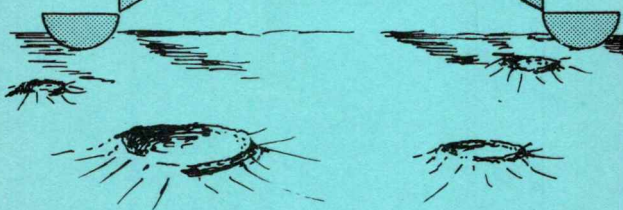
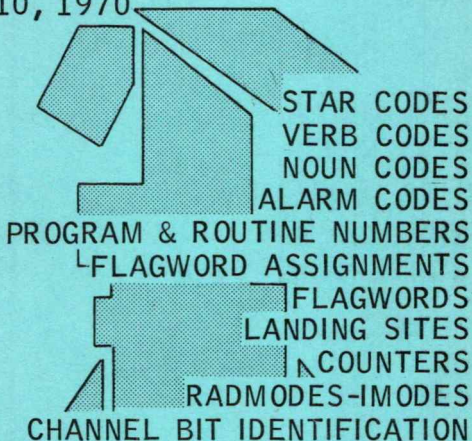


LMS-ISLGC REFERENCE INFORMATION

LUMINARY 173 (1D)

JULY 10, 1970



Progress Is Our Most Important Product

GENERAL  ELECTRIC

APOLLO SYSTEMS-HOUSTON PROGRAMS
HOUSTON, TEXAS

STAR/PLANET LIST

OCTAL STAR CODE	NAME	VIS. MAG.	RIGHT		DECLINATION (DEG. MIN.)
			ASCENSION (HR. MIN.)		
1	ALPHA ANDROMEDAE (ALPHERATZ)	2.1	0	06	+28 53
2	BETA CETI (DIPHDA)	2.2	0	42	-18 11
3	GAMMA CASSIOPEIAE (NAVI)	2.2	0	54	+60 27
4	ALPHA ERIDANI (ACHERNAR)	0.6	1	36	-57 25
5	ALPHA URSAE MINORIS (POLARIS)	2.1	1	58	+89 06
6	THETA ERIDANI (ACAMAR)	3.4	2	57	-40 26
7	ALPHA CETI (MENKAR)	2.8	3	00	+03 56
10	ALPHA PERSEI (MIRFAK)	1.9	3	22	+49 44
11	ALPHA TAURI (ALDEBARAN)	1.1	4	34	+16 26
12	BETA ORIONIS (RIGEL)	0.3	5	12	-08 15
13	ALPHA AURIGAE (CAPELLA)	0.2	5	13	+45 57
14	ALPHA CARINAE (CANOPUS)	-0.9	6	23	-52 40
15	ALPHA CANIS MAJORIS (SIRIUS)	-1.6	6	44	-16 40
16	ALPHA CANIS MINORIS (PROCYON)	0.5	7	37	+05 19
17	GAMMA VELORIUM (REGOR)	1.9	8	08	-47 14
20	IOA URSAE MAJORIS (DNOCES)	3.1	8	50	+48 30
21	ALPHA HYDRAE (ALPHARD)	2.2	9	26	-08 30
22	ALPHA LEONIS (REGULUS)	1.3	10	06	+12 09
23	BETA LEONIS (DENEbola)	2.2	11	47	+14 46
24	GAMMA CORVI (GIENAH)	2.8	12	13	-17 20
25	ALPHA CRUCIS (ACRUX)	1.6	12	24	-62 49
26	ALPHA VIRGINIS (SPICA)	1.2	13	23	-10 58
27	ETA URSAE MAJORIS (ALKALD)	1.9	13	46	+49 30
30	THETA CENTAURI (MENKENT)	2.3	14	04	-36 11
31	ALPHA BOOTIS (ARCTURUS)	0.2	14	14	+19 22
32	ALPHA CORONAE BOREALIS (ALPHECCA)	2.3	15	33	+26 50
33	ALPHA SCORPII (ANTARES)	1.2	16	27	-26 21
34	ALPHA TRIANGULI AUSTR. (ATRIA)	1.9	16	43	-68 56
35	ALPHA OPHIUCHI (RASALHAGUE)	2.1	17	33	+12 35
36	ALPHA LYRAE (VEGA)	0.1	18	36	+38 45
37	SIGMA SAGITTARII (NUNKI)	2.1	18	53	-26 20
40	ALPHA AQUILAE (ALTAIR)	0.9	19	49	+08 46
41	BETA CAPRICORNI (DABIH)	3.2	20	19	-14 54
42	ALPHA PAVONIS (PEACOCK)	2.1	20	23	-56 51
43	ALPHA CYGNI (DENEb)	1.3	20	40	+45 09
44	EPISILON PEGASI (ENIF)	2.5	21	42	+09 42
45	ALPHA PICIS AUSTRINUS (FORMALHAUT)	1.3	22	56	-29 49
46	SUN				
47	EARTH				
50	MOON				
00	PLANET				

STARS - COMMON NAMES - ALPHABETICAL

STAR	NO.	STAR	NO.	STAR	NO.
ACAMAR	6	CANOPUS	14	MIRFAK	10
ACHERNAR	4	CAPELLA	13	NAVI	3
ACRUX	25	DABIH	41	NUNKI	37
ALDEBARAN	11	DENEb	43	PEACOCK	42
ALKALD	27	DENEbola	23	PROCYON	16
ALPHARD	21	DIPHDA	2	POLARIS	5
ALPHECCA	32	DNOCES	20	RASALHAGUE	35
ALPHERATZ	1	ENIF	44	REGOR	17
ALTAIR	40	FORMALHAUT	45	REGULUS	22
ANTARES	33	GIENAH	24	RIGEL	12
ARCTURUS	31	MENKAR	7	SIRIUS	15
ATRIA	34	MENKENT	30	SPICA	26
				VEGA	36

VERB CODES FOR LM

REGULAR VERBS

00 NOT IN USE
 01 DISPLAY OCTAL COMP 1 IN R1
 02 DISPLAY OCTAL COMP 2 IN R1
 03 DISPLAY OCTAL COMP 3 IN R1
 04 DISPLAY OCTAL COMP 1,2 IN R1, R2
 05 DISPLAY OCTAL COMP 1, 2, 3 IN R1, R2, R3
 06 DISPLAY DECIMAL (R1 OR R1, R2 OR R1, R2, R3)
 07 DISPLAY DP DECIMAL (R1,R2) (TEST ONLY)
 08 NOT IN USE
 09 NOT IN USE
 10 NOT IN USE
 11 MONITOR OCTAL COMP 1 IN R1
 12 MONITOR OCTAL COMP 2 IN R1
 13 MONITOR OCTAL COMP 3 IN R1
 14 MONITOR OCTAL COMP 1, 2 IN R1, R2
 15 MONITOR OCTAL COMP 1, 2, 3 IN R1, R2, R3
 16 MONITOR DECIMAL (R1 OR R1, R2 OR R1, R2, R3)
 17 MONITOR DP DECIMAL (R1, R2) (TEST ONLY)
 18 NOT IN USE
 19 NOT IN USE
 20 NOT IN USE
 21 LOAD COMPONENT 1 INTO R1
 22 LOAD COMPONENT 2 INTO R2
 23 LOAD COMPONENT 3 INTO R3
 24 LOAD COMPONENT 1, 2 INTO R1, R2
 25 LOAD COMPONENT 1, 2, 3 INTO R1, R2, R3
 26 NOT IN USE
 27 DISPLAY FIXED MEMORY (GROUND USE)
 28 NOT IN USE
 29 NOT IN USE
 30 REQUEST EXECUTIVE (GROUND USE)
 31 REQUEST WAITLIST (GROUND USE)
 32 RECYCLE PROGRAM
 33 PROCEED WITHOUT DSKY INPUTS
 34 TERMINATE FUNCTION
 35 TEST LIGHTS
 36 REQUEST FRESH START
 37 CHANGE PROGRAM (MAJOR MODE)
 38 NOT IN USE
 39 NOT IN USE

EXTENDED VERBS

40 ZERO CDU-S (SPECIFY N20 OR N72)
 41 COARSE ALIGN CDU (SPECIFY N20 OR N72)
 42 FINE ALIGN IMU
 43 LOAD IMU ATTITUDE ERROR METERS (TEST ONLY)
 44 TERMINATE RR CONTINUOUS DESIGNATE (V41N72 OPTION 2)
 45 NOT IN USE
 46 NOT IN USE
 47 INITIALIZE AGS (R47)
 48 START DAP LOAD ROUTINE (R03)
 49 START CREW DEFINED MANEUVER ROUTINE (R62)
 50 PLEASE PERFORM
 51 NOT IN USE

VERB CODES FOR LM (CONT.)

EXTENDED VERBS

52 PLEASE MARK X-RETICLE
 53 PLEASE MARK Y-RETICLE
 54 PLEASE MARK X OR Y-RETICLE
 55 INCREMENT LGC TIME (DECIMAL)
 56 TERMINATE TRACKING (P20,P25)
 57 PERMIT LANDING RADAR UPDATES (P63)
 58 INHIBIT LANDING RADAR UPDATES
 59 COMMAND LR TO POSITION 2
 60 DISPLAY VEHICLE ATTITUDE RATES ON FDI ERROR NEEDLES
 61 DISPLAY DAP FOLLOWING ATTITUDE ERRORS MODE I
 62 DISPLAY TOTAL ATTITUDE ERRORS (N22) MODE II
 63 SAMPLE RADAR ONCE PER SECOND (R04)
 64 REQUEST S-BAND ANTENNA ROUTINE (R05)
 (CALCULATE DISPLAY S-BAND ANTENNA ANGLES)
 65 DISABLE U,V JETS DURING DPS BURNS
 66 VEHICLES ARE ATTACHED. MOVE THIS VEHICLE STATE VECTOR
 TO OTHER VEHICLE
 67 DISPLAY W MATRIX RMS ERROR
 68 TAKE OUT TERRAIN MODEL IN DESCENT
 69 CAUSE HARDWARE RESTART
 70 START UPDATE LIFTOFF TIME (P27)
 71 START UNIVERSAL UPDATE-BLOCK ADR (P27)
 72 START UNIVERSAL UPDATE-SINGLE ADR (P27)
 73 UPDATE LGC TIME (OCTAL) (P27)
 74 INITIALIZE ERASABLE DUMP VIA DOWNLINK
 75 RESET ENABLE U,V JETS DURING DPS BURNS
 76 MINIMUM IMPULSE COMMAND MODE
 77 RATE COMMAND AND ATTITUDE HOLD MODE
 78 START LR SPURIOUS RETURN TEST (R77)
 79 STOP LR SPURIOUS RETURN TEST (R77)
 80 ENABLE UPDATE LEM STATE VECTOR
 81 ENABLE UPDATE CSM STATE VECTOR
 82 REQUEST ORBIT PARAM DISPLAY (R30)
 83 REQUEST REND PARAM DISPLAY (R31)
 84 NOT IN USE
 85 DISPLAY RR LOS AZIMUTH AND ELQVATION
 86 NOT IN USE
 87 NOT IN USE
 88 NOT IN USE
 89 REQUEST RENDEZVOUS FINAL ATTITUDE ROUTINE (R63)
 90 REQUEST RENDEZVOUS OUT OF PLANE DISPLAY (R36)
 91 DISPLAY BANKSUM
 92 OPERATE IMU PERFORMANCE TEST (P07) (GROUND USE)
 93 ENABLE W MATRIX INITIALIZATION
 94 NOT IN USE
 95 NO UPDATE OF EITHER STATE VECTOR (P20 OR P22)
 96 INTERRUPT INTEGRATION AND GO TO P00
 97 PERFORM ENGINE FAIL PROCEDURE (R40)
 98 NOT IN USE
 99 PLEASE ENABLE ENGINE (P12,P40,P42,P63)

NOUN CODES

<u>NORMAL NOUNS</u>		<u>COMPONENTS & SCALING</u>			<u>RESTRICTIONS</u> (SEE CODE)
00	NOT IN USE				
01	SPECIFY MACHINE ADDRESS (FRACT.)	3 COMP	.XXXXX	FOR EA	A
02	SPECIFY MACHINE ADDRESS (WHOLE)	3 COMP	XXXXX.	FOR EA	B
03	SPECIFY MACHINE ADDRESS (DEGREES)	3 COMP	XXX.XX	DEG FOR EA	A
04	GRAVITY ERROR ANGLE	1 COMP	XXX.XX	DEG	C
05	SIGHTING ANGLE DIFFERENCE	1 COMP	XXX.XX	DEG	C
06	OPTION CODE ID	3 COMP	OCTAL		B
	OPTION CODE		OCTAL		
	DATA CODE		OCTAL		
07	ECADR OF WORD TO BE MODIFIED	3 COMP	OCTAL		B
	ONES FOR BITS TO BE MODIFIED		OCTAL		
	1 TO SET OR 0 TO RESET SELECTED BITS		OCTAL		
LOADING NOUN 07 WILL SET OR RESET SELECTED BITS IN ANY ERASABLE REGISTER					
08	ALARM DATA	3 COMP	OCTAL ONLY	FOR EA	D
09	ALARM CODES	3 COMP	OCTAL ONLY	FOR EA	D
10	CHANNEL TO BE SPECIFIED	1 COMP	OCTAL ONLY		
11	TIG OF CSI	3 COMP	0000X. HRS 0000X. MIN 0XX.XX SEC		A3
12	OPTION CODES (USED BY EXTENDED VERBS ONLY)	2 COMP	OCTAL ONLY		D
13	TIG OF CDH	3 COMP	0000X. HRS 0000X. MIN 0XX.XX SEC		A3
14	CHECKLIST (USED INTERNALLY BY EXTENDED VERBS ONLY).	3 COMP	XXXXX. FOR EA		C
15	INCREMENT MACHINE ADDRESS	1 COMP	OCTAL ONLY		D
16	TIME OF EVENT (USED BY EXTENDED VERBS ONLY)	3 COMP	0000X. HRS 0000X. MIN 0XX.XX SEC		A3
17	SPARE				
18	AUTO MANEUVERS FDAI BALL ANGLES	3 COMP	XXX.XX	DEG FOR EA	A
19	SPARE				
20	PRESENT ICDU ANGLES	3 COMP	XXX.XX	DEG FOR EA	C
21	PIPAS	3 COMP	XXXXX.	PULSES FOR EA X,Y,Z	C
22	DESIRED ICDU ANGLES	3 COMP	XXX.XX	DEG FOR EA OG,IG,MG	A
23	SPARE				
24	DELTA TIME FOR IGC CLOCK	3 COMP	0000X. HRS 0000X. MIN 0XX.XX SEC		A3
25	CHECKLIST (USED WITH V50)	3 COMP	XXXXX.		D
26	PRIORITY/DELAY, ADRES, BBCON	3 COMP	OCTAL ONLY	FOR EA	B
27	SELF TEST ON/OFF SWITCH	1 COMP	XXXXX.		B
28	SPARE				
29	SPARE				
30	SPARE				
31	SPARE				
32	TIME FROM PERIGEE	3 COMP	0000X. HRS 0000X. MIN 0XX.XX SEC		A3

NOUN CODES (CONT.)

<u>NORMAL NOUNS</u>		<u>COMPONENTS & SCALING</u>	<u>RESTRICTI- TIONS</u>
33 TIME OF IGNITION	3 COMP	0000X. HRS 0000X. MIN 00X.XX SEC	A3
34 TIME OF EVENT	3 COMP	0000X. HRS 0000X. MIN 00X.XX SEC	A3
35 TIME FROM EVENT	3 COMP	0000X. HRS 0000X. MIN 00X.XX SEC	A3
36 TIME OF LGC CLOCK	3 COMP	0000X. HRS 0000X. MIN 00X.XX SEC	A3
37 TIG OF TPI	3 COMP	0000X. HRS 0000X. MIN 00X.XX SEC	A3
38 TIME OF STATE VECTOR BEING INTEGRATED	3 COMP	0000X. HRS 0000X. MIN 00X.XX SEC	A3
39 SPARE			
<u>MIXED NOUNS</u>			
40 TIME FROM IGNITION/CUTOFF VG	3 COMP	X0BXX MIN/SEC XXXX.X FT/SEC	C
DELTA V (MEASURED)		XXXX.X FT/SEC	
41 NAV BASE AZIMUTH	2 COMP	XXX.XX DEG	E
NAV BASE LATITUDE		XX.XXX DEG	
42 APOGEE ALTITUDE (H _a)	3 COMP	XXXX.X NAUT MI	A
PERIGEE ALTITUDE (H _p)		XXXX.X NAUT MI	
DELTA V (REQUIRED)		XXXX.X FT/SEC	
43 LATITUDE, (+ NORTH)	3 COMP	XXX.XX DEG	A
LONGITUDE, (+ EAST)		XXX.XX DEG	
ALTITUDE		XXXX.X NAUT MI	
44 APOGEE ALTITUDE	3 COMP	XXXX.X NAUT MI	C
PERIGEE ALTITUDE		XXXX.X NAUT MI	
TFF		X0BXX MIN/SEC	
45 MARKS, TTI OF NEXT BURN, MGA	3 COMP	XXXXX. X0BXX MIN/SEC XXX.XX DEG	C
46 AUTOPILOT CONFIGURATION	1 COMP	XXXXX. OCTAL	B
47 IM WEIGHT	2 COMP	XXXXX. LBS	A
CSM WEIGHT		XXXXX. LBS	
48 GIMBAL PITCH TRIM	2 COMP	XXX.XX DEG	A
GIMBAL ROLL TRIM		XXX.XX DEG	
49 DELTA R	2 COMP	XXXX.X NAUT MI	C
DELTA V		XXXX.X FT/SEC	
RADAR DATA SOURCE CODE		XXXXX.	
50 SPARE			
51 S-BAND ANTENNA ANGLES PITCH, YAW	2 COMP	XXX.XX DEG XXX.XX DEG	C
52 CENTRAL ANGLE OF ACTIVE VEHICLE	1 COMP	XXX.XX DEG	C
53 SPARE			
54 RANGE	3 COMP	XXX.XX NAUT MI	C
RANGE RATE		XXXX.X FT/SEC	
THETA		XXX.XX DEG	

NOUN CODES (CONT.)

MIXED NOUNS	COMPONENTS & SCALING	RESTRICTIONS
55 NO. OF APSIDAL CROSSINGS (NORTH) ELEVATION ANGLE (EAST) CENTRAL ANGLE OF PASSIVE VEHICLE	3 COMP XXXXX. XXX.XX DEG XXX.XX DEG	A
56 RR LOS AZIMUTH RR LOS ELEVATION	2 COMP XXX.XX DEG XXX.XX DEG	C
57 SPARE		
58 PERIGEE ALTITUDE (POST TPI) DELTA V (TPI) DELTA V (TPF)	3 COMP XXXX.X NAUT MI XXXX.X FT/SEC .XXXX.X FT/SEC	C
59 DELTA VELOCITY LOS	3 COMP XXXX.X FT/SEC EA	C
60 FORWARD VELOCITY ALTITUDE RATE COMPUTED ALTITUDE	3 COMP XXXX.X FT/SEC XXXX.X FT/SEC XXXXX. FT	C
61 TIME TO GO IN BRAKING PHASE TIME TO IGNITION CROSS RANGE DISTANCE	3 COMP XXBXX MIN/SEC XXBXX MIN/SEC XXXX.X NAUT MI	C
62 ABSOLUTE VALUE OF VELOCITY TIME TO IGNITION DELTA V (MEASURED)	3 COMP XXXX.X FT/SEC XXBXX MIN/SEC XXXX.X FT/SEC	C
63 ABSOLUTE VALUE OF VELOCITY ALTITUDE RATE COMPUTED ALTITUDE	3 COMP XXXX.X FT/SEC XXXX.X FT/SEC XXXXX. FT	C
64 TIME LEFT FOR RE- DESIGNATION - LFDANGLE ALTITUDE RATE COMPUTED ALTITUDE	3 COMP XXBXX SEC-DEG XXXX.X FT/SEC XXXXX. FT	C
65 SAMPLED LOC TIME (FETCHED IN INTERRUPT)	3 COMP OXXXX. HRS OXXXX. MIN OXX.XX SEC	A3
66 LR SLANT RANGE LR POSITION	2 COMP XXXXX. FT +XXXXX	C
67 LR VX LR XY LR VZ	3 COMP XXXXX. FT/SEC XXXXX. FT/SEC XXXXX. FT/SEC	C
68 SLANT RANGE TO LANDING SITE TIME TO GO IN BRAKING PHASE LR ALTITUDE - COMPUTED ALTITUDE	3 COMP XXXX.X NAUT MI XXBXX MIN/SEC XXXXX. FT	C
69 LANDING SITE CORRECTION, Z COMP LANDING SITE CORRECTION, Y COMP LANDING SITE CORRECTION, X COMP	3 COMP XXXXX. FT XXXXX. FT XXXXX. FT	A
70 AOT DETENT CODE/STAR CODE (BEFORE MARK)	3 COMP OCTAL ONLY	B
71 AOT DETENT CODE/STAR CODE (AFTER MARK)	3 COMP OCTAL ONLY	D
72 RR TRUNNION ANGLE RR SHAFT ANGLE	2 COMP XXX.XX DEG XXX.XX DEG	A
73 NEW RR TRUNNION ANGLE NEW RR SHAFT ANGLE	2 COMP XXX.XX DEG XXX.XX DEG	C
74 TIME FROM IGNITION YAW AFTER VEHICLE RISE PITCH AFTER VEHICLE RISE	3 COMP XXBXX MIN-SEC XXX.XX DEG XXX.XX DEG	C
75 DELTA ALTITUDE CDH DELTA TIME (CDH - CSI OR TPI - CDH) DELTA TIME (TPI - CDH OR TPI - NOMTPI)	3 COMP XXXX.X NAUT MI XXBXX MIN-SEC XXBXX MIN-SEC	C

NOUN CODES (CONT.)

<u>MIXED NOUNS</u>	<u>COMPONENTS & SCALING</u>	<u>RESTRICTIONS</u>
76 DESIRED HORIZONTAL VELOCITY DESIRED RADIAL VELOCITY CROSSRANGE DISTANCE	3 COMP XXXX.X FT/SEC XXXX.X FT/SEC XXXX.X NM	A
77 TIME TO ENGINE CUTOFF VELOCITY NORMAL TO CSM PLANE	2 COMP XKBXX MIN/SEC XXXX.X FT/SEC	C
78 RR RANGE RR RANGE RATE TIME FROM IGNITION	3 COMP XXX.XX NAUT/MI XXXXX. FT/SEC XKBXX MIN/SEC	C
79 CURSOR ANGLE SPIRAL ANGLE POSITION CODE (AOT)	3 COMP XXX.XX DEG XXX.XX DEG XXXXX.	A
80 DATA INDICATOR OMEGA	2 COMP XXXX. XXX.XX DEG	C
81 DELTA V (LV)	3 COMP XXXX.X FT/SEC FOR EA X,Y,Z	A
82 DELTA V (LV)	3 COMP XXXX.X FT/SEC FOR EA X,Y,Z	A
83 DELTA V (LM)	3 COMP XXXX.X FT/SEC FOR EA X,Y,Z	A
84 DELTA V (LV,CSM)	3 COMP XXXX.X FT/SEC FOR EA X,Y,Z	A
85 VG (LM)	3 COMP XXXX.X FT/SEC FOR EA X,Y,Z	A
86 VG (LV)	3 COMP XXXX.X FT/SEC FOR EA X,Y,Z	A
87 BACKUP OPTICS LOS AXIMUTH BACKUP OPTICS LOS ELEVATION	2 COMP XXX.XX DEG XXX.XX DEG	A
88 CELESTIAL BODY UNIT POS. VECTOR	3 COMP .XXXXX FOR EA	A
89 LANDMARK LATITUDE LONGITUDE/2 ALTITUDE	3 COMP XX.XXX DEG XX.XXX DEG XXX.XX NAUT MI	A
90 REND OUT OF PLANE Y Y DOT PSI	3 COMP XXX.XX NAUT MI XXXX.X FT/SEC XXX.XX DEG	C
91 ALTITUDE VELOCITY FLIGHT PATH ANGLE	3 COMP XXXXXB NM XXXXX. FT/SEC XXX.XX DEG	C
92 PCT FTP (10.5K LB) AT PRESENT THRUST ALTITUDE RATE COMPUTED ALTITUDE	3 COMP XXXXX. XXXX.X FT/SEC XXXXX. FT	C
93 DELTA GYRO ANGLES	3 COMP XX.XXX DEG FOR EA X,Y,Z	C
94 SPARE		
95 SPARE		
96 SPARE		
97 SYSTEM TEST INPUTS	3 COMP XXXXX. FOR EA	B
98 SYSTEM TEST RESULTS AND INPUTS	3 COMP XXXXX. .XXXXX XXXXX.	E
99 WMATRIX RMS ERROR IN POSITION RMS ERROR IN VELOCITY RMS IN BIAS	3 COMP XXX.XX NAUT MI XXXX.X FT/SEC XX.XXX RADIANS	A

RESTRICTION CODE

A DECIMAL ONLY	C NO LOAD DECIMAL ONLY
B OCTAL ONLY	D NO LOAD OCTAL ONLY
A3 DECIMAL ONLY MUST LOAD 3 COMPONENTS	E SYSTEM TEST ONLY

CHECKLIST CODES FOR LUMINARY
(USED WITH V50 N25)

<u>R1 CODE</u>		<u>ACTION TO BE EFFECTED</u>
00013	KEY IN	NORMAL OR GYRO COARSE ALIGN IN P52
00014	PROCEED	DO IMU FINE ALIGNMENT ROUTINE (P57,P63,R51)
00014	ENTER	DO LANDING SITE DETERMINATION (N89DISP)(P57)
00015	PERFORM	CELESTIAL BODY ACQUISITION (P51,R51)
00062	SWITCH	LGC POWER DOWN (P06)
00201	SWITCH	RR MODE TO AUTOMATIC (P20,P22,R04)
00203	SWITCH	GUID CONTROL TO PGNC, MODE TO AUTO, THROTTLE CONTROL TO AUTO (P12,P40,P42,P63,P71)
00205	PERFORM	MANUAL ACQUISITION OF RR (R23)
00500	SWITCH	LR ANTENNA TO POSITION 1 (P63)

NOTE: SWITCH DENOTES: CHANGE POSITION OF A CONSOLE SWITCH
 PERFORM DENOTES: START OR END OF A TASK
 KEY IN: DENOTES KEY IN OF DATA THRU THE DSKY

LIST OF OPTION CODES FOR LUMINARY
(USED WITH V04 N06)

THE SPECIFIED OPTION CODES WILL BE FLASHED IN COMPONENT R1 IN CONJUNCTION WITH FLASHING V04 N06 TO REQUEST THE ASTRONAUT TO LOAD INTO COMPONENT R2 THE OPTION HE DESIRES.

<u>R1 OPTION CODE</u>	<u>PURPOSE</u>	<u>INPUT FOR R2</u>
00001	SPECIFY IMU ORIENTATION	1 = PREF, 2 - NOMINAL 3 = REFSMMAT, 4 = LANDSITE (P)
00002	SPECIFY VEHICLE	1 = LM 2 - CSM (P21,R30)
00003	SPECIFY TRACKING ATTITUDE	1 = PREFERRED, 2 = OTHER (R63)
00004	SPECIFY RADAR	1 = RR 2 = LR (R04)
00005	SPECIFY SOR PHASE	1 = FIRST 2 = SECOND (P38)
00006	SPECIFY RR COARSE ALIGN OPTION	1 = LOCKON 2 = CONTINUOUS DESIGNATE (V41 N72)
00010	SPECIFY ALIGNMENT MODE	0 = ANYTIME 1 = REFSMMAT+G (2 = TWO BODIES 3 = ONE BODY
00012	SPECIFY CSM ORBIT OPTION	1 = NO ORBIT CHANGE 2 = CHA ORBIT TO PASS OVER LM (P2

ALARM CODES

<u>CODE</u>	<u>TYPE</u>	<u>SET BY</u>
00107	MORE THAN 5 MARK PAIRS	AOTMARK
00111	MARK MISSING	AOTMARK
00112	MARK OR MARK REJECT NOT BEING ACCEPTED	AOTMARK
00113	NO INBITS	AOTMARK
00114	MARK MADE BUT NOT DESIRED	AOTMARK
00115	NO MARK PAIRS IN LAST PAIR TO REJECT	AOTMARK
00206	ZERO ENCODE NOT ALLOWED WITH COARSE ALIGN + GIMBAL LOCK	IMU MODE SWITCHING
00207	ISS TURN ON REQUEST NOT PRESENT FOR 90 SEC	T4RUPT
00210	IMU NOT OPERATING	IMU MODE SW IMU/2,R02,P51,P57
00211	COARSE ALIGN ERROR	IMU/MODE SWITCH
00212	PIPA FAIL BUT PIPA IS NOT BEING USED	IMU/MODE SWITCH, T4RUPT
00213	IMU NOT OPERATING WITH TURN ON-REQUEST	T4RUPT
00214	PROGRAM USING IMU WHEN TURNED OFF	T4RUPT
00217	BAD RETURN FROM STALL ROUTINES	P51,P52,P57
00220	IMU NOT ALIGNED BAD REFSMMAT	R47,R02
00401	DESIRED GIMBAL ANGLES YIELD GIMBAL LOCK	INF ALIGN,IMU/2
00402	FINDCDUW NOT CONTROLLING ATTITUDE	FINDCDUW
00404	TWO STARS NOT AVAILABLE IN ANY DETENT	R59,LUNAR SURFACE
00405	TWO STARS NOT AVAILABLE	P52
00421	W-MATRIX OVERFLOW	INTEGRV
00501 P	RADAR ANTENNA OUT OF LIMITS	R23
00502	BAD RADAR GIMBAL ANGLE INPUT	V41N72
00503 P	RADAR ANTENNA DESIGNATE FAIL	R21,NON-P IN V41N72
00510	RADAR AUTO DISCRETE NOT PRESENT	R25
00511	LR NOT IN POSITION 2 OR REPOSITIONING	SERVICER
00514 P	RR GOES OUT OF AUTO MODE WHILE IN USE	P20
00515	RR CDU FAIL DISCRETE PRESENT	R25
00520	RADARUPT NOT EXPECTED AT THIS TIME	RADAR READ
00521	COULD NOT READ RADAR	P20
00522	LR POSITION CHANGE	RADAR READ
00523 P	LR ANTENNA FAILED TO ACHIEVE POSITION 2 IN ALLOWABLE TIME	SERVICER, V60 (NON-PINV60)
00525 P	DELTA THETA GREATER THAN 3 DEGREES	R22
00526 P	RANGE GREATER THAN 400 NAUTICAL MILES	P20,P22
00527 P	LOS NOT IN MODE 2 COVERAGE WHILE ON LUNAR SURFACE OR VEHICLE MANEUVER REQUIRED	R21,R24
00530 P	LOS NOT IN MODE 2 COVERAGE ON LUNAR SURFACE AFTER 600 SECS.	R21
00600	IMAGINARY ROOTS ON FIRST ITERATION	P32,P72
00601	PERIGEE ALTITUDE CSI LESS THAN 35K FT (LUNAR ORBIT) OR 85 NM (EARTH ORBIT)	P32,P72
00602	PERIGEE ALTITUDE CDH LESS THAN 35K FT (LUNAR ORBIT) OR 85 NM (EARTH ORBIT)	P32,P72
00603	CSI TO CDH TIME LESS THAN 10 MIN	P32,P72,P33,P73
00604	CDH TO TPI TIME LESS THAN 10 MIN OR COMPUTED CDH TIME IS GREATER THAN INPUT TPI TIME	P32,P72
00605	NUMBER OF ITERATIONS EXCEEDS LOOP MAXIMUM	P32,P72
00606	DV EXCEEDS MAXIMUM	P32,P72
00611	NO TIG FOR GIVEN ELEV ANGLE	P34,P74
00701	ILLEGAL OPTION CODE SELECTED	P57
00777	PIPA FAIL CAUSED THE ISS WARNING	T4RUPT
01102	LCG SELF TEST ERROR	SELF TEST
01105	DOWNLINK TOO FAST	T4RUPT
01106	UPLINK TOO FAST	T4RUPT
01107	PHASE TABLE FAILURE, ASSUME ERASABLE MEMORY IS SUSPECT	RESTART

ALARM CODES (CONT.)

<u>CODE</u>	<u>TYPE</u>	<u>SET BY</u>
01301	ARCSIN - ARCCOS ARGUMENT TOO LARGE	INTERPRETER
01406	BAD RETURN FROM ROOTPSRS	DESCENT GUIDANCE EQNS
01407	VG INCREASING (DELTA-V ACCUMULATED GREATER THAN 90 DEGREES AWAY FROM DESIRED THRUST VECTOR)	P40,P42
01410	UNINTENTIONAL OVERFLOW IN GUIDANCE	DESCENT GUIDANCE EQNS
01412	DESCENT IGNITION ALGORITHM NOT CONVERGING	P63
01520	V37 REQUEST NOT PERMITTED AT THIS TIME	V37
01600	OVERFLOW IN DRIFT TEST	GROUND TEST
01601	BAD IMU TORQUE	GROUND TEST
01703	LESS THAN 45 SECONDS TO IGNITION (SLIP IGNITION)	MIDOTAVE
01706	INCORRECT PROGRAM REQUESTED FOR VEHICLE CONFIGURATION	P40,p42
02001	JET FAILURES HAVE DISABLED Y-Z TRANSLATION	DAP
02002	JET FAILURES HAVE DISABLED X TRANSLATION	DAP
02003	JET FAILURES HAVE DISABLED P ROTATION	DAP
02004	JET FAILURES HAVE DISABLED U-V ROTATION	DAP
03777	ICDU FAIL CAUSED THE ISS WARNING	T4RUPT
04777	ICDU,PIPA FAILS CAUSED THE ISS WARNING	T4RUPT
07777	IMU FAIL CAUSED THE ISS WARNING	T4RUPT
10777	IMU, PIPA FAILS CAUSED THE ISS WARNING	T4RUPT
13777	IMU, ICDU FAILS CAUSED THE ISS WARNING	T4RUPT
14777	IMU,ICDU,PIPA FAILS CAUSED THE ISS WARNING	T4RUPT

NOTE: P INDICATES A PRIORITY ALARM. ALL OTHERS ARE NON-ABORTIVE.

**THE FOLLOWING CODES INDICATE THE MORE SERIOUS POODOO ABORTS THAT RESULT IN THE PROGRAM GOING TO ROO

**20105	AOTMARK SYSTEM IN USE	AOTMARK
**20430	ACCELERATION OVERFLOW IN INTEGRATION	ORBITAL INTEGRATION
**20607	NO SOLUTION FROM TIME-THETA OR TIME-RADIUS	TIMETHET, TIMERAD
**21103	UNUSED CCS BRANCH EXECUTED	ABORT
**21204	WAITLIST, VARDELAY, FXDELAY, OR LONGCALL CALLED WITH ZERO OR NEGATIVE DELTA-TIME	ROUTINES WAITLIST
**21302	SQRT CALLED WITH NEGATIVE ARGUMENT	INTERPRETER
**21406	BAD RETURN FROM ROOTPSRS	IGNITION ALGORITHMS
**21501	KEYBOARD AND DISPLAY ALARM DURING INTERNAL USE (NVSUB) ABORT	PINBALL

* THE FOLLOWING CODES INDICATE A BAILOUT ABORT THAT RESULTS IN A SOFTWARE RESTART

*31104	DELAY ROUTINE BUSY	EXECUTIVE
*31201	EXECUTIVE OVERFLOW - NO VAC AREAS	EXECUTIVE
*31202	EXECUTIVE OVERFLOW - NO CORE SETS	EXECUTIVE
*31203	WAITLIST OVERFLOW - TOO MANY TASKS	WAITLIST
**31206	SECOND JOB ATTEMPTS TO GO TO SLEEP VIA KEYBOARD AND DISPLAY PROGRAM	PINBALL
*31207	NO VAC AREAS FOR MARKS	AOTMARK
*31210	TWO PROGRAMS USING DEVICE AT SAME TIME	MODE SWITCHING
*31211	ILLEGAL INTERRUPT OF EXTENDED VERT	AOTMARK
*31502	TWO PRIORITY DISPLAYS WAITING	DSP INTERFACE
*32000	DAP STILL IN PROGRESS AT NEXT TIME 5 RUPT	DAP

LM GUIDANCE COMPUTER PROGRAMS AND ROUTINES

<u>NUMBER</u>	<u>TITLE</u>
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SERVICER

P00	LGC IDLING
P06	PGNCS POWER DOWN
P07	SYSTEMS TEST (NON-FLIGHT)

ASCENT

P12	POWERED ASCENT GUIDANCE
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COAST

P20	RENDEZVOUS NAVIGATION
P21	GROUND TRACK DETERMINATION
P22	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)

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

NOTE: LUMINARY PROGRAMS AND ROUTINES LIST IS BASED ON GSOP R-567
VOL. IV, 7 DECEMBER 1969.

LM GUIDANCE COMPUTER PROGRAMS AND ROUTINES
(CONT.)

DESCENT AND LANDING

P63 LANDING MANEUVER: BRAKING PHASE
P64 LANDING MANEUVER: APPROACH PHASE
P65 LANDING PHASE (AUTO) (WILL NOT DISPLAY ON AUTO LANDING)
P66 RATE OF DESCENT LANDING PHASE (ROD)
 (ALSO P66 M.M. ON AUTO LANDING)
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 (TPS) TARGETING
P76 TARGET DELTA V

ROUTINES

TITLE

R00 FINAL AUTOMATIC REQUEST TERMINATE
R01 ERASABLE MODIFICATION
R02 IMU STATUS CHECK
R03 DIGITAL AUTOPILOT DATA LOAD
R04 RR/LR SELF TEST
R05 S BAND ANTENNA
R09 R10/R11/R12 SERVICE
R10 LANDING ANALOG DISPLAYS
R11 ABORT DISCRETES MONITOR
R12 DESCENT STATE VECTOR UPDATE

LM GUIDANCE COMPUTER PROGRAMS AND ROUTINES
(CONT.)

<u>ROUTINES</u>	<u>TITLE</u>
R13	LANDING AUTO MODES MONITOR
R20	LR/RR READ
R21	RR DESIGNATE
R22	RR DATA READ
R23	RR MANUAL ACQUISITION
R24	RR SEARCH
R25	RR MONITOR
R26	LUNAR SURFACE RR PRE-DESIGNATE
R30	ORBIT PARAMETER DISPLAY
R31	RENDEZVOUS PARAMETER DISPLAY
R33	LGC/CMC CLOCK SYNCHRONIZATION
R36	OUT-OF-PLANE RENDEZVOUS DISPLAY
R40	DPS/APS THRUST FAIL
R41	STATE VECTOR INTEGRATION (MID TO AVE)
R47	AGS INITIALIZATION
R50	COARSE ALIGN
R51	IN-FLIGHT FINE ALIGN
R52	AUTO OPTICS POSITIONING
R53	IN-FLIGHT SIGHTING MARK (AOT)
R54	SIGHTING DATA DISPLAY
R55	GYRO TORQUING
R56	TERMINATE TRACKING
R57	MARKRUPT
R58	CELESTIAL BODY DEFINITION
R59	LUNAR SURFACE SIGHTING MARK
R60	ATTITUDE MANEUVER
R61	PREFERRED TRACKING ATTITUDE
R62	CREW-DEFINED MANEUVER
R63	RENDEZVOUS FINAL ATTITUDE
R65	FINE PREFERRED TRACKING ATTITUDE
R76	EXTENDED VERB INTERLOCK
R77	LR SPURIOUS TEST

ALPHABETICAL FLAGWORD ASSIGNMENTS

<u>FLAGWORD NAME</u>	<u>BIT NO.</u>	<u>FLAGWORD NO.</u>
ABTTGFLG	07	FW09
ACCOKFLG	03	FW13
ACC4-2FL	11	FW13
ACMODFLG	13	FW02
ALTSCALE	09	FW12
ANTENFLG	12	FW12
AORBSFLG	05	FW05
AORBTFLG	10	FW13
APSEW	05	FW08
APSFLAG	13	FW10
ASTNFLAG	12	FW07
ATTFLAG	01	FW06
AUTOMODE	02	FW12
AUTR1FLG	01	FW13
AUTR2FLG	02	FW13
AUXFLAG	02	FW06
AVEGFLAG	05	FW07
AVEMIDSW	01	FW09
AVFLAG	05	FW02
CALCMAN2	02	FW02
CALCMAN3	03	FW02
CDESFLAG	15	FW12
CMOONFLG	12	FW08
COGAPLAG	04	FW08
CSMDKFLG	13	FW13
CULTFLAG	07	FW03
DAPBOOLS	ALL	FW13
DBSELFLG	04	FW13
DBSL2FLG	05	FW13
DESIGFLG	10	FW12
DIDFLAG	14	FW01
DIMOFLAG	01	FW03
DMENFLG	09	FW05
DRIFTDFL	08	FW13
DRIFTFLG	15	FW02
DSKYFLAG	15	FW05
D6OR9FLG	02	FW03
ENGONFLG	07	FW05
ERADFLAG	13	FW01
ETPIFLAG	07	FW02
FINALFLG	06	FW02
FLAGWRD0	ALL	(STATE +0)
FLAGWRD1	ALL	(STATE +1)
FLAGWRD2	ALL	(STATE +2)
FLAGWRD3	ALL	(STATE +3)
FLAGWRD4	ALL	(STATE +4)
FLAGWRD5	ALL	(STATE +5)
FLAGWRD6	ALL	(STATE +6)
FLAGWRD7	ALL	(STATE +7)
FLAGWRD8	ALL	(STATE +8D)
FLAGWRD9	ALL	(STATE +9D)
FLAP	08	FW09
FLGWRD10	ALL	(STATE +10D)
FLGWRD11	ALL	(STATE +11D)
FLGWRD12	ALL	(STATE +12D)
FLGWRD13	ALL	(STATE +13D)

ALPHABETICAL FLAGWORD ASSIGNMENTS

(CONT.)

<u>FLAGWORD NAME</u>	<u>BIT NO.</u>	<u>FLAGWORD NO.</u>
FLPC	12	FW09
FLPI	11	FW09
FLRCS	10	FW09
FLUNDISP	10	FW08
FLVR	14	FW09
FREEFLAG	03	FW00
FSPASFLG	10	FW00
GLOKFAIL	14	FW03
GMBDRVSW	10	FW06
GUESSW	02	FW01
HFAILFLG	13	FW11
HFLSHFLG	01	FW11
IDLEFLAG	07	FW07
IGNFLAG	13	FW07
IMPULSW	09	FW02
IMUSE	08	FW00
INFINFLG	07	FW08
INITALGN	02	FW08
INTFLAG	14	FW10
INTYPFLG	04	FW03
ITSWICH	15	FW07
JSWITCH	14	FW00
LETABORT	09	FW09
LMOONFLG	11	FW08
LOKONSW	05	FW00
LOSCMFLG	12	FW02
LPOS2FLG	06	FW11
LRALTFLG	05	FW12
LRBYPASS	15	FW11
LRINH	08	FW11
LRPOSFLG	06	FW12
LRVELFLG	08	FW12
LUNAFLAG	12	FW03
MANUFLAG	14	FW07
MGLVFLAG	02	FW05
MIDAVFLG	02	FW09
MIDFLAG	13	FW00
MID1FLAG	03	FW09
MKOVFLAG	03	FW04
MOONFLAG	12	FW00
MRKIDFLG	15	FW04
MRKNVFLG	09	FW04
MRUPTFLG	05	FW04
MUNFLAG	08	FW06
MWAITFLG	11	FW04
NEEDLFLG	04	FW00
NEED2FLG	15	FW00
NEWIFLG	13	FW08
NJETSFLG	15	FW01
NODOFLAG	01	FW02
NODOPO7	11	FW03

ALPHABETICAL FLAGWORD ASSIGNMENTS

(CONT.)

<u>FLAGWORD NAME</u>	<u>BIT NO.</u>	<u>FLAGWORD NO.</u>
NOLRREAD	10	FW11
NORMSW	10	FW07
NORRMON	04	FW05
NOTERFLG	11	FW01
NOTHROTL	12	FW05
NOUFPLAG	06	FW01
NRMNVFLG	08	FW04
NRMIDFLG	13	FW04
NRUPTFLG	04	FW04
NTARGFLG	03	FW06
NWAITFLG	10	FW04
ORBWFLG	06	FW03
ORDERSW	06	FW08
OURRCFLG	12	FW13
PDSFPLAG	12	FW04
PFRATFLG	04	FW02
PINBRFLG	06	FW04
POOHFLAG	15	FW03
PRECIFLG	08	FW03
PRIODFLG	14	FW01
PRONVFLG	07	FW04
PSTHIGAT	11	FW11
PULSEFLG	15	FW13
P21FLAG	11	FW00
P25FLAG	09	FW00
P66PROFL	01	FW00
P7071FLG	13	FW09
QUITFLAG	05	FW09
RADMODES	ALL	FW12
RASFLAG	ALL	FW10
RCDUFALL	07	FW12
RCDUOFLG	13	FW12
REDFLAG	06	FW06
REFSMFLG	13	FW03
REINTFLG	07	FW10
REMODFLG	14	FW12
RENDWFLG	01	FW05
REPOSMON	11	FW12
RHCSCFLG	07	FW13
RNDVZFLG	07	FW00
RNGEDATA	04	FW11
RNGSCFLG	10	FW05
RODFLAG	12	FW01
ROTFLAG	06	FW09
RPQFLAG	15	FW08

ALPHABETICAL FLAGWORD ASSIGNMENTS

(CONT.)

<u>FLAGWORD NAME</u>	<u>BIT NO.</u>	<u>FLAGWORD NO.</u>
RRDATAFL	04	FW12
RRNBSW	06	FW00
RRRSFLAG	03	FW12
RVSW	09	FW07
RO4FLAG	09	FW03
R10FLAG	02	FW00
R12RDFLG	03	FW11
R61FLAG	10	FW01
R77FLAG	11	FW05
SLOPESW	03	FW01
SNUFFER	13	FW05
SOLNSW	03	FW05
SRCHOPTN	14	FW02
STATEFLG	05	FW03
STEERSW	11	FW02
SURFFLAG	08	FW08
SWANDISP	11	FW07
S32.1F1	15	FW06
S32.1F2	14	FW06
S32.1F3A	13	FW06
S32.1S3B	12	FW06
TFFSW	01	FW07
TRACKFLG	05	FW01
TURNONFL	01	FW12
ULLAGFLG	06	FW13
UFDATFLG	07	FW01
UFLOCKFL	04	FW07
USEQRFLG	14	FW13
VEHUFFLG	08	FW01
VELDATA	07	FW11
VERIFLAG	03	FW07
VFAILFLG	14	FW11
VFLAG	10	FW03
VFLSHFLG	02	FW11
VINTFLAG	03	FW03
VXINH	12	FW11
V37FLAG	06	FW07
V67FLAG	08	FW07
V62EMFLG	02	FW07
XDELVFLG	08	FW02
XDSPFLAG	01	FW04
XORFLG	09	FW11
XOVINFLG	09	FW13
ZOOMFLAG	08	FW05
3AXISFLG	06	FW05
36CSW	01	FW08

FLAGWORD 0 LOCATION 0074

	<u>BIT</u>	<u>SET</u>	<u>RESET</u>
NEED2FLG	15	DISPLAY DAP RATES ON FDAI NEEDLES	CHECK BIT 4 OF THIS WORD FOR DISPLAY MODES (1 OR 2)
JSWITCH	14	INTEGRATION OF W MATRIX	INTEGRATION OF STATE VECTOR
MIDFLAG	13	INTEGRATION WITH SECONDARY BODY AND SOLAR PERTURBATIONS	INTEGRATION WITHOUT SOLAR PERTURBATIONS
MOONFLAG	12	MOON IS SPHERE OF INFLUENCE	EARTH IS SPHERE OF INFLUENCE
P21FLAG	11	USE BASE VECTORS ALREADY CALCULATED	FIRST PASS--CALCULATE BASE VECTORS
FSPASFLG	10	FIRST PASS THROUGH REPOSITION ROUTINE	NOT FIRST PASS THROUGH REPOSITION ROUTINE
P25FLAG	9	P25 OPERATING	P25 NOT OPERATING
IMUSE	8	IMU IN USE	IMU NOT IN USE
RNDVZFLG	7	P20 RUNNING (RADAR IN USE)	P20 NOT RUNNING (RADAR NOT IN USE)
RRNBSW	6	RADAR TARGET IN NB COORDINATES	RADAR TARGET IN SM COORDINATES
LOKONSW	5	RADAR LOCK-ON DESIRED	RADAR LOCK-ON NOT DESIRED
NEEDLFLG	4	TOTAL ATTITUDE ERROR DISPLAYED	A/P FOLLOWING ERROR DISPLAYED
FREEFLAG	3	USED BY P51-53 TEMPORARY IN MANY ROUTINES AND BY LUNAR AND SOLAR EPHEMERIDES	
R10FLAG	2	R10 OUTPUTS DATA TO ALTITUDE - ALTITUDE RATE METERS ONLY	BESIDES OUTPUT WHEN SET, R10 ALSO OUTPUT TO FORWARD LATERAL VELOCITY CROSSPOINTER
P66PROFL	1	CONTINUE P66 HORIZONTAL VELOCITY NULLING	STOP P66 HORIZONTAL VELOCITY NULLING

FLAGWORD 1 LOCATION 0075

<u>NAME</u>	<u>BIT</u>	<u>SET</u>	<u>RESET</u>
NJETSFLG	15	TWO JET RCS BURN	FOUR JET RCS BURN
DIDFLAG	14	INERTIAL DATA IS AVAILABLE	PERFORM DATA DISPLAY INITIALIZATION FUNCTION
ERADFLAG	13	COMPUTE REARTH FISCHER ELLIPSOID	USE CONSTANT REARTH PAD RADIUS
RODFLAG	12	IF IN P66, NORMAL OPERATION CONTINUES. RESTART CLEARS FLAG.	IF IN P66, RE-INITIALIZATION IS PERFORMED AND FLAG IS SET.
NOTERFLG	11	TERRAIN MODEL INHIBITED	TERRAIN MODEL PERMITTED
R61FLAG	10	RUN R61 LEM	RUN R65 LEM
SPARE	9		
VEHUPFLG	8	CSM STATE VECTOR BEING UPDATED	LM STATE VECTOR BEING UPDATED
UPDATFLG	7	UPDATING BY MARKS ALLOWED	UPDATING BY MARKS NOT ALLOWED
NOUPFLAG	6	NEITHER CSM NOR LM STATE VECTOR MAY BE UPDATED	EITHER STATE VECTOR MAY BE UPDATED
TRACKFLG	5	TRACKING ALLOWED	TRACKING NOT ALLOWED
SPARE	4		
SLOPESW	3	ITERATE WITH BIAS METHOD IN ITERATOR	ITERATE WITH REGULAR FALSI METHOD IN ITERATOR
GUESSW	2	NO STARTING VALUE FOR ITERATION EXISTS	STARTING VALUE FOR ITERATION EXISTS
SPARE	1		

FLAGWORD 2 LOCATION 0076

<u>NAME</u>	<u>BIT</u>	<u>SET</u>	<u>RESET</u>
DRIFTFLG	15	T3RUPT CALLS GYRO COMPENSATION	T3RUPT DOES NO GYRO COMPENSATION
SRCHOPTN	14	RADAR IN AUTOMATIC SEARCH OPTION (R24)	RADAR NOT IN AUTOMATIC SEARCH OPTION
ACMODFLG	13	MANUAL ACQUISITION BY RENDEZVOUS RADAR	AUTO ACQUISITION BY RENDEZVOUS RADAR
LOSCMFLG	12	LINE OF SIGHT BEING COMPUTED (R21)	LINE OF SIGHT NOT BEING COMPUTED
STEERSW	11	SUFFICIENT THRUST IS PRESENT	INSUFFICIENT THRUST IS PRESENT
SPARE	10		
IMPULSW	9	MINIMUM IMPULSE BURN (CUTOFF TIME SPECIFIED	STEERING BURN (NO CUTOFF TIME YET AVAILABLE
XDELVFLG	8	EXTERNAL DELTAV VG COMPUTATION	LAMBERT (AIMPOINT) VG COMPUTATION
ETPIFLAG	7	ELEVATION ANGLE SUPPLIED FOR P34, P74	TPI TIME SUPPLIED FOR P34, P74 TO COMPUTE ELEVATION
FINALFLG	6	LAST PASS THROUGH RENDEZVOUS PROGRAM COMPUTATIONS	INTERIM PASS THROUGH RENDEZVOUS PROGRAM COMPUTATIONS
AVFLAG	5	IM IS ACTIVE VEHICLE	CSM IS ACTIVE VEHICLE
PFPRATFLG	4	PREFERRED ATTITUDE COMPUTED	PREFERRED ATTITUDE NOT COMPUTED
CALCMAN3	3	NO FINAL ROLL	FINAL ROLL IS NECESSARY
CALCMAN2	2	PERFORM MANEUVER STARTING PROCEDURE	BYPASS STARTING PROCEDURE
NODOFLAG	1	V37 NOT PERMITTED	V37 PERMITTED

FLAGWORD 3 LOCATION 0077

<u>NAME</u>	<u>BIT</u>	<u>SET</u>	<u>RESET</u>
POOHFLAG	15	INHIBIT BACKWARDS INTEGRATION	ALLOW BACKWARDS INTEGRATION
GLOKFAIL	14	GIMBAL LOCK HAS OCCURRED	NOT IN GIMBAL LOCK
REFSMFLG	13	REFSMMAT GOOD	REFSMMAT NO GOOD
LUNAFLAG	12	LUNAR LAT-LONG	EARTH LAT-LONG
NODOPO7	11	SYSTEM TESTS NOT ALLOWED	SYSTEM TESTS ALLOWED
VFLAG	10	LESS THAN TWO STARS IN FIELD OF VIEW	TWO STARS IN FIELD OF VIEW
RO4FLAG	9	ALARM 521 SUPPRESSED	ALARM 521 ALLOWED
PRECIFLG	8	NORMAL INTEGRATION IN POO	ENGAGES 4-TIME STEP (POO) LOGIC IN INTEGRATION
CULTFLAG	7	STAR OCCULTED	STAR NOT OCCULTED
ORBWFLAG	6	W MATRIX VALID FOR ORBITAL NAVIGATION	W MATRIX INVALID FOR ORBITAL NAVIGATION
STATEFLG	5	PERMANENT STATE VECTOR UPDATED	PERMANENT STATE VECTOR NOT UPDATED
INTYPFLG	4	CONIC INTEGRATION	ENCKE INTEGRATION
VINTFLAG	3	CSM STATE VECTOR BEING INTEGRATED	LM STATE VECTOR BEING INTEGRATED
D6OR9FLG	2	DIMENSION OF W IS 9 FOR INTEGRATION	DIMENSION OF W IS 6 FOR INTEGRATION
DIMOFLAG	1	W MATRIX IS TO BE USED	W MATRIX IS NOT TO BE USED

FLAGWORD 4 LOCATION 0100

<u>NAME</u>	<u>BIT</u>	<u>SET</u>	<u>RESET</u>
MRKIDFLG	15	MARK DISPLAY IN ENDIDLE	NO MARK DISPLAY IN ENDIDLE
PRIODFLG	14	PRIORITY DISPLAY IN ENDIDLE	NO PRIORITY DISPLAY IN ENDIDLE
NRMIDFLG	13	NORMAL DISPLAY IN ENDIDLE	NO NORMAL DISPLAY IN ENDIDLE
PDSPFLAG	12	P20 SETS SO AS TO TURN A NORMAL DISPLAY INTO A PRIORITY DISPLAY IN R60	LEAVE AS NORMAL DISPLAY
MWAITFLG	11	HIGHER PRIORITY DISPLAY OPERATING WHEN MARK DISPLAY INITIATED	NO HIGHER PRIORITY DISPLAY OPERATING WHEN MARK DISPLAY INITIATED
NWAITFLG	10	HIGHER PRIORITY DISPLAY OPERATING WHEN NORMAL DISPLAY INITIATED	NO HIGHER PRIORITY DISPLAY OPERATING WHEN NORMAL DISPLAY INITIATED
MRKNVFLG	9	ASTRONAUT USING KEYBOARD WHEN MARK DISPLAY INITIATED	ASTRONAUT NOT USING KEYBOARD WHEN MARK DISPLAY INITIATED
NRMNVFLG	8	ASTRONAUT USING KEYBOARD WHEN NORMAL DISPLAY INITIATED	ASTRONAUT NOT USING KEYBOARD WHEN NORMAL DISPLAY INITIATED
PRONVFLG	7	ASTRONAUT USING KEYBOARD WHEN PRIORITY DISPLAY INITIATED	ASTRONAUT NOT USING KEYBOARD WHEN PRIORITY DISPLAY INITIATED
PINBRFLG	6	ASTRONAUT HAS INTERFERED WITH EXISTING DISPLAY	ASTRONAUT HAS NOT INTERFERED WITH EXISTING DISPLAY
MRIPTFLG	5	MARK DISPLAY INTERRUPTED BY PRIORITY DISPLAY	MARK DISPLAY NOT INTERRUPTED BY PRIORITY DISPLAY
NRIPTFLG	4	NORMAL DISPLAY INTERRUPTED BY PRIORITY OR MARK DISPLAY	NORMAL DISPLAY NOT INTERRUPTED BY PRIORITY OR MARK DISPLAY
MKOVFLAG	3	MARK DISPLAY OVER NORMAL	NO MARK DISPLAY OVER NORMAL
SPARE	2		
XDSPFLAG	1	MARK DISPLAY NOT TO BE INTERRUPTED	NO SPECIAL MARK INFORMATION

FLAGWORD 5 LOCATION 0101

<u>NAME</u>	<u>BIT</u>	<u>SET</u>	<u>RESET</u>
DSKYFLAG	15	DISPLAYS SENT TO DSKY	NO DISPLAYS TO DSKY
SPARE	14		
SNUFFER	13	U,V, JETS DISABLED DURING DPS BURNS (V65)	U,V JETS ENABLED DURING DPS BURNS (V75)
NOTHROTL	12	INHIBIT FULL THROTTLE	PERMIT FULL THROTTLE
R77FLAG	11	R77 IS ON, SUPPRESS ALL RADAR ALARMS AND TRACKER FAILS	R77 IS NOT ON
RNGSCFLG	10	SCALE CHANGE HAS OCCURRED DURING RR READING	NO SCALE CHANGE HAS OCCURRED DURING RR READING
DMENFLG	9	DIMENSION OF W IS 9 FOR INCORPORATION	DIMENSION OF W IS 6 FOR INCORPORATION
ZOOMFLAG	8	THROTTLE-UP HAS OCCURRED IN P63	THROTTLE-UP HAS NOT OCCURRED IN P63
ENGNONFLG	7	ENGINE TURNED ON	ENGINE TURNED OFF
3AXISFLG	6	MANEUVER SPECIFIED BY THREE AXES	MANEUVER SPECIFIED BY ONE AXIS - R60 CALLS VECPOINT
AORBSFLG	5	PREFER P AXIS JET PAIRS 7, 15 AND 8, 16	PREFER P AXIS JET PAIRS 4, 12 AND 3, 11
NORRMON	4	BYPASS RR GIMBAL MONITOR	PERFORM RR GIMBAL MONITOR
SOLNSW	3	LAMBERT DOES NOT CONVERGE, OR TIME- RAD NEARLY CIRCULAR	LAMBERT CONVERGES ON TIME-RADIUS NON-CIRCULAR
MGLVFLAG	2	LOCAL VERTICAL CO- ORDINATES COMPUTED	MIDDLE GIMBAL ANGLE COMPUTED
RENDWFLG	1	W MATRIX VALID FOR RENDEZVOUS NAVIGATION	W MATRIX INVALID FOR RENDEZVOUS NAVIGATION

FLAGWORD 6 LOCATION 0102

<u>NAME</u>	<u>BIT</u>	<u>SET</u>	<u>RESET</u>
S32.1F1	15	DELTA V AT CSI TIME ONE EXCEEDS MAX	DVT1 LESS THAN MAX
S32.1F2	14	FIRST PASS OF NEWTON ITERATION	REITERATION OF NEWTON
S32.1F3A	13	BIT 13 AND BIT 12 FUNCTION AS AN ORDERED PAIR (13,12) INDICATING THE POSSIBLE OCCURRENCE OF 2 NEW ITERATIONS FOR S32.1 IN THE PROGRAM IN THE FOLLOWING ORDER. (0,1) (I.E. BIT 13 RESET, BIT 12 SET)=FIRST NEWTON ITERATION BEING DONE (0.0)=FIRST PASS OF NEWTON ITERATION (1.1)=50 FT/SEC STAGE OF SECOND NEWTON ITERA- TION (1.0)=REMAINDER OF NEWTON ITERATION.	
S32.1F3B	12		
SPARE	11		
GMDRVSW	10	TRIMGIMB OVER	TRIMGIMB NOT OVER
SPARE	9		
MUNFLG	8	SERVICER CALLS MUNRVG	SERVICER CALLS CALCRVG
SPARE	7		
REDFLAG	6	LANDING SITE REDESIGNATION PERMITTED	LANDING SITE REDESIG- NATION NOT PERMITTED
SPARE	5		
SPARE	4		
NTARGFLG	3	ASTRONAUT DID OVERWRITE DELTA VELOCITY AT TPI OR TPM (P34,P35)	ASTRONAUT DID NOT OVERWRITE DELTA VELOCITY
AUXFLAG	2	PROVIDING IDLEFLAG IS NOT SET, SERVICER WILL EXERCISE DVMON ON ITS NEXT PASS	SERVICER WILL SKIP DVMON ON ITS NEXT PASS EVEN IF IDLEFLAG IS NOT SET. IT WILL THEN SET AUX FLAG
ATTFLAG	1	IM ATTITUDE EXISTS IN MOON-FIXED COORDINATES	NO IM ATTITUDE AVAILABLE IN MOON- FIXED COORDINATES

FLAGWORD " LOCATION 0103

<u>NAME</u>	<u>BIT</u>	<u>SET</u>	<u>RESET</u>
ITSWICH	15	P34-TPI TIME TO BE COMPUTED	TPI HAS BEEN COMPUTED
MANUFLAG	14	ATTITUDE MANEUVER GOING DURING RR SEARCH	NO ATTITUDE MANEUVER DURING RR SEARCH
IGNFLAG	13	TIG HAS ARRIVED	TIG HAS NOT ARRIVED
ASTNFLAG	12	ASTRONAUT HAS OKAYED IGNITION	ASTRONAUT HAS NOT OKAYED IGNITION
SWANDISP	11	LANDING ANALOG DISPLAYS ENABLED	LANDING ANALOG DISPLAYS SUPPRESSED
NORMSW	10	UNIT NORMAL IMPUT TO LAMBERT	LAMBERT COMPUTES ITS OWN UNIT NORMAL
RVSW	9	DO NOT COMPUTE FINAL STATE VECTOR IN TIME THETA	COMPUTE FINAL STATE VECTOR IN TIME-THETA
V67FLAG	8	ASTRONAUT OVERWRITE W-MATRIX INITIAL VALUES	ASTRONAUT DOES NOT OVERWRITE W-MATRIX INITIAL VALUES
IDLEFLAG	7	NO DV MONITOR	CONNECT DV MONITOR
V37FLAG	6	AVERAGE G (SERVICER) RUNNING	AVERAGE G (SERVICER) OFF
AVEGFLAG	5	AVERAGE G (SERVICER) DESIRED	AVERAGE G (SERVICER) NOT DESIRED
UPLOCKFL	4	K-KBAR-K FAIL	NO K-KBAR-K FAIL
VERIFLAG	3	CHANGED WHEN V33E OCCURS AT END OF P27	
V82EMFLG	2	MOON VICINITY	EARTH VICINITY
TFFSW	1	CALCULATE PERIGEE	CALCULATE TFF

FLAGWORD 8 LOCATION 0104

<u>NAME</u>	<u>BIT</u>	<u>SET</u>	<u>RESET</u>
RPQFLAG	15	RPQ NOT COMPUTED RPQ=VECTOR BETWEEN SECONDARY BODY AND PRIMARY BODY	RPQ COMPUTED
SPARE	14		
NEWIFLG	13	FIRST PASS THROUGH INTEGRATION	SUCCESSING ITERATION OF INTEGRATION
CMOONFLG	12	PERMANENT CSM STATE IN LUNAR SPHERE	PERMANENT CSM STATE IN EARTH SPHERE
LMOONFLG	11	PERMANENT LM STATE IN LUNAR SPHERE	PERMANENT LM STATE IN EARTH SPHERE
FLUNDISP	10	CURRENT GUIDANCE DISPLAYS INHIBITED	CURRENT GUIDANCE DISPLAYS PERMITTED
SPARE	9		
SURFFLAG	8	LM ON LUNAR SURFACE	LM NOT ON LUNAR SURFACE
INFINFLG	7	NO CONIC SOLUTION (CLOSURE THROUGH INFINITY REQUIRED)	CONIC SOLUTION EXISTS
ORDERSW	6	ITERATOR USES 2ND ORDER MINIMUM MODE	ITERATOR USES 1ST ORDER STANDARD MODE
APSESW	5	R DESIRED OUTSIDE PERICENTER-APOCENTER RANGE IN TIME-RADIUS	R DESIRED INSIDE PERICENTER-APOCENTER RANGE IN TIME-RADIUS
COGAFLAG	4	NO CONIC SOLUTION- TOO CLOSE TO RECTI- LINEAR (COGA OVRFLWS)	CONIC SOLUTION EXISTS (COGA DOES NOT OVERFLOW)
SPARE	3		
INITALGN	2	INITIAL PASS THRU P57	SECOND PASS THRU P57
360SW	1	TRANSFER ANGLE NEAR 360 DEGREES	TRANSFER ANGLE NOT NEAR 360 DEGREES

FLAGWORD 9 LOCATION 0105

<u>NAME</u>	<u>BIT</u>	<u>SET</u>	<u>RESET</u>
SPARE	15		
FLVR	14	VERTICAL RISE (ASCENT GUIDANCE)	NON-VERTICAL RISE
P7071FLG	13	P70 OR P71 IS USING GUIDANCE EQUATIONS	P12 IS USING THE ASCENT GUIDANCE EQUATIONS
FLPC	12	NO POSITION CONTROL (ASCENT GUIDANCE)	POSITION CONTROL
FLPI	11	PRE-IGNITION PHASE (ASCENT GUIDANCE)	REGULAR GUIDANCE
FLRCS	10	RCS INJECTION MODE (ASCENT GUIDANCE)	MAIN ENGINE MODE
LETABORT	9	ABORT PROGRAMS ARE ENABLED	ABORT PROGRAMS ARE NOT ENABLED
FLAP	8	APS CONTINUED ABORT AFTER DPS STAGING (ASCENT GUIDANCE)	APS ABORT IS NOT A CONTINUATION
ABTTGFLG	7	J2, K2 PARAMETERS USED FOR ABORT TARGETING	J1, K1 PARAMETERS USED FOR ABORT TARGETING
ROTFLAG	6	P70 AND P71 WILL FORCE VEHICLE ROTATION IN THE PREFERRED DIRECTION	P70 AND P71 WILL NOT FORCE VEHICLE ROTATION IN THE PREFERRED DIRECTION
QUITFLAG	5	DISCONTINUE INTEGRATION	CONTINUE INTEGRATION
SPARE	4		
MID1FLG	3	INTEGRATE TO TDEC	INTEGRATE TO THE THEN- PRESENT TIME
MIDAVFLG	2	INTEGRATION ENTERED FROM ONE OF MIDTOAV PORTALS	INTEGRATION WAS NOT ENTERED VIA MIDTOAV
AVEMIDSW	1	AVETOMID CALLING FOR W MATRIX INTEGRATION	NO AVETOMID W. INTEGRATION ALLOW SET UP RN, VN, PIPTIME

FLAGWORD 10 LOCATION 0106

<u>NAME</u>	<u>BIT</u>	<u>SET</u>	<u>RESET</u>
SPARE	15		
INTFLAG	14	INTEGRATION IN PROGRESS	INTEGRATION NOT IN PROGRESS
APSFLAG	13	ASCENT STAGE	DESCENT STAGE
SPARE	12		
SPARE	11		
SPARE	10		
SPARE	9		
SPARE	8		
REINTFLG	7	INTEGRATION ROUTINE TO BE RESTARTED	INTEGRATION ROUTINE NOT TO BE RESTARTED
SPARE	6		
SPARE	5		
SPARE	4		
SPARE	3		
SPARE	2		
SPARE	1		

FLAGWORD 11 LOCATION 0107

<u>NAME</u>	<u>BIT</u>	<u>SET</u>	<u>RESET</u>
LRBYPASS	15	BYPASS ALL LANDING RADAR UPDATES (R12)	DO NOT BYPASS LANDING RADAR UPDATES
VFAILFLG	14	LANDING RADAR VELOCITY FAILED REASONABLENESS TEST	LANDING RADAR PASSED REASONABLENESS TEST
HFAILFLG	13	LANDING RADAR ALTITUDE FAILED REASONABLENESS TEST	LANDING RADAR PASSED REASONABLENESS TEST
VXINH	12	IF Z VELOCITY DATA UNREASONABLE BYPASS X VELOCITY UPDATE ON NEXT PASS (R12)	UPDATE X AXIS VELOCITY
PSTHIGAT	11	PAST HIGATE	PREHIGATE
NOLRREAD	10	LANDING RADAR REPOSITIONING, BYPASS UPDATE (R12)	LR NOT REPOSITIONING
XORFLG	9	BELOW LIMIT, INHIBIT X AXIS OVEPRIDE (R12)	ABOVE LIMIT, DO NOT INHIBIT X AXIS OVERRIDE
LRINH	8	LANDING RADAR UPDATES PERMITTED BY ASTRONAUT	LANDING RADAR UPDATES INHIBITED BY ASTRONAUT
VELDATA	7	LR VELOCITY MEASUREMENT MADE (R12)	LR VELOCITY MEASUREMENT NOT MADE
LPOS2FLG	6	USE LR POSITION 2 TRANSFORMATION (R12)	USE LR POSITION 1 TRANSFORMATION
SPARE	5		
RNGEDATA	4	LR ALTITUDE MEASUREMENT MADE (R12)	LR ALTITUDE MEASUREMENT NOT MADE
R12RDFLG	3	WAIT UNTIL VELOCITY READS DONE BEFORE R12 PROCESSING	ALLOW R12 PROCESSING OF VELOCITY DATA, LR VELOCITY REDONE
VFLSHFLG	2	LR VELOCITY FAIL LAMP SHOULD BE FLASHING (R12)	LR VELOCITY FAIL LAMP SHOULD NOT BE FLASHING
HFLSHFLG	1	LR ALTITUDE FAIL LAMP SHOULD BE FLASHING (R12)	LR ALTITUDE FAIL LAMP SHOULD NOT BE FLASHING

FLAGWORD 12 LOCATION 0110
 (RADMODES EQUALS FLAGWORD 12)
 RADAR FLAGWORD

<u>NAME</u>	<u>BIT</u>	<u>SET</u>	<u>RESET</u>
CDESFLAG	15	CONTINUOUS DESIGNATE, LGC COMMANDS RR REGARDLESS OF LOCK-ON	LGC CHECKS FOR LOCK-ON WHEN ANTENNA BEING DESIGNATED
REMODFLG	14	CHANGE IN ANTENNA MODE HAS BEEN REQUESTED, I.E. REMODE	NO REMODE REQUESTED OR OCCURRING
RCDUOFLG	13	RR CDU-S BEING ZEROED	RR CDU-S NOT BEING ZEROED
ANTENFLG	12	RR ANTENNA MODE IS MODE 2	RR ANTENNA IN MODE 1
REPOSMON	11	REPOSITION MONITOR, RR REPOSITION IS TAKING PLACE	NO REPOSITION TAKING PLACE
DESIGFLG	10	RR DESIGNATE REQUESTED OR IN PROGRESS	RR DESIGNATE NOT RE- QUESTED OR IN PROGRESS
ALTSCALE	9	LR ALTITUDE READING IS ON HIGH SCALE	LR ALTITUDE READING IS ON LOW SCALE
LRVELFLG	8	LR VELOCITY DATA FAIL	NO LR VELOCITY DATA FAIL
RCDUFAIL	7	RR CDU FAIL HAS NOT OCCURRED	RR CDU FAIL OCCURRED
LRPOSFLG	6	LANDING RADAR POSITION 2	LANDING RADAR POSITION 1
LRALTFLG	5	LR ALTITUDE DATA FAIL. COULD NOT BE READ SUCCESSFULLY	NO LR ALTITUDE DATA FAIL
RRDATAFL	4	RR DATA FAIL. DATA COULD NOT BE READ SUCCESSFULLY	NO RR DATA FAIL
RRRSFLAG	3	RR RANGE READING ON THE HIGH SCALE	RR RANGE READING ON THE LOW SCALE
AUTOMODE	2	RR NOT IN AUTO MODE. AUTO MODE DISCRETE IS NOT PRESENT	RR IN AUTO MODE
TURNONFL	1	RR TURN-ON SEQUENCE IN PROGRESS. (ZERO CDUS. FIX ANTENNA MODE)	NO RR TURN-ON SEQUENCE IN PROGRESS

FLAGWORD 13 LOCATION 0111
(DAPBOOLS EQUALS FLAGWORD 13 DIGITAL AUTOPILOT FLAGWORD.)

<u>NAME</u>	<u>BIT</u>	<u>SET</u>	<u>RESET</u>
PULSEFLG (PULSES)	15	MINIMUM IMPULSE COMMAND MODE. IN ATTITUDE HOLD (V76)	NOT IN MINIMUM IMPULSE COMMAND MODE (V77)
USEQRFLG (USEQRJTS)	14	GIMBAL UNUSABLE. USE JETS ONLY	TRIM GIMBAL MAY BE USED
CSMDKFLG (CSMDOCKD)	13	CSM DOCKED. USE BACKUP DAP	CSM NOT DOCKED TO IM
OURREFLG (OURRCBIT)	12	CURRENT DAP PASS IS RATE COMMAND	CURRENT DAP PASS IS NOT RATE COMMAND
ACC4-2FL (ACC4OR2X)	11	4 JET X-AXIS TRANSLA- TION REQUESTED	2 JET X-AXIS TRANSLA- TION REQUESTED
AORBTFLG (AORBTRAN)	10	B-SYSTEM FOR X-TRANS- LATION	A-SYSTEM FOR X-TRANS- LATION (PREFERRED)
LPDFHASE (XOVINHIB)	9	IN LPD PHASE (X-AXIS OVERRIDE LOCKED OUT)	NOT IN LPD PHASE (X-AXIS OVERRIDE OKAY)
DRIFTDFL (DRIFTBIT)	8	ASSUME ZERO OFFSET DRIFTING FLIGHT	USE OFFSET ACCELERATION ESTIMATE
RHCSCFLG (RHCSSCALE)	7	NORMAL RHC SCALING REQUESTED	FINE RHC SCALING REQUESTED
ULLAGFLG (ULLAGER)	6	ULLAGE REQUESTED BY MISSION PROGRAM	NO INTERNAL ULLAGE REQUESTED
DBSL2FLG (DBSELECT2)	5	5 DEGREE DEADBAND SELECTED BY CREW	1 OR .3 DEGREE DEAD- BAND SELECTED BY CREW
DBSELFLG (DBSELECT)	4	1 DEGREE DEADBAND SELECTED BY CREW	MINIMUM DEADBAND SELECTED BY CREW (0.3 DEG.)
ACCSOKFLG (ACCSOKAY)	3	CONTROL AUTHORITY VALUES FROM ACCS USABLE	RESTART OR FRESH START SINCE LAST 1/ACCS. OUTPUTS SUSPECT
AUTR2FLG (AUTORATE 2)	2	THESE FLAGS ARE USED TOGETHER TO INDICATE ASTRO- NAUT CHOSEN HALCMANU MANEUVER RATES (0,0) = (BIT 2, BIT 1) = 0.2 DEG/SEC (0,1) = 0.5 DEG/SEC	
AUTR1FLG (AUTORATE 1)	1	(1,0) = 2.0 DEG/SEC (1,1) = 10.0 DEG/SEC	

FRESH START SETS DAPBOOLS TO 21322 OCTAL

PROGRAM 64 LUNAR LANDING SITE REDESIGNATION

DURING THE LPD MODE ONE PULSE INTRODUCED TO THE LGC VIA THE RHC PROVIDES A FIXED ANGULAR INCREMENT ($\frac{1}{2}$ DEGREE IN ELEVATION AND 2 DEGREES IN AZIMUTH)

- (A) - PITCH ROTATION = - LPD ELEVATION (NEW SITE BEYOND PRESENT SITE)
- (B) + PITCH ROTATION = LPD ELEVATION (NEW SITE SHORT OF PRESENT SITE)
- (C) + ROLL ROTATION = LPD AZIMUTH (RIGHT CROSSRANGE)
- (D) - ROLL ROTATION = - LPD AZIMUTH (LEFT CROSSRANGE)

ROUTINE 03
VERB 48 ENTER

THE DAP DATA CODE VO6N46 SIGNIFIES THE FOLLOWING: R1:ABCDE

- A - VEHICLE CONFIGURATION
 - 1 - LM ALONE, ASCENT
 - 2 - LM ALONE, DESCENT
 - 3 - CSM AND LM DOCKED
- B - ACCELERATION CODE
 - 0 - 2-JET X TRANSLATION WITH SYSTEM A JETS
 - 1 - 2-JET X TRANSLATION WITH SYSTEM B JETS
 - 2 - 4-JET X TRANSLATION, SYSTEM A PREFERRED BUT BOTH USED
 - 3 - 4-JET X TRANSLATION, SYSTEM B PREFERRED BUT BOTH USED
- C - ACA SCALING
 - 0 - FINE
 - 1 - NORMAL
- D - DEADBAND
 - 0 - 0.3 DEGREE DEADBAND
 - 1 - 1.0 DEGREE DEADBAND
 - 2 - 5.0 DEGREE DEADBAND
 - 3 - 5.0 DEGREE DEADBAND (BY DEFAULT)
- E - MANEUVER RATE
 - 0 - 0.2 DEG/SEC
 - 1 - 0.5 DEG/SEC
 - 2 - 2.0 DEG/SEC
 - 3 - 10.0 DEG/SEC

LUNAR LANDING SITE COORDINATES

<u>LANDING SITE</u>	<u>LONGITUDE</u>	<u>LATITUDE</u>	<u>ELEVATION (RADIUS VECTOR)</u>
SITE 7	23° 23' 31" W	2° 58' 56" S	1735719 METERS
FRA MAURO	17° 29' 03" W	3° 40' 07" S	1736685 METERS
DESCARTES	15° 34' E	8° 51' S	1737800 METERS
LITROW	28° 57' 00" E	21° 44' 10" N	1735150 METERS
CENSORINUS	32° 28' 50" E	0° 18' 40" S	1735800 METERS
TYCHO	11° 24' 25" W	41° 02' 45" S	1737900 METERS
COPERNICUS	19° 55' W	9° 52' N	1733000 METERS
MARIUS HILLS	56° 34' W	14° 36' N	1734600 METERS
HADLEY/APENNINES	2° 27' E	24° 47' N	1740500 METERS
HYGINUS RILLE	6° 23' 54" E	8° 02' 54" N	1736800 METERS
6R (FLAMSTEED)	42° 41' 18" W	2° 46' 12" S	1736450 METERS
DAVY RILLE	6° 17' 10" W	11° 02' 30" S	1736700 METERS

LGC COUNTER INTERRUPTS

LGC MEMORY LOCATION (COUNTER)	NAME	REMARKS	SCALE	RANGE
0024	TIME 2	STORES MOST SIGNIFICANT TIME WORD	INCREMENTS EACH 163.84 SEC	OVERFLOWS EACH 31D, 1H,39M,14.56S
0025	TIME 1	STORES LEAST SIGNIFICANT TIME WORD	INCREMENTS EACH 0.01 SEC	OVERFLOWS EACH 163.84 SEC
0026	TIME 3	TIME COUNTER FOR T-3RUPT	INCREMENTED EACH 10 MS	+ 16384
0027	TIME 4	TIME COUNTER FOR T-4RUPT	INCREMENTED EACH 10 MS	+ 16384
0030	TIME 5	TIME COUNTER FOR REACTION CONTROL	INCREMENTED EACH 10 MS	+ 16384
0031	TIME 6	TIME COUNTER FOR REACTION CONTROL	DECREMENTED 0.625 MS	
0032	CDU X	COUNTS $\pm \Delta \theta$ PULSES FROM X INERTIAL CDU	39.55 $\frac{\text{SEC}}{\text{COUNT}}$	$\pm 180^\circ$
0033	CDU Y	COUNTS $\pm \Delta \theta$ PULSES FROM Y INERTIAL CDU	39.55 $\frac{\text{SEC}}{\text{COUNT}}$	$\pm 180^\circ$
0034	CDU Z	COUNTS $\pm \Delta \theta$ PULSES FROM Z INERTIAL CDU	39.55 $\frac{\text{SEC}}{\text{COUNT}}$	$\pm 180^\circ$
0035	CDU T (OPT Y)	COUNTS $\pm \Delta \theta$ PULSES FROM RADAR TRUNNIN CDU	39.55 $\frac{\text{SEC}}{\text{COUNT}}$	$\pm 70^\circ$
0036	CDU S (OPT X)	COUNTS $\pm \Delta \theta$ PULSES FROM RADAR SHAFT CDU	39.55 $\frac{\text{SEC}}{\text{COUNT}}$	+ 180° - 70°
0037	PIPA X	COUNTS $\pm \Delta \theta$ PULSES FROM X PIPA	1.0 CM/SEC/ COUNT	± 16383 CM
0040	PIPA Y	COUNTS $\pm \Delta \theta$ PULSES FROM Y PIPA	1.0 CM/SEC/ COUNT	± 16383 CM
0041	PIPA Z	COUNTS $\pm \Delta \theta$ PULSES FROM Z PIPA	1.0 CM/SEC/ COUNT	± 16383 CM
0042	Q-RHCCTR	COUNTS PITCH $\pm \Delta \theta$ PULSES FROM RHC	3.82 COUNTS/ DEG	$\pm 11^\circ$
0043	P-RHCCTR	COUNTS YAW $\pm \Delta \theta$ PULSES FROM RHC	3.82 COUNTS/ DEG	$\pm 11^\circ$
0044	R-RHCCTR	COUNTS ROLL $\pm \Delta \theta$ PULSES FROM RHC	3.82 COUNTS/ DEG	$\pm 11^\circ$
0045	INLINK	CONVERTS SERIAL UPLINK DATA INTO PARALLEL INFORMATION		
0046	RNRAD	CONVERTS SERIAL RADAR DATA INTO PARALLEL INFORMATION		

LGC COUNTER INTERRUPTS
(CONTINUED)

LGC MEMORY LOCATION (COUNTER)	NAME	REMARKS	SCALE	RANGE
0047	GYROCMD	OUTPUT PULSES TO SELECTED GYRO	.618 $\frac{\text{SEC}}{\text{COUNT}}$	$\pm 4.0^\circ$
0050	CDUXCMD	OUTPUT PULSES TO X (OUTER) CDU	158.2 $\frac{\text{SEC}}{\text{COUNT}}$	$\pm 16.88^\circ$
		YAW ATTITUDE ERROR DISPLAY	388 COUNTS/DEG	$\pm 5-1/16^\circ$
0051	CDUYCMD	OUTPUT PULSES TO Y (INNER) CDU	158.2 $\frac{\text{SEC}}{\text{COUNT}}$	$\pm 16.88^\circ$
		PITCH ATTITUDE ERROR DISPLAY	388 COUNTS/DEG	$\pm 5-1/16^\circ$
0052	CDUZCMD	OUTPUT PULSES TO Z (MIDDLE) CDU	158.2 $\frac{\text{SEC}}{\text{COUNT}}$	$\pm 16.88^\circ$
		ROLL ATTITUDE ERROR DISPLAY	388 COUNTS/DEG	$\pm 5-1/16^\circ$
0053	OPTXCMD CDUTCMD	OUTPUT PULSES TO TRUNNION CDU	38.4 COUNTS/DEG 0.5571 FPS/BIT	± 10 DEG ± 200 FPS
0054	OPTXCMD CDUSCMD	OUTPUT PULSES TO SHAFT CDU	38.4 COUNTS/DEG 0.5571 FPS/BIT	± 10 DEG ± 200 FPS
0055	THRUST	THRUST DRIVE FOR METER DISPLAY AND ENGINE CONTROL	ABOUT 2.7 LBS/COUNT	9450 LBS 0-3428 COUNTS
0056	LEMONM	NOT USED		
0057	OUTLINK	NOT USED		
0060	ALTM	OUTPUT PULSES TO ATTITUDE AND ALTITUDE RATE METERS	2.345 FT/COUNT 0.5 FPS/COUNT	0-60000 FT ± 500 FPS

RADMODES--CHANNEL CORRELATION		
BIT	RADMODES DESCRIPTION (BIT SET)	CHANNEL 33 DESCRIPTION
15	CONTINUOUS DESIGNATE	
14	RR REMODE	
13	RR ZERO IN PROGRESS	
12	RR MODE (ANTENNA) POS. 2	
11	MONITOR REPOSITION	
10	RR DESIGNATE IN PROGRESS	
9	LR HIGH SCALE	LR RANGE LOW SCALE
8	LR VELOCITY DATA FAIL	LR VELOCITY DATA GOOD
7	RR CDU OPERATIVE	CHANNEL 30 RR CDU FAIL
6	LR ANTENNA POSITION #2	LR ANTENNA POSITION 1
5	LR POSITION DATA BAD	LR DATA GOOD
4	RR DATA BAD	RR DATA GOOD
3	RR HIGH SCALE	RR RANGE LOW SCALE
2	RR NOT IN AUTO MODE	RR POWER ON/AUTO
1	RR TURN ON IN PROGRESS	

IMODES 30 - CHANNEL 30 CORRELATION		
BIT	IMODES 30 DESCRIPTION (BIT SET)	CHANNEL 30 DESCRIPTION
15	ISS TEMP NOT IN LIMITS	ISS TEMP IN LIMITS
14	ISS TURN ON DELAY	ISS TURN ON REQUEST
13	IMU GOOD	IMU FAIL
12	ICDU GOOD	ICDU FAIL
11	IMU NOT CAGED (EXT)	IMU CAGE
10	PIPA GOOD	
9	IMU OFF	IMU OPERATE
8	IMU TURN-ON DELAY IN PROGRESS	
7	IMU TURN-ON DELAY INITIATE	
6	IMU CAGED (INT)	
5	PIPA FAIL INHIBIT	
4	IMU FAIL INHIBIT	
3	ICDU FAIL INHIBIT	
2	TURN ON DELAY SEQUENCE FAIL	
1	PIPA FAIL INHIBIT	

IMODES 33 - CHANNEL 32 & 33 CORRELATION		
BIT	IMODES 33 DESCRIPTION (BIT SET)	CHANNELS 32 & 33 DESCRIPTION
14	PROCEED KEY NOT PRESSED	32 PROCEED KEY PRESSED
13	PIPA GOOD	33 PIPA FAIL
12	DOWNLINK NOT TOO FAST	33 DOWNLINK TOO FAST
11	UPLINK NOT TOO FAST	33 UPLINK TOO FAST
8	INERTIAL DATA JUST DISPLAYED	
7	DISPLAY ALTITUDE	
6	ENABLE DAP	
5	ICDU ZEROING	
1	LAMPTEST IN PROGRESS	

LGC MEMORY

ECADR CONVERSION TABLE - SWITCHED E MEMORY

	14XX	15XX	16XX	17XX
E0	00XX	01XX	02XX	03XX
E1	04XX	05XX	06XX	07XX
E2	10XX	11XX	12XX	13XX
E3	14XX	15XX	16XX	17XX
E4	20XX	21XX	22XX	23XX
E5	24XX	25XX	26XX	27XX
E6	30XX	31XX	32XX	33XX
E7	34XX	35XX	36XX	37XX

CADR CONVERSION TABLE - COMMON FIXED MEMORY

	2XXX	3XXX		2XXX	3XXX
00	00XXX	01XXX	20	40XXX	41XXX
01	02XXX	03XXX	21	42XXX	43XXX
02	04XXX	05XXX	22	44XXX	45XXX
03	06XXX	07XXX	23	46XXX	47XXX
04	10XXX	11XXX	24	50XXX	51XXX
05	12XXX	13XXX	25	52XXX	53XXX
06	14XXX	15XXX	26	54XXX	55XXX
07	16XXX	17XXX	27	56XXX	57XXX
10	20XXX	21XXX	30	60XXX	61XXX
11	22XXX	23XXX	31	62XXX	63XXX
12	24XXX	25XXX	32	64XXX	65XXX
13	26XXX	27XXX	33	66XXX	67XXX
14	30XXX	31XXX	34	70XXX	71XXX
15	32XXX	33XXX	35	72XXX	73XXX
16	34XXX	35XXX	36	74XXX	75XXX
17	36XXX	37XXX	37	76XXX	77XXX

NOTE: X's represent any octal digits and remain unchanged in the conversion.

MEMORY REFERENCES

UNSWITCHED E

Bank	0	C(S) = 0000-0377
Bank	1	C(S) = 0400-0777
Bank	2	C(S) = 1000-1377

SWITCHED E

Bank	0-7	C(S) = 1400-1777	C(EBANK) = 0-7
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FIXED F

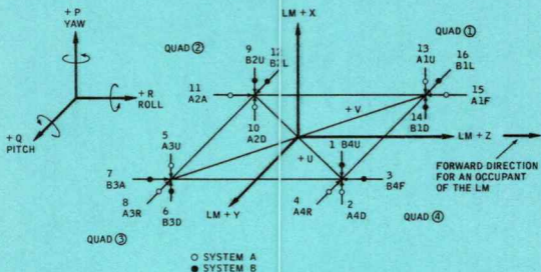
Bank	02	C(S) = 4000-5777
Bank	03	C(S) = 6000-7777

COMMON F

Banks	00-27	C(S) = 2000-3777	C(FBANK) = 00-27
Banks	30-37	C(S) = 2000-3777	C(FBANK) = 30-37
			C(FEXT) = OXX
Banks	40-43	C(S) = 2000-3777	C(FBANK) = 30-33
			C(FEXT) = 100

ISLGC $ADD_8 = 54000_8 + ECADR$

$ADD_8 = 100000_8 + FCADR$



NOTES:

1. THE ARROWS INDICATE THRUST DIRECTION, NOT EXHAUST VELOCITY.
2. IN CASE OF FAILED JETS, THE ASTRONAUT DISABLES JETS IN PAIRS AS FOLLOWS:

1, 3 5, 8 9, 12 13, 15
2, 4 6, 7 10, 11 14, 16

3. THE P, Q, AND R DESIGNATIONS FOR THE CONTROL AXES ARE USED IN CONNECTION WITH ROTATION, WHEREAS THE X, Y, AND Z DESIGNATIONS ARE USED IN CONNECTION WITH TRANSLATION.

CHANNEL 14 GYRO SELECTION

BITS	9 8 7			GYRO	9 8 7			GYRO
	9	8	7		9	8	7	
	0	0	0	-	1	0	0	-
	0	0	1	+X	1	0	1	-X
	0	1	0	+Y	1	1	0	-Y
	0	1	1	+Z	1	1	1	-Z

CHANNEL 13 RAIR SELECTIONS

A	B	C	FUNCTION	A	B	C	FUNCTION
0	0	0	NONE	1	0	0	LR X VELOCITY
0	0	1	R R RANGE	1	0	1	LR Y VELOCITY
0	1	0	R R RANGE RATE	1	1	0	LR Z VELOCITY
0	1	1	NONE	1	1	1	LR RANGE

CHANNEL ASSIGNMENTS LM

CHANNEL	NAME	A			B			C			D			E			CHANNEL		
		4 BIT 15	2 BIT 14	1 BIT 13	4 BIT 12	2 BIT 11	1 BIT 10	4 BIT 9	2 BIT 8	1 BIT 7	4 BIT 6	2 BIT 5	1 BIT 4	4 BIT 3	2 BIT 2	1 BIT 1			
CP	1	L	CP REGISTER L, BITS 15-1														1		
	2	Q	CP REGISTER Q, BITS 15-1														2		
	3	HISCALAR	HIGH - ORDER SCALAR CHANNEL, BITS 14-1														3		
	4	LOSCALAR	LOW - ORDER SCALAR CHANNEL, BITS 14-1														4		
OUT	5	PYJETS																5	
	6	ROLLJETS																6	
CP	7	SUPERBNK															7		
OUT	10	OUT 0	RELAY ADRS 4	RELAY ADRS 3	RELAY ADRS 2	RELAY ADRS 1	RELAY BIT 11	RELAY BIT 10	RELAY BIT 9	RELAY BIT 8	RELAY BIT 7	RELAY BIT 6	RELAY BIT 5	RELAY BIT 4	RELAY BIT 3	RELAY BIT 2	RELAY BIT 1	10	
	11	DSALM OUT	ENGINE OFF	ENGINE ON				CAUTION RESET	TEST CONNECTOR OUTBIT	OPERATOR ERROR LAMP	VN FLASH	KEY REL LAMP	TEMP CAUTION LAMP	UPLINK ACTY LAMP	COMPUTER ACTY LAMP	ISS WARNING	11		
	12	CHAN 12	ISS TURNON DELAY COMPLETE	RRENABLE AUTO TRK	LR POS 2 COMMAND	+ ROLL GIMBAL TRIM	- ROLL GIMBAL TRIM	+ PITCH GIMBAL TRIM	- PITCH GIMBAL TRIM	DISPLAY INERTIAL DATA	ENABLE IMU ERROR COUNTER	ZERO IMU CDU	COARSE ALIGN ENABLE	ENABLE RR ERROR COUNTER	ZERO RRCDU	12			
	13	CHAN 13	ENABLE T6RUPT	RESET TRAP 32	RESET TRAP 31B	RESET TRAP 31A	ENABLE STANDBY	TEST ALARMS	START RHC READ	ENABLE RHC CTR	DNLINK WD ORD	BLOCK INLINK	RADAR ACTY	RADAR a	RADAR b	RADAR c	13		
	14	CHAN 14	DRIVE CDU X	DRIVE CDU Y	DRIVE CDU Z	DRIVE CDU T	DRIVE CDU S	GYRO ACTY	GYRO MINUS	GYRO SEL a	GYRO SEL b	GYRO ENABLE	THRUST DRIVE	ALT METER	ALT RATE	OUTLINK ACTY	14		
	15	MN KEY IN															15		
	16	NAV KEY IN															16		
	IN	30*	CHAN 30	TEMP OF IMU IN LIMITS	ISS TURNON REQUEST	IMU FAIL	ICDU FAIL	IMU CAGE	G/N CONT OF S/C	IMU OPER	RRCDU FAIL	DISPLAY INERTIAL DATA REQ	AUTO THROTTLE	ABORT WITH ASCENT STAGE	ENGINE ARMED	ABORT WITH DESCENT STAGE	30		
31*		CHAN 31	ATT CONTROL OUT OF DETECT	AUTO STABILIZA- TION	SCS ATTITUDE HOLD	-2 THC TRANS	+2 THC TRANS	-Y THC TRANS	+Y THC TRANS	-X THC TRANS	+X THC TRANS	RHC -AZ(LPD) - ROLL	RHC +AZ(LPD) + ROLL	RHC + YAW	RHC -EL(LPD) + PITCH	RHC +EL(LPD) + PITCH	31		
32*		CHAN 32	PROCEED						GIMBAL FAIL	GIMBAL OFF	T 10-11 DISABLE	T 9-12 DISABLE	T 13-15 DISABLE	T 14-16 DISABLE	T 6-7 DISABLE	T 1-3 DISABLE	T 5-8 DISABLE	T 2-4 DISABLE	32
33*		CHAN 33	OSC ALARM	COMPUTER WARNING	PIPA FAIL	DNLINK TOO FAST	UPLINK TOO FAST	BLOCK UPLINK	LR RANG LO SCALE	LR VEL DATA GOOD	LR POS 2	LR POS 1	LR DATA GOOD	LR DATA GOOD	RR RANGE LO SCALE	RR PWR ON AUTO	33		
OUT	34	DNTM1	FIRST OF TWO WORDS														34		
	35	DNTM2	SECOND OF TWO WORDS														35		
		15	14	13	12	11	10	9	8	7	6	5	4	3	2	1			

*INVERTED LOGIC USED

BITS WITHIN DARK LINES ARE
PGNCS EXTERNAL INTERFACES