ASTP

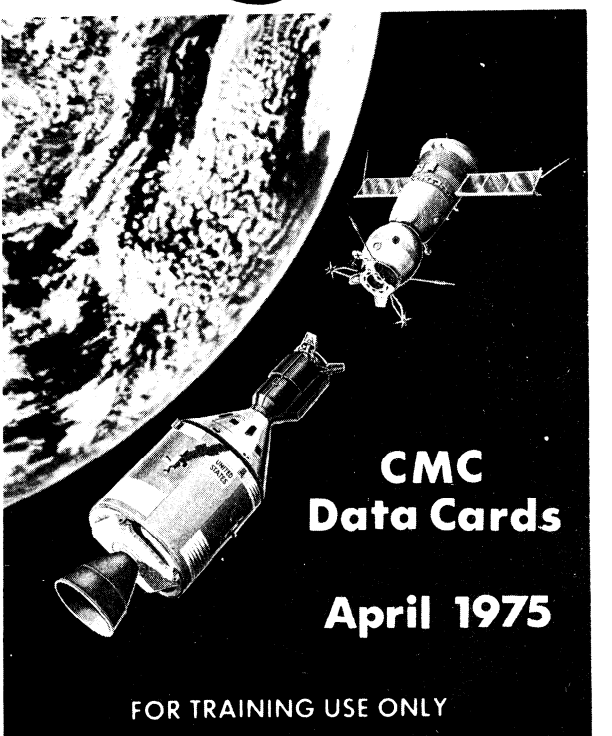
GNC

GUIDANCE AND NAVIGATION

F. DIGENOVA

CONSOLE 256

SSR



CMC Data Cards

April 1975

FOR TRAINING USE ONLY

Delco Electronics

General Motors Corporation Goleta, California 93017

BLOCK II BASIC INSTRUCTIONS

INSTRUCTION	ORDER CODE	DESCRIPTION
AD K	06.	ADD K
ADS E	02.6	ADD TO STORAGE E
AUG E	12.4	AUGMENT E
BZF F	11.2 11.4 11.6	BRANCH ON ZERO TO FIXED F
BZMF F	16.2 16.4 16.6	BRANCH ON ZERO OR MINUS TO FIXED F
CA K	03.	CLEAR AND ADD K
CAE E	03.	CLEAR AND ADD E
CAF F	03.	CLEAR AND ADD F
CCS E	01.0	COUNT, COMPARE, AND SKIP ON E
COM	04.0000	COMPLEMENT A
CS K	04.	CLEAR AND SUBTRACT K
CYL	.0022	CYCLE LEFT
CYR	.0020	CYCLE RIGHT
DAS E	02.0	DOUBLE ADD TO STORAGE E
DCA K	13.	DOUBLE CLEAR AND ADD K
DCS K	14.	DOUBLE CLEAR AND SUBTRACT K
DCOM	14.0000	DP COMPLEMENT
DDOUBL	02.0000	DP DOUBLE
DIM E	12.6	DIMINISH E
DOUBLE	06.0000	DOUBLE A
DTCB	05.2005	DP TRANSFER CONTROL BOTH BANKS
DV E	11.0	DIVIDE BY E
DXCH E	05.2	DOUBLE EXCHANGE A AND E
EDOP	.0023	EDIT OPERATOR
EXTEND	0.0006	EXTEND
INCR E	02.4	INCREMENT E
INDEX E	05.0	INDEX NEXT BASIC INSTRUCTION WITH E
INDEX K	15.	INDEX NEXT EXTRACODE INSTRUCTION WITH K
INHINT	00.0004	INHIBIT INTERRUPT
LXCH E	02.2	EXCHANGE L AND E
MASK K	07.	MASK WITH K
MP K	17.	MULTIPLY K
MSK K	07.	MASK K
MSU E	12.0	MODULAR SUBTRACT E
NDX E	05.0	INDEX E
NDX K	15.	INDEX K
NOOP	03.0000	NO OPERATION (E)
NOOP	TCF I+1	NO OPERATION (F)
OVSK	05.4000	OVERFLOW SKIP; TS A
QXCH E	12.2	EXCHANGE Q AND E
RAND H	10.2	READ AND "AND" H
READ H	10.0	READ H
RELINT	00.0003	RELEASE INHIBIT INTERRUPT
RESUME	05.0017	RESUME INTERRUPTED PROGRAM
RETURN	00.0002	RETURN; TOQ
ROR H	10.4	READ AND "OR" H
RXOR H	10.6	READ AND EXCLUSIVE "OR" H
SR	.0021	SHIFT RIGHT
SU E	16.0	SUBTRACT E
TCAA	05.4005	TRANSFER CONTROL TO ADDRESS IN A; TS Z
TC K	00.	TRANSFER CONTROL TO K
TCF F	01.2 01.4 01.6	TRANSFER CONTROL TO FIXED F
TCR K	00.	TC K
TS E	05.4	TRANSFER TO STORAGE E
WAND H	10.3	WRITE AND "AND" H
WOR H	10.5	WRITE AND "OR" H
WRITE H	10.1	WRITE H
XCH E	05.6	EXCHANGE A AND E
ZL	02.2007	ZERO L; LXCH ZERO
ZQ	12.2007	ZERO Q; QXCH ZERO

VERB CODES

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 IN R1 OR R1, R2 OR R1, R2, R3
07 DISPLAY DOUBLE PREC DECIMAL IN R1, R2 (TEST ONLY)
08
09
10
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 IN R1 OR R1, R2 OR R1, R2, R3
17 MONITOR DOUBLE PREC DECIMAL IN R1, R2 (TEST ONLY)
18
19
20
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
27 DISPLAY FIXED MEMORY
28
29
30 REQUEST EXECUTIVE
31 REQUEST WAITLIST
32 RECYCLE PROGRAM
33 PROCEED WITHOUT DSKY INPUTS
34 TERMINATE FUNCTION
35 TEST LIGHTS
36 REQUEST FRESH START
37 CHANGE PROGRAM (MAJOR MODE)
38
39
40 ZERO CDU'S
41 COARSE ALIGN CDU'S
42 FINE ALIGN IMU
43 LOAD IMU ATT ERROR METERS
44 REQUEST DOCKED DAP DATA LOAD ROUTINE (R04)
45 DOCKED DAP TURN ON
46 ESTABLISH G & C CONTROL
47 MOVE OWS STATE VECTOR INTO CM STATE VECTOR
48 REQUEST DAP DATA LOAD (R03)
49 REQUEST CREW DEFINED MANEUVER (R62)
50 PLEASE PERFORM
51 PLEASE MARK
52 SPARE
53 PLEASE PERFORM ALTERNATE LOS MARK
54 REQUEST RENDEZVOUS BACKUP SIGHTING MARK ROUTINE (R23)
55 INCREMENT AGC TIME (DECIMAL)
56 TERMINATE TRACKING (P20)
57 DISPLAY UPDAT STATE OF FULTKFLG
58 ENABLE AUTO MANEUVER IN P20
59 ENABLE JETS DISABLED IN R04 DOCKED DATA LOAD ROUTINE
60 SET ASTRONAUT TOTAL ATTITUDE (N17) TO PRESENT ATTITUDE
61 DISPLAY DAP ATTITUDE ERROR
62 DISPLAY TOTAL ATTITUDE ERROR WRT N22
63 DISPLAY TOTAL ASTRONAUT ATTITUDE ERROR WRT N17
64 TRANSFORM OPTICS ANGLES TO TRACKING ANGLES
65 OPTICAL VERIFICATION OF PRELAUNCH ALIGNMENT
66 VEHICLES ATTACHED. MOVE THIS VEHICLE STATE VECTOR TO OTHER VEHICLE STATE VECTOR
67 DISPLAY W MATRIX
68 SPARE
69 CAUSE RESTART
70 UPDATE LIFTOFF TIME
71 UNIVERSAL UPDATE - BLOCK ADR
72 UNIVERSAL UPDATE - SINGLE ADR
73 UPDATE AGC TIME (OCTAL)
74 INITIALIZE ERASABLE DUMP VIA DOWNLINK
75 BACKUP LIFTOFF
76 START R27 in P20
77 KILL R27
78 UPDATE PRELAUNCH AZIMUTH
79 SPARE
80 UPDATE OWS STATE VECTOR
81 UPDATE CSM STATE VECTOR
82 REQUEST ORBITAL PARAMETER DISPLAY (R30)
83 REQUEST RENDEZVOUS PARAMETER DISPLAY (R31)
84 SPARE
85 REQUEST RENDEZVOUS PARAMETER DISPLAY NO. 2 (R34)
86 REJECT RENDEZVOUS BACKUP SIGHTING MARK
87 SET VHF RANGE FLAG
88 RESET VHF RANGE FLAG
89 REQUEST RENDEZVOUS FINAL ATTITUDE (R63)
90 REQUEST RENDEZVOUS OUT OF PLANE DISPLAY (R36)
91 DISPLAY BANK SUM
92 SPARE
93 ENABLE W MATRIX INITIALIZATION
94 SPARE
95 SPARE
96 TERMINATE INTEGRATION AND GO TO P00
97 PERFORM ENGINE FAIL PROCEDURE
98 SPARE
99 PLEASE ENABLE ENGINE

NOUN CODES

	NORMAL NOUNS	COMPONENTS & SCALING	
00	NOT IN USE		
01	SPECIFY MACHINE ADDRESS (FRACTIONAL)	3 COMP	.XXXXX FOR EACH
02	SPECIFY MACHINE ADDRESS (WHOLE)	3 COMP	XXXXX. FOR EACH
03	SPECIFY MACHINE ADDRESS (DEGREES)	3 COMP	XXX.XX DEG FOR EACH
04	ATTITUDE ERRORS	3 COMP	XXX.XX DEG FOR EACH
05	ANGULAR ERROR/DIFFERENCE CELESTIAL ANGLE	2 COMP	XXX.XX DEG FOR EACH
06	OPTION CODE	2 COMP	OCTAL ONLY FOR EACH
LOADING NOUN 07 WILL SET OR RESET SELECTED BITS IN ANY ERASABLE LOCATION			
07	ECADR OF WORD TO BE MODIFIED ONES FOR BITS TO BE MODIFIED 1 TO SET OR 0 TO RESET SELECTED BITS	3 COMP	OCTAL ONLY FOR EACH
08	ALARM DATA	3 COMP	OCTAL ONLY FOR EACH
09	ALARM CODES	3 COMP	OCTAL ONLY FOR EACH
10	CHANNEL TO BE SPECIFIED	1 COMP	OCTAL ONLY
11	TIG OF NCC	3 COMP	00XXX. HRS 000XX. MIN 0XX.XX SEC
12	OPTION CODE (USED BY EXTENDED VERBS ONLY)	2 COMP	OCTAL ONLY FOR EACH
13	TIG OF NSR	3 COMP	00XXX. HRS 000XX. MIN 0XX.XX SEC
14	STAR TRACKER AZIMUTH ELEVATION	2 COMP	XXXXX. MIN XXXXX. MIN
15	INCREMENT MACHINE ADDRESS	1 COMP	OCTAL ONLY
16	TIME OF EVENT (USED BY EXTENDED VERBS ONLY)	3 COMP	00XXX. HRS 000XX. MIN 0XX.XX SEC
17	ASTRONAUT TOTAL ATTITUDE	3 COMP	XXX.XX DEG FOR EACH
18	AUTO MANEUVER BALL ANGLES	3 COMP	XXX.XX DEG FOR EACH
19	STAR TRACKER AZIMUTH IN 2-WORD OCTAL FORMAT (USE VERB 04 TO DISPLAY)		OCTAL ONLY
20	ICDU ANGLES	3 COMP	XXX.XX DEG FOR EACH
21	PIPAS	3 COMP	XXXXX. PULSES FOR EACH
22	NEW ICDU ANGLES	3 COMP	XXX.XX DEG FOR EACH
23	NAV BASE TO ATM EULER ANGLES	3 COMP	XXX.XX DEG FOR EACH
24	DELTA TIME FOR AGC CLOCK	3 COMP	00XXX. HRS 000XX. MIN 0XX.XX SEC
25	CHECKLIST (USED WITH PLEASE PERFORM ONLY)	3 COMP	XXXXX. FOR EACH
26	PRIORITY/DELAY, ADRES, BBCON	3 COMP	OCTAL ONLY FOR EACH
27	SELF TEST ON/OFF SWITCH	1 COMP	XXXXX.
28	TIG OF NC2	3 COMP	00XXX HRS 000XX MIN 0XX.XX SEC
29	XSM LAUNCH AZIMUTH	1 COMP	XXX.XX DEG
30	TARGET CODES	3 COMP	XXXXX. FOR EACH
31	TIME OF W INITIALIZATION	3 COMP	00XXX. HRS 000XX. MIN 0XX.XX SEC
32	TIME FROM PERIGEE	3 COMP	00XXX. HRS 000XX. MIN 0XX.XX SEC
33	TIME OF IGNITION	3 COMP	00XXX. HRS 000XX. MIN 0XX.XX SEC
34	TIME OF EVENT	3 COMP	00XXX. HRS 000XX. MIN 0XX.XX SEC
35	TIME FROM EVENT	3 COMP	00XXX. HRS 000XX. MIN 0XX.XX SEC
36	TIME OF AGC CLOCK	3 COMP	00XXX. HRS 000XX. MIN 0XX.XX SEC
37	TIG OF TPI	3 COMP	00XXX. HRS 000XX. MIN 0XX.XX SEC
38	TIME OF STATE VECTOR	3 COMP	00XXX. HRS 000XX. MIN 0XX.XX SEC
39	TIG OF LAST MANEUVER	3 COMP	00XXX. HRS 000XX MIN 0XX.XX SEC

NOUN CODES(CONT.)

	MIXED NOUNS	COMPONENTS & SCALING		
40	TIME FROM IGNITION/CUTOFF	3 COMP	XXBXX	MIN/SEC
	VG,		XXXX.X	FT/SEC
	DELTA V (ACCUMULATED)		XXXX.X	FT/SEC
41	TARGET AZIMUTH,	2 COMP	XXX.XX	DEG
	TARGET ELEVATION		XX.XXX	DEG
42	APOGEE,	3 COMP	XXXX.X	NAUT MI
	PERIGEE,		XXXX.X	NAUT MI
	DELTA V (REQUIRED)		XXXX.X	FT/SEC
43	LATITUDE,	3 COMP	XXX.XX	DEG
	LONGITUDE,		XXX.XX	DEG
	ALTITUDE		XXXX.X	NAUT MI
44	APOGEE,	3 COMP	XXXX.X	NAUT MI
	PERIGEE,		XXXX.X	NAUT MI
	TFF		XXBXX	MIN/SEC
45	MARKS (VHF - OPTICS)	3 COMP	+XXBXX	
	TFI OF NEXT BURN		XXBXX	MIN/SEC
	MGA		XXX.XX	DEG
46	AUTOPILOT CONFIGURATION	2 COMP	OCTAL ONLY FOR EACH	
47	THIS VEHICLE WEIGHT	2 COMP	XXXXX.	LBS
	OTHER VEHICLE WEIGHT		XXXXX.	LBS
48	PITCH TRIM	2 COMP	XXX.XX	DEG
	YAW TRIM,		XXX.XX	DEG
49	DELTA R	3 COMP	XXX.XX	NAUT MI
	DELTA V		XXXX.X	FT/SEC
	VHF OR OPTICS CODE		XXXXX.	
50	SPLASH ERROR,	3 COMP	XXXX.X	NAUT MI
	PERIGEE,		XXXX.X	NAUT MI
	TFF		XXBXX	MIN/SEC
51	SPARE	2 COMP	XXX.XX	DEG
52	CENTRAL ANGLE OF ACTIVE VEHICLE	1 COMP	XXX.XX	DEG
53	RANGE,	3 COMP	XXX.XX	NAUT MI
	RANGE RATE,		XXXX.X	FT/SEC
	PHI		XXX.XX	DEG
54	RANGE,	3 COMP	XXX.XX	NAUT MI
	RANGE RATE,		XXXX.X	FT/SEC
	THETA		XXX.XX	DEG
55	PERIGEE CODE	2 COMP	XXXXX.	
	ELEVATION ANGLE		XXX.XX	DEG
56	VEHICLE RATE	3 COMP	X.XXXX	DEG/SEC FOR EACH
57	NO. OF HALF REVS	3 COMP	XXXXX.	
	DELTA ALT NCC		XXXX.X	NAUT MI
	DELTA ALT NSR		XXXX.X	NAUT MI
58	DELTA V TPI	3 COMP	XXXX.X	FT/SEC
	DELTA V TPF		XXXX.X	FT/SEC
	DELTA TIME (TPI - NOMTPI)		XXBXX	MIN/SEC
59	DELTA VELOCITY LOS	3 COMP	XXXX.X	FT/SEC FOR EA.
60	GMAX,	3 COMP	XXX.XX	G
	VPRED,		XXXXX.	FT/SEC
	GAMMA EI		XXX.XX	DEG
61	IMPACT LATITUDE,	3 COMP	XXX.XX	DEG
	IMPACT LONGITUDE,		XXX.XX	DEG
	HEADS UP/DOWN		+/-00001	
62	INERTIAL VEL MAG (VI),	3 COMP	XXXXX.	FT/SEC
	ALT RATE CHANGE (HDOT),		XXXXX.	FT/SEC
	ALT ABOVE PAD RADIUS (H)		XXXX.X	NAUT MI
63	RANGE 297,431 TO SPLASH (RTGO)	3 COMP	XXXX.X	NAUT MI
	PREDICTED INERT VEL (VIO),		XXXXX.	FT/SEC
	TIME FROM 297,431 (TFE)		XXBXX	MIN/SEC
64	DRAG ACCELERATION,	3 COMP	XXX.XX	G
	INERTIAL VELOCITY (VI),		XXXXX.	FT/SEC
	RANGE TO SPLASH		XXXX.X	NAUT MI
65	SAMPLED AGC TIME	3 COMP	00XXX.	HRS
	(FETCHED IN INTERRUPT)		000XX.	MIN
			0XX.XX	SEC
66	COMMAND BANK ANGLE (BETA),	3 COMP	XXX.XX	DEG
	CROSS RANGE ERROR,		XXXX.X	NAUT MI
	DOWN RANGE ERROR		XXXX.X	NAUT MI
67	RANGE TO TARGET,	3 COMP	XXXX.X	NAUT MI
	PRESENT LATITUDE,		XXX.XX	DEG
	PRESENT LONGITUDE		XXX.XX	DEG
68	COMMAND BANK ANGLE (BETA),	3 COMP	XXX.XX	DEG
	INERTIAL VELOCITY (VI),		XXXXX.	FT/SEC
	ALT RATE CHANGE (RDOT)		XXXXX.	FT/SEC
69	BETA	3 COMP	XXX.XX	DEG
	DL		XXX.XX	G
	VL		XXXXX.	FT/SEC

NOUN CODES(CONT.)

	MIXED NOUNS (CONT)	COMPONENTS & SCALING		
70	STAR CODE,	3 COMP	OCTAL ONLY	
71	STAR CODE	3 COMP	OCTAL ONLY	
72	TIME OF R27 OPTIMIZATION	3 COMP	00XXX.	HRS
			000XX.	MIN
			0XX.XX	SEC
73	ALTITUDE	3 COMP	XXXXXB.	NAUT MI
	VELOCITY		XXXXX.	FT/SEC
	FLIGHT PATH ANGLE		XXX.XX	DEG
74	COMMAND BANK ANGLE (BETA)	3 COMP	XXX.XX	DEG
	INERTIAL VELOCITY (VI)		XXXXX.	FT/SEC
	DRAG ACCELERATION		XXX.XX	G
75	DELTA ALTITUDE CDH	3 COMP	XXXX.X	NAUT MI
	DELTA TIME (CDH-CSI OR TPI-CDH)		XXBXX	MIN/SEC
	DELTA TIME (TPI-CDH or TPI-NOMTPI)		XXBXX	MIN/SEC
76	CURRENT R27 RANGE	3 COMP	XXX.XX	NAUT MI
	CURRENT R27 RANGE - RATE		XXXX.X	FT/SEC
	TIME FROM R27 OPTIMIZATION		XXBXX	MIN/SEC
77	OPTIMIZED R27 RANGE	3 COMP	XXX.XX	NAUT MI
	OPTIMIZED R27 RANGE RATE		XXXX.X	FT/SEC
	R27 THETA/PHI		XXXXX	DEG
78	YAW ANGLE FOR P20		XXX.XX	DEG
	PITCH ANGLE FOR P20		XXX.XX	DEG
	AZIMUTH CONSTRAINT FOR P20		XXX.XX	DEG
79	P20 ROTATION RATE	2 COMP	X.XXXX	DEG/SEC
	P20 ROTATION DEADBAND		XXX.XX	DEG
80	TIME FROM IGNITION/CUTOFF	3 COMP	XXBXX	MIN/SEC
	VG		XXXXX.	FT/SEC
	DELTA V (ACCUMULATED)		XXXXX.	FT/SEC
81	DELTA V (LV)	3 COMP	XXXX.X	FT/SEC FOR EACH
82	NSR DELTA V (LV)	3 COMP	XXXX.X	FT/SEC FOR EACH
83	DELTA V (BODY)	3 COMP	XXXX.X	FT/SEC FOR EACH
84	DELTA V NEXT MANEUVER	3 COMP	XXXX.X	FT/SEC
	DELTA ALT - NEXT MANEUVER		XXXX.X	NAUT MI
	DELTA V THIRD MANEUVER		XXXX.X	FT/SEC
85	VG (BODY)	3 COMP	XXXX.X	FT/SEC FOR EACH
86	DELTA V (LV)	3 COMP	XXXXX.	FT/SEC FOR EACH
87	DOCKED DAP FLAG SPECIFICATION	3 COMP	OCTAL ONLY FOR EACH	
	CHANNEL 5 JETS INHIBITED BY DOCKED DAP			
	CHANNEL 6 JETS INHIBITED BY DOCKED DAP			
88	UNIT SUN OR PLANET VECTOR	3 COMP	.XXXXX	FOR EACH
89	MANUAL/AUTO DOCKED DAP MANEUVER RATES	2 COMP	X.XXXX	DEG/SEC
	DEAD BAND FOR DOCKED DAP		XXX.XX	DEG
90	Y ACTIVE VEHICLE	3 COMP	XXX.XX	NM
	Y DOT ACTIVE VEHICLE		XXXX.X	FPS
	Y DOT PASSIVE VEHICLE		XXXX.X	FPS
91	OCDU ANGLE SHAFT	2 COMP	XXX.XX	DEG
	OCDU ANGLE TRUNNION		XX.XXX	DEG
92	NEW OPTICS ANGLE SHAFT	2 COMP	XXX.XX	DEG
	NEW OPTICS ANGLE TRUNNION		XX.XXX	DEG
93	DELTA GYRO ANGLES	3 COMP	XX.XXX	DEG FOR EACH
94	NEW OPTICS ANGLE SHAFT	2 COMP	XXX.XX	DEG
	NEW OPTICS ANGLE TRUNNION		XX.XXX	DEG
95	TIG of NC 1	3 COMP	00XXX.	HRS
			000XX.	MIN
			0XX.XX	SEC
96	Y CM	3 COMP	XXX.XX	NAUT MI
	Y DOT CM		XXXX.X	FT/SEC
	Y DOT LM		XXXX.X	FT/SEC
97	SYSTEM TEST INPUTS	3 COMP	XXXXX.	FOR EACH
98	SYSTEM TEST RESULTS AND INPUTS	3 COMP	XXXXX.	
			.XXXXX	
			XXXXX.	
99	RMS IN POSITION	3 COMP	XXXXX.	FT
	RMS IN VELOCITY		XXXX.X	FT/SEC
	RMS OPTION		XXXXX.	

NOUN STORAGE REGISTER NAMES

CODE	REGISTER(S)
00	
01	(SPECIFY ADDRESS)
02	(SPECIFY ADDRESS)
03	(SPECIFY ADDRESS)
04	AK
	AK1
	AK2
05	DSPTEM1
06	OPTION1, +1
07	XREG
	YREG
	ZREG
08	ALMCADR, +1, +2
09	FAILREG, +1, +2
10	(SPECIFY CHANNEL)
11	TCSI, +1
12	OPTIONX, +1
13	TCDH, +1
14	TRKAZ
	TRKEL
15	(INCREMENT ADDRESS)
16	DSPTEMX, +1
17	CPHIX, +1, +2
18	THETAD, +1, +2
19	TRKAZOCT, +1
20	CDUX, Y, Z
21	PIPAX, Y, Z
22	THETAD, +1, +2
23	THETAD, +1, +2
24	DSPTEM2, +1
25	DSPTEM1, +1, +2
26	N26/PRI, +1, +2
27	SMODE
28	NC2TIG, +1
29	DSPTEM1
30	DSPTEM1, +1, +2
31	AGEOFW, +1
32	-TPER, +1
33	TIG, +1
34	DSPTEM1, +1
35	TTOGO, +1
36	TIME2, +1
37	TTPI, +1
38	TET, +1
39	T3T0T4, +1
40	TTOGO
	VGDISP
	DVTOTAL
41	DSPTEM1, +1
42	HAPO
	HPER
	VGDISP
43	LAT
	LONG
	ALT
44	HAPOX
	HPERX
	TFF
45	VHFCNT
	TTOGO
	+MGA
46	DAPDATR1
	DAPDATR2
47	CSMMASS
	LEMMASS
48	PACTOFF
	YACTOFF
49	N49DISP, +2, +4
50	RSP-RREC
	HPERX
	TFF
51	SPARE
52	ACTCENT
53	RANGE
	RRATE
	RTHETA
54	RANGE
	RRATE
	RTHETA
55	NN1
	ELEV
	CENTANG
56	ADOT
	ADOT2
	ADOT2
57	HALFREVS
	DHNCC
	DELH1
58	DELVTPI
	DELVTPF
	T2TOT3
59	DVLOS, +2, +4
60	GMAX
	VPRED
	GAMMAEI
61	LAT(SPL)
	LNG(SPL)
	HEADSUP
62	VMAGI
	HDOT
	ALT I
63	RTGO
	VIO
	TTF
64	D
	VMAGI
	RTGON64
65	SAMPTIME, +1
66	ROLLC
	XRNGERR
	DNRNGERR
67	RTGON67
	LAT
	LONG
68	ROLLC
	VMAGI
	RDOT
69	ROLLC
	Q7
	VL
70	STARCODE
71	STARCODE
72	HORIZON
73	FIXTIME, +1
	P21ALT
	P21VEL
74	P21GAM
	ROLLC
	VMAGI
75	D
	DIFFALT
	T1TOT2
76	SVEC
	SVEC+2
	TFO
77	OPVEC
	OPVEC+2
	PHETA
78	UTAW
	UTPIT
	AZIMANG1
79	RATEPTC
	DBPTC
80	TTOGO
	VGDISP
	DVTOTAL
81	DELVLVC, +2, +4
82	VGNSR, +2, +4
83	DELVIMU, +2, +4
84	DVDSP1
	DHDSP
	DVDSP2
85	VGBODY, +2, +4
86	DELVLVC, +2, +4
87	MRKBUFF1+3, +5
88	DAPDATR3
	CH5FAIL
	CH6FAIL
89	DKRATE
	DKDB
90	YCSM
	YDOTC
	YDOTL
91	CDUS
	CDUT
92	SAC
	PAC
93	OGC, +2, +4
94	MRKBUF1+3, +5
95	NC1TIG, +1
96	RANGE
	RRATE
	RRATE2
97	DSPTEM1, +1, +2
98	DSPTEM2, +1, +2
99	WWPOS
	WWVEL
	WWOPT

CHECK LIST CODES

RI CODE		ACTION TO BE EFFECTED
00013	KEY IN	COARSE ALIGN OPTION
00014	KEY IN	FINE ALIGNMENT OPTION
00015	PERFORM	CELESTIAL BODY ACQUISITION
00016	KEY IN	TERMINATE MARK SEQUENCE
00017	PERFORM	MINKEY RENDEZVOUS
00020	PERFORM	MINKEY PLANE CHANGE PULSE TORQUING
00041	SWITCH	CM/SM SEPARATION TO UP
00062	SWITCH	AGC POWER DOWN
00204	PERFORM	SPS GIMBAL TRIM

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

OPTION CODES

THE SPECIFIED OPTION CODES WILL BE FLASHED IN COMPONENT R1 IN CONJUNCTION WITH VERB 04 NOUN 06 TO REQUEST THE ASTRONAUT TO LOAD INTO COMPONENT R2 THE OPTION HE DESIRES.

OPTION CODE	PURPOSE	INPUT FOR COMPONENT 2
00001	SPECIFY IMU ORIENTATION	1 = PERF, 2 = NOM 3 = REFSMMAT
00002	SPECIFY VEHICLE	1 = THIS, 2 = OTHER
00004	SPECIFY STATE OF TRACKING = FULTKFLAG	0 = VHF AND OPTICS 1 = PARTIAL VHF OR OPTICS
00012	SPECIFY P50 OPTION	1 = SUN ONLY 2 = SUN AND STAR 3 = INDEPENDENT SOURCE
00013	SPECIFY P55 OPTION	1 = REFSMMAT 2 = MARK
00024	SPECIFY TRACKING OPTION	0 = RENDEZVOUS, VECPOINT 1 = CELESTIAL BODY, VECPOINT 2 = ROTATION 4 = RENDEZVOUS, 3-AXIS 5 = CELESTIAL BODY, 3-AXIS

NOTES

ALARM CODES

CODE	TYPE	SET BY
00107	STAR TRACKER ANGLES OUT OF LIMITS	P55
00110	NO MARK SINCE LAST MARK REJECT	SXTMARK
00113	NO INBITS	SXTMARK
00114	MARK MADE BUT NOT DESIRED	SXTMARK
00115	OPTICS TORQUE REQUEST WITH SWITCH NOT AT CMC	EXT VERB OPT CDU
00116	OPTICS SWITCH ALTERED BEFORE 15 SEC ZERO TIME ELAPSED	T4RUPT
00117	OPTICS TORQUE REQUEST WITH OPTICS NOT AVAILABLE (OPTIND = 0)	EXT VERB OPT CDU
00120	OPTICS TORQUE REQUEST WITH OPTICS NOT ZEROED	T4RUPT
00121	CDUS NO GOOD AT TIME OF MARK	SXTMARK
00205	BAD PIPA READING	SERVICER
00206	ICDU ZERO NOT ALLOWED WITH COARSE ALIGN + GIMBAL LOCK	IMU MODE SWITCHING
00207	ISS TURNON REQUEST NOT PRESENT FOR 90 SEC	T4RUPT
00210	IMU NOT OPERATING	IMU MODE SWITCH, IMU-2, R02, P51
00211	COARSE ALIGN ERROR > 2 DEGREES	IMU MODE SWITCH
00212	PIPA FAIL BUT PIPA IS NOT BEING USED	IMU MODE SWITCH, T4RPT
00213	IMU NOT OPERATING WITH TURN-ON REQUEST	T4RUPT
00214	PROGRAM USING IMU WHEN TURNED OFF	T4RUPT
00217	BAD RETURN FROM STALL ROUTINES	CURTAINS
00220	IMU NOT ALIGNED - NO REFSMMAT	R02, P51
00401	DESIRED GIMBAL ANGLES YIELD GIMBAL LOCK	IMF ALIGN, IMU-2
00402	CREW MUST HONOR 2ND MINKEY TORQUE REQUEST	P52
00404	TARGET OUT OF VIEW - TRUN ANGLE > 90 DEG	R52
00405	TWO STARS NOT AVAILABLE	P52, P54
00406	REND NAVIGATION NOT OPERATING	R21, R23
00421	W-MATRIX OVERFLOW	INTEGRV
00500	NOT ENOUGH PITCH OR YAW JETS	DOCKED DAP
00501	NOT ENOUGH ROLL JETS	DOCKED DAP
00600	10 ITERATIONS OR PHASE MATCH LOOP	P31, P32
00601	15 ITERATIONS OF AN INNER LOOP	P31, P32
00602	15 ITERATIONS OF OUTER LOOP	P31, P32
00603	15 ITERATIONS OF QRDTP1 SUBROUTINE	P31, P32, P33
00611	**NO TIG FOR GIVEN ELEVATION ANGLE**	**P34,**
00777	**PIPA FAIL CAUSED ISS WARNING**	**T4RUPT**
01102	**AGC SELF TEST ERROR**	**SELF CHECK**

ALARM CODES(CONT.)

CODE	TYPE	SET BY
01105	DOWNLINK TOO FAST	T4RUPT
01106	UPLINK TOO FAST	T4RUPT
01107	PHASE TABLE FAILURE. ASSUME ERASABLE MEMORY IS DESTROYED	RESTART
01301	ARCSIN-ARCCOS ARGUMENT TOO LARGE	INTERPRETER
01407	VG INCREASING	S40.8
01426	IMU UNSATISFACTORY	P61, P62
01427	IMU REVERSED	P61, P62
01520	V37 REQUEST NOT PERMITTED AT THIS TIME	V37
01600	OVERFLOW IN DRIFT TEST	OPT PRE ALIGN CALIB
01601	BAD IMU TORQUE	OPT PRE ALIGN CALIB
01703	INSUF. TIME FOR INTEG., TIG WAS SLIPPED	R41
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
20430	*INTEG. ABORT DUE TO SUB-SURFACE STATE VECTOR	ALL CALLS TO INTEG.
20607	*NO SOLUTION FROM TIME-THETA OR TIME-RADIUS	TIMETHET, TIMERAD
21204	*NEGATIVE OR ZERO WAITLIST CALL	WAITLIST
21206	*SECOND JOB ATTEMPTS TO GO TO SLEEP VIA KEYBOARD AND DISPLAY PROGRAM	PINBALL
21210	*TWO PROGRAMS USING DEVICE AT SAME TIME	IMU MODE SWITCH
21302	*SQRT CALLED WITH NEGATIVE ARGUMENT. ABORT	INTERPRETER
21501	*KEYBOARD AND DISPLAY ALARM DURING INTERNAL USE (NVSUB). ABORT	PINBALL
21502	*ILLEGAL FLASHING DISPLAY	GOPLAY
21521	*P01 OR P07 ILLEGALLY SELECTED	P01, P07
31104	**DELAY ROUTINE BUSY	SERVICE ROUTINES
31201	**EXECUTIVE OVERFLOW - NO VAC AREAS	EXECUTIVE
31202	**EXECUTIVE OVERFLOW - NO CORE SETS	EXECUTIVE
31203	**WAITLIST OVERFLOW - TOO MANY TASKS	WAITLIST
31211	**ILLEGAL INTERRUPT OF EXTENDED VERB	SXTMARK
32000	** JASK INTERRUPTING THE PRECEDING JASK	DKJSLECT

*POODOO ABORT. DOES SOFTWARE RESTART (ENEMA) AND "GO TO POOH" (FLASHING VERB 37) UNLESS "AVERAGE G" IS RUNNING THEN ONLY SOFTWARE RESTART

**BAILOUT ABORT. DOES SOFTWARE RESTART (ENEMA)

COMPUTER PROGRAMS

PHASE	PROGRAM NUMBER	PROGRAM TITLE
PRE-LAUNCH	00	CMC IDLING
AND	01	PRELAUNCH OR SERVICE-INITIALIZATION
SERVICE	02	PRELAUNCH OR SERVICE-GYRO COMPASSING
	03	PRELAUNCH OR SERVICE-OPTICAL VERIFICATION OF GYRO COMPASSING
	06	GNCS POWER DOWN
	07	SYSTEMS TEST
BOOST	11	EARTH ORBIT INSERTION MONITOR (EOI)
COAST	20	UNIVERSAL TRACKING
	21	GROUND TRACK DETERMINATION
	25	CONTINGENCY VHF RANGE RATE
	27	CMC UPDATE
	29	TIME-OF-LONGITUDE
PRE-	30	EXTERNAL DELTA V
THRUST	31	NC1 TARGETING
TARGETING	32	NC2 TARGETING
	33	NCC TARGETING
	34	NSR TARGETING
	35	TPI TARGETING
	36	TPM TARGETING
	37	RENDEZVOUS FINAL PHASE
	38	PLANE CHANGE TARGETING
THRUSTING	40	SPS
	41	RCS
	47	THRUST MONITOR
	48	RENDEZVOUS THRUST MONITOR
ALIGNMENT	50	ATM ORIENTATION DETERMINATION
	51	IMU ORIENTATION DETERMINATION
	52	IMU REALIGN
	53	BACK-UP IMU ORIENTATION DETERMINATION
	54	BACK-UP IMU REALIGN
	55	ATM STAR TRACKER GIMBAL ANGLE
ENTRY	61	ENTRY - PREPARATION
	62	ENTRY-CM/SM SEPARATION AND PRE-ENTRY MANEUVER
	63	ENTRY INITIALIZATION
	64	ENTRY-POST 0.05G
	65	ENTRY-UP CONTROL
	66	ENTRY-BALLISTIC
	67	ENTRY-FINAL PHASE
POST-THRUSTING	77	CSM VELOCITY VECTOR UPDATE

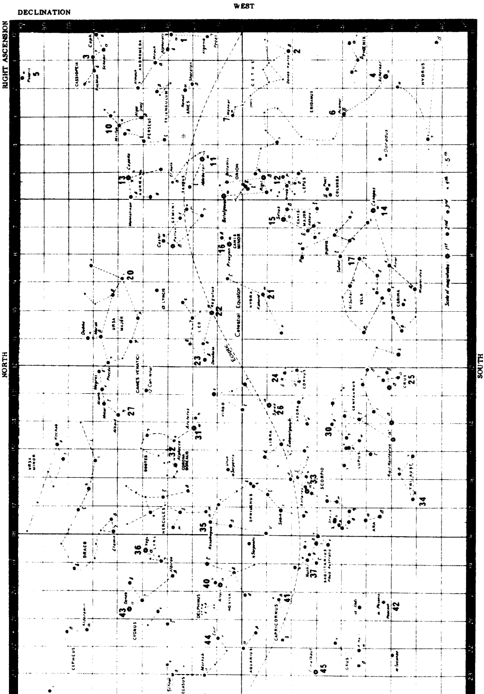
COMPUTER ROUTINES

NUMBER	NAME	CALLED OR INITIATED BY
R00	FINAL AUTOMATIC REQUEST TERMINATE	GO TO POOH
R01	ERASABLE AND CHANNEL MODIFICATION ROUTINE	V25N07
R02	IMU STATUS CHECK	P20, P40, P47, P48, P52, P54 P61, P62, R05, R63
R03	CSM DAP DATA LOAD DATA LOAD	V48
R04	DOCKED DAP DATA LOAD	V44
R07	MINKEY CONTROLLER	
R08	VHF RANGE READ	R27
R21	**RENDEZVOUS TRACKING SIGHTING MARK**	**P20**
R22	**RENDEZVOUS TRACKING DATA PROCESSING**	**P20**
R23	**RENDEZVOUS BACKUP SIGHTING MODE**	**V54**
R27	VHF RANGE RATE MARK PROCESSING	
R30	ORBIT PARAMETER DISPLAY	V82
R31	RENDEZVOUS PARAMETER DISPLAY NUMBER ONE	V83
R34	RENDEZVOUS PARAMETER DISPLAY NUMBER TWO	V85
R36	RENDEZVOUS OUT-OF-PLANE DISPLAY	V90
R40	SPS TRUST FAIL	P40
R41	STATE VECTOR INTEGRATION (MID TO AVE)	P40, P41, P47, P48, P61
R50	COARSE ALIGN	P52, P54
R52	AUTOMATIC OPTICS POSITIONING	P20, R51
R53	SIGHTING MARK	P51, P52
R54	SIGHTING DATA DISPLAY	P51, R51
R55	GYRO TORQUING	R51
R56	ALTERNATE LOS SIGHTING MARK	R51
R60	ATTITUDE MANEUVER	P40, P41, R61, R62, V89
R61	TRACKING ATTITUDE	P20, R52
R62	CREW DEFINED MANEUVER	V49
R63	RENDEZVOUS FINAL ATTITUDE	R61, V89
R64	OPTICS ANGLE TRANSFORM	V64
R66	**UNIVERSAL TRACKING OPTION H1/#5**	**P20**
R67	**ROTATION**	**P20**

STAR / PLANET LIST

OCTAL STAR CODE	NAME	VIS. MAG.	RIGHT ASCENSION (HR. MIN.)	DECLINATION (DEG. 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	IOTA 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 (ALKAID)	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	EPSILON PEGASI (ENIF)	2.5	21 42	+09 42
45	ALPHA PICIS AUSTRINUS (FOMALHAUT)	1.3	22 56	-29 49
46	SUN			
47	EARTH			
50	MOON			
00	PLANET			

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
ALKAID	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	FOMALHAUT	45	REGULUS	22
ANTARES	33	GIENAH	24	RIGEL	12
ARCTURUS	31	MENKAR	7	SIRIUS	15
ATRIA	34	MENKENT	30	SPICA	26
				VEGA	36


DECLINATION
WEST
RIGHT ASCENSION
NORTH
SOUTH
EAST
CASSIOPEIA
ANDROMEDA
PERSEUS
TRIANGULUM
ARIES
CETUS
ERIDANUS
PHOENIX
HYDRUS
AURIGA
TAURUS
ORION
LEPUS
COLUMBA
GEMINI
CANIS MAJOR
CANIS MINOR
PUPPIS
VELA
CARINA
LYNCIS
URSA MAJOR
LEO
HYDRA
CANES VENATICI
CORVUS
CRUX
CENTAURUS
VIRGO
LIBRA
BOOTES
CORONA BOREALIS
URSA MINOR
LUPUS
SCORPIO
OPHIUCHUS
HERCULES
DRACO
LYRA
TRI. AUST.
ARA
SAGITTARIUS
AQUILA
DELPHINUS
CYGNUS
CAPRICORNUS
CEPHEUS
PEGASUS
AQUARIUS
GRUS
Celestial Equator
Ecliptic
Polaris
Capella
Aldebaran
Betelgeuse
Rigel
Sirius
Procyon
Canopus
Castor
Pollux
Regulus
Arcturus
Spica
Antares
Vega
Altair
Deneb
Fomalhaut
Achernar
Scale of magnitudes 1st 2nd 3rd 4th 5th
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FLAGWORD BITS-ALPHABETICAL LIST

.05 GSW	B3	FW6
3AXISFLG	B6	FW5
45/46 FLG	B6	FW3
500**FLG	B12	FW3
501**FLG	B11	FW3
APSESW	B5	FW8
ASTNFLAG	B12	FW7
ATMFLAG	B11	FW0
ATTCHFLG	B2	FW7
AUTOSEQ	B7	FW10
AVEGFLAG	B1	FW1
AVEMIDSW	B1	FW9
AZIMFLAG	B8	FW11
CALCMAN2	B2	FW2
CMDAPARM	B12	FW6
CM/DSTBY	B2	FW6
COGAFLAG	B4	FW8
CULTFLAG	B7	FW3
CYC61FLG	B4	FW0
CYCLFLAG	B11	FW0
DAPB111	B15	FW6
DAPBIT2	B14	FW6
DIM0FLAG	B1	FW3
DRIFTFLG	B15	FW2
DSKYFLAG	B15	FW5
EGSW	B8	FW6
ENG2FLAG	B11	FW1
ENGONFLAG	B7	FW5
ENTRYDSP	B13	FW6
ERADFLAG	B13	FW1
ETPIFLAG	B7	FW2
EXTRANGE	B9	FW10
FINALFLG	B6	FW2
FIRSTFLG	B7	FW2
FIXFLAG	B7	FW11
FREEFLAG	B3	FW0
FULTKFLG	B2	FW10
GAMDIFSW	B11	FW6
GLOKFAIL	B14	FW3
GONEBY	B8	FW7
GONEPAST	B10	FW5
GRRBKFLG	B5	FW5
GUESSW	B2	FW1
GYMD1FSW	B1	FW6
HDSUPFLG	B11	FW10
HIND	B6	FW6
IDLEFAIL	B6	FW1
IGNFLAG	B13	FW7
IMPULSW	B9	FW2
IMUSE	B8	FW0
INCORFLG	B11	FW5
INFINFLG	B7	FW8
INRLSW	B5	FW6
INTFLAG	B14	FW10
INTYPFLG	D4	FW3
ITERFLG	B13	FW2
ITSWICH	B14	FW7
JSWITCH	B14	FW0
KNOWNFLAG	B8	FW6
LATSW	B4	FW6
MANEUFLG	B5	FW10
MARKFLG	B4	FW1
MAXDBFLG	B12	FW9
MIDI1FLG	B3	FW9
MIDAVFLG	B2	FW9
MIDFLAG	B13	FW0
MKOVFLAG	B3	FW4
MRKIDFLG	B15	FW4
MRKNVFLG	B9	FW4
MRUPTFLG	B5	FW4
MWAITFLG	B11	FW4
N220RN17	B6	FW9
N77 FLAG	B9	FW11
NC12FLAG	B5	FW0
NC INT FLG	B2	FW0
NCLPFLG	B9	FW1
NEEDLFLG	B9	FW0
NEWIFLG	B13	FW8
NEWTFLAG	B10	FW5
NJETSFLG	B15	FW1
NODOFLG	B1	FW2
NODOP01	B12	FW1
NORMSW	B10	FW7
NOSWITCH	B7	FW6
NOUN FLG	B10	FW11
NRMIDFLG	B13	FW4
NRMNVFLG	B8	FW4
NRUPTFLG	B4	FW4
NWAITFLG	B10	FW4
ORDERSW	B6	FW8
P21FLAG	B12	FW2
P25 FLAG	B4	FW11
P29FLAG	B1	FW0
P35FLAG	B8	FW10
P48 FLAG	B5	FW11
P50 FLAG	B10	FW0
P50.1 FLG	B12	FW0
P55.1 FLG	B13	FW0
PCFLAG	B1	FW10
PCMANFLG	B15	FW10
PDSPFLAG	B12	FW4
PFRATFLG	B4	FW2
PINBRFLG	B6	FW4
POOFLAG	B9	FW3
PRECIFLG	B8	FW3
PRIODFLG	B14	FW4
PRONVFLG	B7	FW4
PTV39FLG	B4	FW10
QUITFLAG	B5	FW9
R21MARK	B14	FW2
R22CAFLG	B7	FW9
R27FLAG	B12	FW11
R27UP1	B1	FW11
R27UP2	B2	FW11
R31FLAG	B4	FW9
R53FLAG	B6	FW0

FLAGWORD BITS - ALPHABETICAL LIST (CONT)

R67FLAG	B2	FW8	TDFLAG	B3	FW11
REFSMFLG	B13	FW3	TERMIFLG	B15	FW7
REINTFLG	B7	FW10	TFFSW	B1	FW7
REJCTFLG	B12	FW10	TIMRFLAG	B11	FW7
RELVELSW	B9	FW6	TPIMNFLG	B3	FW10
RENDWFLG	B1	FW5	TRACKFLG	B5	FW1
REV FLAG	B5	FW2	UPDATFLG	B7	FW1
RNDVZFLG	B7	FW0	UPLOCKFL	B4	FW7
RVSW	B9	FW7	UTFLAG	B9	FW8
SBFLAG .G	B3	FW2	V37FLAG	B6	FW7
SKIPVHF	B10	FW2	V50N18FL	B15	FW3
SLOPESW	B3	FW1	V96ONFLG	B3	FW8
SNAPFLAG	B6	FW11	VEHUPFLG	B8	FW1
SOLNSW	B3	FW5	VERIFLAG	B3	FW7
SOURCFLG	B8	FW9	VFLAG	B10	FW3
STATEFLG	B5	FW3	VHFRFLAG	B9	FW9
STEERSW	B11	FW2	VINTFLAG	B3	FW3
STIKFLAG	B14	FW1	VNFLAG	B2	FW4
STRULLSW	B13	FW6	XDELVFLG	B8	FW2
SWTOVER	B15	FW9	XDSPFLAG	B1	FW4
TARG1FLG	B10	FW1			
TCOMPFLG	B6	FW1			

FLAGWORD BIT ASSIGNMENTS

FLAGWORD AND BIT	NAME	SET	RESET
FW0 B1	P29FLAG	P29 RUNNING, 1ST PASS IN PROGRESS	P29 FINISHED WITH 1ST PASS
FW0 B2	NC INT FLG	CONIC INTEGRATION	PRECISION INTEGRATION
FW0 B3	FREE FLAG	(TEMPORARY FLAG USED IN MANY ROUTINES)	
FW0 B4	CYC61FLG	KALCMAN 3 TO RETURN TO R61 AFTER COMPUTING TM	KALCMAN 3 TO DO MANEUVER
FW0 B5	NC12FLG	P32(NC 2)	P31 (NC 2)
FW0 B6	R53FLAG	V51 INITIATED	V51 NOT INITIATED
FW0 B7	RNDVZFLG	P20 RUNNING	P20 NOT RUNNING
FW0 B8	IMUSE	IMU IN USE	IMU NOT IN USE
FW0 B9	NEEDLFLG	TOTAL ATTITUDE ERROR DISPLAYED	A/P FOLLOWING ERROR DISPLAYED
FW0 B10	P50FLAG	MODE = 50	MODE NOT 50
FW0 B11	ATMFLAG	ATMSM ENABLED	ATMSM DISABLED
FW0 B12	P50,1 FLG	OPTION = 1 IN P50	OPTION NOT = 1 E IN P50
FW0 B13	P55,1FLG	OPTION = 1 IN P55	OPTION NOT = 1 IN P55
FW0 B14	JSWITCH	INTEGRATION OF W MATRIX	INTEGRATION OF STATE VECTOR
FW0 B15			
FW1 B1	AVEGFLAG	AVERAGEG(SERVICER) TO CONTINUE	AVERAGEG(SERVICER) TO CEASE
FW1 B2	GUESSW	NO STARTING VALUE FOR ITERATION	STARTING VALUE FOR ITERATION EXISTS
FW1 B3	SLOPESW	ITERATE WITH BIAS METHOD IN INTERATOR	ITERATE WITH REGULAR FALSI METHOD IN ITERATOR
FW1 B4	MARKFLG	A MARK HAS BEEN ACCEPTED, ALLOW MARK REJECT	NO MARK HAS BEEN ACCEPTED, DO NOT MARK REJECT
FW1 B5	TRACKFLG	TRACKING ALLOWED	TRACKING NOT ALLOWED
FW1 B6	IDLEFAIL	INHIBIT R41	ENABLE R41 (ENGFAIL)
FW1 B7	UPDATFLG	UPDATING BY MARKS ALLOWED	UPDATING BY MARKS NOT ALLOWED
FW1 B8	VEHUPFLG	CSM STATE VECTOR BEING UPDATED	OWS STATE VECTOR BEING UPDATED
FW1 B9	NCLPFLG	COMPUTING EH2 IN P31/P32	COMPUTING EH1 IN P31/P32
FW1 B9			
FW1 B10	TARG1FLG	SIGHTING OWS	NOT SIGHTING OWS
FW1 B11	ENG2FLG	RCS BURN	SPS BURN
FW1 B12	NODOP01	P01 NOT ALLOWED	P01 ALLOWED

FLAGWORD BIT ASSIGNMENTS(CONT.)

FLAGWORD AND BIT	NAME	SET	RESET
FW1 B13	ERADFLG	EARTH - COMPUTE FISCHER ELLIPSOID RADIUS.	EARTH - USE FIXED RADIUS
FW1 B14	STIKFLAG	RHC CONTROL	CMC CONTROL
FW1 B15	NJETSFLG	TWO JET RCS BURN	FOUR JET RCS BURN
FW2 B1	NODOFLAG	V37 NOT PERMITTED	V37 PERMITTED
FW2 B2	CALCMAN2	PERFORM MANEUVER STARTING PROCEDURE	BYPASS MANEUVER STARTING PROCEDURE
FW2 B3	SBFLAG	PERFORM COMPLEX SHORT BURN LOGIC	PERFORM SIMPLE SHORT BURN LOGIC
FW2 B4	PFRATFLG	PREFERRED ATTITUDE COMPLETED	PREFERRED ATTITUDE NOT COMPUTED
FW2 B5	REVFLAG	ONLY COMPUTE MATRIX IN GET. LVC	COMPUTE MATRIX AND VECTOR IN GET. LVC
FW2 B6	FINALFLG	LAST PASS THROUGH RENDEZVOUS PROGRAM COMPUTATIONS	INTERIM PASS THROUGH RENDEZVOUS PROGRAM COMPUTATIONS
FW2 B7	ETPIFLAG	ELEVATION ANGLE SUPPLIED FOR P34	TPI TIME SUPPLIED FOR P34
FW2 B7	FIRSTFLAG	FIRST PASS THROUGH S40.9	SUCCEEDING PASS THROUGH S40.9
FW2 B8	XDELVFLG	EXTERNAL DELTA V VG COMPUTATION	LAMBERT (AIMPOINT) VG COMPUTATION
FW2 B9	IMPULSW	MINIMUM IMPULSE BURN (CUTOFF TIME SPECIFIED)	STEERING BURN (NO CUTOFF TIME YET AVAILABLE)
FW2 B10	SKIPVHF	DISREGARD RADAR READ BECAUSE OF SFTWRE OR HRDWRE RESTART	RADAR READ TO PROCEED NORMALLY
FW2 B11	STEERSW	STEERING TO BE DONE	STEERING OMITTED
FW2 B12	P21FLAG	SUCCEEDING PASS THRU P21, USE BASE VECTOR FOR CALC.	1ST PASS THRU P21, CALCULATE BASE VECTOR
FW2 B13	ITERFLG	15 ITERATIONS HAVE OCCURRED IN ITER	15 ITERATIONS HAVE NOT OCCURRED IN ITER
FW2 B14	R21MARK	OPTION ONE FOR MARKRUPT	OPTION TWO FOR MARKRUPT
FW2 B15	DRIFTFLG	T3RUPT CALLS GYRO COMPENSA-	T3RUPT DOES NO GYRO COMPENSATION
FW3 B1	DIMOFLAG	W MATRIX IS TO BE USED	W MATRIX IS NOT TO BE USED
FW3 B2			
FW3 B3	VINTFLAG	CSM STATE VECTOR BEING INTEGRATED	OWS STATE VECTOR BEING INTEGRATED

FLAGWORD BIT ASSIGNMENTS(CONT.)

FLAGWORD AND BIT	NAME	SET	RESET
FW3 B4	INTYPFLG	CONIC INTEGRATION	ENCKE INTEGRATION
FW3 B5	STATEFLG	PERMANENT STATE VECTOR UPDATED	PERMANENT STATE VECTOR NOT UPDATED
FW3 B6	45/46 FLG	V45 WAS LAST DAP TURN ON EXT VERB	V46 WAS LAST DAP TURN ON EXT VERB
FW3 B7	CULTFLAG	STAR OCCULTED	STAR NOT OCCULTED
FW3 B8	PRECIFLG	CSM PREC, LMPREC OR INTEGRVS CALLED	INTEGRV CALLED
FW3 B9	POOFLAG	INHIBIT BACKWARDS INTEGRATION	ALLOW BACKWARDS INTEGRATION
FW3 B10	VFLAG	LESS THAN TWO STARS IN FIELD OF VIEW	TWO STARS IN FIELD OF VIEW
FW3 B11	501 **FLG	THE 501 ALARM HAS BEEN SET TO INDICATE THERE ARE NOT ENOUGH JETS UNINHIBITED FOR SOME ROLL ROTATION WANTED BY THE DAP	THE 501 ALARM HAS NOT YET BEEN SET 501**FLG IS RESET IN R04
FW3 B12	500**FLG	THE 500 ALARM HAS BEEN SET TO INDICATE THERE ARE NOT ENOUGH JETS UNINHIBITED FOR SOME PITCH OR YAW ROTATION WANTED BY THE DAP	THE 500 ALARM HAS NOT YET BEEN SET. 500**FLG IS RESET IN R04
FW3 B13	REFSMFLG	REFSMMAT GOOD	REFSMMAT NO GOOD
FW3 B14	GLOKFAIL	GIMBAL LOCK HAS OCCURRED	NOT IN GIMBAL LOCK
FW3 B15	V50N18FL	ENABLE R60 ATTITUDE MANEUVER	INHIBIT R60 ATTITUDE MANEUVER
FW4 B1	XDSPFLAG	MARK DISPLAY NOT TO BE INTERRUPTED	NO SPECIAL MARK INFORMATION
FW4 B2	VNFLAG	DISPLAY IS A VNFLASH TYPE	DISPLAY IS NOT A VNFLASH TYPE
FW4 B3	MKOVFLAG	MARK DISPLAY OVER NORMAL	NO MARK DISPLAY OVER NORMAL
FW4 B4	NRUPTFLG	NORMAL DISPLAY INTERRUPTED BY PRIORITY OR MARK DISPLAY	NORMAL DISPLAY NOT INTERRUPTED BY PRIORITY OR MARK DISPLAY
FW4 B5	MRUPTFLG	MARK DISPLAY INTERRUPTED BY PRIORITY DISPLAY	MARK DISPLAY NOT INTERRUPTED BY PRIORITY DISPLAY
FW4 B6	PINBRFLG	ASTRONAUT HAS INTERFERED WITH EXISTING DISPLAY	ASTRONAUT HAS NOT INTERFERRED WITH EXISTING DISPLAY
FW4 B7	PRONVFLG	ASTRONAUT USING KEYBOARD WHEN PRIORITY DISPLAY INITIATED	ASTRONAUT NOT USING KEYBOARD WHEN PRIORITY DISPLAY INITIATED
FW4 B8	NRMNVFLG	ASTRONAUT USING KEYBOARD WHEN NORMAL DISPLAY INITIATED	ASTRONAUT NOT USING KEYBOARD WHEN NORMAL DISPLAY INITIATED

FLAGWORD BIT ASSIGNMENTS(CONT.)

FLAGWORD AND BIT	NAME	SET	RESET
FW4 B9	MRKNVFLG	ASTRONAUT USING KEYBOARD WHEN MARK DISPLAY INITIATED	ASTRONAUT NOT USING KEYBOARD WHEN MARK DISPLAY INITIATED
FW4 B10	NWAITFLG	HIGHER PRIORITY DISPLAY OPERATING WHEN NORMAL DISPLAY INITIATED	NO HIGHER PRIORITY DISPLAY OPERATING WHEN NORMAL DISPLAY INITIATED
FW4 B11	MWAITFLG	HIGHER PRIORITY DISPLAY OPERATING WHEN MARK DISPLAY INITIATED	NO HIGHER PRIORITY DISPLAY OPERATING WHEN MARK DISPLAY INITIATED
FW4 B12	PDSPFLAG	CAN'T INTERRUPT PRIORITY DISPLAY	
FW4 B13	NRMIDFLG	NORMAL DISPLAY IN ENDIDLE	NO NORMAL DISPLAY IN ENDIDLE
FW4 B14	PRIODFLG	PRIORITY DISPLAY IN ENDIDLE	NO PRIORITY DISPLAY IN ENDIDLE
FW4 B15	MRKIDFLG	MARK DISPLAY IN ENDIDLE	NO MARK DISPLAY IN ENDIDLE
FW5 B1	RENDWFLG	W MATRIX VALID FOR RENDEZVOUS NAVIGATION	W MATRIX INVALID FOR RENDEZVOUS NAVIGATION
FW5 B2			
FW5 B3	SOLNSW	LAMBERT DOES NOT CONVERGE, OR TIME-RADIUS NEARLY CIRCULAR	LAMBERT CONVERGES OR TIME-RADIUS NON CIRCULAR
FW5 B4			
FW5 B5	GRRBKFLG	BACKUP GRR RECEIVED	BACKUP GRR NOT RECEIVED
FW5 B6	3AXISFLG	MANEUVER SPECIFIED BY THREE AXES	MANEUVER SPECIFIED BY ONE AXIS
FW5 B7	ENGONFLG	ENGINE TURNED ON	ENGINE TURNED OFF
FW5 B8			
FW5 B9			
FW5 B10	NEWTFLAG	RETURN TO P29 SKIPPING LONGITUDE DISPLAY	NORMAL OPERATION
FW5 B11	INCORFLG	FIRST INCORPORATION	SECOND INCORPORATION
FW5 B12			
FW5 B13			
FW5 B14			
FW5 B15	DSKYFLAG	DISPLAY SENT TO DSKY	NO DISPLAY TO DSKY
FW6 B1	GYMDIFSW	CDU DIFFERENCES AND BODY RATES COMPUTED	CDU DIFFERENCES AND BODY RATES NOT COMPUTED
FW6 B2	CM/DSTBY	ENTRY DAP ACTIVATED	ENTRY DAP NOT ACTIVATED
FW6 B3	.05GSW	DRAG OVER .05G	DRAG LESS THAN 0.5G

FLAGWORD BIT ASSIGNMENTS(CONT.)

FLAGWORD AND BIT	NAME	SET	RESET
FW6 B4	LATSW	DOWNLIFT NOT INHIBITED	DOWNLIFT INHIBITED
FW6 B5	INRLSW	INITIAL ROLL ATTITUDE HOT HELD	INITIAL ROLL ATTITUDE HELD
FW6 B6	HIND	ITERATING HUNTEST CALCULATIONS TO BE DONE AFTER RANGE PREDICTION	ITERATING OF HUNTEST CALCULATIONS TO BE OMITTED AFTER RANGE PREDICTION
FW6 B7	NOSWITCH	LATERAL ROLL MANEUVER INHIBITED DURING ENTRY	LATERAL ROLL MANEUVER PERMITTED DURING ENTRY
FW6 B8			
FW6 B8	EGSW	IN FINAL PHASE	NOT IN FINAL PHASE
FW6 B9	RELVELSW	TARGETING USES EARTH-RELATIVE VELOCITY	TARGETING USES INERTIAL VELOCITY
FW6 B10	GONEPAST	LATERAL CONTROL CALCULATIONS TO BE OMITTED	LATERAL CONTROL CALCULATIONS TO BE DONE
FW6 B11	GAMDIFSW	CALCULATE GAMDOT	GAMDOT NOT TO BE CALCULATED
FW6 B12	CMDAPARM	ALLOW ENTRY FIRING AND CALCULATIONS	INHIBIT ENTRY FIRING AND CONTROL FUNCTION
FW6 B13	ENTRYDSP	DO ENTRY DISPLAY VIA ENTRYVN	OMIT ENTRY DISPLAY
FW6 B13	STRULLSW	DO STEER RULE	DO ULLAGEOFF ONLY
FW6 B14	DAPBIT2	BIT 14: 0 / 1 / 0 / 1	
FW6 B15	DAPBIT1	BIT 15: 0 / 0 / 1 / 1	
		A/P: NONE / RCS / TVC / SATURN	
FW7 B1	TFFSW	CALCULATE TIME OF PERIGEE	CALCULATE TIME OF FREE FALL
FW7 B2	ATTCHFLG	LM, CM ATTACHED	LM, CM NOT ATTACHED
FW7 B3	VERIFLAG	CHANGES STATE WHEN V33E OCCURS AT END OF P27	
FW7 B4	UPLOCKFL	K-KBAR-K FAIL	NO K-KDAR K FAIL
FW7 B5			
FW7 B6	V37 FLAG	AVERAGE G(SERVICER) RUNNING	AVERAGEG (SERVICER) OFF
FW7 B7			
FW7 B8	GONEBY	PASSED TARGET	APPROACHING TARGET
FW7 B9	RVSW	DO NOT COMPUTE FINAL STATE VECTOR IN TIME-THETA	COMPUTE FINAL STATE VECTOR IN TIME-THETA

FLAGWORD BIT ASSIGNMENTS(CONT.)

FLAGWORD AND BIT	NAME	SET	RESET
FW7 B10	NORMSW	UNIT NORMAL INPUT TO LAMBERT	LAMBERT COMPUTE ITS OWN UNIT NORMAL
FW7 B11	TIMRFLAG	CLOKTASK OPERATING	CLOKTASK INOPERATIVE
FW7 B12	ASTNFLAG	ASTRONAUT HAS OKAYED IGNITION	ASTRONAUT HAS NOT OKAYED IGNITION
FW7 B13	IGNFLAG	TIG HAS ARRIVED	TIG HAS NOT ARRIVED
FW7 B14	ITSWICH	ACCEPT NEXT LAMBERT TPI SEARCH SOLUTION	TEST LAMBERT ANSWER AGAINST LIMITS
FW7 B15	TERMIFLG	TERMINATE R52	DO NOT TERMINATE R52
FW8 B1	360SW	TRANSFER ANGLE NEAR 360 DEGREES	TRANSFER ANGLE NOT NEAR 360 DEGREES
FW8 B2	R67FLAG	R67 CALLING R60	NOT R67 CALLING R60
FW8 B3	V96ONFLG	P00 INTEGRATION HAS BEEN INHIBITED BY V96	P00 INTEGRATION IS PROCEEDING REGULARLY
FW8 B4	COGAFLAG	NO CONIC SOLUTION; TOO CLOSE TO RECTILINEAR (COGA OVERFLOWS)	CONIC SOLUTION EXISTS (COGA DOES NOT OVERFLOW)
FW8 B5	APSESW	R DESIRED OUTSIDE PERICENTER - APOCENTER RANGE IN TIME-RADIUS	R DESIRED INSIDE PERICENTER - APOCENTER RANGE IN TIME-RADIUS
FW8 B6	ORDERSW	ITERATOR USES 2ND ORDER MINIMUM MODE	ITERATOR USES 1ST ORDER STANDARD MODE
FW8 B7	INFINFLG	NO CONIC SOLUTION (CLOSURE THROUGH INFINITY REQUIRED)	CONIC SOLUTION EXISTS
FW8 B8			
FW8 B9	UTFLAG	UNIVERSAL TRACKING	NO UNIVERSAL TRACK
FW8 B10			
FW8 B11			
FW8 B12			
FW8 B13	NEWIFLG	FIRST PASS THROUGH INTEGRATION	SUCCEEDING ITERATION OF INTEGRATION
FW8 B14			
FW8 B15			

FLAGWORD BIT ASSIGNMENTS(CONT.)

FLAGWORD AND BIT	NAME	SET	RESET
FW9 B1	AVEMIDSW	AVETOMID CALLING FOR W MATRIX INTEGRATION. DON'T WRITE OVER RN, VN, PIPTIME	NO AVETOMID FOR W MATRIX. ALLOW SET UP RN, VN, PIPTIME
FW9 B2	MIDAVFLG	INTEGRATION ENTERED FROM ONE OF MIDTOAV PORTALS	INTEGRATION WAS NOT ENTERED VIA MIDTOAV
FW9 B3	MID1FLAG	INTEGRATE TO TDEC	INTEGRATE TO THE THEN - PRESENT TIME
FW9 B4	R31FLAG	R31 SELECTED, VERB 83	R34 SELECTED VERB 85
FW9 B5	QUITFLAG	TERMINATE AND EXIT FROM INTEGRATION	CONTINUE INTEGRATION
FW9 B6	N220RN17	COMPUTE TOTAL ATTITUDE ERRORS WRT N22, VERB 62	COMPUTE TOTAL ATTITUDE ERRORS WRT N17, VERB 63
FW9 B7	R22CAFLG	R22 CALCULATIONS ARE GOING ON	R22 CALCULATIONS NOT GOING ON
FW9 B8	SOURCFLG	SOURCE OF INPUT DATA IS VHF	SOURCE OF INPUT DATA IS OPTICS MARK
FW9 B9	VHFRFLAG	ALLOW R22 TO ACCEPT RANGE DATA	STOP ACCEPTANCE OF RANGE DATA
FW9 B10			
FW9 B11			
FW9 B12	MAXDBFLG	MAX DEADBAND SELECTED	MIN DEADBAND SELECTED
FW9 B13			
FW9 B14			
FW9 B15	SWTOVER	SWITCHOVER HAS OCCURRED	NO SWITCHOVER YET
FW10 B1	PCFLG	PLANE CHANGE TARGETTING	NO PLANE CHANGE
FW10 B2	FULTKFLG	ONLY OPTICS OR VHF MARKS BEING TAKEN	OPTICS AND VHF MARKS TAKEN
FW10 B3	TPIMNFLG	TPI MANEUVER HAS BEEN DONE	
FW10 B4	PTV93FLG	V93 TO BE DONE AFTER MANEUVER	MANEUVER AND V93 DONE
FW10 B5	MANEUFLG	MANEUVER, P76, OR PLANNED MANEUVER	MARK INCORPORATED
FW10 B7	AUTOSEQ	AUTOMATIC RENDEZ-VOUS SEQUENCE IS RUNNING	AUTOMATIC RENDEZ-VOUS NOT RUNNING
FW10 B8	P35FLAG	MCC TARGETTING DONE	NO YET MCC

FLAGWORD BIT ASSIGNMENTS(CONT.)

FLAGWORD AND BIT	NAME	SET	RESET
FW10 B9	EXTRANGE	R63 RANGE VALID	R63 RANGE MEANINGLESS
FW10 B10			
FW10 B11	HDSUPFLG	HEADS UP ATTITUDE	HEADS DOWN ATTITUDE
FW10 B12	REJCTFLG	MARK TO BE REJECTED IN R22	NO MARK REJECTED BY R22
FW10 B13	REINTBIT	INTEGRATION ROUTINE TO BE RESTARTED	INTEGRATION ROUTINE NOT TO BE RESTARTED
FW10 B14	INTFLAG	INTEGRATION IN PROGRESS	INTEGRATION NOT IN PROGRESS
FW10 B15	PCMANFLG	P20 MANEUVER AT PLANE CHANGE	NOT P20 PLANE CHANGE MANEUVER
FW11 B1	R27UP1	1ST PASS IN R27 COMPLETE	1ST PASS NOT COMPLETE
FW11 B2	R27UP2	2ND PASS IN R27 COMPLETE	2ND PASS NOT COMPLETE
FW11 B3	TDFLAG	TD ANGLE IN R27 HAS BEEN COMPUTED	ANGLE HAS NOT YET BEEN COMPUTED
FW11 B4	P25FLAG	PROGRAM IS P25	NOT P25
FW11 B5	P48 FLAG	PROGRAM IS P48	NOT P48
FW11 B6	SNAP FLAG	INHIBIT R22 MARK PROCESSING	ALLOW R22 MARK PROCESSING
FW11 B7	FIXFLAG	R27 IN OPTIMIZING MODE PROGRAM	R27 IN CURRENT MODE
FW11 B8	AZIMFLAG	3-AXIS UT	VECPOINT UT
FW11 B9	N77 FLAG	NOUN 77 HOLDS OPTIMIZED RDOT	ALLOW CURRENT STATE TO BE STORED IN NOUN 77
FW11 B10	NOUNFLG	DISPLAY NOUN 77	DISPLAY NOUN 76
FW11 B11	CYCLFLAG	R27 IS STILL PROCESSING MARK	R27 READY FOR A NEWMARK
FW11 B12	R27FLAG	ALLOW R27 IN P20	INHIBIT R27 IN P20
FW11 B13			
FW11 B14			
FW11 B15			

IMODES30 (CM)

BIT	DESCRIPTION
1	PIPA FAIL INHIBIT (ISS WARNING)
2	TURN ON DELAY SEQUENCE FAIL
3	ICDU FAIL INHIBIT
4	IMU FAIL INHIBIT
5	PIPA FAIL INHIBIT (PROGRAM CAUTION)
6	IMU BEING INITIALIZED
7	FIRST TURN ON SAMPLE
8	SECOND TURN ON SAMPLE
9	IMU OPERATING
10	PIPA FAIL
11	IMU CAGE
12	ICDU FAIL
13	IMU FAIL
14	ISS TURN ON REQUEST
15	ISS TEMP IN LIMITS

IMODES33 (CM)

BIT	DESCRIPTION
1	LAMP TEST IN PROGRESS
2	
3	
4	
5	IMU IN ZEROING ROUTINE
6	ENABLE DAP
7	
8	
9	
10	
11	UPLINK TOO FAST
12	DOWNLINK TOO FAST
13	PIPA FAIL
14	PROCEED KEY DEPRESSED
15	

OPTMODES (CM)

BIT	DESCRIPTION
1	
2	OCDU FAIL INHIBIT
3	ZERO OPTICS PROCESSING
4	$\overline{\text{ZERO OPTICS}}$
5	$\overline{\text{CMC CONTROL}}$
6	
7	$\overline{\text{OCDU FAIL}}$
8	
9	
10	OPT ZEROED SINCE LAST FRESH START
11	
12	
13	
14	
15	

CM AUTOPILOT CONFIGURATION DATA (NOUN 46)

DAP DATA LOADED INTO COMPONENTS R1 & R2 UPON REQUEST BY FLASHING V 04 N 46

R1 = ABCDE (DAPDATR1)

R2 = ABCDE (DAPDATR2)

	VEHICLE CONFIGURATION	X-TRANSLATION FOR QUAD A/C	X-TRANSLATION FOR QUAD B/D	ATTITUDE DEADBAND	MANEUVER RATE
R1	0 = NO DAP 1 = CSM 2 = CSM & LM 3 = CSM & SIVB 6 = CSM & LM (ASCENT STG ONLY)	0 = DISABLE A/C 1 = USE A/C	0 = DISABLE B/D 1 = USE B/D	0 = ±0.5 DEG 1 = ±5.0 DEG	0 = 0.05 DEG/SEC 1 = 0.2 DEG/SEC 2 = 0.5 DEG/SEC 3 = 2.0 DEG/SEC
	ROLL QUAD SELECT	QUAD A STATUS	QUAD B STATUS	QUAD C STATUS	QUAD D STATUS
R2	0 = USE B/D 1 = USE A/C	0 = DISABLE 1 = USE	0 = DISABLE 1 = USE	0 = DISABLE 1 = USE	0 = DISABLE 1 = USE
	DIGIT A	DIGIT B	DIGIT C	DIGIT D	DIGIT E

CM AUTOPILOT CONFIGURATION DATA (NOUN 87)

DAP DATA LOADED INTO COMPONENTS R1, R2 & R3 UPON REQUEST BY FLASHING V 05 N 87

R1 = ABCDE (DAPDATR3)

R2 = CHANNEL 5 JET INHIBIT (CH5FAIL)

R3 = CHANNEL 6 JET INHIBIT (CH6FAIL)

	AC/BD ROLL CONTROL SPEC.	X-TRANSLATION FOR QUAD A/C	X-TRANSLATION FOR QUAD B/D	PITCH CONTROL	YAW CONTROL
R1	0 = BD PREFERENCE 1 = AC PREFERENCE	1 = USE A/C 0 = DISABLE A/C	1 = USE B/D 0 = DISABLE B/D	1 = Z FORCE CONTROL 0 = TORQUE COUPLE CONTROL	1 = Y FORCE CONTROL 0 = TORQUE COUPLE CONTROL

R2	SUM THE OCTAL VALUE(S) GIVEN FOR THE JET(S) TO BE DISABLED	C3 = 1_8	A3 = 4_8	D3 = 20_8	B3 = 100_8
		C4 = 2_8	A4 = 10_8	D4 = 40_8	B4 = 200_8
R3	SUM THE OCTAL VALUE(S) GIVEN FOR THE JET(S) TO BE DISABLED	B1 = 1_8	D1 = 4_8	A1 = 20_8	C1 = 100_8
		B2 = 2_8	D2 = 10_8	A2 = 40_8	C2 = 200_8

CHANNEL BIT ASSIGNMENTS

CHANNEL 00

NOT USED

CHANNEL 01

IDENTICAL TO THE L REG.

CHANNEL 02

IDENTICAL TO THE Q REG.

CHANNEL 03

BITS 1-14; CONTAINS THE HIGH ORDER SCALER: 23.3 HRS = MAX. CAPACITY IN INCREMENTS OF 5.12 SEC

CHANNEL 04

BITS 1-14; CONTAINS THE LOW ORDER SCALER: 5.12 SEC = MAX. CAPACITY IN INCREMENTS OF 1/3200 SEC

OUTPUT CHANNEL 05

BIT POSITION	CHANNEL OUTPUT SIGNAL	SM	CM
1	RC + X + P	#1 RCS + X + P	#1 RCS + P - X + YW
2	RC - X + P	#4 RCS - X - P	#4 RCS - P + Z - R
3	RC - X + P	#3 RCS - X + P	#3 RCS + P - X - YW
4	RC + X - P	#2 RCS + X - P	#2 RCS - P + Z + R
5	RC + X + Y	#5 RCS + X + YW	#5 RCS + YW - X + P
6	RC - X - Y	#8 RCS - X - YW	#8 RCS - YW - X - P
7	RC - X + Y	#7 RCS - X + YW	#7 RCS + YW - X - P
8	RC + X - Y	#6 RCS + X - YW	#6 RCS - YW - X + P

OUTPUT CHANNEL 06

BIT POSITION	CHANNEL OUTPUT SIGNAL	SM	CM
1	RC + Z + R	#9 RCS + Z + R	#9 RCS + R + YW + Z
2	RC - Z - R	#12 RCS - Z - R	#12 RCS - R - YW - Z
3	RC - Z + R	#11 RCS - Z + R	#11 RCS + R + YW - Z
4	RC + Z - R	#10 RCS + Z - R	#10 RCS - R - YW +Z
5	RC + Y + R	#13 RCS + Y + R	
6	RC - Y - R	#16 RCS - Y - R	
7	RC - Y + R	#15 RCS - Y + R	
8	RC + Y - R	#14 RCS + Y - R	

CHANNEL 07

BITS 5-7; CONTAINS THE SUPERBANK DESIGNATOR BITS

CHANNEL BIT ASSIGNMENTS(CONT.)

OUTPUT CHANNEL 10

BIT POSITION	CHANNEL OUTPUT SIGNAL	CM
1	RLYBO1	RELAY BIT 1
2	RLYBO2	RELAY BIT 2
3	RLYBO3	RELAY BIT 3
4	RLYBO4	RELAY BIT 4
5	RLYBO5	RELAY BIT 5
6	RLYBO6	RELAY BIT 6
7	RLYBO7	RELAY BIT 7
8	RLYBO8	RELAY BIT 8
9	RLYBO9	RELAY BIT 9
10	RLYBO10	RELAY BIT 10
11	RLYBO11	RELAY BIT 11
12	RYWD12	RELAY ADDRESS 1
13	RYWD13	RELAY ADDRESS 2
14	RYWD14	RELAY ADDRESS 3
15	RYWD16	RELAY ADDRESS 4

OUTPUT CHANNEL 11

BIT POSITION	CHANNEL OUTPUT SIGNAL	CM
1	ISSWAR	ISS WARNING
2	COMACT	LIGHT COMPUTER ACTIVITY LAMP
3	UPLACT	LIGHT UPLINK ACTIVITY LAMP
4	TMPOUT	LIGHT TEMP CAUTION LAMP
5	KYRLS	LIGHT KEY RELEASE LAMP FLASH
6	VNFLSH	FLASH VERB AND NOUN LAMPS
7	OPEROR	LIGHT OPERATOR ERROR LAMP (FL)
8	OT1108	
9	OT1109	TEST CONNECTOR OUTBIT
10	OT1110	CAUTION RESET
11	OT1111	
12	OT1112	
13	OT1113	ENGINE ON/OFF
14	OT1114	
15	OT1116	

CHANNEL BIT ASSIGNMENTS(CONT.)

OUTPUT CHANNEL 12

BIT POSITION	CHANNEL OUTPUT SIGNAL	CM
1	ZOPCDU	ZERO OPTICS CDU
2	ENEROP	ENABLE OPTICS ERR CTR
3		
4	COARSE	COARSE ALIGN ENABLE
5	ZIMCDU	ZERO IMU CDU'S
6	ENERIM	ENABLE IMU ERR CTR
7		
8	TVCNAB	TVC ENABLE
9	S4BTAK	ENABLE SIVB TAKE OVER
10	ZEROPT	ZERO OPTICS
11	DISDAC	DISENGAGE OPTICS DAC
12		
13		
14	S4BOFF	SIVB CUTOFF
15	ISSTDC	ISS TURN ON DELAY COMPLETED

OUTPUT CHANNEL 13

BIT POSITION	CM
1	RADAR MODE SELECTION c
2	RADAR MODE SELECTION b
3	RADAR MODE SELECTION a
4	VHF ACTIVITY
5	INHIBIT UPLINK, ENABLE XLINK
6	BLOCK INLINK
7	DOWNLINK WORD ORDER
8	
9	
10	TEST ALARMS
11	ENABLE STANDBY
12	RESET TRAP 31-A
13	RESET TRAP 31-B
14	RESET TRAP 32
15	ENABLE T6RUPT

RADAR SELECTION			MODE
a	b	c	
0	0	0	NONE
0	0	1	VHF OR RR RANGE
0	1	0	RR RANGE RATE
0	1	1	NONE
1	0	0	LR X VELOCITY
1	0	1	LR Y VELOCITY
1	1	0	LR Z VELOCITY
1	1	1	LR RANGE

CHANNEL BIT ASSIGNMENTS(CONT.)

OUTPUT CHANNEL 14

BIT POSITION	CM
1	
2	
3	
4	
5	
6	GYRO ENABLE
7	GYRO SELECTION b
8	GYRO SELECTION a
9	GYRO SIGN MINUS
10	GYRO ACTIVITY
11	DRIVE OCDU SHAFT
12	DRIVE OCDU TRUNNION
13	DRIVE IMU CDU Z
14	DRIVE IMU CDU Y
15	DRIVE IMU CDU X

GYRO SELECTION		GYRO
a	b	
0	0	NONE
0	1	DRIVE X GYRO
1	0	DRIVE Y GYRO
1	1	DRIVE Z GYRO

INPUT CHANNEL 15

BIT POSITION	CHANNEL INPUT SIGNAL	CM	TRAP	RUPT
1	MKEY1	KEY 1M	15	5
2	MKEY2	KEY 2M	15	5
3	MKEY3	KEY 3M	15	5
4	MKEY4	KEY 4M	15	5
5	MKEY5	KEY 5M	15	5

INPUT CHANNEL 16

BIT POSITION	CHANNEL INPUT SIGNAL	CM	TRAP	RUPT
1	NKEY1	KEY1	16A	6
2	NKEY2	KEY2	16A	6
3	NKEY3	KEY3	16A	6
4	NKEY4	KEY4	16A	6
5	NKEY5	KEY5	16A	6
6	MARK	MARK	16B	6
7	MRKREJ	MARK REJECT	16B	6

CHANNEL BIT ASSIGNMENTS(CONT.)

CHANNELS 17 AND 20-27

NOT USED

INPUT CHANNEL 30 (INVERTED LOGIC)

BIT POSITION	CHANNEL INPUT SIGNAL	CM
1		
2		
3		
4		
5	LFTOFF	LIFT OFF SIVB
6		
7	OPCDFL	OPTICS CDU FAIL
8		
9	IMUOPR	IMU OPERATE
10	CTLSAT	S/C CONTROL OF SAT
11	IMUCAG	IMU CAGE
12	CDUFAL	IMU CDU FAIL
13	IMUFAL	IMU FAIL
14	ISSTOR	ISS TURN ON REQUEST
15	TEMPIN	TEMP IN LIMITS

INPUT CHANNEL 31 (INVERTED LOGIC)

BIT POSITION	CHANNEL INPUT SIGNAL	CM
1	MANR+P	+PITCH MAN ROT
2	MANR-P	-PITCH MAN ROT
3	MANR+Y	+YAW MAN ROT
4	MANR-Y	-YAW MAN ROT
5	MANR+Z	+ROLL MAN ROT
6	MANR-Z	-ROL MAN ROT
7	TRAN+X	+X TRANSLATION
8	TRAN-X	-X TRANSLATION
9	TRAN+Y	+Y TRANSLATION
10	TRAN-Y	-Y TRANSLATION
11	TRAN+Z	+Z TRANSLATION
12	TRAN-Z	-Z TRANSLATION
13	HOLFUN	HOLD FUNCTION
14	FREFUN	FREE FUNCTION
15	GCAPCL	G&N AUTO PILOT CONTROL

CHANNEL BIT ASSIGNMENTS(CONT.)

INPUT CHANNEL 32 (INVERTED LOGIC)

BIT POSITION	CHANNEL INPUT SIGNAL	CM
1	MNIM+P	+PITCH MIN IMPULSE
2	MNIM-P	-PITCH MIN IMPULSE
3	MNIM+Y	+YAW MIN IMPULSE
4	MNIM-Y	-YAW MIN IMPULSE
5	MNIM+R	+ROLL MIN IMPULSE
6	MNIM-R	-ROLL MIN IMPULSE
7		
8		
9		
10	ROLGOF	
11		
12		
13		
14	IN3214	PROCEED
15		

INPUT CHANNEL 33 (INVERTED LOGIC)

BIT POSITION	CHANNEL INPUT SIGNAL	CM
1		
2	RRPONA	VHF DATA GOOD
3		
4	ZEROP	ZERO OPTICS
5	OPMSW 2	AGC CONTROL
6		
7		
8		
9		
10	BLKUPL	BLOCK UPLINK INPUT
11	NO NAME 3	UPLINK TOO FAST
12	NO NAME 4	DOWNLINK TOO FAST
13	PIPAFL 2	PIPA FAIL
14	AGCA AR 2	COMPUTER WARNING
15	OSCALM 2	OSCILLATOR ALARM

CHANNELS 34 AND 35
CONTAIN DOWNLINK WORDS 1 AND 2

RESTART MONITOR CHANNEL 77

BIT POSITION	CM	LM
1	PARITY FAIL (BOTH)	* SAME AS CM
2	PARITY FAIL (E MEM)	*
3	TC TRAP FAIL	*
4	RUPTLOC FAIL	*
5	NITE WATCHMAN FAIL	*
6	VOLTAGE FAIL	*
7	COUNTER FAIL	*
8	SCALAR FAIL	*
9	SCALAR DOUBLE FREQ	*

CHANNEL BIT ASSIGNMENTS(CONT.)

CHANNELS 17 AND 20-27

NOT USED

INPUT CHANNEL 30 (INVERTED LOGIC)

BIT POSITION	CHANNEL INPUT SIGNAL	CM
1		
2		
3		
4		
5	LFTOFF	LIFT OFF SIVB
6		
7	OPCDFL	OPTICS CDU FAIL
8		
9	IMUOPR	IMU OPERATE
10	CTLSAT	S/C CONTROL OF SAT
11	IMUCAG	IMU CAGE
12	CDUFAL	IMU CDU FAIL
13	IMUFAL	IMU FAIL
14	ISSTOR	ISS TURN ON REQUEST
15	TEMPIN	TEMP IN LIMITS

INPUT CHANNEL 31 (INVERTED LOGIC)

BIT POSITION	CHANNEL INPUT SIGNAL	CM
1	MANR+P	+PITCH MAN ROT
2	MANR-P	-PITCH MAN ROT
3	MANR+Y	+YAW MAN ROT
4	MANR-Y	-YAW MAN ROT
5	MANR+Z	+ROLL MAN ROT
6	MANR-Z	-ROL MAN ROT
7	TRAN+X	+X TRANSLATION
8	TRAN-X	-X TRANSLATION
9	TRAN+Y	+Y TRANSLATION
10	TRAN-Y	-Y TRANSLATION
11	TRAN+Z	+Z TRANSLATION
12	TRAN-Z	-Z TRANSLATION
13	HOLFUN	HOLD FUNCTION
14	FREFUN	FREE FUNCTION
15	GCAPCL	G&N AUTO PILOT CONTROL

CHANNEL BIT ASSIGNMENTS(CONT.)

INPUT CHANNEL 32 (INVERTED LOGIC)

BIT POSITION	CHANNEL INPUT SIGNAL	CM
1	MNIM+P	+PITCH MIN IMPULSE
2	MNIM-P	-PITCH MIN IMPULSE
3	MNIM+Y	+YAW MIN IMPULSE
4	MNIM-Y	-YAW MIN IMPULSE
5	MNIM+R	+ROLL MIN IMPULSE
6	MNIM-R	-ROLL MIN IMPULSE
7		
8		
9		
10	ROLGOF	
11		
12		
13		
14	IN3214	PROCEED
15		

INPUT CHANNEL 33 (INVERTED LOGIC)

BIT POSITION	CHANNEL INPUT SIGNAL	CM
1		
2	RRPONA	VHF DATA GOOD
3		
4	ZEROP	ZERO OPTICS
5	OPMSW 2	AGC CONTROL
6		
7		
8		
9		
10	BLKUPL	BLOCK UPLINK INPUT
11	NO NAME 3	UPLINK TOO FAST
12	NO NAME 4	DOWNLINK TOO FAST
13	PIPAFL 2	PIPA FAIL
14	AGCWARN 2	COMPUTER WARNING
15	OSCALM 2	OSCILLATOR ALARM

CHANNELS 34 AND 35
CONTAIN DOWNLINK WORDS 1 AND 2

RESTART MONITOR CHANNEL 77

BIT POSITION	CM	LM
1	PARITY FAIL (BOTH)	* SAME AS CM
2	PARITY FAIL (E-MEM)	*
3	TC TRAP FAIL	*
4	RUPTLOC FAIL	*
5	NITE WATCHMAN FAIL	*
6	VOLTAGE FAIL	*
7	COUNTER FAIL	*
8	SCALAR FAIL	*
9	SCALAR DOUBLE FREQ	*

NOTES


GM