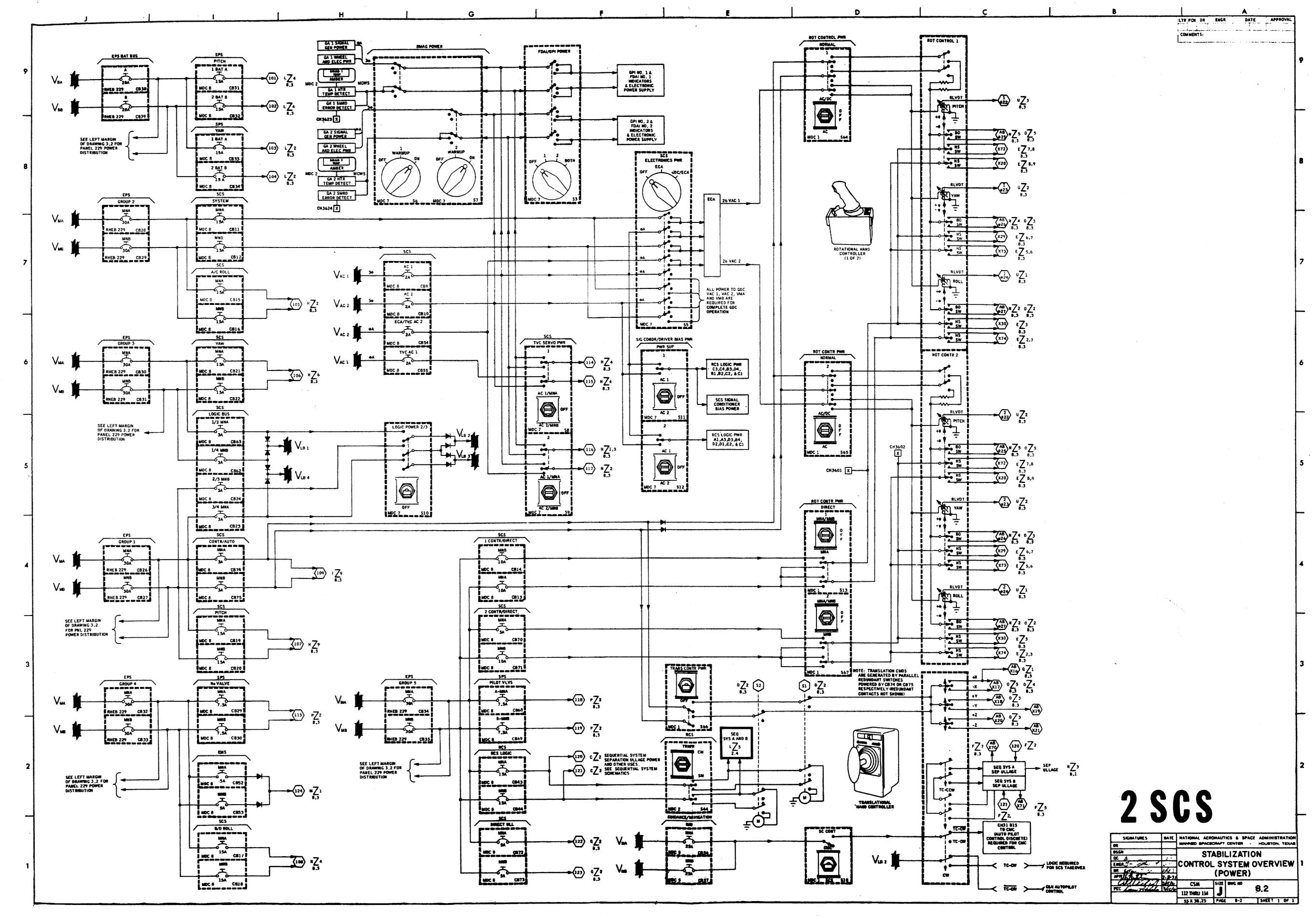


# SCS SIGNAL AND POWER CODE

CODE	TYPE OR POWER	CODE	TYPE OF POWER
01	27.5Vdc	40	GA2 ac RATE
02	±20 Vdc	41	dc RATE
03	10 Vac	42	ENGINE ON WITH 1 S
04	2.2 KHz	43	ENGINE ON/OFF 1 SE
05	25 Vac	44	MODE SELECTED SC
06	±15 Vdc	45	PITCH GYRO UNCAGE
07	±14.5 Vdc	46	YAW GYRO UNCAGE
80	400 Hz SPIN MOTOR POWER	47	ROLL GYRO UNCAGE
09	26 Vac 400 Hz REFERENCE	48	SIG COND POWER ±1
10	14 Vdc	49	115 V 400 Hz PHASE
11	13 Vdc	50	MODE SELECTED CM
12	-15 Vdc	51	PITCH AUTO CNTL D
13	+20 Vdc	52	YAW AUTO CNTL DIS
14	±32 Vdc	53	ROLL AUTO CNTL DI
15	±32 Vdc	54	PITCH ACCEL CMD E
M	400 Hz 26 V BUS 1 SWITCH 3 OR 800 Hz	55	YAW ACCEL CMD EN
	0 PHASE IMU	56	ROLL ACCEL CMD E
N	400 Hz 26 Vac BUS 2 SWITCH 3 OR 800 Hz	57	DIRECT ULLAGE PIT
<b>D</b>	0 PHASE IMU 400 Hz 26 Vac BIS 2 SWITCH 3 OR 400 Hz	58	DIRECT ULLAGE YAV
Р	26 Vac BUS 1 SWITCH 6 OR 800 Hz	59	.05g OFF
	O PHASE IMU	60	GDC EULER
16	+X TRANSLATION	61	.05g <b>ON</b>
17	-X TRANSLATION	R	400/800 CPS OUT F
18	+Y TRANSLATION	_	SIG DEMOD
19	-Y TRANSLATION	S	400/800 CPS OUT F SIG DEMOD
20	+Z TRANSLATION	T	FDAI 1 AND 2 PYR F
21	-Z TRANSLATION	62	115 V 400 Hz
22	PITCH RATE COMMAND	63	26 Vac <90°, 400 H
23	YAW RATE COMMAND	64	A/C ROLL ENGINE P
24	ROLL RATE COMMAND	65	B/D ROLL REACTION
25	PITCH MIN IMP		CB18, MDC 8
26	YAW MIN IMP	66	PITCH REACTION EN
27	ROLL MIN IMP	W = 40	CB20, MDC 8
28	PITCH DIRECT (C3-A4)	67	YAW REACTION ENG MDC 8
29	YAW DIRECT (D3-B4)	68	REACTION ENGINE
30	ROLL DIRECT (B1-D1, B2, D2)	30	POWER CB74 A
31	SCS LOGIC BUS 1	69	RCS LOGIC POWER
32	SCS LOGIC BUS 2		PNL 229
33	SCS LOGIC BUS 3	70	SEQ A SPS THRUST SEP ULLAGE
34	SCS LOGIC BUS 4	71	SEQ B SPS THRUST
35	-4 Vdc	/ 1	SEP ULLAGE
36	TRANSLATION CONTROL CLOCKWISE	72	PITCH DIRECT (A3
37	SCS CONTROL MODE	73	YAW DIRECT (B3-D
38	RCS ERROR	74	ROLL DIRECT (A1-
39	GA1 ac RATE OR ATTITUDE ERROR		

Note: Codes 100 and up designate drawing interconnections from 8.2 to 8.3 only.





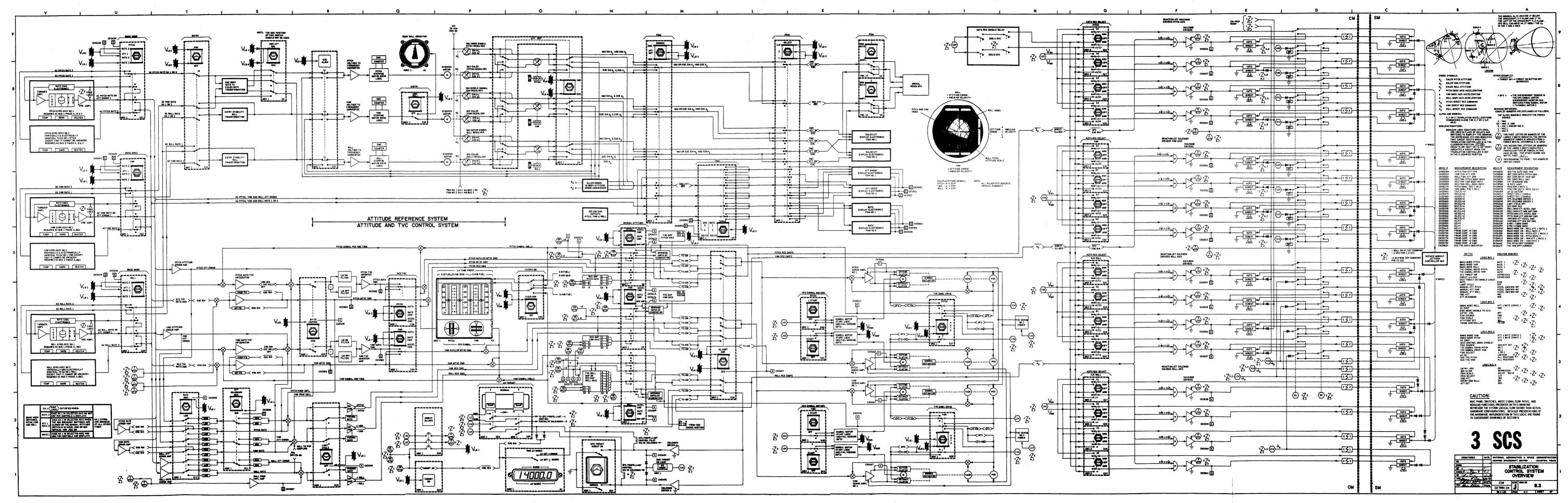


TABLE 8-1.- CMC INPUT/OUTPUT CHANNELS ON TELEMETRY

BITS	ОИТРИТ			INPUT					
	CHANNEL								
	77 WD69b	11 WD91a	12 WD91b	13 WD92a	14 WD9 2b	30 WD93a	31 WD93b	32 WD94a	33 WD94b
1	PARITY FAIL F or E	ISS WARN	OCDU ZERO	RANGING	$\times$	S4 ULL <b>AGE</b>	+P RHC	+P MIC	$\geq$
2	E PARITY (B 1 & 2)	COMP ACTV	OPT EC EN	RANGING	$\times$	RCS XFER	-P RHC	-P MIC	RANGING
3	TC TRAP	UPL ACTV	$\geq$	RANGING		SPS READY	+Y RHC	+Y MIC	$\geq$
4	RUPTLOC	TEMP CAUT	COAR ALGN	RANGING	><	S4 SP/ABT	-Y RHC	-Y MIC	CMC/MAN
5	NIGHT WTMN	KEY REL	ICDU ZERO	$\times$	$\times$	CMC L/O	+R RHC	+R MIC	ZERO/MAN
6	VOLT FAIL	FLASH	IMU EC EN	BL INLINK	GY ENABLE	$\times$	-R RHC	-R MIC	
7	COUNT FAIL	OPR ERR		DN WD ORD	GY SEL B*	OCDU FAIL	+X TRANS		$\geq$
8	SCALAR FAIL		TVC ENABLE		GY SEL A∼	$\times$	-X TRANS		
9	SCALER D FREQ	TST CONN	IVB TK/EN		GY SIGN- *	IMU OPER	+Y TRANS	$\times$	$\times$
10		CAUT REST	ZERO OPT	TST ALARM	GY ACT	SAT TAKO	-Y TRANS	><	UP TM BLK
11			DIS O DAC	EN STBY	DR CDU S	IMU CA <b>GE</b>	+Z TRANS	LM ATTACH	UPL FAST
12			$\times$	RST T 31A	DR CDU T	ICDU Fail	-Z TRANS		DNL FAST
13		ENG ON	S-IVB INJ	RST T 31B	DR CDU Z	1MU FAIL	FREE/AUTO		PIPA FAIL
14			S-TVB CO	RST T 32	DR CDU Y	ISS TN ON	HOLD/AUTO	PROCEED	CMC WARN
15			ISS TURN ON DELAY COMPLETE	EN T6 RUPT	DR CDU X	IMU TEMP	A/P CONT		OSC ALARM

* GYRO SELECT		
BITS 7,8,9	GYRO TORQUE	
000	NO TORQUE	
0 0 1	NO TORQUE	
0 1 0	+Y	
0 1 1	-Y	
100	+X	
101	-X	
110	+Z	
111	-Z	

### TABLE 8-II.- CSM ALARM CODES

ALARM CODE		•
(CODE)	ACTION	TITLE-DESCRIPTION
00100	NONE	NO MARK SINCE LAST MK REJ THE PROCESS OF MARKING SETS BIT 10 OF MARKSTAT TO ENABLE A MARK REJECT. IF MARKING IS BEING ACCEPTED BY PROGRAM WHEN MARK REJECT IS ACTIVATED, BIT 10 OF MARKSTAT IS FOUND TO BE ZERO. THIS INDICATES NO MARK HAS BEEN MADE WHICH CAN BE REJECTED. PROGRAM ALARM WILL BE DISPLAYED.
00113	DETERMINE IF AN INPUT CHANNEL BIT(S) FAILURE HAS OCCURRED.	NO INBITS - IF A MARKRUPT OR KEYRUPT 2 (SAME RUPT) OCCURS AND THE RUPT ROUTINE DETECTS, BITS 1 THROUGH 7 ARE RESET (I.E., NO KEYCODE, MARK OR MARK REJECT IS PRESENT). PROGRAM ALARM WILL BE DISPLAYED.
00114	SELECT THE DESIRED PROGRAM BEFORE TAKING MARKS, OR TOO MANY MARKS HAVE BEEN MADE. NO OTHER ACTION RE- QUIRED.	MARK MADE BUT NOT DESIRED - THE PROGRAM USING THE MARK ROUTINE STORES THE NUMBER OF MARKS DESIRED IN BITS 12 THROUGH 14 OF MARKSTAT. IF A MARK IS MADE WITH NO MARKS DESIRED AS INDICATED BY BITS 12 THROUGH 14 = 0, PROGRAM ALARM IS DISPLAYED.
	PLACE OPTICS SWITCH TO CMC.	OPTICS TORQUE REQUEST WITH SWITCH NOT AT CMC - OCCURS WHEN AN EXTENDED VERB 41 AND NOUN 91 IS REQUESTED FOR A COARSE ALIGN OF THE OCDU'S WITH THE OPTICS MODE SWITCH NOT IN THE CMC POSITION. THIS WILL RESULT IN A PROGRAM ALARM DISPLAY.
00116	REZERO THE OPTICS.	OPTICS SWITCH ALTERED BEFORE 15 SEC ZERO TIME ELAPSED - POSITIONING OF THE OPTICS ZERO SWITCH TO THE ZERO POSITION INITIATES A COMPUTER ROUTINE, WHICH HAS A 15 SECOND TIME DELAY TO ALLOW THE OPTICS TO ZERO BEFORE RESET OF THE SHAFT AND TRUNNION COUNTERS. ALTERING OF THE ZERO SWITCH TO THE OFF POSITION PRIOR TO COMPLETION OF THE TIME DELAY RESULTS IN A PROGRAM ALARM DISPLAY.

ALARM CODE (OCTAL)	<u>ACTION</u>	TITLE-DESCRIPTION
00117	WAIT UNTIL INTERNAL USE OF OPTICS IS TERMINATED.	OPTICS TORQUE REQUEST WITH OPTICS NOT AVAILABLE - OCCURS WHEN A VERB 41 NOUN 91 IS REQUESTED FOR A COARSE ALIGN OF THE OCDU'S AND AN INTERNAL CMC FUNCTION IS USING THE OCDU'S, I.E., AUTO POSITIONING OF THE OPTICS OR USE OF THE OCDU DAC'S FOR GIMBAL POSITIONING DURING TVC RESULTING IN A PROGRAM ALARM DISPLAY.
00120	ZERO THE OPTICS AND PROCEED.	OPTICS TORQUE REQUEST WITH OPTICS NOT ZEROED - BIT 10 OF OPTMODES IS A FLAG WHICH IS SET DURING OPTICS ZEROING AND IS RESET BY A FRESH START OR RESTART. IF THE OPTICS MODE SWITCH IS IN THE CMC POSITION WITH BIT 10 = 0, THIS INDICATES THE OPTICS ARE AVAILABLE FOR TORQUING WITHOUT HAVING BEEN ZEROED SINCE THE LAST FRESH START OR RESTART. SINCE THIS CAN RESULT IN DISAGREEMENT BETWEEN CMC AND OCDU ANGLES, A PROGRAM ALARM WILL BE DISPLAYED.
00121	REPEAT MARK.	CDU'S NOT GOOD AT TIME OF MARK - THERE EXISTS IN THE CDU'S FINE ERROR SWITCHING TRANSIENTS WHICH MAY RESULT IN ERRONEOUS CDU SAMPLINGS AT TIME OF MARK. A DOUBLE SAMPLING TECHNIQUE IS USED IN PROGRAM TO DETECT THESE TRANSIENTS, AND SHOULD THEY OCCUR, THE MARK IS IGNORED AND PROGRAM ALARM IS DISPLAYED.
00205	REF MALF. PROCE- DURES.	BAD PIPA READING - SERVICER HAS DETECTED AT LEAST ONE PIPA IS SATURATED AND IS OUTPUTTING PULSES AT A 3200 PPS RATE. THIS RESULTS IN A BYPASS OF DELTA V COMPUTATIONS AND PROGRAM ALARM DISPLAY.

ALARM CODE (OCTAL)	ACTION	TITLE-DESCRIPTION
00206	ACTION  POSITION GIMBAL OUT  OF GIMBAL LOCK &  REPEAT.	ZERO ENCODE NOT ALLOWED WITH COARSE ALIGN AND GIMBAL LOCK - SINCE A ZERO ENCODE (V40N20) SETS THE PLATFORM INERTIAL, THE ZEROING ROUTINE IS CONSIDERED ILLEGAL IF THE ISS IS IN COARSE ALIGN MODE AND IS IN THE GIMBAL LOCK REGION. THE ZERO WILL NOT BE EXECUTED AND PROGRAM ALARM WILL BE DISPLAYED.
00207	REF MALF. PROCEDURES	ISS TURNON REQUEST NOT PRESENT FOR 90 SEC - TURNON OF IMU POWER CAUSES A TURNON REQUEST INPUT TO THE CMC. THE CMC INITIATES A 90 SEC DELAY BEFORE ISSUING TURNON DELAY COMPLETE. THIS SEQUENCE CAGES THE PLATFORM TO ALLOW FOR WHEEL RUNUP AND PIPA POWER SUPPLY WARMUP. REMOVAL OF THE TURNON REQUEST (IMU POWERDOWN) BEFORE THE TIME DELAY IS COMPLETE WILL RESULT IN PROGRAM ALARM.
00210	REF MALF. PROCEDURES	IMU NOT OPERATING - VARIOUS COMPUTER ROUTINES PERFORM A STATUS CHECK ON BIT 9 IMODES 30 TO DETERMINE IF THE IMU IS OPERATING BEFORE COMPUTATIONS DEPENDENT ON THE IMU ARE MADE. IF THIS BIT INDICATES THE IMU IS NOT OPERATING (IMU POWER OFF), PROGRAM ALARM IS DISPLAYED.
00211	REF MALF. PROCEDURES	COARSE ALIGN ERROR GREATER THAN 2 DEGREES - IF, DURING AN IMU COARSE ALIGN (EITHER V41N20 OR ALIGNMENT PROGRAM), THE GIMBAL ANGLE ATTAINED IS GREATER THAN 2 DEGREES IN ERROR FROM THE DESIRED ANGLE, A PROGRAM ALARM IS DISPLAYED.
00212	REF MALF. PROCEDURES	PIPA FAIL BUT PIPA NOT BEING USED - A PIPA FAIL CAN CAUSE AN ISS WARNING OR PROGRAM ALARM ONLY DEPENDING ON THE STATE OF BIT 1 OF IMODES 30. THIS BIT IS CONTROLLED BY AVERAGE G WHICH ALLOWS FOR AN ISS WARNING WHEN THE PIPA INPUT IS BEING USED AND INHI- BITS IT WHEN NOT IN USE. WHEN NOT IN USE, AND PROVIDING THE PROGRAM CAUTION INHIBIT (BIT 5 IMODES 30) IS RESET, A PROGRAM ALARM WILL BE DISPLAYED.

ALARM CODE (OCTAL)	ACTION	TITLE-DESCRIPTION
00213	REF MALF. PROCEDURES	IMU NOT OPERATING WITH TURNON REQUEST  - UPON RECEIPT OF A TURNON REQUEST,  THE CMC WILL CHECK THE OPERATE BIT  (BIT 9 IMODES 30). IF THE OPERATE  BIT INDICATES THE IMU IS NOT POWERED  UP, A PROGRAM ALARM WILL BE DISPLAYED.
00214	REACTIVATE IMU IF PROGRAM USING IMU IS CRITICAL - OTHERWISE TERMINATE PROGRAM.	PROGRAM USING IMU WHEN TURNED OFF - WHEN THE IMU IS TURNED OFF, AS INDICATED BY BIT 9 IMODES 30, THE CMC CHECKS THE STATUS OF BIT 8 FLAGWORD 0 (IMU IN USE FLAG). IF A PROGRAM HAD BEEN USING THE IMU AND HAD SET THIS BIT, A PROGRAM ALARM WILL BE DISPLAYED.
00217	REF MALF. PROCEDURES	BAD RETURN FROM STALL ROUTINES - DETECTION BY THE MODE SWITCHING LOGIC OF THE IMU INITIALIZATION BIT (BIT 6 OF IMODES 30) PROVIDES A FLAG FOR THE IMU STALL ROUTINE TO PERFORM AN ERROR RETURN TO THE SLEEPING PROGRAM (PRIMARILY P51 OR P53). THE ERROR RETURN IS TO ROUTINE CURTAINS WHICH CAUSES A PROGRAM ALARM DISPLAY.
00220	REALIGN IMU.	IMU NOT ALIGNED (BAD REFSMMAT) - ANY MAJOR PROGRAM WHICH USES THE IMU ATTITUDE INFORMATION AND THE REFSMMAT WILL PERFORM A CHECK WITH ROUTINE RO2BOTH, ON THE REFSMMAT FLAG (BIT 13 OF FLAGWORD 3) AND THE IMU OPERATE BIT (BIT 9 OF IMODES 30), TO INSURE THE IMU IS OPERATING AND THE REFSMMAT IS VALID. THE THRUSTING, ALIGNMENT, AND NAVIGATION PROGRAMS ALL USE THIS INFORMATION; AND, IF THE REFSMMAT IS FOUND INVALID WHILE THE IMU IS OPERATING, A PROGRAM ALARM WILL BE DISPLAYED.
00401	MANEUVER AND REINITIATE PROGRAM TO AVOID GIMBAL LOCK.	DESIRED ANGLES YIELD GIMBAL LOCK - CALCGA COMPUTES DESIRED IMU GIMBAL ANGLES FROM A SET OF N.B. VECTORS AND DESIRED S.M. VECTORS FOR PRELAUNCH AND INFLIGHT ALIGNMENT PROGRAMS. IF THE DESIRED IMU ATTITUDE WILL RESULT IN A MIDDLE GIMBAL ANGLE OF GREATER THAN 60°, GLOK FAIL (BIT 14 OF FLAG- WORD 3) IS SET AND PROGRAM ALARM IS DISPLAYED.

ALARM CODE	ACTION	TITLE-DESCRIPTION
(OCTAL) 00402	ACTION  CREW MUST TORQUE PLATFORM BACK TO PRE-PLANE CHANGE ALIGNMENT.	CREW MUST HONOR 2ND MINKEY TORQUE  REQUEST - SET IN P52 DURING RENDEZVOUS  SEQUENCE WHEN CREW HAS TORQUED PLAT- FORM FOR PLANE CHANGE BUT FAILED TO  TORQUE BACK TO PRE-PLANE CHANGE ALIGN- MENT.
00404	<ol> <li>TERMINATE, REINITIATE PROGRAM, AND RESELECT A NEW PAIR OF STARS.</li> <li>MANEUVER AND PROCEED WITH RECOMPUTATION OF DESIRED OPTICS ANGLES.</li> </ol>	TARGET OUT OF VIEW (At > 90 DEG) - IF A SELECTED STAR IS OCCULTED BY EARTH, SUN, MOON OR IF COMPUTATION OF DESIRED TRUNNION ANGLE IS GREATER THAN 90°, THE CULTFLAG (BIT 7 OF FLAGWORD 3) WILL BE SET. PROVIDING THE TARGET BEING SIGHTED IS NOT THE LM, THE OPTICS AUTO-POSITION ROUTINE WILL DISPLAY PROGRAM ALARM AND ERROR CODE 404 WITH AN OPTIONAL CREW RESPONSE REQUIRED.
00405	<ol> <li>PROCEED WITH SIGHT- INGS USING MANUALLY SELECTED STARS.</li> <li>MANEUVER AND RECYCLE THROUGH THE STAR SELECTION ROUTINE.</li> </ol>	TWO STARS NOT AVAILABLE - IF THE STAR SELECTION ROUTINE CANNOT FIND TWO STARS WHICH ARE NOT OCCULTED BY THE SUN, EARTH, OR MOON, AND DO NOT HAVE SATISFACTORY ANGLE SEPARATION, TRUNNION DRIVE IS INHIBITED AND PROGRAM ALARM AND ERROR CODE 405 WILL BE DISPLAYED WITH AN OPTIONAL CREW RESPONSE REQUIRED.
<b>00</b> 406	ACTIVATE P20 BEFORE REQUESTING SIGHTINGS.	RENDEZVOUS NAVIGATION NOT OPERATING - REQUESTS FOR RENDEZVOUS SIGHTING MARKS (V57, V54) ARE REJECTED IF THE RENDEZVOUS NAVIGATION PROGRAM (P20) IS NOT RUNNING AS INDICATED BY THE RNDVZFLG (FWI BIT 7) AND THE TRACKFLG (FWI BIT 5). IF THE REQUEST IS MADE, A PROGRAM ALARM WILL BE DISPLAYED AND THE REQUEST IS TERMINATED.
00421	<ol> <li>GROUND UPDATE S.V.</li> <li>PERFORM SUFFICIENT NUMBER OF NAVIGATION MARKS TO REINITIA- LIZE W-MATRIX AND ELIMINATE S.V. ERROR.</li> </ol>	W-MATRIX OVERFLOW - IF, DURING STATE VECTOR UPDATE, THE ORBITAL INTEGRATION PACKAGE DETECTS AN OVERFLOW IN ANY W-MATRIX ELEMENT, AN ERRONEOUS STATE VECTOR WILL RESULT AND A PROGRAM ALARM WILL BE DISPLAYED.

ALARM CODE (OCTAL)	ACTION	TITLE-DESCRIPTION
00600	RECYCLE TO START OF PROGRAM AND ADJUST INPUT PARAMETERS.	IMAGINARY ROOTS ON FIRST ITERATION - IF ON THE FIRST ITERATION FOR THE PRE-CSI MANEUVER NO REAL SOLUTION EXISTS FOR AN EQUATION DEFINING TPI LINE OF SIGHT FROM THE ACTIVE VEHICLE, THE PROGRAM IS EXITED AND PROGRAM ALARM IS DISPLAYED WITH ERROR CODE 600.
00601	RECYCLE AND ADJUST INPUT PARAMETERS FOR NEW SOLUTION.	PERIGEE ALTITUDE LIMIT P MIN 1 - IF THE ALTITUDE OF PERIGEE AFTER THE COMPUTED CSI MANEUVER IS LESS THAN THE LIMIT OF 35K FT (LUNAR ORBIT) OR 85 N.MI. (EARTH ORBIT), A PROGRAM ALARM WILL BE DISPLAYED WITH ERROR CODE 601.
00602	RECYCLE AND ADJUST INPUT PARAMETERS FOR NEW SOLUTION.	PERIGEE ALTITUDE LIMIT P MIN 2 - IF THE ALTITUDE OF PERIGEE AFTER THE COMPUTED CDH MANEUVER IS LESS THAN THE LIMIT OF 35K FT (LUNAR ORBIT) OR 85 N.MI. (EARTH ORBIT), A PROGRAM ALARM WILL BE DISPLAYED WITH ERROR CODE 602.
00603	RECYCLE AND ADJUST INPUT PARAMETERS FOR NEW SOLUTION.	CSI TO CDH TIME LIMIT P MIN 22 - IF THE COMPUTED AT BETWEEN THE CSI AND CDH MANEUVERS FOR THE CSI OR CDH MANEUVER SOLUTION IS LESS THAN 10 MINUTES, A PROGRAM ALARM WILL BE DISPLAYED WITH ERROR CODE 603.
00604	RECYCLE AND ADJUST INPUT PARAMETERS FOR NEW SOLUTION.	CDH TO TPI TIME LIMIT P MIN 23 - IF THE COMPUTED AT BETWEEN THE CDH AND TPI MANEUVERS FOR THE CSI MANEUVER SOLUTION IS LESS THAN 10 MINUTES, A PROGRAM ALARM WILL BE DISPLAYED WITH ERROR CODE 604.
00605	RECYCLE THE PROGRAM USING ALTERED INPUT PARAMETERS.	NUMBER OF ITERATIONS EXCEEDS LOOP MAXIMUM - THE MANEUVER SOLUTION DESIRED IS A RESULT OF A NUMBER OF PROGRAM ITERATIONS. IF THE NUMBER OF ITERATIONS EXCEEDS 15 WITH NO SOLUTION, A PROGRAM ALARM IS DISPLAYED WITH ERROR CODE 605.

ALARM CODE		
(OCTAL) 00606	ACTION  IF NO SOLUTION IS  FOUND, THE PROGRAM  MUST BE RECYCLED.	TITLE-DESCRIPTION  DV EXCEEDS MAXIMUM - IF TWO SUCCEEDING ITERATIONS YIELD A DV SOLUTION FOR THE CSI MANEUVER OF GREATER THAN 1000 FT/SEC, A PROGRAM ALARM WILL BE DISPLAYED WITH ERROR CODE 606.
00611	PROCEED WITH DISPLAYS OR RECYCLE PROGRAM WITH NEW INPUT PARAMETERS.	NO TIG FOR ELEVATION ANGLE - THE PRE- CDH PROGRAM USES THE TPI TIME AND THE ELEVATION ANGLE (DESIRED LINE OF SIGHT TO PASSIVE VEHICLE AT TPI) COMPUTED IN THE PRE-CSI MANEUVER PROGRAM. IF NO CDH SOLUTION IS FOUND FOR THE DESIRED E ANGLE AND TPI TIME, A PROGRAM ALARM IS DISPLAYED WITH ERROR CODE 611.
00612	DELAY COMPUTATIONS UNTIL VEHICLE CO- ORDINATES ARE IN EARTH SPHERE.	STATE VECTOR IN WRONG SPHERE OF INFLUENCE - THE RETURN-TO-EARTH TARGETING COMPUTATIONS ARE VALID ONLY IF THE VEHICLE IS OUTSIDE THE LUNAR SPHERE OF INFLUENCE. IF CMOONFLAG (BIT 12 FWD8) IS SET INDICATING LUNAR SPHERE, THE RESULT WILL INDIRECTLY BE A DISPLAY OF PROGRAM ALARM WITH ERROR CODE 612.
00613	RECYCLE PROGRAM AND ADJUST INPUT PARAMETER.	REENTRY ANGLE OUT OF LIMITS - IF THE PRECISION TRAJECTORY SOLUTION FOR THE REENTRY ANGLE HAS NOT CONVERGED TO THE CONIC SOLUTION WITHIN LIMITS, A PROGRAM ALARM WILL BE DISPLAYED WITH ERROR CODE 613.
00777	REF MALF. PROCEDURE G\$N 6.	PIPA FAIL CAUSED THE ISS WARNING - WHEN AN ISS FAIL INPUT (IMU, CDU, PIPA) IS DETECTED BY T4RUPT, THE INPUT WHICH CAUSES THE ALARM IS COMMUNICATED TO THE "VARALARM" ROUTINE WHICH PROVIDES FOR AN ERROR CODED DISPLAY OF THE FAIL INPUT. THOSE FAIL BITS OF IMODES 30 (BITS 13, 12, 10) WHICH ARE NOT INHIBITED (BITS 4, 3, AND 1) WILL CAUSE ISS WARNING AND THE SUM OF THESE FAIL BITS MINUS 1 WILL YIELD THE ERROR CODE. (BIT 10 - 1 = 010008 - 1 = 07778) AND A PROGRAM ALARM IS DISPLAYED.
01102	REF MALF. PROCEDURES.	CMC SELF TEST ERROR - IF AN ERROR IS DETECTED DURING THE CMC SELF TEST, REGARDLESS OF OPTION, A PROGRAM ALARM WILL BE DISPLAYED.

ALARM CODE (OCTAL)	ACTION	TITLE-DESCRIPTION
01105	REF MALF, PROCEDURES	DOWNLINK TOO FAST - TRANSMISSION OF THE CMC DOWNLINK DATA TO THE PCM IS INITIATED BY A DOWNLINK START PULSE FOLLOWED BY SYNC PULSES WHICH SERIALLY GATE THE DOWNLINK WORDS TO THE PCM. FOLLOWING THE TRANSMISSION OF THE WORDS FROM THE OUTCOUNTERS, A DOWNLINK END PULSE IS SENT TO THE COMPUTER WHICH INITIATES RELOADING OF THE OUTCOUNTERS WITH THE NEXT TWO WORDS OF THE DOWNLIST. RECEIPT OF THE DOWNLINK END PULSE IS ENABLED AT A RATE OF 100 PPS. IF TWO END PULSES ARE RECEIVED WITHIN A 10 MSEC PERIOD, THE DOWNLINK TOO-FAST BIT (CH33 BIT 12) IS RESET AND WHEN DETECTED BY THE THRUPT ROUTINE, A PROGRAM ALARM IS DISPLAYED.
01106	REF MALF. PROCEDURES	UPLINK TOO FAST - TRANSMISSION OF EACH SERIAL UPLINK BIT IS ENABLED AT A 6400 PPS RATE. IF TWO UPLINK BITS (EITHER 1'S OR 0'S) ARE RECEIVED WITHIN A 156 MSEC PERIOD, THE UPLINK TOO-FAST BIT (CH 33 BIT 11) IS RESET AND WHEN DETECTED BY THE T4RUPT ROUTINE, A PROGRAM ALARM IS DISPLAYED.
01107	REF MALF. PROCEDURES. IMU REALIGN MAY BE NECESSARY.	PHASE TABLE FAILURE - ASSUMING ERASABLE MEMORY IS DESTROYED - AT VARIOUS POINTS IN A PROGRAM, THE PHASE TABLE IS SET UP TO ESTABLISH A RESTART POINT IN THE PROGRAM SHOULD A RESTART OCCUR. ESSENTIALLY, TWO TABLES ARE SET UP, ONE BEING THE INVERSE OF THE OTHER. THESE TABLES ARE CHECKED FOR AGREEMENT DURING A RESTART. IF PHASE TABLE DISAGREEMENT OCCURS IT IS ASSUMED THAT ERASABLE MEMORY HAS BEEN ALTERED, AND A FRESH START IS PER- FORMED. E MEMORY MUST THEN BE REESTABLISHED. DETECTION OF THE ABOVE RESULTS IN A PROGRAM ALARM DISPLAY.
01301	RECYCLE PROGRAM WHICH IS UTILIZING COMPUTA-TIONS.	ARCSIN - ARCCOS INPUT ANGLE TOO LARGE - IF THE ARCSIN OR ARCCOS IS GREATER THAN 1, THE COMPLEMENT ROUTINE WILL DISPLAY A PROGRAM ALARM.

ALARM CODE		
(OCTAL) 01407	ACTION REF MALF. PROCEDURES	TITLE-DESCRIPTION  Vg INCREASING - A CHECK IS MADE IN P40, WHICH ESSENTIALLY CHECKS THAT THE DIRECTION OF THE MEASURED DV ACCUMULATED IS THE SAME AS THAT OF Vg. IF THRUST IS IN THE WRONG DIRECTION, A PROGRAM ALARM IS DISPLAYED.
1426	REALIGN OR USE EMS FOR ENTRY.	IMU UNSATISFACTORY - A CHECK IS MADE ON THE IMU ORIENTATION TO INSURE THAT THE +Y SM VECTOR IS WITHIN 30 DEGREES OF THE (V X R) VECTOR. IF NOT, A CHECK IS MADE TO INSURE THE -Y SM VECTOR IS WITHIN -30 DEGREES OF THE (V X R) VECTOR. (SEE ALARM CODE 1427.) IF NEITHER OF THESE CONDITIONS EXIST, A PROGRAM ALARM AND ERROR CODE 1426 ARE DISPLAYED.
1427	FDAI DISPLAY IS REVERSED.	IMU REVERSED - IF THE -Y SM VECTOR IS WITHIN -30° OF THE (V X R) VECTOR (SEE ALARM CODE 1426), A PROGRAM ALARM WITH ERROR CODE 1427 IS DISPLAYED.
1520	WAIT UNTIL MODE CHANGE IS PERMITTED OR CALL POO BEFORE CALLING DESIRED PROGRAM.	V37 REQUEST NOT PERMITTED AT THIS  TIME - IF A MAJOR MODE CHANGE REQUEST IS MADE DURING IMU INITIALIZATION (IMODES 30 BIT 6) OR IF OTHER THAN A POO REQUEST IS INHIBITED BY ANOTHER PROGRAM, A PROGRAM ALARM WILL BE DISPLAYED.
01600	REPEAT TEST PROGRAM FOR VALID DATA.	OVERFLOW IN DRIFT TEST - THIS ALARM IS PECULIAR TO PRELAUNCH TESTING ONLY AND IS MECHANIZED FOR A COMPUTATIONAL OVERFLOW IN THE PRELAUNCH GYRO DRIFT TEST. THIS OVERFLOW WILL RESULT IN A PROGRAM ALARM DISPLAY.
01601	REPEAT TEST PROGRAM AS TEST RESULTS MAY BE INVALID.	BAD IMU TORQUE - THIS ALARM IS THE RESULT OF A BAD RETURN FROM THE IMU STALL ROUTINE IN THE PRELAUNCH ALIGN-MENT PROGRAM. IT IS INDICATIVE OF A BAD COARSE ALIGN OR IMU TORQUE AND WILL RESULT IN A PROGRAM ALARM DISPLAY.

ALARM CODE (OCTAL)	ACTION	TITLE-DESCRIPTION
01703	PROCEED. TIG WILL SLIP BY AN AMOUNT NECESSARY TO ALLOW FOR INTEGRATION.	INSUFFICIENT TIME FOR INTEGRATION - TIG WAS SLIPPED - IN THE BURN PROGRAM, THE STATE VECTOR IS INTEGRATED TO TIG - 30 AND IS INPUT TO THE SERVICER. IF THERE IS INSUFFICIENT TIME (12.5 SECONDS) PRIOR TO TIG - 30 TO ALLOW FOR THIS INTEGRATION, A PROGRAM ALARM WILL BE DISPLAYED.
03777	REFER TO MALF. PROCEDURE G&N 6.	ICDU FAIL CAUSED THE ISS WARNING + WHEN AN ICDU FAIL (IMODES 30 BIT 12) IS DETECTED BY THRUPT ROUTINE WITH NO FAIL INHIBIT PRESENT, ISS WARNING IS DISPLAYED, AND THE ROUTINE VARALARM WILL GENERATE AN ERROR CODE OF THE FAIL BIT VALUE MINUS 1 (04000 - 1 = 03777) AND WILL DISPLAY A PROGRAM ALARM.
04777	REFER TO MALF. PROCEDURE G&N 6.	ICDU, PIPA FAILS CAUSED ISS WARNING - WHEN BOTH ICDU (IMODES 30 BIT 12) AND PIPA (IMODES 30 BIT 10) UNINHIBITED FAILS ARE DETECTED BY THE TARUPT ROUTINE, ISS WARNING IS DISPLAYED, AN ERROR CODE OF THE FAIL BIT VALUES MINUS 1 (05000 - 1 = 4777) IS GENERATED AND A PROGRAM ALARM IS DISPLAYED.
07777	REFER TO MALF. PROCEDURE GSN 6.	IMU FAIL CAUSED THE ISS WARNING - WHEN AN UNINHIBITED IMU FAIL (IMODES 30 BIT 13) IS DETECTED BY THE THRUPT ROUTINE, ISS WARNING IS DISPLAYED, AN ERROR CODE OF THE FAIL BIT VALUE MINUS 1 (10000 - 1 = 07777) IS GENERATED, AND A PROGRAM ALARM IS DISPLAYED.
10777	REFER TO MALF. PROCEDURE G&N 6.	IMU, PIPA FAILS CAUSED THE ISS WARNING - WHEN BOTH UNINHIBITED IMU FAIL (IMODES 30 BIT 13) AND PIPA FAIL (IMODES 30 BIT 10) ARE DETECTED BY T4RUPT ROUTINE, ISS WARNING IS DISPLAYED, AN ERROR CODE OF THE FAIL BIT VALUES MINUS 1 (11000 - 1 = 10777) IS GENERATED, AND A PROGRAM ALARM IS DISPLAYED.
13777	REFER TO MALF. PROCEDURE G&N 6.	IMU, ICDU FAILS CAUSED THE ISS WARNING - WHEN BOTH UNINHIBITED IMU FAIL (IMODES 30 BIT 13) AND ICDU FAIL (IMODES 30 BIT 12) ARE DETECTED BY THE T4RUPT ROUTINE, ISS WARNING IS DISPLAYED, AN ERROR CODE OF THE FAIL BIT VALUES MINUS 1 (14000 - 1 = 13777) IS GENERATED, AND A PROGRAM ALARM IS DISPLAYED.
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ALARM CODE		
(OCTAL)	ACTION	TITLE-DESCRIPTION
14777	REFER TO MALF. PROCEDURE G&N 6.	IMU, ICDU, PIPA FAILS CAUSED ISS  WARNING - WHEN UNINHIBITED IMU FAIL.  (IMODES 30 BIT 13), PIPA FAIL (IMODES 30 BIT 10), AND ICDU FAIL (IMODES 30 BIT 12) ARE DETECTED BY THRUPT ROUTINE, ISS WARNING \$\$ DISPLAYED, AN ERROR CODE OF THE FAIL BIT VALUES MINUS 1 (15000 - 1 = 14777) IS GENERATED, AND A PROGRAM ALARM IS DISPLAYED.
20430	UPLINK NEW S.V.	INTEGRATION ABORT DUE TO SUBSURFACE S.V IF STATE VECTOR POSITION MAGNI- TUDE BECOMES TOO LOW DUE TO A "BAD" S.V. CAUSING OVERFLOW IN THE INTEGRA- TION ROUTINE WHICH RECTIFICATION CANNOT ELIMINATE, A SOFTWARE RESTART IS GENERATED AND, PROVIDING AVERAGE-G IS NOT RUNNING, ALL RESTART GROUPS ARE RESET. PROGRAM ALARM WILL BE DISPLAYED AND PROGRAM FLOW WILL ENTER GOTOPOOH.
20607	RECYCLE PROGRAM WITH ADJUSTED INPUT PARAMETERS.	NO SOLUTION FROM TIME THETA OR TIME RADIUS ROUTINE - THESE ROUTINES PRO- VIDE TRANSFER TIME SOLUTIONS FOR TWO BODIES WITH INPUTS OF POSITION AND VELOCITY VECTORS AND THE TRANSFER ANGLE TO THE TERMINAL POSITION OR THE RADIUS MAGNITUDE. IF THE CONIC TRAJECTORY IS PARABOLIC OR HYPERBOLIC AND THE DESIRED TRANSFER ANGLE LIES BEYOND THE ASYMPTOTE TO THE TRAJECTORY OR THE ECCENTRICITY OF ORBIT IS LESS THAN 2-18, NO SOLUTION IS AVAILABLE FOR THE ROUTINE AND A POODOO ALARM WILL OCCUR. A SOFTWARE RESTART WILL BE GENERATED, AND PROGRAM ALARM WILL BE DISPLAYED WITH AN ENTRANCE TO GOTOPOOH.
20610	RECYCLE PROGRAM AND ADJUSTING	LAMBDA LESS THAN UNITY - IF THE POSI- TION VECTOR IS LESS THAN 400,000 FT ABOVE THE PAD RADIUS AT TIG FOR THE RTE MANEUVER, THIS SIGNIFIES THE POSI- TION VECTOR IS TOO SMALL FOR THE MANEUVER. PROGRAM ALARM WILL BE DISPLAYED, AND PROGRAM WILL PROCEED TO GOTOPOOH.

ACTION	TITLE-DESCRIPTION
REF MALF, PROCEDURES.	SECOND JOB ATTEMPTS TO GO TO SLEEP VIA KEYBOARD AND DISPLAY PROGRAM - WHEN JOB IS PUT TO SLEEP WITH A DSKY DISPLAY WHILE WAITING FOR A CREW RESPONSE OR DSKY RELEASE, THE RETURN ADDRESS OF THE SLEEPING JOB IS STORED IN CADRSTOR OR DSPLIST. IF ANOTHER ATTEMPT IS MADE BY PROGRAM TO PUT A JOB TO SLEEP USING THESE LOCATIONS, A PROGRAM ALARM IS DISPLAYED, A SOFTWARE RESTART IS EXECUTED, AND THE PROGRAM WILL PROCEED TO GOTOPOOH.
REF MALF. PROCEDURES.	TWO PROGRAMS USING SAME DEVICE AT SAME TIME - IF TWO JOBS TRY TO UTILIZE ANY OF THE STALL ROUTINES OR THE AUTO MANEUVER ROUTINE, ALL OF WHICH CONTAIN RETURN ADDRESS INFORMATION TO THE PROGRAM USING THESE DEVICES, A PROGRAM ALARM WILL BE DISPLAYED, A SOFTWARE RESTART I IS EXECUTED, AND THE PROCESSING WILL PROCEED TO GOTOPOOH.
REF MALF, PROCEDURES.	SORT CALLED WITH NEGATIVE ARGUMENT - IF A SQUARE ROOT IS ATTEMPTED WITH A NEGATIVE NUMBER WHICH IS LESS NEGATIVE THAN -2 <sup>-14</sup> , THE SQUARE ROOT IS 0. IF THE ARGUMENT IS MORE NEGATIVE THAN -2 <sup>-14</sup> , A PROGRAM ALARM IS DISPLAYED, A SOFTWARE RESTART IS EXECUTED, AND PROCESSING PROCEEDS TO GOTOPOOH.
	REF MALF. PROCEDURES.

ALARM CODE (OCTAL)	ACTION	TITLE-DESCRIPTION
21501	REF MALF. PROCEDURES.	KEYBOARD AND DISPLAY ALARM DURING INTERNAL USE (NVSUB) - IF AN INTERNAL USER OF THE DISPLAY SYSTEM FAILS TO COMMUNICATE A VERB NOUN PATTERN OR AN ILLEGAL PATTERN, A PROGRAM ALARM WILL BE DISPLAYED, A SOFTWARE RESTART IS EXECUTED, AND PROCESSING WILL PROCEED TO GOTOPOOH. AN ERROR FOR AN EXTERNAL USER OF THE DSKY WILL RESULT IN AN OPERATE ERROR LIGHT.
21502	REF MALF. PROCEDURES.	ILLEGAL FLASHING DISPLAY - IF A REQUEST FOR A FLASHING DISPLAY IS MADE WITH ONE ALREADY ACTIVATED IN THE DISPLAY SYSTEM, A PROGRAM ALARM WILL BE DISPLAYED AND PROCESSING WILL PROCEED TO GOTOPOOH.
21521	DO NOT REQUEST PO1, PO7 AFTER LIFTOFF.	PO1, PO7 ILLEGALLY SELECTED - AT LIFTOFF WHEN P11 IS STARTED, THE NODOPO1 FLAG (FW1 BIT 12) IS SET AND REMAINS SET THEREAFTER. IF PO1, PO7 ARE ATTEMPTED AFTER LIFTOFF, THE STATE OF THE FLAG BIT WILL CAUSE A PROGRAM ALARM DISPLAY, A SOFTWARE RESTART, AND PROCESSING WILL PROCEED TO GOTOPOOH.
31104	REF MALF. PROCEDURES.	DELAY ROUTINE BUSY - THE ROUTINE DELAYJOB CAN HANDLE FOUR DELAY REQUESTS. IF MORE THAN FOUR JOBS ATTEMPT TO USE THE ROUTINE, A BAILOUT ABORT IS GENERA- TED WHICH PERFORMS A SOFTWARE RESTART FOR A RESTARTABLE PROGRAM. PROGRAM ALARM IS DISPLAYED.
31201	REF MALF, PROCEDURES.	EXECUTIVE OVERFLOW - NO VAC AREAS - THE PROCESS OF JOB SCHEDULING BY THE EXECUTIVE ROUTINE RESERVES VAC AREAS OR INTERPRETER WORK AREAS FOR THE JOBS ON THE EXECUTIVE CORE SET LIST. IF A JOB IS REQUESTED AND NO VAC AREAS EXIST, A BAILOUT ABORT IS GENERATED WHICH PERFORMS A SOFTWARE RESTART AND DISPLAYS PROGRAM ALARM.
31202	REF MALF, PROCEDURES.	EXECUTIVE OVERFLOW - NO CORE SETS - WHEN A JOB IS REQUESTED, THE EXECUTIVE ROUTINE PLACES THE JOB ON THE CORE SET LIST AND RESERVES A CORESET AREA FOR USE BY THE JOB. IF NO CORE SETS ARE AVAILABLE TO SCHEDULE A REQUESTED JOB, A BAILOUT ABORT IS GENERATED WHICH PERFORMS A SOFTWARE RESTART AND DISPLAYS PROGRAM ALARM.

ALARM CODE (OCTAL)	ACTION	TITLE-DESCRIPTION
31203	REF MALF. PROCEDURES.	WAITLIST OVERFLOW - TOO MANY TASKS - THE WAITLIST ROUTINE HAS CAPABILITY OF SCHEDULING NINE TIME-DEPENDENT TASKS. IF A TASK IS REQUESTED AND NO VACANT ENTRIES EXIST ON THE LIST, A BAILOUT ABORT IS GENERATED WHICH PERFORMS A SOFTWARE RESTART AND DIS- PLAYS PROGRAM ALARM.
31211	REF MALF. PROCEDURES.	ILLEGAL INTERRUPT OF EXTENDED VERB - THE MARKING SYSTEM PERFORMS A CHECK OF THE EXTENDED VERB ACTIVITY BITS (EXTVBACT BITS 2, 3) BEFORE THE MARK SYSTEM IS ACTIVATED. IF THE MARK SYSTEM INTERRUPTS AN EXTENDED VERB IN PROCESS, A BAILOUT ABORT IS GENERA- TED WHICH PERFORMS A SOFTWARE RESTART, AND A PROGRAM ALARM IS DISPLAYED.

TABLE 8-III. - G&N/SCA ASSOCIATED POWER SUPPLY/POWER SWITCH

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PARAMETERS	NAME	OPTICS OPERATE PWR	HTR PWR ISS STBY	ISS OPERATE PWR	CMC OPERATE PWR	ISS 800 HZ 1% CG1201V	2.5 VDC REF BIAS CG1110V #1	3200 HZ CG1331V
ÇG0001V	DIG DATA 40 BITS				×			
ÇG1040V	PIPA +120 VDC			х		х .	×	
CG1110V	TM BIAS 2.5 VDC			х		×	х	
CG1201V	IMU 28V 800 HZ			×		×		
CG1331V	3.2 KHZ 28V SUPP		х					×
CG1513X	IMU HTR +28 VDC		х					
CG1523X	CMC OPER +28 VDC		х		×			
CG1533X	OPTX OPER +28 VDC	×						
CG2112V	IG RSVR SIN			×		×	х	
CG2113V	IG RSVR COS			х		×	×	
CG2117V	IGA SERV ERR		х	x		×	X	×
CG2142V	MG RSVR SIN			х		×	Х	
CG2143V	MG RSVR COS			×		×	×	
CG2147V	MGA SERV ERR		Х	×		×	Х	Х
CG2172V	OG RSVR SIN			Х		х	X	
CG2173V	OG RSVR COS			х		×	х	
CG2177V	OGA SERV ERR		х	х		х	×	x
CG2300T	PIPA TEMP		Х					
#CG3721V	SHFT CDU DAC OUT	х		х		×	х	
*CG3722V	TRUN CDU DAC OUT	х		х		х	х	
CG5040X	CMC WARNING		×		х			×

\*The OPTICS OPERATE power may be off during an SPS burn. In this case, the shaft and trunion CDU DAC outputs will still be operational because a TVC relay operated during the burn switches the 28V 800 cycle power from the OPTICS 800 cycle source to the ISS 800 cycle source. The 28 Vdc power to the DAC's is "ored" from the ISS OPERATE or OPTICS OPERATE power sources.

