+06	5511.5	35.8/74842	N/R	N/R	111+27+07	45.1	112+24+43	13.1	17.8	112+57+15
11+00	18+14	5553.5	61.4/65356	111+28+15	112+28+15	113+18+15	33.7	114+16+52	-18.2	-43.9	114+55+52
12+00	19+23	5546.8	53.8/60243	111+29+24	112+29+24	113+19+24	36.7	114+17+44	-9.7	-26.9	114+55+52
13+00	20+22	5539.2	48.2/60241	111+30+23	112+30+23	113+20+23	37.6	114+18+31	-3.0	-14.1	114+55+52
14+00	21+22	5531.5	42.7/60239	111+31+23	112+31+23	113+21+23	38.4	114+19+17	3.8	-3.9	114+55+52
PDI2 DATA											
+20	1+00	5717.3	183.9/51579	N/R	N/R	113+04+46	28.6	114+08+17	-149.5	-255.4	114+55+52
1+00	2+09	5716.2	183.6/52750	N/R	N/R	113+05+55	28.0	114+09+27	-149.5	-255.0	114+55+52
2+00	4+02	5709.6	182.1/59382	N/R	N/R	113+07+48	26.7	114+11+14	-147.6	-248.8	114+55+52
3+00	5+42	5703.5	177.2/60020	N/R	N/R	113+09+28	27.7	114+12+45	-143.9	-237.1	114+55+52
4+00	7+16	5695.3	170.3/60026	N/R	N/R	113+11+02	29.4	114+14+04	-137.9	-220.3	114+55+52
5+00	8+43	5684.1	160.9/60033	N/R	N/R	113+12+30	31.7	114+15+11	-129.5	-198.4	114+55+52
6+00	10+42	5667.5	148.9/63048	N/R	N/R	113+14+28	33.7	114+16+42	-118.4	-171.2	114+55+52
7+00	12+57	5640.8	132.2/71523	N/R	N/R	113+16+44	35.2	114+18+19	-101.8	-134.4	114+55+52
8+00	14+45	5613.6	114.4/78296	N/R	N/R	113+18+31	36.8	114+19+24	-83.2	-98.7	114+55+52
9+00	16+03	5593.7	99.3/79178	N/R	N/R	113+19+50	38.8	114+20+06	-66.4	-71.4	114+55+52
10+00	17+11	5579.1	85.9/75116	N/R	N/R	113+20+58	41.4	114+20+41	-50.7	-49.6	114+55+52
11+00	18+16	5569.4	73.3/65490	N/R	N/R	113+22+02	44.9	114+21+14	-35.5	-31.6	114+55+52
12+00	19+24	5552.1	57.7/60249	N/R	N/R	113+23+10	47.5	114+21+42	-15.8	-10.6	114+55+52
13+00	20+23	5536.9	46.6/60246	N/R	N/R	113+24+09	48.1	114+22+13	-1.4	2.9	114+55+52
14+00	21+22	5521.5	35.5/60242	N/R	N/R	113+25+08	48.6	114+22+44	13.4	15.1	114+55+52

MPAD DATA MODIFIED BY FPRE/OPS  
MISSION: APOLLO 12. OCTOBER 30, 1969

DATE OCTOBER 30, 1969

LM RENDEZVOUS/ABORT BOOK

DATE OCTOBER 27, 1969

LH RENDEZVOUS/ABORT BOOK

APOLLO 12 FLIGHT DATA FILE

THIS PAGE INTENTIONALLY LEFT BLANK  
TAB USAGE ONLY

PAGE 3

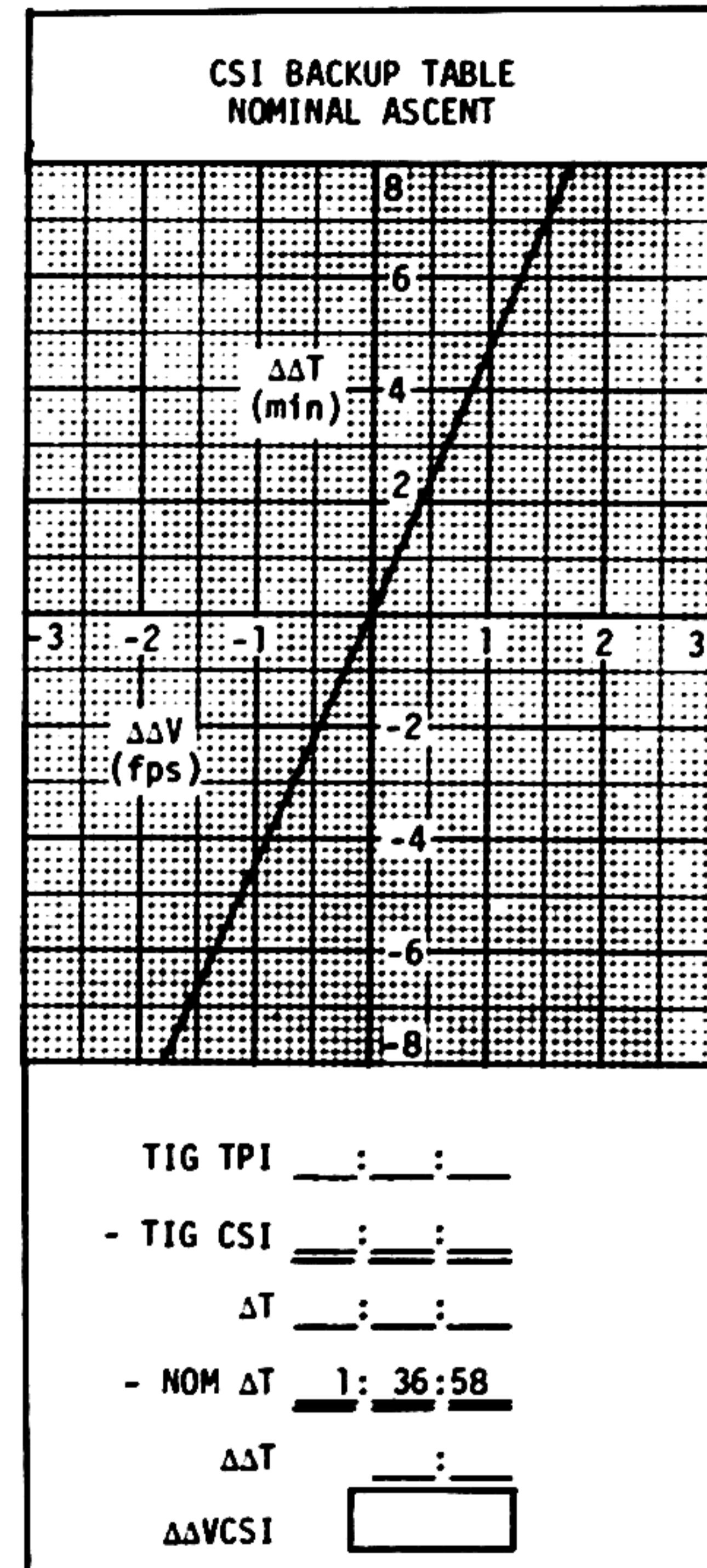
CSI B/U  
NOMINAL ASCENT

RDOT1	F1	RDOT2	F2	RDOT3	F3	R3	F4
-240.0	47.3	-140.0	45.2	-70.0	-27.6	120.0	-15.2
-241.0	48.4	-141.0	43.4	-71.0	-26.6	121.0	-15.5
-242.0	49.4	-142.0	41.6	-72.0	-25.6	122.0	-15.7
-243.0	50.5	-143.0	39.8	-73.0	-24.5	123.0	-15.9
-244.0	51.5	-144.0	37.9	-74.0	-23.5	124.0	-16.1
-245.0	52.5	-145.0	36.1	-75.0	-22.5	125.0	-16.3
-246.0	53.6	-146.0	34.3	-76.0	-21.4	126.0	-16.5
-247.0	54.6	-147.0	32.4	-77.0	-20.4	127.0	-16.7
-248.0	55.7	-148.0	30.6	-78.0	-19.4	128.0	-16.9
-249.0	56.7	-149.0	28.7	-79.0	-18.3	129.0	-17.1
-250.0	57.8	-150.0	26.9	-80.0	-17.3	130.0	-17.3
-251.0	58.8	-151.0	25.1	-81.0	-16.3	131.0	-17.5
-252.0	59.9	-152.0	23.2	-82.0	-15.2	132.0	-17.7
-253.0	60.9	-153.0	21.4	-83.0	-14.2	133.0	-17.9
-254.0	62.0	-154.0	18.6	-84.0	-13.1	134.0	-18.1
-255.0	63.0	-155.0	17.7	-85.0	-12.1	135.0	-18.4
-256.0	64.1	-156.0	15.9	-86.0	-11.1	136.0	-18.6
-257.0	65.1	-157.0	14.0	-87.0	-10.0	137.0	-18.8
-258.0	66.2	-158.0	12.2	-88.0	-9.0	138.0	-19.0
-259.0	67.2	-159.0	10.3	-89.0	-8.0	139.0	-19.2
-260.0	68.3	-160.0	8.5	-90.0	-6.9	140.0	-19.4
-261.0	69.3	-161.0	6.6	-91.0	-5.9	141.0	-19.6
-262.0	70.4	-162.0	4.8	-92.0	-4.8	142.0	-19.8
-263.0	71.4	-163.0	3.0	-93.0	-3.8	143.0	-20.0
-264.0	72.5	-164.0	1.1	-94.0	-2.8	144.0	-20.2
-265.0	73.5	-165.0	-.7	-95.0	-1.7	145.0	-20.5
-266.0	74.6	-166.0	-2.6	-96.0	-.7	146.0	-20.7
-267.0	75.7	-167.0	-4.4	-97.0	.4	147.0	-20.9
-268.0	76.7	-168.0	-6.3	-98.0	1.4	148.0	-21.1
-269.0	77.8	-169.0	-8.1	-99.0	2.4	149.0	-21.3
-270.0	78.8	-170.0	-10.0	-100.0	3.5	150.0	-21.5
-271.0	79.9	-171.0	-11.9	-101.0	4.5	151.0	-21.7
-272.0	81.0	-172.0	-13.7	-102.0	5.6	152.0	-21.9
-273.0	82.0	-173.0	-15.6	-103.0	6.6	153.0	-22.1
-274.0	83.1	-174.0	-17.4	-104.0	7.7	154.0	-22.4
-275.0	84.2	-175.0	-19.3	-105.0	8.7	155.0	-22.6
-276.0	85.2	-176.0	-21.1	-106.0	9.7	156.0	-22.8
-277.0	86.3	-177.0	-23.0	-107.0	10.8	157.0	-23.0
-278.0	87.4	-178.0	-24.9	-108.0	11.8	158.0	-23.2
-279.0	88.4	-179.0	-26.7	-109.0	12.9	159.0	-23.4
-280.0	89.5	-180.0	-28.6	-110.0	13.9	160.0	-23.6
-281.0	90.6	-181.0	-30.4	-111.0	15.0	161.0	-23.8

CSI BACKUP TABLE NOMINAL ASCENT	
TIME (Min)	NOMINAL
-30 R1	DSKY>TM (-283.3) -1.4
-20 R2	(-173.9) -.9
-10 R3	(- 94.0) -.5
-10 R3	( 154.1)
F1	( 93.0)
+F2	( -17.3)
	( 75.7)
+F3	( -2.8)
	( 72.9)
+F4	(- 22.4)
	( 50.5)
+ΔΔVCSI	( 0.0)
ΔVCSI	( 50.5)

Prepared by FPRB/OPS  
MISSION APOLLO 12, SEPTEMBER 12, 1969

RDOT1	F1	RDOT2	F2	RDOT 3	F3	R3	F4
-282.0	91.6	-182.0	-32.3	-112.0	16.0	162.0	-24.0
-283.0	92.7	-183.0	-34.2	-113.0	17.0	163.0	-24.2
-284.0	93.8	-184.0	-36.0	-114.0	18.1	164.0	-24.5
-285.0	94.8	-185.0	-37.9	-115.0	19.1	165.0	-24.7
-286.0	95.9	-186.0	-39.8	-116.0	20.2	166.0	-24.9
-287.0	97.0	-187.0	-41.6	-117.0	21.2	167.0	-25.1
-288.0	98.1	-188.0	-43.5	-118.0	22.3	168.0	-25.3
-289.0	99.2	-189.0	-45.4	-119.0	23.3	169.0	-25.5
-290.0	100.2	-190.0	-47.2	-120.0	24.4	170.0	-25.7
-291.0	101.3	-191.0	-49.1	-121.0	25.4	171.0	-25.9
-292.0	102.4	-192.0	-51.0	-122.0	26.5	172.0	-26.1
-293.0	103.5	-193.0	-52.9	-123.0	27.5	173.0	-26.3
-294.0	104.6	-194.0	-54.7	-124.0	28.6	174.0	-26.5
-295.0	105.6	-195.0	-56.6	-125.0	29.6	175.0	-26.7
-296.0	106.7	-196.0	-58.5	-126.0	30.7	176.0	-26.9
-297.0	107.8	-197.0	-60.4	-127.0	31.7	177.0	-27.1
-298.0	108.9	-198.0	-62.2	-128.0	32.8	178.0	-27.3
-299.0	110.0	-199.0	-64.1	-129.0	33.8	179.0	-27.5
-300.0	111.1	-200.0	-66.0	-130.0	34.9	180.0	-27.7
-301.0	112.2	-201.0	-67.9	-131.0	35.9	181.0	-27.9
-302.0	113.2	-202.0	-69.8	-132.0	37.0	182.0	-28.1
-303.0	114.3	-203.0	-71.6	-133.0	38.0	183.0	-28.3
-304.0	115.4	-204.0	-73.5	-134.0	39.1	184.0	-28.5
-305.0	116.5	-205.0	-75.4	-135.0	40.1	185.0	-28.7
-306.0	117.6	-206.0	-77.3	-136.0	41.2	186.0	-28.9
-307.0	118.7	-207.0	-79.2	-137.0	42.2	187.0	-29.1
-308.0	119.8	-208.0	-81.1	-138.0	43.3	188.0	-29.3
-309.0	120.9	-209.0	-83.0	-139.0	44.3	189.0	-29.5
-310.0	122.0	-210.0	-84.9	-140.0	45.4	190.0	-29.7
-311.0	123.1	-211.0	-86.8	-141.0	46.4	191.0	-29.9
-312.0	124.2	-212.0	-88.7	-142.0	47.5	192.0	-30.1
-313.0	125.3	-213.0	-90.5	-143.0	48.5	193.0	-30.3
-314.0	126.4	-214.0	-92.4	-144.0	49.6	194.0	-30.5
-315.0	127.5	-215.0	-94.3	-145.0	50.7	195.0	-30.7
-316.0	128.6	-216.0	-96.2	-146.0	51.7	196.0	-30.9
-317.0	129.7	-217.0	-98.1	-147.0	52.8	197.0	-31.0
-318.0	130.8	-218.0	-100.0	-148.0	53.8	198.0	-31.2
-319.0	131.9	-219.0	-101.9	-149.0	54.9	199.0	-31.4
-320.0	133.0	-220.0	-103.8	-150.0	55.9	200.0	-31.6
-321.0	134.1	-221.0	-105.7	-151.0	57.0	201.0	-31.8
-322.0	135.3	-222.0	-107.7	-152.0	58.1	202.0	-32.0
-323.0	136.4	-223.0	-109.6	-153.0	59.1	203.0	-32.2



Prepared by FPRB/OPS  
MISSION APOLLO 12, SEPTEMBER 12, 1969

CSI B/U  
NOMINAL ASCENT

CDH B/U  
NOMINAL ASCENT

RDOT	X1	Z1	X2	Z2	X3	Z3
-50.0	67.3	254.8	-17.2	-193.9	-50.2	-60.7
-51.0	67.6	253.9	-17.5	-191.8	-50.3	-62.0
-52.0	68.0	253.0	-17.8	-189.6	-50.3	-63.2
-53.0	68.3	252.0	-18.2	-187.5	-50.3	-64.4
-54.0	68.7	251.1	-18.5	-185.4	-50.3	-65.6
-55.0	69.0	250.2	-18.9	-183.2	-50.3	-66.8
-56.0	69.4	249.3	-19.2	-181.1	-50.3	-68.0
-57.0	69.7	248.3	-19.5	-179.0	-50.3	-69.2
-58.0	70.1	247.4	-19.9	-176.8	-50.3	-70.5
-59.0	70.4	246.5	-20.2	-174.7	-50.3	-71.7
-60.0	70.8	245.6	-20.5	-172.5	-50.4	-72.9
-61.0	71.1	244.6	-20.9	-170.4	-50.4	-74.1
-62.0	71.5	243.7	-21.2	-168.3	-50.4	-75.3
-63.0	71.8	242.8	-21.6	-166.1	-50.4	-76.5
-64.0	72.2	241.9	-21.9	-164.0	-50.4	-77.7
-65.0	72.5	240.9	-22.2	-161.8	-50.4	-78.9
-66.0	72.9	240.0	-22.6	-159.7	-50.4	-80.2
-67.0	73.2	239.1	-22.9	-157.5	-50.5	-81.4
-68.0	73.6	238.1	-23.2	-155.4	-50.5	-82.6
-69.0	73.9	237.2	-23.6	-153.2	-50.5	-83.8
-70.0	74.3	236.3	-23.9	-151.1	-50.5	-85.0
-71.0	74.6	235.3	-24.3	-149.0	-50.5	-86.2
-72.0	75.0	234.4	-24.6	-146.8	-50.5	-87.4
-73.0	75.3	233.5	-24.9	-144.7	-50.6	-88.6
-74.0	75.7	232.5	-25.3	-142.5	-50.6	-89.8
-75.0	76.0	231.6	-25.6	-140.4	-50.6	-91.1
-76.0	76.4	230.6	-25.9	-138.2	-50.6	-92.3
-77.0	76.7	229.7	-26.3	-136.1	-50.6	-93.5
-78.0	77.1	228.8	-26.6	-133.9	-50.6	-94.7
-79.0	77.4	227.8	-26.9	-131.8	-50.7	-95.9
-80.0	77.8	226.9	-27.3	-129.6	-50.7	-97.1
-81.0	78.1	225.9	-27.6	-127.5	-50.7	-98.3
-82.0	78.5	225.0	-27.9	-125.3	-50.7	-99.5
-83.0	78.8	224.1	-28.3	-123.2	-50.7	-100.7
-84.0	79.2	223.1	-28.6	-121.0	-50.8	-102.0
-85.0	79.5	222.2	-28.9	-118.9	-50.8	-103.2
-86.0	79.9	221.2	-29.3	-116.7	-50.8	-104.4
-87.0	80.2	220.3	-29.6	-114.6	-50.8	-105.6
-88.0	80.6	219.3	-29.9	-112.4	-50.8	-106.8
-89.0	80.9	218.4	-30.3	-110.2	-50.9	-108.0
-90.0	81.3	217.4	-30.6	-108.1	-50.9	-109.2
-91.0	81.6	216.5	-30.9	-105.9	-50.9	-110.4
-92.0	82.0	215.5	-31.3	-103.8	-50.9	-111.6
-93.0	82.3	214.6	-31.6	-101.6	-50.9	-112.9

CDH BACKUP TABLE  
NOMINAL ASCENT

Prepared by FPRB/OPS  
MISSION APOLLO 12, SEPTEMBER 12, 1969

DATE OCTOBER 27, 1969

LM RENDEZVOUS/ABORT BOOK

CDH B/U  
NOMINAL ASCENT

RDOT	X1	Z1	X2	Z2	X3	Z3
-50.0	67.3	254.8	-17.2	-193.9	-50.2	-60.7
-51.0	67.6	253.9	-17.5	-191.8	-50.3	-62.0
-52.0	68.0	253.0	-17.8	-189.6	-50.3	-63.2
-53.0	68.3	252.0	-18.2	-187.5	-50.3	-64.4
-54.0	68.7	251.1	-18.5	-185.4	-50.3	-65.6
-55.0	69.0	250.2	-18.9	-183.2	-50.3	-66.8
-56.0	69.4	249.3	-19.2	-181.1	-50.3	-68.0
-57.0	69.7	248.3	-19.5	-179.0	-50.3	-69.2
-58.0	70.1	247.4	-19.9	-176.8	-50.3	-70.5
-59.0	70.4	246.5	-20.2	-174.7	-50.3	-71.7
-60.0	70.8	245.6	-20.5	-172.5	-50.4	-72.9
-61.0	71.1	244.6	-20.9	-170.4	-50.4	-74.1
-62.0	71.5	243.7	-21.2	-168.3	-50.4	-75.3
-63.0	71.8	242.8	-21.6	-166.1	-50.4	-76.5
-64.0	72.2	241.9	-21.9	-164.0	-50.4	-77.7
-65.0	72.5	240.9	-22.2	-161.8	-50.4	-78.9
-66.0	72.9	240.0	-22.6	-159.7	-50.4	-80.2
-67.0	73.2	239.1	-22.9	-157.5	-50.5	-81.4
-68.0	73.6	238.1	-23.2	-155.4	-50.5	-82.6
-69.0	73.9	237.2	-23.6	-153.2	-50.5	-83.8
-70.0	74.3	236.3	-23.9	-151.1	-50.5	-85.0
-71.0	74.6	235.3	-24.3	-149.0	-50.5	-86.2
-72.0	75.0	234.4	-24.6	-146.8	-50.5	-87.4
-73.0	75.3	233.5	-24.9	-144.7	-50.6	-88.6
-74.0	75.7	232.5	-25.3	-142.5	-50.6	-89.8
-75.0	76.0	231.6	-25.6	-140.4	-50.6	-91.1
-76.0	76.4	230.6	-25.9	-138.2	-50.6	-92.3
-77.0	76.7	229.7	-26.3	-136.1	-50.6	-93.5
-78.0	77.1	228.8	-26.6	-133.9	-50.6	-94.7
-79.0	77.4	227.8	-26.9	-131.8	-50.7	-95.9
-80.0	77.8	226.9	-27.3	-129.6	-50.7	-97.1
-81.0	78.1	225.9	-27.6	-127.5	-50.7	-98.3
-82.0	78.5	225.0	-27.9	-125.3	-50.7	-99.5
-83.0	78.8	224.1	-28.3	-123.2	-50.7	-100.7
-84.0	79.2	223.1	-28.6	-121.0	-50.8	-102.0
-85.0	79.5	222.2	-28.9	-118.9	-50.8	-103.2
-86.0	79.9	221.2	-29.3	-116.7	-50.8	-104.4
-87.0	80.2	220.3	-29.6	-114.6	-50.8	-105.6
-88.0	80.6	219.3	-29.9	-112.4	-50.8	-106.8
-89.0	80.9	218.4	-30.3	-110.2	-50.9	-108.0
-90.0	81.3	217.4	-30.6	-108.1	-50.9	-109.2
-91.0	81.6	216.5	-30.9	-105.9	-50.9	-110.4
-92.0	82.0	215.5	-31.3	-103.8	-50.9	-111.6
-93.0	82.3	214.6	-31.6	-101.6	-50.9	-112.9

CDH BACKUP TABLE  
NOMINAL ASCENT

Prepared by FPRB/OPS  
MISSION APOLLO 12, SEPTEMBER 12, 1969

DATE OCTOBER 27, 1969

LM RENDEZVOUS/ABORT BOOK



RDOT	X1	Z1	X2	Z2	X3	Z3
-93.0	82.3	214.6	-31.6	-101.6	-50.9	-112.9
-94.0	82.7	213.6	-31.9	-99.5	-51.0	-114.1
-95.0	83.0	212.7	-32.3	-97.3	-51.0	-115.3
-96.0	83.4	211.7	-32.6	-95.1	-51.0	-116.5
-97.0	83.7	210.8	-32.9	-93.0	-51.0	-117.7
-98.0	84.1	209.8	-33.3	-90.8	-51.0	-118.9
-99.0	84.5	208.9	-33.6	-88.7	-51.1	-120.1
-100.0	84.8	207.9	-33.9	-86.5	-51.1	-121.3
-101.0	85.2	207.0	-34.2	-84.3	-51.1	-122.5
-102.0	85.5	206.0	-34.6	-82.2	-51.1	-123.7
-103.0	85.9	205.1	-34.9	-80.0	-51.2	-125.0
-104.0	86.2	204.1	-35.2	-77.8	-51.2	-126.2
-105.0	86.6	203.1	-35.6	-75.7	-51.2	-127.4
-106.0	86.9	202.2	-35.9	-73.5	-51.2	-128.6
-107.0	87.3	201.2	-36.2	-71.4	-51.3	-129.8
-108.0	87.6	200.3	-36.6	-69.2	-51.3	-131.0
-109.0	88.0	199.3	-36.9	-67.0	-51.3	-132.2
-110.0	88.3	198.3	-37.2	-64.9	-51.3	-133.4
-111.0	88.7	197.4	-37.5	-62.7	-51.4	-134.6
-112.0	89.1	196.4	-37.9	-60.5	-51.4	-135.8
-113.0	89.4	195.5	-38.2	-58.4	-51.4	-137.0
-114.0	89.8	194.5	-38.5	-56.2	-51.4	-138.3
-115.0	90.1	193.5	-38.9	-54.0	-51.5	-139.5
-116.0	90.5	192.6	-39.2	-51.8	-51.5	-140.7
-117.0	90.8	191.6	-39.5	-49.7	-51.5	-141.9
-118.0	91.2	190.6	-39.8	-47.5	-51.6	-143.1
-119.0	91.5	189.7	-40.2	-45.3	-51.6	-144.3
-120.0	91.9	188.7	-40.5	-43.2	-51.6	-145.5
-121.0	92.2	187.7	-40.8	-41.0	-51.6	-146.7
-122.0	92.6	186.8	-41.2	-38.8	-51.7	-147.9
-123.0	93.0	185.8	-41.5	-36.6	-51.7	-149.1
-124.0	93.3	184.8	-41.8	-34.5	-51.7	-150.3
-125.0	93.7	183.8	-42.1	-32.3	-51.7	-151.5
-126.0	94.0	182.9	-42.5	-30.1	-51.8	-152.8
-127.0	94.4	181.9	-42.8	-27.9	-51.8	-154.0
-128.0	94.7	180.9	-43.1	-25.8	-51.8	-155.2
-129.0	95.1	180.0	-43.4	-23.6	-51.9	-156.4
-130.0	95.4	179.0	-43.8	-21.4	-51.9	-157.6
-131.0	95.8	178.0	-44.1	-19.2	-51.9	-158.8
-132.0	96.2	177.0	-44.4	-17.1	-52.0	-160.0
-133.0	96.5	176.0	-44.7	-14.9	-52.0	-161.2
-134.0	96.9	175.1	-45.1	-12.7	-52.0	-162.4
-135.0	97.2	174.1	-45.4	-10.5	-52.1	-163.6
-136.0	97.6	173.1	-45.7	-8.3	-52.1	-164.8

CDH BACKUP TABLE NOMINAL ASCENT		
TIME (MIN)	NOMINAL	DSKY>TM
-36 R1	_____ (-118.0)	-.6
-23 R2	_____ (-118.0)	-.6
-10 R3	_____ (-118.0)	-.6
$\Delta V_X$ : X1	_____ ( 91.2 )	
+X2	_____ (- 39.8 )	
	_____ ( 51.4 )	
+X3	_____ (- 51.6 )	
$\Delta V_X(LV)$	<input type="text"/> (- 0.2 )	
$\Delta V_Z$ : Z1	_____ ( 190.6 )	
+Z2	_____ (- 47.5 )	
	_____ ( 143.1 )	
+Z3	_____ (-143.1 )	
$\Delta V_Z(LV)$	<input type="text"/> ( 0.0 )	

Prepared by FPRB/OPS  
MISSION APOLLO 12, NOVEMBER 3, 1969

**CDH B/U  
NOMINAL ASCENT**

<b>RDOT</b>	<b>X1</b>	<b>Z1</b>	<b>X2</b>	<b>Z2</b>	<b>X3</b>	<b>Z3</b>
-136.0	97.6	173.1	-45.7	-8.3	-52.1	-164.8
-137.0	97.9	172.1	-46.0	-6.2	-52.1	-166.0
-138.0	98.3	171.2	-46.4	-4.0	-52.2	-167.2
-139.0	98.7	170.2	-46.7	-1.8	-52.2	-168.4
-140.0	99.0	169.2	-47.0	.4	-52.2	-169.7
-141.0	99.4	168.2	-47.3	2.6	-52.2	-170.9
-142.0	99.7	167.2	-47.7	4.8	-52.3	-172.1
-143.0	100.1	166.2	-48.0	6.9	-52.3	-173.3
-144.0	100.4	165.3	-48.3	9.1	-52.4	-174.5
-145.0	100.8	164.3	-48.6	11.3	-52.4	-175.7
-146.0	101.2	163.3	-49.0	13.5	-52.4	-176.9
-147.0	101.5	162.3	-49.3	15.7	-52.5	-178.1
-148.0	101.9	161.3	-49.6	17.9	-52.5	-179.3
-149.0	102.2	160.3	-49.9	20.1	-52.5	-180.5
-150.0	102.6	159.3	-50.3	22.2	-52.6	-181.7
-151.0	103.0	158.4	-50.6	24.4	-52.6	-182.9
-152.0	103.3	157.4	-50.9	26.6	-52.6	-184.1
-153.0	103.7	156.4	-51.2	28.8	-52.7	-185.3
-154.0	104.0	155.4	-51.5	31.0	-52.7	-186.5
-155.0	104.4	154.4	-51.9	33.2	-52.7	-187.7
-156.0	104.7	153.4	-52.2	35.4	-52.8	-189.0
-157.0	105.1	152.4	-52.5	37.6	-52.8	-190.2
-158.0	105.5	151.4	-52.8	39.8	-52.8	-191.4
-159.0	105.8	150.4	-53.1	42.0	-52.9	-192.6
-160.0	106.2	149.4	-53.5	44.2	-52.9	-193.8
-161.0	106.5	148.4	-53.8	46.3	-53.0	-195.0
-162.0	106.9	147.4	-54.1	48.5	-53.0	-196.2
-163.0	107.3	146.4	-54.4	50.7	-53.0	-197.4
-164.0	107.6	145.4	-54.8	52.9	-53.1	-198.6
-165.0	108.0	144.4	-55.1	55.1	-53.1	-199.8
-166.0	108.3	143.4	-55.4	57.3	-53.2	-201.0
-167.0	108.7	142.4	-55.7	59.5	-53.2	-202.2
-168.0	109.1	141.4	-56.0	61.7	-53.2	-203.4
-169.0	109.4	140.4	-56.4	63.9	-53.3	-204.6
-170.0	109.8	139.4	-56.7	66.1	-53.3	-205.8
-171.0	110.1	138.4	-57.0	68.3	-53.4	-207.0
-172.0	110.5	137.4	-57.3	70.5	-53.4	-208.2
-173.0	110.9	136.4	-57.6	72.7	-53.4	-209.4
-174.0	111.2	135.4	-57.9	74.9	-53.5	-210.6
-175.0	111.6	134.4	-58.3	77.1	-53.5	-211.9
-176.0	111.9	133.4	-58.6	79.3	-53.6	-213.1
-177.0	112.3	132.4	-58.9	81.5	-53.6	-214.3
-178.0	112.7	131.4	-59.2	83.7	-53.6	-215.5
-179.0	113.0	130.4	-59.5	85.9	-53.7	-216.7

**CDH BACKUP TABLE  
NOMINAL ASCENT**

Prepared by FPRB/OPS  
MISSION APOLLO 12, SEPTEMBER 12, 1969

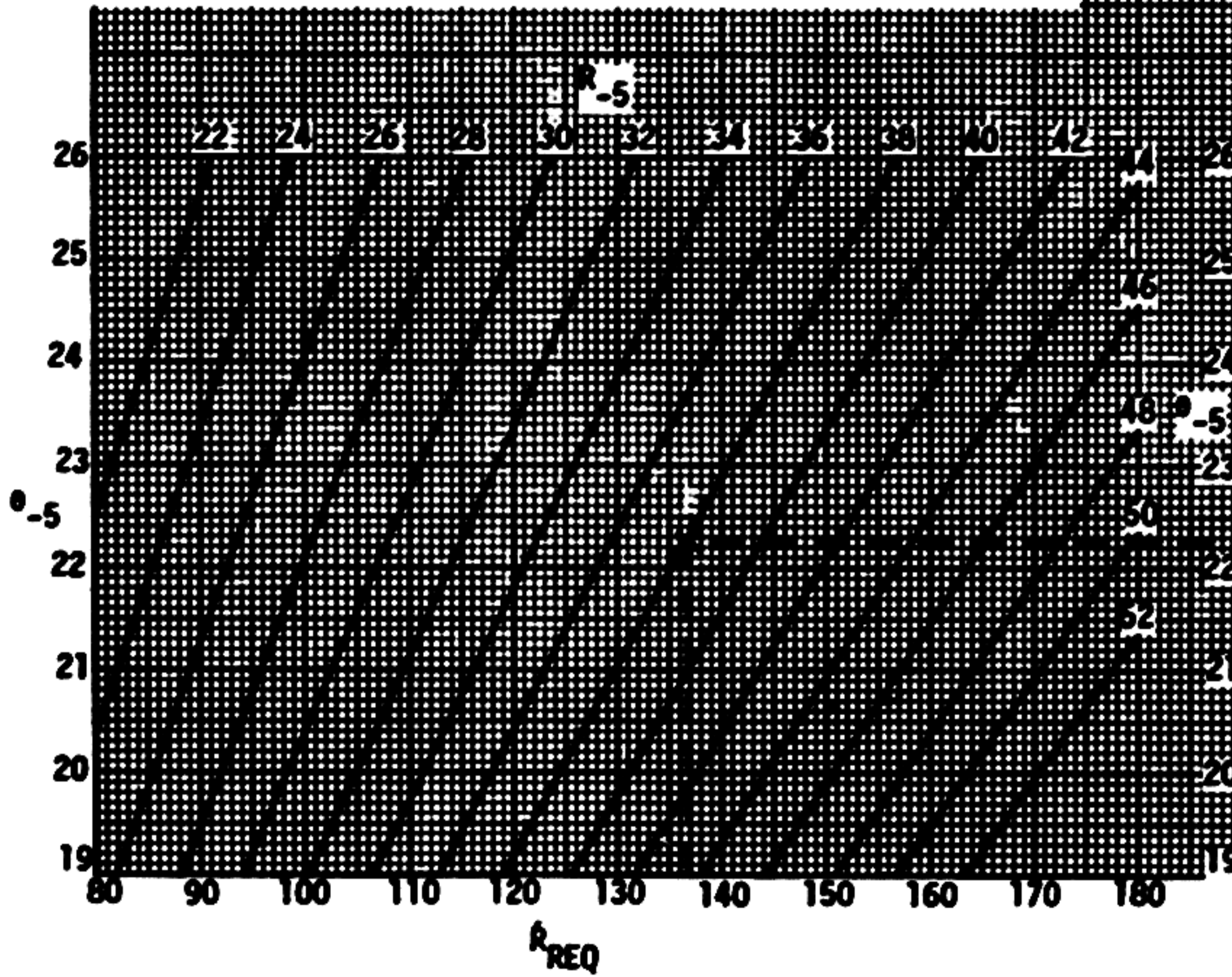
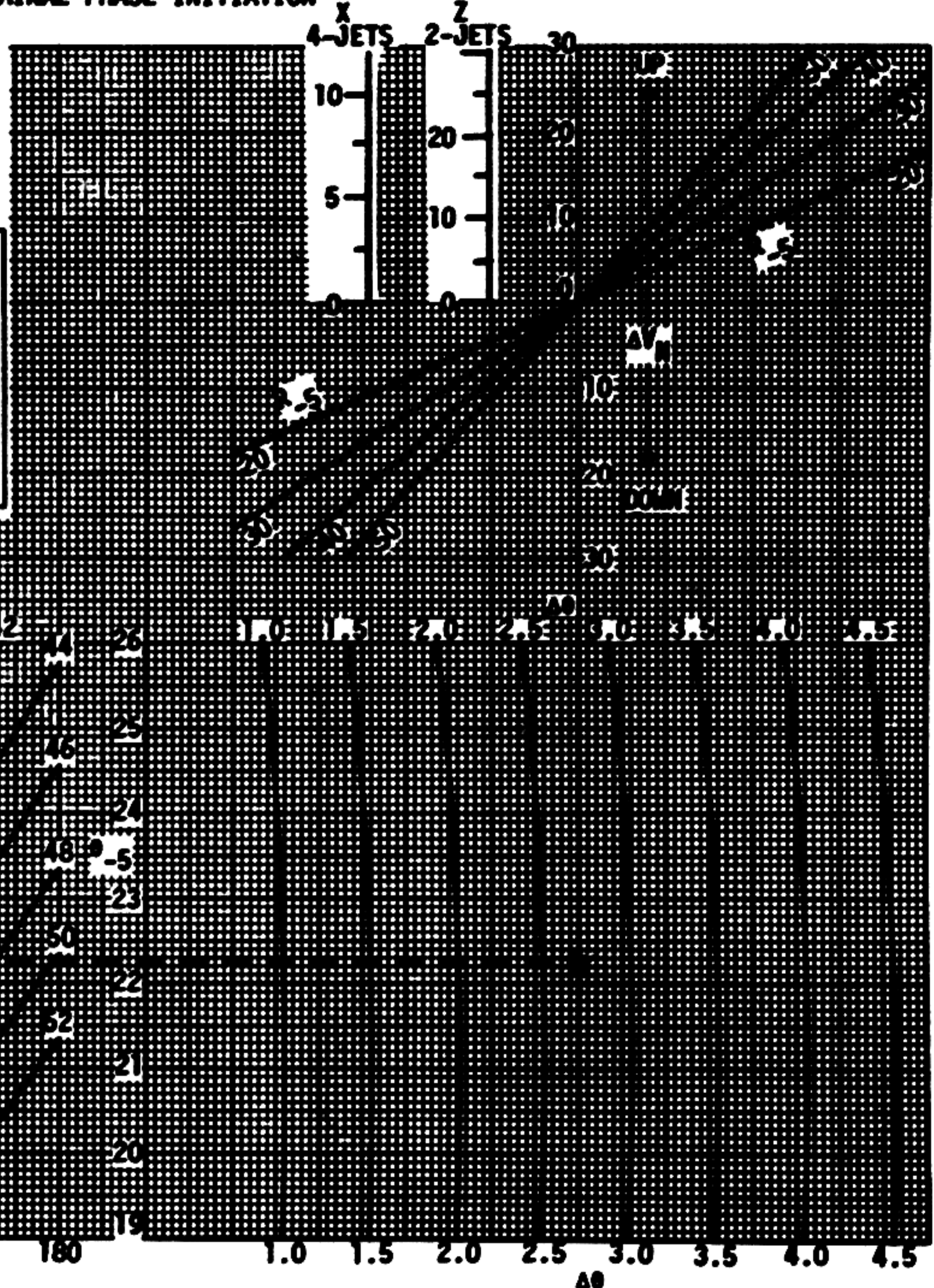
DATE OCTOBER 27, 1969

LM RENDEZVOUS/ABORT BOOK

H-1 MISSION TERMINAL PHASE INITIATION

$\dot{R}_{REQ}$  \_\_\_\_\_ 136.9  
 $\theta_{-5}$  \_\_\_\_\_ 22.24  $R_{-5}$  \_\_\_\_\_ 38.18  $R_{-5}$  \_\_\_\_\_ 112.3  
 $\theta_{-9}$  \_\_\_\_\_ 19.54  $\Delta R$  \_\_\_\_\_ 24.6  
 $\Delta \theta$  \_\_\_\_\_ 2.70

	PNGS (N59)	GND	CHARTS	$\Delta T$
$\theta/A$	_____	_____	_____	_____
$R/L$	_____	_____	_____	_____
$\theta/U$	_____	_____	_____	_____



Prepared By FPRB/OPS  
MISSION APOLLO 12, september

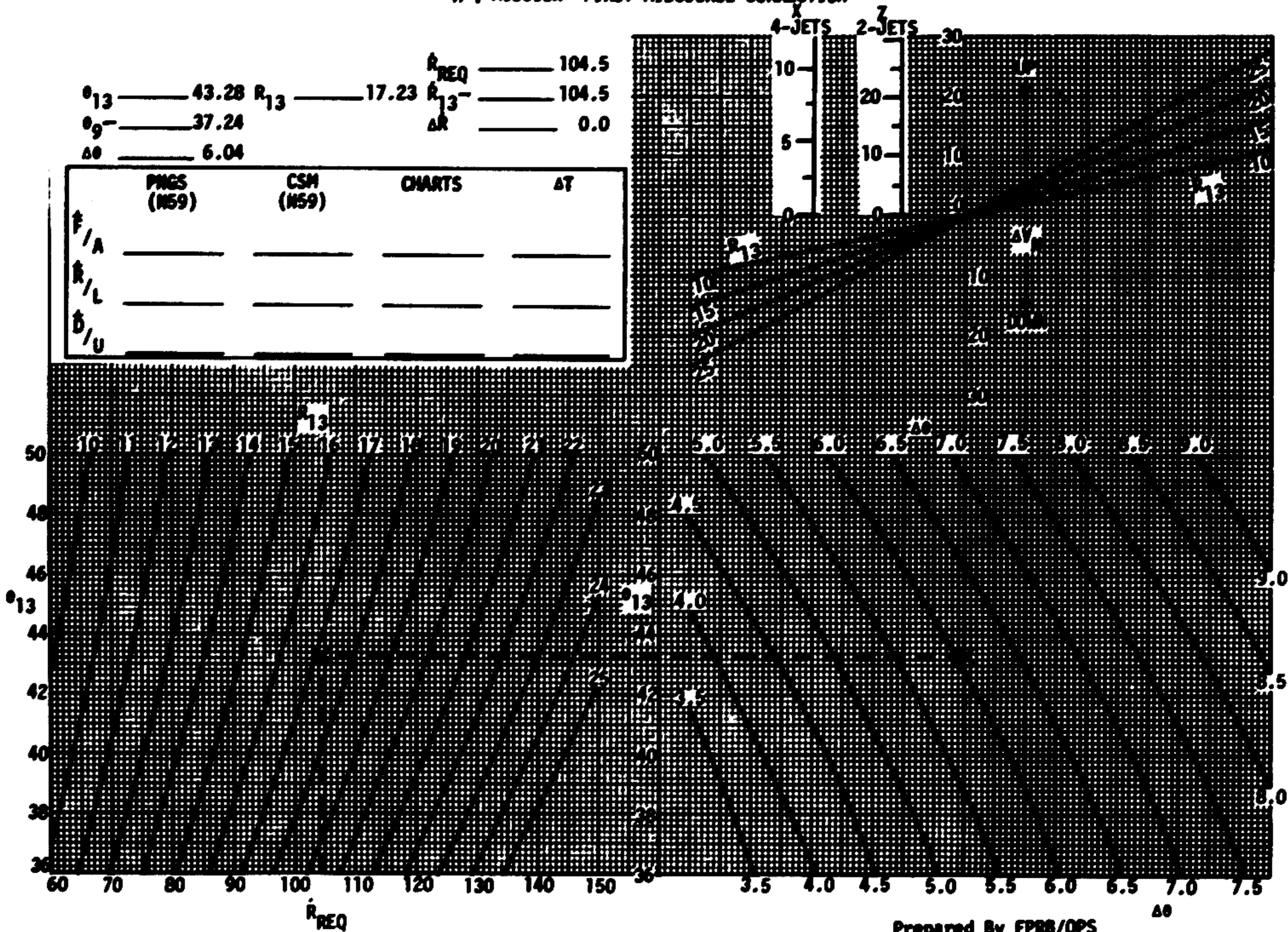
TERMINAL PHASE  
INITIATION

FIRST  
MCC

H-1 MISSION FIRST MIDCOURSE CORRECTION

$\theta_{13}$  — 43.28  $R_{13}$  — 17.23  $R_{REQ}$  — 104.5  
 $\theta_9$  — 37.24  $R_{13}$  — 104.5  
 $\Delta\theta$  — 6.04  $\Delta R$  — 0.0

	PNGS (N59)	CSM (N59)	CHARTS	$\Delta T$
F/A	_____	_____	_____	_____
R/L	_____	_____	_____	_____
B/U	_____	_____	_____	_____



Prepared By FPRB/OPS  
MISSION APOLLO 12, SEPTEMBER 26, 1969

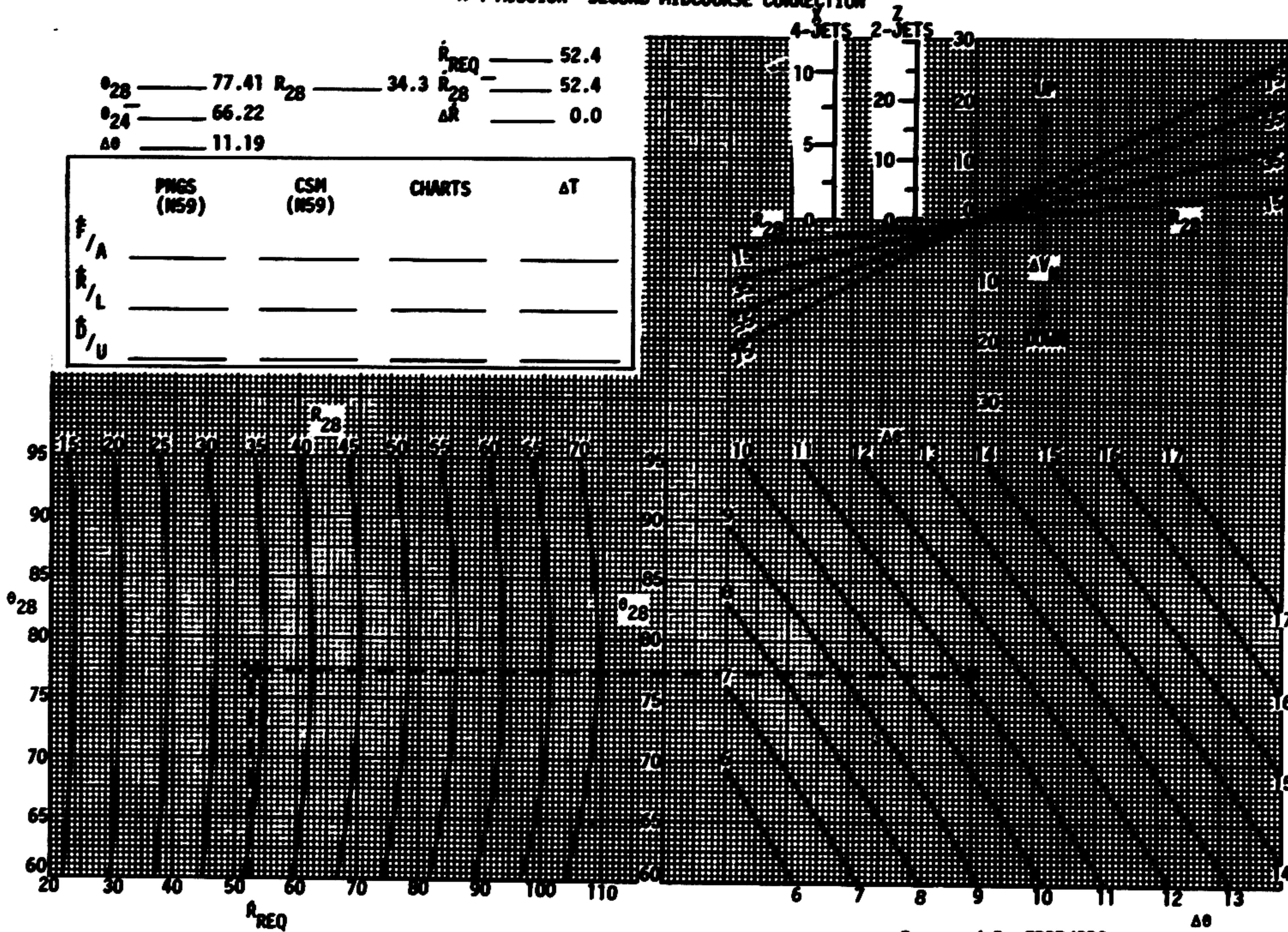
DATE OCTOBER 27, 1969

LM RENDEZVOUS/ABORT BOOK

H-1 MISSION SECOND MIDCOURSE CORRECTION

$\theta_{28}$  — 77.41  $R_{28}$  — 34.3  $R_{REQ}$  — 52.4  
 $\theta_{24}$  — 66.22  $R_{28}$  — 52.4  
 $\Delta\theta$  — 11.19  $\Delta R$  — 0.0

	PNGS (NS9)	CSM (NS9)	CHARTS	$\Delta T$
F/A	_____	_____	_____	_____
R/L	_____	_____	_____	_____
B/U	_____	_____	_____	_____



Prepared By FPRB/OPS  
MISSION APOLLO 12, SEPTEMBER 26, 1969

SECOND  
MCC

**THIS PAGE INTENTIONALLY LEFT BLANK  
TAB USAGE ONLY**

DATE OCTOBER 27, 1969

LM RENDEZVOUS/ABORT BOOK

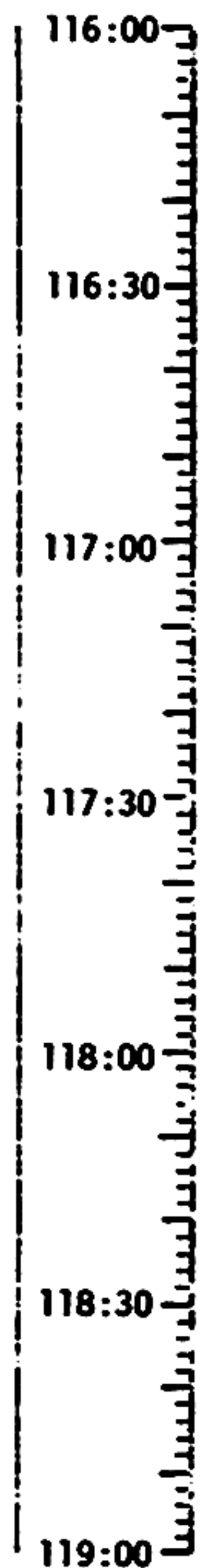
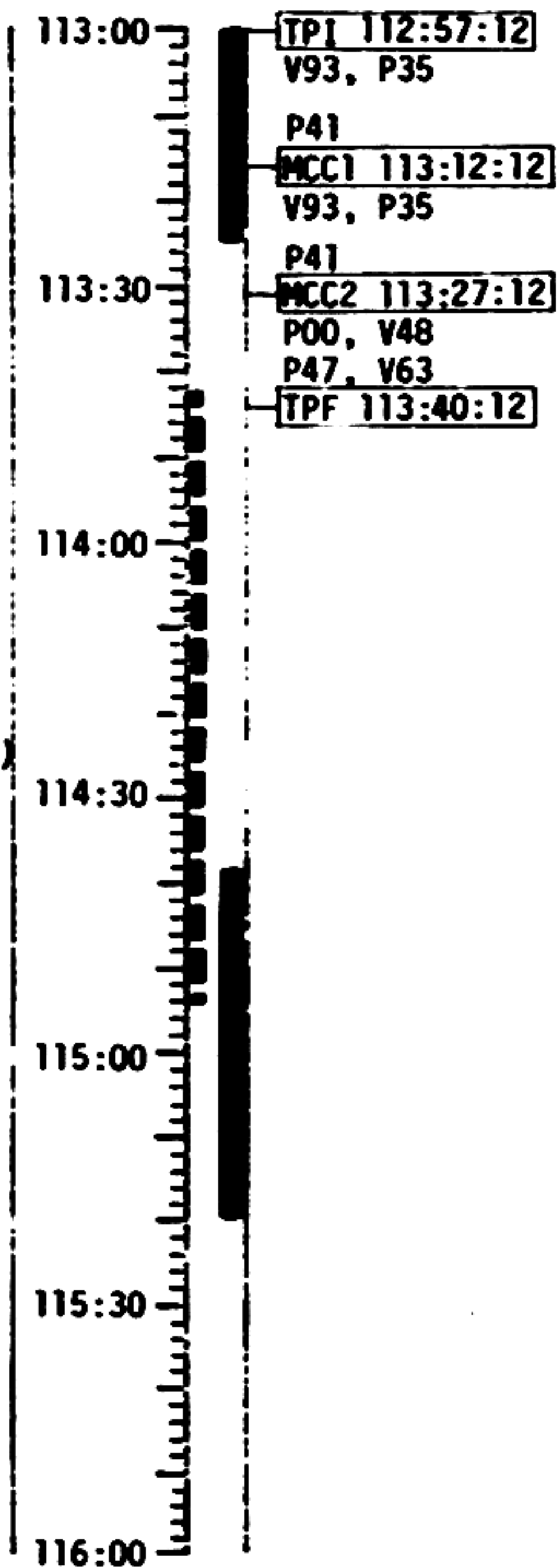
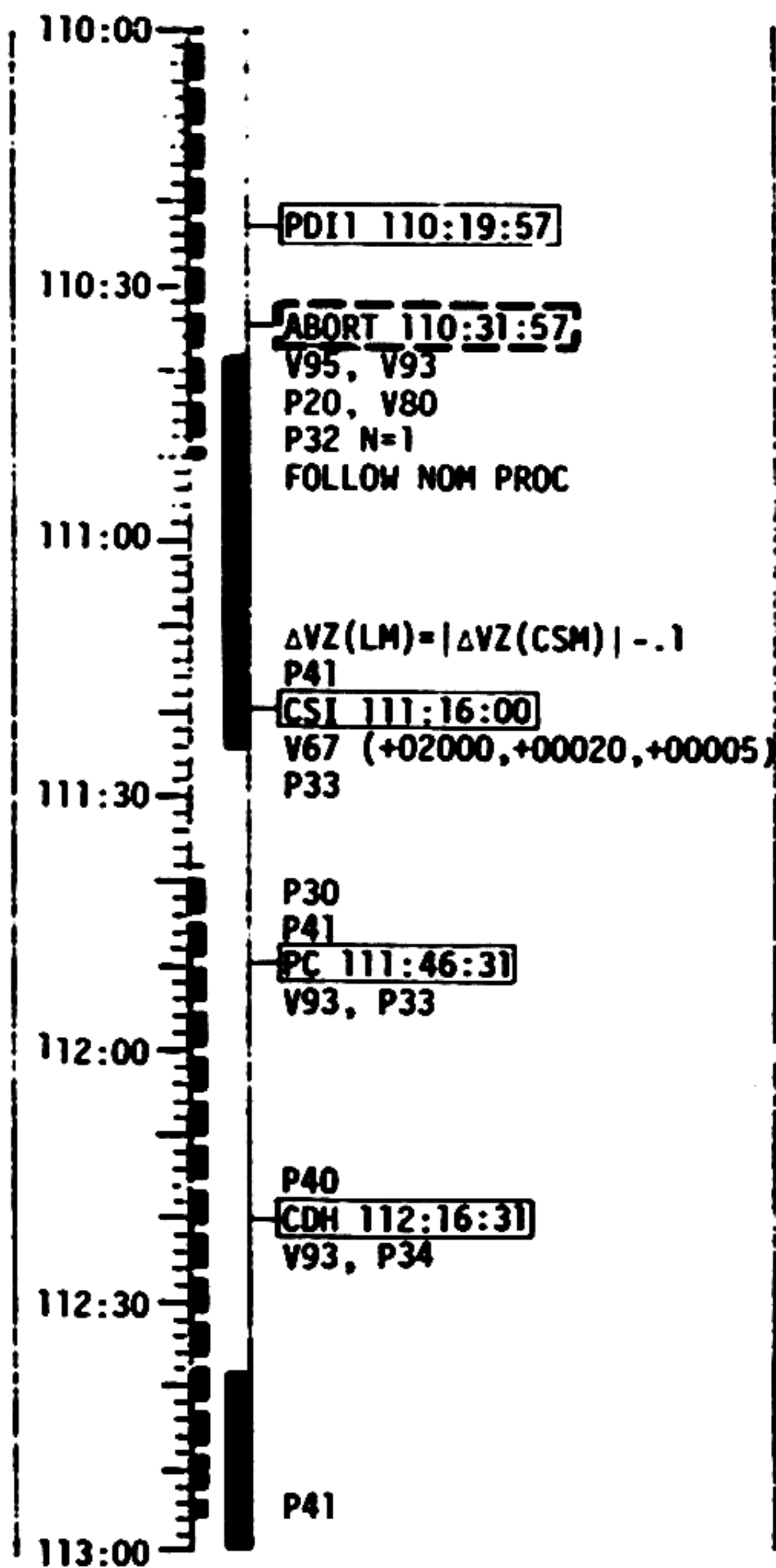
APOLLO 12 FLIGHT DATA FILE

RENDEZVOUS TIMELINES  
RELATIVE MOTION TRAJECTORIES  
INERTIAL PLOTS  
AND  
ABORT CHARTS

PAGE 13

PDI ABORTS

NO PDI 1 + 12 TIMELINE



Prepared By FPRB/OPS  
MISSION APOLLO 12, OCTOBER 20, 1969

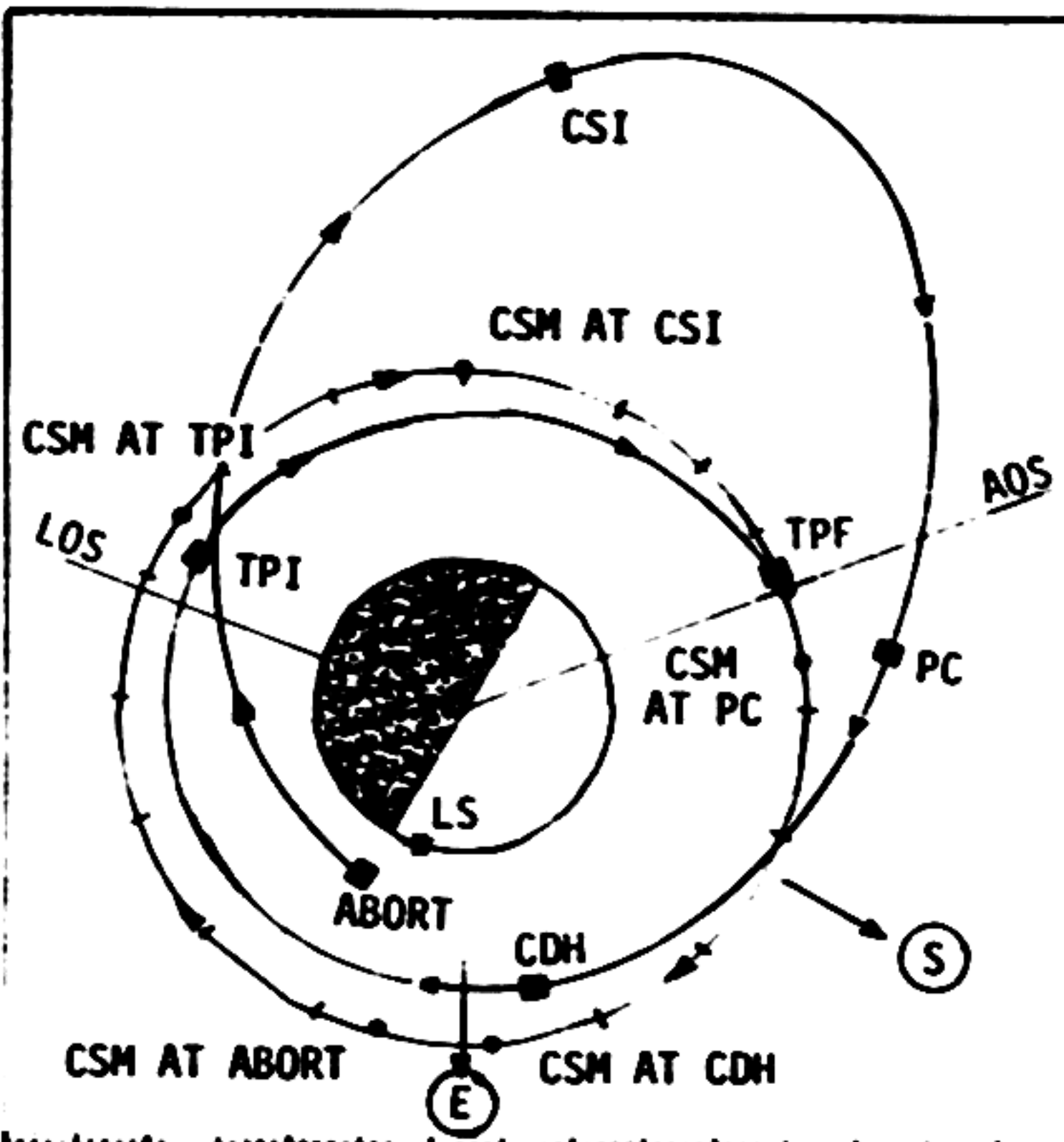
DATE OCTOBER 27, 1969

LM RENDEZVOUS/ABORT BOOK

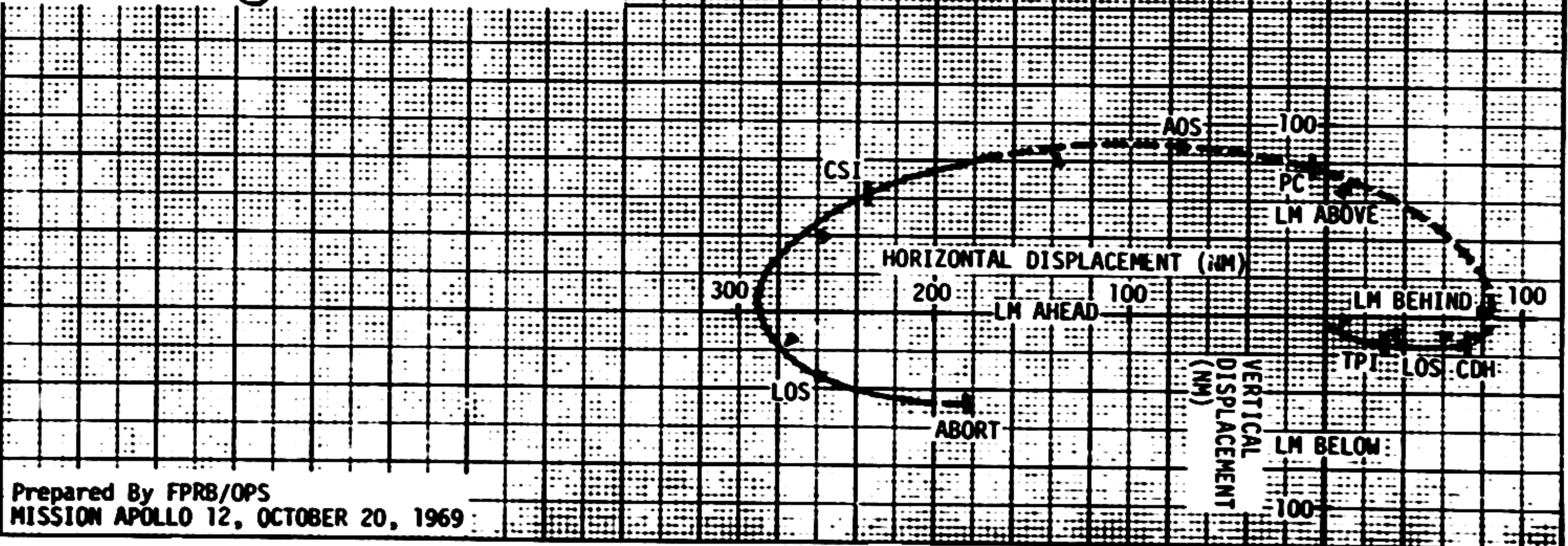


MISSION APOLLO 12  
INERTIAL AND RELATIVE PLOTS  
NO PDI 1 + 12

APOLLO 12 FLIGHT DATA FILE



EVENT	GET TIG	$\Delta VR$	$\Delta VX$	$\Delta VY$	$\Delta VZ$
ABORT	110:31:57	174.4	118.3	0.0	128.2
CSI	111:16:00	0.0	0.0	0.0	0.0
PC	111:46:31	0.0	0.0	0.0	0.0
CDH	112:16:31	300.3	-83.7	0.0	-288.4
TPI	112:57:12	24.6	21.8	0.1	-11.1

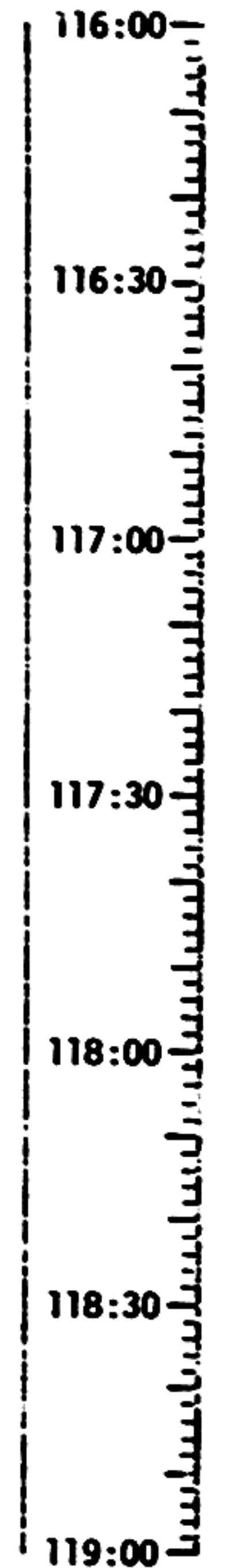
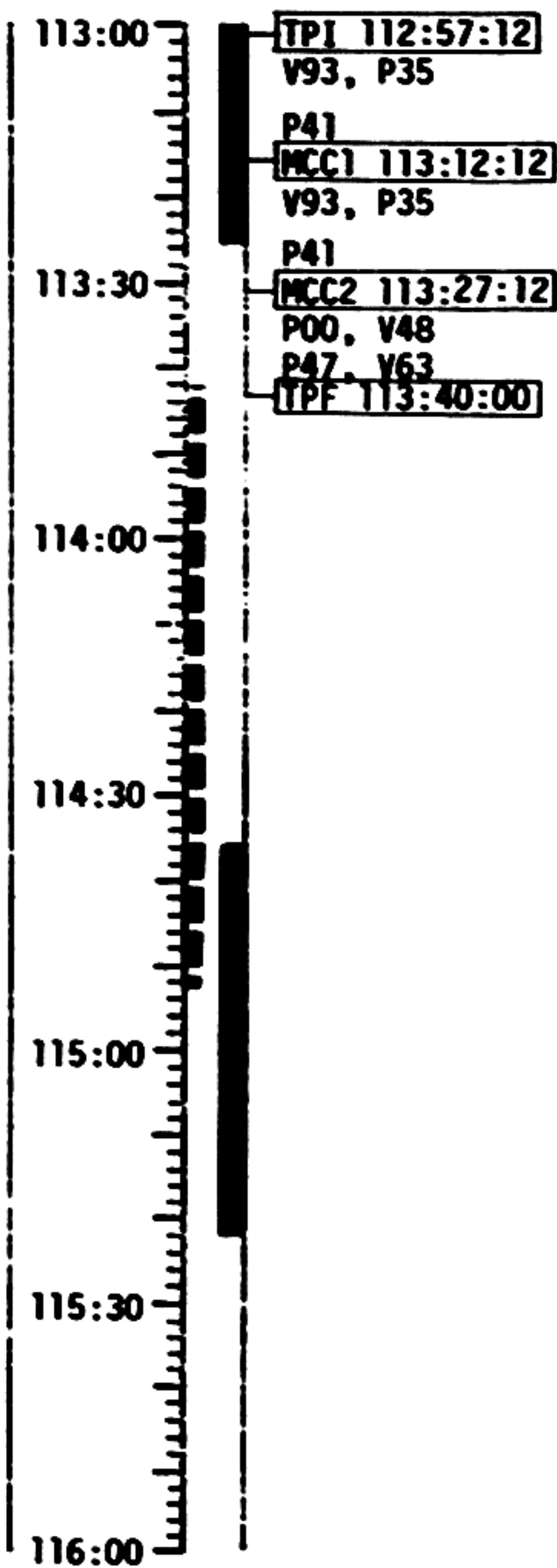
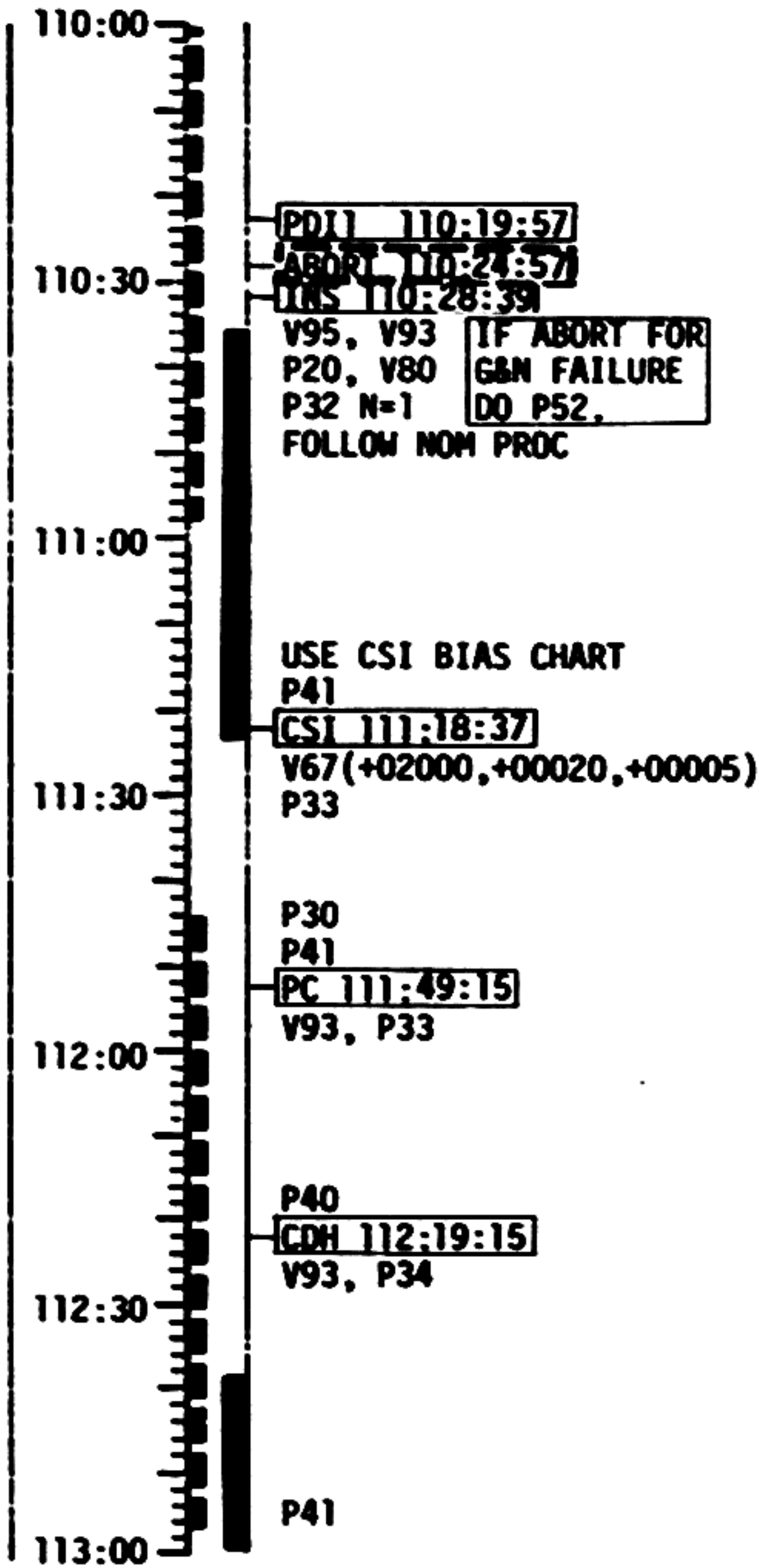


Prepared By FPRB/OPS  
MISSION APOLLO 12, OCTOBER 20, 1969

RELATIVE TRAJ  
NO PDI 1 + 12

PAGE 15

0 < PDI 1 ≤ 5 TIMELINE

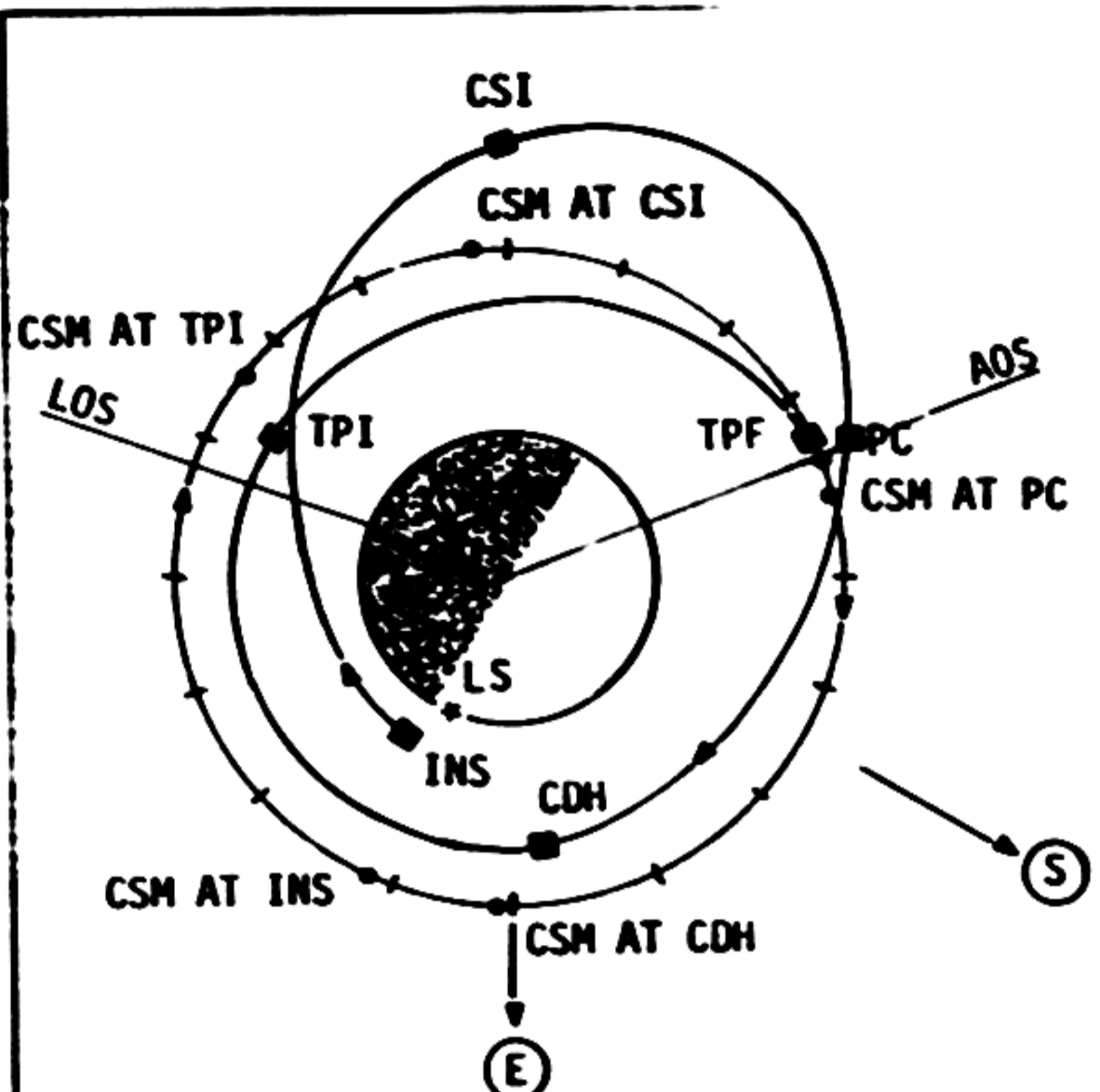


Prepared By FPRB/OPS  
MISSION APOLLO 12, OCTOBER 20, 1969

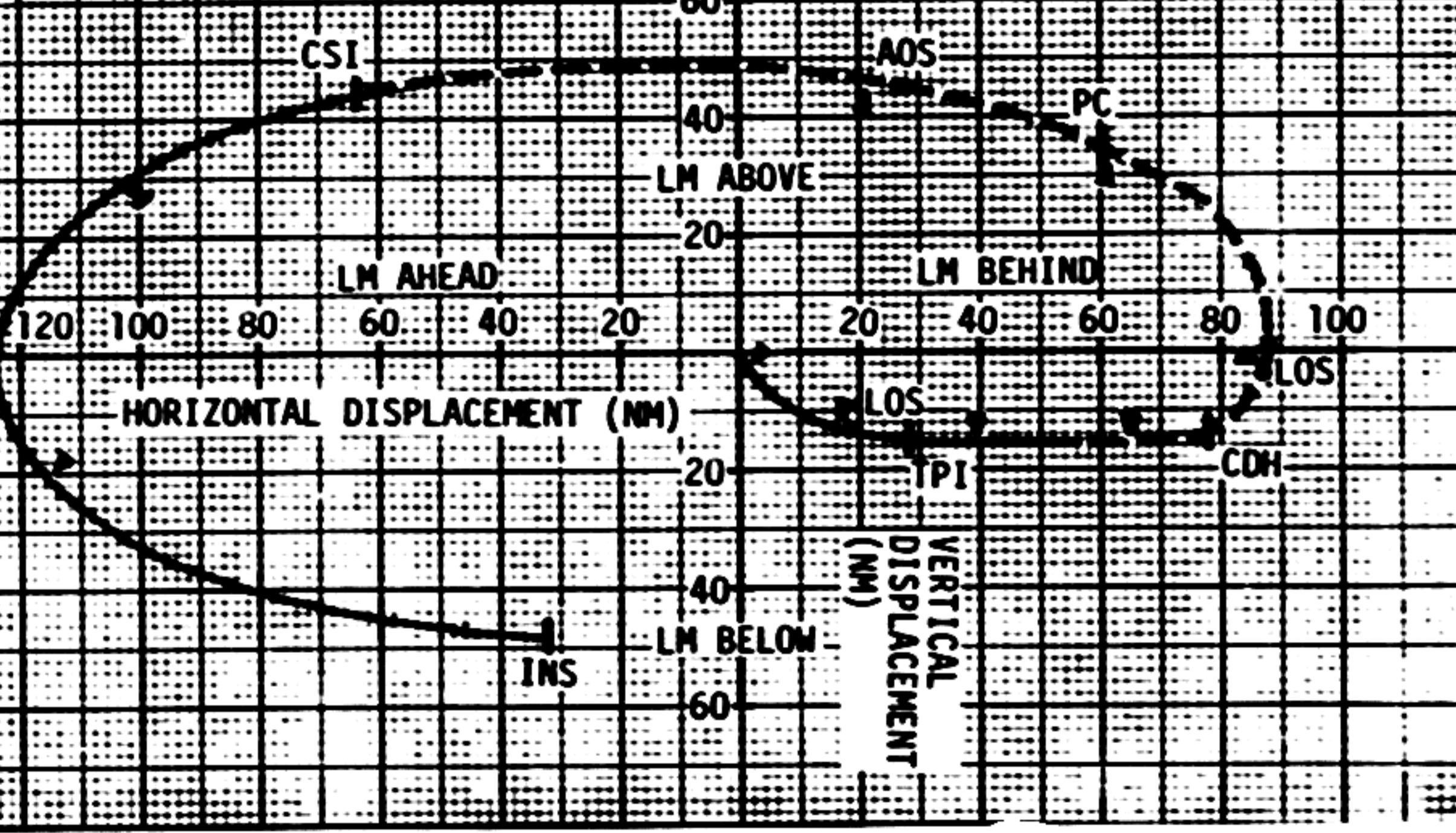
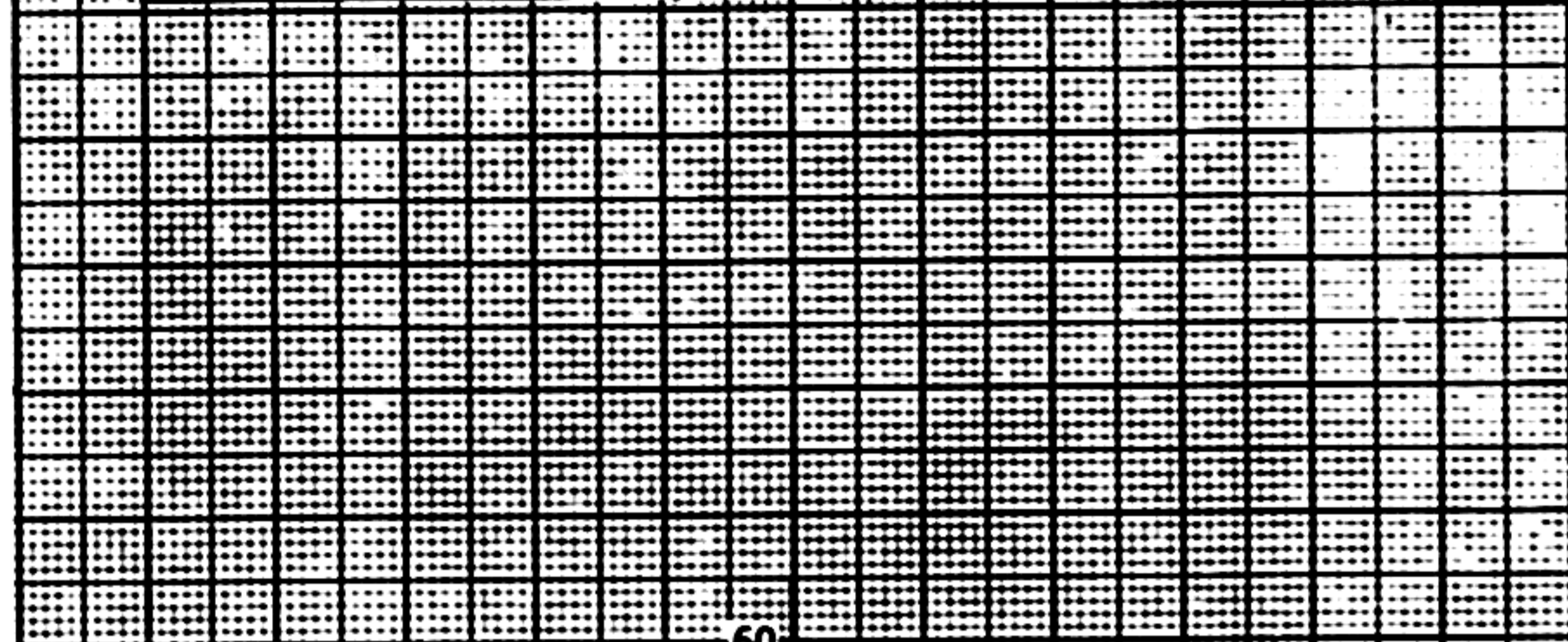
DATE OCTOBER 27, 1969

LM RENDEZVOUS/ABORT BOOK

MISSION APOLLO 12  
INERTIAL AND RELATIVE PLOTS  
0 < PDI ≤ 5 (BURNS FOR ABORT AT 5)

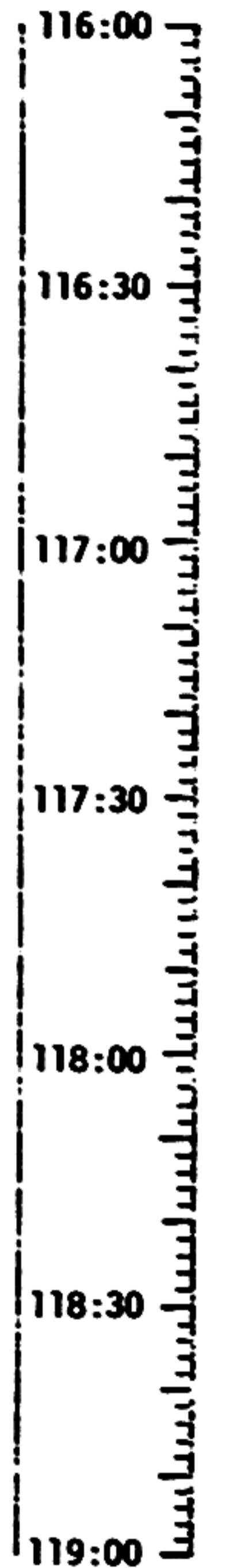
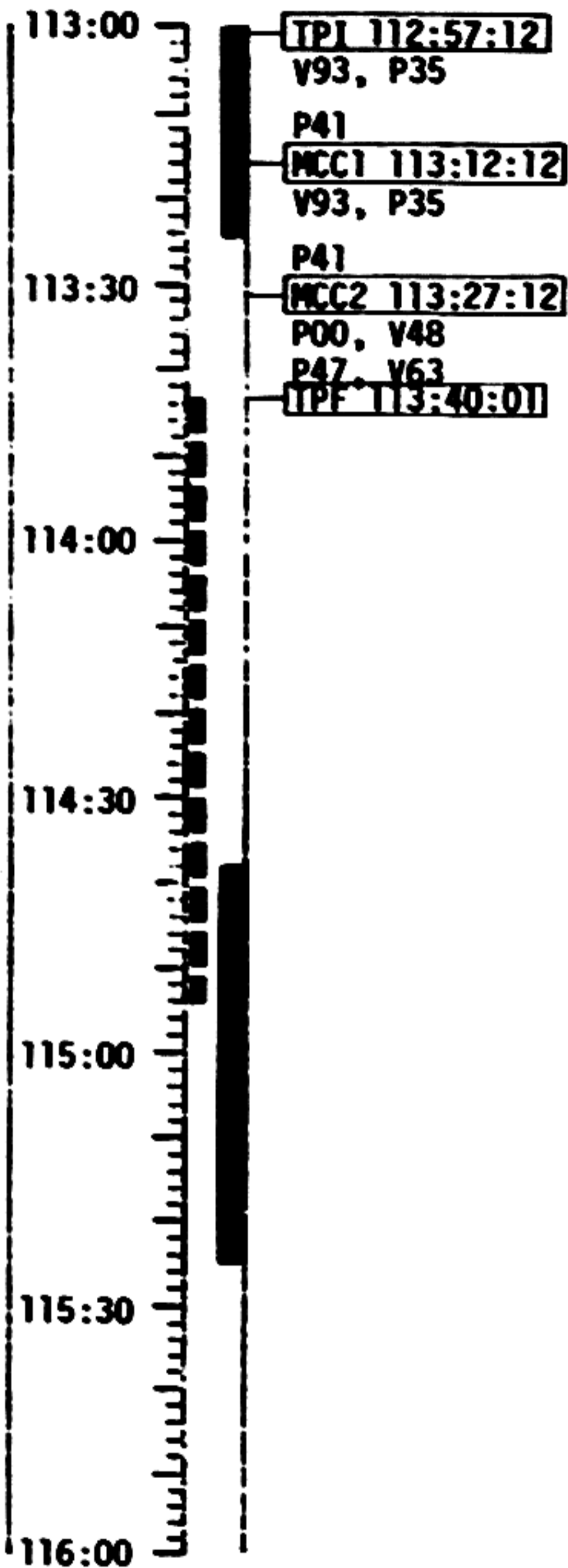
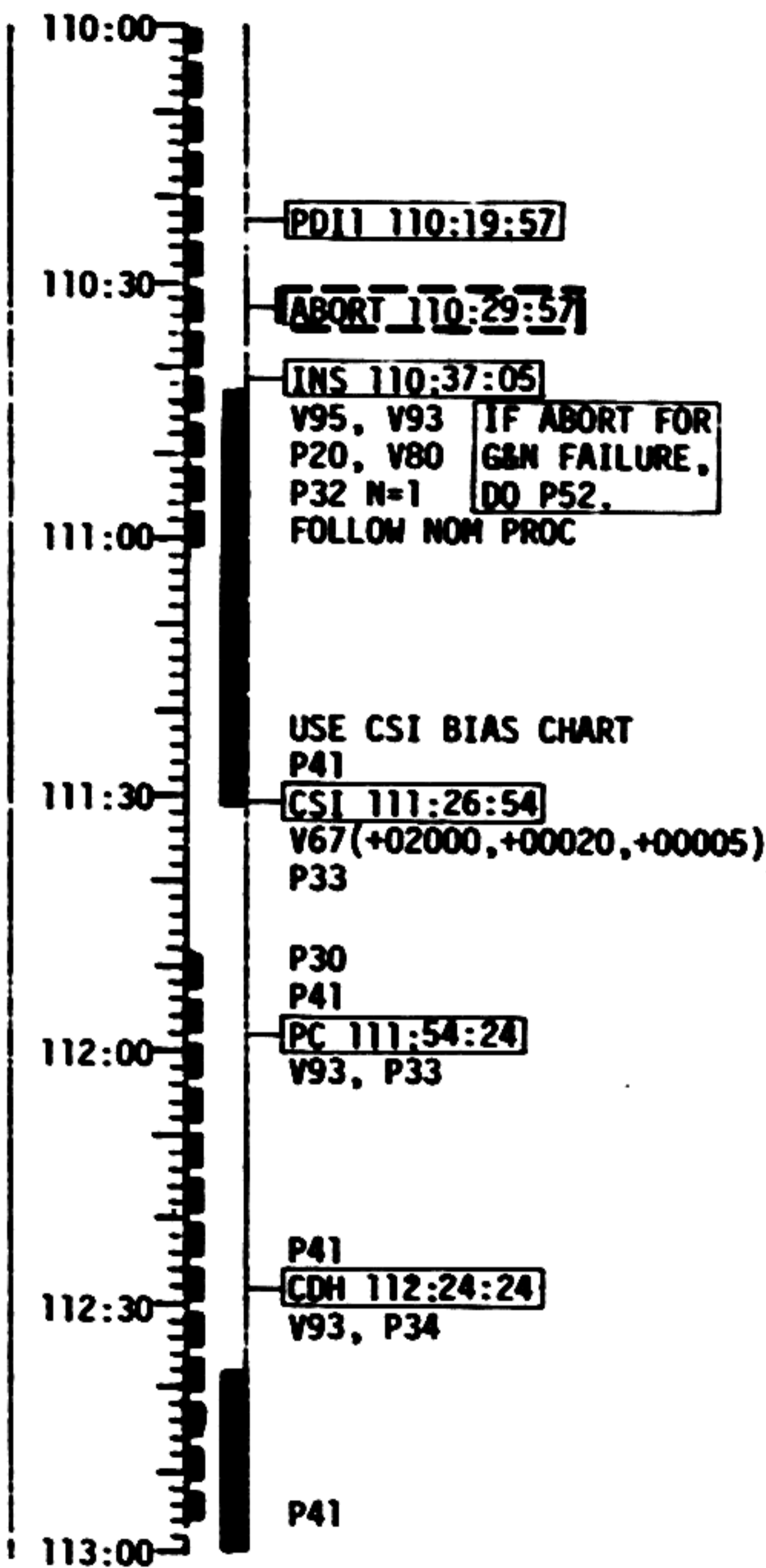


EVENT	GET TIG	ΔVR	ΔVX	ΔVY	ΔVZ
CSI	111:18:37	42.6	42.6	0.0	0.0
PC	111:49:15	0.0	0.0	0.0	0.0
CDH	112:19:15	119.6	-77.7	0.0	-90.8
TPI	112:57:12	24.4	21.5	-1	-10.8



Prepared By FPRB/OPS  
MISSION APOLLO 12, OCTOBER 20, 1969

5 < PDI 1 ≤ 10 TIMELINE



Prepared By FPRB/OPS  
MISSION APOLLO 12, OCTOBER 20, 1969

DATE OCTOBER 27, 1969

LM RENDEZVOUS/ABORT BOOK

APOLLO 12 FLIGHT DATA FILE

THIS PAGE INTENTIONALLY LEFT BLANK  
TAB USAGE ONLY

PAGE 19

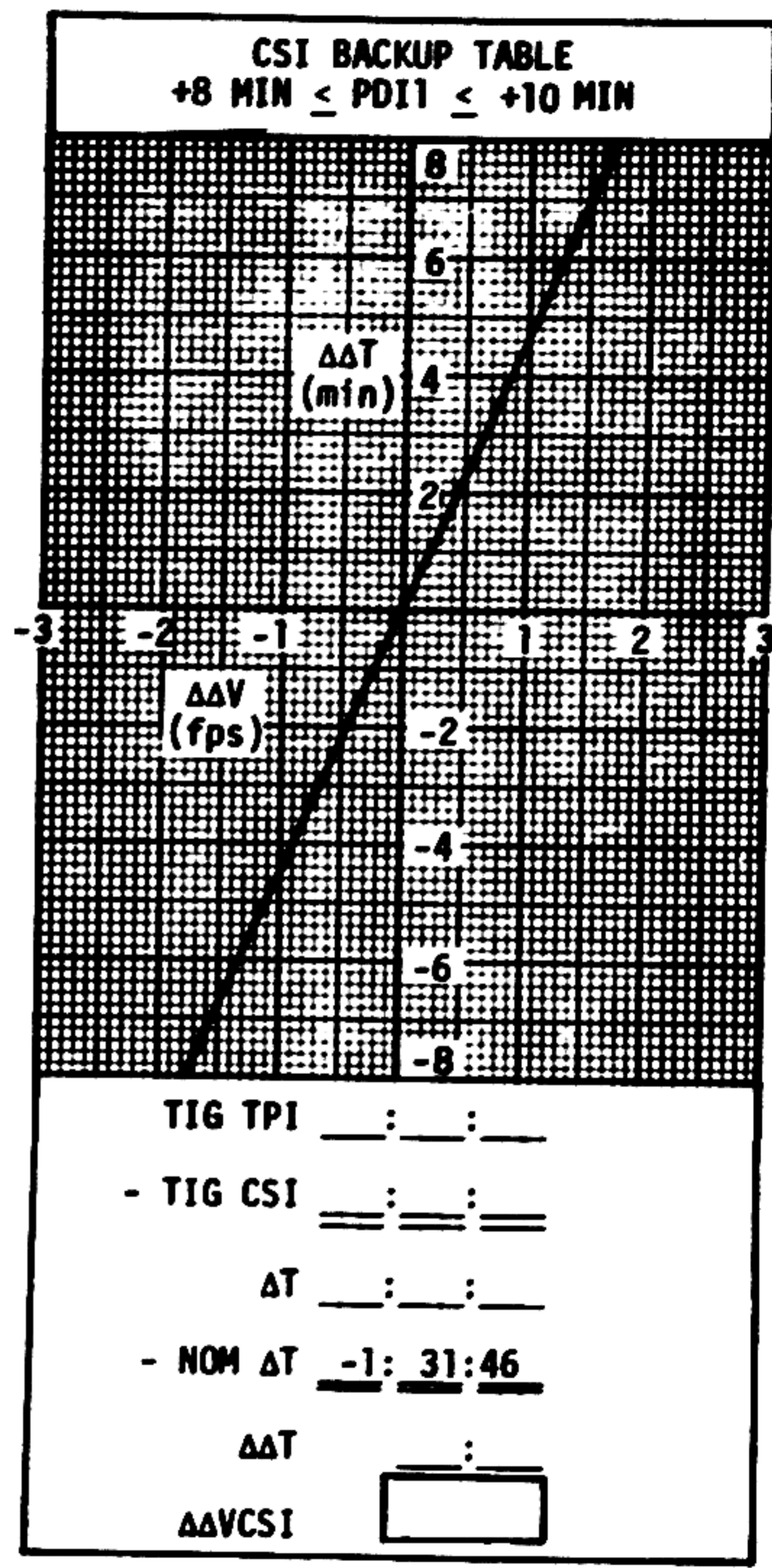
CSI B/U  
8 ≤ PDI 1 ≤ 10

RDOT1	F1	RDOT2	F2	RDOT3	F3	R3	F4
-370	103.2	-312	-108.0	-270	100.3	122	-21.1
-369	102.0	-311	-106.0	-269	99.2	124	-21.5
-368	100.9	-310	-104.0	-268	98.1	126	-21.9
-367	99.7	-309	-102.0	-267	97.0	128	-22.2
-366	98.6	-308	-100.0	-266	95.9	130	-22.6
-365	97.4	-307	- 98.0	-265	94.8	132	-23.0
-364	96.3	-306	- 96.0	-264	93.7	134	-23.4
-363	95.1	-305	- 94.1	-263	92.6	136	-23.7
-362	94.0	-304	- 92.1	-262	91.5	138	-24.1
-361	92.9	-303	- 90.1	-261	90.4	140	-24.5
-360	91.7	-302	- 88.1	-260	89.3	142	-24.8
-359	90.6	-301	- 86.1	-259	88.2	144	-25.2
-358	89.4	-300	- 84.1	-258	87.1	146	-25.6
-357	88.3	-299	- 82.1	-257	86.0	148	-26.0
-356	87.1	-298	- 80.1	-256	84.9	150	-26.3
-355	86.0	-297	- 78.1	-255	83.8	152	-26.7
-354	84.9	-296	- 76.1	-254	82.7	154	-27.1
-353	83.7	-295	- 74.2	-253	81.6	156	-27.5
-352	82.6	-294	- 72.2	-252	80.5	158	-27.8
-351	81.4	-293	- 70.2	-251	79.4	160	-28.2
-350	80.3	-292	- 68.2	-250	78.3	162	-28.6
-349	79.1	-291	- 66.2	-249	77.2	164	-29.0
-348	78.0	-290	- 64.2	-248	76.1	166	-29.4
-347	76.9	-289	- 62.2	-247	75.0	168	-29.7
-346	75.7	-288	- 60.2	-246	73.9	170	-30.1
-345	74.6	-287	- 58.3	-245	72.8	172	-30.5
-344	73.5	-286	- 56.3	-244	71.7	174	-30.9
-343	72.3	-285	- 54.3	-243	70.6	176	-31.3
-342	71.2	-284	- 52.3	-242	69.5	178	-31.7
-341	70.0	-283	- 50.3	-241	68.4	180	-32.0
-340	68.9	-282	- 48.3	-240	67.3	182	-32.4
-339	67.8	-281	- 46.3	-239	66.1	184	-32.8
-338	66.6	-280	- 44.4	-238	65.0	186	-33.2
-337	65.5	-279	- 42.4	-237	63.9	188	-33.6
-336	64.4	-278	- 40.4	-236	62.8	190	-34.0
-335	63.2	-277	- 38.4	-235	61.7	192	-34.4
-334	62.1	-276	- 36.4	-234	60.6	194	-34.8
-333	60.9	-275	- 34.4	-233	59.5	196	-35.1
-332	59.8	-274	- 32.5	-232	58.4	198	-35.5
-331	58.7	-273	- 30.5	-231	57.3	200	-35.9

CSI BACKUP TABLE +8 MIN ≤ PDI1 ≤ +10 MIN		
TIME (MIN)		NOMINAL DSKY>TM
-30	R1	(-327.9)-1.6
-20	R2	(-269.3)-1.3
-10	R3	(-228.3)-1.1
-10	R3	(201.8)
	F1	(55.2)
	+ F2	(-23.1)
		(32.1)
	+ F3	(54.3)
		(86.4)
	+ F4	(-36.3)
		(50.1)
	+ΔΔVCSI	(0.0)
	ΔVCSI	(50.1)

Prepared By FPRB/OPS  
MISSION APOLLO 12, OCTOBER 20, 1969

RDOT1	F1	RDOT2	F2	RDOT3	F3	R3	F4
-330	57.5	-272	- 28.5	-230	56.2	202	-36.3
-329	56.4	-271	- 26.5	-229	55.1	204	-36.7
-328	55.3	-270	- 24.5	-228	54.0	206	-37.1
-327	54.1	-269	- 22.5	-227	52.9	208	-37.5
-326	53.0	-268	- 20.6	-226	51.8	210	-37.9
-325	51.9	-267	- 18.6	-225	50.7	212	-38.3
-324	50.7	-266	- 16.6	-224	49.6	214	-38.7
-323	49.6	-265	- 14.6	-223	48.5	216	-39.1
-322	48.5	-264	- 12.6	-222	47.4	218	-39.5
-321	47.3	-263	- 10.7	-221	46.3	220	-39.9
-320	46.2	-262	- 08.7	-220	45.2	222	-40.3
-319	45.1	-261	- 06.7	-219	44.1	224	-40.7
-318	44.0	-260	- 04.7	-218	43.0	226	-41.1
-317	42.8	-259	- 02.7	-217	41.8	228	-41.5
-316	41.7	-258	1.8	-216	40.7	230	-41.9
-315	40.6	-257	1.2	-215	39.6	232	-42.3
-314	39.4	-256	3.2	-214	38.5	234	-42.7
-313	38.3	-255	5.2	-213	37.4	236	-43.1
-312	37.2	-254	7.1	-212	36.3	238	-43.5
-311	36.0	-253	9.1	-211	35.2	240	-43.9
-310	34.9	-252	11.1	-210	34.1	242	-44.3
-309	33.8	-251	13.1	-209	33.0	244	-44.7
-308	32.7	-250	15.0	-208	31.9	246	-45.1
-307	31.5	-249	17.0	-207	30.8	248	-45.5
-306	30.4	-248	19.0	-206	29.7	250	-45.9
-305	29.3	-247	21.0	-205	28.6	252	-46.3
-304	28.2	-246	22.9	-204	27.5	254	-46.8
-303	27.0	-245	24.9	-203	26.4	256	-47.2
-302	25.9	-244	36.9	-202	25.3	258	-47.6
-301	24.8	-243	28.9	-201	24.2	260	-48.0
-300	23.7	-242	30.8	-200	23.0	262	-48.4
-299	22.5	-241	32.8	-199	21.9	264	-48.8
-298	21.4	-240	34.8	-198	20.8	266	-49.2
-297	20.3	-239	36.8	-197	19.7	268	-49.6
-296	19.2	-238	38.7	-196	18.6	270	-50.1
-295	18.0	-237	40.7	-195	17.5	272	-50.5
-294	16.9	-236	42.7	-194	16.4	274	-50.9
-293	15.8	-235	44.7	-193	15.3	276	-51.3
-292	14.7	-234	46.6	-192	14.2	278	-51.7
-291	13.5	-233	48.6	-191	13.1	280	-52.1



Prepared By FPRB/OPS  
MISSION APOLLO 12, OCTOBER 20, 1969

CSI B/U  
8 ≤ PDI 1 ≤ 10

RDOT1	X1	Z1	RDOT2	X2	Z2	RDOT3	X3	Z3
-272	89.8	+56.1	-215	-59.6	+ 1.8	-161	-9.1	-36.6
-271	89.5	+56.4	-214	-59.3	+ .9	-160	-9.0	-36.2
-270	89.2	+56.6	-213	-59.1	- .1	-159	-8.9	-35.8
-269	88.8	+56.9	-212	-58.8	- 1.0	-158	-8.9	-35.4
-268	88.5	+57.1	-211	-58.6	- 1.9	-157	-8.8	-35.0
-267	88.2	+57.3	-210	-58.3	- 2.8	-156	-8.7	-34.7
-266	87.9	+57.6	-209	-58.1	- 3.7	-155	-8.6	-34.3
-265	87.6	+57.8	-208	-57.9	- 4.7	-154	-8.5	-33.9
-264	87.3	+58.1	-207	-57.6	- 5.6	-153	-8.5	-33.6
-263	86.9	+58.3	-206	-57.4	- 6.5	-152	-8.4	-33.2
-262	86.6	+58.6	-205	-57.1	- 7.4	-151	-8.3	-32.8
-261	86.3	+58.8	-204	-56.9	- 8.4	-150	-8.2	-32.5
-260	86.0	+59.1	-203	-56.7	- 9.3	-149	-8.1	-32.1
-259	85.7	+59.3	-202	-56.4	-10.2	-148	-8.0	-31.7
-258	85.4	+59.5	-201	-56.2	-11.1	-147	-8.0	-31.4
-257	85.1	+59.8	-200	-56.0	-12.1	-146	-7.9	-31.0
-256	84.7	+60.0	-199	-55.7	-13.0	-145	-7.8	-30.7
-255	84.4	+60.2	-198	-55.5	-13.9	-144	-7.7	-30.3
-254	84.1	+60.5	-197	-55.2	-14.8	-143	-7.6	-29.9
-253	83.8	+60.7	-196	-55.0	-15.7	-142	-7.5	-29.6
-252	83.5	+61.0	-195	-54.8	-16.7	-141	-7.4	-29.2
-251	83.2	+61.2	-194	-54.5	-17.6	-140	-7.4	-28.9
-250	82.9	+61.4	-193	-54.3	-18.5	-139	-7.3	-28.6
-249	82.6	+61.7	-192	-54.1	-19.4	-138	-7.2	-28.2
-248	82.2	+61.9	-191	-53.8	-20.3	-137	-7.1	-27.9
-247	81.9	+62.1	-190	-53.6	-21.3	-136	-7.0	-27.5
-246	81.6	+62.3	-189	-53.4	-22.2	-135	-6.9	-27.2
-245	81.3	+62.6	-188	-53.1	-23.1	-134	-6.9	-26.9
-244	81.0	+62.8	-187	-52.9	-24.0	-133	-6.8	-26.5
-243	80.7	+63.0	-186	-52.7	-24.9	-132	-6.7	-26.2
-242	80.4	+63.3	-185	-52.5	-25.8	-131	-6.6	-25.9
-241	80.1	+63.5	-184	-52.2	-26.7	-130	-6.5	-25.5
-240	79.8	+63.7	-183	-52.0	-27.6	-129	-6.4	-25.2
-239	79.5	+63.9	-182	-51.8	-28.5	-128	-6.3	-24.9
-238	79.1	+64.2	-181	-51.5	-29.4	-127	-6.3	-24.6
-237	78.8	+64.4	-180	-51.3	-30.4	-126	-6.2	-24.2
-236	78.5	+64.6	-179	-51.1	-31.3	-125	-6.1	-23.9
-235	78.2	+64.8	-178	-50.8	-32.2	-124	-6.0	-23.6
-234	77.9	+65.0	-177	-50.6	-33.1	-123	-5.9	-23.3
-233	77.6	+65.3	-176	-50.4	-34.0	-122	-5.8	-23.0
-232	77.3	+65.5	-175	-50.1	-34.8	-121	-5.7	-22.7
-231	77.0	+65.7	-174	-49.9	-35.7	-120	-5.7	-22.3
-230	76.7	+65.9	-173	-49.7	-36.6	-119	-5.6	-22.0

CDH BACKUP TABLE +8 MIN ≤ PDI1 ≤ +10 MIN	
TIME (MIN)	NOMINAL
-36 R1	DSKY>TM (-230.1) -1.2
-23 R2	(-173.0) -.9
-10 R3	(-119.5) -.6
VX: X1	( 76.7)
+X2	( -49.7)
	( 27.0)
+X3	( -5.6)
VX(LV)	( 21.4)
VZ: Z1	( 65.9)
+Z2	( -36.6)
	( 29.3)
+Z3	( -22.0)
VZ(LV)	( 7.3)

Prepared By FPRB/OPS  
MISSION APOLLO 12, OCTOBER 20, 1969



DATE OCTOBER 27, 1969

LM RENDEZVOUS/ABORT BOOK

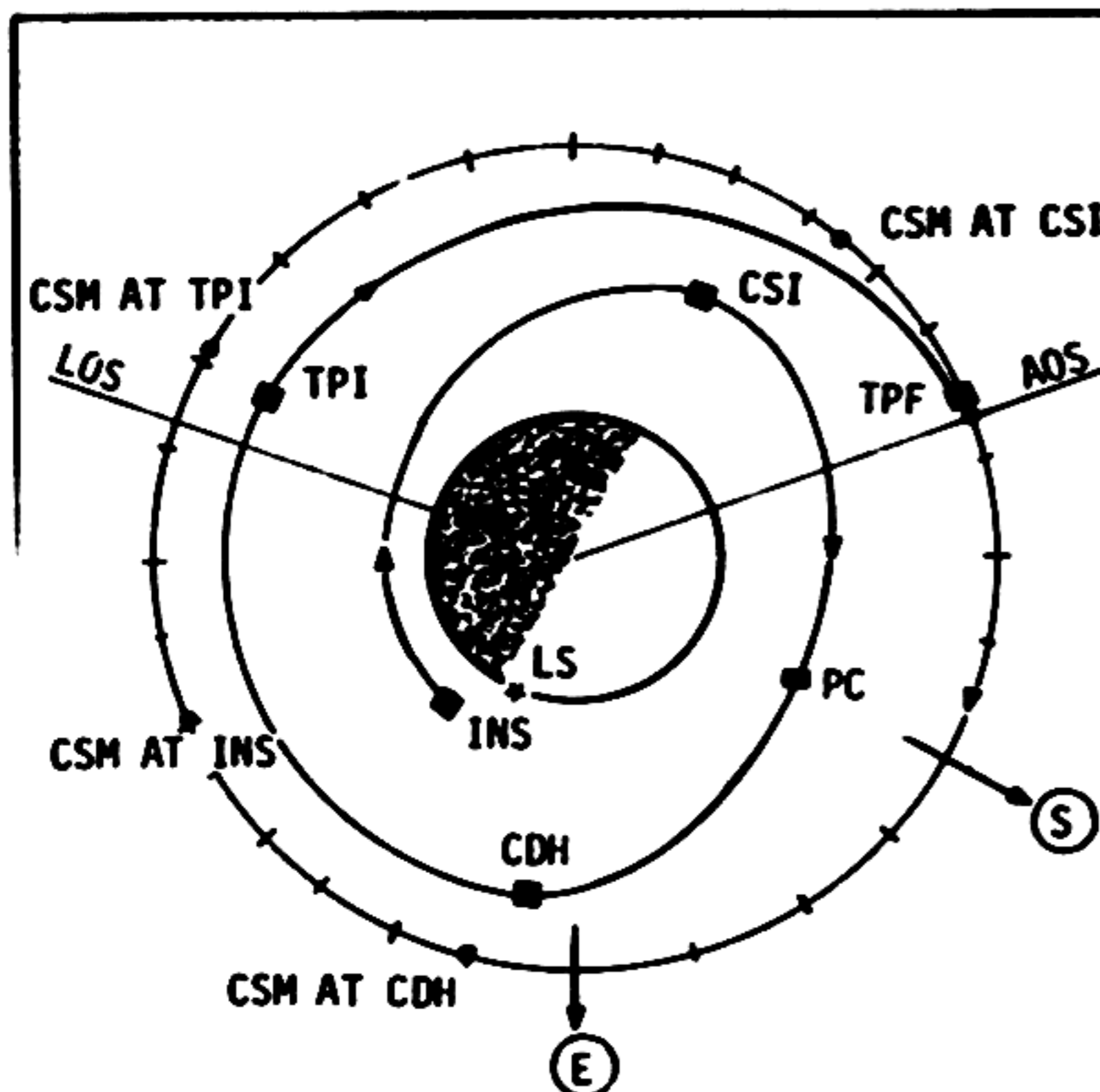
RDOT1	X1	Z1	RDOT2	X2	Z2	RDOT3	X3	Z3
-229	76.4	-66.1	-172	-49.5	37.5	-118	-5.5	21.7
-228	76.1	-66.4	-171	-49.2	38.4	-117	-5.4	21.4
-227	75.8	-66.6	-170	-49.0	39.3	-116	-5.3	21.1
-226	75.5	-66.8	-169	-48.8	40.2	-115	-5.2	20.8
-225	75.2	-67.0	-168	-48.5	41.1	-114	-5.2	20.5
-224	74.9	-67.2	-167	-48.3	41.9	-113	-5.1	20.2
-223	74.6	-67.4	-166	-48.1	42.8	-112	-5.0	19.9
-222	74.3	-67.6	-165	-47.9	43.7	-111	-4.9	19.6
-221	74.0	-67.9	-164	-47.6	44.5	-110	-4.8	19.4
-220	73.7	-68.1	-163	-47.4	45.4	-109	-4.7	19.1
-219	73.3	-68.3	-162	-47.2	46.3	-108	-4.7	18.8
-218	73.0	-68.5	-161	-46.9	47.1	-107	-4.6	18.5
-217	72.7	-68.7	-160	-46.7	48.0	-106	-4.5	18.2
-216	72.4	-68.9	-159	-46.5	48.8	-105	-4.4	17.9
-215	72.1	-69.1	-158	-46.2	49.7	-104	-4.3	17.7
-213	71.8	-69.3	-157	-46.0	50.5	-103	-4.3	17.4
-213	71.5	-69.5	-156	-45.8	51.4	-102	-4.2	17.1
-212	71.2	-69.7	-155	-45.6	52.2	-101	-4.1	16.8
-211	70.9	-69.9	-154	-45.3	53.1	-100	-4.0	16.6
-210	70.6	-70.1	-153	-45.1	53.9	-99	-3.9	16.3
-209	70.3	-70.3	-152	-44.9	54.7	-98	-3.9	16.0
-208	70.0	-70.5	-151	-44.6	55.6	-97	-3.8	15.8
-207	69.7	-70.7	-150	-44.4	56.4	-96	-3.7	15.5
-206	69.4	-70.9	-149	-44.2	57.2	-95	-3.6	15.2
-205	69.1	-71.1	-148	-43.9	58.0	-94	-3.5	15.0
-204	68.8	-71.3	-147	-43.7	58.8	-93	-3.5	14.7
-203	68.5	-71.5	-146	-43.5	59.7	-92	-3.4	14.5
-202	68.2	-71.7	-145	-43.2	60.5	-91	-3.3	14.2
-201	67.9	-71.9	-144	-43.0	61.3	-90	-3.2	14.0
-200	67.6	-72.1	-143	-42.8	62.1	-89	-3.2	13.7
-199	67.3	-72.3	-142	-42.5	62.9	-88	-3.1	13.5
-198	67.0	-72.5	-141	-42.3	63.6	-87	-3.0	13.2
-197	66.7	-72.7	-140	-42.1	64.4	-86	-2.9	13.0
-196	66.4	-72.9	-139	-41.8	65.2	-85	-2.9	12.7
-195	66.1	-73.1	-138	-41.6	66.0	-84	-2.8	12.5
-194	65.8	-73.3	-137	-41.4	66.8	-83	-2.7	12.2
-193	65.5	-73.5	-136	-41.1	67.5	-82	-2.7	12.0
-192	65.2	-73.7	-135	-40.9	68.3	-81	-2.6	11.8
-191	64.9	-73.9	-134	-40.7	69.0	-80	-2.5	11.6
-190	64.6	-74.1	-133	-40.4	69.8	-79	-2.4	11.3
-189	64.3	-74.2	-132	-40.2	70.5	-78	-2.4	11.1

CDH BACKUP TABLE  
+8 MIN ≤ PDI1 ≤ +10 MIN

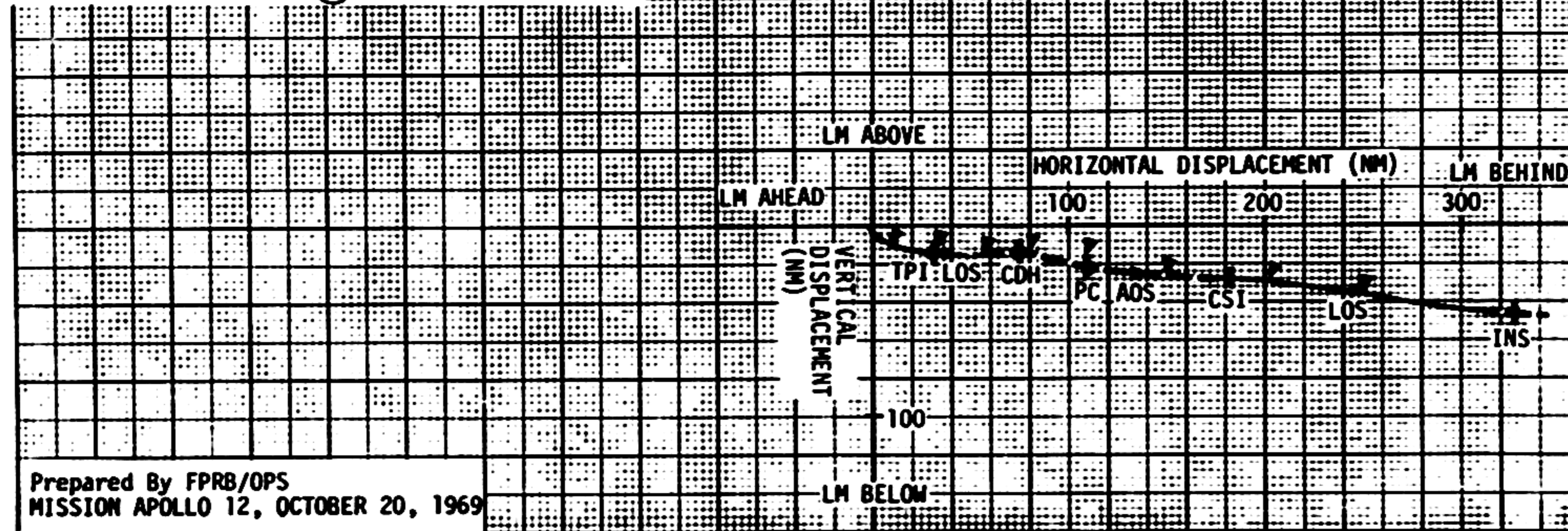
Prepared By FPRB/OPS  
MISSION APOLLO 12, OCTOBER 20, 1969

CDH B/U  
8 ≤ PDI 1 ≤ 10

MISSION APOLLO 12  
INERTIAL AND RELATIVE PLOTS  
5 < PDI 1 ≤ 10 (BURNS FOR ABORT AT 10)



EVENT	GET TIG	ΔVR	ΔVX	ΔVY	ΔVZ
CSI	111:26:54	49.4	49.4	0.0	0.0
PC	111:54:24	0.0	0.0	0.0	0.0
CDH	112:24:24	28.4	18.7	0.0	21.3
TPI	112:57:12	24.2	21.5	.2	-10.8



Prepared By FPRB/OPS  
MISSION APOLLO 12, OCTOBER 20, 1969

DATE OCTOBER 27, 1969

LM RENDEZVOUS/ABORT BOOK

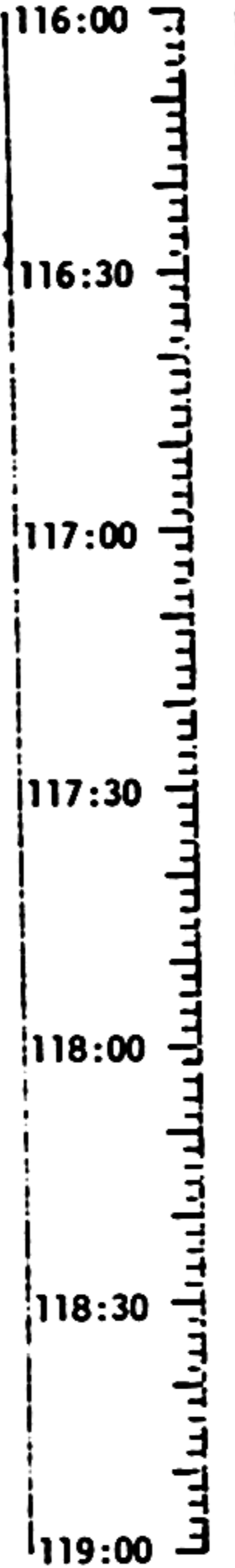
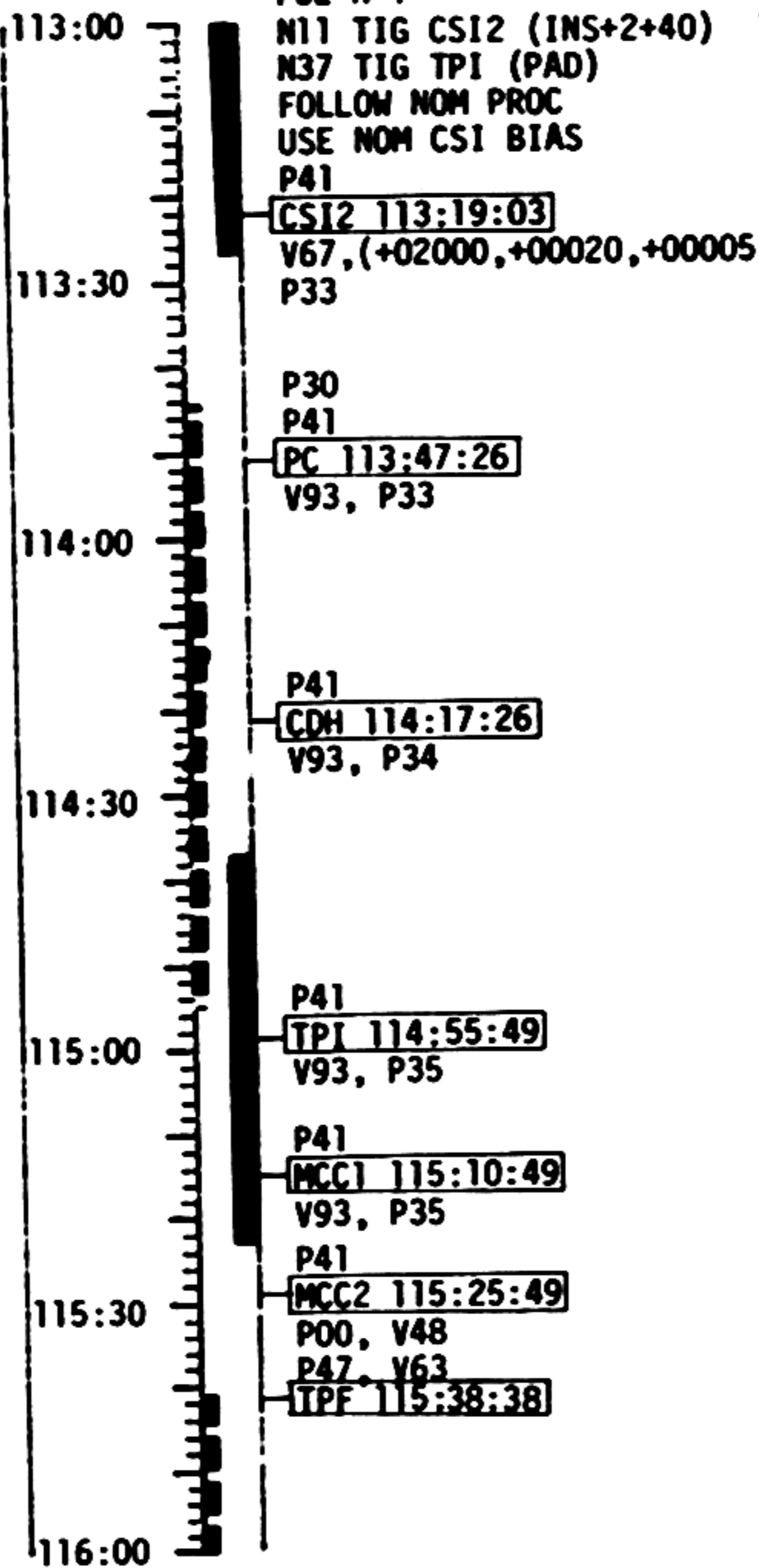
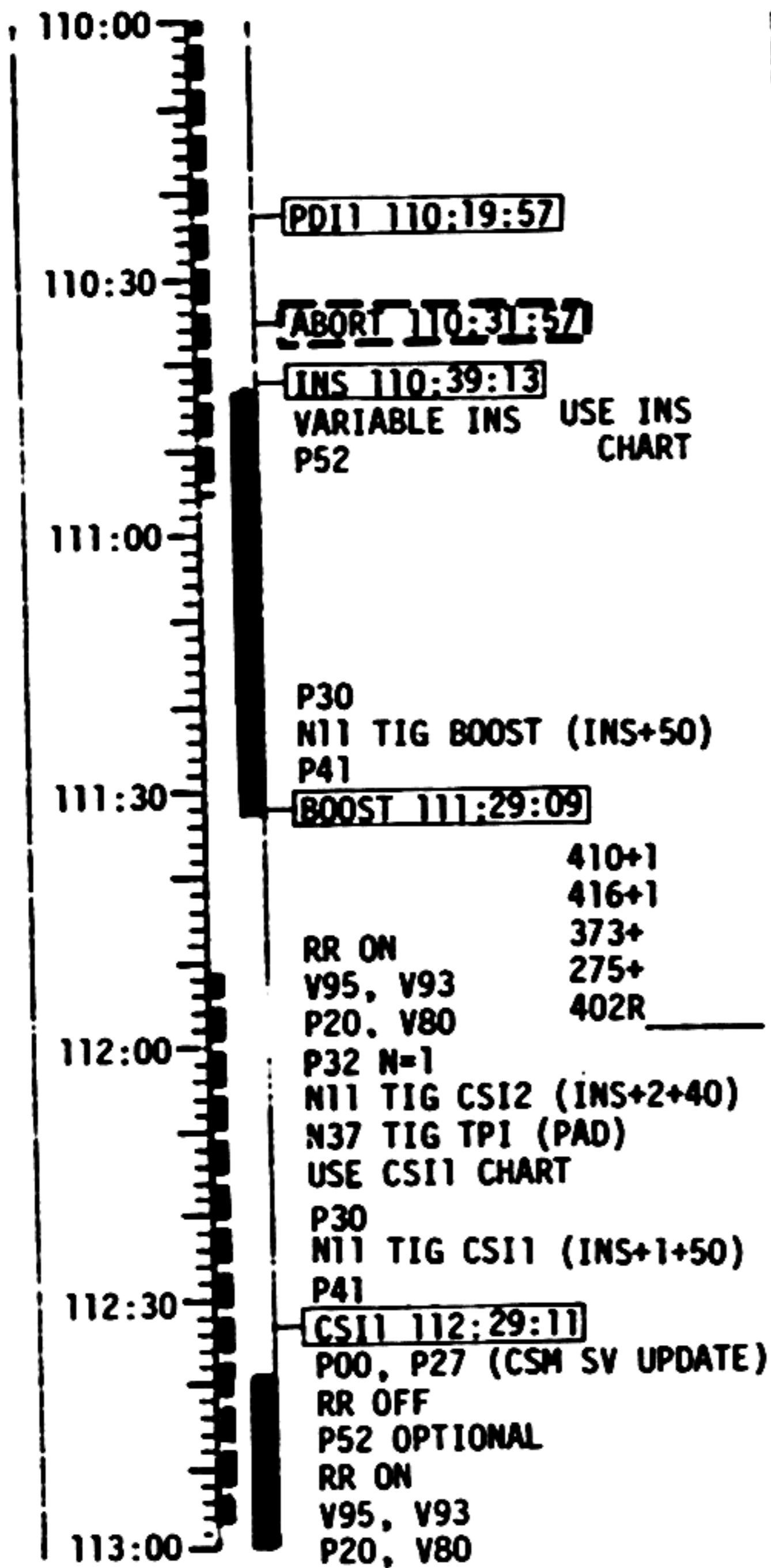
APOLLO 12 FLIGHT DATA FILE

THIS PAGE INTENTIONALLY LEFT BLANK  
FOR TAB USAGE ONLY

PAGE 25

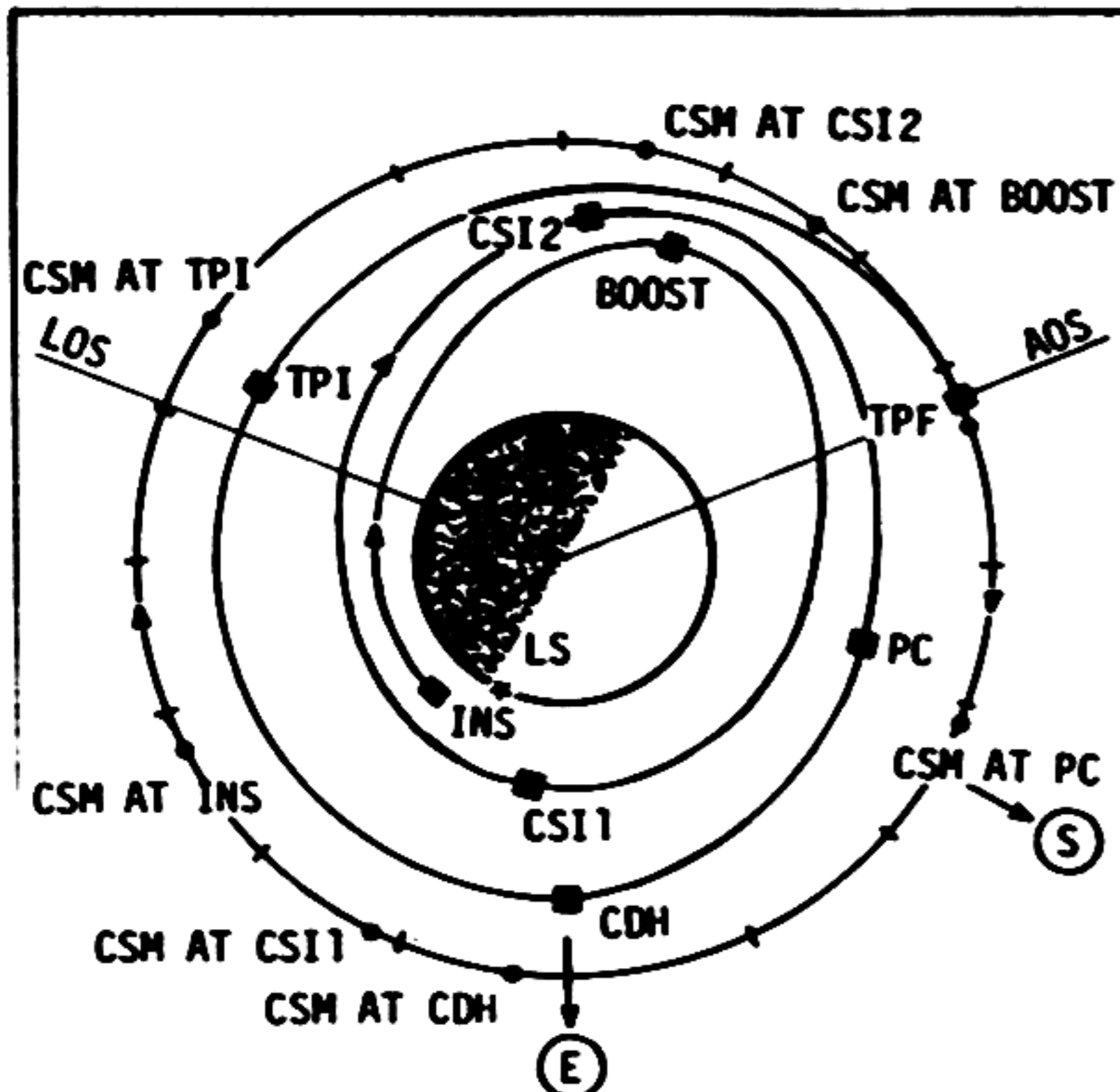
TIMELINE  
10 < PDI ≤ 16:20

10 < PDI 1 ≤ 16:20 (T1-1) TIMELINE

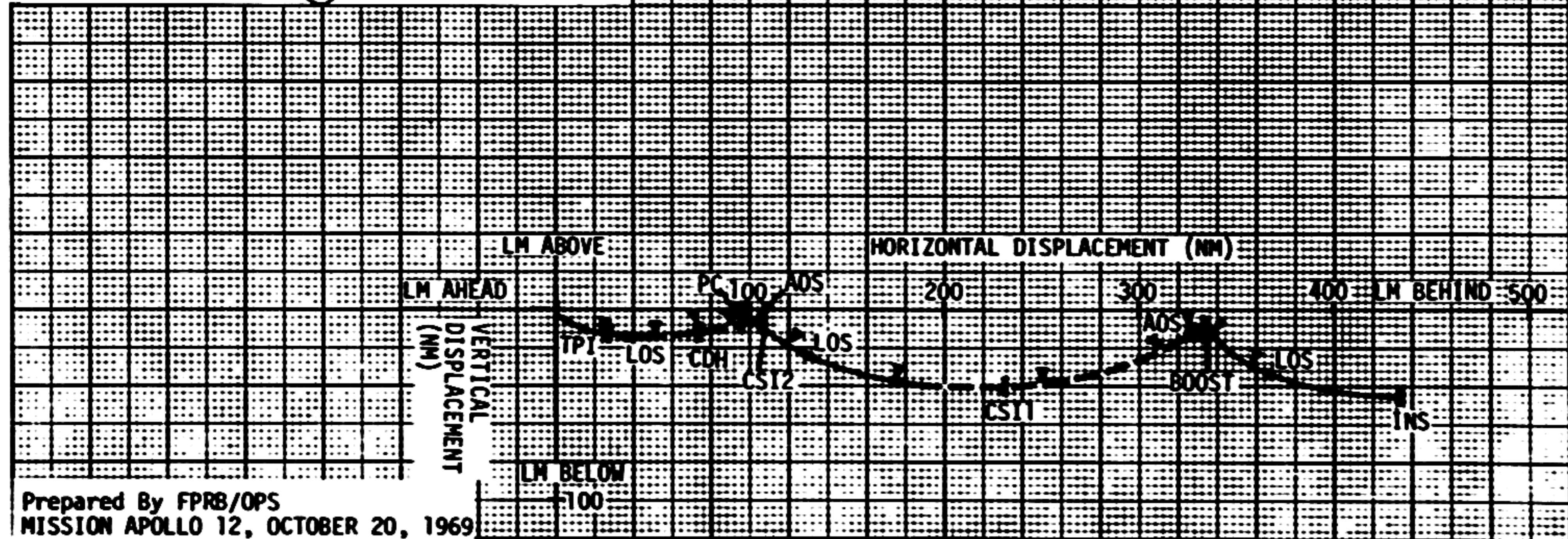


Prepared By FPRB/OPS  
MISSION APOLLO 12, OCTOBER 20, 1969

MISSION APOLLO 12  
 INERTIAL AND RELATIVE PLOTS  
 10<POI 1< 16:20(T1-1) (BURNS FOR ABORT AT 12)

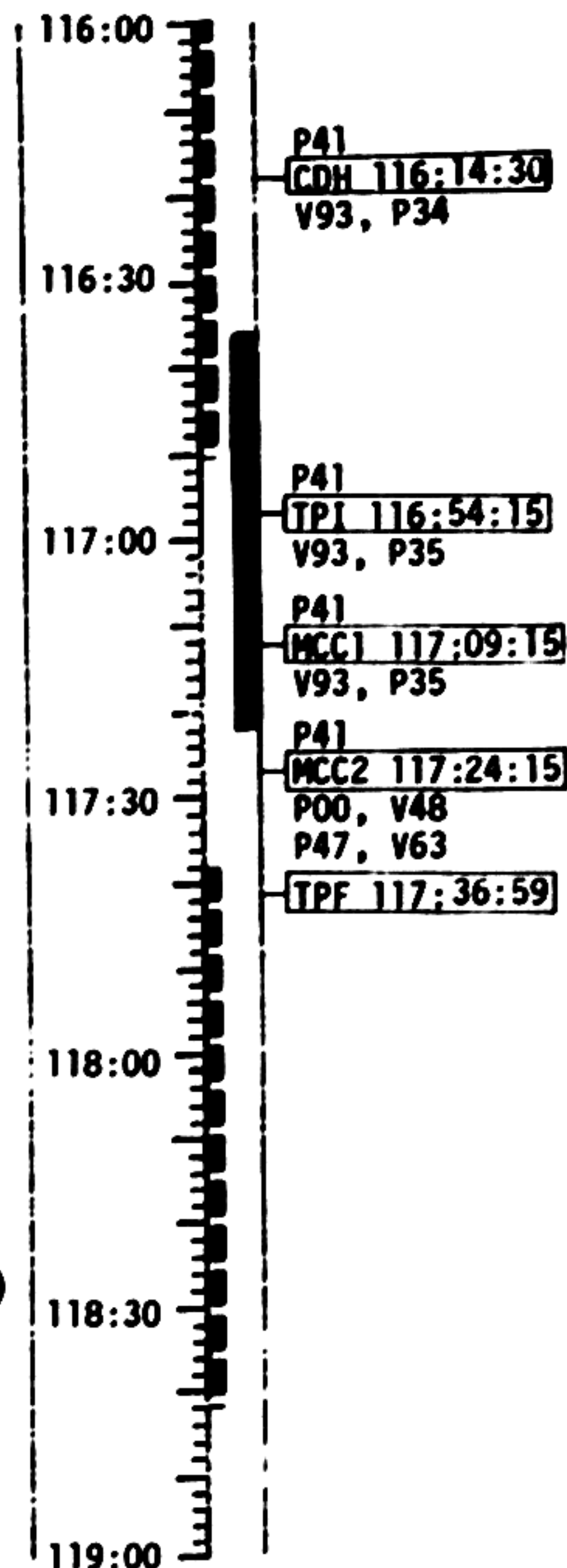
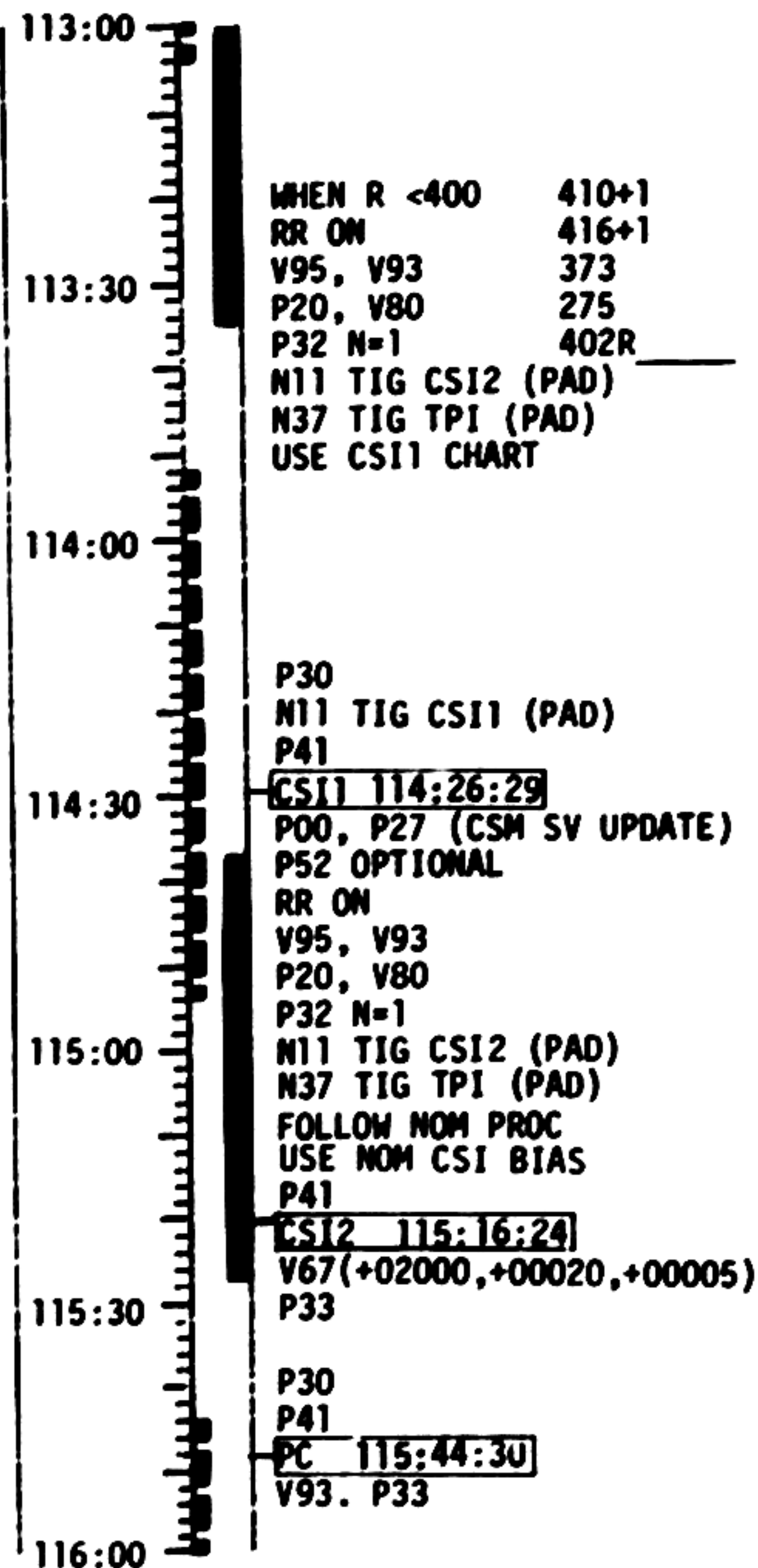
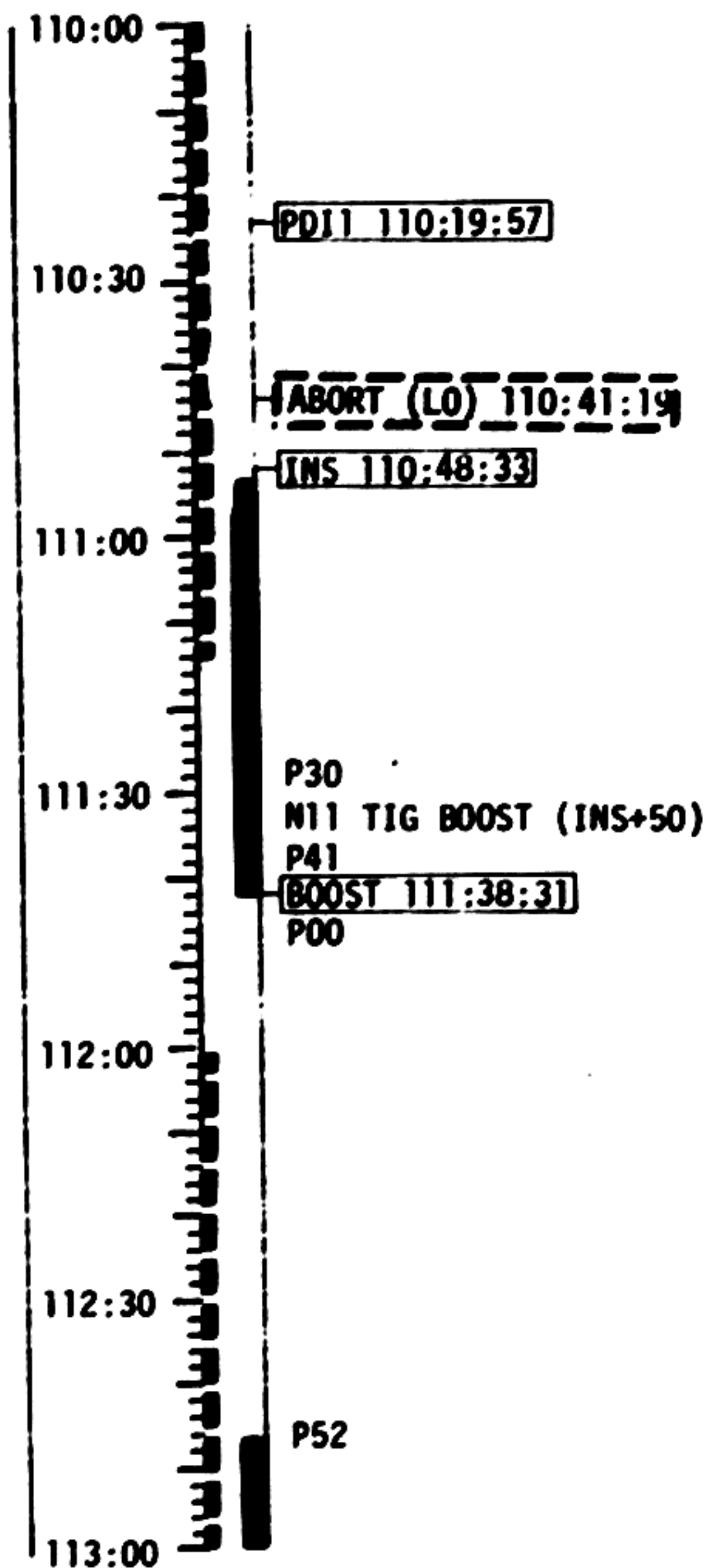


EVENT	GET TIG	$\Delta VR$	$\Delta VX$	$\Delta VY$	$\Delta VZ$
BOOST	111:29:09	10.0	10.0	0.0	0.0
CS11	112:29:11	0.0	0.0	0.0	0.0
CS12	113:19:03	36.5	36.5	0.0	0.0
PC	113:47:26	0.0	0.0	0.0	0.0
CDH	114:17:26	30.1	-10.8	0.0	-28.1
TPI	114:55:49	24.9	22.0	-1.2	-11.2



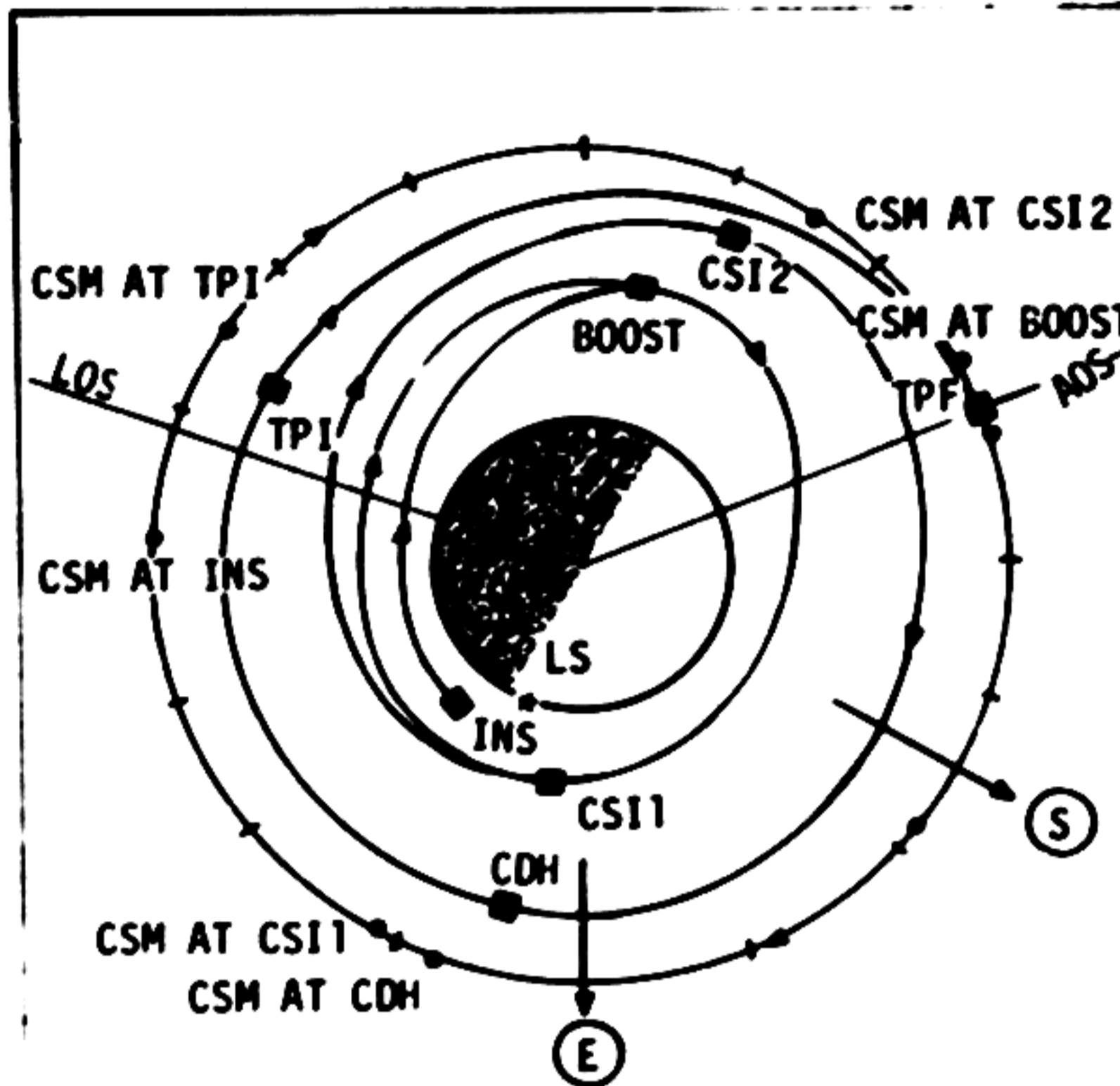
Prepared By FPRB/OPS  
 MISSION APOLLO 12, OCTOBER 20, 1969

PDI 1 + 21:22(T2-1) TIMELINE

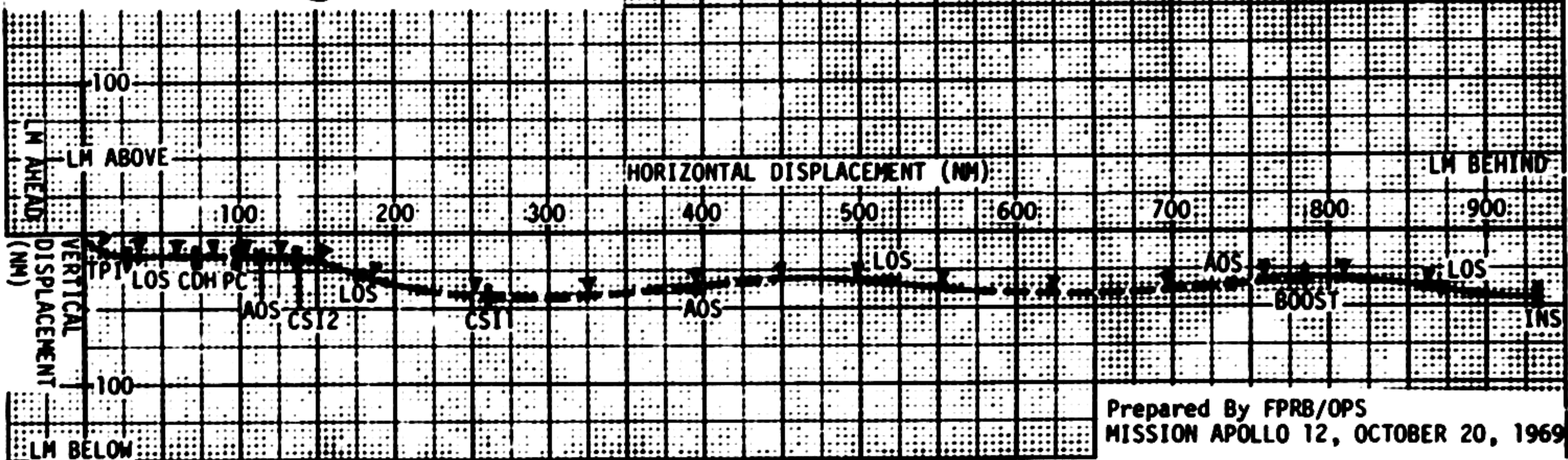


Prepared By FPRB/OPS  
MISSION APOLLO 12, OCTOBER 20, 1969

MISSION APOLLO 12  
INERTIAL AND RELATIVE PLOTS  
PDI 1 + 21:22(T2-1)



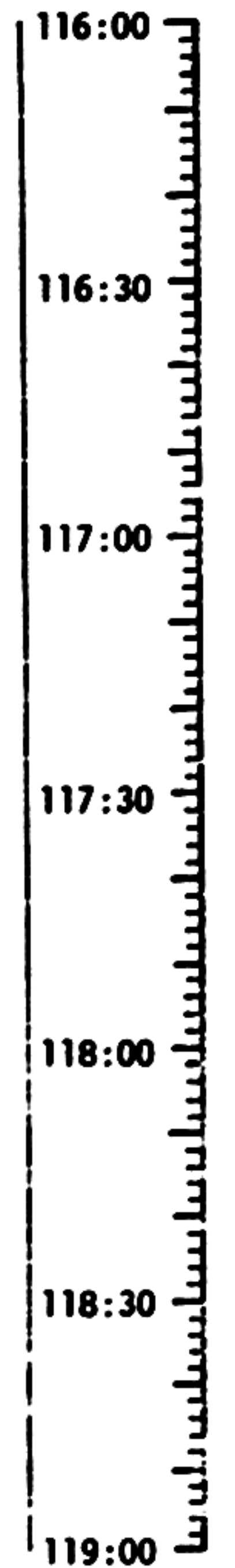
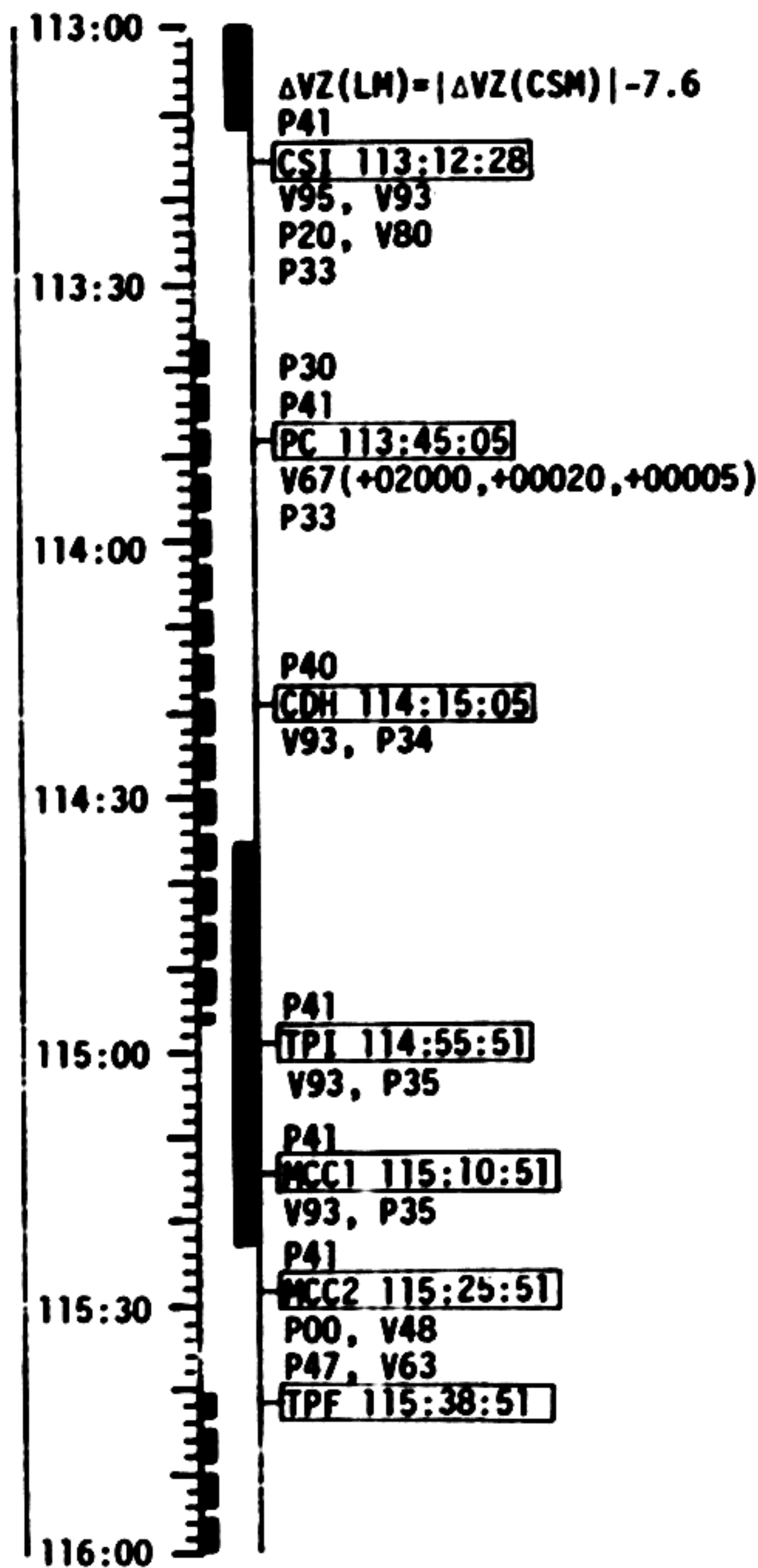
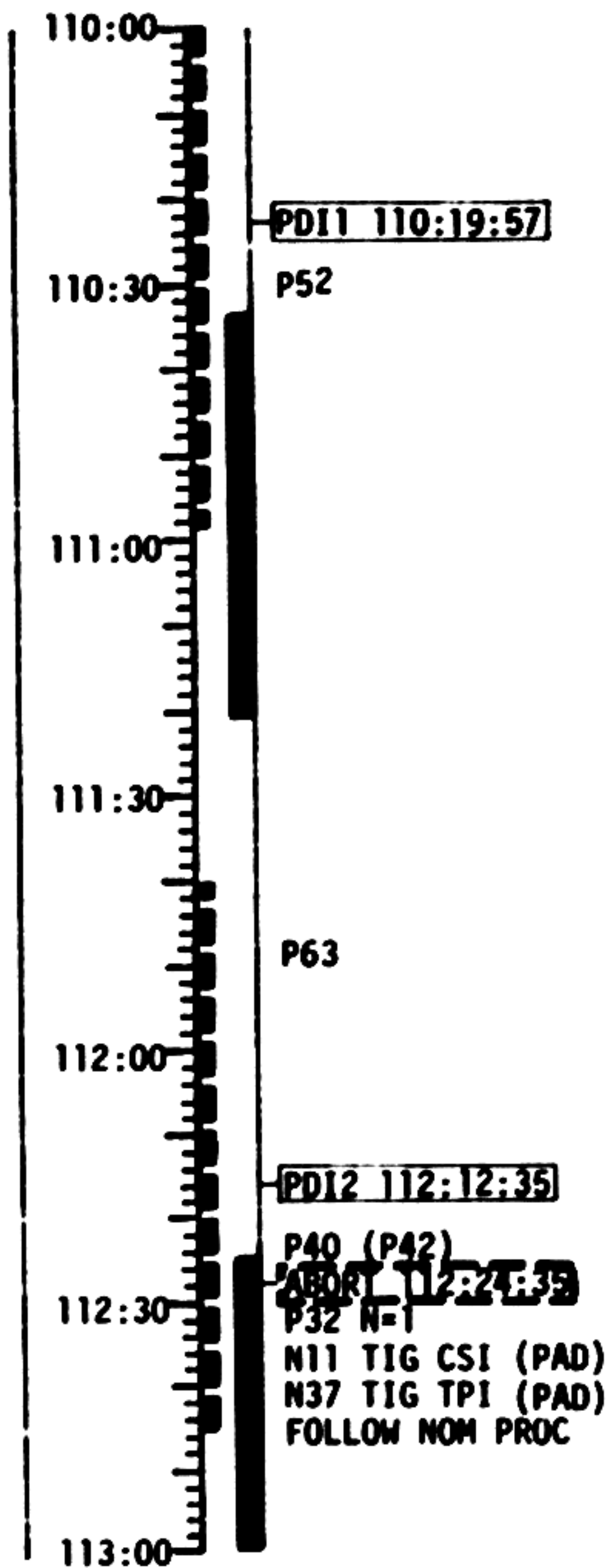
EVENT	GET TIG	ΔVR	ΔVX	ΔVY	ΔVZ
BOOST	111:38:31	10.0	10.0	0.0	0.0
CS11	114:26:29	19.0	19.0	0.0	0.0
CS12	115:16:24	40.5	40.5	0.0	0.0
PC	115:44:30	0.0	0.0	0.0	0.0
CDH	116:14:30	5.4	2.0	0.0	-5.0
TPI	116:54:15	23.7	21.2	-.9	-10.7



Prepared By FPRB/OPS  
MISSION APOLLO 12, OCTOBER 20, 1969

RELATIVE TRAJ  
PDI 1 + 21:22

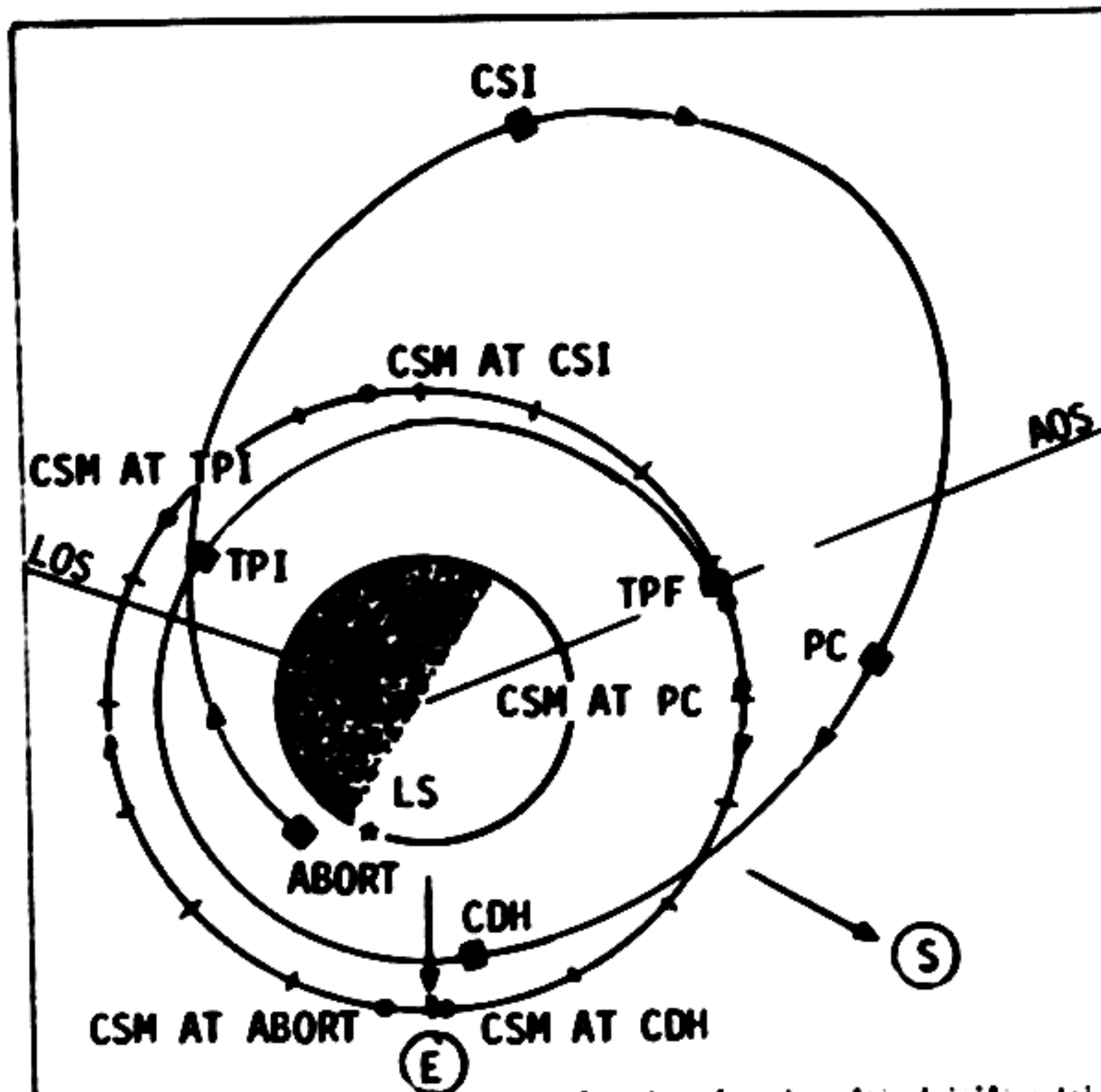
NO PDI 2 + 12 TIMELINE



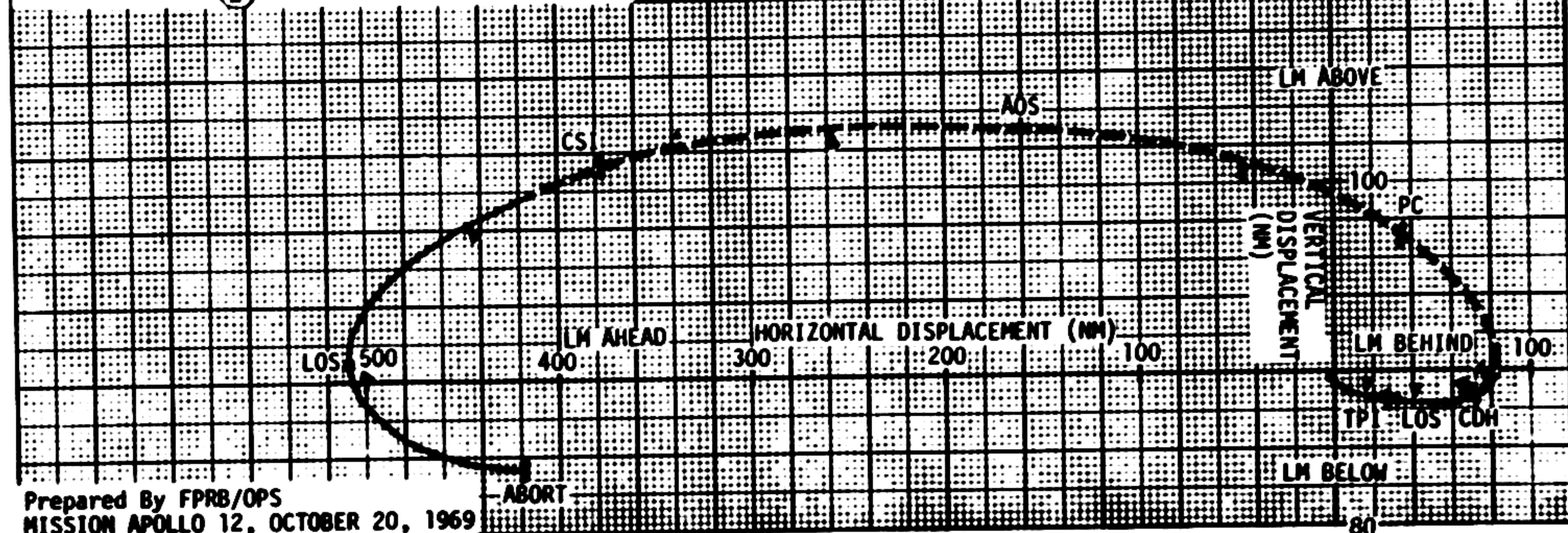
Prepared By FPRB/OPS  
MISSION APOLLO 12, OCTOBER 20, 1969



MISSION APOLLO 12  
INERTIAL AND RELATIVE PLOTS  
NO PDI 2 + 12

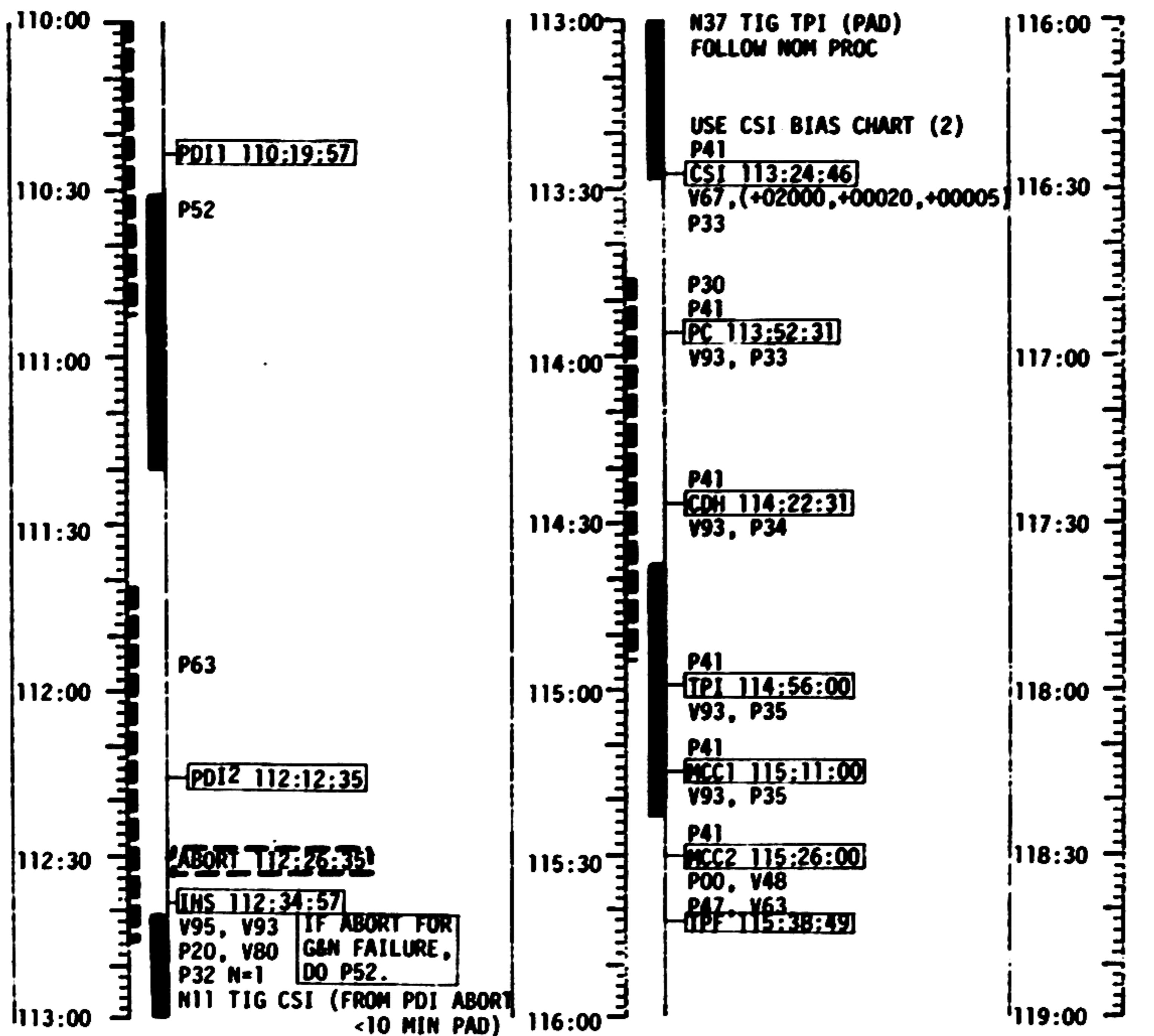


EVENT	GET TIG	$\Delta VR$	$\Delta VX$	$\Delta VY$	$\Delta VZ$
ABORT	112:24:35	198.4	175.2	0.0	93.0
CSI	113:12:28	0.0	0.0	0.0	0.0
PC	113:45:05	0.0	0.0	0.0	0.0
CDH	114:15:05	379.1	-139.7	0.0	-352.4
TPI	114:55:51	24.6	21.8	.1	-11.0



Prepared By FPRB/OPS  
MISSION APOLLO 12, OCTOBER 20, 1969

0< PDI 2 < 14:24(T1-2) TIMELINE

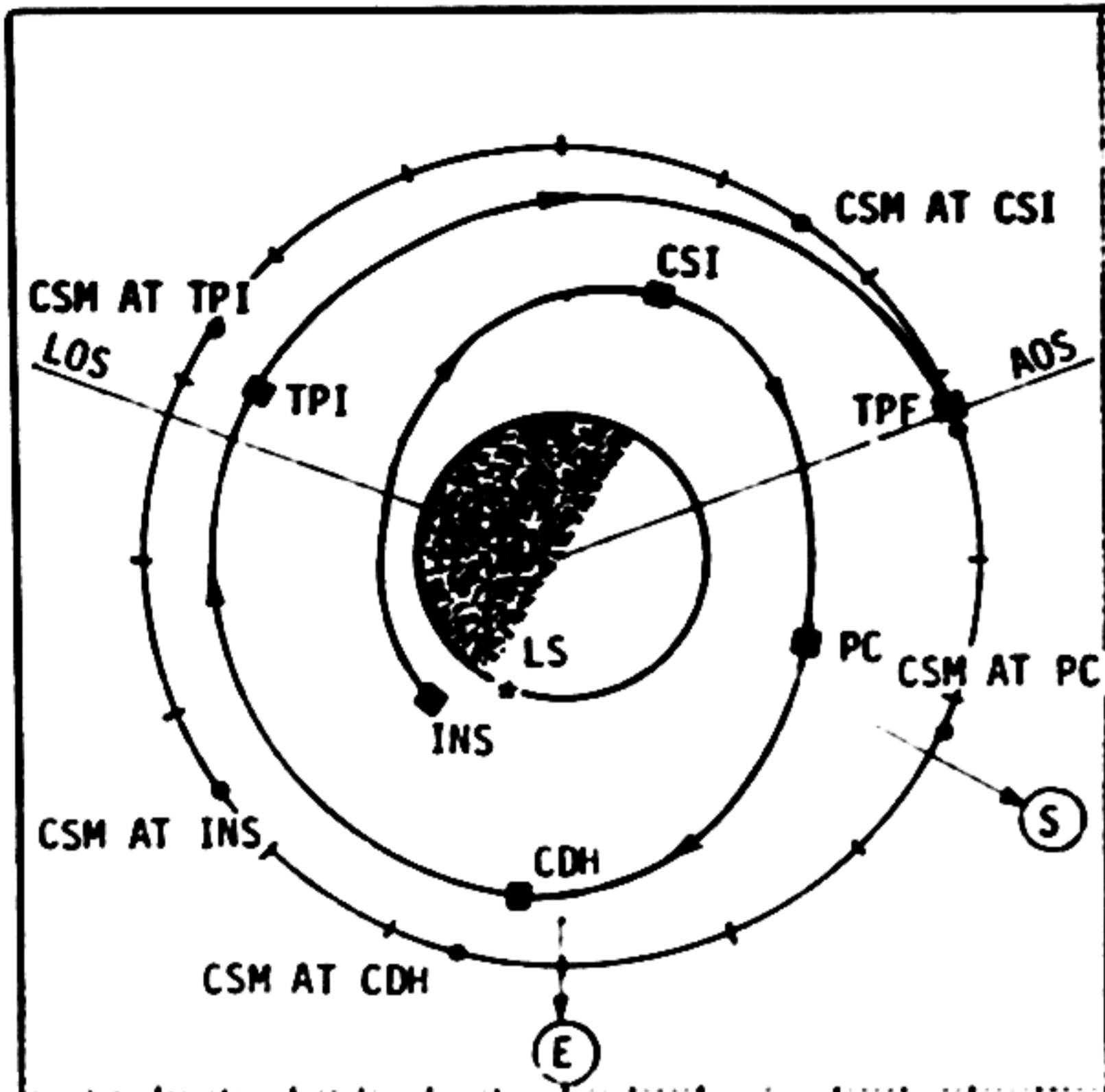


Prepared By FPRB/OPS  
MISSION APOLLO 12, OCTOBER 20, 1969

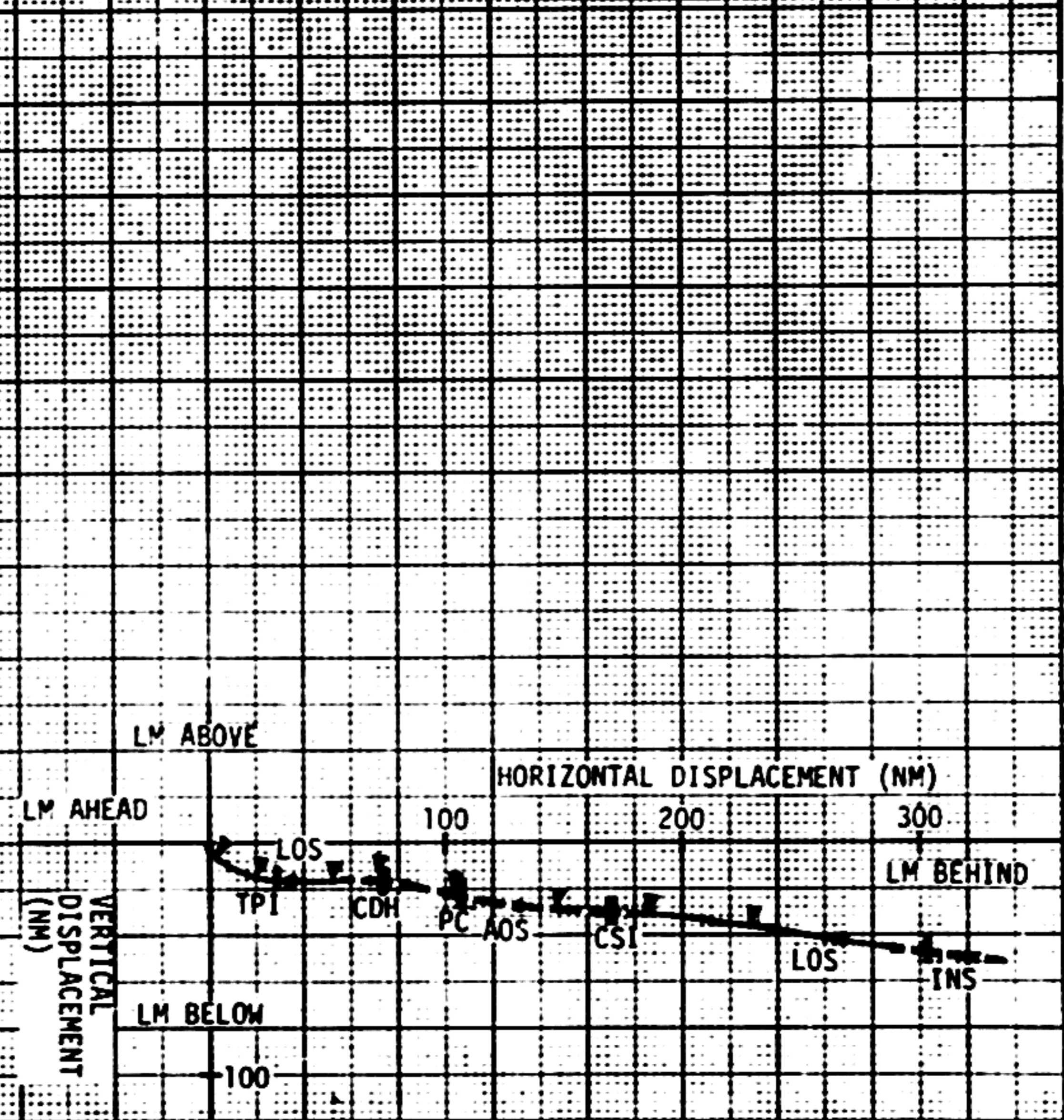
DATE OCTOBER 27, 1969

LM RENDEZVOUS/ABORT BOOK

MISSION APOLLO 12  
 INERTIAL AND RELATIVE PLOTS  
 0 < PDI 2 < 14:24(TI-2) (BURNS FOR ABORT AT 14)



EVENT	GET TIG	$\Delta VR$	$\Delta VX$	$\Delta VY$	$\Delta VZ$
CSI	113:24:46	49.4	49.0	0.0	0.0
PC	113:52:31	0.0	0.0	0.0	0.0
CDH	114:22:31	20.3	12.2	0.0	16.2
TPI	114:56:00	24.5	21.2	-4.1	-11.2

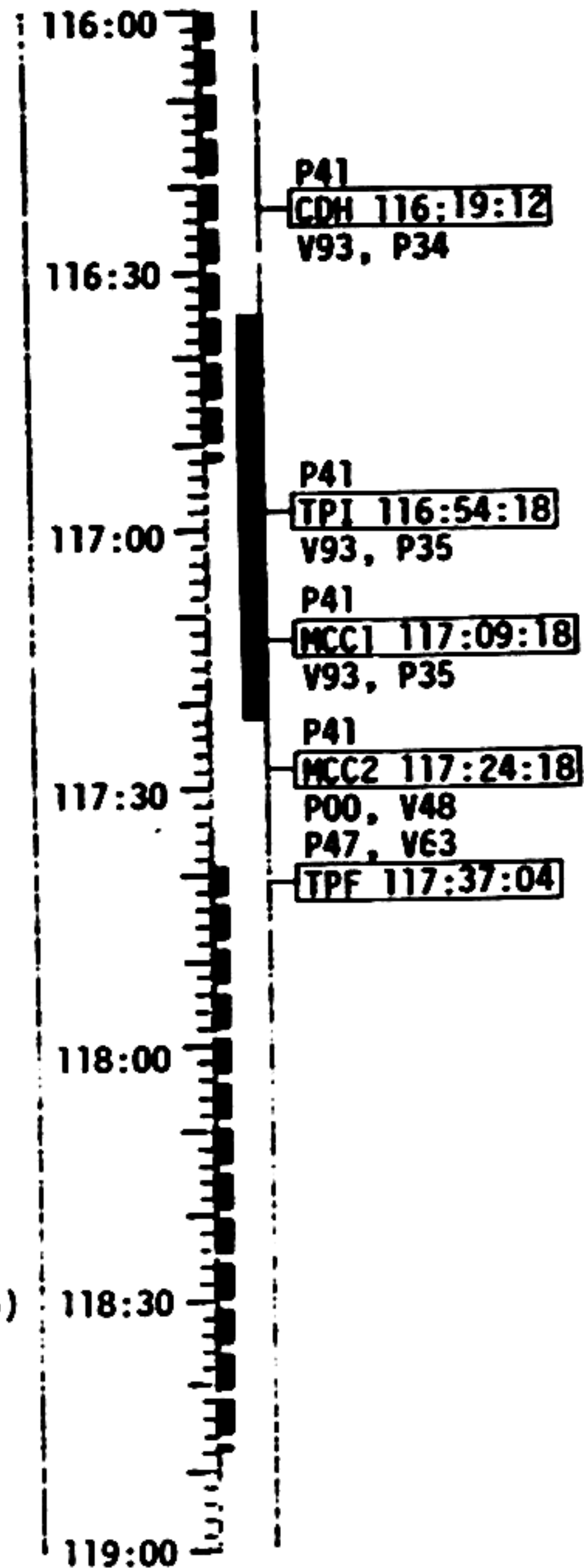
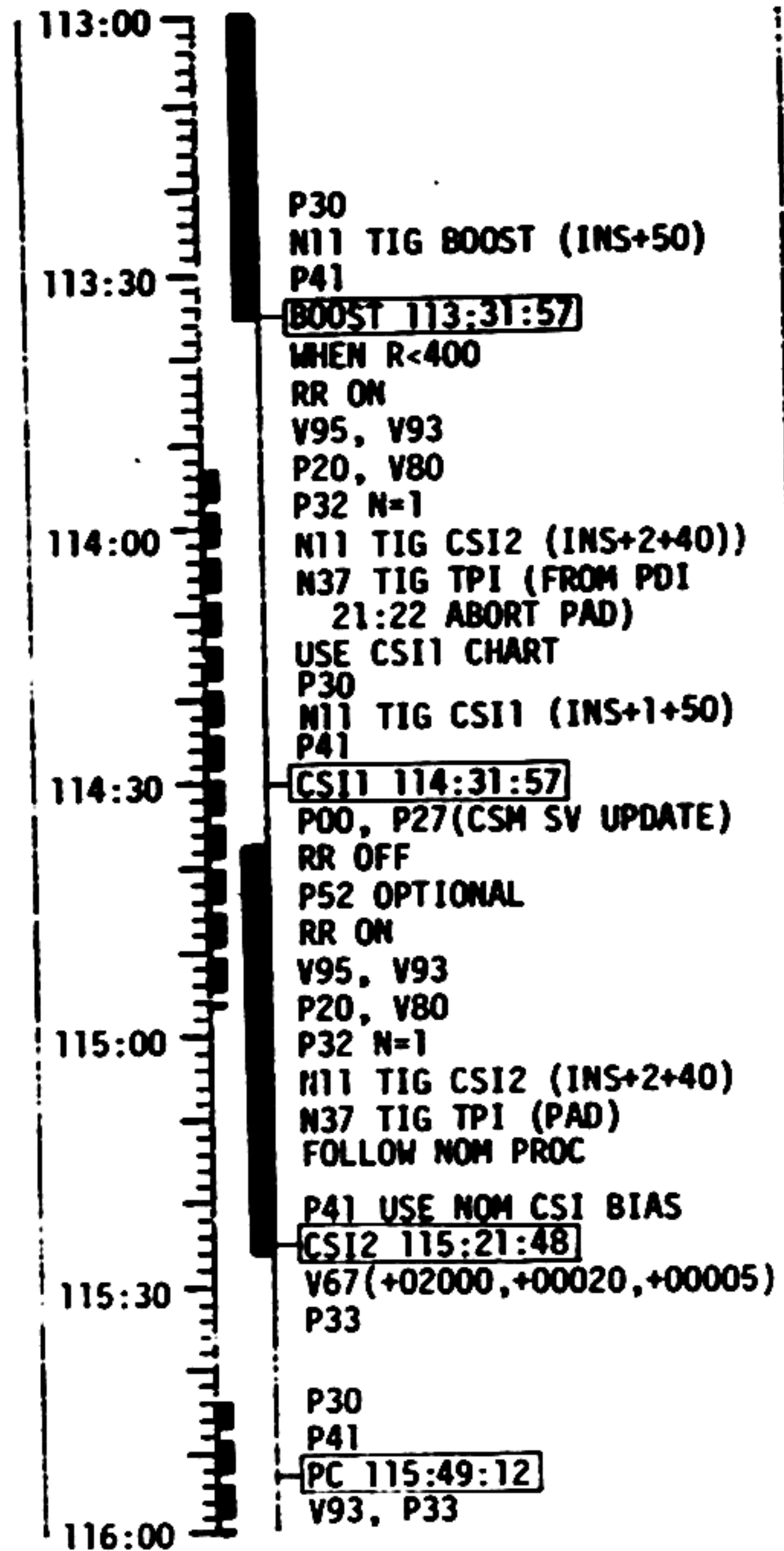
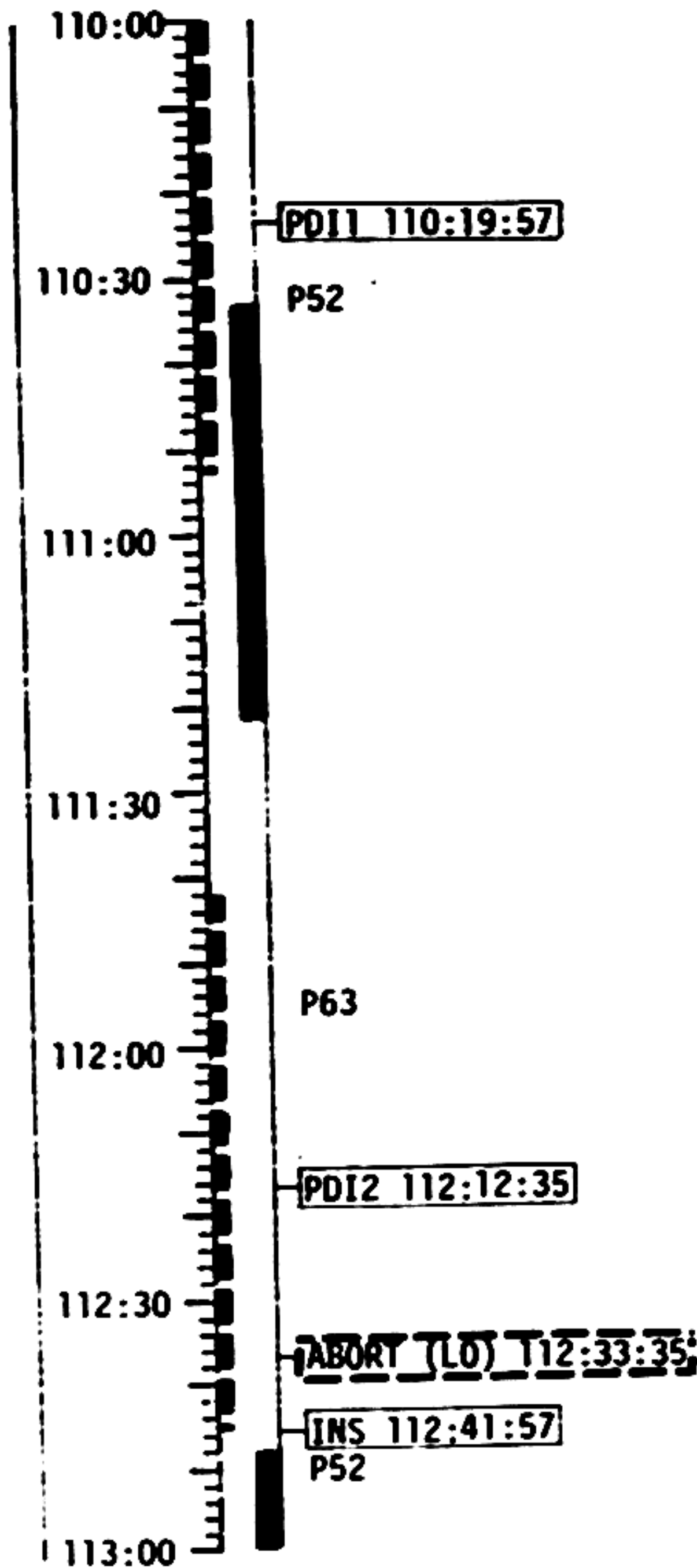


Prepared By FPRB/OPS  
 MISSION APOLLO 12, OCTOBER 20, 1969

RELATIVE TRAJ  
 PDI 2 + 14:24

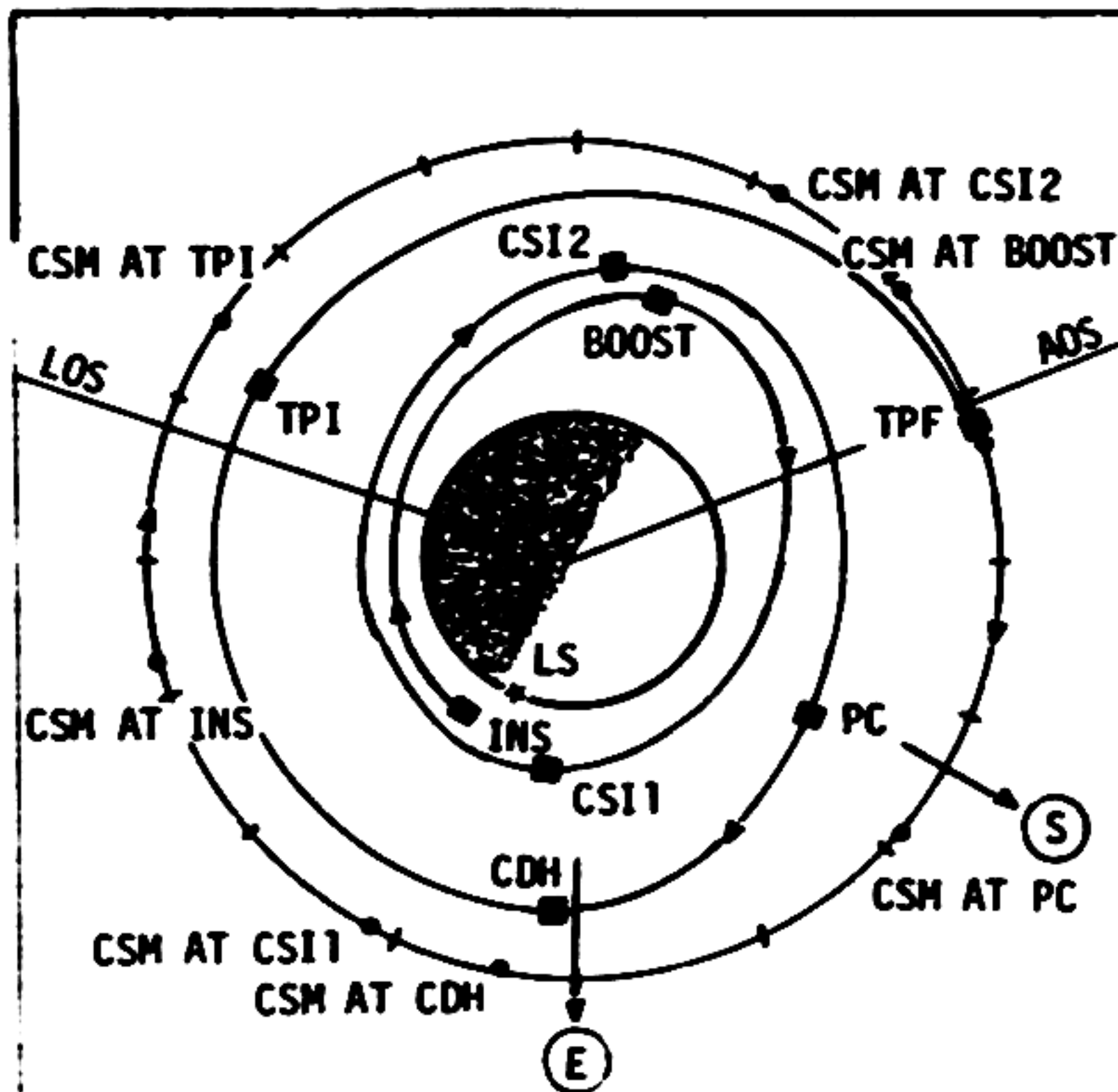
**TIMELINE**  
**PDI 2 + 21:00**

**PDI 2 + 21:00(T2-2) TIMELINE**

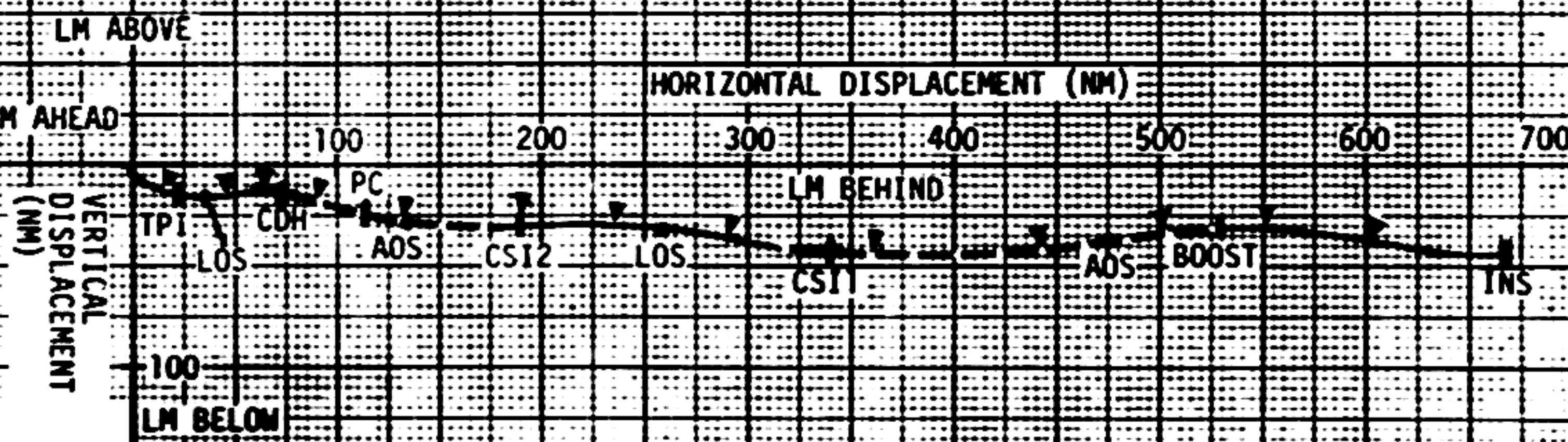


Prepared By FPRB/OPS  
 MISSION APOLLO 12, OCTOBER 20, 1969

MISSION APOLLO 12  
INERTIAL AND RELATIVE PLOTS  
PDI 2 + 21:00(T2-2)



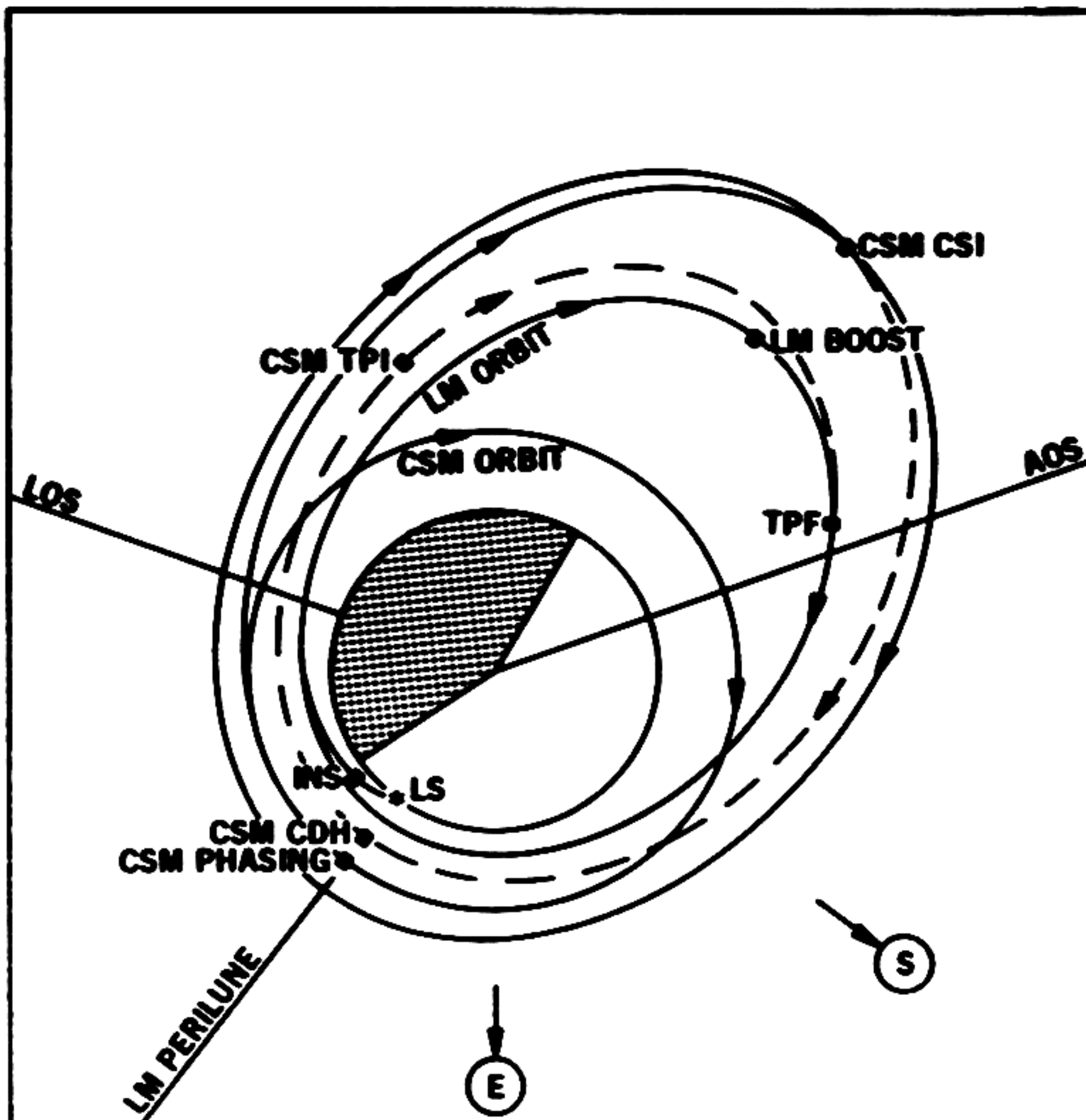
EVENT	GET TIG	$\Delta VR$	$\Delta VX$	$\Delta VY$	$\Delta VZ$
BOOST	113:31:57	10.0	10.0	0.0	0.0
CSI1	114:31:57	0.0	0.0	0.0	0.0
CSI2	115:21:48	39.7	39.7	0.0	0.0
PC	115:49:12	0.0	0.0	0.0	0.0
CDH	116:19:12	27.6	20.2	0.0	18.8
TPI	116:54:18	25.0	22.0	-3.9	-11.2



Prepared By FPRB/OPS  
MISSION APOLLO 12, OCTOBER 20, 1969

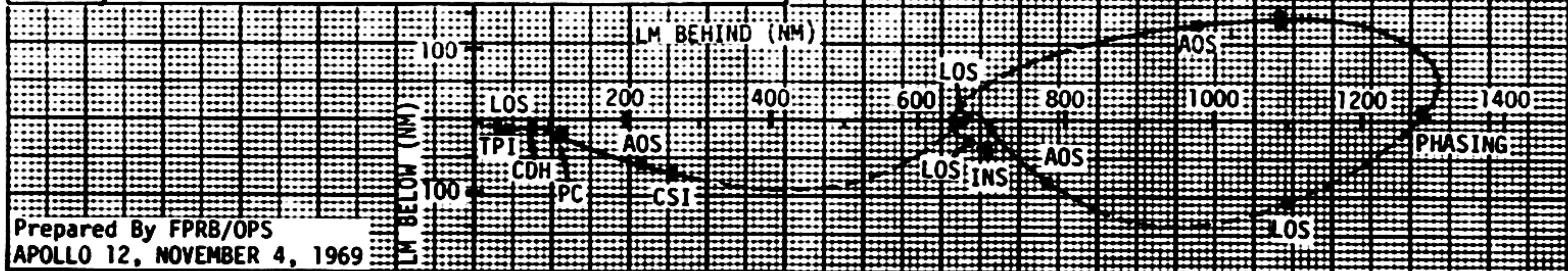
RELATIVE TRAJ  
PDI 2 + 21:00

MISSION APOLLO 12  
INERTIAL AND RELATIVE PLOTS  
MANUAL INSERTION

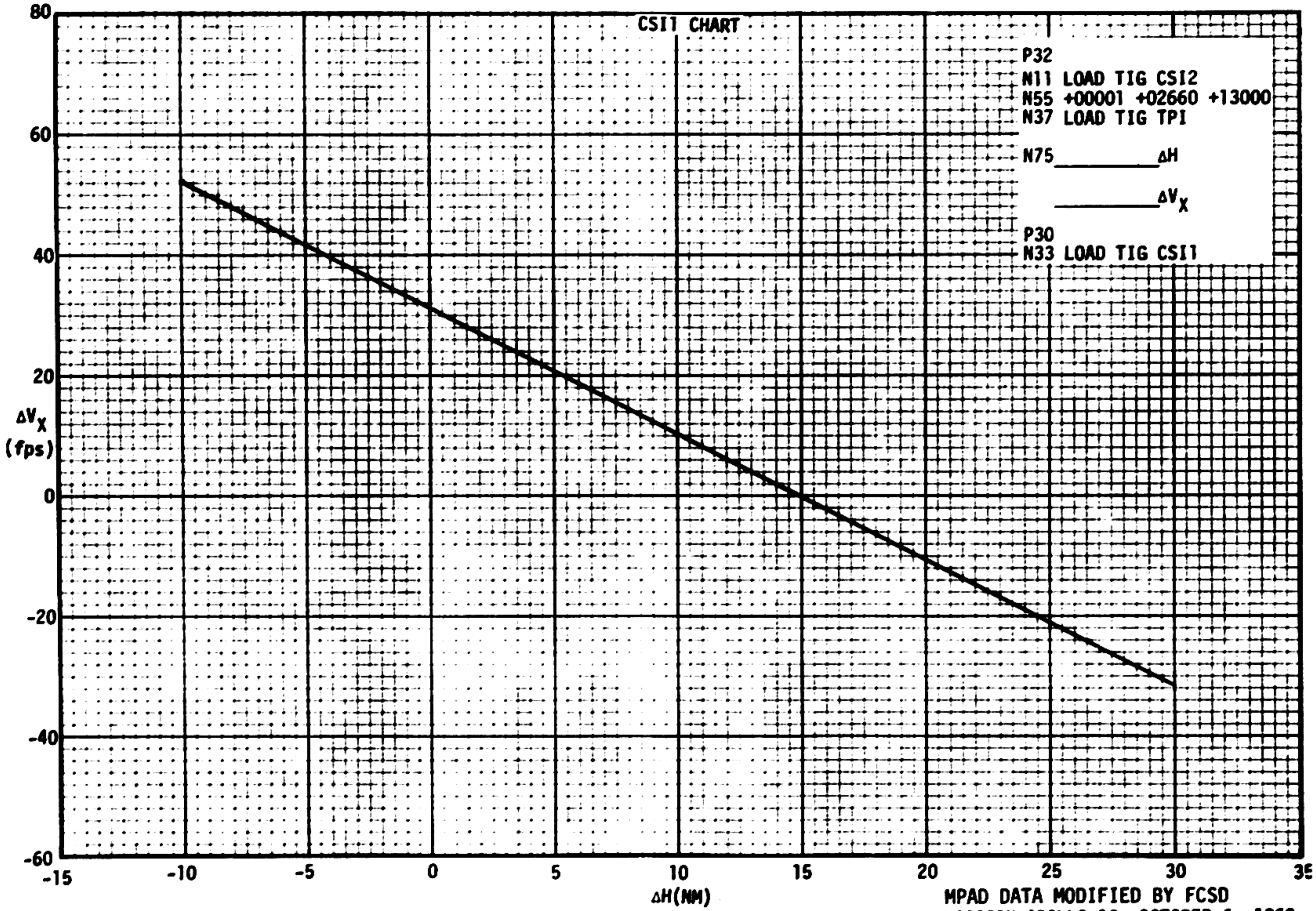


EVENT	GET TIG	$\Delta VR$	$\Delta VX$	$\Delta VZ$	LM HA/HP	CSM HA/HP
LM INS	142:20:58				200/10	60/60
LM BOOST	143:24:18	10.0	10.0	0.0	200/15	60/60
CSM PHASING	144:05:19	257.4	257.4	0.0	200/15	280/60
CSM CSI	146:24:05	0.0	0.0	0.0	200/15	280/60
CSM CSI	147:33:22	-35.1	-35.1	0.0	200/15	280/30
CSM PC	148:11:24	0.0	0.0	0.0	200/15	280/30
CSM CDH	148:41:24	-68.5	-68.5	0.0	200/15	215/30
CSM TPI	149:13:41	-22.0	-21.1	-1.8	200/15	207/21

- ASSUMPTIONS:
1. LM ALWAYS DOES 10fps BOOST
  2. CSM ALWAYS DOES PHASING OVER LM PERILUNE
  3. APOLUNE <50; CSI .5 REV AFTER CSM PHASING
  4. APOLUNE >50; CSI 1.5 REV AFTER CSM PHASING



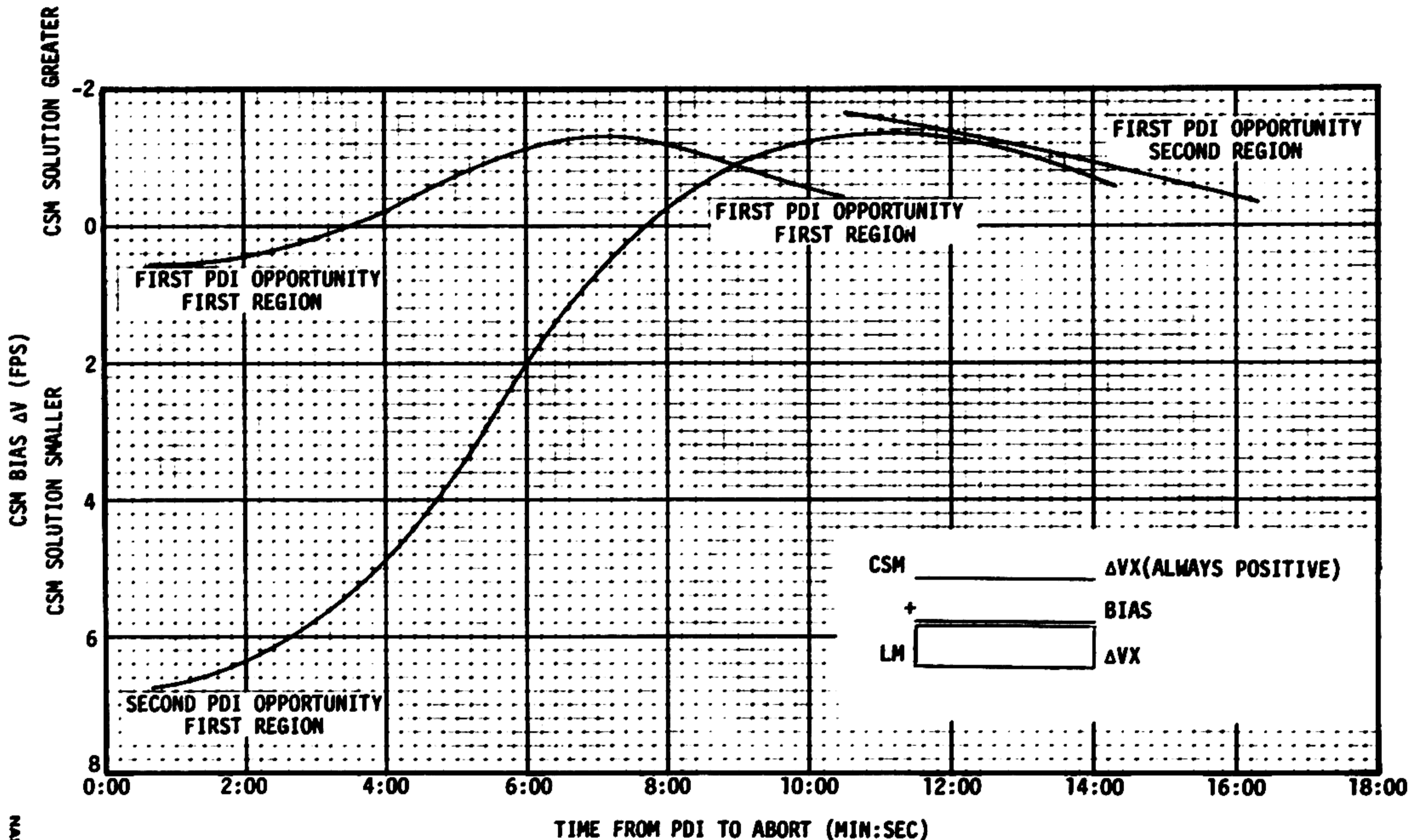
Prepared By FPRB/OPS  
APOLLO 12, NOVEMBER 4, 1969



CSI 1 CHART

MPAD DATA MODIFIED BY FCSD  
MISSION APOLLO 12, OCTOBER 6, 1969

CSI BIAS CHART



MPAD DATA MODIFIED BY FPRB/OPS  
MISSION APOLLO 12. OCTOBER 22, 1969



APOLLO 12 MISSION  
14 NOVEMBER 1969 LAUNCH DATE  
DESCRIPTION OF PHOTOGRAPHIC TARGETS OF OPPORTUNITY

<u>Target Number</u>	<u>Summary</u>
1 . . . . .	SECONDARY CRATERS; AGING COMPARISON.
2 . . . . .	SHARP CRATER.
3 . . . . .	FRACTURED, TUMESCENT CRATER FLOORS.
4 . . . . .	SHARP CRATER.
5 . . . . .	FRESH CRATER.
6 . . . . .	GROOVED INTERIOR WALL OF LARGE CRATER AND FLOOR.
7 . . . . .	20 KM CRATER.
8 . . . . .	SHARP CRATER.
9 . . . . .	CRATER PASTEUR AND RAY NIMBUS.
10 . . . . .	COPERNICAN CRATER.
11 . . . . .	CRATER PETAVIUS B.
12 . . . . .	BOHNENBERGER, BOHNENBERGER A, BOHNENBERGER G.
13 . . . . .	DARK MATERIAL NEAR GAUDIBERT.
14 . . . . .	CENSORINUS S, IRREGULAR CRATER WITH BULBOUS HILLS.

14 NOVEMBER 1969 LAUNCH DATE

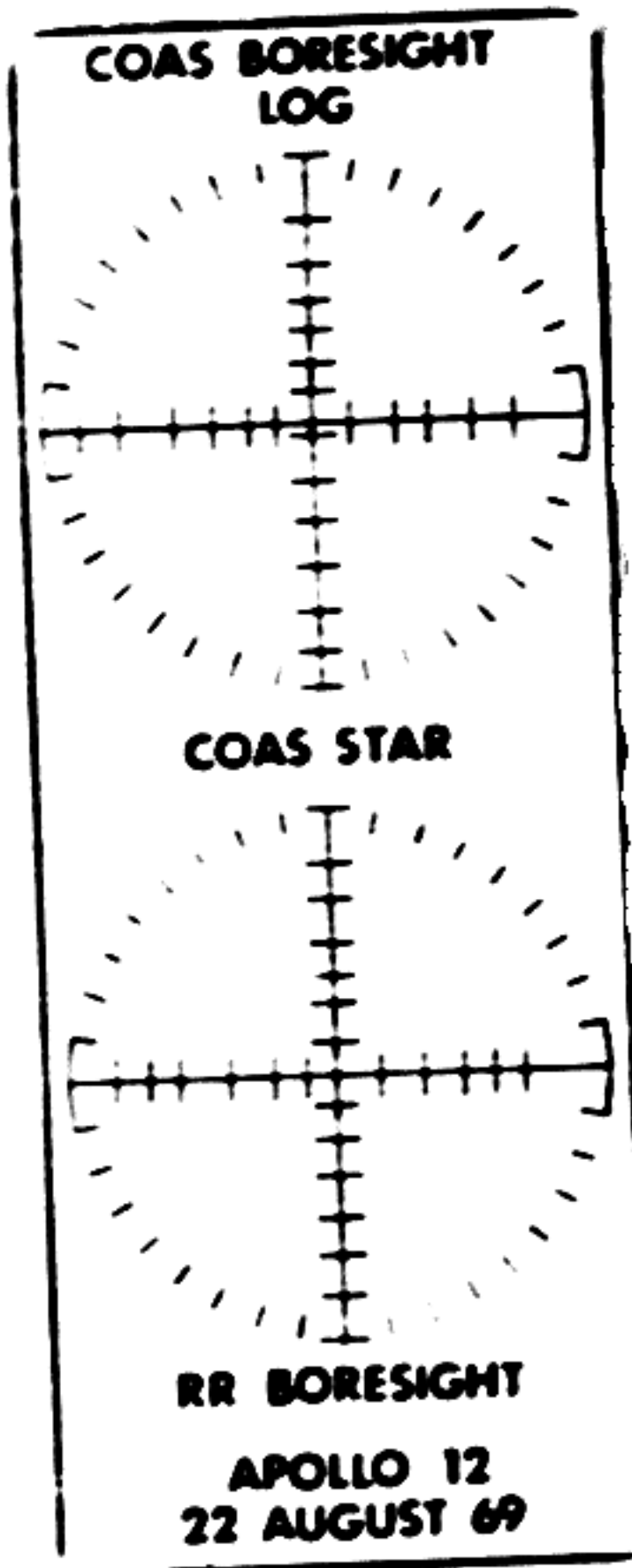
15. . . . . CRATERS DAGUERRE, MASKELYNE B, AND THEOPHILUS (RIM).
16. . . . . HYPATIA - IRREGULAR CRATER WITH SMALL DEPRESSIONS, ALFRAGANUS A.
17. . . . . CHAIN OF DEPRESSIONS EAST OF ALFRAGANUS.
18. . . . . HILLY, GROOVED MATERIAL NEAR DESCARTES.
19. . . . . CRATER ABULFEDA.
20. . . . . CRATER TAYLOR B WITH HILLY GROOVED HIGHLAND MATERIAL.
21. . . . . CRATER BOSCOVICH.
22. . . . . AREA OF ELONGATE CRATERED CONES AND IRREGULAR DOMES.
23. . . . . RAY CRATER HIPPARCHUS C.
24. . . . . CRATER AIRY-DARK STRUCTURED FLOOR.
25. . . . . CRATER WITH THIN CIRCULAR PLATEAU SOUTH OF ALBATEGINIUS.
26. . . . . BOWL SHAPED CRATER MÜLLER AND ADJACENT CRATER CHAIN.
27. . . . . CRATER HERSCHEL.
28. . . . . RIMA BODE I AND FRA MAURO FORMATION.
29. . . . . CRATER ALPHONSUS INTERIOR AND WEST WALL.
30. . . . . CRATER MÖSTING.
31. . . . . CRATER WITH IRREGULAR DEPRESSIONS OR FLOW FRONTS ON FLOOR. HALO CRATER TO EAST.

14 NOVEMBER 1969 LAUNCH DATE

- 32 . . . . . CRATER LALANDE INTERIOR, EJECTA AND CLOSE SATELLITES.
- 33 . . . . . MARE RIDGE ESE OF COPERNICUS. VOLCANIC DOMES WEST OF RIDGE.
- 34 . . . . . CRATER GAMBART - POSSIBLE CALDERA.
- 35 . . . . . STEEP HILL NORTH OF FRA MAURO CRATER.
- 36 . . . . . BRIGHT SMALL CRATER IN SOUTH WALL OF PARRY.
- 37 . . . . . COPERNICUS, S. FLOOR, WALL, AND RIM.
- 38 . . . . . CRATER AND MARE RIDGE. CRATERS BONPLAND AND DARNEY S.
- 39 . . . . . TWIN HILLS WITH SUMMIT CRATERS, SURVEYOR III, AND CRATERS LANSBERG, B, C, D, E, F, G.
- 40 . . . . . CRATER REINHOLD.
- 41 . . . . . NORTHERN RIPHAEUS MT.
- 42 . . . . . KUNOWSKY D AND TERRAIN TO WEST.
- 43 . . . . . VOLCANIC CONES INTERSECTING HORTENSIVS DB TO KEPLER.
- 44 . . . . . SINUOUS RILLE AND SPIRAL CRATER CHAIN EAST OF KEPLER.
- 45 . . . . . MARE DOME WEST OF MILICHIUS.
- 46 . . . . . III P-11 REDESIGNATED.
- 47 . . . . . ENCKE.
- 48 . . . . . III P-13 PRIME.

14 NOVEMBER 1969 LAUNCH DATE

- 49. . . . . III P-12 REDESIGNATED.
- 50. . . . . FLOWS IN THE FORM OF A RING AND COMPLEX MARE RIDGE.
- 51. . . . . CRATERS EAST OF MARIUS.
- 52. . . . . MARIUS HILLS NORTH.
- 53. . . . . REINER.
- 54. . . . . MARIUS HILLS SOUTH.



ft	nm
500	= 0.08
1000	= 0.16
1500	= 0.25
2000	= 0.33
2500	= 0.41
3000	= 0.49
3500	= 0.57
4000	= 0.66
4500	= 0.74
5000	= 0.82
5500	= 0.90
6000	= 0.99
6500	= 1.07
7000	= 1.15
7500	= 1.23
8000	= 1.32
8500	= 1.40
9000	= 1.48
9500	= 1.56

**APOLLO 12 SEPT 29, 1969**

**DEDA ADDRESSES**

R DOT - 440	Y DOT - (Present)(-)270
R - 317	- (Next Man)(-)263
H <sub>a</sub> - 315	STORE } - 415 & 1E
H <sub>p</sub> - 403	STORE R DOT - 503E
	STORE R 316E
VI - 433	V16N78 RR RNG/RNG RT
H DOT - 367	
H - 337	
⊙ - 277	

ΔV 404,5,6=0 470,71,72R

**APOLLO 12  
10/28/69**

**LM S-BAND**

**Antenna Angles**

	0° YAW
0	120/-30
10	110/-35
20	99/-36
30	86/-37
40	75/-35
50	62/-32
60	52/-29
70	40/-22
80	34/-19
90	26/-9
100	18/-6
106	14/-2
110	12/2
120	4/8
130	-3/16
140	-10/22
150	-18/29
160	-27/35
170	-37/42
180	-49/46
190	-62/52
200	-78/53
210	
220	250/52
230	236/50
240	222/44
250	212/36
260	208/38
270	195/26
280	186/18
290	180/10
300	172/4
310	168/-4
320	158/-9
330	152/-17
340	142/-22
350	134/-27

**APOLLO 12  
OCT 2, 1969**

**LM-6 COMM CARD MODES**

COMM BASIC CONFIGURATION	PRIOR TO DOCKING	PREP FOR UN DOCKING	LOS PROCEDURE	LM RELAY WITH VHF RNG	CSM RELAY	LUNAR STAY	PLSS/ EVCS WITH TV (EVA)
PANEL 11 - ALL COM							
CB'S-CLOSED							
PANEL 8 - AUDIO(CDR)					OFF		
S-BAND Y/R SW - Y/R							
ICS Y/R SW - Y/R							
RELAY ON SW -							
RELAY OFF							
MODE SW - ICS/PTT				VOX			VOX
AUDIO CONT SW - NORM							
VHF A SW - Y/R							OFF
VHF B SW - OFF	RCV	RCV	RCV	RCV			
VOX SENS - MAX							
PANEL 16 - ALL							
ALL COMM CB'S-CLOSED							
CB16 TV -							CLOSED
OPEN							
PANEL 14 - UPLINK	ENABLE	ENABLE	ENABLE	ENABLE	ENABLE	OFF*	ENABLE
SQUELCH SW AS DESIRED							
PANEL 12 - UPLINK							
SW - OFF							
PANEL 12 - AUDIO (LMP)					RCV	OFF	
S-BAND Y/R SW - Y/R							
ICS Y/R SW - Y/R					ON		ON
RELAY ON SW -							
RELAY - OFF							
MODE SW - ICS/PTT				VOX			VOX
AUDIO CONT SW - NORM							
VHF A SW - Y/R						OFF	
VHF B SW - OFF	RCV	RCV	RCV	RCV		RCV	RCV
VOX SENS - MAX INCR							
PANEL 12 - COMM							
S-BAND MODULATE							FM
SW-PM							
S-BAND XMTR/RCVR							
SW-PRIM							
S-BAND PWR AMPL							
SW-PRIM							
S-BAND VOICE			VOICE				
SW-VOICE							
S-BAND PCM SW - PCM							
S-BAND RANGE		RANGE				AS REQ	
SW-OFF/RESET							
VHF A XMTR	VOICE/RNG			VOICE OR VOICE/RNG (IF RNG REQ)		OFF	
SW - VOICE						OFF	
VHF A RCVR SW - ON						OFF	
VHF B XMTR SW - OFF	ON	ON	DATA	ON		ON	ON
VHF B RCVR SW - OFF						ON	ON
SQUELCH VHF A - NORM							N.Y.-11/2
SQUELCH VHF B - NORM							N.Y.-11/2
YLM BICOMED SW -	RIGHT	RIGHT	OFF	OFF			OFF
AS REQ							
YLM PCM SW - HI			LO				
RECORDER SW - OFF	AS DES	AS DES	AS DES	AS DES	AS DES	AS DES	ON
PANEL 12 - COMM ANT:							
TRACK MODE			SLEW			SLEW	OFF
SW - AUTO							
PITCH CONT -							
COMPUTED ANGLE							
YAW CONT -							
COMPUTED ANGLE							
S-BAND SEL-SLEW			AFT OR FWD				AS REQ
VHF SEL - AFT OR FWD							EVA

\* DURING EVA - ENABLE

**APOLLO 12**

**29 OCTOBER 1969**

DAP DATA LOAD			DPS	APS	RCS	
A	1=STAGED	2=UNSTAGED	3=DOCKED	TEMP PRESS NOM >30 PSI @ DOI >237 PSI @ PDI	TEMP PRESS NOM >125 PSI	He >1400 PSI PRPLNT
B	0=RCS A	1=RCS B	2=RCS A & B			PRESS >100 PSI TEMP 40 - 100°F
C	0=FINE	1=NORM				FUEL/OXID MANF PRESS >100 PSI
D	0=0.3°	1=1.0°	2=5.0°	HELIUM NOM >1000<1150 PSI PRE DOI >1150<1300 PSI PRE PDI	50 - 90°F ΔT<60°F FOR BT<100 SEC HELIUM NOM TEMP 70°F PRESS 3125 PSI	ΔP <80 PSI QUAD TEMP >119°F (25 MIN TO FIRING)
E	0=0.2°/SEC	1=0.5/SEC	2=2.0°/SEC			
			3=10.0°/SEC			
APOLLO 12			11/6/69			



:05

FINAL PREP FOR EGRESS

PLSS FEEDWATER - OPEN (H2O Flag - Clear In About 4 Min)

Fwd Hatch - Full Open

Rest Until Cooling Sufficient

Verify:

PGA Stable At 3.7 To 4.0 Psig

LM Suit Circuit 3.6 To 4.3 Psia

CWEA Status:

Warning

ASC PRESS

Caution

PREAMPS

ECS

H2O SEP COMP LT - ON

Lighting: ANUN/NUM - DIM

CB(16) COMM: TV - Close

Position Seq Camr On Crash Bar

Jettison Bag & LHSSC

Release PLSS Antennas

Lower EV Visor

:10

**POST EVA 2**

PLSS FEEDWATER - CLOSE

Fwd Hatch - Close & Lock

Dump Valves (Both) - AUTO (Verify)

Note: PLSS O2 & PRESS Flags May Come On During Repress. If PLSS O2 < 10% Manually Control Cabin Repress To Maintain Positive PGA Pressure.

Lighting: ANUN/NUM - BRIGHT

CABIN REPRESS VLV - AUTO

PRESS REG A & B - CABIN (MASTER ALARM & Cabin Warning Lt - On)  
Verify Cabin Press Increasing

PLSS O2 - OFF  
Operate OPS Purge Valve To Depress Suit As Required

CABIN REPRESS Valve Closes At 4.4 Psia  
Verify Cabin Press Stable At 4.6 to 5.0 Psia (Cabin Warning Lt - Off)

POST EVA SYSTEMS CONFIGURATION

Verify EVA CB Configuration  
CB(11) ECS: SUIT FAN 1 - Close  
CB(16) ECS: SUIT FAN ΔP - Close  
(ECS Caution & H2O SEP Comp Lts - Out)

Doff Gloves

DES H2O VLV - OPEN  
Remove Purge Valve & OPS O2 Hose  
Stow Purge Valves in TSB

Connect LM O2 Hoses (R/R & B/B)  
SUIT ISOL (Both) - SUIT FLOW

PLSS PUMP - OFF  
PLSS FAN - OFF

Disconnect PLSS H2O From PGA  
Connect LM H2O To PGA  
CB(16) ECS: LCG PUMP - Close

PLSS Mode (Both) - 0  
Connect To LM Comm (Audio, Biomed)

AUDIO (CDR & LMP)  
VHF A - OFF  
VHF B - OFF  
MODE - ICS/PTT  
RELAY - OFF

COMM:  
VHF - OFF, OFF, OFF, OFF, LEFT, HI  
RECORDER - OFF

PLSS/OPS DOFFING

Disconnect OPS Actuator From RCU  
Disconnect RCU From PGA  
Verify All RCU Controls - OFF  
Disconnect RCU From PLSS And Stow On Mid-Step

Disconnect PLSS O2 Hoses  
Doff PLSS/OPS  
Stow LMP PLSS On Floor  
Stow CDR PLSS On Mid-Step

Stow OPS O2 Hoses, Actuator, & Antenna  
Disconnect OPS Antenna Connector  
Doff Yo-Yos, Stow In LHSSC  
Stow PLSS Hoses

Remove OPS & Perform Checkout  
Stow OPS On Engine Cover, End Up  
Remove Lower PLSS Straps, Clip Straps Together (Name-To-Name) & Stow In RHSSC (FECAL EMESIS)  
Stow PLSS (Both) On Floor

Verify Powerdown CB Configuration  
CB(11) HEATERS: RR OPR - Close

Unstow 2 Jett Bags, Aft LHSSC, Upper RH Corner  
Doff Lunar Boots, Stow In Jett Bag  
Remove CSC Cassette From ETB, Stow In Upper Boot Comp  
Unstow 70mm Camrs From ETB  
Stow ETB In 2nd Bag, Stow On Eng Cover

PREP FOR EQUIPMENT JETTISON

Fwd Hatch Handle - UNLOCK

Verify O2 QTY > 25%

Photo Lunar Surface Out Of Both Windows  
Using B&W Film [12]

APOLLO 12  
25 OCTOBER 1969



CDR

[8,74] [8,74] [11,74]

[8,30] [8,30]

[8,15]

LMP

[11,74] [8,74] [8,74]

[8,30] [8,30]

[8,15]

Stow 70mm Mags in RHSSC  
Stow 70mm Camrs In Jett Bag

Configure Seq Camr - Mag, Settings  
2.8/500, 12FR & Stow Above RH Window

Stow In LHSSC:  
Rt Angle Brkt  
Remote Cont Cable  
RCU's (2)  
Unused Def Bags As Desired  
Yo-Yos (2)  
Cuff Checklist (2)  
Food Waste  
Urine Bags

Perform Feedwater Collection:  
Unstow Feedwater Bag & Spring  
Scale On Top Of Data File  
Flatten Bag To Remove Trapped Gas  
Zero Spring Scale

Connect Bag To PLSS H2O F111  
PLSS O2 - ON  
After 30 sec, PLSS H2O V1v - OPEN  
Drain Feedwater Bladder 1.5 Minutes Min

PLSS H2O V1v - CLOSE  
PLSS O2 - OFF

Disconnect Bag From PLSS H2O F111  
Weigh Bag & Record LBS, CDR \_\_\_\_\_ LMP \_\_\_\_\_  
(Report To Hou)  
Stow Bag In Jett Bag  
Repeat For 2nd PLSS (Scissor Name Tags)  
Stow Bag & Scale In Jett Bag

Lower CDR RH Attitude Controller  
Remove Armrest, Stow In Jett Bag

Position PLSS (2) For Jettison, Eng  
Cover & Mid-Step  
Position LHSSC And Bag For Jettison

Don EV Gloves

PGA Diverter V1vs - Horizontal  
Check PGA Connectors

PRESS INTEGRITY CHECK

**Note: ARS/PGA Circuit Shall Not Be  
Maintained At Elevated Press >5 Min**

SUIT GAS DIVERter - PULL-EGRESS (Verify)  
CABIN GAS RETURN - EGRESS (Verify)  
SUIT CIRCUIT RELIEF - CLOSE

PRESS REG A - CLOSE  
PRESS REG B - DIRECT O2  
Monitor Suit Press To 8.85 Psia  
Then PRESS REG B - CLOSE (Cuff  
Gage Decay <.3 Psig In 1 Min)

SUIT CIRCUIT RELIEF - AUTO (Suit  
Press Decays To 4.8 Psia)  
PRESS REG A & B - EGRESS

CABIN DEPRESS FOR JETTISON

Fwd Dump Valve - OPEN Then AUTO At  
3.5 Psia

(Verify Cabin Press 3.5 Psia  
& LM Suit Circuit 3.6 To 4.3  
Psia & Decaying)

Fwd Dump Valve - OPEN (Verify LM  
Suit Circuit 3.6 To 4.3 Psia)

HATCH OPENING

Partially Open Fwd Hatch  
Fwd Dump Valve - AUTO

Fwd Hatch - Full Open

Jettison The Following:

LHSSC  
PLSS On Mid-Step  
Jett Bag  
PLSS On Eng Cover

Verify Items Clear Of Ascent Stage

Fwd Hatch - Close & Lock

CABIN REPRESS

Fwd Dump Valve - AUTO (Verify)  
CABIN REPRESS - AUTO (Verify)

PRESS REG A & B - CABIN (MASTER  
ALARM & Cabin Warning Lts - On)  
Verify Cabin Press Increasing &  
Stabilizes At 4.6 To 5.0 Psia  
(Cabin Warning Lt - Off)

CABIN GAS RETURN - AUTO  
SUIT GAS DIVERter - PUSH-CABIN

Doff Gloves, Helmets With Visors  
VHF ANT SEL - AFT

Unstow Lunar Surface Checklist (SUR-97)  
Stow EVA 2 Prep & Post Card

APOLLO 12  
25 OCTOBER 1969

VHF B - OFF  
No MSFN Reception In PLSS Mode B  
PLSS Mode (CDR) - B (Tone-on, Vent  
Flag - P, Press Flag - 0)  
PLSS O2 Press Gage >75%  
Perform Comm Check With LMP

PLSS Mode (LMP) - B (Tone-On)  
PLSS Mode (CDR) - A (Tone-On)  
Verify Voice Comm With Each Other

PLSS Mode (Both) - AR (Tone-On)  
Perform Comm & TM Check With Hou &  
Comm Check With Each Other  
Read PLSS O2 Qty to Hou

Note: If Comm Is NO GO With Hou  
S-BD MOD - PM  
Verify COMM & TM

CB(16) COMM: TV - Open

-:33

### FINAL SYSTEMS PREP

CB(16) ECS: CABIN REPRESS - Close (Ver)  
SUIT FAN ΔP - Open  
CB(11) ECS: SUIT FAN 1 - Open  
Verify ECS Caution & H2O SEP COMP  
Lts - On

SUIT GAS DIVERTER - PULL-EGRESS  
CABIN GAS RETURN - EGRESS  
SUIT CIRCUIT RELIEF - AUTO (Verify)

### OPS CONNECT

LMP 1st - Unstow OPS O2 Hose & Actuator  
Connect Actuator To RCU  
Snap OPS O2 Hose To Side of PLSS  
SUIT ISOL - SUIT DISC  
Discon LM O2 Hoses, Secure About PGA  
Connect OPS O2 Hose To PGA B/B

Retrieve Purge Valve (TSB) -  
Verify Closed & Locked  
Install Purge Valve In PGA R/R  
Verify PLSS Centered & At Proper Height

CDR Repeat OPS CONNECT

Drink  
DES H2O VLV - CLOSE

### HELMET/GLOVE DONNING

Position Mikes (Both)  
PLSS FAN - ON (Vent Flag - Clear)  
Don Helmets, Then Visors

CB(16) ECS: LCG PUMP - Open  
Disconnect LM H2O Hose  
Connect PLSS H2O Hose  
Stow LM Hoses

Verify The Following:

Helmet & Visor (2) - Locked &  
Adjusted  
Torso Tiedown (2) - Adjusted  
O2 Connectors (6) - Locked  
Purge Valves (2) - Locked  
H2O Connectors (2) - Locked  
Comm Connectors (2) - Locked

Don EV Gloves & Verify:  
Wrist Locks (4) - Locked  
Glove Straps (4) - Adjusted

PLSS DIVERTER - MIN (Verify)  
PLSS PUMP - ON

PRESS REG A & B - EGRESS

Verify Items Prepared For Jettison:  
ECS LiOH Cartridge-Jett Bag  
PLSS Condensate Container-Jett Bag  
Hammocks-Jett Bag  
LHSSC (Fwd Section)-PLSS Batteries,  
LiOH Carts, Food Waste, Urine Bags

Position ETB On Eng Cover  
Verify EVA CB Configuration

-:13

### PRESSURE INTEGRITY CHECK

PLSS O2 - ON (Tone-On, O2 Flag-0)  
Press Flag Clear (3.1-3.4 Psia)  
Cuff Gage 3.7-4.0 Psig  
O2 Flag Clear

PLSS O2 - OFF (Cuff Gage Decay <.3  
Psig In 1 Min)

PLSS O2 - ON (Cuff Gage 3.7-4.0  
Psig, Tone & O2 Flag May Come On)

### CABIN DEPRESS

Confirm "Go" For EVA From MSFN  
CABIN REPRESS VLV - CLOSE

Fwd Dump Valve - OPEN Then AUTO At  
3.5 Psia (Verify Cuff Gage Does  
Not Drop Below 4.8 Psig)

Verify:  
Cabin At 3.5 Psia  
LM Suit Circuit 3.6 To 4.3 Psia &  
Decaying  
PGA >4.8 Psig & Decaying

:00

Start Wrist Watch

Fwd Dump Valve - OPEN  
Verify:

Tone-On & H2O Flag - A (1.3-1.6 Psia)  
LM Suit Circuit 3.6 To 4.3 Psia  
& Decaying  
PGA >4.8 Psig & Decaying

Partially Open Fwd Hatch  
Fwd Dump Valve - AUTO

EQUIPMENT PREP EVA 2

**EVA 2 PREP & POST CARD**

**\*\*PLSS COMM CHECK**

Set DET For Cabin Depress - :20  
Counting Down

Empty UCTA's  
Check PGA Zippers  
PGA Diverter Valves - Vertical  
Stow Gas Connector Plugs In TSB

Empty PGA Pockets Into TSB  
Verify Match On Left Arm  
Verify LM 02 Hoses To PGA R/R & B/B

Don Lunar Boots (CDR 1st)  
Unsnap LHSSC (Fwd Section) For Jett  
Position Utility Lights As Required

Stow Helmet Bags On LH Cabin Floor

Verify 70mm Camrs Configured In ETB,  
Settings 5.6/250 (Both), ~~PLSS~~  
Stow Jett Bag In LHSSC

Configure Seq Camr - Utility  
Bracket, Rt Angle Bracket &  
Remote Control Cable (LHSSC)  
Settings - 8/250, ∞, 6FR

Stow Seq Camr On AOT Guard

CDR Move To Aft Cabin  
Remove PLSS Condensate Container,  
Stow In Jett Bag

Remove ECS LiOH Cart & Bracket,  
Stow In Jett Bag

Unstow 2 PLSS Feedwater Collection  
Bags & Spring Scale Aft of Boot  
Comp & Place On Top Of Data File  
Unstow CDR OPS

Perform OPS Check (Both)  
Stow Both OPS On Floor  
FWD Hatch Handle - UNLOCK  
CDR Move To CDR Station

Position Helmet Bags On Eng Cover  
Apply Antifog (CDR Helmet Bag)

Stow Visors, Helmets, & EV Gloves On  
RH Eng Cover  
Position Helmet Bags In SRC Area

-:59

PLSS DONNING

LMP 1st - Unstow OPS Antenna Lead  
& Secure Flap  
Attach OPS To Unstowed PLSS  
Connect OPS Antenna Lead To PLSS  
Verify Sublimator Exhausts Clear

Unstow PLSS Straps & Hoses  
Verify ALL PLSS Valves - Up

Verify The Following Locked:  
OPS To PLSS  
OPS Antenna To PLSS  
PLSS Battery Connection

Unstow RCU's From LHSSC & Place  
On Mid-Step

Don PLSS/OPS (Lift PLSS Hoses Above  
LH Lower Strap)  
Connect PLSS 02 Hoses To PGA  
Verify DIVERTER, 02, FEEDWATER-OFF

Verify Helmets Accesible

Unstow CDR PLSS & Repeat PLSS DONNING

Verify RCU Controls:  
PUMP, FAN, MODE SEL - OFF  
Vol Cont (2) - FULL INCR  
(NOTE: Blade-B & AR, Wheel-A)  
PTT - MAIN  
Connect RCU To PLSS, Then PGA

-:39

Verify Powerdown CB Configuration  
COMM: MODULATE - FM  
PWR AMPL - PRIM  
CB(16) COMM: TV - Close  
Verify Voice Comm With Hou

Audio (CDR)  
S-BAND - T/R  
ICS - T/R  
RELAY - OFF  
MODE - VOX (VOX SENS MAX)  
VHF A - T/R  
VHF B - RCV

Audio (LMP)  
S-BAND - T/R  
ICS - T/R  
RELAY - ON  
MODE - VOX (VOX SENS MAX)  
VHF A - T/R  
VHF B - RCV

COMM:  
VHF - VOICE, ON, OFF, ON, OFF, HI  
RANGE - OFF/RESET  
SQUELCH A&B - Noise Thres + 1-1/2  
RECORDER - ON  
VHF Antenna - EVA  
UPLINK SQUELCH - ENABLE

LMP Connect To PLSS Comm (Audio CB)

PLSS Mode (LMP) - A (Tone-On, Vent  
Flag - P, Press Flag - 0)  
PLSS 02 Press Gage >75%  
Perform Comm Check With CDR

**Note: Unstow PLSS Antenna If It  
Transmits Garbled And/Or Loses TM**

CDR Connect To PLSS Comm (Audio CB)

Audio (CDR)  
VHF A - OFF

APOLLO 12  
31 OCTOBER 1969

**EVT (DOCKED)**

CDR Egress Feet First and Transfer To CSM LMP Tend Lifeline

CDR Ingress CSM Feet First, Face Away From MDC, and Move To LEB  
Retrieve C O2 Hoses and Comm Umbilical

CMP Connect C Comm Umbilical To CDR

CDR Configure Audio Panel As Desired

CDR Secure Position In LEB & Tend Lifeline For LMP

LMP Egress Feet First and Transfer to CSM

LMP Ingress CSM Feet First, Face Away From MDC, and Assume Position for Closing Side Hatch

**EVT (UNDOCKED, STABLE)**

CSM Maneuver Apex to LM Forward Hatch

CDR, Then LMP, Egress Feet First, Move Along Handrails to CSM  
LMP Tend Lifeline

CDR Ingress CSM, Feet First, Face Away From MDC, And Move To LEB  
Retrieve C O2 Hoses And Comm Umbilical

CMP Connect C Comm Umbilical To CDR

CDR Configure Audio Panel As Desired  
Secure Position In LEB And Tend Lifeline For LMP

LMP Ingress CSM Feet First, Face Away From MDC, and Assume Position for Closing Side Hatch

**EVT (UNDOCK, UNSTABLE)**

CSM Maneuver to LM

CDR Egress Feet First, Move to EVA Handrail Clear of Hatch  
LMP Tend Lifeline

LMP Egress, Move Up EVA Handrail

CDR and LMP Push Away from LM at Same Time (Give Signal, Pull In, Push Off)

CSM Maneuver Apex to CDR and LMP

CDR and LMP Use CSM Handholds to Move To Side Hatch

CDR Ingress CSM, Feet First, Face Away From MDC, And Move To LEB  
Retrieve C O2 Hoses And Comm Umbilical

CMP Connect C Comm Umbilical To CDR

CDR Configure Audio Panel As Desired  
Secure Position in LEB And Tend Lifeline For LMP

LMP Ingress CSM Feet First, Face Away From MDC, and Assume Position for Closing Side Hatch

**CONTINGENCY EVT (2 OPS)****PREP FOR EGRESS**

Configure CB's As Required  
 Doff IV Gloves, Stow Under Netting Behind LMP  
 Doff Helmets, Verify Feedport Cover Installed, & Stow Helmets On Ceiling  
 Verify Wristwatch Donned  
 FWD Hatch Handle - UNLOCK

**Stow Loose Items**

Stow COAS On Fwd Window Brkt  
 Stow DEDA & DSKY DESK  
 CDR Unstow CSRC From Upper Lunar Boot Comp & Place In PGA Pocket  
 Stow Other Items As Desired For XFER (SEQ,70mm, & CSC CASSETTE MAGS;PPKS; SRC CONTENTS)

Stow PGA Gas Connector Plugs In RHSSC (Fecal Emesis)

Unstow OPS Straps & Purge Valves From RHSSC (Fecal Emesis)

Don Purge Valves (R/R) (LH SIDE)  
 Don OPS Straps (Break Stitch, Remove Keeper, Extend To Max Length, Route Thru PGA LH D-RING With Adjustable Strap On RH Side)

LMP Cut OPS Flaps To Expose Press Gage

LMP Unstow OPS & Checkout

Wait Until PRESS Drops To 2.5 PSI (Approx 3 MIN)

Unstow OPS O2 Gas Connector  
 Secure OPS To LMP's OPS Straps (Route RH Strap Under LM O2 Hoses)  
 Connect O2 Hose To LMP's PGA (B/B)

CDR Unstow OPS & Checkout

Wait Until PRESS Drops To 2.5 PSI (Approx 3 MIN)

Unstow OPS O2 Gas Connector  
 Secure OPS To CDR's OPS Straps (Route RH Strap Under LM O2 Hoses)  
 Connect O2 Hose To CDR's PGA (B/B)

CDR Unstow Waist Tethers & Lifeline  
 Attach Waist Tether Hooks To PGA (Connect To LMP RH Side, Route in Front of LMP & Behind CDR, Connect To CDR LH Side, Verify Hooks Locked)

PGA Diverter Valves - Vertical

Don Helmets  
 Don LEVA's  
 Don EV Gloves

Give CMP Go For CSM Depress  
 Inspect EMU & Lock - Locks  
 Verify LM Restraints Removed  
 Verify Purge VLVS Accesible

**SUIT INTEGRITY CHECK**

SUIT CIRCUIT RELIEF - CLOSE  
 SUIT GAS DIVERTER - PULL-EGRESS  
 CABIN GAS RETURN - EGRESS

PRESS REG A - CLOSE  
 PRESS REG B - DIRECT O2  
 Monitor Suit Press To 8.85 Psia Then  
 PRESS REG B - CLOSE (Cuff Gage Decay <.3 Psig in 1 Min)

SUIT CIRCUIT RELIEF - AUTO  
 PRESS REG A & B - CABIN  
 Confirm CSM Side Hatch Open And  
 CMP Go For LM Depress

PRESS REG A & B - EGRESS  
 CB(16) ECS: LCG Pump - Open  
 Disconnect LM H2O Hoses  
 Inspect EMU

**CABIN DEPRESS**

Verify With CMP Tunnel Depress, If Not, OVHD Dump VLV - OPEN  
 CABIN REPRESS VLV - CLOSE  
 Fwd Dump Valve - OPEN Then AUTO At 3.5 Psia  
 Verify LM Suit Press 3.6-4.3 Psia And Decaying Slowly  
 Fwd Dump Valve - OPEN  
 Monitor Cabin Press To 0 Psia  
 Verify LM Suit Press 3.6-4.3 Psia

**HATCH OPENING**

Open Hatch  
 Verify CSM In Position & Go For EVT  
 LMP Verify XFER Items Ready

**VERIFY/PERFORM:**

CB(11) STAB/CONT: ATCA (PGNS) - OPEN  
 AELD - OPEN  
 ATT DIR CONT- OPEN  
 CB(16) STAB/CONT: ATCA (AGS) - OPEN  
 AELD - OPEN

OPS O2 - On (Mark Time With CMP, T+25 Min On OPS)  
 SUIT ISOL VALVES (Both) - SUIT DISC  
 Purge Valves - OPEN  
 Verify O2 Flow & PGA Press 3.4-4.0 Psig

Disconnect LM O2 Hoses

Disconnect LM Comm Umbilical  
 Stow LM Hoses  
 LEVA - Lower As Required

CDR Transfer To CSM LEB (LMP Manage Lifeline)  
 LMP Transfer To CSM & Close CM Hatch (CDR Manage Lifeline)

CABIN PREP-Perform EVA 1 Or 2 As Req'd  
EQUIPMENT PREP-Perform EVA 1 Or 2 As

Required

PLSS DONNING-Perform EVA 1 or 2 As Req'd

Position Post EVA 1 or 2 Cue Cards  
For Post EVA

FWD HATCH HANDLE-UNLOCK

NON EVA CREWMAN-Connected To LM O2,  
COMM, & H2O

Gas Connector Plugs In PGA

EVA CREWMAN: For EVA 1-  
CSRC In PGA Pocket

PLSS COMM CHECK

Verify PWRDN CB Configuration  
Verify LM EVA Antenna Deployed

COMM: MODULATE-FM

PWR AMPL - PRIM

CB(16) COMM: TV-Close

Verify Voice Comm With Hou

Audio (Non EVA Crewman)

S-BAND - T/R

ICS - T/R

RELAY - OFF

MODE - VOX (VOX SENS MAX)

VHF A - RCV

VHF B - T/R

Audio (EVA Crewman)

S-BAND - T/R

ICS - T/R

RELAY - ON

MODE - VOX (VOX SENS MAX)

VHF A - RCV

VHF B - T/R

COMM:

VHF-OFF, ON, VOICE, ON, NON EVA

CREWMAN POSITION, HI

SQUELCH A&B - Noise Thres + 1-1/2

RECORDER - ON

VHF Antenna - EVA

**ONE MAN EVA PREP & POST**

EVA Crewman Connect to PLSS Comm  
(Audio CB)

RCU PTT - MAIN

PLSS Mode-B (Tone-On, Vent Flag-P, Press  
Flag-0)

PLSS O2 Press Gage >85% (75% for EVA 2)  
Perform Comm Check With CDR

Note: Unstow PLSS antenna if It Transmits  
Garbled and/or loses TM.

Audio (Non EVA Crewman)

VHF A - T/R

VHF B - RCV

Audio (EVA Crewman)

VHF A - T/R

VHF B - RCV

COMM:

VHF A XMTR - VOICE

VHF B XMTR - OFF

PLSS Mode - A (Tone-On)

Perform Comm Check With Each Other &  
Comm & TM Check With Hou

Read PLSS O2 Qty To Hou

Note: IF Comm Is NO GO With Hou  
S-BD MOD - PM  
Verify Comm & Tm

CB(16) COMM: TV - Open

FINAL SYSTEMS PREP

CB(16) ECS: CABIN REPRESS - Close (Ver)  
SUIT FLOW CONT- Open

SUIT GAS DIVERTER - PULL-EGRESS  
CABIN GAS RETURN-EGRESS  
SUIT CIRCUIT RELIEF-AUTO (Verify)

OPS CONNECT

Unstow OPS O2 Hose & Actuator  
Connect Actuator To RCU  
Snap OPS O2 Hose To Side Of PLSS  
SUIT ISOL - SUIT. DISC  
Discon LM O2 Hoses, Secure About PGA

Connect OPS O2 Hose To PGA B/B  
Retrieve Purge Valve (TSB) -  
Verify Closed & Locked  
Install Purge Valve In PGA R/R  
Verify PLSS Centered & At Proper  
Height

Drink

DES H2O VLV - CLOSE

HELMET/GLOVE DONNING

Position Mikes (Both)  
PLSS FAN - ON (Vent Flag - Clear)  
Don Helmets, Then Visors  
Unstow EV Gloves  
Position Helmet Bags In SRC Area

EVA Crewman:

Disconnect LM H2O Hose

Connect PLSS H2O Hose

Stow LM Hoses

Verify EVA Crewman in CDR's Station

Verify The Following:

Helmet & Visor (2) - Locked &  
Adjusted

Torso Tiedown (2) - Adjusted

O2 Connectors (7) - Locked

Purge Valves (1) - Locked

H2O Connectors (2) - Locked

Comm Connectors (2) - Locked

Don EV Gloves & Verify:  
Wrist Locks (4) - Locked  
Glove Straps (4) - Adjusted

PLSS DIVERTER - MIN (Verify)  
PLSS PUMP - ON

FOR EVA 2:

Verify Items Prepared For Jettison -  
ECS LiOH Cartridge - Jett Bag  
PLSS Condensate Container - Jett Bag  
Hammocks - Jett Bag  
LHSSC (Fwd Section) - PLSS Batteries,  
LiOH Carts, Food Waste, Urine Bags  
Position ETB on Eng Cover

PRESSURE INTEGRITY CHECK

ARS/PGA (Non EVA Crewman)

Note: ARS/PGA Circuit Shall Not Be  
Maintained At Elevated Press >5 min

SUIT GAS DIVERTER - PULL-EGRESS (Verify)  
CABIN GAS RETURN-EGRESS (Verify)  
SUIT CIRCUIT RELIEF - CLOSE

PRESS REG A - CLOSE  
PRESS REG B - DIRECT O2  
Monitor Suit Press To 8.85 Psia  
Then PRESS REG B - CLOSE (Cuff Gage  
Decay <.3 Psig In 1 min)

SUIT CIRCUIT RELIEF - AUTO (Suit Press  
Decays To 4.8 Psia)  
PRESS REG A & B - EGRESS

PLSS/OPS/PGA (EVA Crewman)

PLSS O2 - ON (Tone-On, O2 Flag-0)  
Press Flag Clear (3.1-3.4 Psid)  
Cuff Gage 3.7-4.0 Psig  
O2 Flag Clear

PLSS O2 - OFF (Cuff Gage Decay <.3  
Psig In 1 Min)

PLSS O2 - ON (Cuff Gage 3.7-4.0  
Psig, Tone & O2 Flag May Come On)

CABIN DEPRESS

Confirm "Go" For EVA From Hou  
CABIN REPRESS VLV - AUTO (Verify)

Fwd Dump Valve - OPEN Then AUTO At  
3.5 Psia (Verify EVA Crewman Cuff  
Gage Does Not Drop Below 4.8 Psig)

Verify:

Cabin At 3.5 Psia  
LM Suit Circuit 3.6 to 4.3 Psia &  
Decaying  
PLSS/OPS/PGA >4.8 Psig & Decaying

:00

Start Wrist Watch

Fwd Dump Valve - OPEN

Verify:

Tone-On & H2O Flag-A(1.3-1.6 Psia)  
LM Suit Circuit 3.6 To 4.3 Psia  
& Decaying  
PLSS/OPS/PGA >4.8 Psig & Decaying

CABIN REPRESS VLV - CLOSE  
Partially Open Fwd hatch  
FWD Dump Valve - AUTO

:05

FINAL PREP FOR EGRESS

PLSS FEEDWATER - OPEN (H2O Flag -  
Clear In About 4 Min)

Fwd Hatch - Full Open

Rest Until Cooling Sufficient

Verify:

PLSS/OPS/PGA Stable 3.7 To 4.0 Psig  
LM Suit Circuit 3.6 To 4.3 Psia  
CWEA Status:

Warning  
ASC PRESS

Caution  
PREAMPS

CB(16) COMM: TV - Close  
Position Seq Camr On Crash Bar

For EVA 1: Jettison At End of EVA 1  
- Malfunctioned Equipment Which Is  
NO-GO FOR EVT

For EVA 2: Jettison At Start of EVA 2  
- Malfunctioned Equipment Which Is  
NO-GO For EVT  
- Jettison Bag & LHSSC

Release PLSS Antenna

:10

Lower EV Visor

POST ONE-MAN EVA

Perform POST EVA 1 or 2 As Applicable

Don EV Gloves & Verify:  
 Wrist Locks (4) - Locked  
 Glove Straps (4) - Adjusted

PLSS DIVERTER - MIN (Verify)  
 PLSS PUMP - ON

PRESS REG A & B - EGRESS

Verify EVA CB Configuration

-:13

PRESSURE INTEGRITY CHECK

PLSS O2 - ON (Tone-On, O2 Flag-0)  
 Press Flag Clear (3.1-3.4 Psid)  
 Cuff Gage 3.7-4.0 Psig  
 O2 Flag Clear

PLSS O2 - OFF (Cuff Gage Decay < .3  
 Psig In 1 Min)

PLSS O2 - ON (Cuff Gage 3.7-4.0  
 Psig, Tone & O2 Flag May Come On)

-:10

CABIN DEPRESS

Confirm "Go" For EVA From Hou  
 CABIN REPRESS VLV - CLOSE

Fwd Dump Valve - OPEN Then AUTO At  
 3.5 Psia (Verify Cuff Gage Does  
 Not Drop Below 4.8 Psig)

Verify: 4  
 Cabin At 3.5 Psia  
 LM Suit Circuit 3.6 To 4.3 Psia &  
 Decaying  
 PGA > 4.8 Psig & Decaying

:00

Start Wrist Watch

Fwd Dump Valve - OPEN  
 Verify:  
 Tone-On & H2O Flag-A(1.3-1.6 Psia)  
 LM Suit Circuit 3.6 To 4.3 Psia  
 & Decaying  
 PGA >4.8 Psig & Decaying

Partially Open Fwd Hatch  
 Fwd Dump Valve - AUTO

:05

FINAL PREP FOR EGRESS

PLSS FEEDWATER - OPEN (H2O Flag -  
 Clear In About 4 Min)

Fwd Hatch - Full Open

Rest Until Cooling Sufficient

Verify:  
 PGA Stable At 3.7 To 4.0 Psig  
 LM Suit Circuit 3.6 To 4.3 Psia  
 CMEA Status:

Warning  
ASC PRESS

Caution  
PREAMPS  
 ECS

H2O SEP COMP LT - ON

Lighting: ANUN/NUM - DIM

CB(16) COMM: TV - Close  
 Position Seq Camr On Crash Bar

Release PLSS Antennas

Lower EV Visor

:10

Jettison Bag

PLSS FEEDWATER - CLOSE  
 Fwd Hatch - Close & Lock  
 Dump Valves (Both) - AUTO (VERIFY)

Note: PLSS O2 & PRESS Flags May Come  
 On During Repress. If PLSS O2 <10%  
 Manually Control Cabin Repress To  
 Maintain Positive PGA Pressure.

Lighting: ANUN/NUM - BRIGHT

CABIN REPRESS - AUTO  
 PRESS REG A&B - CABIN (MASTER  
 ALARM & Cabin Warning Lt-On)  
 Verify Press Increasing

PLSS O2 - OFF  
 Operate OPS Purge Valve To Depress  
 Suit As Required  
 CABIN REPRESS Valve Closes At 4.4 Psia  
 Verify Cabin Press Stable At 4.6  
 To 5.0 Psia (Cabin Warning Lt-Off)

POST EVA SYSTEMS CONFIGURATION

CABIN GAS RETURN - AUTO  
 SUIT CIRCUIT RELIEF - AUTO (Verify)  
 SUIT GAS DIVERTER - PUSH-CABIN

Verify EVA CB Configuration  
 CB(11) ECS: SUIT FAN 1 - Close  
 CB(16) ECS: SUIT FAN ΔP- Close  
 (ECS Caution & H2O SEP Comp Lts - Out)  
 CB(16) COMM: TV - Open

Doff Gloves, Helmets With Visors &  
 Stow On Eng Cover

DES H2O VLV - OPEN  
 Remove Purge Valve & OPS O2 Hose  
 Stow Purge Valves In TSB



## Connect-LM O2 Hoses

SUIT ISOL (Both) - SUIT FLOW  
PLSS PUMP - OFF  
PLSS FAN - OFF

Disconnect PLSS H2O From PGA  
Connect LM H2O To PGA  
CB(16) ECS: LCG PUMP - Close  
(Note: Adjust LCG Cooling Gradually)

PLSS Mode (Both) - 0  
Connect To LM Comm (Audio, Biomed)

AUDIO (CDR & LMP)  
VHF A - OFF  
VHF B - RCV  
MODE - ICS/PTT  
RELAY - OFF

## COMM:

VHF - OFF,OFF,OFF,ON,LEFT,HI  
RECORDER - OFF  
UPLINK SQUELCH-OFF

## PLSS O2 RECHARGE

Verify DES O2 >35%

Connect O2 Supply To PLSS (LMP's 1st)  
PLSS FILL - OPEN Then CLOSE After 2 Min

PLSS Mode - AR (O2 QTY ≈75%)  
PLSS Mode - 0

Repeat O2 Recharge For CDR PLSS

Stow O2 Supply Hose

## PLSS/OPS DOFFING

Disconnect OPS Actuator From RCU  
Disconnect RCU From PGA  
Verify All RCU Controls - Off  
Disconnect RCU From PLSS & Stow On  
Mid-Step

Disconnect PLSS O2 Hoses  
Doff PLSS/OPS

Stow LMP PLSS On Floor  
Stow CDR PLSS On Mid-Step  
Stow OPS O2 Hose, Actuator, & Antenna  
Disconnect OPS Antenna Connector  
Stow PLSS Hoses

Install Gas Connector Plugs (TSB) In PGA

**Caution: Replace Expended PLSS LiOH  
Carts & Batts Numbered 1 or 2 with  
New Carts & Batts Numbered 3 or 4**

Replace CDR PLSS Batt, Stow In Fwd LHSSC  
Connect Cable to Battery  
Change LiOH Cart, Temp <130°, Read Decal  
Remove OPS & Stow On Eng Cover  
Stow CDR PLSS In Recharge Station

Stow One RCU Inside LHSSC, One Outside  
Stow EV Gloves, Helmets, & Visors In  
Helmet Bags  
Stow Helmet Bags On Floor

Replace LMP PLSS Batt, Stow In Fwd LHSSC  
Connect Cable to Battery  
Change LiOH Cart, Temp <130°, Read Decal  
Remove OPS  
Stow PLSS On Floor

Perform OPS Check (Both)  
Place LMP OPS On Floor

## POST EVA CABIN CONFIGURATION

CDR Move To Aft Cabin  
Stow SRC In Lower Comp  
Stow CDR OPS In Top Comp

Configure Seq Camr (Mag, Settings  
11/250,12FR) & Stow Above RH Window  
Stow Rt Angle Brkt & Remote Cont Cable  
In LHSSC  
Remove Mags From TSB & Stow In RHSSC

Replace 70mm Camr Mags With B&W  
Install Polarizing Filter (Camr Comp)  
Stow Cameras In ETB  
Unstow Jett Bag From Aft LHSSC,  
Upper RH Corner  
Place ETB In Jett Bag, Stow On RH  
Cabin Floor, Fwd

Verify Powerdown CB Configuration  
MODULATE - PM  
CB(16) ECS: LCG PUMP - Open  
Reverse O2 Hoses, R/B & B/R

Unstow Lunar Surface Checklist SUR-63  
Stow EVA 1 Prep & Post Card

MODE - VOX (VOX SENS MAX)  
VHF A - T/R  
VHF B - RCV

**Audio (LMP)**

S-BAND - T/R  
ICS - T/R  
RELAY - ON  
MODE - VOX (VOX SENS MAX)  
VHF A - T/R  
VHF B - RCV

**COMM:**

VHF - VOICE, ON, OFF, ON, OFF, HI  
RANGE - OFF/RESET  
SQUELCH A&B - Noise Thres + 1-1/2  
RECORDER - ON  
VHF Antenna - EVA  
UPLINK SQUELCH - ENABLE

LMP Connect To PLSS Comm (Audio CB)

PLSS Mode (LMP) - A (Tone-On, Vent  
Flag - P, Press Flag - 0)  
PLSS O2 Press Gage > 85%  
Perform Comm Check With CDR

**Note: Unstow PLSS Antenna If It  
Transmits Garbled And/Or Loses TM**

CDR Connect To PLSS Comm (Audio CB)

**Audio (CDR)**

VHF A - OFF  
VHF B - OFF  
No MSFN Reception In PLSS Mode B  
PLSS Mode (CDR) - B (Tone-on, Vent  
Flag - P, Press Flag - 0)  
PLSS O2 Press Gage > 85%  
Perform Comm Check With LMP

PLSS Mode (LMP) - B (Tone-On)  
PLSS Mode (CDR) - A (Tone-On)  
Verify Voice Comm With Each Other

PLSS Mode (Both) - AR (Tone-On)  
Perform Comm & TM Check With Hou &  
Comm Check With Each Other  
Read PLSS O2 Qty to Hou

**Note: If Comm Is NO GO With Hou  
S-BD MOD - PM  
Verify Comm & TM**

CB(16) COMM: TV - Open

-:33

**FINAL SYSTEMS PREP**

CB(16) ECS: CABIN REPRESS - Close (Ver)  
SUIT FAN ΔP - Open  
CB(11) ECS: SUIT FAN 1 - Open  
SUIT GAS DIVERTER - PULL-EGRESS  
CABIN GAS RETURN - EGRESS  
SUIT CIRCUIT RELIEF - AUTO (Verify)  
Verify ECS Caution & H2O SEP COMP  
Lts - On

**OPS CONNECT**

LMP 1st - Unstow OPS O2 Hose  
& Actuator  
Connect Actuator To RCU  
Snap OPS O2 Hose To Side Of PLSS  
SUIT ISOL - SUIT DISC  
Discon LM O2 Hoses, Secure About PGA

Connect OPS O2 Hose To PGA B/B  
Retrieve Purge Valve (TSB) -  
Verify Closed & Locked  
Install Purge Valve In PGA R/R  
Verify PLSS Centered & At  
Proper Height

CDR Repeat OPS CONNECT

Drink  
DES H2O VLV - CLOSE

**HELMET/GLOVE DONNING**

Position Mikes (Both)  
PLSS FAN - ON (Vent Flag - Clear)  
Don Helmets, Then Visors  
Unstow EV Gloves  
Position Helmet Bags In SRC Area

CB(16) ECS: LCG PUMP - Open  
Disconnect LM H2O Hose  
Connect PLSS H2O Hose  
Stow LM Hoses (CDR's With Straps To  
ECS Module Handhold)

**Verify The Following:**

Helmet & Visor (2) - Locked &  
Adjusted  
Torso Tiedown (2) - Adjusted  
O2 Connectors (6) - Locked  
Purge Valves (2) - Locked  
H2O Connectors (2) - Locked  
Comm Connectors (2) - Locked

(TURN CARD OVER)

EQUIPMENT PREP EVA 1

**EVA 1 PREP & POST CARD**

Set DET For Cabin Depress -:20  
Counting Down

Unstow PLSS On Floor,  
Position Against Hatch  
Stow COAS In FWD Window Mount  
Remove TSB From Bottom Pocket ISA,  
Position On Panel 5  
Stow CDR restraint cables

Empty UCTA's  
Check PGA Zippers  
PGA Diverter Valves - Vertical

Stow Gas Connector Plugs In TSB  
Empty PGA Pockets Into TSB  
Verify Watch On Left Arm  
Verify LM O2 Hoses To PGA R/R & B/B

Unstow LEC And Place On Panel 6  
Restow Tether Package

Configure Seq Camr  
Rt. Angle Bracket - LHSSC  
Remote Control Cable - LHSSC  
Utility Bracket - Utility Light  
Mag - RHSSC  
Settings - 2.8/60,∞, 12FR  
Verify Operation, Stow On AOT Guard  
Place 2 Seq Camr Mags In TSB

Disconnect Utility Lights & Position On  
Aft Eng Cover  
Verify Interim Stowage Straps Accessible

Apply Antifog (CDR Helmet Bag)  
Stow Helmet Bags On Floor  
Position Helmets On Aft Eng Cover

CDR Move To Aft Cabin Area  
Deploy LM EVA Antenna

Unstow RCU's (Resnap Flaps) & Place  
In LHSSC

Unstow CDR Lunar Boots, Remove &  
Stow Purge Valve In TSB  
CDR Don Lunar Boots

LMP Move To Aft Cabin Area  
Unstow LMP Lunar Boots, Remove &  
Stow Purge Valve In TSB  
Stow Utility Lights In Bot Boot Comp  
LMP Don Lunar Boots

Remove Dust Caps & Shorting Plug From  
ISA Bottom Pocket, Stow In Camr Comp  
Unstow Jett Bag, Aft LHSSC,  
Upper RH Corner  
Stow ISA In Jett Bag  
Open Top Boot Comp For EVA Stowage

CDR Unstow CSRC From LHSSC & Place  
In PGA Pocket

Unstow LMP OPS  
Remove Pallet, Stow In Jett Bag  
Hand LMP OPS To CDR For Checkout  
Unstow CDR OPS  
Remove Pallet, Stow In Jett Bag

Perform OPS Check (Both)  
Stow LMP OPS On Floor  
LMP Move To LMP Station  
Stow CDR OPS On LH Eng Cover

Stow Helmet Bags On RH Eng Cover  
Disconnect 3 Armrests, CDR LH &  
LMP RH & LH, Place In Jett Bag  
Fwd Hatch Handle - UNLOCK

-:59

PLSS DONNING

LMP 1st - Unstow OPS Antenna Lead  
& Secure Flap  
Attach OPS To Unstowed PLSS  
Connect OPS Antenna Lead To PLSS

Verify Sublimator Exhausts Clear

Unstow PLSS Straps & Hoses  
Remove Dust Cover From PLSS Elect  
Conn & Stow In LHSSC  
Verify ALL PLSS Valves - Up  
Connect Battery Cable

Verify The Following Locked:  
OPS To PLSS  
OPS Antenna To PLSS  
PLSS Battery Connection

Unstow RCU's From LHSSC & Place  
On Mid-Step

Don PLSS/OPS (Lift PLSS Hoses Above  
LH Lower Strap)  
Connect PLSS O2 Hoses To PGA  
Verify DIVERTER, O2, FEEDWATER-OFF

Verify Helmets Accesible

Unstow CDR PLSS & Repeat PLSS DONNING

Verify RCU Controls:  
PUMP, FAN, MODE SEL - OFF  
Vol Cont (2) - FULL INCR  
(NOTE: Blade-B & AR, Wheel-A)  
PTT - MAIN  
Connect RCU To PLSS, Then PGA

-:39

\*\*PLSS COMM CHECK

Verify Powerdown CB Configuration  
COMM: MODULATE - FM  
CB(16) COMM: TV - Close  
Verify Voice Comm With Hou

Audio (CDR)  
S-BAND - T/R  
ICS - T/R  
RELAY - OFF

## STAGING

ASC BATT (2)-ON(PRECONDITION)  
DES BATTs-OFF  
DEADFACE  
✓GUID SW  
ATT CONT (3)-MODE CONT  
BAL CPL-ON  
DB-MIN  
MODE CONT (BOTH)-ATT HOLD  
P47, 404, 5,6,=0  
470R  
HELIUM MON-✓ASC PRESS  
MASTER ARM-ON  
ASC He Sel-BOTH  
He PRESS ASC-FIRE  
✓CB ED LOGIC PWR (2) CLSD  
STOP PB-PUSH  
-X TRANS 2fps  
STAGE FIRE  
+X TRANS 2fps  
CB ED LOGIC PWR (2)-OPEN  
CABIN REPRESS-CLOSE  
O2 DES-CLOSE, ASC 1 OPEN  
H2O SEL ASC  
H2O DES-CLOSE, ASC-H2O OPEN  
CABIN REG A&B-EGRESS  
SUIT GAS DIV-EGRESS  
CABIN GAS RETURN VLV-EGRESS  
ATT/TRANSL-2 JET  
DAP: 11002, V77  
POO  
STOP PB-RESET

APOLLO 12

November 3, 1969

## DPS ABORT/APS INSERTION

GUID SW  
THROTTLE-UP  
ABORT PB-PUSH  
MODE CONT (BOTH)-AUTO  
BURN DPS TO DEPLETION

ABORT STAGE PB-PUSH  
ENG ARM-ASC  
START PB-PUSH  
BAL CPL-OFF (AGS ONLY)  
+ (UNLESS BUS FAILURE)  
ASC FEED(2)-OPEN  
MAIN SOV-CLOSE  
YAW RT 20°  
623+1  
CABIN REPRESS VLV-CLOSE  
O2 DES-CLOSE, ASC 1 OPEN  
H2O SEL ASC  
H2O DES-CLOSE, ASC-OPEN  
PRESS REGS A&B-EGRESS  
SUIT GAS DIVERTER VLV-EGRE  
CABIN GAS RETURN VLV-EGRES  
PROP TEMP PRESS-ASC  
He MON-ASC  
✓XFEED  
✓INVERTER  
THROTTLE/JET-JETS  
CB(11) RR(2) - CLOSED  
V16:185 (500R)  
200fps MAIN SOV-OPEN+  
ASC FEED-CLOSE+  
100fps ENG ARM-OFF (UNLESS BUS LOSS)  
STANDBY TO COPY GET  
0fps ABORT STAGE-RESET  
STOP PB-PUSH  
DET-STOP  
GET  
MODE CONT-ATT HOLD  
404,5,6=0 470R

## DPS ABORT/INSERTION

GUID SW  
THROTTLE-UP  
ABORT PB-PUSH  
MODE CONT(BOTH)-AUTO  
YAW RT 20°  
623+1

✓INVERTER  
V16N85 (500R)

6:30 DES REG-CLOSE  
100fps DES ENG CMD OVRD-OFF  
(UNLESS CDR BUS OUT)

STANDBY TO COPY GET

0fps STOP PB - PUSH

DET - STOP

GET

MODE CONT ATT HOLD

ENG ARM-OFF

ABORT (STAGE) RESET

STOP PB-RESET

404,5,6=0 470R

### ABORT RULES

#### 1. ATT & RATE LIMITS

DPS > 5° SEC

APS > 10° SEC

#### 2. DPS SHUTDOWN

< 30 fps - STAGE & RCS

> 30 fps - ABORT STAGE

#### 3. APS UNDER BURN

PGNS

AGS

<400fps NULL

AUTO,

RESIDUALS A/H 15fps

>400fps A/H,

AUTO,

BURN Hp A/H 15fps

#### 4. PGNS & AGS DIFFER

< 10 fps - TRIM X

> 10 fps - ✓MCC FOR TRIM

& TWEAK (10° OHW)

T. ABORT > 10 USE AGS CHART

## APS ABORT/INSERTION

GUID SW

ABORT STAGE PB-PUSH

MODE CONT(BOTH)-AUTO

MASTER ARM-ON

ENG ARM-ASC

START PB-PUSH

BAL CPL-OFF (AGS ONLY)

+ (UNLESS BUS FAILURE)

ASC FEED(2)-OPEN

MAIN SOV-CLOSE

YAW RT 20°

623+1

CABIN REPRESS VLV-CLOSE

O2 DES-CLOSE, ASC 1 OPEN

PRESS REGS A&B-EGRESS

SUIT GAS DIV VLV-EGRESS

CABIN GAS RETURN VLV-EGRESS

H2O SEL ASC

H2O DES-CLOSE, ASC-OPEN

PROP TEMP PRESS, ASC

He MON-ASC

✓XFEED

✓INVERTERS

THROTTLE/JETS-JETS

V16N85 (500R)

200fps MAIN SOV-OPEN+

ASC FEED-CLOSE+

100fps ENG ARM-OFF(UNLESS BUS LOSS)

STANDBY TO COPY GET

0fps ABORT STAGE-RESET

STOP PB-PUSH

DET-STOP

GET

MODE CONT-ATT HOLD

404,5,6=0 470R

APOLLO 12

November 5, 1969

ABNORMAL VEHICLE DYNAMICS

Use ACA Hardover To Stabilized Vehicle

If RCA TCA On - Turn Affected Quad Off

GUID CONT - AGS, MODE CONT - ATT HOLD, ATT CONT - MODE CONT

If Not Stabilized-TTCA/TRANSL - DISABLE, DEADBAND - MAXIf Not Stabilized - ACA PROP - DISABLEIf Not Stabilized - ACA PROP - ENABLE, cb ATT DR CONT - OPENIf Not Stabilized - cb ATT DIR CONT - CLOSE ACA/4 JET - DISABLEAPOLLO 12  
11/5/69

LIGHT	MEANING	IMMEDIATE ACTION (POSSIBLE OPERATIONAL IMPLICATIONS)
ASC PRESS	Either He Tank < 2775 psia (Before Staging) Either Fuel/Oxid Press < 120 psia	For Powered Ascent Cycle He Regs - Open, Monitor TEMP/PRESS and maintain > 125 psia and $\Delta P < 10$ psi. (M35)
DES REG	Reg Pressure > 260 psia or < 220 psia	Close DES He REG 1, Open DES He REG 2, Monitor Temp/Press And Maintain > 125 psia @ < 65% Thrust Or > 160 psia @ > 65% Thrust (M29)
DES QTY	Fuel Or Oxid Remaining 5.6%	Monitor Fuel And Oxid Quantities (M31)
CES AC	ATCA A.C. Out-Of-Tolerance	GUID CONT-PGNS, GYRO TEST-POS RT. <u>If Lt Stays On It Is CWEA Fail.</u> (POSS AGS Control Lost, RR Usable In LGC Mode Only, FDAI Rate Needles Invalid) (M25)
CES DC	ATCA D.C. Out-Of-Tolerance	GUID CONT-PGNS, GYRO TEST-POS RT. <u>If It Stays On It Is CWEA Fail.</u> <u>If Light Off, Cycle CWEA cb.</u> <u>If Light Remains Off, Cycle ENG ARM To Unlock Throttle Control.</u> (POSS No DPS Throttling Or Gimbaling In PGNS Or AGS. DPS To 100%, AGS Deadband Inoperative.) (M25)
AGS	AGS Power Supplies Out-Of-Tolerance AGS Heater Failed On AGS Self Test Failed	GUID CONT-PGNS, Perform Self Test 412R AEA Failed, Auto AGS Failed, ATTITUDE HOLD-OK (M15)
LGC	LGC Power, Scaler, CR Counter Failure	GUID CONT-AGS, <u>If RESTART Lt-ON LGC Fail</u> (POSS No Auto Engine Shutdown, LGC Fail DSKY Fail) (M 9)
ISS	IMU, ICDU, Or PIPA Failure (During Thrust)	GUID CONT-AGS, <u>If PROG Lt Not On CWEA Fail</u> (POSS No Auto Engine Shutdown) (M 9)

LIGHT	MEANING	IMMEDIATE ACTION (POSSIBLE OPERATIONAL IMPLICATIONS)
<b>RCS TCA</b>	One Or More Thruster Fail Off, Collinear Thrusters Firing Simultaneously.	If Vehicle Stable-Recycle CMEA, If Vehicle Unstable-OPEN QUAD TCA CB's AND CLOSE QUAD ISOL VALVES. MONITOR MANF PRESS. (M40)
<b>RCS A REG</b> <b>RCS B REG</b>	Reg Press>218 psia Or<165psia	MONITOR MANF PRESS, WHEN <100 PSI CLOSE MAIN SOV AND OPEN CRSFD. (M40)
<b>DC BUS</b>	<26.5V On CDR OR LMP BUS	Check Bats and Bus Voltages (Power down Critical System Until V>26.5V)(M43)
<b>DC BUS</b> <b>BATTERY</b> FEEDER FAULT COMPONENT POSS + 7 WARNING & CAUTION LTS.	CDR Bus Failure	<p>Check BATT 3&amp;4 tb. If only one bp Turn Off BATT With gray tb And Turn On bp BATT. If Both BATTs 3&amp;4 bp - Turn Them Off Then Close cb ASC ECA CONT, Open both cb BATT FEED TIE. If FEEDER FAULT LT On - Put ASC BATT 5 On LMP BUS, Then DEADFACE And Check Feeder Fault Lt. If Lt Still On - Reconnect DEADFACE And Open CB's, Use CROSS TIE BAL LOADS &amp; BUS cb's To Power CDR BUS.</p> <p>If FEEDER FAULT Lt Off - CDR BUS Shorted, Reconfigure: GUIDANCE-AGS, SUIT FAN-2, CDR AUDIO-BU, INV-2, Shutdown PRI EVAP And Use Sec EVAP</p> <p>(DPS Goes To 100% And GDA Locked)</p> <p>To Start DPS - DES ENG CMD OVRD - ON To Stop DPS - DES ENG CMD OVRD - OFF Or ENG STOP pb - PUSH, OR ENG ARM OFF. To Start APS - AGS AUTO ON To Stop APS - AGS AUTO OFF, Reset ABORT STAGE pb (M45)</p>
<b>DC BUS</b> <b>BATTERY</b> FEEDER FAULT COMPONENTS POSS + 7 WARNING & CAUTION LTS.	LMP Bus Fault	<p>Check BATT 1&amp;2 tb. If ONLY One bp Turn Off BATT With Gray tb And Turn On bp BATT. If Both BATTs 1&amp;2 bp - Turn Them Off Then Close cb ASC ECA CONT And Open both cb BATT FEED TIE cb's If FEEDER FAULT LT ON - Put ASC BATT 6 On CDR BUS. Then DEADFACE And Check Feeder Fault Lt. If Lt Still On - Reconnect DEADFACE And Open CB's, Use CROSS TIE BAL LOADS &amp; BUS cb's To Power LMP BUS.</p> <p>If FEEDER FAULT LT OFF - LMP BUS Short</p> <p>(DPS Goes To 100%)</p> <p>To Start APS: USE MANUAL START pb To Stop APS: USE ENG STOP PB (M45)</p>

APOLLO 12  
11/5/69

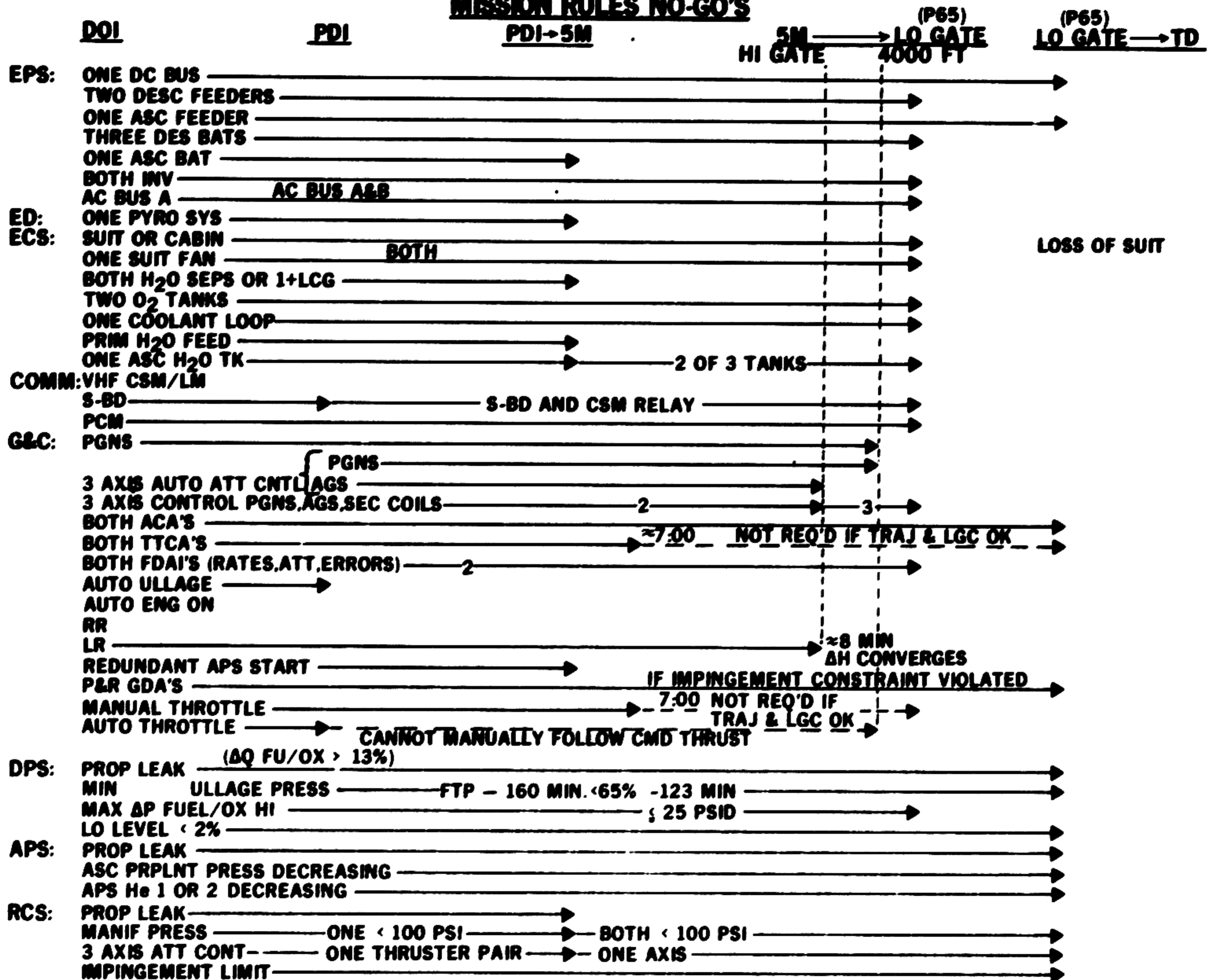
LIGHT	MEANING	IMMEDIATE ACTION (POSSIBLE OPERATIONAL IMPLICATIONS)
<b>CABIN</b>	Cabin Press <4.45 To 3.7psia	Monitor Cabin Press Close DUMP VALVES, PRESS REGS A&B - EGRESS. (Auto Cabin Repress Lost) (M57)
<b>SUIT/FAN</b>	Suit press<3.12 psia In EGRESS Mode Suit Fan #2 Failed	Check SUIT ISOL VALVES, Suit Press, Cabin Press, And PGA Cuff Gage, If No O2 Flow - REMOVE HELMETS IMMEDIATELY. If Press Low-Repress Cabin ASAP (M59)
<b>ASC HI REG</b>	Reg Outlet Press>220 psia	Close Both ASC He REGS. Open Each Reg Separately When Ullage Press<220 psia (M36)
<b>ASC QTY</b>	Burn Time Remaining<10 Sec	Open Both MAIN SOV's And Close Both ASC FEED 2 Valves (M36)
<b>ENG GMBL</b>	Discrepancy Between Gmb1 Cmd And Gmb1 Response	Eng Gmb1-Off - If Light Remains On-CWEA Fail Enable ENG GMBL (M47)
<b>INVERTER</b>	AC Volts <112 Freq <398 >402	Check AC Volts, Switch To Other INV (M47)
<b>BATTERY</b>	BATT Overtemp, Reverse Current, CR Overcurrent	Check BATT VOLTS/AMPS And TB's. IF BAT LOOKS OK ON POWER TEMP MON TURN FAULTY BATT - OFF THEM ON (M46)
<b>RNDZ RDR</b> (Auto Track and/or No Track)	Loss Of RR Data Good	IF NO TRACK Lt-OFF, RR TO SLEW, IF RNDZ RDR Lt-ON, CWEA Fail. Verify AGC>.5V, XMTR PWR >2.1 And CSM Attitude & Xpndr. Cycle PGNS: RNDZ RDR cb Off For 10 Sec, Cycle RR SLEW Then Back To AUTO TRACK. (M12)
<b>PREAMPS</b>	Either (4.7 VDC) Power Supply Out-Of-Tolerance	No Crew Action. (Sporadic Jet Firings May Occur)
<b>ED RELAY</b>	ED Relays K1 Through K6 Close With MASTER ARM-OFF	DO NOT SET MASTER ARM-ON, STAGE RELAY-RESET cb ED LOGIC PWR cb-OPEN (M65)
<b>RCS</b>	Either SYS A Or B He Tank Press<1700 psia	Monitor He PRESS & RCS Quantity. When MANF PRESS <100 psia Close MAIN SOV And Use CROSSFEED. If He >1400 psi Open RCS QUAD (4) CB, Close QUAD ISOL And MAIN SOVS. Then Monitor PRESS(Translation May Be Lost In One Or More Axis With A Single System Out.) (M39)
<b>HEATER</b>	RNDZ RDR Temp>148°F<-54°F S-BAND Temp >156°F<-64°F	Use appropriate cb's To Cool Or Heat Antenna (M69)
<b>ECS &amp; Suit Fan Component</b>	Suit Fan ΔP<6" H2O	Select SUIT FAN 2 (M61)



CODES	DEFINITION	ACTION
1 00214	PROG USING IMU WHEN TURNED OFF	GUID CONT - AGS
2 00402 (4 TIMES)	FIND CDUW ROUTINE NOT CONTROLLING ATTITUDE	GUID CONT - AGS
3 00511	LR NOT IN POS 1 (P63) or POS 2 (P64) BUT IT WAS PREVIOUSLY	(P63) LDG ANT-DES, 10 SEC, THEN AUTO - FOR RECURRING ALARM (P64) LDG ANT - HOVER V2400E 3927E 20000E 5777E
4 00523	LR NOT IN POS 2	KEY V58E - KEY PRO LDG ANT - HOVER
5 01107	PHASE TABLE FAILURE	GUID CONT-AGS (LAND MANUALLY IF DESIRED)
6 RECURRING 01406	BAD RETURN FROM ROOTPSRS	PRIOR TO BURN SUSPECT BAD UPLINK SV OR RLS, HAVE MSFN S-BND NEW UPLINK DURING BURN NO GUIDANCE, SWITCH TO P66, P67
7 RECURRING 01410	UNINTENTIONAL OVERFLOW IN GUIDANCE	PRIOR TO BURN SUSPECT BAD UPLINK SV OR RLS, HAVE MSFN S-BND NEW UPLINK DURING BURN NO GUIDANCE, SWITCH TO P66, P67
8 01412	DESCENT IGN ALGORITHM NOT CONVERGING	PRIOR TO BURN-SUSPECT BAD UPLINK SV OR RLS, HAVE MSFN SEND NEW UPLINK
9 1703	INTEGRATION CANNOT BE COMPLETED IN TIME BURN TIG	IF LARGE IGNITION DELAY-DO NOT BURN PDI IF SMALL IGNITION DELAY-MANUALLY THROTTLE UP AT DET N+26
10 2XXXX	ALL POO DO'S	GUID CONT - AGS
11 RECURRING 3XXXX	ALL SOFTWARE RESTARTS (BAILOUT)	CONTINUE-INSURE NO UNSAFE CONDITION DEVELOPS. IF IT DOES SWITCH TO AGS TO REDUCE LGC DUTY CYCLE AND FLY ATTITUDE NEEDLES PGNS
12 N49	$R_{MAX} V_{MAX} > .3nm, 2.0fps$	1. IF STEADY STATE-RESET 2. REJECT FIRST MARK THEN ACCEPT NEXT COUPLE OF MARKS AND MONITOR FOR NEXT CONVERGENCE >2.0nm OR 12.0fps PRIOR TO CSI OR >.8nm OR 5.0fps AFTER CSI CONSIDERED EXCESSIVE
13 F97N63	LGC THINKS ENG FAILED	PRO TO RESET $\Delta V$ MON. DO NOT ENTER BECAUSE IT WILL SLIP TIG

LIGHT	MEANING	IMMEDIATE ACTION (POSSIBLE OPERATIONAL IMPLICATIONS)
ECS & CO2 Component	PP CO2 >6.75 MM Hg	Select SEC LIOH Cannister (M61)
ECS & H2O Component	H2O Sep Speed <800 RPM	Select H2O SEP 2 (M61)
ECS & GLYCOL PUMP Component	Glycol Pump $\Delta P < 3$ psid	Select GLYCOL PUMP 2 (M61)
O2 QTY	Des O2 <5% ASC O2 (Tank 1 or 2) <80% Before Staging ASC O2 (TANK 1) <10% After Staging	Close Both PRESS REGS, CABIN REPRESS, And PLSS FILL VLVS And Monitor Cabin Press. IF CABIN PRESS GOES DOWN, CLOSE BOTH DUMP VALVES, AND OPEN VALVES PREVIOUSLY CLOSED. (M60)
GLYCOL	Glycol Temp >50°F Or PRIM Or SEC ACCUM <10%	If Temp Increasing-PRIM EVAP FLOW #1 - CLOSE, Then PRIM EVAP FLOW #2-OPEN If Temp Normal-Check For GLYCOL Leak By Turning Off-Pump And Monitor PRESS (M62) To Actuate Secondary Loop-PM Evap Flow #1 & #2-CLOSE, WATER TANK SEL-SEC GLYCOL-INST(SEC), cb GLYCOL PUMP SEC-Close, SEC EVAP FLOW - OPEN
WATER QTY	DES H2O <16% ASC H2O <95% Unstaged ASC H2O $\Delta QTY > 15\%$	If Both ASC H2O Tanks <95%-Then CYCLE EVAP FLOW #2 And SEC EVAP FLOW VALVE OPEN Then CLOSE (M57)
S-BAND	Range Sw - TV/CWEA/Enabled And AGC <1.0	Attempt Comm Using Comm Cue Card Procedures (M53)
AGC SIG STRENGTH LOW		Check CSM Sig Strength, <u>If CSM Sig Strength Is Low</u> - Check CSM In Preferred Track Att. <u>If CSM Sig Strength OK</u> - RR On Side Lobe, Maximize, AGC With Slew Switch

# MISSION RULES NO-GO'S



RR RANGE VS AGC VOLTS APOLLO 12  
21 AUGUST 69

RANGE	VOLTS	RANGE	VOLTS
400 nm	1.62	6.25 nm	2.92
200 nm	1.94	3.12 nm	3.01
100 nm	2.21	1.56 nm	3.06
50 nm	2.43	4747 ft	3.10
25 nm	2.63	2373 ft	3.12
12.5 nm	2.79	1187 ft	3.14

**SPS BURN**  
 FUEL TEMP >27° (55-75°)  
 FUEL PRESS >160(170-195)  
 ΔP-20 Pc>80 psi  
 GN<sub>2</sub> PRESS→400 BOTH BANKS  
 He VLV's-AUTO tb-bp Check He PRESS  
 BUS TIES/HBR/STANDBY TO START WATCH  
 MONITOR BALL VALVES, He VLV's AND PUGS  
**SPS PRESS LT** PRESS LOW-He to's, He VLV-ON  
 PRESS HI-He VLV-OFF, HIGH ΔP-He VLV-ON, IF  
 NO EFFECT, He VLV-OFF, UNTIL Pc-80  
**SURGE TANK LEAK** SURGE TANK-OFF, PLSS VLV-FILL  
**O<sub>2</sub> HIGH** SUIT CIRCUIT RETURN VLV, CABIN RELIEF-CLOSE,  
 CHECK CABIN PRESS THEN SURGE TANK, MAIN REGS A&B,  
 DIRECT O<sub>2</sub>, DEMAND REG, EMERG CABIN REG, WASTE MGT VLV's,  
 H<sub>2</sub>O/GLY TK REG, SUIT H<sub>2</sub>O ACCUM  
**RAD FAIL** LOW - RAD HEATER, RAD FLOW CONT  
 HIGH - PUMP, EVAP STM PRESS, RAD HTR, RAD FLOW CONT  
**EVAP FAIL** IND-SEC, ACTIVATE SEC COOLANT LOOP THEN-CHECK RAD  
 OUT TEMP. IF >48°, GLY EVAP IN TEMP-MAN, IF 48°, CHECK GLY EVAP  
 STM PRESS

**AC BUS LOSS (1)**  
 SUIT COMP  
 GLYCOL PUMP  
 TELCOM  
 FUEL CELL PUMPS  
 FDAI-(2,SOURCE CMC)  
 TVC SERVO PWR  
 SIG COND BIAS  
 BMAG-(RATE 2)  
 SCS TVC-(RT CMD)  
 HAND CONTROLLER-(2)  
 (IF AC 2 LOST, STAY IN G&N)  
**MIN BUS LOST (A)**  
 (IF A/C LOST ALSO, PERFORM ABV)  
 TVC SERVO PWR  
 AUTO RCS-(2-MIN B)  
 FDAI SEL-(2)  
 ΔV THRUST (B)  
 TVC GMBL DRIVE-(2)  
 SPS GMBL MOTORS-(2)  
 ECS RAD FLOW CONT-(PWR 2)  
**BAT BUS LOST (A)**  
 cb BAT BUS/MAIN A-Open,cb BAT C/MAIN A-C1s  
 TVC GMBL DRIVE-(2)  
 SPS GMBL MOTORS-(2)  
**LOST COMM** UP TLM CMD-RESET, CHECK ALL CB's-  
 CLOSED, SELECT SEC XPNDR/RCV & PWR AMP, PMP PWR-  
 AUX, S-BD AUX TAPE-DN VOICE B/U  
**UP VOICE BU** UP TLM-UP VOICE BU (ONLY AVAIL ON REQ)  
**DUMP DATA** PCM/ANLG, PLAY, FWD, S-BD AUX-TAPE  
**O<sub>2</sub> HIGH** SUIT CIRCUIT RETURN VLV, CABIN RELIEF-CLOSE,  
 CHECK CABIN PRESS THEN SURGE TANK, MAIN REGS A&B,  
 DIRECT O<sub>2</sub>, DEMAND REG, EMERG CABIN REG, WASTE MGT  
 VLV's, H<sub>2</sub>O/GLY TK REG, SUIT H<sub>2</sub>O ACCUM

**SATURN V BOOST**

θ	DET	VI	H	H
90	00:00	1340	0	0.0
86	00:30	1390	286	0.6
68	01:00	1858	796	3.2
49	01:30	3023	1460	7.1
34	02:00	5052	2193	17.7
29	*02:15	6455	2607	23.6
26	02:30	7773	2883	30.4
23	*02:42	9059	3144	36.5
23	03:00	9261	2812	45.2
25	03:30	9816	2350	57.9
22	04:00	10471	1951	68.5
20	04:30	11227	1581	77.2
17	05:00	12088	1243	84.1
14	05:30	13058	940	89.5
11	06:00	14147	678	93.5
8	06:30	15367	461	96.3
5	07:00	16739	297	98.1
2	07:30	18291	197	99.3
3	08:00	19827	161	100.2
359	08:30	21114	151	101.0
355	09:00	22398	164	101.7
353	*09:11	22856	179	102.0
350	09:30	23143	112	102.5
346	10:00	23708	32	102.8
344	10:30	24300	-17	102.8
340	11:00	24921	-30	102.7
340	*11:28	25562	0	102.6

**LAUNCH/ENTRY**  
**EPS ABORTS**  
 UNCONTROLLED MAN BUS SHORT  
 LOSS OF 3 FUEL CELLS & 1 BAT  
 LOSS OF BOTH AC BUSES DURING I&II  
**LOSS OF 2 OR 3 FUEL CELLS** - EDS AUTO -  
 OFF - USE BAT C  
**MAIN BUS SHORT (-85a)** EDS AUTO - OFF, USE  
 BAT C, USE INV 3, POWER DOWN SHORTED BUS  
**LOSS OF 1 A/C BUS OR INVERTER** - USE INV 3  
**LOSS OF 1 OR 2 BATS** - EDS AUTO - OFF, USE BAT C, OPEN  
 CB BAT BUS/MAIN BUS  
**BAT BUS SHORT (-22a)** EDS AUTO - OFF, OPEN CB BAT BUS/MAIN  
 BUS, CLOSE CB BAT C/MAIN BUS (IF SEP REQ-AUTO RCS, TVC GMBL  
 DRIVE - 2, SPS GMBL MOT P/Y-2, SPS GMBL CNTL CB(4) - OPEN)  
**LOSS OF BAT RELAY BUS** - NO ACTION

OCT 20, 1969

APOLLO 12 OCT 20, 1969

OCT 20, 1969

**ECS ABORTS**  
 LOSS OF CABIN & SUIT PRESS OR CABIN PRESS & SUIT O<sub>2</sub> NOT SUFFICIENT

VEL

ENTRY

HORIZON CK (E1-17:00)  
 GET : :  
 PITCH \_\_\_\_\_ (+5°)  
 .05g  
 (HORIZON 34°) R P Y  
 RRT : : (400K)  
 RET.05g  
 RET VCIRC  
 RET DROGUE

P61  
 F 06 61 IMP LAT .01°  
 IMP LONG .01°  
 [PRO] HDS UP/DN ±00001  
 F 06 60 GMAX .01G  
 V400K fps  
 [PRO] Y EI .01°  
 F 16 63 RTOGO .1 nm  
 VIO fps  
 [PRO] TFE min-sec

P62  
 F 50 25 00041 REQ SEP  
 [PRO]  
 F 06 61 IMP LAT .01°  
 IMP LONG .01°  
 [PRO] HDS/DN -00001  
 06 22 Poss R .01°  
 P .01°  
 Y .01°

P63  
 06 64 G .01G  
 VI fps  
 RTOGO .1 nm

P64  
 .05 LT, EMS START  
 \*No EMS 3 sec: \*  
 \*EMS-BACKUP/VHF RNG\*  
 06 74 BETA .01°  
 VI fps  
 G .01

P65  
 F 16 69 BETA .01°  
 DL .01G  
 [PRO] VL fps  
 06 74 BETA, VI, G

P66  
 06 22 R,P,Y .01°

P67  
 06 66 BETA .01°  
 CR ERR .1 nm  
 VERB DR ERR .1 nm  
 Record DR ERR  
 KEY RLSE  
 F 16 67 RTOGO .1 nm  
 LAT .01°  
 LONG .01°

OCT 20, 1969

TRANSPOSITION AND DOCKING

PRE-SEPARATION S-IVB MAN, TB 7 + 15

WASTE STOWAGE VENT vlv - CLOSED  
 DIRECT O2 - OPEN UNTIL CAB PRESS = 5.7  
 CB DOCKING PROBE (2) - CLOSE  
 COAS PWR - ON  
 ALIGN GDC  
 DAP: R1 = 11102, R2 = 01111, V46E  
 LOAD N17 & N22 (PAD VALUES)  
 V63E

SEPARATION GET

SM RCS PRPLNT tb (8) - gray  
 AUTO RCS SELECT (16) - MNA/MNB  
 EMS FUNCT - ΔV SET/VHF RNG  
 EMS - SET ΔV TO - 100, FUNCT - ΔV  
 MAN ATT (3) - RATE CMD  
 LIMIT CYCLE - OFF, DB - MIN, RATE - LOW, THC - ON  
 RHC PWR NORMAL (2) - AC/DC, DIRECT (2) - MNA/MNB  
 CMC MODE - FREE, SC CONT - CMC  
 BMAG MODE (3) - RATE 2  
 DOCK PROBE EXTD/REL - RETRACT(tb - gray)  
 CB RCS LOGIC (2) - CLOSE  
 TVC SERVO PWR #1 - AC1/MNA  
 DET - SET 59:30  
 FC REACT vlv - LATCH  
 THC - ARMED, RHC #2 - ARMED  
 CB SECS LOGIC (2) & SECS ARM (2) - CLOSED  
 SECS LOGIC (2) - ON (UP)  
 RCS CMD - ON  
 TAPE RCDR - HBR/RCD/FWD/CMD RESET  
 EMS MODE - NORMAL (VERIFY FUNCT ΔV)  
 SECS PYRO ARM (2) - ON

OCT 20, 1969

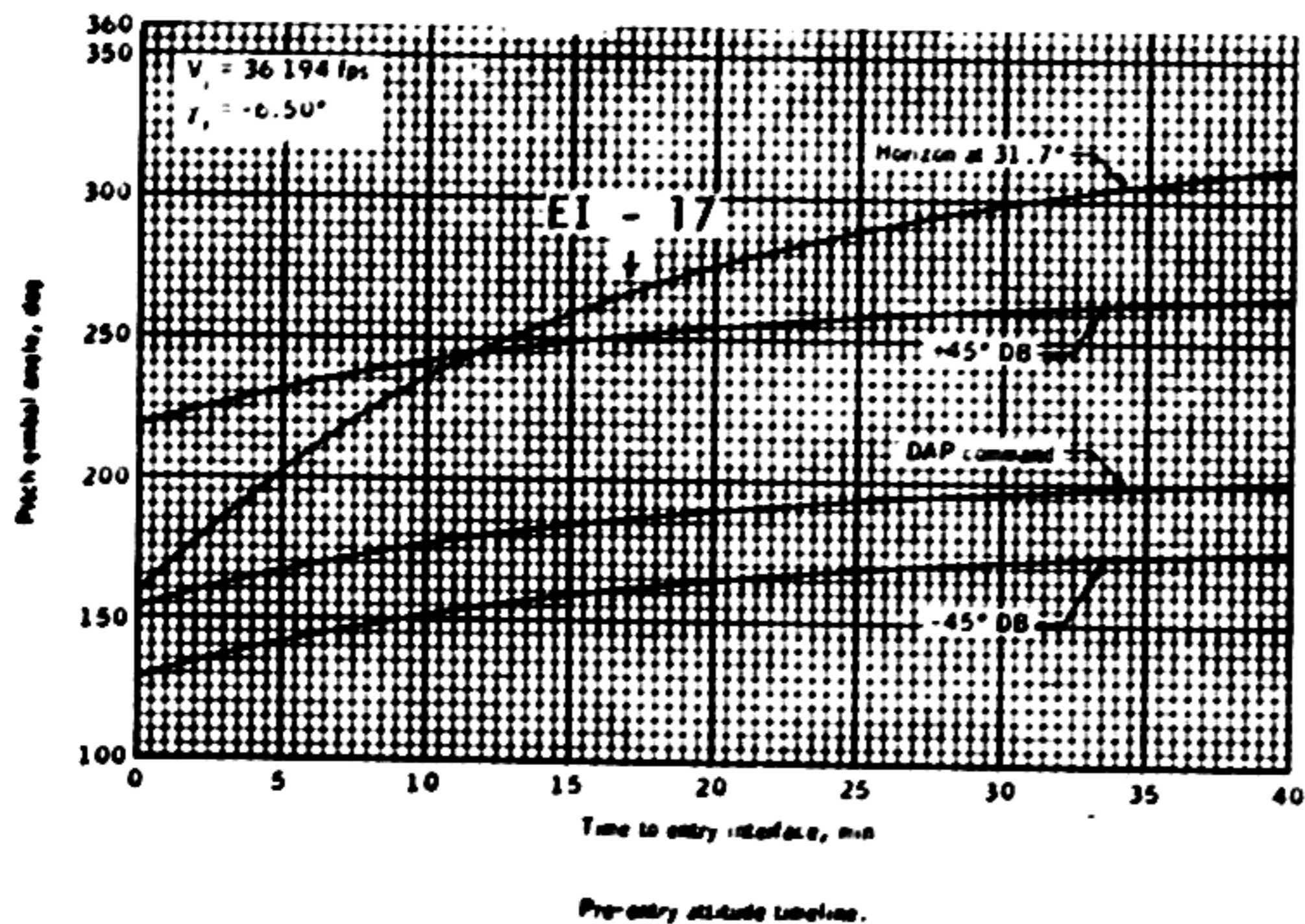
EI (400K) { Pitch Needle Off Peg  
 Vi Dsky=Vi PAD  
 Event Timer Zero

.05g { START EMS (:03)  
 TRANSFER P64 (:05)  
 PITCH NEEDLE 0°  
 PITCH ANGLE 152° } +5°  
 HORIZON 34°  
 RGO DSKY=RGO PAD

BETA 90° UNTIL <6.5g  
 180° TO 4-5g

RETCIRC VS VDSKY VS VEMS  
 EMS 26nm @4000FPS (0@DRO)

ELS Cbs, LOGIC, AUTO  
 PYROS



OCT 29, 1969

START DET  
 59:50 CMC MODE - AUTO  
 59:58 THC - +X AND HOLD  
 00:00 CSM/LV SEP pb - PUSH  
 THC - RELEASE AT  $\Delta V - 100.8 \text{ fps}$   
 SM RCS PRPLNT tb(8) - GRAY  
 SM RCS He tb(8) - GRAY  
 SM RCS SEC PRPLNT FUEL PRESS (4) - CLOSE  
 FC REAC vlv - NORM  
 00:15 THRUST -X TO -100.5 fps  
 BMAG MODE (3) - ATT 1/RATE 2, SC CONT - SCS  
 MAN ATT(P) - ACCEL CMD

PITCH UP AT  $1.5^\circ/\text{SEC}$ , KEY V62E  
 MAN ATT(P) - RATE CMD, SC CONT - CMC  
 BMAG MODE (3) - RATE 2, V49E, OMNI ANT-D  
 HI GAIN ANT TRACK - MAN, PWR - POWER  
 S BD ANT OMNI - HI GAIN  
 HI GAIN ANT TRACK - REACQ  
 BMAG MODE (3) - ATT 1/RATE 2

AT CAPTURE

PROBE tb - bp, CMC MODE - FREE  
 PROBE RETRACT PRIM - 1, PROBE tb - GRAY  
 SECS PYRO ARM(2) - SAFE, SECS LOGIC(2) - OFF  
 EDS PWR - OFF, CB EDS (3) - OPEN  
 PROBE EXTD/REL - OFF, PROBE RETRACT (2) - OFF  
 CB DOCK PROBE (2) - OPEN  
 TAPE RCDR - OFF, PCM BIT RATE - LOW

POST DOCKING

RATE - HIGH, ATT DB - MAX, COAS PWR - OFF  
 CB RCS LOGIC (2) - OPEN  
 TVC SERVO PWR #1 - OFF  
 THC, RHC - LOCKED, EMS MODE - STBY/OFF  
 BMAG MODE (3) - RATE 2

OCT 20, 1969

**SPS BURNS**

CYCLE CRYO FANS  
 EMS ΔV CK, SET ΔV, EMS FUNCT-ΔV/STBY  
 BMAGS MODE(3)-RATE 2  
 ΔVCG-LM/CSM or CSM  
 LOAD DAP, ROT CONTR PWR NORM(2)-AC/DC  
 DET SET, POO, SC CONT-CMC/AUTO  
 MNVR TO PAD BURN ATT: V62E, V49E  
 BORESIGHT & SXT STAR CHECK  
 P-40 TO F50 18, ALIGN S/C ROLL  
 GDC ALIGN  
 CB STAB CONT SYS (Pnl 8) - CLOSE  
 CB SPS (12) - CLOSE

MAN ATT (3)-RATE CMD, LIMIT CYCLE-ON  
 ATT DB-MIN, RATE-LOW, THC-ON  
 SCS TVC(2)-RATE CMD  
 TVC GMBL DR P&Y-AUTO

**54:00**  
**(-06:00)**

**MN BUS TIE (2) - ON**  
**TVC SERVO PWR #1-AC1/MNA, #2-AC2/MNB**  
 RHC PWR NORMAL(2)-AC, DIRECT(2)-OFF  
**BMAG MODE(3) - ATT 1/RATE 2**  
 SC CONT-SCS, RHC #2 - ARMED  
 PRIMARY TVC CHECK

**55:00**  
**(-05:00)**

**GMBL MOT P1-Y1 - START/ON**  
 VERIFY TRIM CONTROL AND SET, CHECK MTVC  
 \*SCS ONLY: SCS TVC(2)-AUTO\*  
 SC CONT-CMC(SCS), THC-CW(NO MTVC)  
 SEC TVC CHECK

(TRIM)

**GMBL MOT P2-Y2 - START/ON**  
 SET GPI TRIM, VERIFY MTVC  
 THC NEUTRAL (NO MTVC)  
 VERIFY GPI RETURNS TO 0,0 (CMC) or TRIM(SCS)  
 RHC PWR NORMAL(2)-AC/DC, DIRECT(2)-MNA/MNB

(BYPASS)

F 50 25  
 (ACCEPT)

PRO  
**BMAG MODE(3)-ATT 1/RATE 2**  
 ENTR  
 GMBL TEST OPTION  
 PRO  
**F 06 40 FDAI SCALE - 5/5, LIMIT CYCLE-OFF**  
**RATE-HIGH, UPDATE DET**

OCT 29, 1969

**TRANSLUNAR/TRANSEARTH**

	COLOR TV	CEX 80	CEX 250	CEX 500	BW 80	BW 250
EARTH	22	11	11	11	11	11
MOON	22	5.6	5.6	8	5.6	5.6
VEH/VEH	22	8	8	8	3	8
INTERIOR	5.6	S			S	

GET WHEN FULL FRAME	18mm	80mm	250mm	500mm
EARTH(TRANSLUNAR)	4:21	3:38	6:31	12:24
EARTH(TRANSEARTH)	242:51	243:32	240:40	234:00
MOON (TRANSLUNAR)	82:13	82:35	80:25	76:19
MOON (TRANSEARTH)	173:50	173:13	175:08	179:07

OCT 20, 1969

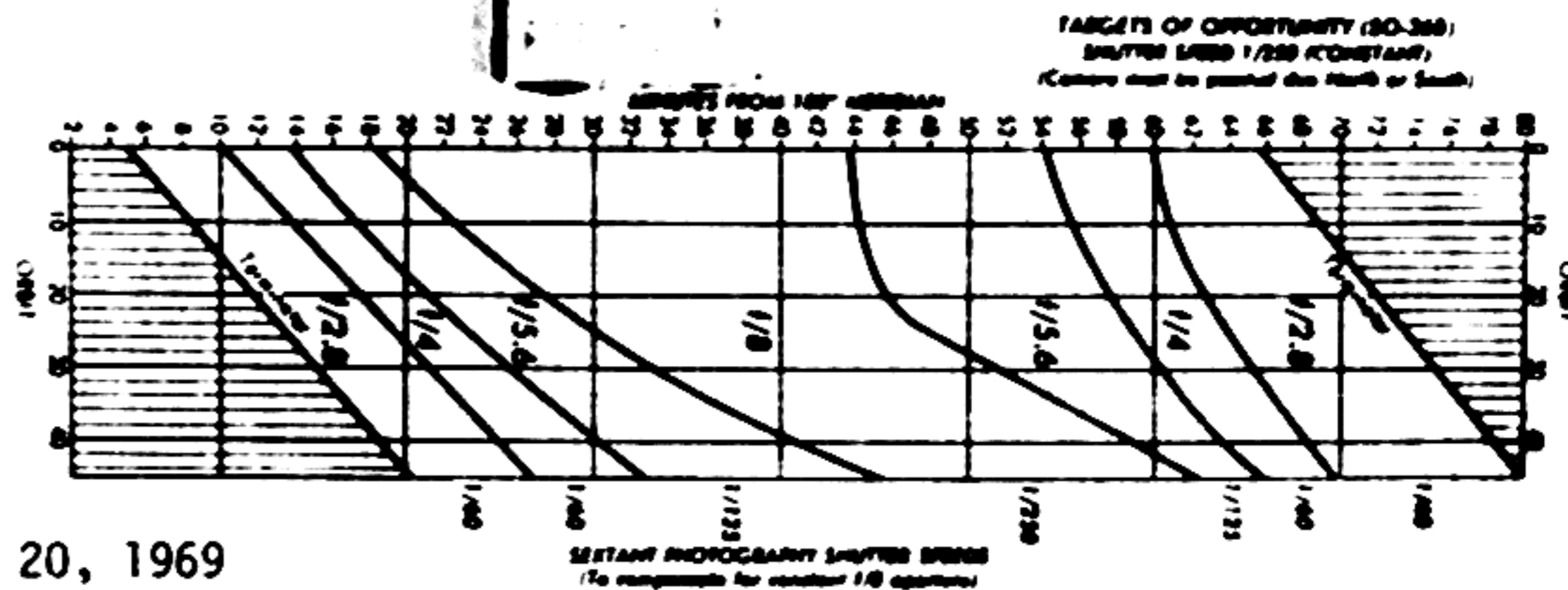
**58:00** **ΔV THRUST A(B) - NORMAL**  
**(-02:00)** **THC-ARMED, RHC(2)-ARMED**  
**SPS He vlv (2)-AUTO**  
**TAPE RCDR-HBR/RCD/FWD/CMD RESET**  
**59:30** **EMS MODE - NORMAL**  
**(-00:30)**  
**59:XX** **ULLAGE AS REQ**  
**(-00:XX)**  
**(-00:05)**  
**F 99 40** **\*ENG ON ENABLE REQUEST**  
**00:00** **IGNITION (\*IF SCS: THRUST PB - PUSH\*)**

**00:03** **ΔV THRUST B(A)-NORMAL**  
**\*IF SCS: DIR ULLAGE PB & THRUST PB-PUSH\***

**00:XX** **ECO**  
**F 16 40** **ΔV THRUST A & B - OFF**  
**GMBL MTRS(4) - OFF**  
**TVC SERVO PWR 1 & 2 - OFF**  
**MN BUS TIE (2) - OFF**

**F 16 85** **NULL RESIDUALS (TEI & MCC)**  
**RECORD ΔV COUNTER & RESIDUALS**  
**EMS FUNC - OFF, MODE - STBY**  
**LIMIT CYCLE - ON, ATT DB - MAX**  
**THC PWR - OFF, RHC PWR DIR(2) - OFF**  
**BMAG MODE(3) - RATE 2**  
**PCM BIT RATE - LOW**

	COLOR	CEX	B&W
LUNAR ORBIT	TV	16	80
GENERAL	22	CC	4
TERM	22	2.8	4/125
ZERO PHASE	22	11	5.6
SITE OBLQ	22	8	4
VEH/VEH	22	8	5.6
EARTH	22	11	5.6
INTERIOR	5.6	5	5.6



OCT 20, 1969

OCT 20, 1969

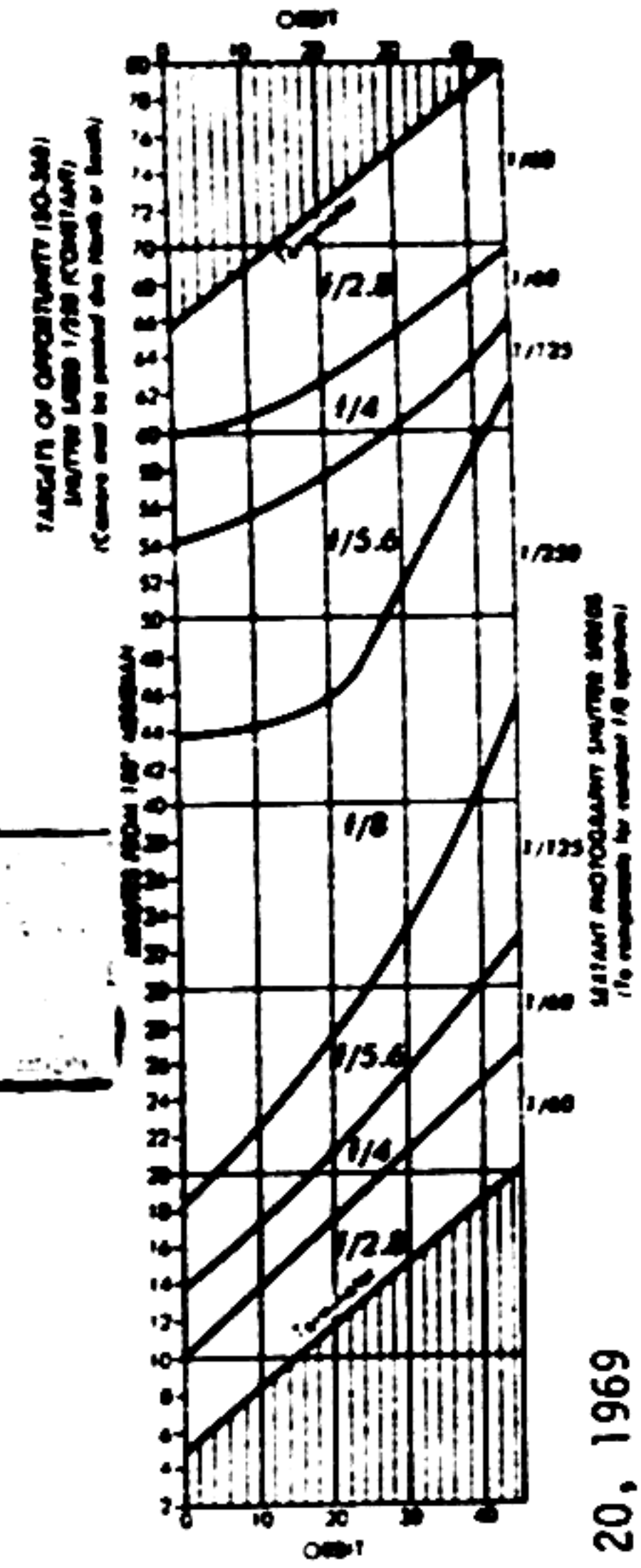


TIG	
ΔV	7000
EMS CUTOFF	
BT	
PITCH (BURN)	
GET 400K	
PITCH (.05G)	
GET DROGUE	1:42

LUNAR ORBIT  
GENERAL TERM  
ZERO PHASE  
SITE OBLQ  
VEH/VEH  
EARTH INTERIOR

B&W 80  
CEX 16  
CC 2.8  
11  
8  
8  
11  
5

COLOR TV  
22  
22  
22  
22  
22  
22  
5.6




OCT 20, 1969



LANDING PAD					
		•	•		SEP
		•	•		RRT
	X	X		•	RETBBO
	X	X		•	RETEBO
	X	X		•	RETDRO 1:42
	X	X		•	MAINS 2:31
	X	X		•	LANDING



OCT 20, 1969

**LANDING**  
 90K(06:36) START WATCH-STEAM PRESS  
 50K CABIN PRESS - B/E  
 SECS PYRO - ARM  
 40K **CM UNSTABLE**  
 RCS CMD - OFF  
 APEX JETT - P  
 (WAIT 2 SEC)  
**DROG DEPLOY**  
 30K ELS LOGIC - ON  
 ELS - AUTO  
 24K APEX JETT - P  
 (WAIT 2 SEC)  
**DROG DEPLOY**  
**DROGUE FAIL**  
 ELS - MAN  
 STABILIZE CM  
 5K - MAINS  
 ELS - AUTO  
 17K IF NO CAB INC.  
 CAB PRESS - DUMP  
 10K MAIN DEPLOY  
 VHF ANT - RECY  
 VHF AM A - SIMPLEX  
 VHF BCN - ON  
 VOICE REPORT  
 DIRECT O<sub>2</sub> - ON (IF SUITED)  
 CAB PRESS - CLOSE  
 CM RCS LOGIC - ON  
 CM PRPLNT - DUMP  
 CB F&PL BAT ABC (3)-CLOSE  
 CB MN A&B (2)-OPEN  
 CB BAT RELAY  
 CM PRPLNT -  BUS(2)-OPEN  
 STRUT LOCKS - PURGE  
 CM RCS PRPLNT- UNLOCK  
 FLOOD LT-POST LDG OFF  
 CAB PRESS - DUMP  
 3K CAB PRESS-CLOSE  
 DIR O<sub>2</sub> - OPEN  
 1K MN BUS TIE - OFF

RRT					
.05g					
Vcirc					
BBO					
EBO					
PRESS					
DPO					
MAINS					
LDG					

**POST LANDING**  
 CB MAIN REL PYRO (2) - CLOSE  
 MAIN REL - ON  
 SECS PYRO ARM(2) - SAFE  
 SECS LOGIC(2) - OFF  
 REMOVE HELMET  
 DIR O<sub>2</sub> - OFF  
 CB PL VENT - CLOSE  
 CB FLOAT BAG (3) - CLOSE  
 CB UPRIGHT SYS (2) - CLOSE  
**STABLE II**  
 FLOAT BAG (3)-FILL UPRIGHT  
 + 2 MIN  
 VHF A&B & BCN-OFF INVERTED  
**STABLE I**  
 AFTER 10 MIN

FLOAT BAG(3)-FILL 7 MIN  
 THEN OFF

**TLI**  
 XLUNAR-INJECT, EDS PWR-ON  
 EMS TEST-STBY-SET ΔV<sub>C</sub>-ΔV  
 GDC ALIGN, PYRO ARM (2)-ON  
 THC PWR - ON  
 RHC PWR NORM (2)-AC/DC  
 DIR (2)-MNA/MNB  
 LV IND/GPI - SII/SIVB  
 LV GUID - IU  
 CB DIRECT ULLAGE(2)-CLOSED  
 SET DET TO 51:00  
 TB6 - SII SEP Lt - ON  
 51:00 When Lt Out **START DET**  
 SC CONT - SCS

TK PRESS  $\left\{ \begin{array}{l} 0 > F 36 \\ F > 0 26 \\ LOX > 50 \end{array} \right\}$  EMG SEP

ORDEAL - 300/LUNAR  
 57:00 V37E 47E  
 CK BIAS  
 FDAI P=15°  
 58:00 N62E  
 SCS TVC SERVO PWR #1 -  
 AC1/MNA, #2 - OFF  
 TAPE RCDR-HBR/RCD/FWD/  
 CMD RESET  
 58:20 EMS MODE - NORMAL  
 58:36 SII SEP Lt - ON  
 58:38 SIVB ULLAGE  
 59:00 FDAI P=7°  
 59:42 SII SEP Lt - OUT  
 (No TLI Inhibit)  
 59:55 SIVB ULLAGE STOPS  
 FDAI P=3°  
 59:59 LV ENG 1 Lt - ON  
 00:00 SIVB IGNITION  
 00:02 LV ENG 1 Lt - OUT  
 SIVB ECO (Lt ON)  
 \*MANUAL ECO [V<sub>i</sub> AND  
 BT+6S (IU CONT)]  
 \*IF NO ECO, LV STAGE  
 SW - SII/SIVB  
 \*THC-CCW&NEUTRAL(<3S)  
 KEY VERB  
 F16 83 SCS TVC SERVO PWR#1-OFF  
 PCM BIT RATE - LOW  
 EMS MODE - STBY/OFF  
 SEC PYRO ARM(2)-SAFE  
 FDAI #1 - INRTL  
 WASTE STOMAGE VENT v1v  
 - CLOSED  
 HI GAIN ANT PWR - OFF  
 CB HI GAIN ANT FLT BUS  
 - CLOSE  
 CB HI GAIN ANT GRP 2  
 - CLOSE

OCT 20, 1969

OCT 20, 1969

**MODE IA (:00 - :42)**

:00 ABORT: CCW NEUT  
\*CM/SM SEP\*  
:14 ELS LOGIC  
TWR JETT  
APEX JETT  
:16 DROGUES  
:18 He DUMP  
<3.8K OR 28 S & <10K - MAINS

**MODE IB (:42 - 1:56)**

:00 ABORT: CCW NEUT  
\*CM/SM SEP\*  
:11 CANARDS  
:14 ELS LOGIC  
24K TWR JETT  
APEX JETT  
DROGUES

**MODE IC(1:56-TWR JETT)**

:00 ABORT: CCW NEUT *CM/SM SEP*	
:11 CANARDS	
V82E.Ha> 32.PLAT	Ha<32.PLAT NO
GO	GO
TWR JETT	*P+5°/SEC*
MAN ATT(P)-RT	*HIGH+P*
CMD	*ROLL 90° DAMP
0/135/0	RATES*
BMAG(3) - 1/2	*ROLL HEADS
EMS-ENTRY/	DW*
NORM	30K ELS LOGIC
.05G LT -	24K TWR JETT
.05G SW - ON	APEX/DROGUE
MAX LIFT	

**MODES II - III - IV**

:00 ABORT - CCW(4S) NEUT FWD  
:03 CSM/LV SEP\*  
:05 +X TO :24  
V82

**II** N44      **III** N50E      **IV** N62E

0/120/0	180/194/0	180/356/0
CM/SM	EMS -	EMS -
SEP	NORM	NORM

CSM/LM		MTVC
FNL SEP		

CM RCS    0/105/0(FL) Hp> 75 + 6S

EMS-ENT/  
NORM

305/105/0(HL)

**EMS - ΔV TO 7,000 FPS**

**BOOST**

**PREP**

**-3:00 DSKY - VERIFY P02  
V75 DO NOT ENTER**

**00:00 LIFT OFF, MODE IA  
CLOCK RUNNING  
P11 AUTO START**

**00:02 YAW MNVR**

**00:11 R&P PROG**

**00:30 ROLL COMPL**

**00:42 MODE IB  
PRPLNT DUMP - RCS CMD**

**00:50 MONIT α TO T+2:00  
100%, 5° ATT ERR  
CABIN PRESS DECR**

**01:21 MAX Q**

**01:56 MODE IC**

**02:00 EDS AUTO - OFF  
2 ENG OUT - OFF  
LV RATES - OFF  
α/Pc- Pc**

**02:16 IECO**

**02:42 OECO/STAGING/IGN**

**03:18 TWR JET, MODE II  
MAN ATT (P)-RT CMD  
STEAM/H<sub>2</sub>O - AUTO**

**03:23 GUID INIT (OECO + 41)**

**05:30 SIVB TO COI  
UPSTG LIMIT 08:37**

**06:00 GMBL MTRS - ON  
CK GPI  
P-1.49  
Y+1.32**

**07:42 IECO**

**09:00 MODE IV**

**09:11 OECO/STAGING**

**09:17 SIVB IGN**

**10:08 MODE III**

**11:29 SECO**

**11:39 INSERTION**

**±4°/sPY  
±20°/sR**

**±9°/sPY  
±20°/sR**

## CM PREP FOR CONT EVA

### A CM PREP FOR CONTINGENCY EVA

- 1 C&R SUIT FLOW-OFF, INTERCONN
- 2 EVA Stabilizer Strut Installed
- 3 R hoses secured around RH Couch headrest
- 4 Center couch removed, stowed
- 5 Marmon clmps closed & locked
- 6 Disconnect And TIE OFF LH X-X Strut
- 7 PGA Bag securd/aft bulkhd
- 8 L and R couch -270°
- 9 TSBs instld R&L grth rng & LEB

- 10 Tool Kit(A-1) Snapped to RH Grth Rng
- 11 Jack Screws Full Opened
- 12 Hatch counterbal vented
- 13 Pull Pip Pin, Stw In A-1
- 14 CABIN FAN (both) - OFF
- 15 REPRESS PGK vlv-FILL

### B CMP STATUS

- 1 Comm Carrier Donned
- 2 L O2 PGA LOCK-LOCK
- 3 SUIT FLOW-CAB FLOW
- 4 SUIT CKT RET vlv-open (pull)
- 5 EMER CAB PRESS sel-BOTH
- 6 Verify PGA zipper lock-lock

### C SYSTEM PREP FOR DEPRESS

- 1 Verify REPRESS O2 865-935 psi
- 2 EMERG O2 vlv-CLOSED
- 3 Verify REPRESS O2 vlv-CLOSED
- 4 Ver SURGE TNK vlv-ON
- 5 O2 PRESS IND sw - SURGE TK
- 6 Ver SURGE TNK PRESS 865-935 psi
- 7 Sel att cont mode & mnvr S/C to EVT attitude
- 8 AUTO RCS SEL-UNDOCKED Xfer:  
A/C ROLL-A1, A2-OFF  
PITCH-A3-OFF  
YAW-B3-OFF  
DOCKED: ALL-OFF

### D PLSS/COMM CK (if reqd)

- 1 VHF A - DUPLEX
- 2 VHF B - OFF (verify)
- 3 VHF RANGING-OFF (verify)
- 4 Verify Comm with:  
2 PLSS-CDR (EVCS#1) then LMP (EVCS#2) - or  
1 PLSS-EVCS#1 or #2

### E FINL SYS PREP FOR DEPRESS

- 1 EXT LTS-RUN/EVA-on (up)
- 2 EXT LTS-RNDZ/SPOT-off(ctr)
- 3 Verify Feed Cover-Lock
- 4 Apply anti-fog
- 5 Don Helmet, Shield, & Gloves
- 6 SUIT CKT RET vlv-close
- 7 EMERG CAB PRESS Sel-off
- 8 Ver all conn made/locked

### F PRESS INTEGRITY CK-Decal

### G CABIN DEPRESS-Decal

### H HATCH OPENING-Decal

### I OPS ON TIME

### J CM INGRESS

- 1 CDR:ft 1st, face dwn, to LEB
- 2 Retrieve O2 hoses
- 3 Secure Position
- 4 Manage Lifeline
- 5 LMP:ft 1st,face dwn,in position for hatch closing
- 6 B:Conn elec umbs, verf comm
- 7 PLSS FEED WATER VLV - CLOSE

### K VAC XFER TO CM ECS

25 min. from OPS O2 ON:

- 1 C&R SUIT FLOW vlv-OFF
- 2 (PLSS/OPS: DISCONNECT PURGE vlv, then OPS hose)
- 3 Conn O2 hoses to PGA
- 4 PURGE vlv-CLOSE
- 5 SUIT FLOW vlv-Adjust for comfort
- 6 OPS O2 shutoff vlv-CLOSE
- 7 (PLSS:PLSS O2 vlv-CLOSE  
PLSS fan-OFF)

### L HATCH CLOSING - Decal

### M CABIN REPRESS - Decal

### GO TO OPERATIONS CHECKLIST

OCT 30, 1969

SIVB TLI - NOMINAL					
NOV. 14, 1969 AZ 72°					
SECOND OPPORTUNITY					
●	ψ	DET	V <sub>I</sub>	H	H
60	1.0	0:00	25553	10	108
54	5.5	0:30	26189	3	108
52	3.2	1:00	26912	38	108
52	1.0	1:30	27673	143	108
51	- 1.5	2:00	28475	326	109
50	- 3.5	2:30	29319	598	112
49	- 5.7	3:00	30208	967	115
48	- 7.9	3:30	31143	1441	121
47	- 9.9	4:00	32135	2025	130
45	-12.0	4:30	33190	2732	142
43	-13.8	5:00	34320	3556	157
41	-14.6	5:29	35502	4447	177

SIVB TLI - MANUAL					
NOV. 14, 1969 AZ 72°					
SECOND OPPORTUNITY					
●	ψ	DET	V <sub>I</sub>	H	H
55	-5.0	0:00	25553	10	108
54	-5.0	0:30	26189	3	108
52	-5.0	1:00	26912	38	108
51	-5.0	1:30	27673	143	108
51	-5.0	2:00	28475	326	109
50	-5.0	2:30	29319	598	112
48	-5.0	3:00	30208	967	115
47	-5.0	3:30	31143	1441	121
46	-5.0	4:00	32135	2025	130
45	-5.0	4:30	33190	2732	142
44	-5.0	5:00	34320	3556	157
43	-5.0	5:29	35502	4447	177

RATE	ATT	LOI LIMITS	C/O
VGO (Tb)	MODE		ABORT LIMITS
2890 (0)	I		<b>TIGHT</b>
2755 (+20)			TNK < 160 + Pc + ΔP > 20 + Pc + Pc < 80 OR DECAY > 10
2600 (+40)	IA		
2240 (1+30)	IIA LOOSE		1 BALL VALVE CLOSED + GN2 OTHER TANK DECAY TO 1500psi (SHUTDOWN DECAYING BANK FIRST)
1830 (2+24)	II		<b>LOOSE</b>
1620 (2+50)	III		TNK - 115 Pc < 70 PHYSICAL
<del>1600 (3+30)</del>	<del>III</del>		
1290 <del>(2+30)</del> (3+30)	III		<b>TIGHT</b>

NOV 4, 1969

SIVB TLI - NOMINAL					
NOV. 14, 1969 AZ 72°					
FIRST OPPORTUNITY					
●	ψ	DET	V <sub>I</sub>	H	H
59	1.0	0:00	25559	9	106
56	- 2.0	0:30	26116	24	106
55	0.0	1:00	26727	85	106
54	2.5	1:30	27364	206	107
53	3.0	2:00	28092	399	108
53	6.8	2:30	28903	681	111
52	8.7	3:00	29754	1057	115
51	10.6	3:30	30649	1534	122
50	12.5	4:00	31594	2122	131
48	14.3	4:30	32595	2819	143
46	15.9	5:00	33664	3633	159
41	17.6	5:30	34819	4536	179
41	17.5	5:44	35426	5026	190

SIVB TLI - MANUAL					
NOV. 14, 1969 AZ 72°					
FIRST OPPORTUNITY					
●	ψ	DET	V <sub>I</sub>	H	H
57	8.0	0:00	25559	9	106
56	8.0	0:30	26116	24	106
55	8.0	1:00	26727	85	106
54	8.0	1:30	27364	206	107
53	8.0	2:00	28092	399	108
52	8.0	2:30	28903	681	111
51	8.0	3:00	29754	1057	115
50	8.0	3:30	30649	1534	122
49	8.0	4:00	31594	2122	131
48	8.0	4:30	32595	2819	143
47	8.0	5:00	33664	3633	159
45	8.0	5:30	34819	4536	179
45	8.0	5:44	35426	5026	190

### MNA

TVC GMBL DR (P&Y)-2  
 CB SPS P2, Y2 - OPEN  
 FDAI - 2  
 ΔV THRUST B - NORM  
 BMAG MODE(3) - RATE 2  
 RHC PWR DIR 2 - MNB  
 AUTO RCS - MNB

FDAI - 1  
 GMBL MTRS P1, Y1  
 ΔV THRUST A  
 GDC (EXCEPT RSI)  
 BMAG - 1  
 AUTO SCS ΔV

### MNB

TVC GMBL DR (P&Y)-1  
 CB SPS P1, Y1 - OPEN  
 ΔV THRUST A - NORM  
 AUTO RCS - MNA  
 BMAG MODE(3) - RATE 1  
 RHC PWR DIR 1 - MNA

FDAI - 2  
 GMBL MTRS P2, Y2  
 ΔV THRUST B  
 GDC  
 BMAG - 2

### AC-1

TVC SERVO PWR 1-AC2/MNB  
 BMAG MODE(3) - RATE 2  
 FDAI - 2

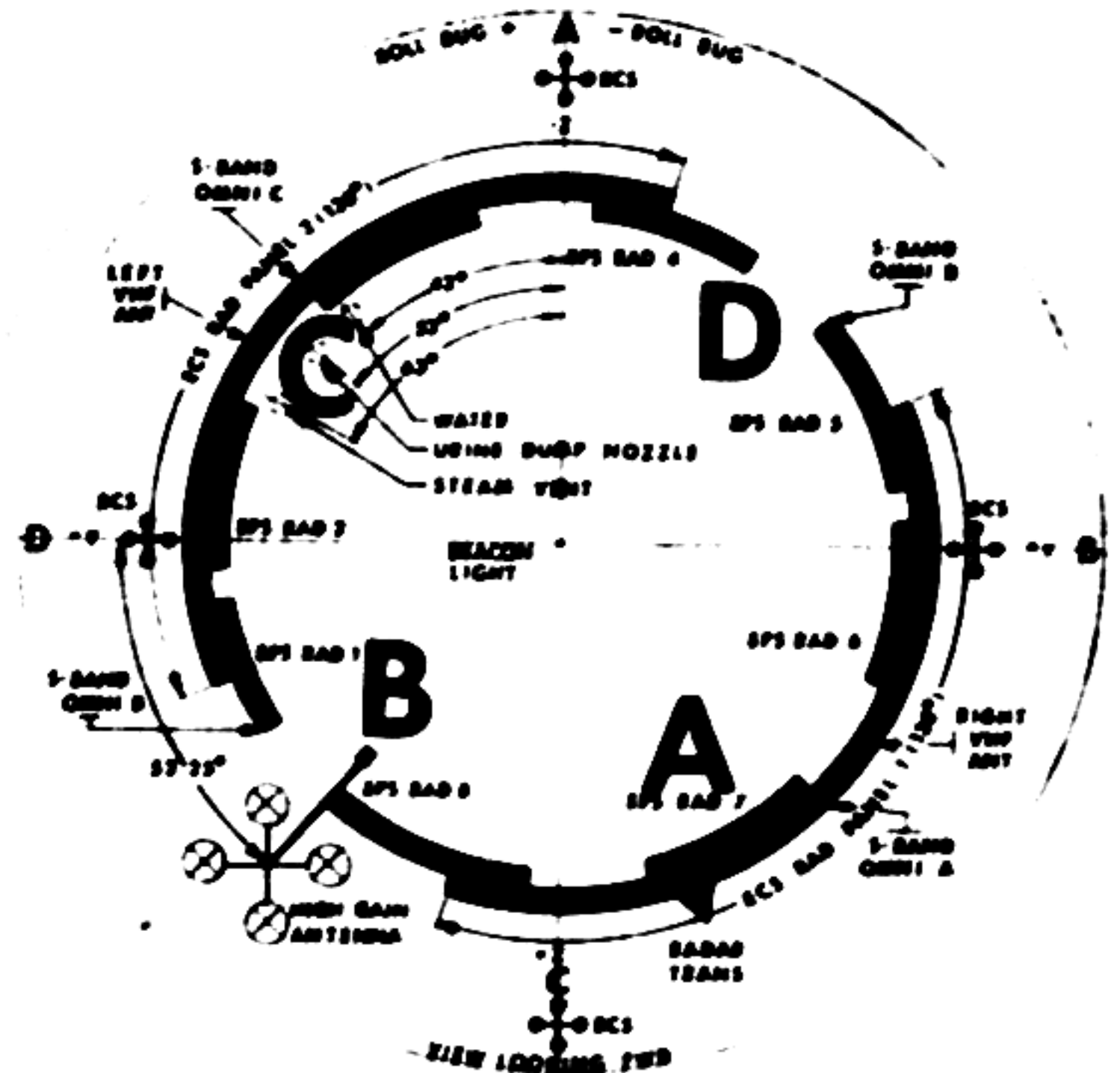
FDAI - 1  
 GDC (EXCEPT RSI)  
 BMAG - 1  
 MIN IMP  
 RATE CMD  
 RHC 1 - MTVC  
 GPI - 1  
 EMS ΔV (LIGHTING)  
 AUTO SCS ΔV

### AC-2

TVC SERVO PWR 2-AC1/MNA  
 BMAG MODE(3) - RATE 1  
 SCS TVC(2) - AUTO  
 ΔVCG-LM/CSM  
 MTVC WITH TRIM TW'S

FDAI - 2  
 GDC  
 BMAG - 2  
 RATE CMD  
 MTVC  
 GPI - 2

VEHICLE CONFIG	QUAD A/C FOR Z	QUAD B/D FOR Z	EMS DEADBAND	RATE SELECT
0 - No DAP	0 - Fail A/C	0 - Fail B/D	0 - 20°	0 - 0.00°/sec
1 - CSM	1 - Use A/C	1 - Use B/D	1 - 25°	1 - 0.2°/sec
2 - CSM & LM				2 - 0.5°/sec
3 - CSM & SEP				3 - 2.0°/sec
4 - CSM & LM (Ascent Eng only)				
Roll Quad Select	Quad A	Quad B	Quad C	Quad D
0 - Use B/D	0 - Fail	0 - Fail	0 - Fail	0 - Fail
1 - Use A/C	1 - Use	1 - Use	1 - Use	1 - Use



00:00 IA  
 00:42 IB  
 00:50 CAB PRESS  
 01:56 IC  
 02:42 OECO/STAGING  
 03:13 II  
 03:18 TWR JETT  
 STEAM/H2O AUTO  
 06:00 GMBL MTRS - ON  
 06:15 OMNI ANT - D  
 09:00 MODE IV  
 09:14 OECO/STAGING  
 10:08 III  
 11:29 SECO  
 11:39 INSERT

IA  
 BELOW 3800'  
 MAIN DEPLOY  
 IB  
 24K TWR JETT  
 ✓LAND PROC.

IC  
 IMU GO  
 TWR JETT  
 PITCH-RATE CMD  
 0,135,0  
 BMAG-1/2  
 EMS-ENTRY, NOR-  
 MAL  
 .05G-MAX LIFT  
 IMU NO GO  
 PITCH +5°/SEC  
 30K ELS LOGIC-ON  
 24K TWR JETT  
 ✓LAND. PROC.

II  
 0,120,0  
 BMAG-1/2  
 CB MN A&B BAT  
 C (2)-CLOSED  
 CM/SM SEP -ON  
 CSM/LM FNL SEP  
 EMS-ENTRY, NOR-  
 MAL  
 SINGLE RING  
 .05G - EMS ROLL  
 MAX LIFT  
 30K ELS LOGIC-ON,  
 ✓LAND PROC.

III  
 180,194,0  
 BMAG - 1/2  
 RATE - LOW  
 EMS - NORMAL  
 ΔV THRUST A-NORM  
 2:05 DIRECT ULLAGE PB  
 THRUST ON PB  
 ΔV THRUST (2)-OFF  
 RATE - HIGH  
 CB MN A&B BAT C(2)  
 CM/SM SEP  
 CSM/LM FNL SEP  
 0,105,0  
 EMS-ENTRY NORMAL  
 SINGLE RING  
 .05G-EMS ROLL  
 .2G 305,105,0  
 HALF LIFT  
 30K ELS LOGIC - ON  
 ✓LAND. PROC.

IV  
 180,356,0  
 EMS-NORMAL  
 ΔV THRUST A-NORM  
 1:30 DIR. ULL PB  
 THRUST ON  
 ΔV THRUST (2)-OFF  
 EMS - STBY