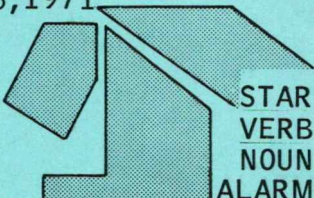


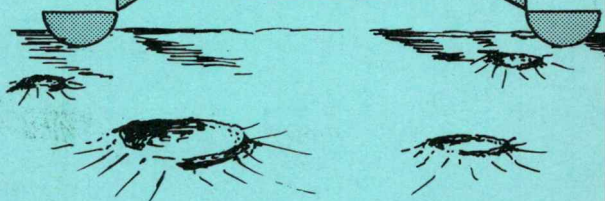
LMS-ISLGC REFERENCE INFORMATION

LUMINARY 209 (1E)

MARCH 6, 1971



STAR CODES
VERB CODES
NOUN CODES
ALARM CODES
PROGRAM & ROUTINE NUMBERS
FLAGWORD ASSIGNMENTS
FLAGWORDS
LANDING SITES
COUNTERS
RADMODES-IMODES
CHANNEL BIT IDENTIFICATION



Progress Is Our Most Important Product

GENERAL  ELECTRIC

**APOLLO SYSTEMS-HOUSTON PROGRAMS
HOUSTON, TEXAS**

STAR/PLANET LIST

JANUARY 1.010, 1971

| OCTAL STAR CODE | NAME | VIS. MAG. | RIGHT ASCENSION | | | DECLINATION | | |
|-----------------------|--|--------------|--------------------|------------------|------|-------------|----|----|
| | | | (HR. MIN. SEC.) | (DEG. MIN. SEC.) | | | | |
| 1 | ALPHA ANDROMEDAE (ALPHERATZ) | 2.1 | 0 | 06 | 53.0 | +28 | 55 | 49 |
| 2 | BETA CETI (DIPHDA) | 2.2 | 0 | 42 | 08.0 | -18 | 08 | 44 |
| 3 | GAMMA CASSIOPELAE (NAVI) | VAR. | 0 | 54 | 56.6 | +60 | 33 | 36 |
| 4 | ALPHA ERIDANI (ACHERNAR) | 0.6 | 1 | 36 | 38.1 | -57 | 23 | 02 |
| 5 | ALPHA URSAE MINORIS (POLARIS) | 2.1 | 2 | 04 | 07.3 | +89 | 07 | 52 |
| 6 | THETA ERIDANI (ACAMAR) | 3.4 | 2 | 57 | 09.6 | -40 | 25 | 13 |
| 7 | ALPHA CETI (MENKAR) | 2.8 | 3 | 00 | 45.6 | +03 | 58 | 37 |
| 10 | ALPHA PERSEI (MIRFAK) | 1.9 | 3 | 22 | 14.6 | +49 | 45 | 34 |
| 11 | ALPHA TAURI (ALDEBARAN) | 1.1 | 4 | 34 | 15.3 | +16 | 27 | 08 |
| 12 | BETA ORIONIS (RIGEL) | 0.3 | 5 | 13 | 08.6 | -08 | 14 | 02 |
| 13 | ALPHA AURIGAE (CAPELLA) | 0.2 | 5 | 14 | 32.6 | +45 | 58 | 13 |
| 14 | ALPHA CARINAE (CANOPUS) | -0.9 | 6 | 23 | 18.5 | -52 | 40 | 46 |
| 15 | ALPHA CANIS MAJORIS (SIRIUS) | -1.6 | 6 | 43 | 52.3 | -16 | 40 | 30 |
| 16 | ALPHA CANIS MINORIS (PROCYON) | 0.5 | 7 | 37 | 47.1 | +05 | 18 | 01 |
| 17 | GAMMA VELORUM (REGOR) | 1.9 | 8 | 08 | 38.3 | -47 | 15 | 02 |
| 20 | IOTA URSAE MAJORIS (DNOCES) | 3.1 | 8 | 57 | 13.8 | +48 | 09 | 24 |
| 21 | ALPHA HYDRAE (ALPHARD) | 2.2 | 9 | 26 | 09.7 | -08 | 31 | 56 |
| 22 | ALPHA LEONIS (REGULUS) | 1.3 | 10 | 06 | 49.7 | +12 | 06 | 34 |
| 23 | BETA LEONIS (DENEbola) | 2.2 | 11 | 47 | 34.9 | +14 | 44 | 03 |
| 24 | GAMMA CORVI (GLENAH) | 2.8 | 12 | 14 | 18.7 | -17 | 22 | 52 |
| 25 | ALPHA CRUCIS (ACRUX) | 1.6 | 12 | 24 | 58.3 | -62 | 56 | 19 |
| 26 | ALPHA VIRGINIS (SPICA) | 1.2 | 13 | 23 | 39.7 | -11 | 00 | 38 |
| 27 | ETA URSAE MAJORIS (ALKALD) | 1.9 | 13 | 46 | 23.9 | +49 | 27 | 27 |
| 30 | THETA CENTAURI (MENKENT) | 2.3 | 14 | 04 | 58.1 | -36 | 13 | 41 |
| 31 | ALPHA BOOTIS (ARCTURUS) | 0.2 | 14 | 14 | 20.2 | +19 | 19 | 57 |
| 32 | ALPHA CORONAE BOREALIS (ALPHECCA) | 2.3 | 15 | 33 | 27.5 | +26 | 48 | 40 |
| 33 | ALPHA SCORPII (ANTARES) | 1.2 | 16 | 27 | 37.5 | -26 | 22 | 09 |
| 34 | ALPHA TRIANGULI AUSTR. (ATRIA) | 1.9 | 16 | 45 | 34.7 | -68 | 58 | 37 |
| 35 | ALPHA ORHIUCHI (RASALHAGUE) | 2.1 | 17 | 33 | 35.2 | +12 | 34 | 47 |
| 36 | ALPHA LYRAE (VEGA) | 0.1 | 18 | 35 | 57.3 | +38 | 45 | 20 |
| 37 | SIGMA SAGITTARII (NUNKI) | 2.1 | 18 | 53 | 28.0 | -26 | 20 | 04 |
| 40 | ALPHA AQUILLAE (ALTAIR) | 0.9 | 19 | 49 | 22.0 | +08 | 47 | 26 |
| 41 | BETA CAPRICORNI (DABIH) | 3.2 | 20 | 19 | 22.9 | -14 | 52 | 27 |
| 42 | ALPHA PAVONIS (PEACOCK) | 2.1 | 20 | 23 | 21.7 | -56 | 49 | 47 |
| 43 | ALPHA CYGNI (DENEb) | 1.3 | 20 | 40 | 26.5 | +45 | 10 | 34 |
| 44 | EPISILON PEGASI (ENIF) | 2.5 | 21 | 42 | 45.6 | +09 | 44 | 29 |
| 45 | ALPHA PICTIS AUSTRINUS (FORMALHAUT) | 1.3 | 22 | 56 | 03.0 | -29 | 46 | 35 |
| 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 | DENEbCLA | 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 | VEGA | 36 |

VERB CODES FOR IM

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 (V4LN72 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 FDAI 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 (F31)
 84 NOT IN USE
 85 DISPLAY RR LOS AZIMUTH AND ELEVATION
 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 POO
 97 PERFORM ENGINE FAIL PROCEDURE (R40)
 98 NOT IN USE
 99 PLEASE ENABLE ENGINE (P12,P40,P42,P63)

NOUN CODES

| NORMAL NOUNS | | COMPONENTS & SCALING | | | RESTRICTIONS (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 | C |
| | | | X,Y,Z | | |
| 22 | DESIRED ICDU ANGLES | 3 COMP | XXX.XX | DEG FOR EA | A |
| | | | OG,IG,MG | | |
| 23 | SPARE | | | | |
| 24 | DELTA TIME FOR LGC 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.)

| NORMAL NOUNS | COMPONENTS & SCALING | RESTRICTIONS |
|--|---|--------------|
| 33 TIME OF IGNITION | 3 COMP 0000X. HRS 0000X. MIN 0XX.XX SEC | A3 |
| 34 TIME OF EVENT | 3 COMP 0000X. HRS 0000X. MIN 0XX.XX SEC | A3 |
| 35 TIME FROM EVENT | 3 COMP 0000X. HRS 0000X. MIN 0XX.XX SEC | A3 |
| 36 TIME OF LGC CLOCK | 3 COMP 0000X. HRS 0000X. MIN 0XX.XX SEC | A3 |
| 37 TIG OF TPI | 3 COMP 0000X. HRS 0000X. MIN 0XX.XX SEC | A3 |
| 38 TIME OF STATE VECTOR BEING INTEGRATED | 3 COMP 0000X. HRS 0000X. MIN 0XX.XX SEC | A3 |
| 39 SPARE | | |
| <u>MIXED NOUNS</u> | | |
| 40 TIME FROM IGNITION/CUTOFF VG DELTA V (MEASURED) | 3 COMP XXXXX. MIN/SEC XXXX.X FT/SEC XXXX.X FT/SEC | C |
| 41 NAV BASE AZIMUTH NAV BASE LATITUDE | 2 COMP XXX.XX DEG XX.XXX DEG | E |
| 42 APOGEE ALTITUDE (H _a) PERIGEE ALTITUDE (H _p) DELTA V (REQUIRED) | 3 COMP XXXX.X NAUT MI XXXX.X NAUT MI XXXX.X FT/SEC | A |
| 43 LATITUDE, (+ NORTH) LONGITUDE, (+ EAST) ALTITUDE | 3 COMP XXX.XX DEG XXX.XX DEG XXXX.X NAUT MI | A |
| 44 APOGEE ALTITUDE PERIGEE ALTITUDE TFF | 3 COMP XXXX.X NAUT MI XXXX.X NAUT MI XXXXX. MIN/SEC | C |
| 45 MARKS, TTI OF NEXT BURN, MGA | 3 COMP XXXXX. MIN/SEC XXXXX. MIN/SEC XXX.XX DEG | C |
| 46 AUTOPILOT CONFIGURATION CHANNEL BIT FAILURE PROTECTION WORD | 2 COMP XXXXX. OCTAL XXXXX. OCTAL | B |
| 47 LM WEIGHT CSM WEIGHT | 2 COMP XXXXX. LBS XXXXX. LBS | A |
| 48 GIMBAL PITCH TRIM GIMBAL ROLL TRIM | 2 COMP XXX.XX DEG XXX.XX DEG | A |
| 49 DELTA R DELTA V RADAR DATA SOURCE CODE | 3 COMP XXX.XX NAUT MI XXXX.X FT/SEC XXXXX. | C |
| 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 RANGE RATE THETA | 3 COMP XXX.XX NAUT MI XXXX.X FT/SEC XXX.XX DEG | C |

NOUN CODES (CONT.)

| <u>MIXED NOUNS</u> | <u>COMPONENTS & SCALING</u> | <u>RESTRICTIONS</u> |
|--|---|---------------------|
| 55 NO. OF APSIDAL CROSSINGS (NORTH) ELEVATION ANGLE (EAST) CENTRAL ANGLE OF PASSIVE VEHICLE | 3 COMP XXXX. XXX.XX DEG XXX.XX DEG | A |
| 56 RR LOS AXIMUTH 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 XXXXX MIN/SEC XXXXX MIN/SEC XXXX.X NAUT MI | C |
| 62 ABSOLUTE VALUE OF VELOCITY TIME TO IGNITION DELTA V (MEASURED) | 3 COMP XXXX.X FT/SEC XXXXX MIN/SEC XXXX.X FT/SEC | C |
| 63 LR ALTITUDE MINUS COMPUTED ALTITUDE ALTITUDE RATE COMPUTED ALTITUDE | 3 COMP XXXXX. FT XXXX.X FT/SEC XXXXX. FT | C |
| 64 TIME LEFT FOR REDESIGNATION - LPD ANGLE ALTITUDE RATE COMPUTED ALTITUDE | 3 COMP XXXXX SEC/DEG XXXX.X FT/SEC XXXXX. FT/SEC | C |
| 65 SAMPLED LGC TIME (FETCHED IN INTERRUPT) | 3 COMP OXXXX. HRS OXXXX. MIN OXX.XX SEC | A3 |
| 66 LR SLANT RANGE LR POSITION | 2 COMP XXXXX. FT +OXXXX | C |
| 67 LR VX LR VY LR VZ | 3 COMP XXXXX. FT/SEC XXXXX. FT/SEC XXXXX. FT/SEC | C |
| 68 SM Z-AXIS RANGE TO LANDING SITE TIME TO GO IN BRAKING PHASE ABSOLUTE VALUE OF VELOCITY | 3 COMP XXXX.X NAUT MI XXXXX MIN/SEC XXXX.X FT/SEC | 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 XXXXX 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 XXXXX MIN/SEC XXXXX MIN/SEC | C |
| 76 DESIRED HORIZONTAL VELOCITY DESIRED RADIAL VELOCITY CROSSRANGE DISTANCE | 3 COMP XXXX.X FT/SEC XXXX.X FT/SEC XXXX.X NM | A |

NOUN CODES (CONT.)

| <u>MIXED NOUNS</u> | | <u>COMPONENTS & SCALING</u> | | <u>RESTRICTI- TIONS</u> |
|--------------------|---|---------------------------------|--|-----------------------------|
| 77 | TIME TO ENGINE CUTOFF VGY (BODY) ABSOLUTE VALUE OF VELOCITY | 3 COMP | XXBXX MIN/SEC XXXX.X FT/SEC XXXX.X FT/SEC | C |
| 78 | RR RANGE RR RANGE RATE TIME FROM IGNITION | 3 COMP | XXX.XX NAUT/MI XXXX.X FT/SEC XXBXX 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 | XXXXX. 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 AZIMUTH 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 XX.XXX DEG FOR EA X,Y,Z | C |
| 93 | DELTA GYRO ANGLES | 3 COMP | XX.XXX DEG FOR EA X,Y,Z | C |
| 94 | VGX (BODY) ALTITUDE RATE COMPUTED ALTITUDE | 3 COMP | XXXX.X FT/SEC XXXX.X FT/SEC XXXXX. FT | C |
| 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 | XXXXX. FT 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) |
| 00016 | PROCEED | DO IMU ALIGNMENT WITH NON-REJECTED DATA (R51,P51) |
| 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 (P57) |
| 00002 | SPECIFY VEHICLE | 1 = IM, 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 (P57), 2 = TWO BODIES, 3 = ONE BODY + G |
| 00012 | SPECIFY CSM ORBIT OPTION | 1 = NO ORBIT CHANGE, 2 = CHANGE ORBIT TO PASS OVER LM (P22) |

ALARM CODES

| <u>CODE</u> | <u>TYPE</u> | <u>SET BY</u> |
|-------------|--|----------------------------------|
| 00111 | MARK MISSING | AOTMARK |
| 00112 | MARK OR MARK REJECT NOT BEING ACCEPTED | AOTMARK |
| 00113 | NO INBITS | 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,RO2,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,RO2 |
| 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 | RANGE GREATER THAN 400 NAUTICAL MILES | P20 |
| 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 TIC FOR GIVEN ELEV ANGLE | P34,P74 |
| 00701 | ILLEGAL OPTION CODE SELECTED | P57 |
| 00777 | PIPA FAIL CAUSED THE ISS WARNING | T4RUPT |
| 01102 | LGC 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 |
| 01466 | INSUFFICIENT THROTTLINGS BETWEEN SKIPPED THROTS | P66 |
| 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) | MIDTAVE |
| 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, FIXDELAY, 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 VERB | 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> |
|--|---------------------------------------|
| <u>SERVICER</u> | |
| P00 | LGC IDLING |
| P06 | PGNCS POWER DOWN |
| P07 | SYSTEMS TEST (NON-FLIGHT) |
| <u>ASCENT</u> | |
| P12 | POWERED ASCENT GUIDANCE |
| <u>COAST</u> | |
| P20 | RENDEZVOUS NAVIGATION |
| P21 | GROUND TRACK DETERMINATION |
| P22 | LUNAR SURFACE NAVIGATION |
| P25 | PREFERRED TRACKING ATTITUDE |
| P27 | LGC UPDATE |
| <u>PRETHRUSTING</u> | |
| 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) |
| <u>THRUST</u> | |
| P40 | DPS THRUSTING |
| P41 | RCS THRUSTING |
| P42 | APS THRUSTING |
| P47 | THRUST MONITOR |
| <u>ALIGNMENTS</u> | |
| P51 | IMU ORIENTATION DETERMINATION |
| P52 | IMU REALIGN |
| P57 | LUNAR SURFACE ALIGNMENT |
| <u>NOTE:</u> 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 IMJ 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 IR 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 |
| APSESW | 05 | FW08 |
| APSFAG | 13 | FW10 |
| ASTNFLAG | 12 | FW07 |
| ATTFAG | 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 |
| COGAFLAG | 04 | FW08 |
| CONTRLFL | 02 | FW10 |
| 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 |
| DSKYFLG | 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 |
| FLT59FLG | 04 | FW09 |
| FLUNDISP | 10 | FW08 |
| FLVR | 14 | FW09 |
| FREEFLAG | 03 | FW00 |
| FRSTIME | 04 | FW01 |
| 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 |
| INTYPLG | 04 | FW03 |
| ITSWICH | 15 | FW07 |
| JSWITCH | 14 | FW00 |
| LETABORT | 09 | FW09 |
| LMQONFLG | 11 | FW08 |
| LOKONSW | 05 | FW00 |
| LOSCMFLG | 12 | FW02 |
| 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 |
| NOUPFLAG | 06 | FW01 |
| NPGNCSFL | 01 | FW10 |
| NRMNVFLG | 08 | FW04 |
| NRMIDFLG | 13 | FW04 |
| NRUPIFLG | 04 | FW04 |
| NIARGFLG | 03 | FW06 |
| NWAITFLG | 10 | FW04 |
| ORBWFLG | 06 | FW03 |
| ORDERSW | 06 | FW08 |
| OURRCFLG | 12 | FW13 |
| FDSPPFLAG | 14 | FW05 |
| PFRATFLG | 04 | FW02 |
| PINERFLG | 06 | FW04 |
| POOHFLAG | 15 | FW03 |
| PRECIFLG | 08 | FW03 |
| PRIODFLG | 14 | FW01 |
| FRONVFLG | 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 |
| RHSCCFLG | 07 | FW13 |
| RNDVZFLG | 07 | FW00 |
| RNGEDATA | 04 | FW11 |
| RNGSCFLG | 10 | FW05 |
| RODFLAG | 12 | FW01 |
| ROTFLAG | 06 | FW09 |
| RFQFLAG | 15 | FW08 |

ALPHABETICAL FLAGWORD ASSIGNMENTS

(CONT.)

| <u>FLAGWORD NAME</u> | <u>B.T 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 |
| UPDATFLG | 07 | FW01 |
| UPLOCKFL | 04 | FW07 |
| USEQRFLG | 14 | FW12 |
| VEHUPFLG | 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 |
| V82EMFLG | 02 | FW07 |
| XDELVFLG | 08 | FW02 |
| XDSFFLAG | 01 | FW04 |
| XORFLG | 09 | FW11 |
| XOVINFLG | 09 | FW13 |
| ZOOMFLAG | 08 | FW05 |
| 3AXISFLG | 06 | FW05 |
| 360SW | 01 | FW08 |

FLAGWORD O 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 |
| FBPASFLG | 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 | | |
| VEHUFFLG | 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 |
| FRSTIME | 4 | FIRST TIME THRU PREPOSITION | NOT FIRST TIME THRU PREPOSITION |
| SLOPESW | 3 | ITERATE WITH BIAS METHOD IN ITERATOR | ITERATE WITH REGULAR FALSJ 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 | T3RUPRT CALLS GYRO COMPENSATION | T3RUPRT 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 |
| PFRATFLG | 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 | RO4 RUNNING | RO4 NOT RUNNING |
| 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 |
| INTYFFLG | 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 |
| DIMOFLEG | 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 |
| SPARE | 12 | | |
| 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 |
| MRUPTFLG | 5 | MARK DISPLAY INTERRUPTED BY PRIORITY DISPLAY | MARK DISPLAY NOT INTERRUPTED BY PRIORITY DISPLAY |
| NRUPTFLG | 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 |
| PDSPFLAG | 14 | R60 DOES PRIORITY DISPLAY | R60 DOES NORMAL DISPLAY |
| 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 |
| ENGNFLG | 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 COORDINATES 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 |
| S32.1P3A | 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 ITERATION (1.0)=REMAINDER OF NEWTON ITERATION. | |
| S32.1F3B | 12 | | |
| SPARE | 11 | | |
| GMBDRVSW | 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 | LM ATTITUDE EXISTS IN MOON-FIXED COORDINATES | NO LM ATTITUDE AVAILABLE IN MOON- FIXED COORDINATES |

FLAGWORD 7 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 DMPUT 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 TPERIGE | 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 | SUCCEEDING ITERATION OF INTEGRATION |
| CMOONFLG | 12 | PERMANENT CSM STATE IN LUNAR SPHERE | PERMANENT CSM STATE IN EARTH SPHERE |
| LMDONFLG | 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 |
| ABTYGFLG | 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 |
| FLT59FLG | 4 | LUNAR SURFACE MARK PROCEDURE USED DURING ALIGNMENT | NORMAL MARKING TO BE USED DURING INFLIGHT ALIGNMENT |
| 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 |
| APSFFLAG | 13 | ASCENT STAGE | DESCENT STAGE |
| SPARE | 12 | | |
| SPARE | 11 | | |
| SPARE | 10 | | |
| SPARE | 9 | | |
| SPARE | 8 | | |
| REINIFLG | 7 | INTEGRATION ROUTINE TO BE RESTARTED. | INTEGRATION ROUTINE NOT TO BE RESTARTED |
| SPARE | 6 | | |
| SPARE | 5 | | |
| SPARE | 4 | | |
| SPARE | 3 | | |
| CONTRLFL | 2 | DAP CONTROLLING VEHICLE ATTITUDE | DAP NOT CONTROLLING VEHICLE ATTITUDE |
| NPGNCSFL | 1 | LAST ACTIVE DAP PASS DONE WITH AN AGS INDICATION | LAST ACTIVE DAP PASS DONE WITH A PGNCS INDICATION |

CHANNEL 77

| <u>BIT</u> | <u>RESTART (AND/OR LGC WARNING) CAUSE</u> |
|------------|---|
| 15-10 | SPARE |
| 9 | SCALAR DOUBLE FREQ. |
| 8 | SCALAR FAIL |
| 7 | COUNTER FAIL |
| 6 | VOLTAGE FAIL |
| 5 | NIGHTWATCHMAN |
| 4 | RUPILOCK |
| 3 | TC TRAP |
| 2 | E-MEMORY PARITY FAIL |
| 1 | E OR F-MEMORY PARITY FAIL |

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 |
| VFALFLG | 14 | LANDING RADAR VELOCITY FAILED REASONABLENESS TEST | LANDING RADAR VELOCITY PASSED REASONABLENESS TEST |
| HFALFLG | 13 | LANDING RADAR ALTITUDE FAILED REASONABLENESS TEST | LANDING RADAR ALTITUDE 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 OVERRIDE (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 |
| SPARE | 6 | | |
| 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 READ DONE |
| 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 |
| ALTSSCALE | 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 LM |
| OURRCFLG (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 |
| ACRBTFGL (ACRBTRAN) | 10 | B-SYSTEM FOR X-TRANS- LATION | A-SYSTEM FOR X-TRANS- LATION (PREFERRED) |
| XOVINFLG (XOVINHIB) | 9 | (X-AXIS OVERRIDE LOCKED OUT) | (X-AXIS OVERRIDE OKAY) |
| DRIFTDFL (DRIFTBIT) | 8 | ASSUME ZERO OFFSET DRIFTING FLIGHT | USE OFFSET ACCELERATION ESTIMATE |
| RHCSCFLG (RHCSCALE) | 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.) |
| ACCOKFLG (ACCSOKAY) | 3 | CONTROL AUTHORITY VALUES FROM LACCS 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 KAICMANU MANEUVER RATES (0,0) = (BIT 2, BIT 1) = 0.2 DEG/SEC (0,1) = 0.5 DEG/SEC | |
| AUTR1FLG (AUTRATE 1) | 1 | (1,0) = 2.0 DEG/SEC (1,1) = 10.0 DEG/SEC | |

FRESH START SETS DAPBOOLS TO 21322 (CTAL

PROGRAM 64 LUNAR LANDING SITE REDESIGNATION

DURING THE LPD MODE ONE PULSE INTRODUCED TO THE LGC VIA THE RHC PROVIDES A FIXED ANGULAR INCREMENT (1 DEGREE IN ELEVATION AND 1 DEGREE 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° 27' 46" W | 3° 40' 19" S | 1736680 METERS |
| DESCARTES | 15° 34' 00" E | 8° 51' 00" S | 1737800 METERS |
| LITTROW | 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 | 20° 05' 30" W | 9° 51' 00" N | 1730000 METERS (EST) |
| MARIUS HILLS | 56° 33' 12" W | 14° 46' 00" N | 1734600 METERS |
| HADLEY/APENNINES | 2° 39' 14" E | 26° 04' 54" N | 1734540 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 |
| *HADLEY (PHOTOMAP) | 3° 39' 30" E | 26° 04' 54" N | 1734700 METERS |

LGC COUNTER INTERRUPTS

| IGC 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 1-3RUPT | INCREMENTED EACH 10 MS | + 16384 |
| 0027 | TIME 4 | TIME COUNTER FOR 1-4RUPT | 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 CIU | 39.55 $\frac{\text{SEC}}{\text{COUNT}}$ | $\pm 180^\circ$ |
| 0033 | CDU Y | COUNTS $\pm \Delta \theta$ PULSES FROM Y INERTIAL CIU | 39.55 $\frac{\text{SEC}}{\text{COUNT}}$ | $\pm 180^\circ$ |
| 0034 | CDU Z | COUNTS $\pm \Delta \theta$ PULSES FROM Z INERTIAL CIU | 39.55 $\frac{\text{SEC}}{\text{COUNT}}$ | $\pm 180^\circ$ |
| 0035 | CDU T (OPT Y) | COUNTS $\pm \Delta \theta$ PULSES FROM RADAR TRUNNION CDU | 39.55 $\frac{\text{SEC}}{\text{COUNT}}$ | $\pm 70^\circ$ |
| 0036 | CDU S (OPT X) | COUNTS $\pm \Delta \theta$ PULSES FROM RADAR SHAFT (DU | 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 UELINK 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 SEC/ COUNT | + 4.0° |
| 0050 | CDUXCMD | OUTPUT PULSES TO X (OUTER) CDU | 158.2 SEC/ COUNT | ± 16.88° |
| | | YAW ATTITUDE ERROR DISPLAY | 388 COUNTS/DEG | ± 5-1/16° |
| 0051 | CDUYCMD | OUTPUT PULSES TO Y (INNER) CDU | 158.2 SEC/ COUNT | ± 16.88° |
| | | PITCH ATTITUDE ERROR DISPLAY | 388 COUNTS/DEG | ± 5-1/16° |
| 0052 | CDUZCMD | OUTPUT PULSES TO Z (MIDDLE) CDU | 158.2 SEC/ COUNT | ± 16.88° |
| | | ROLL ATTITUDE ERROR DISPLAY | 388 COUNTS/DEG | ± 5-1/16° |
| 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 | ALIM | 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 #1 | 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

FIXED F

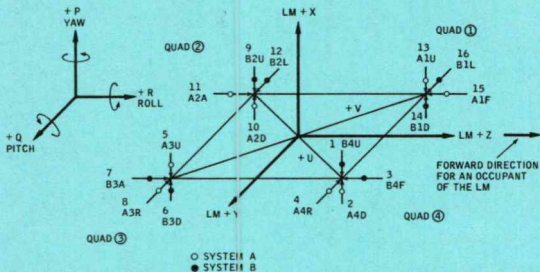
Bank 02 C(S) = 4000-5777
 Bank 03 C(S) = 6000-7777

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) = 0XX
 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 | GYRO | | | GYRO | | | |
|------|------|---|---|------|---|---|---|
| | 9 | 8 | 7 | 9 | 8 | 7 | |
| | 0 | 0 | 0 | - | 1 | 0 | 0 |
| | 0 | 0 | 1 | +X | 1 | 0 | 1 |
| | 0 | 1 | 0 | +Y | 1 | 1 | 0 |
| | 0 | 1 | 1 | +Z | 1 | 1 | 1 |

CHANNEL 13 RADAR 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 |
|-------------|---------------|--|--------------------|-------------------|--------------------|--------------------|---------------------|-----------------------|-----------------------|--------------------------|---------------------------|---------------------|-------------------------|-------------------------|--------------------------|----------------------|---------|
| | | BIT 15 | BIT 14 | BIT 13 | BIT 12 | BIT 11 | BIT 10 | BIT 9 | BIT 8 | BIT 7 | BIT 6 | BIT 5 | BIT 4 | BIT 3 | BIT 2 | 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 | | | | | | | | #14 RCS B10 | #13 RCS A1U | #10 RCS A2D | #9 RCS B2U | #6 RCS B3D | #5 RCS A3U | #2 RCS A4D | #1 RCS B4U | 5 |
| | 6 ROLLJETS | | | | | | | | #16 RCS B1L | #4 RCS A4R | #8 RCS A3R | #12 RCS B2L | #11 RCS A2A | #15 RCS A1F | #3 RCS B4F | #7 RCS B3A | 6 |
| CP | 7 SUPERBNK | | | | | | | | FE 7 | | | FE 6 | FE 5 | | | | 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 T6RUPRT | 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 |
| IN | 15 MN KEY IN | | | | | | | | | | | KEY 5M | KEY 4M | KEY 3M | KEY 2M | KEY 1M | 15 |
| | 16 NAV KEY IN | | | | | | | | DESCENT - | | DESCENT + | MARK REJECT | MARK Y | MARK X | | | 16 |
| | 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 DETENT | AUTO STABILIZATION | SCS ATTITUDE HOLD | -Z THC TRANS | +Z 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 + 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 | RR 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