



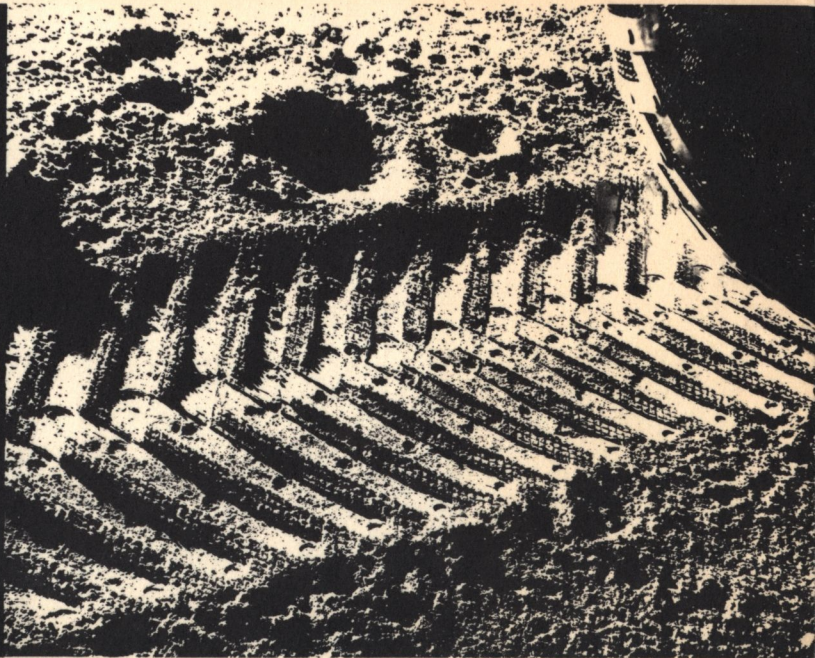
LUNAR ROVING VEHICLE

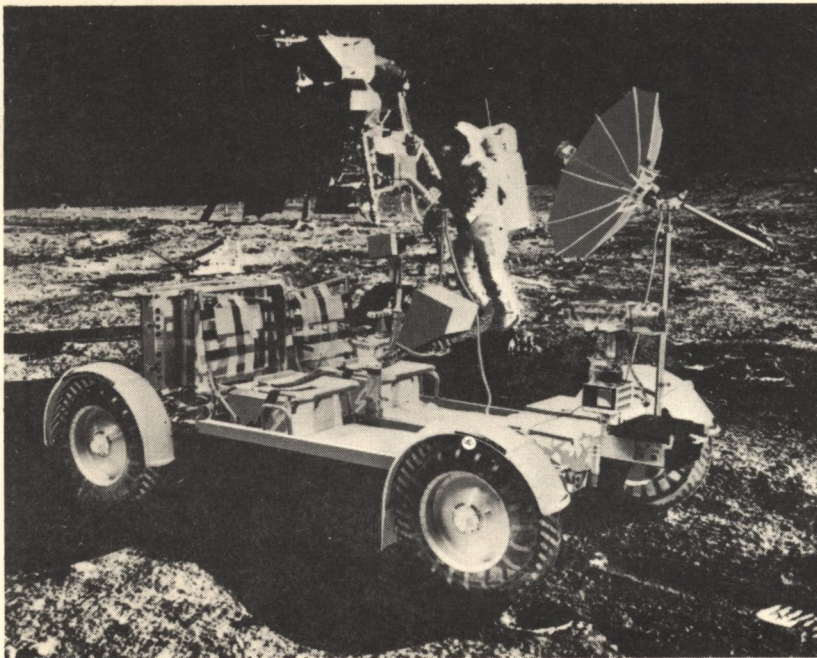
APOLLO 17

AS512 CM114 LM12



Delco Electronics
GENERAL MOTORS CORPORATION
GOLETA, CALIFORNIA 93017





GM PUTS THE "ROVE" IN LUNAR ROVING VEHICLE

The General Motors Delco Electronics Division facility of Santa Barbara, Calif., supplied nearly everything that moves on the Lunar Roving Vehicle.

As mobility systems subcontractor to the U.S. National Aeronautics and Space Administration's prime contractor — The Boeing Company — for the LRV, Delco Electronics supplied the special wire mesh wheels, four-wheel traction drive systems, suspension, steering and brakes, hand controller, and drive control electronics. The GM facility also built the complete "1-G" astronaut training vehicle.

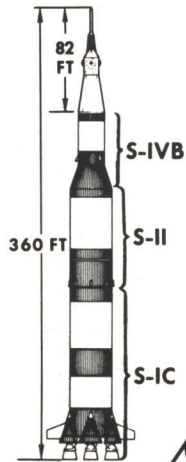
And it is the Lunar Roving Vehicle's mobility which will enable the astronauts to cover more area than was covered on all H series Apollo moon landing missions. They will be able to travel over the lunar surface faster and easier, carry heavy and bulky experiments to precise locations, and return with over twice the amount of rock and soil samples as on earlier missions.

LUNAR ROVING VEHICLE MOBILITY SPECIFICATIONS

Wheelbase	7' 5"
Overall Width	6' 9"
Overall Length	10' 2"
Weight (Unloaded)	460 lbs - 1G (76 lbs - 1/6G)
Weight (Loaded)	1,540 lbs - 1G (255 lbs - 1/6G)
Wheel Motors	1/4 hp DC brush-type
Drive	Harmonic Drive, 80:1 reduction
Suspension	Double torsion bar
Spring rate	15 lbs per inch
Jounce	6"
Rebound	4"
Steering	Double Ackermann
Controls	"T" handle hand controller for steering, speed control and braking
Wire Mesh Wheels	One ply .033 dia wire Titanium inner bump stop Titanium tread strips
Diameter	32"

Width	9"
Deflection (Loaded)	1.75"
Loading	63 lbs (lunar)
Ground Pressure	0.6 psi (lunar)
Weight	12 lbs
Shock Absorbers	Specially designed hydraulic
Battery Power	2 silver-zinc 33-41 Vdc (non-rechargeable)
Brakes	Shoe-drum
Turning Radius	10' 2"
(front & rear turning)	
Ground Clearance	14"
Step Obstacle Climb	12"
Roll Stability	45 degrees
Climb/Descend Slope	25 degrees
Crevasse Crossing	28"
(both wheels in crevasse)	
Top Speed	8.7 mph
Maximum Range	57 Statute Miles (92 km)

APOLLO SPACECRAFT LAUNCH ESCAPE SYSTEM



TOTAL WT.
7,000,000 LB

BOOST PROTECTIVE COVER

COMMAND MODULE

SERVICE MODULE

ADAPTER

LUNAR MODULE

INSTRUMENT UNIT

S-IV B

LUNAR
EXPLORA-
TIONS

LUNAR
LANDING

LUNAR
ORBIT

EARTH ORBITS
WITH LM
MULTI-VEHICLE
INTEGRATION

EARTH ORBITS
PARAMETER &
STATISTICAL

SUBORBIT

1ST INTEGRATED
SC SYSTEMS EXPOSURE

BOOSTER-SC
COMPATIBILITY

ABORT &
RECOVERY

CREW SAFETY

SPACECRAFT DEVELOPMENT FLIGHT CATEGORIES



Delco Electronics
GENERAL MOTORS CORPORATION
GOLETA, CALIFORNIA 93017

- APOLLO 17 AS512 S/C 114
- LM 12 LUNAR LANDING ()
- APOLLO 16 AS511 S/C 113
- LM 11 LUNAR LANDING (11 DAYS)
- APOLLO 15 AS510 S/C 112
- LM 10 LUNAR LANDING (12 DAYS)
- APOLLO 14 AS509 S/C 110
- LM8 LUNAR LANDING (9 DAYS)
- APOLLO 13 AS508 S/C 109
- LM7 LUNAR LANDING (6 DAYS ABORTED)
- APOLLO 12 AS507 S/C 108
- LM6 LUNAR LANDING (10 DAYS)
- APOLLO 11 AS506 S/C 107
- LM5 LUNAR LANDING (8 DAYS)
- APOLLO 10 AS505 S/C 106
- LM4 LUNAR ORBIT W/LM (8 DAYS)
- APOLLO 9 AS504 S/C 104
- LM3 EARTH ORBIT W/LM (10 DAYS)
- APOLLO 8 AS503 S/C 103
- LUNAR ORBIT (6 DAYS)
- APOLLO 7 AS205 S/C 101
- EARTH ORBIT (10 DAYS)
- APOLLO 6 AS502 S/C 020
- EARTH ORBIT (3 REV)
- APOLLO 5 AS204 LM1
- EARTH ORBIT (4 REV)
- APOLLO 4 AS501 S/C 17
- EARTH ORBIT (3 REV)
- AS202 S/C 11 SUBORBITAL
- SC 009 SUBORBITAL
- SC 002 TUMBLING ABORT
- BP 23A PAD ABORT
- BP 23 HI Q ABORT
- BP 22 HI ALTITUDE ABORT
- BP 15 BOOSTER
- BP 13 BOOSTER
- BP 12 TRANSONIC ABORT
- BP 6 PAD ABORT

U.S. SPACE FLIGHT LOG

MISSION	ASTRONAUTS	LAUNCH DATE	ELAPSED TIME HR:MIN:SEC	TOTAL U.S. MANNED HOURS IN SPACE
Mercury-Redstone 3	Shepard	May 5, '61	00:15:22	00:15:22
Mercury-Redstone 4	Grissom	July 21, '61	00:15:37	00:30:59
Mercury-Atlas 6	Glenn	Feb. 20, '62	04:55:23	05:26:22
Mercury-Atlas 7	Carpenter	May 24, '62	04:56:05	10:22:27
Mercury-Atlas 8	Schirra	Oct. 3, '62	09:13:11	19:35:38
Mercury-Atlas 9	Cooper	May 15, '63	34:19:49	53:55:27
Gemini-Titan III	Grissom-Young	Mar. 23, '65	04:53:00	63:41:27
Gemini-Titan IV	McDivitt-White	June 3, '65	97:56:11	259:33:49
Gemini-Titan V	Cooper-Conrad	Aug. 21, '65	190:55:14	641:24:17
Gemini-Titan VII	Borman-Lovell	Dec. 4, '65	330:35:31	1302:35:19
Gemini-Titan VI-A	Schirra-Stafford	Dec. 15, '65	25:51:24	1354:18:07
Gemini-Titan VIII	Armstrong-Scott	Mar. 16, '66	10:41:26	1375:40:59
Gemini-Titan IX-A	Stafford-Cernan	June 3, '66	72:21:00	1520:22:59
Gemini-Titan X	Young-Collins	July 18, '66	70:46:39	1661:56:17
Gemini-Titan XI	Conrad-Gordon	Sept. 12, '66	71:17:08	1804:30:33
Gemini-Titan XII	Lovell-Aldrin	Nov. 11, '66	94:34:31	1993:39:35
Apollo 7 Saturn 1B	Schirra-Eisele-Cunningham	Oct. 11, '68	260:06:18	2773:58:29
Apollo 8 Saturn V	Borman-Lovell-Anders	Dec. 21, '68	147:00:11	3214:59:02
Apollo 9 Saturn V	McDivitt-Scott-Schweickart	Mar. 3, '69	241:00:53	3938:01:41
Apollo 10 Saturn V	Stafford-Young-Cernan	May 18, '69	192:03:23	4514:11:50
Apollo 11 Saturn V	Armstrong-Aldrin-Collins	July 16, '69	195:18:35	5100:07:35
Apollo 12 Saturn V	Conrad-Gordon-Bean	Nov. 14, '69	244:36:24	5833:56:47
Apollo 13 Saturn V	Lovell-Swigert-Haise	April 11, '70	142:54:44	6262:40:59
Apollo 14 Saturn V	Shepard-Roosa-Mitchell	Jan. 31, '71	216:02:50	6910:49:29
Apollo 15 Saturn V	Scott-Worden-Irwin	July 26, '71	295:11:53	7796:25:8
Apollo 16 Saturn V	Young-Mattingly-Duke	Apr 16, '72	265:51:05	8593:58:23
Apollo 17 Saturn V	Cernan-Evans-Schmitt	Dec 6, '72		

APOLLO 17 MISSION DESCRIPTION

- Manned: Prime Crew
Eugene Cernan (CDR)
Ronald Evans (CMP)
Harrison Schmitt (LMP)
Backup Crew
John Young (CDR)
Stuart Roosa (CMP)
Charles Duke (LMP)
- Tenth Manned Saturn V Mission
- Seventh Lunar Landing Mission - Third Lunar Rover Mission
- Planned Duration of Apollo 17 - 304 Hours
- Booster - Saturn V Booster # AS 512
- Spacecraft - CSM # 114 and LM # 12
- Block II G & N System 218 LM G & N System 613

The Apollo 17 Mission is an Apollo Lunar Rover Mission and is targeted for the Taurus - Littrow. This mission will be approximately 12 days 16 hours long. The Lunar surface stay will be 75 hours. The launch time is 8:53 P.M. C.S.T. on December 6, 1972. Translunar injection (TLI) occurs during the third revolution over the Atlantic Ocean.

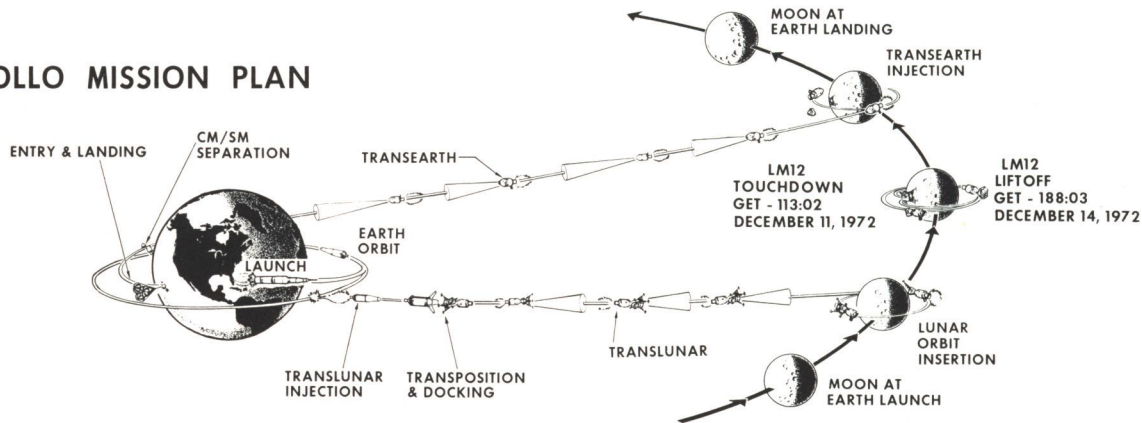
Objectives of the Mission include:

- Placement of the Apollo Lunar Experiment Package (ALSEP)
- Perform Selenological Inspection, Survey, and Sampling in the Taurus Littrow region.
- Three 7-hour exploratory excursions aboard the Lunar Rover Vehicle.
- Service Module Scientific Instrument Module Activation (SIM)



Delco Electronics
GENERAL MOTORS CORPORATION
GOLETA, CALIFORNIA 93012

APOLLO MISSION PLAN

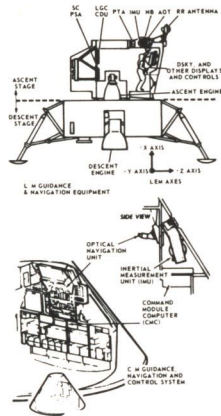


LM GUIDANCE and NAVIGATION EQUIPMENT.....

CM GUIDANCE, NAVIGATION and CONTROL SYSTEM

THE APOLLO GUIDANCE AND NAVIGATION SYSTEM IS COMPOSED OF THREE BASIC SUBSYSTEMS: INERTIAL, OPTICAL AND COMPUTER.

1. The inertial guidance subsystem is composed of inertial measurement unit (IMU) and associated equipment. This subsystem performs three major functions: (A) Measures changes in spacecraft attitude; (B) Measures spacecraft velocity due to thrust; and (C) Assists in generating steering signals.
2. The optical navigation subsystem is composed of a space sextant and a scanning telescope. Sightings on celestial bodies and landmarks on the moon and earth are used by the computer subsystem to determine the spacecraft's position and velocity and to align the inertial reference within the IMU.
3. The command module computer (CMC) provides five major functions: (A) Calculates steering signals and engine disretes necessary to keep the spacecraft on the required trajectory; (B) Positions the stable member in the IMU to a coordinate system defined by precise optical measurements; (C) Positions the optical unit to celestial objects; (D) Conducts limited malfunction isolation of the G&N system by monitoring the level and rate of system signals; and (E) Supplies pertinent spacecraft condition information to the display and control panel.



INERTIAL MEASUREMENT UNIT (IMU) and associated equipment performs three major functions; (A) Measures changes in LM attitude, (B) Assists in generating steering commands, and (C) Measures LM velocity changes due to thrust.

ALIGNMENT OPTICAL TELESCOPE (AOT) - Provides star sighting data which is manually inserted into the LM Guidance Computer for establishing the inertial reference.

NAVIGATION BASE (NAV BASE) - Provides an accurate mounting base for the Alignment Optical Telescope (AOT) and the Inertial Measurement Unit.

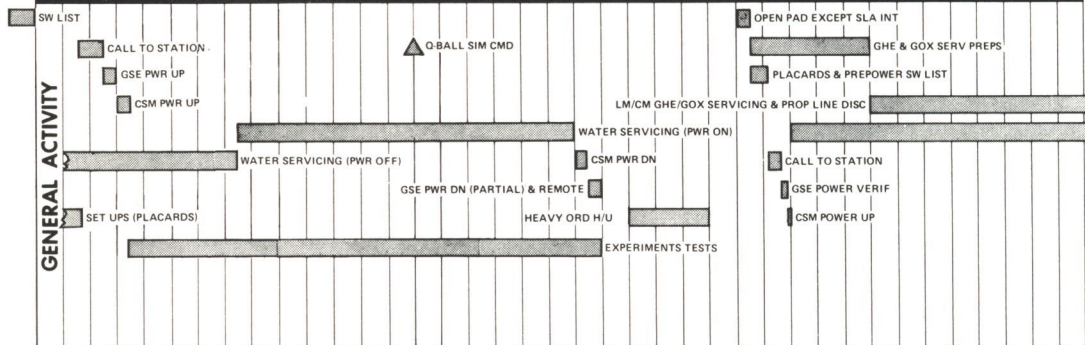
LM GUIDANCE COMPUTER (LGC) - Performs four major functions: (A) Calculates steering signals and engine disretes necessary to keep the LM on the required trajectory, (B) Positions the stable member in the IMU to a coordinate system defined by precise optical measurements, (C) Conducts limited malfunction isolation of the PGNCs by monitoring the level and rate of system signals and (D) Supplies pertinent LM condition information to the display and control panels.

DISPLAY AND KEYBOARD (DSKY) - Provides a two-way communication link between the operator and the LGC and the following functions may be performed: (A) Loading of data into the LGC and (B) Display of data and system configuration to the operator.

COUPLING DATA UNIT (CDU) - The CDU, an all-electronic device, is used as an interface element between the following: (A) The inertial subsystem and computer subsystem and (B) The computer subsystem and the controls. This unit functions primarily as an analog to digital or digital to analog converter.

APOLLO 17 LAUNCH COUNTDOWN

GENERAL ACTIVITY



PRELAUNCH

G & N

-108 -106 -104 -102 -100 -98 -96 -94 -92 -90 -88 -86 -84 -82 -80 -78 -76 -74 -72

MIDCOUNT

Activity	Approximate Start Time (hours)	Approximate End Time (hours)
LM MECHANICAL BUILDUP	0	10
CSM MECH BUILDUP, BATT HOOKUP	0	10
FUEL CELL ACT	4	6
CSM LH2	3	5
CSM LO2 & LH2 LOAD	6	10
CSM POWER ON THROUGH LAUNCH	0	1
CSM ECS SUIT SEP VERIFICATION	2	5
LM SHE LOADING PREPS	0	3
WHITE ROOM RETRACT FOR BCP INSTALL	1	3
G&N ACTIVATION	5	6
CYRO	10	11

COUNTDOWN

OFFICIAL COUNTDOWN START

CSM POWER ON THRU LAUNCH

LM SHE SERV PREPS

LM SHE TOP OFF

ATTITUDE CMD CKS

SM ECS, AIR MIN

SM ECS AIR FULL FLOW

CREW STOWAGE

Q-BALL SIM CMD

SV EDS TEST

CSM PRE-INGRESS OPNS

OPEN SILO 4

CSM A/G VOICE CKS

CSM CABIN PREPS

OPEN SILO 3

AUX DAMPER DISC

CENTER COUCH INSTL

MSS PWR DN

MOVE MSS

PRIMARY DAMPER CONN

RF SILEN

PRESS

FT25

REMOVE SA-8 ECS "Y"

FPI CK

MIDCOUNT

STANDBY POWER ON

CMC OP

CLOCK ALIGN

OP PWR ON

G&N OP

DELTA T

PTC DISC

Time scale: -70, -68, -66, -64, -62, -60, -58, -56, -54, -52, -50, -48, -46, -44, -42, -40, -38, -36, -34, -32, -30

A horizontal bar chart titled "COUNTDOWN" showing the time to launch for various systems. The x-axis represents time in minutes, with labels at -28, -26, -24, -22, -20, -18, -16, -14, -12, -10, and -9. The y-axis lists the systems: IMU PERFORMANCE, DELTA T, ATTITUDE CMD CKS, E-MEMORY VERIF, and GYROCOMPASS. The bars indicate the duration of each system's countdown.

System	Start Time (min)	End Time (min)	Duration (min)
IMU PERFORMANCE	-28	-23	5
DELTA T	-23	-22	1
ATTITUDE CMD CKS	-22	-21	1
E-MEMORY VERIF	-10	-9	1
GYROCOMPASS	-28	-9	19

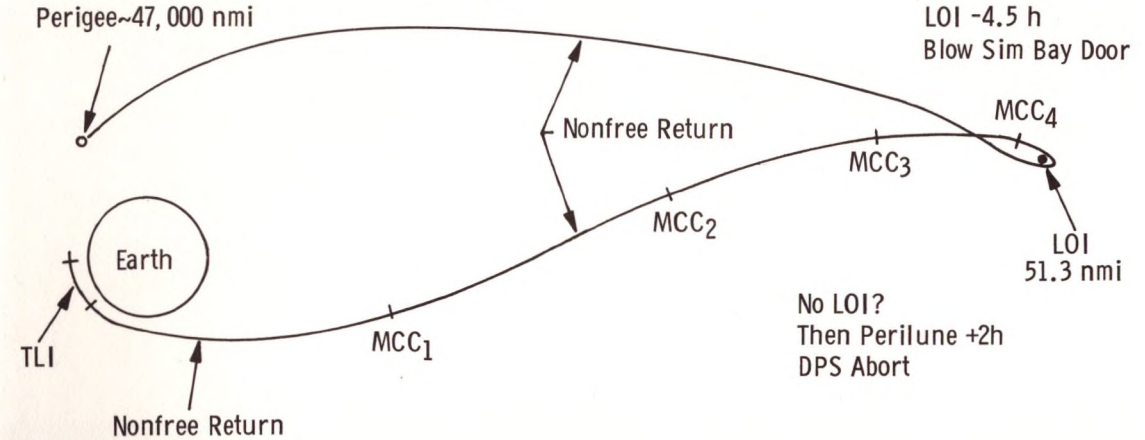
1 HR HOLD T-0330

Activity	Start Time (T-8 to T+0)	End Time (T-8 to T+0)
CSM C/O CREW TO CM	-3.5	-3.0
PRE-INGRESS PREPS	-3.0	-2.5
FLIGHT CREW INGRESS	-2.5	-2.0
CLEAR PAD	-8.0	-7.5
CABIN CLOSE OUT	-2.0	-1.5
MCC/CSM CMD CKS	-2.0	-1.8
LV TANKING	-8.0	-4.0
AAS CHECKS	-1.5	-1.2
C/O CREW CLEAR PAD	-1.5	-1.3
RETRACT SA-9	-1.2	-1.0
LES ARMED	-1.0	-0.5
C/O CREW DEPART W/R	-8.0	-7.8
ASTRO LAUNCH CKT COMM CKS	-1.8	-1.5
E-MEMORY VERIF	-4.0	-3.8

SEQUENCE OF MAJOR EVENTS

EVENT	G.E.T HR-MIN	C.S.T HR-MIN	EVENT	G.E.T HR-MIN	C.S.T HR-MIN
--- WED/DEC 6 ---					
LAUNCH	00:00	20:53	--- WED/DEC 13 ---		
EPO INSERTION	00:12	21:05	THIRD EVA	162:42	15:35
--- THURS/DEC 7 ---			TV COVERAGE (6 HR 40 MIN)	163:00	15:53
TRANSLUNAR INJECTION	03:21	00:14	--- THURS/DEC 14 ---		
CSM/S-IVB SEPARATION	04:06	00:59	CSM PLANE CHANGE (REV 40)	182:35	11:28
DOCKING	04:16	01:09	TV COVERAGE (LM LIFTOFF 0:25 MIN)	187:48	16:41
CSM/LM EJECTION	05:01	01:54	LM ASCENT		
EVASIVE MANEUVER (S-IVB BURN)	05:24	02:17	LM LIFTOFF	188:03	16:56
FIRST MIDCOURSE CORRECTION (MCC-1 IF REQUIRED)	08:45	05:38	LM INSERTION ($T_B = 437.7$ SEC)	188:11	17:04
--- FRI/DEC 8 ---			TPI (APS) ($t_B = 2.7$ SEC)	188:58	17:51
MCC-2 (IF REQUIRED)	35:30	08:23	RENDEZVOUS MANEUVERS		
--- SAT/DEC 9 ---			FIRST BRAKING MANEUVER	189:39	18:32
MCC-3 (IF REQUIRED)	66:55	15:48	TV COVERAGE (5 MIN)	190:01	18:54
--- SUN/DEC 10 ---			DOCKING	190:05	18:58
MCC-4 (IF REQUIRED)	83:55	08:48	LM JETTISON	193:58	22:51
SIM DOOR JETTISON	84:25	09:18	CSM SEPARATION		
LUNAR ORBIT INSERTION (LOI)	88:55	13:48	BURN INITIATION	194:03	22:56
DESCENT ORBIT INSERTION (DOI-1)	93:13	18:06	--- FRI/DEC 15 ---		
--- MON/DEC 11 ---			LM DEORBIT BURN	195:32	00:25
CSM/LM UNDOCK AND SEPARATION	110:28	11:21	LM IMPACT (CSM REV 55)	195:58	00:51
CSM CIRCULARIZATION	111:55	12:48	SELENOGRAPHIC LATITUDE $\sim 19.9^\circ$		
SECOND DESCENT ORBIT INSERTION (DOI-2)	112:01	12:54	SELENOGRAPHIC LONGITUDE $\sim 30.5^\circ$		
POWERED DESCENT INITIATION (PDI)	112:50	13:43	--- SAT/DEC 16 ---		
HIGH GATE (P63 TO P64)	112:59	13:52	TRANSEARTH INJECTION		
LO GATE	113:00	13:53	BURN INITIATION ($t_B = 142.2$ SEC)	236:39	17:32
LM LANDING	113:02	13:55	--- SUN/DEC 17 ---		
SELENOGRAPHIC LATITUDE $\sim 20.2^\circ$			TRANSEARTH COAST MIDCOURSE CORRECTION (MCC-5)	253:40	10:33
SELENOGRAPHIC LONGITUDE $\sim 30.7^\circ$			--- MON/DEC 18 ---		
FIRST EVA	116:50	17:43	MCC-6	282:18	15:11
TV COVERAGE (5 HR 38 MIN)	117:50	18:43	--- TUE/DEC 19 ---		
--- TUES/DEC 12 ---			MCC-7	301:18	10:11
SECOND EVA	139:20	16:13	CM/SM SEPARATION	303:58	12:51
TV COVERAGE (6 HR 30 MIN)	139:30	16:23	ENTRY INTERFACE	304:18	13:11
			CM LANDING	304:31	13:24

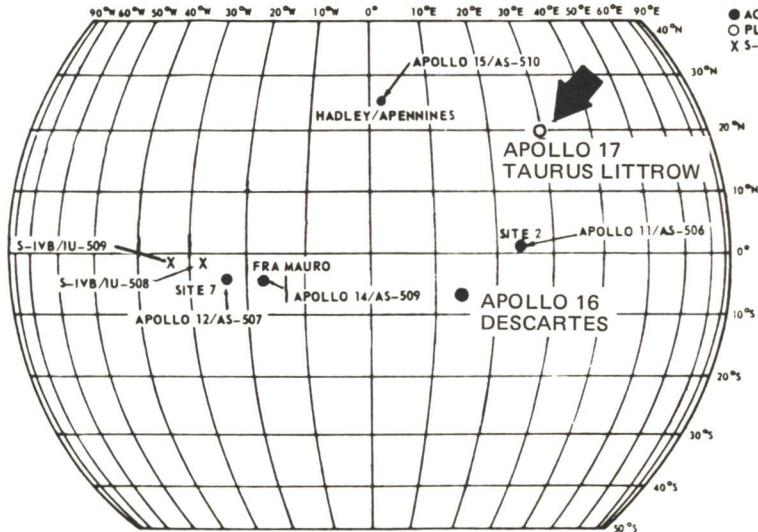
APOLLO 17 TRANSLUNAR TRAJECTORY



APOLLO 17 LANDING SITE

LEGEND:

- ACTUAL LANDING SITES
- PLANNED LANDING SITES
- X S-IVB/IU IMPACT POINTS



MISSION EVENTS (CSM)

G.E.T HR-MIN-SEC	EVENT	G.E.T HR-MIN-SEC	EVENT	G.E.T. HR-MIN-SEC	EVENT
	LIFTOFF 8:53 P.M. CST DEC 6, 1972	88:30:00	P40 SPS THRUST	113:19:00	P20 FWD SIM ATT
00:11:50	SECO	88:55:38	LOI BT 6 MIN 35.4 SEC	114:00:00	ORBITAL SCIENCE PHOTOS
01:22:00	P52 IMU REALIGN	90:10:00	P52 LDG SITE ORIENT	133:03:00	P52 LDG SITE ORIENT
01:32:00	TLI PREPARATION	90:15:00	P20 UNIV TRACKING	133:09:00	P20 UNIV TRACKING
03:21:19	TLI BT 5 MIN 45.7 SEC	92:03:00	P52 LDG SITE ORIENT	143:18:00	P52 LDG SITE ORIENT
03:42:05	CSM SEPARATION PREP	92:11:00	P30 EXTERNAL DELTA V	143:23:00	P20 UNIV TRACKING
04:06:00	CSM/S-IVB SEPARATION	92:13:00	P40 SPS THRUST	156:19:00	P20 UNIV TRACKING
04:16:00	CSM/LM DOCKING	92:48:00	P40 TRIM	157:05:00	P52 LDG SITE ORIENT
05:01:00	CSM/LM EJECTION	93:13:09	DOI BT 22.9 SEC	157:30:00	P20 UNIV TRACKING
05:24:00	S-IVB EVASIVE BURN	93:44:00	P24 MONITOR LDMK	167:12:00	P20 OPT 5 FWD SIM ATT
08:15:00	P52 PTC ORIENT	95:54:00	P52 LDG SITE ORIENT	168:52:00	P52 LDG SITE ORIENT
17:08:00	P23 CISLUNAR NAV	96:00:00	P20 UNIV TRACKING	168:58:00	P20 UNIV TRACKING
34:39:00	P30 EXTERNAL ΔV	107:19:00	P52 LDG SITE ORIENT	180:37:00	P52 LOPC ORIENT
35:20:00	P40/P41 SPS/RCS THRUST	107:57:00	IVT TO LM	182:19:00	P30 EXTERNAL ΔV
35:30:00	MCC-2	110:06:00	P30 LOAD CSM SEPARATION	182:20:00	P40 TRIM
40:05:00	LM INGRESS	110:27:55	UNDOCK/SEP BT 3.3 SEC	182:35:45	LOPC BT 18.6 SEC
42:00:00	LM EGRESS	110:46:00	P24 UPDATE T2 TIME (IF REQ'D)	182:45:00	P20 FWD SIM ATT
43:45:00	P20 OPT 2	110:50:00	P20 LOW ALT LDMK TRK	183:00:00	P52 LIFTOFF ORIENT
46:32:00	P52 PTC ORIENT	110:54:00	P24 LANDMARK TRACKING	183:08:00	P20 UNIV TRACKING
60:37:00	LMP/CMD IVT TO LM	111:08:00	P52 LDG SITE ORIENT	184:30:00	P52 LIFTOFF ORIENT
62:20:00	LMP/CMD IVT TO CSM	111:23:00	P30 VERIFY CIRC TIG AND ΔV'S	184:56:00	P20 OPT 2 (ZODIACAL LIGHT)
66:55:00	MCC-3 (IF REQUIRED)	111:42:00	P40 TRIM	185:16:00	P20 OPT 5 (LDMK TRK ATT)
70:40:00	P52 PTC ORIENT	111:55:23	CSM CIRCULARIZATION BT = 4.0 SEC	185:37:00	P24 LANDMARK TRACKING
82:37:00	P30 EXTERNAL ΔV	112:00:00	P20 LDMK TRK ATT	186:29:00	P52 LIFTOFF ORIENT
83:10:00	P52 PTC ORIENT	112:50:00	LM PDI BT = 12 MIN	188:03:00	LM LIFTOFF
83:55:00	MCC-4 (IF REQUIRED)	113:02:00	LM TOUCHDOWN	188:11:00	LM LUNAR ORBIT INSERTION
		113:11:00	P52 LDG SITE ORIENT	188:23:00	P34 TPI TARGETING

G. E. T. HR-MIN-SEC		G. E. T. HR-MIN-SEC	
EVENT		EVENT	
189:00:00	P76	253:40:00	MCC-5
189:01:00	P35 TPM TARGETING	253:55:00	CABIN PREP FOR EVA
189:15:00	P76	257:20:00	CABIN DEPRESS
189:30:00	P79 RENDEZVOUS FINAL PROGRAM	257:25:00	HATCH OPENING
190:00:00	P47 THRUST MONITOR	257:33:00	CMP EGRESS
190:05:00	DOCKING	257:45:00	RETRIEVE LUNAR SOUNDER FILM
192:22:00	CSM MNVR TO JETT ATT	258:30:00	INGRESS
193:10:00	IVT TO CSM	258:36:00	HATCH CLOSING
193:57:00	P47	264:50:00	P52 PTC ORIENT
193:58:30	LM JETTISON	265:30:00	P20
194:03:30	CSM SEPARATION BT 12.6 SEC ORBIT 63.9 x 62.3 NM	276:33:00	P52 PTC ORIENT
194:11:00	P20 FWD SIM ATT	281:12:00	P20 UNIV TRACKING
210:26:00	P52 LIFTOFF ORIENT	282:18:00	MCC-6 (IF REQUIRED)
210:28:00	P20 UNIV TRACKING	288:00:00	P52 PTC ORIENT
230:08:00	P52 LIFTOFF ORIENT	288:22:00	P20 UNIV TRACKING
230:12:00	P20 UNIV TRACKING	299:52:00	P52 PTC ORIENT
234:07:00	P52 LIFTOFF ORIENT	299:58:00	P52 ENTRY
234:12:00	P52 TEI	300:14:00	P30 EXTERNAL ΔV
235:55:00	P30 EXTERNAL ΔV	301:05:00	P40/P41 SPS/RCS THRUSTING
236:10:00	P40 SPS THRUSTING	301:18:00	MCC-7 (IF REQUIRED)
236:39:51	TEI BT 2 MIN 22.2 SEC	302:54:00	P52 ENTRY
238:10:00	P52 TEI ORIENT	303:55:00	P61 ENTRY PREP
238:19:00	P52 PTC ORIENT	303:58:00	P62 CM/SM SEPARATION
252:00:00	P52 PTC ORIENT	304:18:00	EI
252:30:00	P30 EXTERNAL ΔV	304:31:00	SPLASHDOWN
253:04:00	P40/P41 SPS/RCS THRUSTING		

MISSION EVENTS (LM)

G.E.T. HR-MIN-SEC	EVENT	G.E.T. HR-MIN-SEC	EVENT
107:57:00	IVT TO LM	185:54:00	P22 LUNAR SURFACE NAV
109:15:00	P52 IMU REALIGN	187:18:00	P57 LUNAR SURFACE ALIGN
110:27:55	CSM/LM UNDOCKING AND SEPARATION	187:30:00	P12 POWERED ASCENT
111:07:00	P52 IMU REALIGN	188:03:00	LM LUNAR LIFTOFF
111:25:00	COAS CAL	188:11:00	LUNAR ORBIT INSERTION
112:04:00	P76 UPDATE	188:15:00	P20 RENDEZVOUS NAV
112:43:00	P63	188:16:00	P34 TPI TARGETING
112:50:00	P63 POWERED DESCENT INITIATION	188:53:00	P42 APS THRUSTING
113:02:00	LM LUNAR TOUCHDOWN	188:58:00	TPI
113:20:00	P57 LUNAR SURFACE ALIGN	189:13:00	MCC-1 (IF REQUIRED)
113:30:00	LM PGNS POWER DOWN	189:28:00	MCC-2 (IF REQUIRED)
114:55:00	PREP FOR EVA-1	189:39:00	FIRST LM BRAKING MANEUVER
116:40:00	CABIN DEPRESS	190:05:00	DOCKING
116:48:00	OPEN HATCH	193:10:00	IVT TO CSM
116:50:00	EGRESS	193:58:30	LM JETTISON
117:02:00	LRV DEPLOY	194:03:30	CSM SEPARATE BURN
118:05:00	ALSEP OFFLOAD	195:32:49	LM DEORBIT BURN
121:10:00	EVA-1 TRAVERSE	195:58:25	LM IMPACT
123:40:00	END EVA-1		
137:50:00	PREP FOR EVA-2		
139:10:00	CABIN DEPRESS		
139:20:00	START EVA-2		
145:30:00	END EVA 2		
161:30:00	PREP FOR EVA-3		
162:40:00	CABIN DEPRESS		
162:42:00	START EVA-3		
169:40:00	END EVA-3		
184:00:00	P57 LUNAR SURFACE ALIGN		

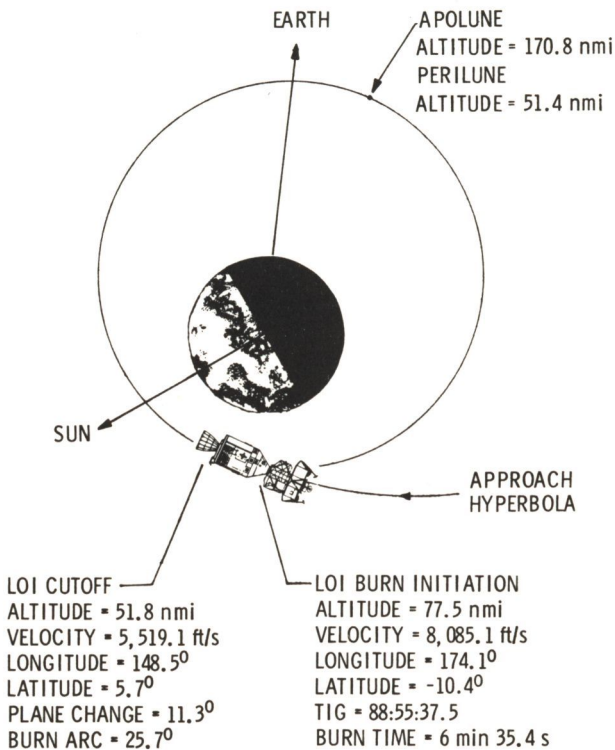
CSM BURN/EVENT SCHEDULE

BURN/ EVENT	GET 1(HR:MIN)/ BURN TIME	VT (FPS)	ULLAGE BT	REFSMMAT	RESULTANT HA/HP (NM)	DATE/ CST
LAUNCH SATURN	00:00 12 MIN 05 SEC	25,604	--	LAUNCH	93.4 89.7	DEC 6 20:53
S-IVB TLI	03:21:19.0 5 MIN 45.7 SEC	10,346.8	--	LAUNCH	--	DEC 7 00:14
CSM/LM EJECTION	05:01:00.0 3.0 SEC	1.2	--	LAUNCH	--	DEC 7 1:54
MCC-1	08:45	Nom Zero	--	PTC	--	DEC 7 05:38
MCC-2	35:30	Nom Zero	--	PTC	--	DEC 8 08:23
MCC-3	66:55	Nom Zero	--	PTC	--	DEC 9 15:48
MCC-4	83:55	Nom Zero	--	PTC	--	DEC 10 8:48
LOI SPS	88:55:37.5 06 MIN 35.4 SEC	2979.9	--	LOI	170.8 51.4	DEC 10 13:48
DOI SPS	93:13:08.5 22.9 SEC	198.7	4 JETS 15 SEC	LDG SITE	58.96 14.97	DEC 10 18:06
BAILOUT SPS	93:48:16.8 11.05 SEC	100	4 JETS 17 SEC	LDG SITE	61.5 5.0	DEC 10 18:41
DOI TRIM SPS	AS REQD			LS OR LOPC-1 AS REQD		
UNDOCK & SEP (RCS)	110:27:55.2 3.3 SEC	1.0	--	LDG SITE	60.33 13.6	DEC 11 11:20
CSM CIRC SPS	111:55:22.7 4.0 SEC	70.1	4 JETS 12 SEC	LDG SITE	70.3 54.3	DEC 11 12:48
LOPC-1 SPS	182:35:45.3 18.7 SEC	336.7	4 JETS 12 SEC	LOPC-1	63.0 61.3	DEC 14 11:29
LM JETT	193:58:30.0	2.5	--	LIFT-OFF	62.2 60.3	DEC 14 22:51
CSM SEP RCS	194:03:30.0 12.6 SEC	2.0	--	LIFT-OFF	63.9 62.3	DEC 14 23:02
TEI SPS	236:39:51.1 2 MIN 22.2 SEC	3045.7	4 JETS 12 SEC	TEI	--	DEC 16 17:32
MCC-5	253:40	Nom Zero	--	PTC	--	DEC 17 10:33
MCC-6	282:18	Nom Zero	--	PTC	--	DEC 18 15:11
MCC-7	301:18	Nom Zero	--	ENTRY	--	DEC 19 10:11
EI	304:18:0.5	NO BURN	--	ENTRY	--	DEC 19 13:11
SPLASH- DOWN	304:31:10.5	NO BURN	--	ENTRY	--	DEC 19 13:24

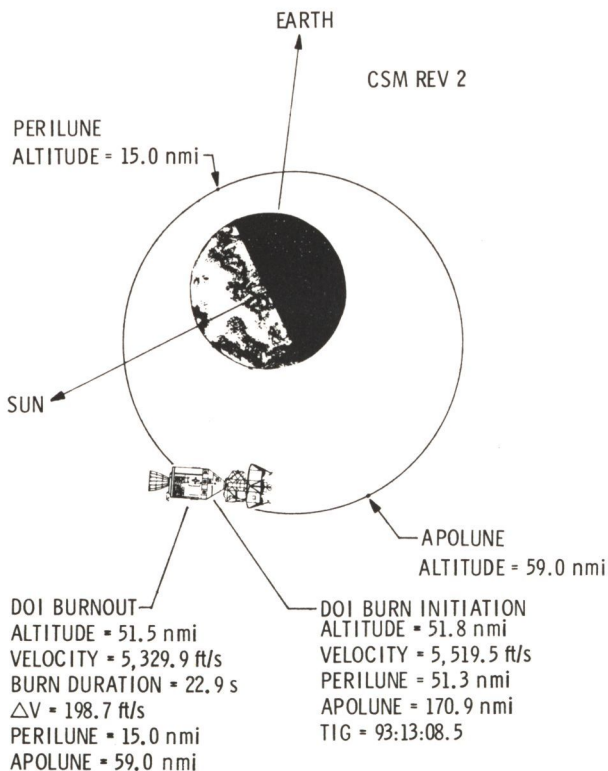
LM BURN/EVENT SCHEDULE

BURN/ EVENT	GET I (HR:MIN)/ BURN TIME	Δ VT (FPS)	ULLAGE BT	REFSMMAT	RESULTANT HA/HP (NM)	DATE/ CST
DOI-2	112:00:33.7 26.9 SEC	9.4	--	LDG SITE	60.0 7.2	DEC 11 12:53
PDI	112:49:37.7 12 MIN 00 SEC	6701.8	4 JETS 7.5 SEC	LDG SITE	--	DEC 11 13:42
LANDING	113:01:38.1	NO BURN	--	--	LUNAR SURFACE	DEC 11 13:54
EVA-1	116:40	NO BURN	--	--	--	DEC 11 17:33
EVA-2	139:10	NO BURN	--	--	--	DEC 12 16:03
EVA-3	162:40	NO BURN	--	--	--	DEC 13 15:33
ASCENT	188:03:14.6 7 MIN 17.7 SEC	6062.2	None	LIFTOFF	47.85 9.06	DEC 14 16:56
ORBIT INSERTION	188:10:32.3	NO BURN	--	--		DEC 14 17:03
TPI	188:57:32.3 2.7 SEC	76.6	4 JETS 10 SEC	LIFTOFF	64.4 46.7	DEC 14 17:50
BRAKING GATES	189:36:35.0 to 189:43:10.5		--	--	62.4 61.8	DEC 14 18:29
DOCKING	190:05:00.0	NO BURN	--	--	62.4 61.8	DEC 14 19:53
LM DEORBIT	195:32:49.0 1 MIN 56.4 SEC	281.1	--	LIFTOFF	64.9 -141.8	DEC 15 01:34

LOI GEOMETRY

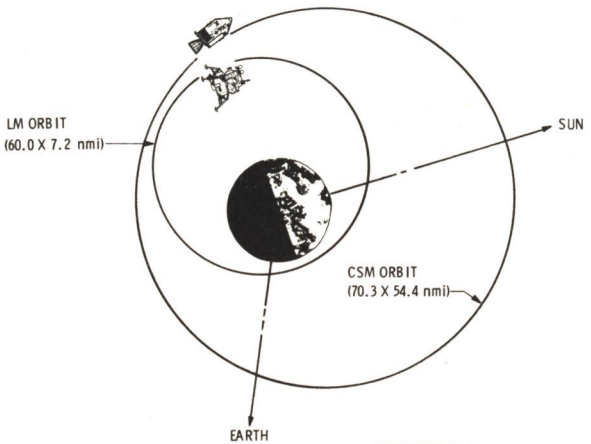


DOI-1 GEOMETRY



DOI-2 GEOMETRY

CSM REV 12



BURN TIME: 26.9 s
 ΔV : 9.4 ft/s
TIG: 112:00:33.7
GUIDANCE: PGNS/RCS

DESCENT AND ASCENT EVENTS

EVENT	TIME HR:MIN:SEC G.E.T	TIME HR:MIN:SEC C.S.T	DATA SUMMARY
DOI-1 Burn Termination	93:13:31.3	Dec 10, 1972 18:06:31.3	Altitude Above LLS Radius, nmi 51.5 Selenographic Latitude, deg -9.8 Selenographic Longitude, deg 158.8 Selenographic Inclination, deg 20.1 Burn Duration, sec 22.9 Inertial Burn Arc, deg 1.2 Plane Change, deg 0.0 ΔV , fps 198.7 SPS Propellant Used, lb 1487.2 Velocity, fps 5329.9 Orbital Period, hr:min:sec 01:54:29.6 Perilune Altitude Above LLS Radius, nmi 15.0 Apolune Altitude Above LLS Radius, nmi 59.0 Revolution Number 3
CSM/LM UNDOCK AND SEP	110:27:55.2	DEC 11, 1972 11:20:55.2	Selenographic Latitude, deg -5.1 Selenographic Longitude, deg 136.0 Revolution Number 12
CIRCULARIZATION (CSM) Burn Initiation	111:55:22.7	12:48:22.7	Mass, lb 38,130.6 Altitude Above LLS, nmi 59.2 Selenographic Latitude, deg -20.0 Selenographic Longitude, deg -142.0 Selenographic Inclination, deg 20.2 Velocity, fps 5288.0 Perilune Altitude Above LLS, nmi 13.6 Revolution Number 12

EVENT	TIME HR:MIN:SEC G.E.T	TIME HR:MIN:SEC C.S.T	DATA SUMMARY
Burn Termination	111:55:26.7	12:48:26.7	Altitude Above LLS, nmi 59.2 Burn Duration, sec 4.0 Burn, Arc, deg 0.2 ΔV , fps 70.1 SPS Propellant Consumed, lb 263.1 Velocity, fps 5358.0 Orbital Period, hr:min:sec 01:59:00.0 Perilune Altitude Above LLS, nmi 54.4 Apolune Altitude Above LLS, nmi 70.3 Revolution Number 12
SECOND DESCENT ORBIT INSERTION (DOI-2) Burn Initiation	112:00:33.7	DEC 11, 1972 12:53:33.7	Altitude Above LLS Radius, nmi 60.0 Selenographic Latitude, deg -19.9 Selenographic Longitude, deg -158.6 Velocity, fps 5283.5 Perilune Altitude Above LLS Radius, nmi 13.8 Apolune Altitude Above LLS Radius, nmi 60.0 Revolution Number 12
Burn Termination	112:01:00.6	12:54:00.6	Altitude Above LLS Radius, nmi 60.0 Selenographic Latitude, deg -19.8 Selenographic Longitude, deg -160.0 Burn Duration, sec 26.9 ΔV , fps 9.4 Velocity, fps 5274.1 Perilune Altitude Above LLS Radius, nmi 7.2 Apolune Altitude Above LLS Radius, nmi 60.0 Revolution Number 12

EVENT	TIME HR:MIN:SEC G.E.T	TIME HR:MIN:SEC C.S.T	DATA SUMMARY
PDI (DPS Ignition Time)	112:49:37.7	13:42:37.7	Altitude Above LLS, ft 56,543.4 Velocity, fps 5568.8 Revolution Number 13
High Gate (P63 to P64)	112:58:57.7	13:51:57.7	Altitude Above LLS, ft 8181.2 Velocity, fps 357.7
Low Gate	113:00:17.7	13:53:17.7	Altitude Above LLS, ft 710.5 Velocity, fps 85.3
Vertical Descent (P64 to P66)	113:00:59.7	13:53:59.7	Altitude Above LLS, ft 208.5 Velocity, pfs 10.2 Selenographic Latitude, deg 20.2 Selenographic Longitude, deg 30.7 Burn Duration, sec 720.4 DPS Propellant Consumed, lb 18,093.3 ΔV , fps 6701.8 Revolution Number 13
LM Landing	113:01:38.1	13:54:38.1	
CSM FIRST PASS OVER LLS	112:57:28.9	13:50:28.9	Revolution Number 13
CSM PLANE CHANGE Burn Initiation	182:35:45.3	DEC 14, 1972 11:28:45.3	Mass, lb 37,686.1 Altitude Above LLS, nmi 61.6 Selenographic Latitude, deg 12.6 Selenographic Longitude, deg -56.6 Velocity fps 5344.4 Perilune Altitude Above LLS, nmi 61.3 Apolune Altitude Above LLS, nmi 63.0 Revolution Number 48

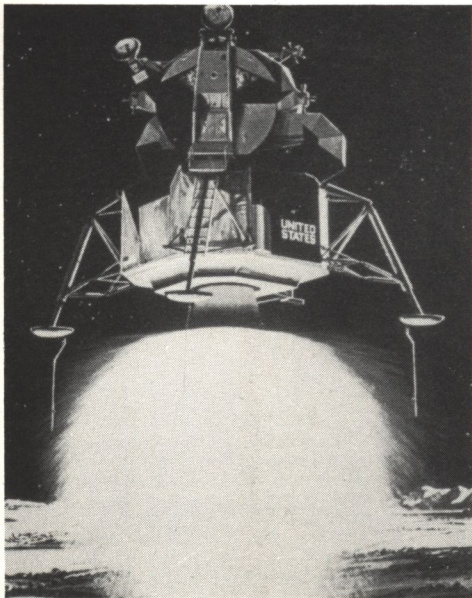
EVENT	TIME HR:MIN:SEC G.E.T	TIME HR:MIN:SEC C.S.T	DATA SUMMARY
Burn Termination	182:36:03.9	11:29:03.9	Altitude Above LLS, nmi 61.6 Selenographic Latitude, deg 12.3 Selenographic Longitude, deg -57.4 Selenographic Inclination, deg 23.2 Burn Duration, sec 18.7 Plane Change, deg 3.6 ΔV , fps 336.7 SPS Propellant Consumed, lb 1232.5 Velocity, fps 5344.4 Perilune Altitude Above LLS, nmi 61.3 Apolune Altitude Above LLS, nmi 63.0 Revolution Number 48
CSM SECOND PASS OVER LLS	188:04:10.1	16:57:10.1	Revolution Number 51
ASCENT LM Lift-Off	188:03:14.6	16:56:14.6	Mass, lb 10 917.1 Selenographic Latitude, deg 20.2 Selenographic Longitude, deg 30.8 Revolution Number 51
LM Insertion	188:10:32.3	17:03:32.3	Mass, lb 5933.4 Altitude Above LLS, ft 59 997.3 Selenographic Latitude, deg 21.9 Selenographic Longitude, deg 19.9 Burn Duration, sec 437.7 ΔV , fps 6062.2 Perilune Altitude Above LLS, ft 55 065.3 Apolune Altitude Above LLS, ft 290 745.8

EVENT	TIME HR:MIN:SEC G.E.T	TIME HR:MIN:SEC C.S.T	DATA SUMMARY
RENDEZVOUS TPI (APS Ignition) Preced by a 10- sec RCS ullage $\Delta V = 21.8$ fps	188:57:32.3	Dec 14, 1972 17:50:32.3	Burn Duration, sec 2.7 ΔV , fps 54.8 Propellant used, lb 32.7 Resultant h_a/h_p , nmi 64.4/46.7 Range at Cutoff, nmi 32.5 Range Rate at Cutoff, fps -131.7 Propulsion System APS Revolution Number 51
Braking	189:38:59.3	18:31:59.3	Burn Duration, sec 28.4 ΔV , fps 31.2 Propellant used, lb 20.3 Range at Final Braking, nmi 0.01 Range Rate at Final Braking, fps -0.22 h_a/h_p at Final Braking, nmi 62.4/61.8 Propulsion System LM RCS Revolution Number 52
Docking	190:05:00	18:53:00.0	
LM JETTISON	193:58:30	22:51:30	Selenographic Latitude, deg 21.8 Selenographic Longitude, deg 17.8 Revolution Number 54

EVENT	TIME HR:MIN:SEC G.E.T	TIME HR:MIN:SEC C.S.T	DATA SUMMARY
CSM/LM SEPARATION Burn Initiation	194:03:30	22:56:30	Revolution Number 54
Burn Termination	194:03:42.6	22:56:42.6	Mass, lb 36 833.5 Altitude Above LLS Radius, nmi 62.4 Selenographic Latitude, deg 23.2 Selenographic Longitude, deg 0.8 Selenographic Inclination, deg 23.2 Burn Duration, sec 12.6 Plane Change, deg 0.0 ΔV , fps 2.0 Velocity, fps 5342.9 Perilune Altitude Above LLS Radius, nmi 62.3 Apolune Altitude Above LLS Radius, nmi 63.9 Revolution Number 54
LM DEORBIT	195:32:49	DEC 15, 1972 00:25:49	Mass, lb 5230.4 Selenographic Latitude, deg 2.5 Selenographic Longitude, deg 80.0 Burn Duration, sec 146.9 ΔV , fps 357.1
LM IMPACT	195:58:25	00:51:25	Mass, lb 5027.8 Selenographic Latitude, deg 19.9 Selenographic Longitude, deg 30.5 Velocity, fps 5394.2 Revolution Number 55

EVENT	TIME HR:MIN:SEC G.E.T	TIME HR:MIN:SEC C.S.T	DATA SUMMARY
TRANSEARTH INJECTION Burn Initiation	236:39:51.2	DEC 16, 1972 17:32:51.2	Mass, lb 36 616.9 Altitude Above LLS Radius, nmi 64.1 Selenographic Latitude, deg -19.8 Selenographic Longitude, deg -171.5 Selenographic Inclination, deg 23.2 Velocity, fps 5333.8 Perilune Altitude Above LLS, nmi 59.2 Revolution Number 75
Burn Termination	236:42:13.4	17:35:13.4	Altitude Above LLS Radius, nmi 66.5 Selenographic Latitude, deg -21.5 Selenographic Longitude, deg 179.0 Selenographic Inclination, deg 23.6 Burn Duration, sec 142.2 Inertial Burn Arc, deg 9.1 Plane Change, deg 0.9 ΔV , fps 3045.7 SPS Propellant used, lb 9506.0 Velocity, fps 8368.0 Perilune Altitude Above LLS, nmi 63.8
TRANSEARTH COAST MIDCOURSE CORREC- TION MANEUVERS MCC-5	TEI + 17 hr	DEC 17, 1972 10:33:13.4	Geodetic Altitude, nmi $\approx 166\ 000$
MCC-6	EI - 22 hr	DEC 18, 1972 14:03:00	Geodetic Altitude, nmi $\approx 102\ 500$

EVENT	TIME HR:MIN:SEC G.E.T	TIME HR:MIN:SEC C.S.T	DATA SUMMARY
TRANSEARTH COAST MCC MANEUVERS MCC-7	EI - 3 hr	DEC 19, 1972 10:11:01.5	Geodetic Altitude, nmi 25 500
CM/SM Separation	EI - 15 min	12:56:01.5	Geodetic Altitude, nmi 1967.0
ENTRY INTERFACE	304:18:01.5	13:11:01.5	Transearth Coast Time, hr 68 Inertial Velocity, fps 36 090.3 Geodetic Altitude, nmi (ft) 65.8 (399 849.0) Inertial Flight-Path Angle, deg -6.5 Geodetic Latitude, deg 0.7 Longitude, deg -173.2 Equatorial Inclination (descending), deg 66.5
CM LANDING	304:31:00	13:24:00	Geodetic Latitude, deg -17.9 Longitude, deg -166.0



P66-LANDING PHASE

P66

X-PNTR - LO MULT

BINGO FUEL

DES QTY LT+1+31

TOUCHDOWN

ENG STOP - PUSH

ENG ARM - OFF

PRO

DES ENG CMD OVRD - OFF

MODE CONT (PGNS) - ATT HLD

MODE CONT (AGS) - AUTO

413+1

RECYCLE PARKER VALVES

THROTTLE/JETS - JETS

400	(28 0) 13.0	11	33
300	(20.0) 9.0	10	18
200	(12.0) 5.0	9	-6

ABORT STAGE - PUSH

ENG ARM - ASC

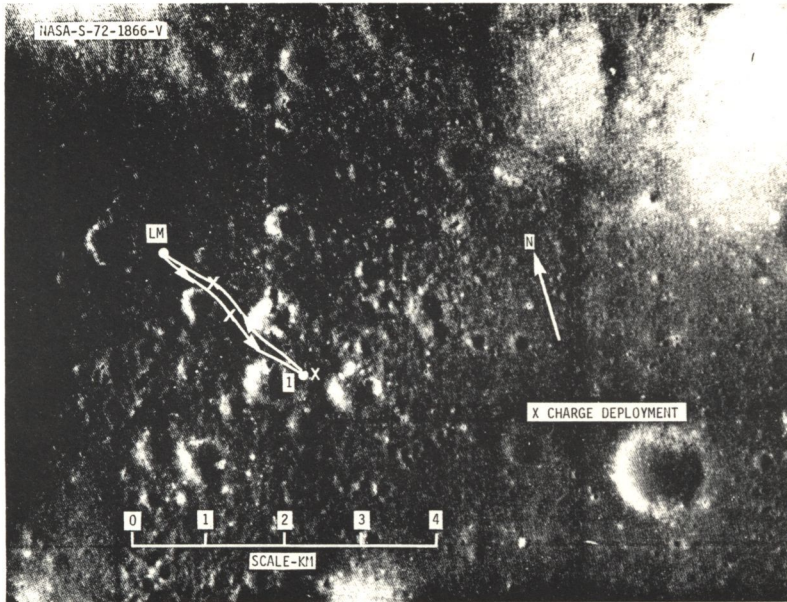
ENG STOP - RESET

ENG START - PUSH

V22 N46 E, E

MODE CONT (BOTH)- AUTO

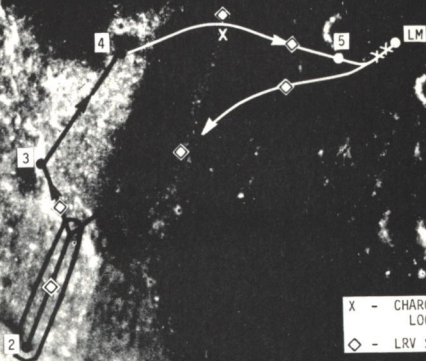
EVA 1 LRV TRAVERSE



EVA 2 LRV TRAVERSE

NASA-S-72-1867-V

N

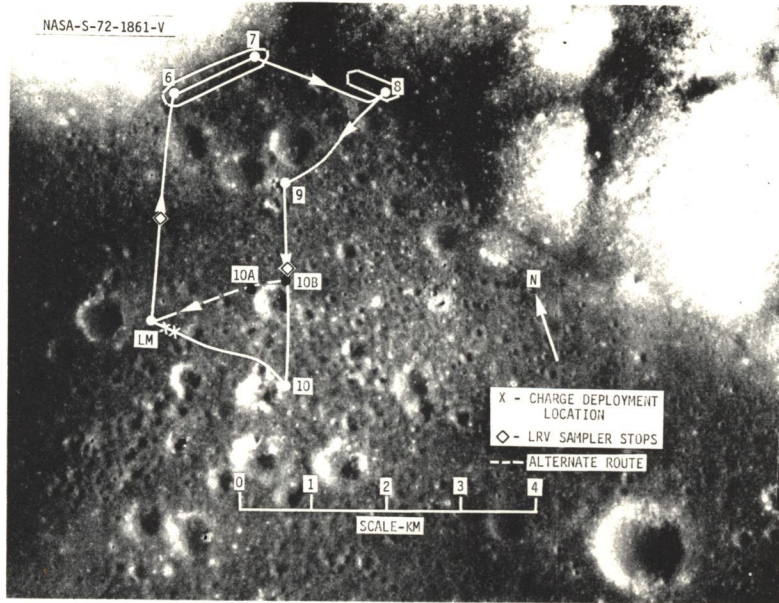


X - CHARGE DEPLOYMENT
LOCATION
◇ - LRV SAMPLER STOPS

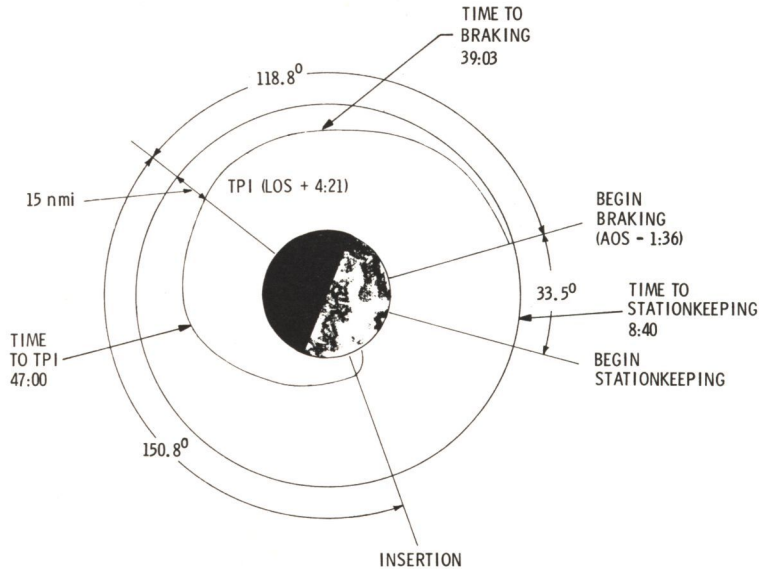


EVA 3 LRV TRAVERSE

NASA-S-72-1861-V

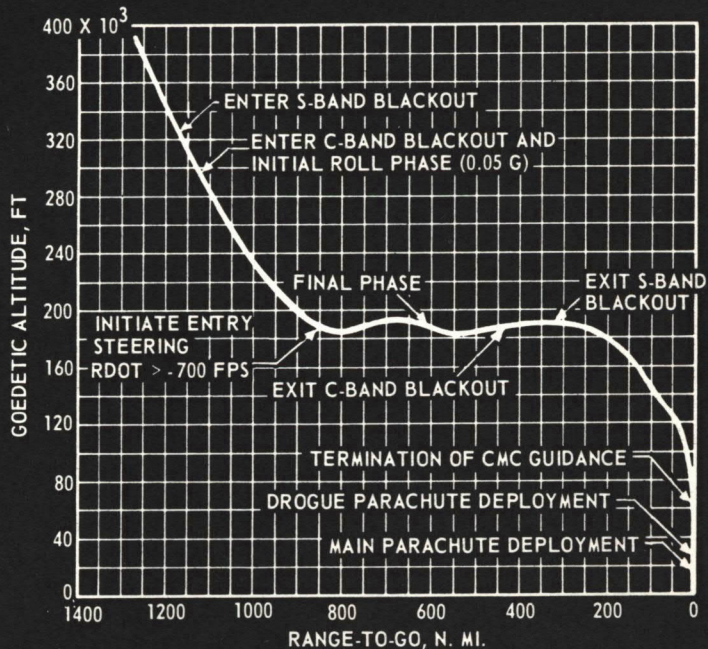


DIRECT RENDEZVOUS PROFILE

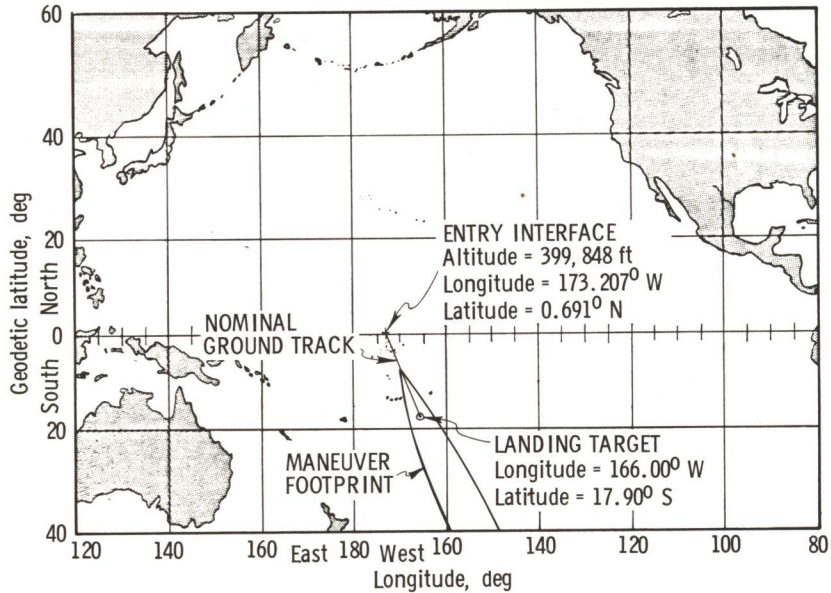


TYPICAL ENTRY SEQUENCE

EVENT	TIME FROM 400 000 FT MIN:SEC
400 k FT (G.E.T. 290:22:45)	00:00
ENTRY S BAND BLACKOUT	00:17
0.05 g	00:28
KA-INITIATE CONSTANT DRAG	00:52
RDOT = 700 FPS	01:18
PEAK g	01:22
SUBCIRCULAR VELOCITY	02:02
P64 TO P67	02:06
EXIT S BAND BLACKOUT	03:33
GUIDANCE TERMINATION	06:50
DROGUE DEPLOYMENT	07:49
MAIN DEPLOYMENT	08:31
SPLASHDOWN	13:81



APOLLO 17 ENTRY FOOTPRINT



COMPUTER PROGRAMS

PHASE	PROGRAM NUMBER	PROGRAM TITLE
Pre-Launch and Service	00	CMC Idling
	01	Prelaunch or Service-Initialization
	02	Prelaunch or Service-Gyro Compassing
	03	Prelaunch or Service-Optical Verification of Gyro Compassing
Boost	06	GNCS Power Down
	07	Systems Test
	11	Earth Orbit Insertion Monitor (EOI)
Coast	15	TLI Initiate/Cutoff
	20	Universal Tracking
	21	Ground Track Determination
	22	Orbital Navigation
	23	Cislunar Midcourse Navigation
	24	Rate-Aided Optics (Landmark Tracking)
	27	CMC Update
Pre-Thrust Targeting	29	Time-to-Longitude
	30	External Delta V
	31	Height Adjustment Maneuver (HAM)
	32	Co-elliptic Sequence Initiation (CSI)
	33	Constant Delta Altitude (CDH)

PHASE	PROGRAM NUMBER	PROGRAM TITLE
Thrusting	34	Transfer Phase Initiation (TPI)
	35	Transfer Phase (TPF)
	36	Plane Change (PCM)
	37	Return to Earth (RTE)
	40	SPS
Alignment	41	RCS
	47	Thrust Monitor
	51	IMU Orientation Determination
	52	IMU Realign
Entry	53	Back-up IMU Orientation Determination
	54	Back-up IMU Realign
	61	Entry — Preparation
	62	Entry-CM/SM Separation and Pre-entry Maneuver
	63	Entry Initialization
	64	Entry-Post 0.05G
	65	Entry-up Control
Pre-Thrusting Other Vehicle	66	Entry-Ballistic
	67	Entry-Final Phase
	72	LM Co-elliptic Sequence Initiation (CSI) Targeting
	73	LM Constant Delta Altitude (CDH) Targeting
	74	LM Transfer Phase Initiation (TPI) Targeting
	75	LM Transfer Phase (Midcourse) Targeting
	76	LM Target Delta V
	77	CSM Target Delta V
	79	Rendezvous Final Phase

LGC PROGRAMS

NUMBER	TITLE
SERVICE	
P00	LGC Idling
P06	PGNS Power
P07	Systems Test (Non-flight)
ASCENT	
P12	Powered Ascent Guidance
COAST	
P20	Rendezvous Navigation
P21	Ground Track Determination
P22	RR Lunar Surface Navigation
P25	Preferred Tracking Attitude
P27	LGC Update
PRETHRUSTING	
P30	External Delta V
P32	Co-elliptic Sequence Initiation (CSI)
P33	Constant Delta Altitude (CDH)
P34	Transfer Phase Initiation (TPI)
P35	Transfer Phase Midcourse (TPM)

NUMBER	TITLE
THRUST	
P40	DPS Thrusting
P41	RCS Thrusting
P42	APS Thrusting
P47	Thrust Monitor
ALIGNMENTS	
P51	IMU Orientation Determination
P52	IMU Realign
P57	Lunar Surface Alignment
DESCENT & LANDING	
P63	Landing Maneuver Braking Phase
P64	Landing Maneuver: Approach Phase
P66	Rate of Descent Landing (ROD)
P68	Landing Confirmation
ABORTS AND BACKUPS	
P70	DPS Abort
P71	APS Abort
P72	CSM Co-elliptic Sequence Initiation (CSI) Targeting
P73	CSM Constant Delta Altitude (CDH) Targeting
P74	CSM Transfer Phase Initiation (TPI) Targeting
P75	CSM Transfer Phase Midcourse (TPM) Targeting
P76	Target Delta V
P77	CSM Target Delta V
P99	Guided RCS Burn (E-Memory Prog)

VERB LIST

43 LOAD ERROR NEEDLES
44 SET SURFACE FLAG
45 RESET SURFACE FLAG
47 LM SV INTO CSM SV
54 COAS MARKING
55 INCREMENT CMC TIME
56 TERMINATE P20
60 N17 = N20
67 W MATRIX DISPLAY
69 RESTART
74 ERASABLE DUMP
86 REJECT COAS MARK
88 TERMINATE VHF MARKS
94 RECYCLE ATT MNVR (P23)
96 TERM SV INTEG (CALL P00)

37 TIG TPI

38 STATE VECTOR TIME
39 ΔT TRANSFER
42 H.A - H.P - ΔV
43 LAT - LONG - .H
44 H.A - H.P - TFF
49 $\Delta P.O.S$ - $\Delta V.E.L$ - CODE
51 HGA PITCH - HGA YAW
52 ACTUAL .WT
53 RANGE - R.R - P.HI
54 RANGE - R.R - THE.TA
55 CODE - ELEV ANG - .WT
58 H.P - $\Delta VTP.I$ - $\Delta VTP.F$
59 $\Delta VLOS.X$ - $\Delta VLOS.Y$ - $\Delta VLOS.Z$
65 CMC TIME
73 H(X10) - VEL - GAMMA

NOUN LIST

05 ANG ERR
10 CHANNEL
11 TIG CSI
13 TIG CDH
14 V CUTOFF TLI
15 INCREMENT ADDRESS
16 T EVENT (EXIT VERB)
24 Δ CMC CLOCK TIME
32 TF HP
33 TIG
34 T EVENT (PROGRAM)
35 TF EVENT
36 CMC TIME

75 ΔH CD.H - $\Delta T1$ - $\Delta T2$
78 YAW - PITCH - OMICRON
79 .RATE - .DB
82 $\Delta VCDH$ LOCAL VERT
85 VG CONTROL AXES
87 CALIB SHAFT - T.RUN
89 .LAT - LONG/2 - ALT
90 Y ACT-Y DOT ACT-Y DOT PAS.S
91 PRESENT SHAFT - T.RUN
92 COMMAND SHAFT - T.RUN
93 TORQUING ANG
94 SHAFT - T.RUN
95 TFI/TFC - VG - VI
99 POS ERR. - VEL ERR - CODE

ALARM CODES (V05N09)

00110 MK REJECT ENTERED & IGNORED
 00113 NO INBITS (CH 16)
 00114 MORE MKS THAN DESIRED
 00115 V41N91 WITH OPTICS NOT IN CMC
 00116 OPTICS SW MOVED BEFORE 15 SEC
 00117 V41N91 BUT OPTICS NOT READY
 00120 ZERO OPTICS FIRST
 00121 CDUS BAD DURING MK-REPEAT
 00205 PIPA SATURATED
 00206 CANNOT ZERO ICDU-WITH ALARMS
 00207 NEED 90 SEC FOR ISS TURN ON
 00210 IMU NOT OPERATING
 00211 COARSE ALIGN ERROR>2 DEG
 00212 PIPA FAIL BUT PIPA NOT IN USE
 00213 IMU NOT ON-TURN ON IMU
 00214 PROGRAM USING IMU BUT IMU OFF
 00217 COARSE ALIGN/TORQUING PROBLEM
 00220 IMU NOT ALIGNED/NO REFSMMAT
 00401 DESIRED MGA TOO LARGE
 00402 DO SECOND MINKEY PULSE TORQUE
 00404 * TGT OUT OF VIEW (TRUN> 90 DEG)
 00405 STAR PAIR NOT AVAILABLE
 00406 P20 NOT OPERATING
 00421 W MATRIX OVERFLOW
 00600 NO SOLUTION ON 1ST ITERATION
 00601 HP < 5.8 NM AFTER CSI

00602 HP < 5.8 NM AFTER CDH
 00603 CSI TIG TO CDH TIG $\Delta T < 10$ MIN
 00604 CDH TIG TO TPI TIG $\Delta T < 10$ MIN
 00605 TOO MANY ITERATIONS
 00606 CSI $\Delta V > 1000$ LAST 2 ITERATIONS
 00611 NO TIG FOR ELEV ANGLE GIVEN
 00612 WRONG SPHERE OF INFL AT TIG
 00613 REENTRY ANGLE OUT OF LIMITS
 00777 ISS WARNING-PIPA FAIL
 01102 CMC SELF TEST ERROR
 01105 DOWNLINK TOO FAST
 01106 UPLINK TOO FAST
 01107 PHASE TABLE FAIL-ERASABLE BAD
 01301 ARCSIN/ARCCOS INPUT > ONE
 01407 VG INCREASING
 01426 IMU UNSATISFACTORY
 01427 IMU POLARITY REVERSED
 01520 V37 NOT PERMITTED NOW
 01600 OVERFLOW DURING DRIFT TEST
 01601 BAD IMU TORQUE
 01703 INSUF TIME TO INTEG-TIG SLIP
 03777 ISS WARNING-ICDU FAIL
 04777 ISS WARNING-ICDU & PIPA FAIL
 07777 ISS WARNING-IMU FAIL
 10777 ISS WARNING-IMU & PIPA FAIL
 13777 ISS WARNING-IMU & ICDU FAIL

14777 ISS WARN-IMU,ICDU & PIPA FAIL
 20430 ORBITAL INTEGRATION STOPPED
 20607 NO CONIC SOLUTION
 20610 ALTITUDE < 400K AT TIG (P37)
 21204 NEG OR ZERO WAITLIST CALL
 21206 TWO DISPLAYS ATTEMPTED AT ONCE
 21210 TWO PROGRAMS USING AT ONCE
 21302 SORT CALLED WITH NEG ARGUMENT
 21501 DSKY ALARM DURING INTERNAL USE
 21502 ILLEGAL FLASHING DISPLAY
 21521 KEYED POI AFTER LIFTOFF
 31104 DELAY ROUTINE IS BUSY
 31201 EXEC OVERFLOW-NO VAC AREAS
 31202 EXEC OVERFLOW-NO CORE SETS
 31203 WAITLIST OVERFLOW-MANY TASKS
 31211 CANNOT INTERRUPT EXTENDED VERB

NOTE :

00404 * IS A PRIORITY ALARM
 2XXXX POODOO-NO RESTART LT-F37
 (AVE G ON OR EXT VERB -
 ACTS AS BAILOUT)
 3XXXX BAILOUT-NO RESTART LT-
 PROGRAM CONTINUES

ABBREVIATIONS

ACN	ASCENSION TRACKING STATION
AGS	ABORT GUIDANCE SYSTEM
ANG	ANTIGUA TRACKING STATION
AOS	ACQUISITION OF SIGNAL
APS	ASCENT PROPULSION SYSTEM
BDA	BERMUDA TRACKING STATION
BT	BURN TIME
CAL	CALIFORNIA TRACKING STATION
CDH	CONSTANT DIFFERENTIAL HEIGHT
CDR	COMMANDER
CES	CONTROL ELECTRONICS SYSTEM
CMC	COMMAND MODULE COMPUTER
CRO	CARNARVON TRACKING STATION
CSI	CONCENTRIC SEQUENCE INITIATION
CSM	COMMAND AND SERVICE MODULES
CYI	GRAND CANARY ISLAND
DAP	DIGITAL AUTOPILOT
DOI	DESCENT ORBIT INSERTION
DPS	DESCENT PROPULSION SYSTEM
EI	ENTRY INTERFACE
EMU	EXTRAVEHICULAR MOBILITY UNIT
EOI	EARTH ORBIT INSERTION
EPO	EARTH PARKING ORBIT
EVA	EXTRAVEHICULAR ACTIVITY
EVT	EXTRAVEHICULAR TRANSFER
FTP	FIXED THROTTLE POINT
GBM	GRAND BAHAMA TRACKING STATION
GDS	GOLDSTONE TRACKING STATION
g.e.t.	GROUND ELAPSED TIME
G.m.t.	GREENWICH MEAN TIME
G&N	GUIDANCE AND NAVIGATION
GYM	GUAYMAS TRACKING STATION
H _o	APOGEE ALTITUDE
HAW	HAWAII TRACKING STATION
H _p	PERIGEE ALTITUDE
IVC	INTERVEHICLE COMMUNICATIONS
IVT	INTRAVEHICULAR TRANSFER
LGC	LM GUIDANCE COMPUTER
LLM	LUNAR LANDING MISSION
LLS	LUNAR LANDING SITE
LM	LUNAR MODULE
LMP	LUNAR MODULE PILOT
LOI	LUNAR ORBIT INSERTION
LOS	LOSS OF SIGNAL
LPO	LUNAR PARKING ORBIT

ABBREVIATIONS

LR	LANDING RADAR
MC	LM MIDCOURSE CORRECTION
MCC	MIDCOURSE CORRECTION
MER	MERCURY TRACKING SHIP
MGA	MIDDLE GIMBAL ANGLE
MIL	MERRITT ISLAND TRACKING STATION
MSFN	MANNED SPACE FLIGHT NETWORK
OGA	OUTER GIMBAL ANGLE
OPS	OXYGEN PURGE SYSTEM
PC	PLANE CHANGE
PDI	POWER DESCENT INITIATION
PGA	PRESSURE GARMENT ASSEMBLY
PGNCS	PRIMARY GUIDANCE & NAVIGATION CONTROL SUBSYSTEM
PLSS	PORTABLE LIFE SUPPORT SYSTEM
PRE	PRETORIA TRACKING STATION
PTC	PASSIVE THERMO CONTROL
RCS	REACTION CONTROL SUBSYSTEM
RDG	POSITION TARGET FOR LM DESCENT
RR	RENDEZVOUS RADAR
SECO	SIIVB ENGINE CUT-OFF
SLA	SPACECRAFT LM ADAPTER
SPS	SERVICE PROPULSION SYSTEM
S-IC	SATURN IC, LV FIRST STAGE
S-II	SATURN II, LV SECOND STAGE
S-IVB	SATURN IVB, LV THIRD STAGE
TAN	TANANARIVE TRACKING STATION
TEC	TRANSEARTH COAST
TD&E	TRANSPOSITION & DOCKING & EXTRACTION
TEI	TRANSEARTH INSERTION
TEX	CORPUS CHRISTI TRACKING STATION
TLC	TRANSLUNAR COAST
TLI	TRANSLUNAR INJECTION
TPF	TERMINAL PHASE FINALIZATION
TPI	TERMINAL PHASE INITIALIZATION
TPM	TERMINAL PHASE MIDCOURSE
TVC	THRUST VECTOR CONTROL
VAN	VANGUARD TRACKING SHIP
ΔV	VELOCITY CHANGE (DIFFERENTIAL)
ΔVC	VELOCITY CHANGE AT ENGINE CUT-OFF
ΔR	POSITION CHANGE (DIFFERENTIAL)

NEWS CENTERS

CAPE KENNEDY

NASA - Apollo 17 Mission News Center	783 7781
NASA - Recorded Information	784 2380
Apollo Contractors Information Center	783 4063

HOUSTON

NASA - Manned Spacecraft Center - News	483 5111
NASA - Recorded Information	483 6112
Joint Industry Press Center - King's Inn	488 5472

DELCO ELECTRONICS DIVISION, GENERAL MOTORS
(Prime Contractor, Guidance and Navigation System;
Major Subcontractor to The Boeing Company for
Lunar Roving Vehicle Mobility System)

Public Relations - Kokomo, Ind.	(317) 459 2453
---------------------------------	----------------

FOR APOLLO 17 MISSION

Bill Draper (Cape Kennedy)	Caravelle	783 1300
	(Houston) King's Inn	488 0220
Bill Noack (Houston)	King's Inn	488 0220

KOLLSMAN INSTRUMENT CORPORATION (Optical Subsystems)

Alvin Allen (Syosset, N.Y.) (516) 921 4300

RAYTHEON COMPANY (Computer Subsystems)

John Severance (Lexington, Mass.)	(617) 862 6600
(Houston) King's Inn	488 0220

TRANSPORTATION

AIR	Cape Area (305)	Houston (713)
National	(800) 432 9431	244 9011
Eastern	632 3110 & 773 1270	621 8100
Delta	262 9526 & 636 3144	623 6000
Braniff		621 3111
American		222 9873
Continental		524 4711
Houston Metro (STOL)		524 9121
GROUND		
Avis	783 3643	443 8870
Hertz	783 7771	443 0800
National	783 7007 & 723 3035	443 8850
Limousine	783 1400	223 6426

MOTELS

	Cape Area (305)		Houston (713)
Freedom Center	783 0361	Airport Inn	644 1261
Caravelle	783 1300	Holiday Inn (Alvin)	331 5227
Holiday Inn	783 2271	Holiday Inn (NASA)	591 2500
Howard Johnson	783 9481	King's Inn	488 0220
Howard Johnson	267 7900		
(Titusville)			
Holiday Inn	269 2121		
(Titusville)			