L   TPI SEARCH

R2000   PROGRAM DESCRIPTION S17.1 AND S17.2

R2001   FUNCTIONAL DESCRIPTION

R2002   THE TPI SEARCH ROUTINE DETERMINES THE MINIMUM TOTAL VELOCITY TRANSFER TRAJECTORY FROM A GIVEN TPI
R2004   MANEUVER TIME WITHIN THE CONSTRAINT OF A SAFE PERICENTER. THIS VELOCITY IS THE SUM OF THE IMPULSIVE VELOCITIES
R2006   FOR THE TPI AND TPF MANEUVERS.
R2007   THE S17.1 ROUTINE EXTRAPOLATES THE STATE VECTORS OF BOTH VEHICLES TO THE TPI TIME AND COMPUTES THE
R2009   RELATIVE PHASE ANGLE BETWEEN THE VEHICLES, THE ALTITUDE DIFFERENCE(I.E. THE MAGNITUDE DIFFERENCE OF THE
R2011   POSITION VECTORS) AND SELECTS A SEARCH SECTOR BASED ON THE SIGN OF THE ALTITUDE DIFFERENCE.
R2013   THE S17.2 ROUTINE FURTHER DEFINES THE SEARCH SECTOR BY COMPUTING ANGULAR LIMITS AND USES THE TIME THETA
R2015   SUBROUTINE TO COMPUTE THE SEARCH START AND END TIMES. THE SEARCH IS THEN MADE IN AN ITERATIVE LOOP USING THE
R2017   LAMBERT SUBROUTINE TO COMPUTE THE VELOCITIES REQUIRED AT TPI TIME AND AT TPF TIME. EXIT FROM THE SEARCH LOOP
R2019   IS MADE WHEN SOLUTION CRITERIA ARE MET (NORMAL EXIT) OR AS SOON AS IT IS EVIDENT THAT NO SOLUTION EXISTS IN
R2021   THE SECTOR SEARCHED.

R2022   CALLING SEQUENCE

R2023   BOTH ROUTINES ARE CALLED IN INTERPRETIVE CODE AND RETURN VIA QPRET. S17.1 HAS ONLY A NORMAL EXIT.
R2025   S17.2 RETURNS VIA QPRET FOR NORMAL EXIT AND TO ALARMS FOR ERROR EXIT.
R2028   SUBROUTINES CALLED

R2029   CSMCONIC
R2030   LEMCONIC
R2031   TIMETHET
R2032   INITVEL

2033   36,2000   BANK   36
2034   REF   1   36,2000   SETLOC P17S
2035   36,2000   BANK

2036   REF   1   COUNT 36/TPI

2037   REF   17 LAST 520   E7,1537   EBANK= RACT3

R2038   **** TEMPORARY ****

2039   36,2000   00004 0 HPE   2DEC   157420.0 B-29   EARTH»S MIN. PERICENTER ALTITUDE 85 N.M.
2039   36,2001   31566 0
2040   36,2002   00000 1 HPL   2DEC   10668.0213 B-29 MOON'S MIN. PERICENTER ALTITUDE 35000FT
2040   36,2003   12326 0
2041   36,2004   00002 0 CDSEC   2DEC   40000
2041   36,2005   16100 1
2042   36,2006   00000 1 CLSEC   2DEC   15000
2042   36,2007   35230 0
2043   36,2010   12137 1 PIINVERS 2DEC   .3183098862
2043   36,2011   06033 1
2044   36,2012   06161 1 SEC1THET 2DEC   .1944444444
2044   36,2013   30707 1

2045					36,2014	35252 1	SEC$_2$THET	2DEC	.9166666667	
2045					36,2015	25253 1				
2046					36,2016	67777 1	MANYFEET	2DEC	-1.0 B-2	
2046					36,2017	77777 0				
2047					36,2020	00000 1	LIMVEL	2DEC	.6096 E-2 B-7	2FPS
2047					36,2021	30760 0				
2048					36,2022	00000 1	DFTMOON	2DEC	.1524 E3 B-29	500 FEET
2048					36,2023	00114 0				
2049					36,2024	00040 0	DP-.002	2DEC	0.002	
2049					36,2025	30447 0				
2050					36,2026	71220 1	S17.1	STO	DLOAD	
2051	REF	17	LAST	490	36,2027	01340 1			NORMEX	
2052	REF	10	LAST	464	36,2030	03663 1			TTPI	
2053	REF	22	LAST	522	36,2031	34041 0		STCALL	TDEC$_1$	ADVANCE PASSIVE VEHICLE TO TPI
2054	REF	1			36,2032	27057 0			LEMCONIC	
2055					36,2033	77624 1		CALL		
2056	REF	2	LAST	490	36,2034	45372 0			LEMSTORE	
2057					36,2035	77745 1		DLOAD		
2058	REF	11	LAST	542	36,2036	03663 1			TTPI	
2059	REF	23	LAST	542	36,2037	34041 0		STCALL	TDEC$_1$	ADVANCE ACTIVE VEHICLE TO TPI
2060	REF	1			36,2040	27045 0			CSMCONIC	
2061					36,2041	77624 1		CALL		
2062	REF	2	LAST	490	36,2042	45402 0			CSMSTORE	
2063					36,2043	77775 1		VLOAD		
2064	REF	18	LAST	541	36,2044	03540 0			RACT$_3$	
2065					36,2045	63246 1	ABVAL	PDVL	/RA/ 0D	PL 2D
2066	REF	9	LAST	522	36,2046	03554 0			RPASS3	
2067					36,2047	65256 0	UNIT	PDDL	UNIT RP 0D	PL 6D
2068					36,2050	43021 0	BDSU	SET		
2069					36,2051	00045 0			36D	/RP/ -/RA/
2070	REF	1			36,2052	00076 0			KFLAG	OFF = +
2071					36,2053	43040 0	BMN	CLEAR		
2072					36,2054	74056 1			+2	
2073	REF	2	LAST	542	36,2055	00276 1			KFLAG	ON = -
2074	REF	2	LAST	276	36,2056	27754 1	STOVL	DELHITE		
2075					36,2057	00001 0			0D	
2076					36,2060	53435 0	VXV	UNIT		
2077	REF	9	LAST	522	36,2061	03562 0			VPASS3	
2078	REF	1			36,2062	27646 0	STOVL	E$_2$	ALMOST IT SAVE FOR 17.2	
2079	REF	19	LAST	542	36,2063	03540 0			RACT$_3$	
2080					36,2064	46206 1	PUSH	VPROJ		
2081	REF	2	LAST	542	36,2065	03646 0			E$_2$	
2082					36,2066	51352 1	VSL$_2$	BVSU	RPA	
2083					36,2067	50256 0	UNIT	DOT		
2084					36,2070	00001 0			0D	
2085					36,2071	65552 0	SL$_1$	ACOS		
2086					36,2072	77715 1		PDVL		
2087					36,2073	50235 0	VXV	DOT		
2088	REF	20	LAST	542	36,2074	03540 0			RACT$_3$	
2089	REF	3	LAST	542	36,2075	03646 0			E$_2$	

2090					36,2076	75325 1		PDDL	SIGN	
2091					36,2077	77626 0		STADR		
2092	REF	3	LAST	276	36,2100	61160 1		STODL	THETZERO	CENTRAL ANGLE
2093	REF	8	LAST	519	36,2101	00047 1			X1	
2094	REF	2	LAST	124	36,2102	37746 0		STCALL	XRS	SAVE INDICES FOR FURTHER USE
2095	REF	18	LAST	542	36,2103	01340 1			NORMEX	+= ACTIVE AHEAD -= ACTIVE BEHIND
2096					36,2104	77220 1	S17.2	STQ	VLOAD	COMPUTE SEARCH SECTOR LIMITS
2097	REF	2	LAST	121	36,2105	03657 0			QTEMP	
2098	REF	21	LAST	542	36,2106	03540 0			RACT3	
2099					36,2107	50256 0		UNIT	DOT	
2100	REF	4	LAST	542	36,2110	03646 0			E2	
2101					36,2111	75446 0		ABS	SQRT	
2102					36,2112	43352 1		SL1	DAD	
2103	REF	1			36,2113	34025 1			DP-.002	ADD .002 RADIANS TO IT
2104					36,2114	57414 1		BON	DCOMP	GIVES CORRECT SINE, COSINE MUST BE
2105	REF	3	LAST	542	36,2115	00316 0			KFLAG	COMP. ADD .5 FOR ANGLE
2106					36,2116	74117 0			+1	

R2107 PHI(0)=180-(-(THETAZERO +K5IT)), PHI(I)=180-(-(THETAZERO+K2IT))
R2108 SIN(180-ALPHA)=SIN(ALPHA) ETC

2109					36,2117	40205 1		DMP	SETPD	
210905	REF	1			36,2120	34011 0			PIINVERS	REVOLUTIONARY HERES TWO IT
2110					36,2121	00001 0			0D	
2111					36,2122	45206 1		PUSH	DSU	
2112	REF	4	LAST	543	36,2123	02617 0			THETZERO	
2113	REF	2	LAST	92	36,2124	02611 0		STORE	IT	PHI(I) , -(THETZERO + K2IT)
2114					36,2125	41525 0		PDDL	PUSH	
2115					36,2126	43342 0		SR1	DAD	
2116					36,2127	41415 1		DAD	PUSH	PHI(0) , -(THETZERO + K5IT)
2117					36,2130	43156 1		SIN	SET	
2118	REF	3	LAST	522	36,2131	03466 0			RVSW	
2119	REF	4	LAST	522	36,2132	16732 0		STODL	SNTH	
2120					36,2133	50146 1		COS	BMN	
212005					36,2134	74136 0			+2	
21201					36,2135	77676 0		DCOMP		
2121	REF	4	LAST	522	36,2136	16734 0		STODL	CSTH	
212105	REF	3	LAST	543	36,2137	03746 1			XRS	
21211	REF	9	LAST	543	36,2140	24047 1		STOVL	X1	
2122	REF	10	LAST	542	36,2141	03554 0			RPASS3	
2123					36,2142	77657 0		VSR*		
2124					36,2143	57176 0			0,2	
2125	REF	4	LAST	522	36,2144	26657 1		STOVL	RVEC	
2126	REF	10	LAST	542	36,2145	03562 0			VPASS3	
2127					36,2146	77657 0		VSR*		
2128					36,2147	57176 0			0,2	
2129	REF	6	LAST	522	36,2150	36746 1		STCALL	VVEC	
2130	REF	3	LAST	522	36,2151	24737 1			TIMETHET	
2131					36,2152	77745 1		DLOAD		SAVE START TIME AND GET END TIME
2132	REF	4	LAST	522	36,2153	00037 0			T	
2133	REF	2	LAST	124	36,2154	03752 1		STORE	TF	
2134	REF	2	LAST	92	36,2155	16627 0		STODL	TFO	

2135	REF	3	LAST	543	36,2156	02611 0		IT	
2136					36,2157	73406 1	PUSH	SIN	
2137	REF	5	LAST	543	36,2160	16732 0	STODL	SNTH	
2138					36,2161	50146 1	COS	BMN	
213805					36,2162	74164 1		+2	
21381					36,2163	77676 0	DCOMP		
2139	REF	5	LAST	543	36,2164	02734 0	STORE	CSTH	
2140					36,2165	45150 1	LXA,1	CALL	
2141	REF	4	LAST	543	36,2166	03745 1		XRS	
2142	REF	4	LAST	543	36,2167	24737 1		TIMETHET	
R2143		INITIALIZE LOOP							
2144					36,2170	43145 0	DLOAD	CLEAR	
2145	REF	5	LAST	543	36,2171	00037 0		T	
2146	REF	5	LAST	461	36,2172	03861 0		ITSWICH	
2147	REF	2	LAST	92	36,2173	16621 0	STODL	TPI	SAVE TIME FOR LOOP TEST
2148	REF	6	LAST	497	36,2174	15340 1		DPPOSMAX	
2149	REF	2	LAST	92	36,2175	16623 1	STODL	DELVEE	
2150	REF	1			36,2176	34017 0		MANYFEET	
2151	REF	2	LAST	92	36,2177	16625 1	STODL	HP	
2152	REF	1			36,2200	34013 1		SEC$_1$THET	70 DEGREES
2153					36,2201	71214 0	BON	DLOAD	
2154	REF	4	LAST	543	36,2202	00316 0		KFLAG	
2155					36,2203	74205 0		+2	
2156	REF	1			36,2204	34015 1		SEC$_2$THET	330 DEGREES
2157	REF	2	LAST	124	36,2205	37750 1	STCALL	THETL	
2158	REF	1			36,2206	74230 0		CONCAUL	
2159					36,2207	70545 1	BIS DLOAD	SR1	
2160	REF	6	LAST	544	36,2210	02734 0		CSTH	
2161	REF	2	LAST	282	36,2211	14021 1	STODL	COSTH	
2162	REF	6	LAST	544	36,2212	02732 0		SNTH	
2163					36,2213	77742 0	SR1		
2164	REF	2	LAST	282	36,2214	34023 1	STCALL	SINTH	GET 4 QUADRANT THETA
2165	REF	2	LAST	282	36,2215	47211 0		ARCTRIG	
2166					36,2216	43244 1	BPL	DAD	
2167					36,2217	74221 0		+2	
2168	REF	7	LAST	544	36,2220	15340 1		DPPOSMAX	PUT THETA BETWEEN 0,1
2169					36,2221	65221 0	BDSU	PDDL	
2170	REF	3	LAST	544	36,2222	03750 0		THETL	
2171	REF	3	LAST	543	36,2223	03752 1		TF	
2172					36,2224	75225 0	DSU	SIGN	FAST TIMES
2173	REF	3	LAST	544	36,2225	02621 0		TPI	
2174					36,2226	77640 0	BMN		
2175	REF	1			36,2227	74432 1		RNGETEST	TIME MUST HAVE A STOP
R2176		ADVANCE PASSIVE FOR TARGET VECTOR							
2177					36,2230	77745 1	CONCAUL DLOAD		
2178	REF	12	LAST	542	36,2231	03663 1		TTPI	
2179					36,2232	43015 1	DAD	BON	
2180	REF	4	LAST	544	36,2233	03752 1		TF	
2181	REF	5	LAST	523	36,2234	01312 0		AVFLAG	
2182	REF	1			36,2235	74242 0		ADVCSM	

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2183   REP  24  LAST  542   36,2236   34041 0          STCALL  TDEC1
2184   REP   2  LAST  542   36,2237   27057 0                  LEMCONIC
2185                        36,2240   77850 1          GOTO
2186   REP   1              36,2241   74244 0                  JUNCT3
2187   REP  25  LAST  545   36,2242   34041 0  ADVCSM  STCALL  TDEC1
2188   REP   2  LAST  542   36,2243   27045 0                  CSMCONIC
R2189  SAVE BACK VALUES OF HP AND DELVEE
2190                        36,2244   77775 1  JUNCT3  VLOAD
2191   REP  12  LAST  519   36,2245   00007 0                  VATT
2192   REP   5  LAST  520   36,2246   27640 0          STOVL   VPASS4
2193   REP  16  LAST  519   36,2247   00001 0                  RATT
2194   REP   2  LAST  121   36,2250   03832 0          STORE   RPASS4
219405 REP   9  LAST  483   36,2251   17415 1          STODL   RTARG
2195   REP   5  LAST  544   36,2252   03752 1                  TP
2196   REP   7  LAST  482   36,2253   17423 1          STODL   DELLT4
2197   REP   3  LAST  544   36,2254   02625 1                  HP
2198   REP   2  LAST   92   36,2255   16631 1          STODL   HPO
2199   REP   3  LAST  544   36,2256   02623 1                  DELVEE
2200   REP   2  LAST   92   36,2257   16633 0          STODL   DELVEO
R2201  PREPARE FOR LAMBERT
2202   REP  13  LAST  544   36,2260   03663 1                  TTPI
2203   REP   8  LAST  519   36,2261   17503 1          STODL   INTIME
220305 REP   5  LAST  544   36,2262   03746 1                  XRS
22031  REP   8  LAST  491   36,2263   17746 1          STODL   RTX1
220313 REP   3  LAST  528   36,2264   15332 1                  HI6ZEROS
220315                      36,2265   65201 1          SETPD   PDDL
22032                       36,2266   00001 0                  0D
220325 REP   2  LAST  467   36,2267   33147 0                  EPSFOUR
22033                       36,2270   77715 1          PDVL
220335 REP  22  LAST  543   36,2271   03540 0                  RACT3
22034  REP  10  LAST  485   36,2272   27570 0          STOVL   RINIT
220345 REP   8  LAST  490   36,2273   03546 0                  VACT3
22035  REP   9  LAST  485   36,2274   37576 1          STCALL  VINIT
2207   REP   2  LAST  467   36,2275   22000 1                  INITVEL
R2208  COMPUTE H ET CETERA
2209                        36,2276   52375 1          VLOAD   VSU
2210   REP   8  LAST  520   36,2277   03620 0                  VTPRIME
2211   REP   6  LAST  545   36,2300   03640 0                  VPASS4
2212                        36,2301   41446 1          ABVAL   PUSH
2213   REP   2  LAST   92   36,2302   26637 1          STOVL   RELDELV
2214   REP  14  LAST  520   36,2303   03646 0                  DELVEET3
2215                        36,2304   77846 0          ABVAL
2216   REP   2  LAST   92   36,2305   02635 0          STORE   MAGVTPI
2217                        36,2306   45415 0          DAD     STADR
2218   REP   4  LAST  545   36,2307   61154 0          STODL   DELVEE
2219   REP   6  LAST  545   36,2310   03746 1                  XRS
2220   REP  10  LAST  543   36,2311   24047 1          STOVL   X1
2221   REP  10  LAST  520   36,2312   03612 1                  VIPRIME
2222                        36,2313   77657 0          VSR*
2223                        36,2314   57176 0                  0,2
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/V2-VP(TPI+TP)/
V1-VA
/V1-VA/

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2224	REF	7	LAST	543	36,2315	28746 0		STOVL	VVEC
2225	REF	23	LAST	545	36,2318	03540 0			RACT3
2226					36,2317	77657 0		VSR*	
2227					36,2320	57176 0			0,2
2228	REF	5	LAST	543	36,2321	36657 0		STCALL	RVEC
2229	REF	1			38,2322	45322 0			PERIAPO
2230					36,2323	71354 0		LXA,2	DLOAD
2231	REF	7	LAST	545	36,2324	03746 1			XRS +1
2232					36,2325	77657 0		SL*	
2233					38,2326	57576 1			0,2
2234	REF	4	LAST	545	36,2327	02625 1		STORE	HP

R2235 ITSWICH DENOTES INTERPOLATION--SOLUTION ACCEPTANCE IS FORCED

2236					36,2330	71214 0		BON	DLOAD	
2237	REF	6	LAST	544	36,2331	03701 1			ITSWICH	
2238	REF	1			36,2332	74443 1			ENDEN	
2239	REF	7	LAST	514	36,2333	02321 0			HPERMIN	
2240					36,2334	50025 0		DSU	BMN	
2241	REF	5	LAST	546	36,2335	02625 1			HP	
2242	REF	1			36,2336	74401 1			HALFSAFE	
2243					36,2337	45325 1		PDDL	DSU	WAS PERICENTER ALT SAFE
2244	REF	8	LAST	546	36,2340	02321 0			HPERMIN	
2245	REF	3	LAST	545	36,2341	02631 1			HPO	
2246					36,2342	45240 0		BMN	DSU	(HPLIM-HPO)-(HPLIM-HP)=HP-HPO
2247	REF	1			36,2343	74360 1			INTERP	SOLUTION AT HAND
2248					36,2344	71240 1		BMN	DLOAD	
2249	REF	1			36,2345	73534 1			ALARMS	ITS GETTING WORSE – SOUND THE ALARM
2250	REF	1			36,2346	34005 0			CDSEC	
2251					36,2347	57414 1	JUNCT1	BOFF	DCOMP	OFF IS PLUS ON IS MINUS
2252	REF	5	LAST	544	36,2350	00356 1			KFLAG	
2253					36,2351	74352 0			+1	
2254	REF	2	LAST	124	36,2352	03744 0		STORE	DELTEE	
2255					36,2353	43345 1	JUNCT2	DLOAD	DAD	
2256	REF	3	LAST	546	36,2354	03744 0			DELTEE	
2257	REF	6	LAST	545	36,2355	03752 1			TP	
2258	REF	7	LAST	546	36,2356	37752 0		STCALL	TP	
2259	REF	1			36,2357	74207 1			BIS	RECYCLE
2260					36,2360	45214 1	INTERP	SET	DSU	HP-HPO
2261	REF	7	LAST	546	36,2361	03461 1			ITSWICH	
2262					36,2362	65301 0		NORM	PDDL	
2263	REF	11	LAST	545	36,2363	00047 1			X1	
2264	REF	1			36,2364	34023 1			DPTMOON	
2265					36,2365	45215 0		DAD	DSU	
2266	REF	9	LAST	546	36,2366	02321 0			HPERMIN	
2267	REF	6	LAST	546	36,2367	02625 1			HP	
2268					36,2370	70501 0		NORM	SR1	
2269	REF	6	LAST	508	36,2371	00050 1			X2	
2270					36,2372	56284 1		XSU,2	DDV	
2271	REF	12	LAST	546	36,2373	00046 0			X1	
2272					36,2374	53605 1		DMP	SR*	
2273	REF	4	LAST	546	36,2375	03744 0			DELTEE	

2274					36,2376	57177	1		0 -1,2	
2275	REF	5	LAST	546	36,2377	37744	1		STCALL DELTEE	
2276	REF	1			36,2400	74353	1		JUNCT$_2$	
2277					36,2401	45325	1	HALFSAFE PDDL	DSU	SAVE HP-HPLIM FOR POSSIBLE
2278	REF	5	LAST	545	36,2402	02623	1		DELVEE	
2279	REF	3	LAST	545	36,2403	02833	0		DELVEO	SAVE THIS TOO
2280					36,2404	51406	1		PUSH ABS	
2281					36,2405	50025	0		DSU BMN	
2282	REF	1			36,2406	34021	0		LIMVEL	2 FT PS
2283	REF	2	LAST	546	36,2407	74443	1		ENDEN	
2284					36,2410	45345	1		DLOAD DSU	
2285	REF	10	LAST	546	36,2411	02321	0		HPERMIN	
2286	REF	4	LAST	546	36,2412	02631	1		HPO	
2287					36,2413	77725	1		PDDL	
2288					36,2414	71240	1		BMN DLOAD	
2289	REF	1			36,2415	74424	0		LRGRDVO	
2290					36,2416	71244	0		BPL DLOAD	
2291	REF	2	LAST	546	36,2417	74360	1		INTERP	
2292	REF	6	LAST	547	36,2420	03744	0		DELTEE	
2293					36,2421	57542	0		SR1 DCOMP	
2294	REF	7	LAST	547	36,2422	37744	1		STCALL DELTEE	
2295	REF	2	LAST	547	36,2423	74353	1		JUNCT$_2$	
2296					36,2424	77745	1	LRGRDVO	DLOAD	
2297					36,2425	71240	1		BMN DLOAD	
2298	REF	3	LAST	547	36,2426	74353	1		JUNCT$_2$	
2299	REF	1			36,2427	34007	1		CLSEC	
2300					36,2430	77650	1		GOTO	
2301	REF	1			36,2431	74347	1		JUNCT$_1$	
R2302									TIME RAN OUT ASSUME SOLUTION IF SAFE PERICENTER	
2303					36,2432	45345	1	RNGETEST DLOAD	DSU	
2304	REF	7	LAST	546	36,2433	02625	1		HP	
2305	REF	11	LAST	547	36,2434	02321	0		HPERMIN	
2306					36,2435	71240	1		BMN DLOAD	
2307	REF	2	LAST	546	36,2436	73534	1		ALARMS	
2308	REF	8	LAST	546	36,2437	03752	1		TF	
2309					36,2440	77625	0		DSU	
2310	REF	8	LAST	547	36,2441	03744	0		DELTEE	
2311	REF	9	LAST	547	36,2442	03752	1		STORE TF	TIME OF SOLUTION
2312					36,2443	77775	1	ENDEN	VLOAD	
2313	REF	9	LAST	545	36,2444	03620	0		VTPRIME	
2314					36,2445	65241	0		DOT PDDL	SG2 WITH MAGNITUDE
2315	REF	3	LAST	545	36,2446	03632	0		RPASS4	
2316	REF	3	LAST	545	36,2447	02637	1		RELDELV	
2317					36,2450	45565	0		SIGN STADR	NOW SIGN(RELDELV)=SIGN(SG2)
2318	REF	4	LAST	547	36,2451	41140	1		STCALL RELDELV	
231805	REF	1			36,2452	16440	0		TRANSANG	COMPUTE OMEGA T , CENTRAL ANGLE
23181					36,2453	50375	0		VLOAD DOT	
2319	REF	24	LAST	546	36,2454	03540	0		RACT$_3$	
2320	REF	11	LAST	545	36,2455	03612	1		VIPRIME	SG$_1$
2321					36,2456	51165	1		SIGN BPL	IF POSITIVE THEN SG1 = SG2 OTHERWISE

2322	REP	5	LAST	547	36,2457	02637 1			RELDELV	
2323	REP	1			36,2460	74470 1			USEKAY	
2324					36,2461	57535 0		SLOAD	DCOMP	
2325	REP	2	LAST	467	36,2462	33144 0			DECTWO	
2326					36,2463	51165 1		SIGN	BPL	
2327	REP	6	LAST	548	36,2464	02637 1			RELDELV	
2328	REP	1			36,2465	74476 1			NEXUS	
232805					36,2466	52076 1		DCOMP	GOTO	
23281	REP	2	LAST	548	36,2467	74474 0			USEKAY +4	
2329					36,2470	43135 1	USEKAY	SLOAD	BON	
2330	REP	3	LAST	548	36,2471	33144 0			DECTWO	
2331	REP	6	LAST	546	36,2472	00316 0			KFLAG	
2332	REP	2	LAST	548	36,2473	74476 1			NEXUS	
2333					36,2474	77625 0		DSU		
2334	REP	2	LAST	450	36,2475	36100 0			P21ONENN	
2335	REP	2	LAST	275	36,2476	17646 0	NEXUS	STODL	NN1	
233505	REP	8	LAST	547	36,2477	02625 1			HP	
2336	REP	4	LAST	520	36,2500	36641 1		STCALL	POSTTPI	
2337	REP	3	LAST	543	36,2501	03657 0			QTEMP	
23371					07,2440			BANK	07	
23372	REP	1			07,2000			SETLOC	XANG	
23373					07,2440			BANK		
23374	REP	1						COUNT	07/XANG	

R2338   CENTRAL ANGLE SUBROUTINE
R2339   THIS SUBROUTINE COMPUTES THE CENTRAL ANGLE OF TRAVEL OF THE
R2340   PASSIVE VEHICLE DURING THE TRANSFER.

2341					07,2440	40220 0	TRANSANG	STQ	SETPD		
2342	REP	15	LAST	519	07,2441	02370 1			SUBEXIT		
2343					07,2442	00001 0			0		
2344					07,2443	73150 0		LXA,1	LXA,2		
2345	REP	8	LAST	546	07,2444	03745 1			XRS		
2346	REP	9	LAST	548	07,2445	03746 1			XRS +1		
2347					07,2446	53775 1		VLOAD	VSR*		
2348	REP	7	LAST	545	07,2447	03640 0			VPASS4		
2349					07,2450	57176 0			0,2		
2350	REP	8	LAST	546	07,2451	22746 1		STODL*	VVEC		
2351	REP	3	LAST	486	07,2452	11633 1			MUTABLE +2,1		
2352					07,2453	53715 1		PDVL	VSR*	SQRT MU (+18 OR +15)	00D
2353	REP	4	LAST	547	07,2454	03632 0			RPASS4		
2354					07,2455	57176 0			0,2		
2355					07,2456	64646 1		ABVAL	PDDL*	MAGNITUDE OF R (+29 OR +27)	02D
2356	REP	4	LAST	548	07,2457	11631 0			MUTABLE,1		
2357					07,2460	47515 0		PDVL	VSQ	1/MU (+34 OR +28)	04D
2358	REP	9	LAST	548	07,2461	02746 0			VVEC		
2359					07,2462	57301 1		NORM	DMPR	PUSH LIST AT 02D	
2360	REP	13	LAST	546	07,2463	00047 1			X1		
2361					07,2464	53605 1		DMP	SRR*		
2362					07,2465	00003 1			02D		

SIGN(SG2-SG1)=SIGN(SG2)=SIGN(RELDELV)

2363					07,2466	21576 0			0 -3,1		
2364					07,2467	77621 1		BDSU		R V**/MU (+6)	
2365	REP	1			07,2470	11508 1			D1/32		
2366					07,2471	65301 0		NORM	PDDL		
2367	REP	14	LAST	548	07,2472	00047 1			X1	(2 - R V**/MU)	(+6-N)
2368					07,2473	56362 0		SR1R	DDV	MAGNITUDE OF R	(+30 OR +28)
2369					07,2474	41457 1		SL*	PUSH	R/(2 - R V**/MU)	(+29 OR +27)02D
2370					07,2475	20174 1			0 -5,1		
2371					07,2476	75542 0		SR1	SQRT		
2372					07,2477	77605 1		DMP			
2373					07,2500	65301 0		NORM	PDDL	ASUBP***	00D
2374	REP	15	LAST	549	07,2501	00047 1			X1		
2375					07,2502	56342 1		SR1	DDV		
2376					07,2503	53605 1		DMP	SL*		
2377	REP	10	LAST	547	07,2504	03752 1			TF		
2378					07,2505	20201 0			0,1		
237805					07,2506	60325 0		PDDL	NORM		
23781	REP	1			07,2507	11520 0			2PISC		
237815	REP	16	LAST	549	07,2510	00047 1			X1		
23782					07,2511	56325 0		PDDL	DDV		
237825					07,2512	77657 0		SL*			
23783					07,2513	20178 0			0 -3,1	CENTANG = (SQRT(MU/ASUP***)TF)	
2379	REP	6	LAST	522	07,2514	37754 0		STCALL	CENTANG	IN REVOLUTIONS B-0	
2380	REP	16	LAST	548	07,2515	02370 1			SUBEXIT		
2381					35,3431			BANK	35		
2382	REP	1			35,2000			SETLOC	P17S1		
2383					35,3431			BANK			
23835	REP	1						COUNT	35/P17		

R2384   TPI SEARCH DISPLAY ROUTINE

2385	REP	5	LAST	521	35,3431	0 3726 1	P17	TC	AVFLAGA	AVFLAG = CSM , SET TRACK + UPDATE FLAGS
2386	REP	1			35,3432	0 3434 1		TC	P17.1	
2387	REP	5	LAST	521	35,3433	0 3741 0	P77	TC	AVFLAGP	AVFLAG = LEM , SET TRACK + UPDATE FLAGS
2388	REP	5	LAST	521	35,3434	0 3746 1	P17.1	TC	P20FLGON	SET UPDATE FLAG
238805	REP	3	LAST	456	35,3435	3 3125 1		CAF	V06N37	DISPLAY TTPI TIME
2389	REP	5	LAST	472	35,3436	0 3114 0		TC	VNPOOH	
2390	REP	72	LAST	537	35,3437	0 6006 1		TC	INTPRET	
2391					35,3440	45014 0		CLEAR	CALL	
2392	REP	8	LAST	520	35,3441	00670 0			UPDATFLG	
2393	REP	1			35,3442	74026 0			S17.1	UPDATE STATE VECTORS TO TTPI
2394					35,3443	76014 0		SET	AXT,1	
2395	REP	9	LAST	549	35,3444	00470 1			UPDATFLG	
2396					35,3445	00002 0		DEC	2	DELTA H = 2 K POSITIVE , KFLAG OFF
2397					35,3446	76014 0		BOFF	AXT,1	
2398	REP	7	LAST	548	35,3447	00356 1			KFLAG	
2399					35,3450	73452 0			+2	
2400					35,3451	00001 0		DEC	1	DELTA H = 1 K NEGATIVE , KFLAG ON
2401					35,3452	77530 1		SXA,1	EXIT	
2402	REP	6	LAST	518	35,3453	01132 0			OPTION2	

L   TPI SEARCH

Line	REF	Cnt	LAST	Pg	Address	Octal		Label	Op	Operand	Comments
2403	REF	1			35,3454	3 3543	0	CAP	V06N72		DISPLAY PHI , DELTA H , SEARCH OPTION K
2404	REF	1			35,3455	0 3517	1	TC	VNCOMP17	
2405	REF	73	LAST	549	35,3456	0 6006	1	TC	INTPRET	
2406					35,3457	43014	0	CLEAR	SET	
2407	REF	10	LAST	549	35,3460	00670	0		UPDATFLG	
2408	REF	8	LAST	549	35,3461	00076	0		KFLAG	
2409					35,3462	45335	0	SLOAD	DSU	
2410	REF	7	LAST	549	35,3463	01133	1		OPTION2		RESET KFLAG ON FOR OPTION =1
2411	REF	3	LAST	548	35,3464	36100	0		P21ONENN		OFF FOR OPTION =2
2412					35,3465	43030	0	BHIZ	CLEAR	
2413					35,3466	73470	0		+2	
2414	REF	9	LAST	550	35,3467	00276	1		KFLAG	
2415					35,3470	46135	0	SLOAD	BHIZ	
2416	REF	10	LAST	548	35,3471	03747	0		XRS +1	
2417					35,3472	73476	0		+4	
2418					35,3473	52145	0	DLOAD	GOTO	
2419	REF	1			35,3474	34003	0		HPL	
2420	REF	1			35,3475	73500	0		P17.2	
2421					35,3476	77745	1	DLOAD		
2422	REF	1			35,3477	34001	1		HPE	
2423	REF	12	LAST	547	35,3500	36321	1	P17.2	STCALL	HPERMIN	
2424	REF	1			35,3501	74104	1		S17.2	
2425					35,3502	77414	0	SET	EXIT	
2426	REF	11	LAST	550	35,3503	00470	1		UPDATFLG	
2427	REF	2	LAST	457	35,3504	3 3127	0	P17.3 CAP	V06N58		DISPLAY DELTA VTPI , DELTA VTPF , AND H
2428	REF	2	LAST	550	35,3505	0 3517	1	TC	VNCOMP17	
2429	REF	2	LAST	475	35,3506	3 3126	1	CAP	V06N55		DISPLAY PERICENTER CODE AND CENTRAL ANG,
2430	REF	120	LAST	536	35,3507	0 4555	0	TC	BANKCALL	
2431	REF	5	LAST	518	35,3510	20763	1	CADR	GOFLASHR	
2432	REF	17	LAST	523	35,3511	0 4106	1	TC	GOTOPOOH		TERMINATE PROGRAM
2433	REF	18	LAST	550	35,3512	0 4106	1	TC	GOTOPOOH		END PROGRAM
2434	REF	2	LAST	549	35,3513	0 3434	1	TC	P17.1		RECYCLE WITH NEW TTPI OR SEARCH OPTION
2435	REF	29	LAST	506	35,3514	3 4711	1	CAP	TWO		BLANK R2
2436	REF	5	LAST	518	35,3515	0 5415	1	TC	BLANKET	
2437	REF	66	LAST	536	35,3516	1 5112	1	TCF	ENDOFJOB	
24375	REF	13	LAST	523	E4,1767			EBANK=	RTRN	
2438					35,3517	0 0006	1	VNCOMP17	EXTEND	
2439	REF	4	LAST	474	35,3520	23«766	1	QXCH	QSAVED	
2440	REF	6	LAST	523	35,3521	55«765	0	TS	VERBNOUN	
2441	REF	7	LAST	550	35,3522	3 1765	1	CA	VERBNOUN	
2442	REF	121	LAST	550	35,3523	0 4555	0	TCR	BANKCALL	
2443	REF	17	LAST	523	35,3524	20624	0	CADR	GOFLASH	
2444					35,3525	0 3522	1	TC	-3		TERMINATE ILLEGAL REDISPLAY
2445	REF	5	LAST	550	35,3526	0 1766	1	TC	QSAVED		PROCEED
2446	REF	246	LAST	537	35,3527	4 0154	0	CS	MPAC		RECYCLE WITH NEW TPI TIME
244605	REF	32	LAST	536	35,3530	6 4705	1	AD	BIT6		OR PROCEED WITH NEW SEARCH OPTION
24461					35,3531	0 0006	1	EXTEND		
244615	REF	3	LAST	550	35,3532	1 3434	0	BZF	P17.1	
24462	REF	3	LAST	550	35,3533	0 3522	1	TC	VNCOMP17 +3	

L   TPI SEARCH   USER«S PAGE NO. 11   E4 S3

2447					35,3534	77414 0	ALARMS	SET	EXIT	
2448	REF	12	LAST	550	35,3535	00470 1			UPDATFLG	
2449	REF	25	LAST	456	35,3536	0 5537 0		TC	ALARM	
2450					35,3537	00124 0		OCT	00124	NO SAFE PERCENTER IN THIS SECTOR
2451	REF	2	LAST	456	35,3540	3 4743 0		CAF	V05N09	
2452	REF	4	LAST	550	35,3541	0 3517 1		TC	VNCOMP17	
2453	REF	19	LAST	550	35,3542	0 4106 1		TC	GOTOPOOH	PROCEED ILLEGAL TERMINATE PROGRAM
2454					35,3543	01510 1	V06N72	VN	0672	

P0001   RENDEZVOUS NAVIGATION PROGRAM 20
R0002   PROGRAM DESCRIPTION
R0003   MOD NO -1
R0004   MOD BY - N.BRODEUR
R0005   FUNCTIONAL DESCRIPTION
R0006
R0007   TO CONTROL THE CSM ATTITUDE AND OPTICS TO ACQUIRE THE LEM IN THE S+T
R0008   FIELD AND TO POINT THE CSM TRANSPONDER AT THE LEM. TO UPDATE EITHER THE
R0009   LEM OR CSM STATE VECTOR (AS SPECIFIED BY THE ASTRONAUT BY THE DSKY
R0010   ENTRY) ON THE BASIS OF OPTICAL TRACKING DATA (REQUESTED BY DSKY)
R0011   CALLING SEQUENCE -
R0012
R0013   ASTRONAUT REQUEST THROUGH DSKY V37E20E
R0014   SUBROUTINES CALLED-
R0015   R02BOTH (IMU STATUS CHECK)   BANKCALL
R0016   FLAGUP   2PHSCHNG   LOADTIME
R0017   R61CSM (PREFERRED TRACKING ATTITUDE) FLAGDOWN
R0018   R52   (AUTO OPTICS POSITIONING ROUT) SETINTG
R00181   R22   (REND TRACK DATA PROC ROUT)   PRIOCHNG
R0019   ENDOFJOB   INTEGRV   GRP2PC
R0020   INTPRET   MKRLEES   FINDVAC
R0021   NORMAL EXIT MODES-
R0022   P20 MAY BE TERMINATED IN TWO WAYS-ASTRONAUT SELECTION OF IDLING
R0023   PROGRAM (P00) BY KEYING V37E00E OR BY KEYING IN V56E
R0024   ALARM OR ABORT EXIT MODES-
R0025   NONE DIRECTLY FROM P20
R0026   OUTPUT
R0027   TRKMKCNT = NO OF RENDEZVOUS TRACKING MARKS TAKEN (COUNTER)
R0028   VHFCNT = NO OF VHF RANGING MARKS INCORPORATED (COUNTER)
R0029   FLAGS SET + RESET
R0030   RNDVZFLG,VEHUPFLG,UPDATFLG,TRACKFLG,TARG1FLG
R0031   HOLDFLAG,WBODY,WBODY1,WBODY2,DELCDUX,DELCDUY,DELCDUZ
R0032   STIKFLAG,PRFTRKAT,VINTFLAG,DIMOFLAG,R60FLAG,R81CNTR

0033					33,3772			BANK	33
0034	REF	2	LAST	450	37,2000			SETLOC	P20S
0035					37,2207			BANK	
0036	REF	4	LAST	206	E6,1412			EBANK=	ESTROKER
0037	REF	1						COUNT*	$$/P20
0038	REF	122	LAST	550	37,2207	0 4555 0	PROG20	TC	BANKCALL
0039	REF	1			37,2210	17573 0		CADR	R02BOTH
A0040									
0041	REF	117	LAST	536	37,2211	3 4714 1		CAF	ZERO
0042	REF	3	LAST	180	37,2212	55∝126 1		TS	TRKMKCNT
0043	REF	5	LAST	504	37,2213	55∝125 1		TS	VHFCNT
0044	REF	19	LAST	503	37,2214	0 5435 0		TC	UPFLAG
0045	REF	3	LAST	258	37,2215	00120 1		ADRES	PRFTRKAT
0046	REF	23	LAST	444	37,2216	0 5447 0		TC	DOWNFLAG
0047	REF	3	LAST	254	37,2217	00026 0		ADRES	VEHUPFLG

IMU STATUS CHECK
BLOCKING OF UPLINK IS DONE BY UPLINK PRG

ZERO REND TRACKING MARK COUNTER
ZERO REND VHF RNG MRK COUNTER
SET PREF TRACK ATT FLAG
BIT 10 FLAG 5
LEM TO BE UPDATED. VEHUPFLG RESET.
BIT 8 FLAG 1

0050	REF	20	LAST	552	37,2220	0 5435 0		TC	UPFLAG	SET TRACKFLAG
0051	REF	3	LAST	502	37,2221	00031 0		ADRES	TRACKFLG	BIT 5 FLAG 1
0052	REF	21	LAST	553	37,2222	0 5435 0		TC	UPFLAG	SET UPDATFLG
0053	REF	13	LAST	551	37,2223	00027 1		ADRES	UPDATFLG	BIT 7 FLAG 1
0054	REF	22	LAST	553	37,2224	0 5435 0		TC	UPFLAG	SET RNDVZFLG
0055	REF	2	LAST	253	37,2225	00010 0		ADRES	RNDVZFLG	BIT 7 FLAG 0
0056	REF	5	LAST	530	37,2226	0 5261 1		TC	2PHSCHNG
0057					37,2227	00004 0		OCT	00004
0058					37,2230	05022 1		OCT	05022
0059					37,2231	26000 0		OCT	26000
0060	REF	74	LAST	550	37,2232	0 6006 1		TC	INTPRET
0061					37,2233	77634 0		RTB
0062	REF	10	LAST	522	37,2234	45505 0			LOADTIME
0063	REF	2	LAST	78	37,2235	35225 1		STCALL	MARKTIME
0064	REF	1			37,2236	56343 0			SETINTG	SET INTEGRATION FLAGS
0065					37,2237	43014 0		BOFF	SET
0066	REF	2	LAST	204	37,2240	02756 1			RENDWFLG
0067	REF	1			37,2241	76243 0			P20.1
0068	REF	3	LAST	204	37,2242	01476 0			DIM0FLAG	SET TO INTEGRATE THE W MATRIX
0069					37,2243	43014 0	P20.1	BON	CLEAR
0070	REF	4	LAST	552	37,2244	00707 1			VEHUPFLG
0071	REF	1			37,2245	76247 1			P20.2
0072	REF	4	LAST	204	37,2246	01674 0			VINTFLAG	SET FOR LM INTEGRATION
0073					37,2247	77624 1	P20.2	CALL
0074	REF	3	LAST	204	37,2250	27113 1			INTEGRV
0075					37,2251	77624 1		CALL
0076	REF	1			37,2252	56741 0			GRP2PC	GROUP 2 PHASE CHANGE
0077					37,2253	77624 1		CALL
0078	REF	2	LAST	553	37,2254	56343 0			SETINTG	SET INTEGRATION FLAGS
0079					37,2255	43014 0		BOFF	CLEAR
0080	REF	5	LAST	553	37,2256	00747 0			VEHUPFLG
0081	REF	1			37,2257	76261 0			P20.3
0082	REF	5	LAST	553	37,2260	01674 0			VINTFLAG	SET FOR LM INTEGRATION
0083					37,2261	77624 1	P20.3	CALL
0084	REF	4	LAST	553	37,2262	27113 1			INTEGRV
0085					37,2263	77776 1		EXIT
0086	REF	2	LAST	410	37,2264	3 7663 0		CAF	PRIO26
0088	REF	21	LAST	531	37,2265	0 5042 1		TC	FINDVAC
0089	REF	7	LAST	504	E7,1734			EBANK=	MRKBUP2
0090	REF	2	LAST	207	37,2266	02512 0		2CADR	R22
0090					37,2267	70067 1
0092	REF	6	LAST	553	37,2270	0 5261 1		TC	2PHSCHNG
0093					37,2271	00072 1		OCT	00072
0094					37,2272	00111 0		OCT	00111
0095	REF	2	LAST	385	37,2273	3 4761 0	PIKUP20	CAF	PRIO14	ALLOW HIGHER PRIO THAN LAMBERT
0096	REF	5	LAST	440	37,2274	0 5103 0		TC	PRIOCHNG
0097	REF	29	LAST	511	37,2275	3 4706 1		CAF	BIT5	IS TRACK FLAG SET
0098	REF	33	LAST	224	37,2276	7 0075 1		MASK	STATE +1
0099					37,2277	0 0006 1		EXTEND
0100	REF	67	LAST	550	37,2300	1 5112 1		BZF	ENDOFJOB	NO

0101	REF	18	LAST	336	37,2301	3 4676 1		CAP	BIT13	
0102	REF	34	LAST	553	37,2302	7 0077 0		MASK	STATE +3	IS REFSMFLG SET
0103					37,2303	0 0006 1		EXTEND		
0104	REF	68	LAST	553	37,2304	1 5112 1		BZF	ENDOFJOB	
0107	REF	118	LAST	552	37,2305	3 4714 1		CAF	ZERO	
0108	REF	2	LAST	114	37,2306	55«775 1		TS	R61CNTR	INITIALIZE R61 COUNTER
0111	REF	23	LAST	553	37,2307	0 5435 0		TC	UPFLAG	SET R60FLAG
0112	REF	1			37,2310	00126 1		ADRES	R60FLAG	BIT 4 FLAG 5
0113	REF	123	LAST	552	37,2311	0 4555 0		TC	BANKCALL	
0114	REF	1			37,2312	76536 0		CADR	R61CSM	
0115	REF	24	LAST	552	37,2313	0 5447 0		TC	DOWNFLAG	RESET R60FLAG
0116	REF	2	LAST	554	37,2314	00126 1		ADRES	R60FLAG	BIT 4 FLAG 5
0117	REF	2	LAST	98	E5,1777			EBANK=	QMIN	
0118	REF	2	LAST	236	37,2315	3 4751 0		CAF	EBANK5	
0119	REF	24	LAST	529	37,2316	54 003 0		TS	EBANK	
01191	REF	24	LAST	554	37,2317	0 5435 0		TC	UPFLAG	SET TARGET FLAG TO LEM·
01192	REF	2	LAST	384	37,2320	00024 1		ADRES	TARG1FLG	BIT 10 FLAG 1
0120	REF	75	LAST	553	37,2321	0 6006 1	P20R52JB	TC	INTPRET	
0121					37,2322	77624 1		CALL		
0122	REF	1			37,2323	30002 0			R52	SET UP AUTO OPTICS JOB
0123					37,2324	77776 1		EXIT		
0124	REF	124	LAST	554	37,2325	0 4555 0		TC	BANKCALL	
0125	REF	1			37,2326	16070 1		CADR	MKRLEES	
0126	REF	66	LAST	530	37,2327	3 4712 1		CAF	ONE	HOLD PRESENT ATTITUDE
0127	REF	4	LAST	409	37,2330	55«332 0		TS	HOLDFLAG	
0128	REF	69	LAST	554	37,2331	0 5112 0		TC	ENDOFJOB	
0129					37,2332	00203 0	OCT203	OCT	00203	
0130	REF	1			7707		FIRST3	EQUALS	FURST3	

P0131 ORBITAL NAVIGATION PROGRAM 22

0132				31,2021			BANK	31	
0133	REF	1		30,2000			SETLOC	P20S1	
0134				30,2000			BANK		
0135	REF	12	LAST 276	E5,1751			EBANK=	LANDMARK	
0136	REF	1					COUNT*	$$/P22	
0139	REF	25	LAST 554	30,2000	0 5447 0	PROG22	TC	DOWNFLAG	RESET RNDVZFLG BIT 7 FLAG 0
01394	REF	3	LAST 553	30,2001	00010 0		ADRES	RNDVZFLG	
013941	REF	25	LAST 554	30,2002	0 5435 0		TC	UPFLAG	
013942	REF	1		30,2003	00025 0		ADRES	TARG2FLG	
01396	REF	125	LAST 554	30,2004	0 4555 0		TC	BANKCALL	
0140	REF	2	LAST 552	30,2005	17573 0		CADR	R02BOTH	IMU STATUS CHECK
0141	REF	76	LAST 554	30,2006	0 6006 1		TC	INTPRET	COMPUTE ANGLE BETWEEN Y AND VXR SM
0142				30,2007	77634 0		RTB		
0143	REF	11	LAST 553	30,2010	45505 0			LOADTIME	
0145	REF	26	LAST 545	30,2011	34041 0		STCALL	TDEC1	
0146	REF	3	LAST 545	30,2012	27045 0			CSMCONIC	INTEGRATE TO PRESENT TIME
0147				30,2013	47375 0		VLOAD	VXV	CROSS PRODUCT BETWEEN V AND R
0148	REF	13	LAST 545	30,2014	00007 0			VATT	
0149	REF	17	LAST 545	30,2015	00001 0			RATT	
0150				30,2016	50256 0		UNIT	DOT	
0151	REF	13	LAST 529	30,2017	01744 1			REFSMMAT +6	
0152				30,2020	77646 0		ABS		
0153				30,2021	65552 0		SL1	ARCCOS	
0154	REF	7	LAST 485	30,2022	03626 0		STORE	+MGA	
0155				30,2023	77414 0		CLEAR	EXIT	
0156	REF	3	LAST 553	30,2024	02676 1			RENDWFLG	
0157	REF	1		30,2025	3 2162 0		CAF	V06N45B	
0158	REF	126	LAST 555	30,2026	0 4555 0		TC	BANKCALL	
0159	REF	6	LAST 550	30,2027	20763 1		CADR	GOFLASHR	
0160	REF	20	LAST 551	30,2030	0 4106 1		TC	GOTOPOOH	TERM P22
0161	REF	1		30,2031	0 2036 0		TC	PROG22A	PROC
0162				30,2032	0 2025 1		TC	-5	ENTER
0163	REF	17	LAST 517	30,2033	3 6214 0		CAF	THREE	
0164	REF	6	LAST 550	30,2034	0 5415 1		TC	BLANKET	BLANK OUT R1 + R2
0165	REF	70	LAST 554	30,2035	0 5112 0		TC	ENDOFJOB	
0166	REF	1		30,2036	4 2172 0	PROG22A	CS	OCTL7000	SET OFFSET NO.=0
01661	REF	13	LAST 555	30,2037	7 1751 1		MASK	LANDMARK	
01662	REF	14	LAST 555	30,2040	55«751 1		TS	LANDMARK	
01663	REF	77	LAST 555	30,2041	0 6006 1		TC	INTPRET	
01664				30,2042	77614 1		CLEAR		
01665	REF	1		30,2043	01664 1			P22MKFLG	
0167				30,2044	43014 0		SET	BOFF	
0168	REF	3	LAST 528	30,2045	00462 1			ERADFLAG	
0169	REF	6	LAST 504	30,2046	04343 1			CMOONFLG	
0170	REF	1		30,2047	60113 1			PROG22B	EARTH
0171				30,2050	77614 1		SET		MOON
0172	REF	3	LAST 451	30,2051	01463 1			LUNAFLAG	

0174					30,2052	77776 1		EXIT	
0178	REP	1			30,2053	3 2163 1		CAF	V05N7022
0179	REP	127	LAST	555	30,2054	0 4555 0		TC	BANKCALL
0180	REP	7	LAST·	555	30,2055	20763 1		CADR	GOFLASHR
0181	REP	21	LAST	555	30,2056	0 4106 1		TC	GOTOPOOH TERMINATE
0182					30,2057	0 2064 1		TC	+5 PROCEED UNPACK ABCDE
0183					30,2060	0 2053 0		TC	-5 RECYCLE
0184	REP	9	LAST	517	30,2061	3 4715 0		CAF	FIVE IMMEDIATE RETURN BLANK OUT R1,R2
0185	REP	7	LAST	555	30,2062	0 5415 1		TC	BLANKET
0186	REP	71	LAST	555	30,2063	0 5112 0		TC	ENDOFJOB
01861	REP	10	LAST	556	30,2064	3 4715 0		CAF	FIVE
01862	REP	3	LAST	202	30,2065	54 301 1		TS	MARKINDX
0187	REP	78	LAST	555	30,2066	0 6006 1		TC	INTPRET
0188					30,2067	77624 1		CALL	UNPACK ABCDE FROM LANDMARK
0189	REP	1			30,2070	60234 1			UNPACKAE
0190					30,2071	45335 0		SLOAD	DSU
0191	REP	2	LAST	95	30,2072	02745 0			22SUBSCL
0192	REP	1			30,2073	20166 1			P22MAXDE
0193					30,2074	45044 0		BPL	CALL
0194	REP	1			30,2075	60101 1			DE-GR-50 DE GREATER THAN MAX
0195	REP	1			30,2076	76333 0			P22SUBRA SUBROUTINE A SETS LAT/LONG/ALT
0196					30,2077	77650 1		GOTO	
0197	REP	1			30,2100	60120 1			CALLR52
0198					30,2101	77624 1	DE-GR-50	CALL	CALL ADVANCED ORBIT ROUTINE
0199	REP	1			30,2102	30206 0			ADVORB
01991					30,2103	77776 1		EXIT	
01992	REP	7	LAST	553	30,2104	0 5261 1		TC	2PHSCHNG
01993					30,2105	00004 0		OCT	00004
01994					30,2106	05022 1		OCT	05022
01995					30,2107	13000 0		OCT	13000
01996	REP	79	LAST	556	30,2110	0 6006 1		TC	INTPRET
0200					30,2111	77650 1		GOTO	
0201	REP	1			30,2112	60132 1			DO V5N71
0202					30,2113	43014 0	PROG22B	CLEAR	SET EARTH ORBIT
0203	REP	4	LAST	555	30,2114	01663 0			LUNAFLAG
0204	REP	2	LAST	56	30,2115	03067 0			KNOWNFLG
0205					30,2116	77624 1		CALL	GET LAT/LONG/ALT FROM ASTRO
0206	REP·	1			30,2117	60217 0			P22SUBRB
0207					30,2120	77776 1	CALLR52	EXIT	
02111	REP	8	LAST	556	30,2121	0 5261 1		TC	2PHSCHNG
02112					30,2122	00004 0		OCT	00004
02113					30,2123	05022 1		OCT	05022
02114					30,2124	13000 0		OCT	13000
0212	REP	11	LAST	556	30,2125	3 4715 0		CAF	FIVE
0213	REP	4	LAST	556	30,2126	54 301 1		TS	MARKINDX SET MARK INDEX=5 FOR R52
0217	REP	80	LAST	556	30,2127	0 6006 1		TC	INTPRET
0218					30,2130	77624 1		CALL	
0219	REP	2	LAST	554	30,2131	30002 0			R52
0220					30,2132	77776 1	DO V5N71	EXIT	
0221	REP	1			30,2133	3 2164 0		CAF	V05N7122

0222	REF	128	LAST	556	30,2134	0 4555 0		TC	BANKCALL
0223	REF	8	LAST	556	30,2135	20763 1		CADR	GOFLASHR
0224	REF	22	LAST	556	30,2136	0 4106 1		TC	GOTOPOOH	TERMINATE
0225					30,2137	0 2144 1		TC	+5	PROCEED UNPACK ABCDE
0226					30,2140	0 2133 1		TC	-5	RECYCLE
0227	REF	12	LAST	556	30,2141	3 4715 0		CAF	FIVE	IMMEDIATE ENTRY BLANK OUT R1,R3
0228	REF	8	LAST	556	30,2142	0 5415 1		TC	BLANKET
0229	REF	72	LAST	556	30,2143	0 5112 0		TC	ENDOFJOB
0230	REF	81	LAST	556	30,2144	0 6006 1		TC	INTPRET
0231					30,2145	77624 1		CALL	
0232	REF	2	LAST	556	30,2146	60234 1			UNPACKAE
0233					30,2147	77624 1		CALL		SET LAT/LANG/ALT
0234	REF	2	LAST	556	30,2150	76333 0			P22SUBRA
0235					30,2151	66744 0	PROG22C	LXC,2	SLOAD*
0236	REF	29	LAST	447	30,2152	01330 0			MARKSTAT
0237	REF	11	LAST	504	30,2153	77724 0			QPRET,2
0238	REF	3	LAST	175	30,2154	36750 0		STCALL	8NN
0240	REF	1			30,2155	60255 0			S22.1	ESTABLISH LANDMARK - COMPUTE ORBITAL
0241					30,2156	77776 1	P22OVER	EXIT	
02411	REF	27	LAST	536	30,2157	0 5301 0		TC	PHASCHNG
02412					30,2160	04022 0		OCT	04022
0242	REF	2	LAST	555	30,2161	0 2036 0		TC	PROG22A	POINT A ON GSOP
0243					30,2162	01455 1	V06N45B	VN	0645
0244					30,2163	01306 0	V05N7022	VN	00570
0245					30,2164	01307 1	V05N7122	VN	00571
0246					30,2165	00033 1	P22MAXDE	2DEC	27 B-14
0246					30,2166	00000 1		
0247					30,2167	01531 1	V06N89	VN	00689
0248					30,2170	00077 1	OCTL77	OCT	77	DE MASK OF ABCDE
0249					30,2171	00700 0	OCTL700	OCT	700	C MASK OF ABCDE
0250					30,2172	07000 0	OCTL7000	OCT	7000	B MASK OF ABCDE
02505	REF	3	LAST	552	37,2000			SETLOC	P20S
02506					37,2333			BANK	
0251					37,2333	43020 1	P22SUBRA	STQ	BOFF	SET LAT/LONG/ALT FOR KNOWN LANDMARK
0252	REF	2	LAST	123	37,2334	03667 0			S22TOFF
0253	REF	3	LAST	556	37,2335	03347 1			KNOWNFLG
0254	REF	3	LAST	557	37,2336	03667 0			S22TOFF	UNKNOWN LANKMARK,EXIT
0255					37,2337	46135 1		SLOAD	BHIZ
0256	REF	3	LAST	556	37,2340	02745 0			22SUBSCL
0257	REF	1			37,2341	60213 1			OBTAINLL	GET LAT/LONG/ALT FROM ASTRO
0258					37,2342	50025 0		DSU	BMN
0259	REF	1			37,2343	21642 0			9DWID	2 B-14
0260	REF	1			37,2344	60173 1			S22LSITE	GET LAT/LONG/ALT FROM RLS (LANDING SITE)
0261					37,2345	70152 0		SL1	LXC,1	GET LAT/LONG/ALT FROM TABLES
0262	REF	247	LAST	550	37,2346	00154 1			MPAC
0263					37,2347	70601 1		SETPD	DLOAD*
0264					37,2350	00001 0			0D
0265	REF	1			37,2351	23705 1			ALTTAB,1
0266					37,2352	64723 0	PDDL*		PDDL*

0267	REF	1			37,2353	23623 1		LONGTAB,1	
0268	REF	1			37,2354	23541 0		LATTAB,1	
0269					37,2355	77866 1		VDEF	
0270	REF	7	LAST	528	37,2356	35104 1	STCALL	LAT	
0271	REF	4	LAST	557	37,2357	03667 0		S22TOFF	EXIT
02715	REF	2	LAST	555	30,2000		SETLOC	P20S1	
02716					30,2173		BANK		
0272					30,2173	77634 0	S22LSITE RTB		CONVERT RLS FROM MOON-FIXED TO BASIC REF
0273	REF	12	LAST	555	30,2174	45505 0		LOADTIME	
02731					30,2175	24007 0	STOVL	6D	6-7D= TIME
02732	REF	5	LAST	510	30,2176	02026 1		RLS	
02733					30,2177	14001 0	STODL	QD	0-5D= LANDING SITE VECTOR
02734	REF	4	LAST	440	30,2200	15330 0		HIDPHALF	MPAC= ANY NON-ZERO FOR MOON
02735					30,2201	77624 1	CALL		
02736	REF	1			30,2202	55341 1		RP-TO-R	RLS IN BASIC REF B-27 IN MPAC
02737					30,2203	77742 0	VSR2		LUNAFLAG AND ERADFLAG SET ABOVE
0274	REF	3	LAST	451	30,2204	02152 0	STORE	ALPHAV	SCALE RLS B-29 FOR LAT-LONG
0275					30,2205	77634 0	RTB		
0276	REF	13	LAST	558	30,2206	45505 0		LOADTIME	SET PRESENT TIME IN MPAC FOR LAT-LONG
0277					30,2207	77624 1	CALL		
0278	REF	2	LAST	451	30,2210	26322 0		LAT-LONG	
0279					30,2211	77650 1	GOTO		
0280	REF	5	LAST	558	30,2212	03667 0		S22TOFF	EXIT
0281					30,2213	77624 1	OBTAINLL CALL		GET LAT/LONG/ALT FROM ASTRO
0282	REF	2	LAST	556	30,2214	60217 0		P22SUBRB	
0283					30,2215	77650 1	GOTO		
0284	REF	6	LAST	558	30,2216	03667 0		S22TOFF	EXIT
0285					30,2217	77420 1	P22SUBRB STQ	EXIT	GET LAT/LONG/ALT FROM ASTRO
0286	REF	7	LAST	558	30,2220	03670 0		S22TOFF +1	
0287	REF	1			30,2221	3 3656 1	CAF	V06N89B	
0288	REF	129	LAST	557	30,2222	0 4555 0	TC	BANKCALL	
0289	REF	18	LAST	550	30,2223	20624 0	CADR	GOFLASH	
0290	REF	23	LAST	557	30,2224	0 4106 1	TC	GOTOPOOH	TERMINATE
0291					30,2225	0 2227 1	TC	+2	PROCEED
0292					30,2226	0 2221 1	TC	-5	ENTER OR RECYCLE
0293	REF	82	LAST	557	30,2227	0 6006 1	TC	INTPRET	
0294					30,2230	77624 1	CALL		
0295	REF	1			30,2231	61345 1		LLASRDA	
0296					30,2232	77650 1	GOTO		
0297	REF	8	LAST	558	30,2233	03670 0		S22TOFF +1	EXIT
0298					30,2234	77776 1	UNPACKAE EXIT		UNPACK LANDMARK INTO ABCDE
0299	REF	15	LAST	555	30,2235	3 1751 0	CA	LANDMARK	
0300	REF	1			30,2236	7 2170 1	MASK	OCTL77	
0301	REF	4	LAST	557	30,2237	55«744 0	TS	22SUBSCL	DE=L=LMK ID NO. N 00,01, 02-26
0302	REF	16	LAST	558	30,2240	3 1751 0	CA	LANDMARK	
0303	REF	2	LAST	555	30,2241	7 2172 0	MASK	OCTL7000	
0304	REF	2	LAST	95	30,2242	55«745 1	TS	CXOFF	B± OFFSET INDICATOR
0305	REF	26	LAST	555	30,2243	0 5435 0	TC	UPFLAG	SET KNOWNFLG
0306	REF	4	LAST	557	30,2244	00141 0	ADRES	KNOWNFLG	BIT 8 FLAG 6

L   P20-P25

0307	REF	17	LAST	558	30,2245	3 1751 0	CA	LANDMARK
0308	REF	36	LAST	417	30,2246	7 4675 0	MASK	BIT14
0309					30,2247	0 0006 1	EXTEND	
0310					30,2250	1 2253 0	BZF	+3
0311	REF	26	LAST	555	30,2251	0 5447 0	TC	DOWNFLAG
0312	REF	5	LAST	558	30,2252	00141 0	ADRES	KNOWNFLG
0313	REF	83	LAST	558	30,2253	0 6006 1	TC	INTPRET
0314					30,2254	77616 0	RVQ	

IF BIT14 OF LANDMARK=1,A=2 OTHERWISE A=1

A=1 LEAVE KNOWNFLAG SET FOR KNOWN LMK
A=2 CLEAR KNOWNFLG (BIT 6 FLAG 6) FOR
        UNKNOWN LMK

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P0315   PROGRAM NAME- OPTICS CALIBRATION ROUTINE
R0316   MOD NO- 1
R0317   MOD BY- TOM KNATT
R0318
R0319   FUNCTIONAL DESCRIPTION- TO MEASURE THE EFFECT OF SOLAR RADIATION ON
R0320      THE SXT TRUNNION ANGLE AND TO STORE THE MEASURED TRUNNION BIAS FOR P23
R0321
R0322   CALLING SEQUENCE- CALL
R0323                          R57
R0324
R0325   SUBROUTINES CALLED- DISPLAY ROUTINES
R0326
R0327   NORMAL EXIT MODES-VIA EGRESS
R0328
R0329   ALARMS- NONE
R0330
R0331   ABORT MODES- P23ABORT IF MARKING SYSTEM OR EXTENDED VERB ACTIVE
R0332   INPUT- NONE REQUIRED, NORMALLY CALLED BY P23
R0333   OUTPUT- TRUNNION BIAS ANGLE- ANGLE DETERMINED WHEN SHAFT LINE OF SIGHT
R03332  (SLOS) AND LANDMARK LINE OF SIGHT (LLOS) ARE SUPERIMPOSED. THIS ANGLE
R03334  MAY NOT BE EXACTLY ZERO BECAUSE OF UNEVEN HEATING OF THE OPTICS,FOR
R03336  EXAMPLE.
R0334
R0335   ERASABLE INITIALIZATION REQUIRED- MRKBUP1, EXTVBACT
R0336
R0337   DEBRIS- RUPTREGS USED BY MARKRUPT AND ERASABLES USED BY DISPLAYS
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0338					33,3772			BANK	33
0339	REP	4	LAST	557	37,2000			SETLOC	P20S
0340					37,2360			BANK	
0341	REP	1						COUNT*	$$/R57
0342	REP	20	LAST	277	E7,1725			EBANK=	MRKBUP1
0343					37,2360	77420 1	R57	STQ	EXIT
0344	REP	2	LAST	88	37,2361	02317 0			EGRESS
03442	REP	3	LAST	434	37,2362	3 4753 1		CAF	EBANK7
03444	REP	25	LAST	554	37,2363	54 003 0		TS	EBANK
0345	REP	19	LAST	518	37,2364	3 6211 0		CAF	SIX
0346	REP	16	LAST	511	37,2365	7 1044 1		MASK	EXTVBACT
0347	REP	143	LAST	530	37,2366	10 000 0		CCS	A
0348	REP	1			37,2367	0 2437 0		TC	P23ABRT
0349	REP	23	LAST	509	37,2370	3 4711 1		CAF	BIT2
0350	REP	17	LAST	560	37,2371	27∝044 1		ADS	EXTVBACT
0351	REP	27	LAST	558	37,2372	0 5435 0	R57A	TC	UPFLAG
0352	REP	1			37,2373	00116 1		ADRES	V59FLAG
0353	REP	1			37,2374	3 2442 1		CAF	V59NB
0354	REP	130	LAST	558	37,2375	0 4555 0		TC	BANKCALL
0355	REP	1			37,2376	20504 1		CADR	GOMARKFR
0356	REP	24	LAST	558	37,2377	0 4106 1		TC	GOTOPOOH
0357	REP	1			37,2400	0 2424 1		TC	ENDR57
0358	REP	2	LAST	560	37,2401	0 2424 1		TC	ENDR57
0359	REP	10	LAST	368	37,2402	3 4716 0		CAF	SEVEN

```
BIT2 = MARKING SYSTEM IN USE
BIT3 = EXTENDED VERB IN PROGRESS

SET, THEREFORE ABORT
NOT SET
SET IT
SET V59FLAG (BIT 12  FLAG 5) TO INDICATE
CALIBRATION MARK



TERMINATE
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0360	REP	9	LAST	557	37,2403	0 5415 1		TC	BLANKET	BLANK OUT R1,R2,R3
0361	REP	73	LAST	557	37,2404	0 5112 0		TC	ENDOFJOB
R0362	STORE TRUNNION ANGLE (OCDU)
0363	REP	1			37,2405	3 2441 1	MARKDISP CAP	V06N87X3
0364	REP	131	LAST	560	37,2406	0 4555 0		TC	BANKCALL
0365	REP	2	LAST	560	37,2407	20504 1		CADR	GOMARKFR
0366	REP	25	LAST	560	37,2410	0 4106 1		TC	GOTOPOOH	TERMINATE
0367	REP	1			37,2411	0 2416 0		TC	R57B	PROCEED
0368	REP	1			37,2412	0 2372 0		TC	R57A	ENTER (RECYCLE)
0369	REP	13	LAST	557	37,2413	3 4715 0		CAF	FIVE
0370	REP	10	LAST	561	37,2414	0 5415 1		TC	BLANKET	BLANK OUT R1,R3
0371	REP	74	LAST	561	37,2415	0 5112 0		TC	ENDOFJOB
03712	REP	1			37,2416	3 2444 1	R57B	CA	19.77DEG	PUT FIXED INTO ERASABLE FOR MSU
03714	REP	61	LAST	533	37,2417	54 001 1		TS	L	INSTRUCTION COMING UP
0372	REP	21	LAST	560	37,2420	3 1732 0		CA	MRKBUF1 +5	CONTAINS TRUNNION
037245					37,2421	0 0006 1		EXTEND
03725	REP	62	LAST	561	37,2422	20 001 1		MSU	L	CORRECTS TRUNBIAS FROM 2=S TO 1=S
0373	REP	1			37,2423	55=342 1		TS	TRUNBIAS
0376	REP	27	LAST	559	37,2424	0 5447 0	ENDR57	TC	DOWNFLAG	RESET V59FLAG
0377	REP	2	LAST	560	37,2425	00116 1		ADRES	V59FLAG	BIT 12 FLAG 5
03772	REP	3	LAST	554	37,2426	3 4751 0		CAF	EBANK5
03774	REP	26	LAST	560	37,2427	54 003 0		TS	EBANK
03776	REP	3	LAST	553	37,2430	3 4761 0		CAF	PRIO14
03777	REP	16	LAST	509	37,2431	0 5027 1		TC	NOVAC	THIS JOB CLEARS BIT IN
03778	REP	30	LAST	557	1330			EBANK=	MARKSTAT
037785	REP	2	LAST	227	37,2432	05423 1		2CADR	ENDMARK	MARKING IN R57 SO R53 CAN TAKE OVER
037785					37,2433	04062 1
0378	REP	84	LAST	559	37,2434	0 6006 1		TC	INTPRET
0379					37,2435	77650 1		GOTO
0380	REP	3	LAST	560	37,2436	02317 0			EGRESS
0381	REP	3	LAST	217	37,2437	0 5604 0	P23ABRT	TC	BAILOUT
0382					37,2440	01211 1		OCT	01211
0383					37,2441	01527 0	V06N87NB	VN	0687
0384					37,2442	16600 0	V59NB	VN	5900
0385					37,2443	14600 1	V51NB	VN	5100
03852					37,2444	61740 0	19.77DEG OCT	61740

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P0386     PROGRAM DESCRIPTION
R0387     MOD NO - 1
R0388     MOD BY - N.BRODEUR
R0389     FUNCTIONAL DESCRIPTION
R0390
R0391        TO PERFORM SIGHTING MARKS IN CONJUNCTION WITH THE RENDEZVOUS NAVIG-
R0392     ATION PROGRAM. CALLED BY ASTRONAUT VIA EXTENDED VERB
R0394     CALLING SEQUENCE -
R0395            R21 VIA V 57
R0396            R23 VIA V 54
R0399     SUBROUTINES CALLED -
R0400        FLAGUP         FLAGDOWN           BANKCALL
R0401        ENDOFJOB       GOMARK2            GOMARKF
R04011       INTPRET        GENTRAN            KLEENEX
R04012       ENDMARK
R0402     NORMAL EXIT MODES-
R0403        MARKRUPT USED BY SXTMARK HAS BEEN MODIFIED TO STORE MARK IN MRKBUF2
R0404     FOR USE BY R22. WHEN ASTRONAUT IS FINISHED TAKING MARKS, HE HITS AN
R0405     PROCEED  ,   R21 IS TERMINATED THUS CAUSING THE FINAL MARK TO BE TRANSFRD
R04051    TO MRKBUF2 FOR PROCESSING BY R22
R0406     ALARM OR ABORT EXIT MODES -
R0407        NONE
R0408     OUTPUT -
R0409        7 REGISTER MRKBUF2 CONTAINING TIME2,TIME1,CDUY,OPTICS X,CDUZ,OPTICS Y,
R0410     CDUX.
R0411     ERASABLE INITIALIZATION REQUIRED
R0412     FLAGS SET AND RESET
R0413        R21MARK   (COMMUNICATION TO MARKRUPT TO STORE MARKS IN MRKBUF1 + 2)
R0414        R23FLG   INDICATES COAS MARKING
R0415     DEBRIS .
 0416     REF  22  LAST  561     E7,1725                       EBANK= MRKBUF1
 0417     REF   1                37,2000                       SETLOC RENDEZ
 0418                            37,2445                       BANK

 0419     REF   1                                              COUNT* $$/R21

 0420     REF  28  LAST  560     37,2445   0 5435 0   R21CSM   TC     UPFLAG          SET R21MARK
 0421     REF   2  LAST  195     37,2446     00037 0            ADRES  R21MARK         BIT 14  FLAG 2
 0422     REF  12  LAST  504     37,2447   3 7716 0   R23CSM   CA     NEGONE
 0423     REF  23  LAST  562     37,2450   55«725 1            TS     MRKBUF1
 0424     REF   8  LAST  553     37,2451   55«734 1            TS     MRKBUF2
 0427     REF  12  LAST  446     37,2452   3 0075 0            CA     FLAGWRD1
 0428     REF  19  LAST  539     37,2453   7 4702 1            MASK   BIT9            TEST R23FLG
 0429                            37,2454   0 0006 1            EXTEND
 0430     REF   1                37,2455   1 2510 0            BZF    R21C1           NOT SET REGULAR R21 MARKING
 0431     REF   1                37,2456   3 2535 0            CAF    V0694           R23 BACKUP MARKING
 0432     REF 132  LAST  561     37,2457   0 4555 0            TC     BANKCALL        DISPLAY SHAFT + TRUNNION
 0433     REF   5  LAST  496     37,2460     20465 1            CADR   GOMARKF
 0434     REF   1                37,2461   0 2527 0            TC     R21END          TERM
 0435                            37,2462   0 2464 0            TC     +2              PROC
```

0436				37,2463	0 2456 1		TC	-5	ENTER
0437	REF	1		37,2464	3 2534 1	R23CSM1	CAP	V53	PERFORM ALT LOS SIGHT MARK
0438	REF	133	LAST 562	37,2465	0 4555 0		TC	BANKCALL	
0439	REF	1		37,2466	20470 0		CADR	GOMARK2	
0440	REF	2	LAST 562	37,2467	0 2527 0		TC	R21END	V34-TERMINATE R23
0441	REF	1		37,2470	1 2516 0		TCF	R21CSMA	PROCEED-END BACK UP MARKING (R23)
0442	REF	20	LAST 560	37,2471	3 6211 0		CAF	SIX	TRANSFER MRKBUF1 TO MRKBUF2
0443	REF	7	LAST 260	37,2472	0 5475 1		TC	GENTRAN	
0444	REF	24	LAST 562	37,2473	01725 0		ADRES	MRKBUF1	
0445	REF	9	LAST 562	37,2474	01734 0		ADRES	MRKBUF2	
0451				37,2475	0 0006 1		EXTEND		
0452	REF	17	LAST 532	37,2476	3 0025 0		DCA	TIME2	
0453	REF	25	LAST 563	37,2477	53«726 1		DXCH	MRKBUF1	READ TIME
0454	REF	4	LAST 528	37,2500	3 0033 1		CA	CDUY	READ CDU ANGLES
0455	REF	26	LAST 563	37,2501	55«727 0		TS	MRKBUF1 +2	
0456	REF	8	LAST 528	37,2502	3 0034 0		CA	CDUZ	
0457	REF	27	LAST 563	37,2503	55«731 1		TS	MRKBUF1 +4	
0458	REF	11	LAST 528	37,2504	3 0032 0		CA	CDUX	
0459	REF	28	LAST 563	37,2505	55«733 0		TS	MRKBUF1 +6	
0464				37,2506	0 0003 1		RELINT		
0465	REF	1		37,2507	0 2464 0		TC	R23CSM1	
0466	REF	1		37,2510	3 2443 0	R21C1	CAP	V51NB	
0467	REF	134	LAST 563	37,2511	0 4555 0		TC	BANKCALL	
0468	REF	2	LAST 563	37,2512	20470 0		CADR	GOMARK2	
0469	REF	3	LAST 563	37,2513	0 2527 0		TC	R21END	V34-TERMINATE R21
0470	REF	2	LAST 563	37,2514	1 2516 0		TCF	R21CSMA	PROCEED-END R21
0471	REF	2	LAST 562	37,2515	1 2510 0		TCF	R21C1	RECYCLE
0473	REF	29	LAST 563	37,2516	3 1725 0	R21CSMA	CA	MRKBUF1	IF -1 NO MARK
0474	REF	67	LAST 554	37,2517	6 4712 1		AD	ONE	
0475				37,2520	0 0006 1		EXTEND		
0476	REF	4	LAST 563	37,2521	1 2527 1		BZF	R21END	ZERO = NO MARK
0478	REF	21	LAST 563	37,2522	3 6211 0		CAF	SIX	MARK THEREFORE TRANSFER IT TO MRKBUF2
0479	REF	8	LAST 563	37,2523	0 5475 1	R21CSM1	TC	GENTRAN	TRANSFER MRKBUF1 TO MRKBUF2
0480	REF	30	LAST 563	37,2524	01725 0		ADRES	MRKBUF1	
0481	REF	10	LAST 563	37,2525	01734 0		ADRES	MRKBUF2	
0482				37,2526	0 0003 1		RELINT		
0487	REF	135	LAST 563	37,2527	0 4555 0	R21END	TC	BANKCALL	
0488	REF	2	LAST 226	37,2530	20470 0		CADR	KLEENEX	
04881	REF	28	LAST 561	37,2531	0 5447 0		TC	DOWNFLAG	RESET R21MARK
04882	REF	3	LAST 562	37,2532	00037 0		ADRES	R21MARK	BIT 14 FLAG 2
0491	REF	3	LAST 561	37,2533	0 5423 1		TC	ENDMARK	END MARKING AND ENDJOB
0494				37,2534	15200 1	V53	VN	5300	
0495				37,2535	01536 0	V0694	VN	0694	

```
P0496    PREFERRED TRACKING ATTITUDE ROUTINE R61CSM
R0497    PROGRAM DESCRIPTION
R0498    MOD NO - 2
R0499    MOD BY - N.BRODEUR
R0500    FUNCTIONAL DESCRIPTION-
R0501      TO COMPUTE THE PREFERRED TRACKING ATTITUDE OF THE CSM TO ENABLE OPTICS
R0502    TRACKING OF THE LM AND TO PERFORM THE MANEUVER TO THE PREFERRED
R0503    OR X-AXIS TRACKING ATTITUDE.
R0504    CALLING SEQUENCE-
R0505              TC     BANKCALL
R0506              CADR   R61CSM
R0507    SUBROUTINES CALLED
R0508      MAKECADR           BANKCALL
R0509      INTPRET      FLAGUP          FLAGDOWN
R0510      BANKJUMP     CRS61.1         R60CSM
R0511      PHASCHNG
R0512    NORMAL EXIT MODES-
R0513      NORMAL RETURN IS TO CALLER + 1
R0517    OUTPUT -
R0518      SEE OUTPUT FOR CRS61.1 d ATTITUDE MANEUVER ROUTINE (R60CSM)
R0519    ERASABLE INITIALIZATION REQUIRED
R0520      GENRET USED TO SAVE Q FOR RETURN
R0521      R61CNTR MUST BE PRESET TO ZERO
R0522    FLAGS SET + RESET
R0523      3-AXIS FLAG
R0524    DEBRIS
R0525      SEE SUBROUTINES
 0527    REF  3 LAST  114  E6,1770              EBANK= GENRET
 0528    REF  1                                 COUNT* $$/R61         ROUTINES - NAVIGATION - PREF. TR. 9TT=

 0529    REF  9 LAST  529  37,2536  3 4752 0 R61CSM  CAF   EBANK6     SWITCH TO EBANK 6
 0530    REF 27 LAST  561  37,2537  56 003 1        XCH   EBANK
 0531    REF  2 LAST  113  37,2540  55∝771 0        TS    SAVBNK     SAVE EBANK
 0532    REF  2 LAST  383  37,2541  0 4604 1        TC    MAKECADR
 0533    REF  4 LAST  564  37,2542  55∝770 1        TS    GENRET
 0534    REF  3 LAST  554  37,2543  11∝775 1        CCS   R61CNTR    TEST R61CNTR
 0535    REF  1            37,2544  0 2575 1        TC    DECRM61    NOT READY TO DO R61.
 0536                      37,2545  0 2547 0        TC    +2         DO R61
 0537    REF  2 LAST. 564  37,2546  0 2576 1        TC    DECRM61 +1
 0538    REF 85 LAST  561  37,2547  0 6006 1        TC    INTPRET
 0539                      37,2550  77624 1        CALL
 0540    REF  1            37,2551  71225 1              CRS61.1      LOS DETERMINATION + VEH ATTITUDE
 0541                      37,2552  77776 1        EXIT
 0542    REF 248 LAST 557  37,2553  50 154 1       INDEX MPAC
 0543                      37,2554  0 2555 0        TC   +1
 0544    REF  1            37,2555  0 2574 0        TC   R61END      SUBROUTINE DRIVING DAP (EXIT R61)
A05441                                                               OR AUTO MODE NOT SET (EXIT R61)
A05442                                                               OR STIKFLAG SET     (EXIT R61)
 0545    REF 29 LAST  563  37,2556  0 5447 0 R61C1  TC   DOWNFLAG    RESET 3-AXIS FLAG
 0553    REF  3 LAST  391  37,2557  00124 0        ADRES 3AXISFLG    BIT 6  FLAG 5
```

0554	REF	68	LAST	563	37,2560	4 4712 0		CS	ONE	SET R61CNTR NEG. TO INDICATE KALCMANU
0555	REF	4	LAST	564	37,2561	55«775 1		TS	R61CNTR	
0556	REF	29	LAST	562	37,2562	0 5435 0		TC	UPFLAG	SET FLAG FOR PROIRITY DISPLAYS FOR R60
0557	REF	2	LAST	384	37,2563	00077 1		ADRES	PDSPFLAG	BIT 12 FLAG 4
0558	REF	136	LAST	563	37,2564	0 4555 0		TC	BANKCALL	
0559	REF	2	LAST	391	37,2565	56000 1		CADR	R60CSM	
0560	REF	30	LAST	564	37,2566	0 5447 0		TC	DOWNFLAG	RESET FLAG FOR PRIORITY DISPLAYS IN R60
0561	REF	3	LAST	565	37,2567	00077 1		ADRES	PDSPFLAG	BIT 12 FLAG 4
0564	REF	28	LAST	557	37,2570	0 5301 0		TC	PHASCHNG	
0565					37,2571	00111 0		OCT	00111	
05651	REF	119	LAST	554	37,2572	3 4714 1		CAF	ZERO	
05652	REF	3	LAST	564 ·	37,2573	0 2575 1		TC	DECRM61	
0567	REF	18	LAST	555	37,2574	3 6214 0	R61END	CAF	THREE	
0568	REF	5	LAST	565	37,2575	55«775 1	DECRM61	TS	R61CNTR	
0569	REF	5	LAST	564	37,2576	31«770 0		CAE	GENRET	
0570	REF	144	LAST	560	37,2577	22 000 1		LXCH	A	RETURN IS IN L
0571	REF	3	LAST	564	37,2600	3 1771 1		CA	SAVBNK	RESTORE EBANK
0572	REF	28	LAST	564	37,2601	56 003 1		XCH	EBANK	
0573	REF	145	LAST	565	37,2602	22 000 1		LXCH	A	RETURN IS NOW BACK IN A
0574	REF	6	LAST	384	37,2603	0 4577 0		TC	BANKJUMP	EXIT R61
0575					13,2176			BANK	13	
0576	REF	1			23,2000			SETLOC	P20S2	
0577					23,3047			BANK		
0578	REF	31	LAST	563	E7,1725			EBANK=	MRKBUP1	

```
P0579    BVECTOR PERFORMS COMPUTATIONS FOR
R0580    DELTAQ,THE MEASURED DEVIATION BASED ON THE DIFFERENCE BETWEEN THE CSM-LE
R0581    M STATE VECTOR ESTIMATES AND THE ACTUAL TRACKING MEASUREMENT.
R0582    US,THE MODIFIED PICTITIOUS STAR DIRECTION VECTOR
R0583    GEOMETRY VECTOR B ASSOCIATED WITH EACH TRACKING MEASUREMENT.
R0584    INPUT
R0585       UM,1/2 UNIT VECTOR ALONG THE CSM-LM LINE OF SIGHT (BASIC REP.SYSTEM)
R0586       USTAR,FICTITIOUS STAR DIRECTION (1/2 UNIT VECTOR)
R0587       RCLP,RELATIVE CSM TO LM POSITION VECTOR
R0588    OUTPUT
R0589       USTAR,MODIFIED FICTITOUS STAR DIRECTION (1/2 UNIT VECTOR)
R0590       BVECTOR = 9 DIMENSIONAL BVECTOR (1/2 UNIT VEC.)
R0591       DELTAQ = MEASURED DEVIATION
R0592    CALLING SEQUENCE
R0593       L  CALL BVECTORS
R0594    NORMAL EXIT
R0595       L+1 OF CALLING SEQUENCE


0596   REF  1                                            COUNT  23/20SUB

0597                              23,3047    77620 0   BVECTORS STO
0598   REF  4  LAST  561         23,3050    02317 0              EGRESS
0599                             23,3051    53575 0      VLOAD   UNIT
0600   REF  2  LAST  119         23,3052    03531 0              RCLP          RELATIVE POSITION VECTOR
0601                             23,3053    14033 1      STODL   26D           RCLP UNIT VEC
0602                             23,3054    00045 0              36D           RCLP ABS VALUE
0603   REF  1                    23,3055    25301 1      STOVL   TEMPOR1       MOVE TO SAFE LOCATION
0604   REF  2  LAST  78          23,3056    01245 0              USTAR
0605                             23,3057    53435 0      VXV     UNIT
0606                             23,3060    00033 1              26D           USTAR = UNIT(US X UCL)
0607   REF  3  LAST  119         23,3061    37502 1      STCALL  BVECTOR
0608   REF  2  LAST  553         23,3062    56741 0              GRP2PC        PHASE CHANGE
0609                             23,3063    77775 1      VLOAD
0610   REF  4  LAST  566         23,3064    03502 0              BVECTOR
0611   REF  3  LAST  566         23,3065    01245 0      STORE   USTAR
0612                             23,3066    72441 0      DOT     SL1
0613   REF  2  LAST  78          23,3067    01235 1              UM            USTAR DOT UM
0614                             23,3070    45326 1      ACOS    DSU
0615   REF  3  LAST  393         23,3071    15322 0              DP1/4TH
0616                             23,3072    41301 0      NORM    DMP
0617   REF  17 LAST  549         23,3073    00047 1              X1
0618   REF  1                    23,3074    07107 0              PI/4.0
0619                             23,3075    53605 1      DMP     SRR*
0620   REF  2  LAST  566         23,3076    01301 1              TEMPOR1       RCLP ABS VALUE
0621                             23,3077    21576 0              0 -3,1        ADJUST SCALING
0622   REF  2  LAST  119         23,3100    27524 1      STOVL   DELTAQ
0623   REF  8  LAST  535         23,3101    15332 1              ZEROVECS
0624   REF  5  LAST  566         23,3102    03510 0      STORE   BVECTOR +6
0625   REF  6  LAST  566         23,3103    03516 0      STORE   BVECTOR +12D
0626                             23,3104    77650 1      GOTO
```

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0627   REP   5   LAST   566    23,3105    02317 0                EGRESS
0628                           23,3108    31103 1   PI/4.0   2DEC   .785398164
0628                           23,3107    36652 0
```

P0629   GETUM-DETERMINES THE LINE OF SIGHT UNIT VECTOR UM IN THE BASIC REFERENC
R0630   E COORDINATE SYSTEM FROM THE OPTICS SHAFT AND TRUNNION ANGLES AND THE IM
R0631   U GIMBAL ANGLES.
R0632   INPUT
R0633   MARKDATA,BASE ADDRESS OF MARK DATA
R0634   REFSMMAT,ROTATION MATRIX FROM STABLE MEMBER TO BASIC REF.COORD.SYSTEM

R0635   SUBROUTINES CALLED-
R0636   SXTNB - SEXT. ANGULAR READINGS TO NAV. BASE COOR.
R0637   NBSM - TRANSFORM FROM NAV. BASE TO STABLE MEMBER
R0638   OUTPUT
R0639   MPAC = LINE OF SIGHT 1/2 UNIT VECTOR IN BASIC REFERENCE SYSTEM
R0640   CALLING SEQUENCE
R0641   L CALL GETUM

R0642   NORMAL EXIT
R0643   L+1 OF CALLING SEQUENCE

0644					23,3110	40220 0	GETUM	STO	SETPD	
0645	REF	6	LAST	567	23,3111	02317 0			EGRESS	
0646					23,3112	00001 0			0	
0647					23,3113	76740 0		LXC,1	VLOAD*	
0648	REF	2	LAST	78	23,3114	01242 1			MARKDATA	CONTAINS ADDRESS OF MARK DATA
0649					23,3115	00002 0			1,1	
0650	REF	7	LAST	222	23,3116	23676 1		STODL*	MARKDOWN +1	TRANSFER DATA FROM WORKING STORAGE
0651					23,3117	00001 0			0,1	TO MARKDOWN ARRAY FOR DOWNLINK
0652	REF	8	LAST	568	23,3120	03875 0		STORE	MARKDOWN	
0653					23,3121	77774 0		AXT,2		
0654					23,3122	00002 0			2	
0655					23,3123	67064 1		XSU,2	SXA,2	
0656	REF	18	LAST	566	23,3124	00046 0			X1	X1 = MARKDATA
0657	REF	6	LAST	431	23,3125	00050 1			S1	S1 = MARKDATA(ADR) +2
0658					23,3126	77624 1		CALL		
0659	REF	3	LAST	501	23,3127	46000 0			SXTNB	SEXT. ANGULAR READINGS TO NAV.BASE COOR.
0660					23,3130	77624 1		CALL		
0661	REF	1			23,3131	47541 1			NBSM	TRANSFORM FROM NAV.BASE TO STABLE MEM.
0662					23,3132	76505 0		VXM	VSL1	
0663	REF	14	LAST	555	23,3133	01736 1			REFSMMAT	
0664					23,3134	77650 1		GOTO		MPAC =((UM)LINE OF SIGHT VECTOR
0665	REF	7	LAST	568	23,3135	02317 0			EGRESS	EXIT

P0666   RENDEZVOUS TRACKING DATA PROCESSING ROUTINE (R22)

R0667   PURPOSE   (1) TO PROCESS RENDEZVOUS SIGHTING MARK DATA TO UPDATE THE STATE VECTOR OF EITHER THE CSM OR LM AS
R0669   DEFINED BY THE RENDEZVOUS NAVIGATION PROGRAM (P20).

R0670   ASSUMPTIONS   (1) THIS ROUTINE IS MANUALLY SELECTED BY THE ASTRONAUT BY V55E WHENEVER RENDEZVOUS SIGHTING MARKS
R0672   ARE DESIRED. ITS SELECTION HOWEVER IS LIMITED TO PERIODS WHEN THE CMC IS HOLDING FOR A V/N FLASHING
R0674   DATA DISPLAY. THIS ROUTINE RETURNS TO THE ORIGINAL PROGRAM AT THE INTERRUPTED DISPLAY.

0676					34,2512			BANK	34
0677	REF	1			34,2000			SETLOC	P20S3
0678					34,2512			BANK	
0679	REF	1						COUNT	34/R22
0680	REF	3	LAST	553	34,2512	3 7663 0	R22	CAF	PRIO26
0681	REF	2	LAST	196	34,2513	55∝056 1		TS	PHSPRDT2
06811	REF	6	LAST	553	34,2514	0 5103 0		TC	PRIOCHNG
0682	REF	1			34,2515	3 7714 1		CA	NEG3
0683	REF	11	LAST	563	34,2516	55∝734 1		TS	MRKBUF2
0684	REF	86	LAST	564	34,2517	0 6006 1		TC	INTPRET
0685					34,2520	77634 0		RTB	
0687	REF	14	LAST	558	34,2521	45505 0			LOADTIME
0688	REF	2	LAST	171	34,2522	01152 0		STORE	VHFTIME	PRESENT TIME
0689					34,2523	77624 1	REND1	CALL	
0690	REF	3	LAST	566	34,2524	56741 0			GRP2PC
06901					34,2525	77624 1		CALL	
0691	REF	1			34,2526	56404 1			WAITONE
0692					34,2527	77778 1	REND1A	EXIT	
0700	REF	12	LAST	569	34,2530	3 1734 0		CA	MRKBUF2
0701					34,2531	0 0006 1		EXTEND	
0702	REF	1			34,2532	1 2535 1		BZF	REND2
0703					34,2533	0 0006 1		EXTEND	
0704	REF	1			34,2534	6 2554 1		BZMF	REND3A
0705	REF	22	LAST	563	34,2535	3 6211 0	REND2	CAF	SIX
0706	REF	9	LAST	563	34,2536	0 5475 1		TC	GENTRAN
0707	REF	13	LAST	569	34,2537	01734 0		ADRES	MRKBUF2
0708	REF	3	LAST	553	34,2540	01224 1		ADRES	MARKTIME	MARKTIME MUST BE CONTIGUOUS WITH VTEMP
0718	REF	2	LAST	569	34,2541	3 7714 1		CAF	NEG3	NEG VALUE TO INDICATE VALUES USED
0719	REF	14	LAST	569	34,2542	55∝734 1		TS	MRKBUF2
0720					34,2543	0 0003 1		RELINT	
0721	REF	87	LAST	569	34,2544	0 6006 1		TC	INTPRET
0722					34,2545	45014 0		CLEAR	CALL
0723	REF	1			34,2546	04667 1			SOURCFLG	0 = OPTICS DATA
0724	REF	4	LAST	569	34,2547	56741 0			GRP2PC	PHASE CHANGE
0725					34,2550	52131 0		SSP	GOTO
0726	REF	3	LAST	568	34,2551	01243 0			MARKDATA
0727	REF	2	LAST	78	34,2552	01224 1		ECADR	VTEMP −2
0728	REF	1			34,2553	70577 0			REND4
0729	REF	88	LAST	569	34,2554	0 6006 1	REND3A	TC	INTPRET
0732					34,2555	77624 1	REND3	CALL	

07321	REP	5	LAST	569	34,2556	56741 0		GRP2PC	
07322					34,2557	77624 1	CALL		
0733	REP	2	LAST	569	34,2560	56404 1		WAITONE	
0734					34,2561	77814 1	BOFF		
0736	REP	4	LAST	258	34,2562	04746 0		VHFRFLAG	
0737	REP	1			34,2563	70527 0		REND1A	
0738					34,2564	77634 0	RTB		
0739	REP	15	LAST	569	34,2565	45505 0		LOADTIME	PRESENT TIME
0740					34,2566	45225 0	DSU	DSU	
0741	REP	1			34,2567	14647 1		60SECDP	1 MIN
0742	REP	3	LAST	569	34,2570	01152 0		VHFTIME	LAST READING OF RADAR
0743					34,2571	45040 1	BMN	CALL	
0744	REP	2	LAST	569	34,2572	70527 0		REND1A	
0745	REP	1			34,2573	56415 1		RANGERD	READ RADAR RANGE
0746					34,2574	77745 1	DLOAD		
0747	REP	4	LAST	569	34,2575	01225 0		MARKTIME	
0748	REP	4	LAST	570	34,2576	01152 0	STORE	VHFTIME	FOR DOWNLINK
0749					34,2577	77624 1	REND4 CALL		
0750	REP	3	LAST	553	34,2600	56343 0		SETINTG	SET INTEGRV FLAGS
0751					34,2601	45014 0	BON	CALL	
0752	REP	6	LAST	553	34,2602	00707 1		VEHUPFLG	
0753	REP	1			34,2603	71034 0		CSMUPP	BRANCH IF CSM UPDATE
0754	REP	5	LAST	553	34,2604	27113 1		INTEGRV	
0755					34,2605	77624 1	CALL		
0756	REP	6	LAST	570	34,2606	56741 0		GRP2PC	PHASE CHANGE
0757					34,2607	77624 1	CALL		
0758	REP	4	LAST	570	34,2610	56343 0		SETINTG	SET INTEGRV FLAGS
0759					34,2611	77814 1	CLEAR		
0760	REP	6	LAST	553	34,2612	01674 0		VINTFLAG	SET INTEGRATION VEHICLE TO LM
0761					34,2613	43014 0	REND5 BOFF	SET	
0762	REP	4	LAST	555	34,2614	02756 1		RENDWFLG	
0763	REP	1			34,2615	70617 0		REND5A	DO NOT INTEGRATE W IF FLAG = 0
0764	REP	4	LAST	553	34,2616	01476 0		DIM0FLAG	
0765					34,2617	77624 1	REND5A CALL		
0766	REP	6	LAST	570	34,2620	27113 1		INTEGRV	
0767					34,2621	77624 1	CALL		
0768	REP	1			34,2622	56526 0		SHIFTNDX	SET EARTH MOON SCALING INDEX
0769					34,2623	77624 1	CALL		
0770	REP	1			34,2624	71123 1		CMPOS	SET CSM POSITION
0771					34,2625	45014 0	SET	CALL	
0772	REP	1			34,2626	02464 0		INCORFLG	SET FOR 1ST PASS
0773	REP	1			34,2627	71132 1		LMPOS	SET LM POSITION
0774					34,2630	43014 0	CLEAR BON		
0775	REP	3	LAST	257	34,2631	01671 0		ORBWFLAG	CLEAR FOR ORBITAL AND CISLUNAR
0776	REP	5	LAST	570	34,2632	02716 0		RENDWFLG	
0777	REP	1			34,2633	70643 1		REND6	
0778					34,2634	77745 1	DLOAD		
07781	REP	1			34,2635	02001 1		WRENDPOS	
07782					34,2636	34001 1	STCALL 0		0 = WRENDPOS 1= WRENDVEL
0779	REP	1			34,2637	56544 1		INITIALW	INITIALIZE W MATRIX

07791					34,2640	77745 1		DLOAD	
07792	REF	9	LAST	566	34,2641	15332 1			ZEROVECS
07793	REF	6	LAST	552	34,2642	01126 0		STORE	VHFCNT
0780					34,2643	77614 1	REND6	SET	
0781	REF	6	LAST	570	34,2644	02476 0			RENDWFLG
0782					34,2645	52375 1		VLOAD	VSU
0783	REF	2	LAST	78	34,2646	01215 0			LEMPOS
0784	REF	2	LAST	78	34,2647	01207 0			CSMPOS
0785	REF	3	LAST	566	34,2650	03531 0		STORE	RCLP
0786					34,2651	43056 0	REND7	UNIT	BON
0787	REF	2	LAST	569	34,2652	04707 0			SOURCFLG
0788	REF	1			34,2653	71045 0			REND14
0789	REF	1			34,2654	01273 0		STORE	UCL
0790					34,2655	45014 0		BOFF	CALL
0791	REF	2	LAST	570	34,2656	02744 1			INCORFLG
0792	REF	1			34,2657	70871 0			REND9
0793	REF	1			34,2660	47110 1			GETUM
0794.	REF	3	LAST	566	34,2661	25235 1		STOVL	UM
0795	REF	2	LAST	571	34,2662	01273 0			UCL
0796					34,2663	40035 0		VXV	BOV
0797	REF	4	LAST	571	34,2664	01235 1			UM
0798	REF	1			34,2665	70666 0			REND8
0799					34,2666	40056 0	REND8	UNIT	BOV
0800	REF	1			34,2667	70555 0			REND3
0801	REF	4	LAST	566	34,2670	01245 0		STORE	USTAR
0802					34,2671	77624 1	REND9	CALL	
0803	REF	1			34,2672	47047 0			BVECTORS
0804					34,2673	77214 0		BON	VLOAD
0805	REF	7	LAST	570	34,2674	00707 1			VEHUPFLG
0806	REF	1			34,2675	70701 0			REND9A
0807	REF	7	LAST	566	34,2676	03502 0			BVECTOR
0808					34,2677	77876 0		VCOMP	
0809	REF	8	LAST	571	34,2700	03502 0		STORE	BVECTOR
0810					34,2701	77624 1	REND9A	CALL	
08101	REF	7	LAST	570	34,2702	56741 0			GRP2PC
08102					34,2703	77614 1		BON	
0811	REF	3	LAST	251	34,2704	00706 0			R23FLG
0812	REF	1			34,2705	71076 0			REND15
0813					34,2706	43345 1		DLOAD	DAD
0814	REF	1			34,2707	31220 0			SXTVAR
0815	REF	1			34,2710	31222 1			IMUVAR
0816	REF	2	LAST	119	34,2711	27526 0	REND10	STOVL	VARIANCE
0817	REF	4	LAST	571	34,2712	03531 0			RCLP
0818					34,2713	60246 1		ABVAL	NORM
0819	REF	19	LAST	568	34,2714	00047 1			X1
0820					34,2715	41316 0		DSQ	DMP
0821	REF	3	LAST	571	34,2716	03526 0			VARIANCE
0822					34,2717	45070 1		XAD,1	CALL
0823	REF	20	LAST	571	34,2720	00046 0			X1
0824	REF	2	LAST	570	34,2721	56526 0			SHIFTNDX

Comments column:

- 07793: ZERO OUT VHFCNT AND TRKMKCNT
- 0785: LM - CSM
- 0788: BRANCH IF DATA IS RADAR
- 0793: CALCULATE UM LINE OF SIGHT
- 0797: UCL X UM
- 0800: BRANCH IF OVERFLOW IGNORE MARK
- 0812: BRANCH IF BACKUP OPTICS (R23 WORKING)
- 0816: TEMP STORAGE FOR VARIANCE CALC.
- 0824: GET EARTH MOON SCALING INDEX

Line	REP				Address	Code	Flag	Label	Operand	Comment
0825					34,2722	56070	0	XAD,1	XAD,1	
0826	REP	7	LAST	546	34,2723	00047	1		X2	
0827	REP	8	LAST	572	34,2724	00047	1		X2	
0828					34,2725	72257	1	SR*	TLOAD	
0829					34,2726	20577	0		0 -2,1	ADJUST SCALING TO B-40
0830	REP	249	LAST	564	34,2727	00155	0		MPAC	
0831	REP	4	LAST	571	34,2730	03526	0	STORE	VARIANCE	
08311					34,2731	54335	0	SLOAD	SR	
083114	REP	2	LAST	90	34,2732	02400	1		INTVAR	INTEGRATION VARIANCE SCALED B-15
083118					34,2733	20632	1		25D	SCALE IT B-40
083122					34,2734	47171	0	TAD	RTB	
083126	REP	5	LAST	572	34,2735	03526	0		VARIANCE	
083128	REP	1			34,2736	45562	1		TPMODE	
08313	REP	6	LAST	572	34,2737	03526	0	STORE	VARIANCE	
0832					34,2740	76214	1	BOFF	TAD	
0833	REP	3	LAST	571	34,2741	04747	1		SOURCFLG	BRANCH IF NOT VHF RADAR
0834	REP	1			34,2742	70751	0		REND10A	
0835	REP	1			34,2743	03005	1		RVARMIN	VHF RADAR MIN. VARIANCE
0836					34,2744	72244	0	BPL	TLOAD	
0837	REP	2	LAST	572	34,2745	70751	0		REND10A	
0838	REP	2	LAST	572	34,2746	03005	1		RVARMIN	
08381					34,2747	77646	0	ABS		MIN. VALUE WAS STORED AS NEG.
0839	REP	7	LAST	572	34,2750	03526	0	STORE	VARIANCE	STORE MIN. VALUE
0840					34,2751	45014	0	REND10A CLEAR	CALL	
0841	REP	1			34,2752	02666	0		DMENFLG	CLEAR FOR 6 X 6 W MATRIX
0842	REP	1			34,2753	75250	1		INCORP1	CALCULATE UPDATE
08421					34,2754	77624	1	CALL		
08422	REP	8	LAST	571	34,2755	56741	0		GRP2PC	
0843					34,2756	45014	0	BOFF	CALL	
0844	REP	3	LAST	571	34,2757	02744	1		INCORFLG	
0845	REP	1			34,2760	71006	1		REND12	
0846	REP	3	LAST	571	34,2761	56526	0		SHIFTNDX	GET EARTH MOON SCALING INDEX
0847					34,2762	51575	1	VLOAD	ABVAL	
0848	REP	5	LAST	78	34,2763	01265	1		DELTAX +6	
0849					34,2764	77657	0	SR*		
0850					34,2765	57176	0		0,2	
0851	REP	4	LAST	275	34,2766	27504	0	STOVL	N49DISP +2	
0852	REP	6	LAST	572	34,2767	01257	0		DELTAX	
0853					34,2770	53646	0	ABVAL	SR*	
0854					34,2771	57176	0		0,2	
0855	REP	5	LAST	572	34,2772	03502	0	STORE	N49DISP	
08551					34,2773	77735	0	SLOAD		
0856	REP	1			34,2774	02003	0		RMAX	
0857					34,2775	45261	0	SR	DSU	
0858					34,2776	20613	1		10D	
0859	REP	6	LAST	572	34,2777	03502	0		N49DISP	
0860					34,3000	67240	0	RVN	SLOAD	
0861	REP	1			34,3001	71141	0		RENDISP	BRANCH IF POS UP.GREATER THAN MAX.
0862	REP	1			34,3002	02004	1		VMAX	
0863					34,3003	50025	0	DSU	RVN	

0864	REF	7	LAST	572	34,3004	03504 0			N49DISP +2	
0865	REF	2	LAST	572	34,3005	71141 0			RENDISP	BRANCH IF VEL.UPDATE GREATER THAN MAX.
0866					34,3006	77624 1	REND12	CALL		
0869	REF	1			34,3007	75462 0			INCORP2	INCORPORATE UPDATE VALUES INTO STATE VEC
0870					34,3010	43014 0		BON	BOFF	
0871	REF	4	LAST	572	34,3011	04707 0			SOURCFLG	
0872	REF	1			34,3012	71103 0			REND16	BRANCH IF DATA IS RADAR
0873	REF	4	LAST	572	34,3013	02744 1			INCORFLG	
0874	REF	1			34,3014	71111 0			REND17	
0875					34,3015	77624 1		CALL		
0876	REF	4	LAST	572	34,3016	56526 0			SHIFTNDX	GET EARTH MOON SCALING INDEX
0877					34,3017	45014 0		BON	CALL	
0878	REF	8	LAST	571	34,3020	00707 1			VEHUPFLG	
0879	REF	1			34,3021	71117 0			REND18	BRANCH IF CSM UPDATE
0880	REF	2	LAST	570	34,3022	71132 1			LMPOS	GET LM POSITION
0881					34,3023	77624 1	REND13	CALL		
0882	REF	9	LAST	572	34,3024	56741 0			GRP2PC	PHASE CHANGE
0883					34,3025	52375 1		VLOAD	VSU	
0884	REF	3	LAST	571	34,3026	01215 0			LEMPOS	
0885	REF	3	LAST	571	34,3027	01207 0			CSMPOS	
0886	REF	5	LAST	571	34,3030	03531 0		STORE	RCLP	LM – CSM
0887					34,3031	77614 1		CLRGO		
0888	REF	5	LAST	573	34,3032	02624 0			INCORFLG	
0889	REF	1			34,3033	70651 1			REND7	BRANCH FOR 2ND PASS THIS OPTICS MARK
0890					34,3034	45014 0	CSMUPP	CLEAR	CALL	
0891	REF	7	LAST	570	34,3035	01674 0			VINTFLAG	SET INTEGRATION VEHICLE EQ LM
0892	REF	7	LAST	570	34,3036	27113 1			INTEGRV	
0893					34,3037	77624 1		CALL		
0894	REF	10	LAST	573	34,3040	56741 0			GRP2PC	PHASE CHANGE
0895					34,3041	77624 1		CALL		
0896	REF	5	LAST	570	34,3042	56343 0			SETINTG	SET FLAGS FOR INTEGRATION
0897					34,3043	77650 1		GOTO		
0898	REF	1			34,3044	70613 1			REND5	
0899	REF	9	LAST	571	34,3045	27502 0	REND14	STOVL	BVECTOR	VHF RADAR BVECTOR
0900	REF	10	LAST	571	34,3046	15332 1			ZEROVECS	
0901	REF	10	LAST	573	34,3047	03510 0		STORE	BVECTOR +6	
0902	REF	11	LAST	573	34,3050	27516 0		STOVL	BVECTOR +12D	
0903	REF	6	LAST	573	34,3051	03531 0			RCLP	
0904					34,3052	71256 0		UNIT	DLOAD	
0905	REF	1			34,3053	01257 0			VHFRANGE	VHFRANGE SCALED B-27
0906					34,3054	60414 0		BON	SR2	
0907	REF	7	LAST	510	34,3055	04303 0			MOONTHIS	
0908					34,3056	71057 0			+1	
0909					34,3057	43025 1		DSU	SET	
0910					34,3060	00045 0			36D	ABVAL (RCLP)
0911	REF	6	LAST	573	34,3061	02464 0			INCORFLG	
0912	REF	3	LAST	566	34,3062	03524 1		STORE	DELTAQ	
0913					34,3063	77214 1		BOFF	VLOAD	
0914	REF	9	LAST	573	34,3064	00747 0			VEHUPFLG	
0915	REF	1			34,3065	71071 1			REND14A	

0916	REF	12	LAST	573	34,3066	03502 0			BVECTOR	
0917					34,3067	77676 0		VCOMP		
0918	REF	13	LAST	574	34,3070	03502 0		STORE	BVECTOR	
0919					34,3071	77624 1	REND14A	CALL		
09191	REF	11	LAST	573	34,3072	56741 0			GRP2PC	
09192					34,3073	52145 0		DLOAD	GOTO	
0920	REF	1			34,3074	03003 1			RVAR	
0921	REF	1			34,3075	70711 1			REND10	
0922					34,3076	43335 0	REND15	SLOAD	DAD	GET ALT LOS VARIANCE
0923	REF	1			34,3077	01357 1			ALTVAR	BACKUP OPTICS
0924	REF	2	LAST	571	34,3100	31222 1			IMUVAR	IMU VARIANCE
0925					34,3101	77650 1		GOTO		
0926	REF	2	LAST	574	34,3102	70711 1			REND10	
0927					34,3103	62150 1	REND16	LXA,1	INCR,1	
0928	REF	7	LAST	571	34,3104	01125 0			VHFCNT	VHF RADAR UPDATE COUNT
0929					34,3105	00001 0		DEC	1	
0930					34,3106	52130 1		SXA,1	GOTO	
0931	REF	8	LAST	574	34,3107	01125 0			VHFCNT	UPDATE COUNT
0932	REF	1			34,3110	70523 1			REND1	
0933					34,3111	62150 1	REND17	LXA,1	INCR,1	
0934	REF	4	LAST	552	34,3112	01126 0			TRKMKCNT	OPTICS MARK COUNT
0935					34,3113	00001 0		DEC	1	
0936					34,3114	52130 1		SXA,1	GOTO	
0937	REF	5	LAST	574	34,3115	01126 0			TRKMKCNT	UPDATE COUNT
0938	REF	2	LAST	571	34,3116	70555 0			REND3	
0939					34,3117	77624 1	REND18	CALL		
0940	REF	2	LAST	570	34,3120	71123 1			CMPOS	GET CSM POSITION
0941					34,3121	77650 1		GOTO		
0942	REF	1			34,3122	71023 0			REND13	
0943					34,3123	53775 1	CMPOS	VLOAD	VSR*	
0944	REF	1			34,3124	01573 1			DELTACSM	
0945					34,3125	57167 0			7,2	
0946					34,3126	77655 1		VAD		
0947	REF	1			34,3127	01607 1			RCVCSM	
0948	REF	4	LAST	573	34,3130	01207 0		STORE	CSMPOS	CSM POSITION SCALED B-27 OR B-29
0949					34,3131	77616 0		RVQ		
0950					34,3132	53775 1	LMPOS	VLOAD	VSR*	
0951	REF	1			34,3133	01645 1			DELTALEM	
0952					34,3134	57167 0			7,2	
0953					34,3135	77655 1		VAD		
0954	REF	1			34,3136	01661 1			RCVLEM	
0955	REF	4	LAST	573	34,3137	01215 0		STORE	LEMPOS	LM POSITION SCALED B-27 OR B-29
0956					34,3140	77616 0		RVQ		
0963					34,3141	77776 1	RENDISP	EXIT		
0964	REF	8	LAST	496	34,3142	3 0105 0		CA	FLAGWRD9	
0965	REF	22	LAST	436	34,3143	7 4703 0		MASK	BIT8	
0966					34,3144	0 0006 1		EXTEND		
0967					34,3145	1 3150 1		BZF	+3	
0968	REF	24	LAST	560	34,3146	3 4711 1		CA	BIT2	
0969					34,3147	0 3151 1		TC	+2	

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0970    REF  37  LAST 509   34,3150  3 4712 1          CA      BIT1
0971    REF   8  LAST 573   34,3151  55«505 1          TS      N49DISP +4
09711   REF 120  LAST 565   34,3152  3 4714 1          CAF     ZERO            SET TEMPOR1 & ZERO TO INDICATE
09712   REF   3  LAST 566   34,3153  55«300 1          TS      TEMPOR1         V06 N49 DISPLAY HASNT BEEN ANSWERED
09713   REF  29  LAST 565   34,3154  0 5301 0          TC      PHASCHNG
09714                       34,3155    04022 0         OCT     04022
09715   REF   1             34,3156  3 7664 1          CAF     PRIO27          SET UP DISPLAY JOB WITH HIGHER PRIORITY
09716   REF  17  LAST 561   34,3157  0 5027 1          TC      NOVAC           THAN PRESENT JOB
097165  REF  32  LAST 565   E7,1725                    EBANK=  MRKBUF1
09717   REF   1             34,3160    03172 0         2CADR   RENDISP2
09717   REF   1             34,3161    70067 1
097175  REF  89  LAST 569   34,3162  0 6006 1  RENDISP7 TC     INTPRET
097177  REF 250  LAST 572   34,3163    00155 0         STORE   MPAC
097179                      34,3164    53135 0         SLOAD   BZE
097181  REF   4  LAST 575   34,3165    01301 1                 TEMPOR1
097183  REF   1             34,3166    71163 0                 RENDISP7 +1     DISPLAY HAS NOT BEEN ANSWERED YET
097185                      34,3167    52040 1          BMN    GOTO
097187  REF   2  LAST 572   34,3170    71006 1                 REND12          NEG INDICATES PROCEED
097189  REF   1             34,3171    71201 1                 RENDISP3        POS INDICATES RECYCLE
0972    REF   1             34,3172  3 3223 1  RENDISP2 CAF    V06N49
0973    REF 137  LAST 565   34,3173  0 4555 0          TC      BANKCALL
0974    REF   1             34,3174    20635 0         CADR    PRIODSP
0975    REF   2  LAST 385   34,3175  0 4550 0          TC      GOTOV56         TERM EXIT P20 VIA V56
0976    REF  69  LAST 565   34,3176  4 4712 0          CS      ONE             NEG INDICATES PROCEED RENDISP7 JOB
0977    REF   5  LAST 575   34,3177  55«300 1          TS      TEMPOR1         POS INDICATES RECYCLE RENDISP7 JOB
0978    REF  75  LAST 561   34,3200  0 5112 0          TC      ENDOFJOB        GO COMPLETE ABOVE JOB
0986                        34,3201    77614 1  RENDISP3 BON
0988    REF   5  LAST 573   34,3202    04707 0                 SOURCFLG
0989    REF   2  LAST 574   34,3203    70523 1                 REND1           DATA WAS RADAR GO LOOK FOR OPTICS NEXT
0990                        34,3204    77776 1          EXIT
0991    REF  33  LAST 575   E7,1725                    EBANK=  MRKBUF1
0992                        34,3205  0 0004 0          INHINT
0993    REF   1             34,3206  3 3224 0          CAF     BUFBANK
0994    REF  13  LAST 413   34,3207  54 006 0          TS      BBANK
0995    REF  13  LAST 562   34,3210  3 7716 0          CA      NEGONE
0996    REF  34  LAST 575   34,3211  55«725 1          TS      MRKBUF1         ERASE MARK ONE BUFFER
0997    REF  15  LAST 569   34,3212  55«734 1          TS      MRKBUF2         ERASE MARK TWO BUFFER
0998                        34,3213  0 0003 1          RELINT
0999    REF  90  LAST 575   34,3214  0 6006 1  RENDISP4 TC     INTPRET
1000                        34,3215    77650 1          GOTO
1001    REF   3  LAST 574   34,3216    70555 0                 REND3
1002                        34,3217    00052 0  SXTVAR  2DEC    0.04 E-6 B+16   SXT ERROR VARIANCE = .04 (MR)SQ
1002                        34,3220    36307 0
1003                        34,3221    00052 0  IMUVAR  2DEC    0.04 E-6 B+16   IMU ERROR VARIANCE = .04 (MR)SQ
1003                        34,3222    36307 0
1008                        34,3223    01461 0  V06N49  VN      0649
1009    REF  35  LAST 575   E7,1725                    EBANK=  MRKBUF1
1010    REF   2  LAST 575   34,3224    70067 1  BUFBANK BBCON   RENDISP3
1011                        31,2021                    BANK    31
1012    REF   1             27,2000                    SETLOC  R22S1
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1013					27,2343			BANK	
1014					27,2343	45020 1	SETINTG	STO	CALL	
1015	REP	8	LAST	568	27,2344	02317 0			EGRESS	
1016	REP	14	LAST	511	27,2345	27371 1			INTSTALL	RESERVE INTEGRATION
1017					27,2346	43145 0		DLOAD	SET	
1018	REP	5	LAST	570	27,2347	01225 0			MARKTIME	
1019	REP	1			27,2350	01472 1			STATEFLG	
1020	REP	27	LAST	555	27,2351	00041 1		STORE	TDEC$_1$	MARKTIME
1021					27,2352	43014 0		CLEAR	CLEAR	
1022	REP	8	LAST	503	27,2353	01673 1			INTYPFLG	PRECISION INTEGRATION
1023	REP	5	LAST	570	27,2354	01676 1			DIM0FLAG	
1024					27,2355	43014 0		SET	CLRGO	
1025	REP	8	LAST	573	27,2356	01474 1			VINTFLAG	SET VEHICLE EQ. CSM
1026	REP	1			27,2357	01635 0			D6OR9FLG	SET W MATRIX DIM. EQ 6
1027	REP	9	LAST	576	27,2360	02317 0			EGRESS	EXIT
1028					27,2361	77620 0	CNTCHK	STO		
1029	REP	2	LAST	77	27,2362	01150 1			POINTEX	
10291					27,2363	77614 1	CONTCHK	BOFF		
10292	REP	3	LAST	529	27,2384	01742 1			REFSMFLG	BRANCH TO END OF JOB IF REFSMMAT NO GOOD
10293	REP	1			27,2385	30147 0			ENDPLAC	
1030					27,2366	50135 0		SLOAD	BMN	
10301	REP	6	LAST	565	27,2387	03378 0			R81CNTR	
10302	REP	1			27,2370	56406 0			WAITONE$_1$	
10303					27,2371	43014 0		BON	BOFF	IS TRACK FLAG SET
1031	REP	14	LAST	553	27,2372	00710 1			UPDATFLG	
1032	REP	3	LAST	576	27,2373	01150 1			POINTEX	
1033	REP	4	LAST	553	27,2374	00752 1			TRACKFLG	
1034	REP	2	LAST	576	27,2375	30147 0			ENDPLAC	
1035					27,2376	77776 1		EXIT		
1036	REP	30	LAST	575	27,2377	0 5301 0	REDOR22	TC	PHASCHNG	
1037					27,2400	00132 1		OCT	00132	
1038	REP	4	LAST	569	27,2401	3 7663 0		CAF	PRIO26	
1039	REP	7	LAST	569	27,2402	0 5103 0		TC	PRIOCHNG	
1040	REP	3	LAST	570	27,2403	0 2407 0		TC	WAITONE +3	
1041					27,2404	77620 0	WAITONE	STO		
1042	REP	4	LAST	576	27,2405	01150 1			POINTEX	
10421					27,2406	77776 1	WAITONE1	EXIT		
1043	REP	2	LAST	139	27,2407	3 4740 0		CAF	4SECS	WAIT 4 SECS.
1044	REP	138	LAST	575	27,2410	0 4555 0		TC	BANKCALL	
1045	REP	7	LAST	536	27,2411	01732 0		CADR	DELAYJOB	
1046	REP	91	LAST	575	27,2412	0 6006 1		TC	INTPRET	
1047					27,2413	77650 1		GOTO		
1048	REP	1			27,2414	56363 1			CONTCHK	CHECK AGAIN NOW
1049					27,2415	77776 1	RANGERD	EXIT		
1050					27,2416	0 0004 0		INHINT		
1051	REP	1			27,2417	4 2472 0		CS	OCT$_{17}$	
1052					27,2420	0 0006 1		EXTEND		
1053	REP	6	LAST	381	27,2421	03 013 0		WAND	CHAN$_{13}$	ZERO OUT BITS 1-4 OF CHANNEL 13
1054	REP	1			27,2422	3 4334 1		CAF	OCT$_{11}$	
1055					27,2423	0 0006 1		EXTEND		

1056	REP	7	LAST	576	27,2424	05 013 0		WOR	CHAN13	GENERATE SHIFT PULSES TO RADR,SET R.BIT
1057					27,2425	0 0003 1		RELINT	
1058					27,2426	0 0006 1		EXTEND	
1059	REP	18	LAST	563	27,2427	3 0025 0		DCA	TIME2
1060	REP	6	LAST	576	27,2430	53∝225 1		DXCH	MARKTIME	READ PRESENT TIME
1061	REP	139	LAST	576	27,2431	0 4555 0		TC	BANKCALL
1062	REP	1			27,2432	17514 1		CADR	RADSTALL	WAIT FOR RANGE COMPLETE
1063	REP	1			27,2433	0 2461 0		TC	LIGHTON	BAD DATA GOOD BIT
10635	REP	2	LAST	258	27,2434	0 5520 0		TC	TRFAILOF	TURN TRACKER LIGHT OFF
1085	REP	92	LAST	576	27,2435	0 6006 1	RANGERD1	TC	INTPRET
1066					27,2436	50135 0		SLOAD	BMN
1067	REP	2	LAST	123	27,2437	03704 1		RM
10671	REP	1			27,2440	56447 0		RANGERD3
1068					27,2441	77605 1		DMP
1069	REP	1			27,2442	16475 0		CONVRNGE	CONVERT RANGE TO METERS B-27
10691					27,2443	77614 1	RANGERD2 SET
1070	REP	6	LAST	575	27,2444	04467 0		SOURCFLG	SOURCE OF DATA TO VHF RADAR
1071	REP	2	LAST	573	27,2445	01257 0		STORE	VHFRANGE
1072					27,2446	77616 0		RVQ
10721					27,2447	77776 1	RANGERD3 EXIT
10722	REP	251	LAST	575	27,2450	3 0154 1		CA	MPAC
10723	REP	13	LAST	538	27,2451	7 4672 1		MASK	POSMAX
10724	REP	252	LAST	577	27,2452	54 154 0		TS	MPAC	MASK OUT NEG. SIGN BIT
10725	REP	93	LAST	577	27,2453	0 6006 1		TC	INTPRET
1073					27,2454	77605 1		DMP
10731	REP	2	LAST	577	27,2455	16475 0		CONVRNGE	CONVERT FROM NM TO METERS AND SCALE B-27
10732					27,2456	52015 0		DAD	GOTO
10733	REP	1			27,2457	16471 1		RANGEB14	VALUE IN METERS OF SIGN BIT SCALED B-27
10734	REP	1			27,2460	56443 1		RANGERD2
10738	REP	1			27,2461	0 5532 0	LIGHTON	TC	TRFAILON	TURN TRACKER LIGHT ON
107406	REP	94	LAST	577	27,2462	0 6006 1		TC	INTPRET
10741					27,2463	77745 1		DLOAD
10742	REP	7	LAST	577	27,2464	01225 0			MARKTIME
10743	REP	5	LAST	570	27,2465	01152 0		STORE	VHFTIME
1075					27,2466	77650 1		GOTO
1076	REP	3	LAST	575	27,2467	70523 1			REND1
10761					27,2470	00045 0	RANGEB14 2DEC		303431.7 B-27	16384 X 18.52 SCALED B-27
10761					27,2471	01217 1	
1077					27,2472	00017 1	OCT17	OCT	00017
10781					27,2473	40200 1	OC40200	OCT	40200
1079					27,2474	00045 0	CONVRNGE 2DEC		18.52 B-13	VHF INPUT RANGE CONV.FROM.01 NM TO M
1079					27,2475	01217 1	
1080					27,2476	0 0006 1	VHFREAD	EXTEND
1081	REP	9	LAST	368	27,2477	04 007 1		ROR	SUPERBNK	MUST SAVE SBANK BECAUSE OF RUPT
1082	REP	5	LAST	539	27,2500	54 016 1		TS	BANKRUPT	EXITS VIA TASKOVER BADEND OR GOODEND
10821	REP	121	LAST	575	27,2501	4 4714 0		CS	ZERO
10822	REP	2	LAST	72	27,2502	54 734 0		TS	RUPTAGN
1083					27,2503	0 0006 1		EXTEND
1084	REP	5	LAST	539	27,2504	22 012 1		QXCH	QRUPT
10841	REP	34	LAST	439	27,2505	3 4704 0		CAF	BIT7

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10842 REF 35 LAST 554   27,2506 7 0075 1          MASK   STATE +1     UPDATE FLAG
10843                   27,2507 0 0006 1          EXTEND
10844 REF 1             27,2510 1 2520 0          BZF    BYPASS
1085  REF 1             27,2511 3 0046 0          CA     RNRAD
1086  REF 3 LAST 577    27,2512 55*703 0          TS     RM           SAVE RANGE
1087  REF 25 LAST 574   27,2513 3 4711 1          CAF    BIT2
1088                    27,2514 0 0006 1          EXTEND
1089  REF 5 LAST 182    27,2515 02 033 0          RAND   CHAN33       READ DATA GOOD BIT
1094                    27,2516 0 0006 1          EXTEND
1095  REF 1             27,2517 1 2523 0          BZF    VHFGOOD      BRANCH IF DATA GOOD BIT EQUALS GOOD
1096  REF 30 LAST 550   27,2520 3 4711 1  BYPASS  CAF    TWO
1097  REF 37 LAST 530   27,2521 0 4574 0          TC     POSTJUMP
1098  REF 1             27,2522 17464 1           CADR   BADEND
1099  REF 31 LAST 578   27,2523 3 4711 1  VHFGOOD CAF    TWO
1100  REF 38 LAST 578   27,2524 0 4574 0          TC     POSTJUMP
1101 .REF 2 LAST 227    27,2525 17467 1           CADR   GOODEND
1102                    27,2526 43174 1  SHIFTNDX AXT,2  BON
1103                    27,2527 00000 1                  0
1104  REF 10 LAST 573   27,2530 00707 1                  VEHUPFLG
1105  REF 1             27,2531 56537 0                  SHIFTA       VEHICLE IS CSM
1106                    27,2532 43414 1           BON    RVQ
1107  REF 2 LAST 32     27,2533 04304 1                  LMOONFLG
1108                    27,2534 56535 1                  +1
1109                    27,2535 43514 0           INCR,2 RVQ
1110                    27,2536 77775 1           DEC    -2
1111                    27,2537 43414 1  SHIFTA   BON    RVQ
1112  REF 7 LAST 555    27,2540 04303 0                  CMOONFLG
1113                    27,2541 56542 1                  +1           MOON ORB.
1114                    27,2542 43514 0           INCR,2 RVQ
1115                    27,2543 77775 1           DEC    -2
1116                    27,2544 68370 0  INITIALW AXT,1  SSP
1117                    27,2545 00044 1                  36D
1118  REF 7 LAST 568    27,2546 00051 0                  S1
1119                    27,2547 00006 1                  6
1120                    27,2550 77775 1           VLOAD
1121  REF 11 LAST 573   27,2551 15332 1                  ZEROVECS
1122  REF 5 LAST 261    27,2552 06445 1  INITA    STORE  W +36D,1     CLEAR 0 - 35
1123                    27,2553 76100 1           TIX,1  AXT,1
1124  REF 1             27,2554 56552 0                  INITA
11241                   27,2555 00044 1                  36D
11242 REF 6 LAST 578    27,2556 06533 1  INITB    STORE  W +90D,1     CLEAR 54 - 89
11243                   27,2557 67300 0           TIX,1  SLOAD
11244 REF 1             27,2560 56556 1                  INITB
1125                    27,2561 00000 1                  0            POSITION VALUE
1127  REF 7 LAST 578    27,2562 02401 0           STORE  W            INITIALIZE DIAGONAL W  POSITION
1128  REF 8 LAST 578    27,2563 02411 1           STORE  W +8D
1129  REF 9 LAST 578    27,2564 02421 1           STORE  W +16D
1130                    27,2565 77735 0           SLOAD
1131                    27,2566 00002 0                  1            VELOCITY VALUE
1132  REF 10 LAST 578   27,2567 02511 0           STORE  W +72D       INITIALIZE DIAGONAL W VELOCITY
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L   P20-P25

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1133   REF  11  LAST  578    27,2570    02521 0        STORE   W +80D
1134   REF  12  LAST  579    27,2571    02531 1        STORE   W +88D
.1135                        27,2572    77616 0        RVQ
R1136
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P1137
R1138   CRS61.1 4/10/68
R1139   TO COMPUTE THE PREFERRED TRACKING ATTITUDE OF THE CSM WHICH ENABLES
R1140   OPTICS TRACKING OF THE LM AND LM TRACKING OF THE CSM RADAR TRANSPONDER
R1141   AND TO COMPUTE THE dX-AXIS TRACKING ATTITUDE OF THE CSM WHICH ENABLES
R11411   COAS TRACKING OF THE LM.
R11412   TO PERFORM THE MANEUVER TO THE SELECTED TRACKING ATTITUDE IF THE
R11413   MANEUVER IS LESS THAN 10 DEGREES BUT TO CALL R60 IF THE MANEUVER IS
R11414   GREATER THAN 10 DEGREES OR IF THE R60FLAG IS SET.
R1142   (1) EXTRAPOLATE LM AND CSM STATE VECTORS TO PRESENT TIME USING
R1143   CONIC EQUATIONS.

R1144   (2) CALCULATE LOS FROM CSM TO LM = RL - RC.

R1145   (3) THE PREFERRED TRACKING ATTITUDE IS DEFINED AS FOLLOWS'
R1146   THE TRACK AXIS (I) IS ALIGNED ALONG THE LOS TO THE LM. THE
R1147   TRACK AXIS (I) IS DEFINED AS'
R1148
R1149   UNIT(I)=UNIT(Z$_{-SC}$)COS55 dUNIT(X$_{-SC}$)SIN55
R1150   -   -SC   -SC
R1159   (4) COMPUTE DESIRED CDU ANGLES, USING VECPOINT.
R1169   (7) FORM DIFFERENCE BETWEEN DESIRED AND ACTUAL CDUS.
R1170   IF ANY OF THE THREE ANGLE DIFFERENCES EXCEEDS 10 DEGREES,
R1171   GROSS MANEUVER IS REQUIRED. SIGNAL R61 (SET MPAC=1) TO
R1172   OPERATE KALCMANU AND EXIT CRS61.1.
R1173   IF ALL DIFFERENCES ARE LESS THAN 10 DEGREES, CONTINUE.

R1174   (8) CALCULATE ORTHOGONAL LOS RATE IN REF COORDS AS

R1175   OMEGATH = ((UNITLOS(B$_1$) X UNITDV(B$_1$))(ABSDV(B$_7$)/ABSLOS(B$_{29}$))
R1176   CONVERSION FACTOR OF 100/2PI (B$_4$) REV CSEC PER RAD SEC IS
R1177   APPLIED TO YIELD UNITS OF REVS/SEC. SCALE IS CARRIED AS
R1178   B+1+1+7-29+4+1 PLUS RESULTS OF NORMALIZING ABSDV, ABSLOS.
R1179   THE EXTRA B+1 RESULTS FROM RESCALING ABSDV B$_8$ AFTER NORM
R1180   TO AVOID OVFLOW ON DIVIDE.

R1181   UNITLOS = UNIT(RL - RC) B$_1$.
R1182   UNITDV = UNIT(VL - VC) B$_1$.
R1183   ABSLOS = LENGTH OF LOS, METERS B$_{29}$.
R1184   ABSDV   = LENGTH OF DV , METERS/CSEC B$_7$.

R1185   (9) OBTAIN RATE IN SM COORDS.

R1186   OMEGATHSM = (REFSMMAT)(OMEGATH).

R1187   (10)OBTAIN GIMBAL ANGLE INCREMENTS FOR 0.1 SECOND.

R1188   DTHETASM = (0.1)(OMEGATHSM)

R1189   (11)OBTAIN DELCDUX,Y,Z USING SUBR SMCDURES.

R1190   INPUT CONSISTS OF

R1191   (A) VECTOR OF ANGULAR INCREMENTS, DTHETASM, STORED
R1192   IN V(DTHETASM).

R1193   (B) SIN,COS CDUX,Y,Z FROM SUBR CDUTRIG.

R1194   TRANSFER OUTPUT OF SMCDURES FROM V(DCDU) TO VAC$_{14}$D.

R1195   (12)CALCULATE ANG LOS RATE IN BODY(NB) COORDS USING SUBR SMNB.

R1196   OMEGANB = (SMNB)(OMEGATHSM)

R1197   SUBR SMNB REQUIRES OMEGATHSM IN V(VAC$_{32}$D) AND ACTUAL CDUS
R1198   (Y,X,Z ORDER) IN V(VAC$_{20}$D) WITH S1 OF VAC = BASE ADDRESS
R1199   OF CDUS (FIXLOC + 20D).

R1200   (13)CALCULATE ANG LOS RATE IN CONTROL COORDS AS FOLLOWS

R1201   WBODY = (MBDYTCTL)(OMEGANB)   UNITS=REVS/SEC(80).

R1202   (0.5   0   0   ) BODY TO
R1203   MBDYTCTL(B$_1$) = (0   COS(7.25)B$_1$ -SIN(7.25)B$_1$)=CONTROL
R1204   (0   SIN(7.25)B$_1$ COS(7.25)B$_1$) AXES
R1205   CONVERSION
R1206   MATRIX

R1207   (14)RESCALE WBODY TO UNITS OF 450 DEG/SEC BY APPLYING FACTOR
R1208   OF 0.8 TO REVS/SEC.

R1209   (15)ADDRESS LIVE AUTOPILOT REGISTERS IN BASIC (UNDER INHINT).

R1210   TRANSFER DESIRED CDUS, SCALED 180 DEGREES,FROM T(SAVEDCDU)
R1211   TO V(CDUXD).
R1212   TRANSFER DELCDUS, SCALED 180 DEG, FROM V(VAC$_{14}$D)
R1213   TO V(DELCDUX).
R1214   TRANSFER OMEGA CONTROL, SCALED 450 DEG/SEC,FROM V(MPAC)
R1215   TO V(WBODY).
R1216   RELINT, SET MPAC=0, EXIT CRS$_{61.1}$

R1217   CALL   L CALL CRS$_{61.1}$

R1218   RETURNS ALL TO L+1.

R1219   (1) S(MPAC)=0. NORMAL EXIT. 3 SETS OF INPUTS FED TO DAP.
R1220   (2) S(MPAC)=1. CALCULATED DESIRED CDUS,SP, SET IN T(CPHI)
R1221   FOR KALCMANU. ABS(ACDU - DCDU) EXCEEDS 10 DEGREES.
R1222   (3) S(MPAC)=2. GNCS AUTO MODE NOT SELECTED (BIT$_{10}$=1).
R1223   (4) S(MPAC)=3. DAP HOLD FLAG (HOLDFLAG) NOT EQUAL -1.

R1224   INPUT   (1) TIME2,TIME1. COMPUTER CLOCK TIME,DP, CENTISEC B28.
R1225   (2) CDUX,Y,Z. PRESENT CDU ANGLES,SP,2S COMPL HALF-REVS B0.
R1226   (3) M(REFSMMAT),STABLE MEMBER COORDS B1.

R1227   OUTPUT   NORMAL. EXIT WITH S(MPAC) = 0.

R1228   (1) CDUXD,CDUYD,CDUZD, DESIRED OUTER, INNER, MIDDLE CDU ANGLES,
R1229   DP, 1S COMPL, SCALED 180 DEGREES (HALF-REVS B0).
R1230   (2) DELCDUX,DELCDUY,DELCDUZ. 0.1 SEC DCU ANGULAR INCREMENTS,
R1231   DP, 1S COMPL, SCALED 180 DEG.
R1232   (3) WBODY,WBODY1,WBODY2. LOS ANGULAR RATE IN CONTROL COORDS,
R1233   DP, 1S COMPL, SCALED 450 DEG/SEC.

R1234   SPECIAL. EXIT WITH S(MPAC) = 1.

R1235   (1) CPHI,CTHETA,CPSI. DESIRED OUTER, INNER, MIDDLE CDU ANGLES,
R1236   SP, 2S COMPL, SCALED 180 DEGREES.

R1237   EXTERNAL SUBROUTINES USED   (B)=BASIC

R1238   (1) CALCGA   (5) LOADTIME(B)   (9) SMNB
R1239   (2) CDUTRIG   (6) MATMOVE
R1240   (3) CSMCONIC   (7) RDCDUS(B)
R1241   (4) LEMCONIC   (8) SMCDURES

R1242   ERASABLE (1) S(Q611),EBANK7   CRS61.1 EXIT .
R1243   (2) S(Q6111)EBANK7   CALCDCDU EXIT.
R1244   (3) T(SAVEDCDU) E6   SP VECTOR OF CDUDS.
R1245   (4) V(SAVEPOS) E7   CSM POS VEC AND D(SAVEPOS)= LENGTH OF LOS.
R1246   (5) V(SAVEVEL) E7   CSM VEL VEC.

R1247   FLAGWDS HOLDFLAG. USED, NOT SET.

R1248   MISC   (1) ERASABLE ITEMP1 USED TO TEMP STORE EBANK UNDER INHINT:
R1249   (2) ERASABLE P21TIME USED AS TEMP STORE DURING CRS61.1
R1250   (3) ERAS DTHETASM USED AS TEMP STORE DURING EARLY CRS61.1

R1251   DEBRIS - CURRENT VAC AREA, CRS61.1 ERASABLES, ITEMP1, P21TIME

1252					24,2002			BANK	24
1253	REP	1			34,2000			SETLOC	P20S4
1254					34,3225			BANK	
1255	REP	6	LAST	412	E6,1646			EBANK=	CDUXD
1256	REP	1						COUNT*	SS/CRS61
A1257									
1258					34,3225	40220 0	CRS61.1	STO	SETPD
1259	REP	2	LAST	123	34,3226	03704 1			Q611
1260					34,3227	00001 0			0
1261					34,3230	77634 0		RTB	

1262	REF	16	LAST	570	34,3231	45505 0			LOADTIME	LOAD CLOCK TIME2,1 INTO MPAC.
A1263										
1264	REF	8	LAST	451	34,3232	36316 0	STORT	STCALL	P21TIME	STORE CLOCK TIME FOR SUBR R63
1265	REF	1			34,3233	71461 1			R63	SUBR TO CALC DCDU(T=PRESENT,PASS1)
1266					34,3234	77751 1		TLOAD		
1267	REF	13	LAST	421	34,3235	01156 1			THETAD	SAVE DCDU(T) FROM CALCDCDU FOR STEP4.
1268	REF	2	LAST	113	34,3236	03373 0		STORE	SAVEDCDU	
A1269										
1270					34,3237	77776 1		EXIT		
12701	REF	1			34,3240	0 3265 0		TC	STEP2CK +4	ELIMINATE FORCED R60 MANEUVER
1271	REF	8	LAST	383	34,3241	3 4371 0	AUTOCK	CAF	PRIO30	
1272					34,3242	0 0006 1		EXTEND		
1273	REF	3	LAST	539	34,3243	06 031 0		RXOR	CHAN31	
1274	REF	2	LAST	554	34,3244	7 7707 1		MASK	FURST3	
1275					34,3245	0 0006 1		EXTEND		AUTO MODE SELECTED (BITS 15-13=011)
1276	REF	1			34,3246	1 3250 0		BZF	DAPCK	YES-CONTINUE.
1278	REF	1			34,3247	0 3254 1		TC	ASET	
1279	REF	13	LAST	562	34,3250	4 0075 1	DAPCK	CS	FLAGWRD1	IS STIKFLAG SET (I.E. IS SOMEONE ON RHC)
1280	REF	37	LAST	559	34,3251	7 4675 0		MASK	BIT14	
1281	REF	146	LAST	565	34,3252	10 000 0		CCS	A	
1282	REF	1			34,3253	0 3320 0		TC	STEP3CK	
1283	REF	122	LAST	577	34,3254	3 4714 1	ASET	CAF	ZERO	
1284	REF	253	LAST	577	34,3255	54 154 0		TS	MPAC	
1285	REF	95	LAST	577	34,3256	0 6006 1		TC	INTPRET	EXIT CRS61.1
1286					34,3257	77650 1		GOTO		
1287	REF	3	LAST	582	34,3260	03704 1			Q611	
1288	REF	9	LAST	439	34,3261	4 0101 0	STEP2CK	CS	FLAGWRD5	IS R60FLAG SET
1289	REF	25	LAST	506	34,3262	7 4707 1		MASK	BIT4	
1290					34,3263	0 0006 1		EXTEND		
1291	REF	1			34,3264	1 3452 0		BZF	MANUEXIS	YES, DO R60
12911	REF	140	LAST	577	34,3265	0 4555 0		TC	BANKCALL	
12912	REF	2	LAST	195	34,3266	57750 1		CADR	UPACTOFF	
1292	REF	32	LAST	578	34,3267	3 4711 1		CAF	TWO	SET TEMPORARY INDEX DTHETASM = 2
1293	REF	2	LAST	107	34,3270	55╗611 1	CDULOOP	TS	DTHETASM	
1294	REF	3	LAST	583	34,3271	51╗611 1		INDEX	DTHETASM	
1295	REF	12	LAST	563	34,3272	3 0032 0		CA	CDUX	SET A = ACTUAL CDU (ACDU).
1296					34,3273	0 0006 1		EXTEND		
1297	REF	4	LAST	583	34,3274	5 1611 0		INDEX	DTHETASM	SET INDEX TO ACCESS DESIRED CDU (DCDU).
1298	REF	14	LAST	583	34,3275	21╗155 0		MSU	THETAD	A = DIFF = ACDU - DCDU.
1299	REF	254	LAST	583	34,3276	54 154 0		TS	MPAC	RETURN TO INTERPRETER FOR 10 DEGREE CK.
1300	REF	96	LAST	583	34,3277	0 6006 1		TC	INTPRET	(DP APPROX SP OK FOR ROUGH CHECK)
1301					34,3300	45246 0		ABS	DSU	
1302	REF	1			34,3301	31550 0			DEGREE10	IS (ACDU - DCDU) MORE THAN 10 DEGREES.
1303					34,3302	77444 0		BPL	EXIT	NO - OK, CONTINUE CHECKING OTHER ANGLES.
1304	REF	1			34,3303	71307 0			STKTEST	TEST STICK FLAG
1305	REF	5	LAST	583	34,3304	11╗611 1		CCS	DTHETASM	HAVE ALL 3 ANGLE DIFFS BEEN CHECKED.
1306	REF	1			34,3305	0 3270 1		TC	CDULOOP	NO - DIM COUNT, CHECK NEXT ANGLE DIFF.

13061	REP	1			34,3306	0 3241 0		TC	AUTOCK	
13062					34,3307	77776 1	STKTEST	EXIT		
130625	REP	14	LAST	583	34,3310	4 0075 1		CS	FLAGWRD1	
13063	REP	38	LAST	583	34,3311	7 4675 0		MASK	BIT14	
130635	REP	147	LAST	583	34,3312	10 000 0		CCS	A	
13064	REP	2	LAST	583	34,3313	0 3452 1		TC	MANUEXIS	STIKFLAG IS NOT SET (DO R63)
130645	REP	19	LAST	539	34,3314	3 4710 0		CAF	BIT3	
13065					34,3315	0 0006 1		EXTEND		STIKFLG IS SET
130655	REP	21	LAST	381	34,3316	05 011 1		WOR	DSALMOUT	TURN ON UPACTY LIGHT
130665	REP	2	LAST	583	34,3317	0 3254 1		TC	ASET	EXIT AND SET R61CNTR
1307	REP	97	LAST	583	34,3320	0 6006 1	STEP3CK	TC	INTPRET	
1308					34,3321	77601 0		SETPD		
1309					34,3322	00001 0			0	*
A1310										NOW HAVE DCDUS STORED IN T(SAVEDCDU).
A1311										GO CALC OTHER DAP INPUTS (DELCDU,WBODY)
1312					34,3323	52375 1	CRS61.2	VLOAD	VSU	
1313	REP	3	LAST	110	34,3324	03204 1			DCDU	DV = VL - VC
1314	REP	2	LAST	124	34,3325	03715 1			SAVEVEL	V(MPAC)=-UNITDV.VAC36D=ABSDV.
1315					34,3326	57456 1		UNIT	VCOMP	(-UNITDV)CROSS(UNITLOS).
1316					34,3327	74235 0		VXV	VXSC	
1317	REP	2	LAST	123	34,3330	03707 1			SAVEPOS	(UNITLOS B1)(UNITDV B1)(CONST B4)=CROSS.
1318	REP	1			34,3331	31551 1			RVCS/RDS	HOLD CROSS IN PUSHLIST0. SCALED B6.
1319					34,3332	77606 1		PUSH		OBTAIN ABS VALUE OF LOS.
1320					34,3333	60345 0		DLOAD	NORM	P21TIME IS TEMP STORE FOR ABSLOS.
1321	REP	9	LAST	583	34,3334	02316 1			P21TIME	
1322	REP	21	LAST	571	34,3335	00047 1			X1	
1323					34,3336	77606 1		PUSH		NORM ABSLOS(DENOM) AND HOLD IN PUSH1.
A1324										
1325					34,3337	60345 0		DLOAD	NORM	
1326					34,3340	00045 0			36D	NORM ABS VALUE OF DV(NUM).
1327	REP	8	LAST	578	34,3341	00051 0			S1	
A1328										
1329					34,3342	70460 1		XSU,1	SR1	X1 = X1(N DENOM)-S1(N NUM).
1330	REP	9	LAST	584	34,3343	00050 1			S1	SR1 TO AVOID OFLOW ON DDV.
1331					34,3344	74271 0		DDV	VXSC	ABSDV(MPAC)/ABSLOS(PUSH1) = QUOT.
1332					34,3345	77730 0		SXA,1		QUOT(MPAC) X CROSS(PUSH0).
1333	REP	2	LAST	123	34,3346	03705 0			Q6111	SAVE SCALE OF RESULT (B-15,1X).
A1334										X1= NORM OF QUOT. QUOT SCALE B7-B29=B-22
A1335										CROSS IS SCALED B6. NEED SL1 TO RECOVER
A1336										SR1 SO THAT -22+6+1=-15. MPAC NOW HOLDS
A1337										ORTHO LOS RATE (OMEGA TH, B-15,X1).
1338					34,3347	76521 0		MXV	VSL1	OBTAIN RATE IN SM COORDS (OMEGTHSM) AND
1339	REP	15	LAST	568	34,3350	01736 1			REFSMMAT	ADJUST FOR REFSMMAT SCALE OF B1.
1340					34,3351	00025 0		STORE	20D	OMEGTHSM = VAC20D
A1341										DELTA THETA SM = OMEGTHSM * .1B-3.
1342					34,3352	77761 1		VXSC		
1343	REP	1			34,3353	31553 0			TENTH	
1344	REP	6	LAST	583	34,3354	03212 0		STORE	DTHETASM	STORE SM INCREM ANGLES FOR SMCDURES.
1345					34,3355	77624 1		CALL		

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1346	REF	3	LAST	535	34,3356	47432	1		CDUTRIG		OBTAIN SIN,COSCDUS FOR SMCDURES.
1347					34,3357	45001	1	SETPD	CALL		SMCDURES USES PUSH
1348					34,3360	00001	0		0		
1349	REF	1			34,3361	47675	0		SMCDURES		OBTAIN DELCDU IN V(DCDU).
1350					34,3362	77750	0	LXA,1			RELOAD X1
1351	REF	3	LAST	584	34,3363	03705	0		Q6111		RECOVER SCALE.
1352					34,3364	53775	1	VLOAD	VSL*		$(B-15,X1) + TENTH(B-3) + HALFREVS(B1)$
1353	REF	4	LAST	584	34,3365	03204	1		DCDU		EQUALS $B-17D,1$ TO OBTAIN HALFREVS BO.
1354					34,3366	20160	1		$0 -17D,1$		HOLD DELS IN V(VAC14D) FOR AUTOPILOT.
1355					34,3367	00017	1	STORE	14D		
A1356											
1357					34,3370	77624	1	CALL			COMPUTES SINES AND COSINES FOR *SMNB*
1358	REF	4	LAST	585	34,3371	47432	1		CDUTRIG		
1359					34,3372	45175	0	VLOAD	CALL		LOAD VECTOR AND CALL TRANSFORMATION
1360					34,3373	00025	0		20D		VECTOR FOR TRG*SMNB INTO MPAC
1361	REF	2	LAST	281	34,3374	47577	1		*SMNB*		OBTAIN ANG. RATE REFERRED TO NB (BODY)
1362					34,3375	77721	0	MXV			
1363	REF	2	LAST	537	34,3376	31557	1		MBDYTCTL		CONVERT RATE(OMEGA) TO CONTROL COORDS.
1364					34,3377	77761	1	VXSC			MULT. BY 0.8 TO RESCALE REVS TO 450 DEG.
1365	REF	1			34,3400	15270	0		POINT8		RECOVER SCALE.
1366					34,3401	53750	0	LXA,1	VSL*		RELOAD X1 TO RECOVER NORMALIZ.
1367	REF	4	LAST	585	34,3402	03705	0		Q6111		$(B-15,X1) + MBDYTCTL(B1) = B-14D,1$ TO
1368					34,3403	20163	1		$0 -14D,1$		OBTAIN REVS SCALED AT 450 DEGREES.
A1369											
1370					34,3404	77776	1	CRS61.2A	EXIT		
1371					34,3405	0 0004	0		INHINT		
1372	REF	123	LAST	583	34,3406	3 4714	1		CAF	ZERO	TRANSFER DESIRED GIMBAL ANGLES
1373	REF	7	LAST	582	34,3407	55«647	1		TS	CDUXD +1	FROM T(SAVEDCDU) TO V(CDUXD).
1374	REF	4	LAST	412	34,3410	55«651	0		TS	CDUYD +1	
1375	REF	4	LAST	412	34,3411	55«653	1		TS	CDUZD +1	
1376	REF	3	LAST	583	34,3412	3 1772	1		CA	SAVEDCDU	
1377	REF	8	LAST	585	34,3413	55«846	0		TS	CDUXD	
1378	REF	4	LAST	585	34,3414	3 1773	0		CA	SAVEDCDU +1	
1379	REF	5	LAST	585	34,3415	55«650	1		TS	CDUYD	
1380	REF	5	LAST	585	34,3416	3 1774	1		CA	SAVEDCDU +2	
1381	REF	5	LAST	585	34,3417	55«652	0		TS	CDUZD	
A1382											
1383					34,3420	0 0006	1		EXTEND		TRANSFER OMEGA CONTROL (ANG.LOS RATE)
1384	REF	255	LAST	583	34,3421	3 0155	0		DCA	MPAC	FROM V(MPAC) TO V(WBODY).
1385	REF	9	LAST	411	34,3422	53«526	0		DXCH	WBODY	
1386					34,3423	0 0006	1		EXTEND		
1387	REF	256	LAST	585	34,3424	3 0160	0		DCA	MPAC +3	
1388	REF	4	LAST	411	34,3425	53«530	1		DXCH	WBODY1	
1389					34,3426	0 0006	1		EXTEND		
1390	REF	257	LAST	585	34,3427	3 0162	1		DCA	MPAC +5	
1391	REF	5	LAST	411	34,3430	53«532	0		DXCH	WBODY2	
A1392											
1393					34,3431	0 0006	1		EXTEND		TRANSFER CDU INCREMENTS
1394	REF	9	LAST	537	34,3432	5 0120	1		INDEX	FIXLOC	FROM V(VAC14D) TO V(DELCDUX).
1395					34,3433	3 0017	1		DCA	14D	

1396	REP	5	LAST	411	34,3434	53«576 0		DXCH	DELCDUX
1397					34,3435	0 0006 1		EXTEND	
1398	REP	10	LAST	585	34,3436	5 0120 1		INDEX	PIXLOC
1399					34,3437	3 0021 1		DCA	18D
1400	REP	4	LAST	411	34,3440	53«600 1		DXCH	DELCDUY
1401					34,3441	0 0006 1		EXTEND	
1402	REP	11	LAST	586	34,3442	5 0120 1		INDEX	PIXLOC
1403					34,3443	3 0023 0		DCA	18D
1404	REP	4	LAST	411	34,3444	53«602 0		DXCH	DELCDUZ
1405	REP	70	LAST	575	34,3445	4 4712 0		CS	ONE
1406	REP	5	LAST	554	34,3446	55«332 0		TS	HOLDFLAG
1407					34,3447	0 0003 1		RELINT	
1408	REP	124	LAST	585	34,3450	3 4714 1		CAF	ZERO
1409	REP	3	LAST	584	34,3451	0 3254 1		TC	ASET
1410	REP	98	LAST	584	34,3452	0 6006 1	MANUEXIS	TC	INTPRET
1411					34,3453	77751 1	MANUEXIT	TLOAD	
1412	REP	6	LAST	585	34,3454	03373 0			SAVEDCDU
1413	REP	8	LAST	412	34,3455	01156 1		STORE	CPHI
1414					34,3456	52135 1		SLOAD	GOTO
1415	REP	1			34,3457	31601 1			LOONE
1416	REP	4	LAST	583	34,3460	03704 1			Q611
A1417									
1418									
1419	REP	5	LAST	585	34,3461	71220 1	R63	STQ	DLOAD
1420	REP	10	LAST	584	34,3462	03705 0			Q6111
1421	REP	28	LAST	576	34,3463	02316 1			P21TIME
1422	REP	4	LAST	555	34,3464	34041 0		STCALL	TDEC1
1423					34,3465	27045 0			CSMCONIC
1424	REP	18	LAST	555	34,3466	77775 1	HOLDATT	VLOAD	
1425	REP	3	LAST	584	34,3467	00001 0			RATT
1426	REP	14	LAST	555	34,3470	27707 1		STOVL	SAVEPOS
1427	REP	3	LAST	584	34,3471	00007 0			VATT
1428					34,3472	03715 1		STORE	SAVEVEL
1429	REP	11	LAST	586	34,3473	77775 1	CALCLEM	DLOAD	
1430	REP	29	LAST	586	34,3474	02316 1			P21TIME
1431	REP	3	LAST	545	34,3475	34041 0		STCALL	TDEC1
1432					34,3476	27057 0			LEMCONIC
1433	REP	15	LAST	586	34,3477	77775 1		VLOAD	
1434	REP	5	LAST	585	34,3500	00007 0			VATT
1435	REP	19	LAST	586	34,3501	27204 1		STOVL	DCDU
1436					34,3502	00001 0			RATT
1437	REP	4	LAST	586	34,3503	53451 1		VSU	UNIT
1438	REP	5	LAST.	586	34,3504	03707 1			SAVEPOS
1439					34,3505	03707 1		STORE	SAVEPOS
1440	REP	16	LAST	584	34,3506	76521 0		MXV	VSL1
1441	REP	3	LAST	387	34,3507	01736 1			REFSMMAT
1442					34,3510	17357 0		STODL	POINTVSM
1443	REP	12	LAST	586	34,3511	00045 0			36D
1444					34,3512	02316 1		STORE	P21TIME
1445	REP	4	LAST	32	34,3513	77775 1		VLOAD	
					34,3514	15330 0			UNITX

NOW DAP VARIABLES LOADED. SET HOLDFLAG.
TO -1.

NORMAL RETURN (MPAC = 0)

ENTER FROM STEP2. ACDU-DCDU EXCEEDS
10 DEG. STORE DCDU(T) IN CPHI,CTHETA,
CPSI FOR KALCMANU.
SPECIAL RETURN (MPAC+0 = 1
OCTAL 00001

SUBR TO CALC DCDUS(T)

HOLD EXTRAPOLATED CSM POSITION AND
VELOCITY

EXTRAPOLATE LEM STATE VECTOR TO SAME
TIME AS CSM USING LEMCONIC.

STORE VATT IN DCDU TEMPORARILY
LOS = RL RC

SAVE UNITLOS FOR CRS61.2 RATE CALC.

CONVERT TO STABLE MEMBER.

HOLD ABS VAL OF LOS (VAC 36D)
IN D(P21TIME) FOR CRS61.2 RATE CALC.

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1446	REP	11	LAST	389	34,3515	37351 1		STCALL	SCAXIS	TRACK AXIS UNIT VECTOR
1447	REP	3	LAST	383	34,3516	56126 1			VECPOINT	FOR +X-AXIS TRACKING ATTITUDE
1448	REP	7	LAST	277	34,3517	01334 1		STORE	CPHIX	STORE ANGLES FOR N96 DISPLAY
1449					34,3520	77775 1		VLOAD		
1450	REP	1			34,3521	31542 0			PRFUNIT	
1451	REP	12	LAST	587	34,3522	37351 1		STCALL	SCAXIS	
1452	REP	4	LAST	587	34,3523	56126 1			VECPOINT	
1453	REP	5	LAST	277	34,3524	03723 1		STORE	PRAXIS	STORE ANGLES FOR N95 DISPLAY
1454					34,3525	77614 1		BOFF		
1455	REP	4	LAST	552	34,3526	02745 0			PRFTRKAT	
1456	REP	1			34,3527	71533 1			CRSTOR1	
1457	REP	15	LAST	583	34,3530	01156 1	CRSTOR	STORE	THETAD	STORE ANGLES FOR N18 DISPLAY
1458					34,3531	77650 1		GOTO		
1459	REP	6	LAST	586	34,3532	03705 0			Q6111	
1460					34,3533	77775 1	CRSTOR1	VLOAD		
1461	REP	5	LAST	586	34,3534	15330 0			UNITX	
1462	REP	13	LAST	587	34,3535	03351 0		STORE	SCAXIS	
1463					34,3536	52151 0		TLOAD	GOTO	
1464	REP	8	LAST	587	34,3537	01334 1			CPHIX	
1465	REP	1			34,3540	71530 1			CRSTOR	
1466					34,3541	15066 0	PRFUNIT	2DEC	.40957602	55 DEG TRACK AXIS UNIT VECTOR
1466					34,3542	17626 0				
1467					34,3543	00000 1		2DEC	0.0	FOR USE WITH VECPOINT
1467					34,3544	00000 1				
1468					34,3545	11132 1		2DEC	.28678822	
1468					34,3546	27477 0				
1469					34,3547	01616 1	DEGREE10	DEC	.05556	10 DEG IN REVS STEP2
1470					34,3550	37651 1	RVCS/RDS	2DEC	15.915494 B-4	100/2PI REV-CSEC/RAD-SEC.
1470					34,3551	16721 1				
1471					34,3552	31463 1	TENTH	2DEC	.1 B+3	.1 B-3 (TO SCALE ANG.RATE TO .1 INREMS)
1471					34,3553	06315 0				
1474					34,3554	20000 0	MAT1B1	2DEC	1.0 B-1	
1474					34,3555	00000 1				
1475					34,3556	20000 0	MBODYCTL	2DEC	.5	7.25 DEG NEGATIVE
1475					34,3557	00000 1				
1476					34,3560	00000 1		2DEC	0	X-AXIS ROTATION MATRIX
1476					34,3561	00000 1				
1477					34,3562	00000 1		2DEC	0	CONVERTS BODY TO CTL
1477					34,3563	00000 1				
1478					34,3564	00000 1		2DEC	0	AXES. SAME AS QUADROT
1478					34,3565	00000 1				
1479					34,3566	17676 0		2DEC	.99200495 B-1	COS7.25 B1 BUT SCALED B1
1479					34,3567	20113 0				
1480					34,3570	75766 1		2DEC	-.12619897 B-1	-SIN7.25 B1
1480					34,3571	45544 0				
1481					34,3572	00000 1		2DEC	0	
1481					34,3573	00000 1				
1482					34,3574	02011 0		2DEC	.12619897 B-1	SIN7.25 B1
1482					34,3575	32233 1				
1483					34,3576	17676 0		2DEC	.99200495 B-1	COS7.25 B1
1483					34,3577	20113 0				

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1484
1485   REF   3  LAST  384      34,3600    00001 0  LOONE    OCT    00001        TO SET MPAC = 00001 FOR SPECIAL EXIT.
                                  7707              FURST3   EQUALS 13,14,15    CONSTANT FOR AUTOCK (OCT 70000).
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R1486   ..... S22.1 ORBITAL NAVIGATION ROUTINE
R1487   MOD 1

R1488   FUNCTIONAL DESCRIPTION
R1489   1. UPDATE CSM STATE VECTOR
R1490   2. UPDATE LANDMARK POSITION
R1491   3. CONVERT W MATRIX FROM 9 TO 6 DIMENSIONS

R1492   SUBROUTINES CALLED
R1493   INTSTALL,INTEGRV,GETUM,SETRE,R-TO-TP,RP-TO-R,BVECTORS,INCORP1,INCORP2
R1494   LALOTORV,S22F2410,LAT-LONG,ROWDOT

R1495   ERASABLE INITIALIZATION
R1496   W=9X9 MATRIX
R1497   ORBWFLAG=0 FOR INVALID W MATRIX,=1 FOR VALID W MATRIX
R1498   ASTRONAUT ENTRY OF KNOWN,L,OFF
R1499   8NN= NUMBER OF MARKS DECIMAL INTEGER 8-14
R1500   REFSMMAT= TRANSFORMATION MATRIX
R1501   MARKSTAT= ADDRESS OF START OF MARK DATA (MARK DATA OF EACH MARK IS
R1502   STORED AS FOLLOWS, TIME,AIG,SA,AMG,PA,ACG) TIME IS IN DOUBLE
R1503   PRECISION,ALL OTHERS ARE IN SINGLE PRECISION
R1504   CSM STATE VECTOR

R1505   OUTPUT
R1506   UPDATED CSM STATE VECTOR
R1507   UPDATED LANDMARK POSITION
R1508   NEW 6 DIMENSIONAL W MATRIX

R1509   DEBRIS
R1510   PUSH LIST,CSMPOS,ALPHAV,ERADM,UM,RCLP,USTAR,VARIANCE,X789,BVECTOR,8KK,
R1511   S22LOC, SVMRKDAT TABLE,22SUBSCL,LANDMARK,CXOFF,S22C,LAT,LONG,ALT,
R1512   TEMPOR1,S22TOFF,S2210FF,DSPTEM1,S22EORM,S22TPRIM

1513					13,2176			BANK	13	
1514	REF	.1			30,2000			SETLOC	P20S6	
1515					30,2255			BANK		
1516	REF	18	LAST	559	E5,1751			EBANK=	LANDMARK	
1517	REF	1						COUNT	35/LUORB	
1518					30,2255	66220 1	S22.1	STQ	SSP	
1519	REF	2	LAST	123	30,2256	03703 0			S22RTNEX	
1520	REF	10	LAST	584	30,2257	00051 0			S1	
1521					30,2260	00006 1		DEC	6	
1522					30,2261	66331 0		SSP	SSP	SET I=1 ITEM 8KK IS I
1523	REF	2	LAST	95	30,2262	02747 1			8KK	
1524					30,2263	00001 0		DEC	1	
1525	REF	2	LAST	95	30,2264	02751 0			S22LOC	
1526	REF	5	LAST	175	30,2265	03537 0		ECADR	SVMRKDAT	SET MARK DATA ADDRESS INTO S22LOC

1527					30,2266	76144 1		LxC,2	AXT,1	
1528	REF	31	LAST	561	30,2267	01330 0			MARKSTAT	
1529					30,2270	00044 1		DEC	36	
1530					30,2271	77773 1	S22.111	VLOAD*		MOVE MARK DATA (5 SETS) FROM ADDR. IN
1531					30,2272	77776 1			0,2	MARKSTAT TO SVMRKDAT TABLE TO AVOID LOSS
1532	REF	6	LAST	589	30,2273	07604 1		STORE	SVMRKDAT +36D,1	IF RESTART OCCURS
1533					30,2274	60114 0		INCR,2	TIX,1	
1534					30,2275	77771 0		DEC	-6	
1535	REF	1			30,2276	60271 0			S22.111	
1536					30,2277	77414 0		SET	EXIT	
15361	REF	2	LAST	555	30,2300	01464 0			P22MKFLG	DOWNLINKED SVMRKDAT HOLDS PRESENT MARKS
1537	REF	141	LAST	583	30,2301	0 4555 0		TC	BANKCALL	RELEASE VAC AREA WHERE MARK DATA WAS
1538	REF	5	LAST	444	30,2302	16083 0		CADR	MKRELEAS	
1539	REF	9	LAST	556	30,2303	0 5261 1		TC	2PHSCHNG	
1540					30,2304	00004 0		OCT	00004	
1541					30,2305	05022 1		OCT	05022	
15411					30,2306	13000 0		OCT	13000	
1542	REF	99	LAST	586	30,2307	0 6006 1		TC	INTPRET	
1543					30,2310	43170 0		AXT,1	BOFF	
1544					30,2311	00000 1			0D	
1545	REF	8	LAST	578	30,2312	04343 1			CMOONFLG	=0 EARTH,=1 MOON
1546	REF	1			30,2313	60316 0			S22SHIFT	
1547					30,2314	77710 1		INCR,1		
1548					30,2315	77775 1		DEC	-2	
1549					30,2316	40330 0	S22SHIFT	SXA,1	SETPD	
1550	REF	2	LAST	123	30,2317	03673 0			S22EORM	SET =0 EARTH,=-2 MOON FOR SHIFTING
1551					30,2320	00001 0			0D	
1554					30,2321	77624 1	FIG2EXIT	CALL		
1555	REF	15	LAST	576	30,2322	27371 1			INTSTALL	
1556					30,2323	77624 1		CALL		
1557	REF	1			30,2324	61326 1			S22FLGS	
R1558					FLOWCHART D=0		THEN DIM0FLAG=0	D6OR9FLG NOT TESTED		
R1559					FLOWCHART D=6		THEN DIM0FLAG=1	D6OR9FLG=0		
R1560					FLOWCHART D=9		THEN DIM0FLAG=1	D6OR9FLG=1		
1561					30,2325	43014 0		BOFF	CLRGO	
1562	REF	4	LAST	570	30,2326	01751 0			ORBWFLAG	
1563	REF	1			30,2327	60332 0			SETWW5D	BRANCH TO SET W0-W5,ORBWFLAG,D
1564	REF	2	LAST	576	30,2330	01635 0			D6OR9FLG	FLOWCHART D=6 PATH
1565	REF	1			30,2331	60357 0			SETVANDI	
1566					30,2332	77614 1	SETWW5D	CLEAR		
1567	REF	6	LAST	576	30,2333	01676 1			DIM0FLAG	FLOWCHART D=0 PATH
1568					30,2334	66370 0		AXT,1	SSP	
1569					30,2335	00154 1		DEC	108	
1570	REF	11	LAST	589	30,2336	00051 0			S1	
1571					30,2337	00006 1		DEC	6	
1572					30,2340	77214 0		CLEAR	VLOAD	
1573	REF	7	LAST	571	30,2341	02676 1			RENDWFLG	GSOP CHANGE 8/18/67
1574	REF	12	LAST	578	30,2342	15332 1			ZEROVECS	
1575	REF	13	LAST	579	30,2343	06555 1	CLEARWW5	STORE	W +108D,1	

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1576				30,2344	67300 0		TIX,1	SLOAD		
1577	REF	1		30,2345	60343 0			CLEARWW5		
1578	REF	1		30,2346	02005 0			WORBPOS		
1580	REF	14	LAST	590	30,2347	02401 0		STORE	W	SET DIAGONALS OF W0
1581	REF	15	LAST	591	30,2350	02411 1		STORE	W +8D	
1582	REF	16	LAST	591	30,2351	02421 1		STORE	W +16D	
1583					30,2352	77735 0		SLOAD		
1584	REF	1		30,2353	02006 0			WORBVEL	SET DIAGONALS OF W4
1585	REF	17	LAST	591	30,2354	02511 0		STORE	W +72D	
1586	REF	18	LAST	591	30,2355	02521 0		STORE	W +80D	
1587	REF	19	LAST	591	30,2356	02531 1		STORE	W +88D	
1588					30,2357	77614 1	SETVANDI	CLEAR		
1589	REF	2	LAST	572	30,2360	02666 0			DMENFLG	0=6X6W, 1=9X9W
1590					30,2361	77624 1	S22NXTIN	CALL		
1591	REF	1		30,2362	61322 0			GETIF	
1592	REF	30	LAST	586	30,2363	34041 0		STCALL	TDEC1	
1593	REF	8	LAST	573	30,2364	27113 1			INTEGRV	
1594					30,2365	77624 1		CALL		
1595	REF	1		30,2366	61273 0			S22CALRC	CALC. RC B-29 OR B-27 (CSMPOS)
1596					30,2367	66150 0		LXA,1	SXA,1	SETUP ADDR. OF MARK DATA FOR GETUM SUBR.
1597	REF	3	LAST	589	30,2370	02750 1			S22LOC	
1598	REF	4	LAST	569	30,2371	01242 1			MARKDATA	
1599					30,2372	77624 1		CALL		COMPUTE UM
1600	REF	2	LAST	571	30,2373	47110 1	S2GETUM		GETUM	
1601	REF	5	LAST	571	30,2374	01235 1		STORE	UM	
1604					30,2375	41535 1	DMPINTEG	SLOAD	PUSH	TEST OFF=I
1605	REF	3	LAST	589	30,2376	02747 1			8KK	
1606					30,2377	50535 1		SLOAD	SR3	CXOFF SCALED B-5, MUST MOVE TO B-14
1607	REF	3	LAST	558	30,2400	02746 0			CXOFF	BEFORE SUBT.
1608					30,2401	50442 0		SR3	SR3	
1609					30,2402	77625 0		DSU		
1610					30,2403	43030 0		BHIZ	BON	
1611	REF	1		30,2404	60720 1			S22OFF=I	BRANCH HERE IF OFF=I
1612	REF	3	LAST	591	30,2405	02708 1			DMENFLG	0=6X6W, 1=9X9W
1613	REF	1		30,2406	60726 1			S22D=9	
16131					30,2407	77624 1		CALL		
16132	REF	12	LAST	574	30,2410	56741 0			GRP2PC	
1614					30,2411	77614 1		SET		
1615	REF	5	LAST	590	30,2412	01471 1			ORBWFLAG	
1616					30,2413	43014 0		SET	SET	
1617	REF	4	LAST	591	30,2414	02466 1			DMENFLG	=0 ON FIRST PASS THRU HERE FOR D=0,OR6
1618	REF	1		30,2415	01062 1			22DSPFLG	=1 TO DISPLAY DR,DV ON FIRST PASS
1619					30,2416	43014 0		SET	BON	
1620	REF	4	LAST	555	30,2417	00462 1			ERADFLAG	=1 TO COMPUTE FISCHER RADIUS
1621	REF	6	LAST	559	30,2420	03307 0			KNOWNFLG	
1622	REF	1		30,2421	61070 1			S22BOX22	
1623					30,2422	53575 0		VLOAD	UNIT	UNIT ALSO PUTS ARVAL(RC) IN 36D
1624	REF	5	LAST	574	30,2423	01207 0			CSMPOS	
1625	REF	4	LAST	558	30,2424	02152 0		STORE	ALPHAV	ALPHAV +4=SINL FOR SETRE
1826					30,2425	43014 0		CLEAR	BOFF	

Line	REF			Address	Octal		Label	Op	Operand	Comment
1627	REF	5	LAST 556	30,2426	01663 0				LUNAFLAG	ERADM= R0 METERS B-29 BOTH EARTH/MOON
1628	REF	9	LAST 590	30,2427	04343 1				CMOONFLG	
1629	REF	1		30,2430	60433 0				S22C=I	
1630				30,2431	77614 1			SET		
1631	REF	6	LAST 592	30,2432	01463 1				LUNAFLAG	
1632				30,2433	77624 1		S22C=I	CALL		
1633	REF	1		30,2434	26533 0				SETRE	COMPUTE RL FROM EQUATION 2.4.10
1634				30,2435	77624 1			CALL		STORED IN X789,MPAC B-27,B-29
1635	REF	1		30,2436	61240 0				S22F2410	SCALE RL B-29 FOR BOTH EARTH/MOON
1636				30,2437	70414 1			BOFF	VSR2	
1637	REF	10	LAST 592	30,2440	04343 1				CMOONFLG	
1638				30,2441	60442 0				+1	
1639	REF	1		30,2442	02635 0			STORE	S22RL	
1640				30,2443	72441 0			DOT	SL-1	
1641	REF	6	LAST 591	30,2444	01235 1				UM	
1642	REF	1		30,2445	24037 0			STOVL	S22D	D= UM.RL B-29
1643	REF	13	LAST 590	30,2446	15332 1				ZEROVECS	
1644				30,2447	41401 1			SETPD	PUSH	
1645				30,2450	00001 0				0D	
1646				30,2451	65206 0			PUSH	PDDL	SET 0-18D = I BACKWARDS
1647	REF	5	LAST 558	30,2452	15330 0				HIDPHALF	PD 18
16471				30,2453	77702 1			SR2		B-3
1648				30,2454	00005 1			STORE	4D	
1649				30,2455	00011 1			STORE	8D	
1650				30,2456	24015 0			STOVL	12D	
1651	REF	7	LAST 592	30,2457	01235 1				UM	B-1
1652	REF	1		30,2460	24023 0			STOVL	S223X1	
1653	REF	2	LAST 592	30,2461	02635 0				S22RL	B-29
1654				30,2462	77624 1			CALL		(UM)(RL T) B-30 STORED IN S22UMRL THRU
1655	REF	1		30,2463	61303 0				S2231X13	S22UMRL +17D
1656				30,2464	66370 0			AXT,1	SSP	
1657				30,2465	00022 1			DEC	18	
1658	REF	12	LAST 590	30,2466	00051 0				S1	
1659				30,2467	00006 1			DEC	6	
1660				30,2470	70573 1		S22NXTU	VLOAD*	VSR2	(UM)(RL T) B-32
1661	REF	1		30,2471	03524 1				S22UMRL +18D,1	
16611				30,2472	77741 0			V/SC		
1662	REF	2	LAST 592	30,2473	00037 0				S22D	D B-29
1663				30,2474	45445 0			BVSU	STADR	SUBTRACT FROM I B-3
1664	REF	2	LAST 592	30,2475	70253 1			STORE	S22UMRL +18D,1	U MATRIX B-3
1665				30,2476	76100 1			TIX,1	AXT,1	PD 0 AFTER TIX
1666	REF	1		30,2477	60470 1				S22NXTU	
1667				30,2500	00044 1			DEC	36	S1 STILL 6 FROM ABOVE
1668				30,2501	64373 1			VLOAD*	MXV	
1669	REF	20	LAST 591	30,2502	02445 0				W +36D,1	B-19
1670	REF	3	LAST 592	30,2503	03502 0				S22UMRL	B-3
1671				30,2504	77732 1			VAD		
1672	REF	21	LAST 592	30,2505	06621 1			VAD	W +144D,1	W(I+18)= (UW(I) B-19
1673				30,2506	71300 1			TIX,1	DLOAD	
1674	REF	1		30,2507	60501 0				S22NXTWI	

1675	REF	1		30,2510	00041 1		S22RHO	B-28,B-30
1676				30,2511	60414 0	BOFF	SR2	MAKE RHO B-30
1677	REF	11	LAST 592	30,2512	04343 1		CMOONFLG	
1678				30,2513	60514 1		+1	
1679				30,2514	57101 0	NORM	XAD,2	
1680	REF	9	LAST 572	30,2515	00050 1		X2	
1681	REF	10	LAST 593	30,2516	00047 1		X2	
1682				30,2517	41316 0	DSQ	DMP	
1683	REF	1		30,2520	21650 1		SCTVAR	B+18
1684				30,2521	77742 0	SR1		ACCOUNTS FOR 1/2 IN NEXT FORMULA
1685	REF	2	LAST 593	30,2522	00041 1	STORE	S22RHO	1/2(RHO SQ)(VARSCT)
1686				30,2523	77770 1	AXT,1		
1687				30,2524	00022 1	DEC	18	S1 STILL 6 FROM ABOVE
1688				30,2525	64373 1	S22NXXA	VLOAD* MXV	
1689	REF	4	LAST 592	30,2526	03524 1		S22UMRL +18D,1	B-3
1690	REF	5	LAST 593	30,2527	03502 0		S22UMRL	B-3
1691				30,2530	53761 1	VXSC	VSR*	
1692	REF	3	LAST 593	30,2531	00041 1		S22RHO	
1693				30,2532	57212 1		0 -12D,2	WITH VARRP SCALED B-28
1694	REF	1		30,2533	05301 0	STORE	S22UUT +18D,1	1/2(RHO SQ)(VARSCT)(U)(U T)
1695				30,2534	77300 1	TIX,1	VLOAD	
1696	REF	1		30,2535	60525 0		S22NXXA	
1697	REF	8	LAST 592	30,2536	01235 1		UM	
1698	REF	2	LAST 592	30,2537	34023 1	STCALL	S223X1	UM ALSO IN MPAC FOR S2231X13 SUBR.
1699	REF	2	LAST 592	30,2540	61303 0		S2231X13	(UM)(UM T) B-2 IN S22UMRL,P17D
1700				30,2541	50545 0	DLOAD	SR3	
1701	REF	2	LAST 87	30,2542	02241 1		ERADM	R0 B-29
1702				30,2543	63471 0	DDV	DSQ	
1703	REF	3	LAST 592	30,2544	00037 0		S22D	B-29
1704				30,2545	77605 1	DMP		
1705	REF	1		30,2546	02010 1		RPVAR	***** METERS SQ
1706	REF	4	LAST 593	30,2547	00041 1	STORE	S22RHO	TEMP (VARRP)(R0/D)
1707				30,2550	77770 1	AXT,1		
1708				30,2551	00022 1	DEC	18	S1 STILL 6 FROM ABOVE
1709				30,2552	74373 0	S22NXXB	VLOAD* VXSC	
1710	REF	6	LAST 593	30,2553	03524 1		S22UMRL +18D,1	(UM)((UM T) B-2
1711	REF	5	LAST 593	30,2554	00041 1		S22RHO	
1712				30,2555	77653 1	VAD*		
1713	REF	2	LAST 593	30,2556	01301 1		S22UUT +18D,1	
1714	REF	3	LAST 593	30,2557	05301 0	STORE	S22UUT +18D,1	SMALL E MATRIX
1715				30,2560	77775 1	VLOAD		
1716	REF	14	LAST 592	30,2561	15332 1		ZEROVECS	
1717	REF	22	LAST 592	30,2562	06643 0	STORE	W +162D,1	CLEAR W8
1718				30,2563	40100 1	TIX,1	BOV	
1719	REF	1		30,2564	60552 0		S22NXXB	
1720				30,2565	60566 1		+1	
1721				30,2566	50145 1	DLOAD	RVN	
1722	REF	4	LAST 593	30,2567	01277 1		S22UUT +16D	E5
1723	REF	1		30,2570	60607 0		S22W76X	
1724				30,2571	53166 0	SQRT	BZE	

1725	REP	2	LAST	593	30,2572	60607 0			S22W76X	
1726	REP	23	LAST	593	30,2573	16625 1		STODL	W +148D	W74= SQ ROOT E5
1727	REP	5	LAST	593	30,2574	01275 0			S22UUT +14D	E4
1728					30,2575	40071 0		DDV	BOV	
1729	REP	24	LAST	594	30,2576	02825 1			W +148D	
1730	REP	1			30,2577	60801 0			S22W72X	
1731	REP	25	LAST	594	30,2600	02823 1		STORE	W +146D	W73= E4/W74
1732					30,2601	56345 0	S22W72X	DLOAD	DDV	
1733	REP	6	LAST	594	30,2602	01273 0			S22UUT +12D	E3
1734	REP	26	LAST	594	30,2603	02825 1			W +148D	
1735					30,2604	77600 1		BOV		
1736	REP	3	LAST	594	30,2605	60607 0			S22W76X	
1737	REP	27	LAST	594	30,2606	02621 0		STORE	W +144D	W72= E4/W74
1738					30,2607	63545 0	S22W76X	DLOAD	DSQ	
1739	REP	28	LAST	594	30,2610	02823 1			W +146D	W73
1740					30,2611	50021 1		BDSU	BMN	
1741	REP	7	LAST	594	30,2612	01267 0			S22UUT +8D	E2
1742	REP	1			30,2613	60827 1			S22W78X	
1743					30,2614	53166 0		SQRT	BZE	
1744	REP	2	LAST	594	30,2615	60627 1			S22W78X	
1745	REP	29	LAST	594	30,2616	16631 1		STODL	W +152D	W76= SQ ROOT (E2-W73 SQ)
1746	REP	30	LAST	594	30,2617	02621 0			W +144D	W72
1747					30,2620	44205 0		DMP	BDSU	
1748	REP	31	LAST	594	30,2621	02623 1			W +146D	W73
1749	REP	8	LAST	594	30,2622	01265 1			S22UUT +6D	E1
1750					30,2623	40071 0		DDV	BOV	
1751	REP	32	LAST	594	30,2624	02631 1			W +152D	W76
1752	REP	3	LAST	594	30,2625	60627 1			S22W78X	
1753	REP	33	LAST	594	30,2626	02627 0		STORE	W +150D	W75= (E1-W72W73)/W76
1754					30,2627	63545 0	S22W78X	DLOAD	DSQ	
1755	REP	34	LAST	594	30,2630	02627 0			W +150D	
1756					30,2631	63525 0		PDDL	DSQ	
1757	REP	35	LAST	594	30,2632	02621 0			W +144D	W72
1758					30,2633	77615 0		DAD		
1759					30,2634	50021 1		BDSU	BMN	
1760	REP	9	LAST	594	30,2635	01257 0			S22UUT	E0
1761	REP	1			30,2636	60641 1			S22SCLW	
1762					30,2637	77766 1		SQRT		
1763	REP	36	LAST	594	30,2640	02635 0		STORE	W +156D	W78= SQ RT(E0-W72 SQ-W75 SQ)
1764					30,2641	74575 0	S22SCLW	VLOAD	VSR1	SCALE W8 METERS B-19
1765	REP	37	LAST	594	30,2642	02621 0			W +144D	
1766	REP	38	LAST	594	30,2643	26621 0		STOVL	W +144D	
1767	REP	39	LAST	594	30,2644	02627 0			W +150D	
1768					30,2645	77762 1		VSR1		
1769	REP	40	LAST	594	30,2646	26627 0		STOVL	W +150D	
1770	REP	41	LAST	594	30,2647	02635 0			W +156D	
1771					30,2650	77762 1		VSR1		
1772	REP	42	LAST	594	30,2651	02635 0		STORE	W +156D	
1773					30,2652	77624 1	S22SAVET	CALL		
1774	REP	2	LAST	591	30,2653	61322 0			GETTF	

L   P20-P25

Line	REF			Address	Octal		Label	Instr	Operand	Comment
1775	REF	2	LAST	123	30,2654	03672 1		STORE	S22TPRIM	SAVE PRESENT TIME FOR PIOS
1776					30,2655	77776 1	S22I=N	EXIT		TEST I=N
1777	REF	31	LAST	576	30,2656	0 5301 0		TC	PHASCHNG	
1778					30,2657	04022 0		OCT	04022	
1779	REF	4	LAST	591	30,2660	4 1746 1		CS	8KK	
1780	REF	4	LAST	557	30,2661	6 1747 1		AD	8NN	
1781					30,2662	0 0006 1		EXTEND		
1782	REF	1			30,2663	6 3126 1		BZMF	S22F244X	EXIT TO FIGURE 2.4-4
1783	REF	5	LAST	595	30,2664	3 1746 0		CA	8KK	I=I+1
1784	REF	71	LAST	586	30,2665	6 4712 1		AD	ONE	
1785	REF	6	LAST	575	30,2666	55≈300 1		TS	TEMPOR1	ADD 7 TO LOC TO GET ADDR. OF NEXT MARK
1786	REF	4	LAST	591	30,2667	3 1750 1		CA	S22LOC	
1787	REF	11	LAST	560	30,2670	6 4716 0		AD	SEVEN	
1788	REF	7	LAST	595	30,2671	55≈301 0		TS	TEMPOR1 +1	
1789	REF	32	LAST	595	30,2672	0 5301 0		TC	PHASCHNG	
1790					30,2673	04022 0		OCT	04022	
1791	REF	8	LAST	595	30,2674	3 1300 0		CA	TEMPOR1	
1792	REF	6	LAST	595	30,2675	55≈746 1		TS	8KK	
1793	REF	9	LAST	595	30,2676	3 1301 1		CA	TEMPOR1 +1	
1794	REF	5	LAST	595	30,2677	55≈750 0		TS	S22LOC	
1795	REF	100	LAST	590	30,2700	0 6006 1		TC	INTPRET	
1796					30,2701	77624 1		CALL		FOR ALL INTEGRATIONS OTHER THAN FIRST
1797	REF	16	LAST	590	30,2702	27371 1	S2INTS1		INTSTALL	
1798					30,2703	77624 1		CALL		
1799	REF	2	LAST	590	30,2704	61328 1			S22FLGS	
1800					30,2705	43014 0		BON	CLEAR	
1801	REF	5	LAST	591	30,2706	02706 1			DMENFLG	
1802	REF	1			30,2707	60361 0			S22NXTIN	RETURN ALWAYS EXCEPT OFFSET POINT MARK 1
1803	REF	7	LAST	590	30,2710	01676 1			DIM0FLAG	
1804					30,2711	43014 0		BOFF	SET	
1805	REF	6	LAST	591	30,2712	01751 0			ORFWFLAG	
1806	REF	2	LAST	595	30,2713	60361 0			S22NXTIN	OFFSET POINT MARK 1,NO W INTEGRATION
1807	REF	8	LAST	595	30,2714	01476 0			DIM0FLAG	
1808					30,2715	77614 1		CLRGO		
1809	REF	3	LAST	590	30,2716	01635 0			D6OR9FLG	OFFSET POINT MARK 1,INTEGRATE W 6X6
1810	REF	3	LAST	595	30,2717	60361 0			S22NXTIN	
1811					30,2720	77624 1	S22OFF=I	CALL		
1812	REF	3	LAST	594	30,2721	61322 0			GETTP	
1813	REF	9	LAST	558	30,2722	27670 0		STOVL	S22TOFF	TIME SUB OFF
1814	REF	9	LAST	593	30,2723	01235 1			UM	
1815	REF	1			30,2724	35215 1		STCALL	S22UOFF	U SUB OFF
1816	REF	1			30,2725	60655 1			S22I=N	TEST I=N
1817					30,2726	77775 1	S22D=9	VLOAD		D=9 PATH
1818	REF	1			30,2727	01701 0			X789	
1819					30,2730	14001 0		STODL	0D	CALL PIOS TWICE TO TRANSFORM RL TO TIME
1820	REF	3	LAST	595	30,2731	03672 1			S22TPRIM	T(SUB F) FROM TIME T PRIME
1821					30,2732	·00007 0		STORE	6D	
1822					30,2733	45135 1		SLOAD	CALL	
1823	REF	3	LAST	590	30,2734	03674 1			S22EORM	0=EARTH,NON-ZERO=MOON
1824	REF	1			30,2735	55366 1	S2RTRP		R-TO-RP	

Line	REP			Address	Octal		Label	Op	Operand	Comment
1825				30,2736	45006	0		PUSH	CALL	R-TO-RP LEAVES PUSHLOC AT 0
1826	REP	4	LAST 595	30,2737	61322	0			GETIF	
1827				30,2740	00007	0		STORE	6D	
1828				30,2741	45135	1		SLOAD	CALL	
1829	REP	4	LAST 595	30,2742	03674	1			S22EORM	
1830	REP	2	LAST 558	30,2743	55341	1	S2RPTR		RP-TO-R	
1831	REP	2	LAST 595	30,2744	01701	0	S22BOX32	STORE	X789	
1832				30,2745	40014	0		SET	BOV	
1833	REP	7	LAST 573	30,2746	02464	0			INCORFLG	FLAG=1
1834				30,2747	60750	0			+1	CLEAR OVERFLOW
1835				30,2750	77651	0		VSU		
1836	REP	6	LAST 591	30,2751	01207	0			CSMPOS	
1837	REP	7	LAST 573	30,2752	03531	0		STORE	RCLP	RCL=RL-RC
1838				30,2753	47256	0		UNIT	VXV	USTAR=UNIT(UNIT(RCL)XUM)
1839	REP	10	LAST 595	30,2754	01235	1			UM	
1840				30,2755	40056	0		UNIT	BOV	
1841	REP	1		30,2756	60852	0			S22SAVET	COMPUTATION OVERFLOW,SAVE TP
1842	REP	5	LAST 571	30,2757	01245	0		STORE	USTAR	
1843				30,2760	43014	0	S22BOX12	SET	SET	
1844	REP	6	LAST 595	30,2761	02466	1			DMENFLG	=1 FOR 9X9 W
1845	REP	11	LAST 578	30,2762	00467	1			VEHUPFLG	=1 FOR CSM
1846				30,2763	43345	1		DLOAD	DAD	
1847	REP	2	LAST 593	30,2764	21650	1			SCTVAR	B+18
1848	REP	1		30,2765	21652	0			IMUVARR	B+18
1849	REP	8	LAST 572	30,2766	27526	0		STOVL	VARIANCE	
1850	REP	8	LAST 596	30,2767	03531	0			RCLP	
1851				30,2770	60246	1		ABVAL	NORM	B-29 OR B-27
1852	REP	22	LAST 584	30,2771	00047	1			X1	
1853				30,2772	41316	0		DSQ	DMP	
1854	REP	9	LAST 596	30,2773	03526	0			VARIANCE	
1855				30,2774	56070	0		XAD,1	XAD,1	
1856	REP	23	LAST 596	30,2775	00046	0			X1	
1857	REP	5	LAST 596	30,2776	03673	0			S22EORM	DOUBLE NORM SHIFT SINCE RCLP WAS SQUARED
1858				30,2777	53670	0		XAD,1	SR*	DOUBLE EARTH OR MOON SHIFT,SAME REASON
1859	REP	6	LAST 596	30,3000	03673	0			S22EORM	
1860				30,3001	20601	1			0,1	SCALE VARIANCE B-40 FOR BOTH EARTH,MOON
1861				30,3002	77751	1		TLOAD		CHANGE MODE TO TRIPLE
1862	REP	258	LAST 585	30,3003	00155	0			MPAC	
1863	REP	10	LAST 596	30,3004	37526	1		STCALL	VARIANCE	CALC B_0,B_1,DELTAO, NEW USTAR
1864	REP	2	LAST 571	30,3005	47047	1	S2BVTRS		BVECTORS	
1865				30,3006	57575	1		VLOAD	VCOMP	
1866	REP	14	LAST 574	30,3007	03502	0			BVECTOR	
1867	REP	15	LAST 596	30,3010	37516	1		STCALL	BVECTOR +12D	$B_2=-B_0$
1868	REP	2	LAST 572	30,3011	75250	1	S2INCP1		INCORP1	
1869				30,3012	77624	1		CALL		
1870	REP	13	LAST 591	30,3013	56741	0			GRP2PC	
1871				30,3014	43014	0		BOFF	CLEAR	
1872	REP	2	LAST 591	30,3015	01342	0			22DSPFLG	=1 DISPLAY DELTA R,V =0 DO NOT
1873	REP	1		30,3016	61047	0			S22BOX42	
1874	REP	3	LAST 596	30,3017	01262	0			22DSPFLG	

L   P20-P25

18741					30,3020	77624 1		CALL		
18742	REF	14	LAST	596	30,3021	56741 0			GRP2PC	
1875					30,3022	51575 1		VLOAD	ABVAL	
1876	REF	7	LAST	572	30,3023	01257 0			DELTAX	DELTA R
1877					30,3024	53750 0		LXA,1	SR*	
1878	REF	7	LAST	596	30,3025	03673 0			S22EORM	SCALE DELTA R ALWAYS METERS B-29
1879					30,3026	20601 1			0,1	
1880	REF	9	LAST	575	30,3027	27502 0		STOVL	N49DISP	
1881	REF	8	LAST	597	30,3030	01265 1			DELTAX +6	DELTA V
1882					30,3031	53646 0		ABVAL	SR*	DELTA V=METERS/CSEC B-7 ALWAYS
1883					30,3032	20601 1			0,1	
1884	REF	10	LAST	597	30,3033	03504 0		STORE	N49DISP +2	
1885					30,3034	77776 1		EXIT		
1886	REF	1			30,3035	3 3655 1		CAF	V06N49EE	
1887	REF	142	LAST	590	30,3036	0 4555 0		TC	BANKCALL	
1888	REF	9	LAST	557	30,3037	20763 1		CADR	GOFLASHR	
1889	REF	26	LAST	561	30,3040	0 4106 1		TC	GOTOPOOH	V34E TERMINATE
1890					30,3041	0 3046 0		TC	+5	INCORPORATE CHANGES
1891	REF	1			30,3042	0 3230 0		TC	S22EXEX	V32E RECYCLE
1892	REF	20	LAST	584	30,3043	3 4710 0		CAF	BIT3	
1893	REF	11	LAST	561	30,3044	0 5415 1		TC	BLANKET	
1894	REF	76	LAST	575	30,3045	0 5112 0		TC	ENDOFJOB	
1895	REF	101	LAST	595	30,3046	0 6006 1		TC	INTPRET	
1896					30,3047	77624 1	S22BOX42	CALL		
1897	REF	2	LAST	573	30,3050	75462 0			INCORP2	
1898					30,3051	77624 1		CALL		CSMPOS=RC B-29 OR B-27
1899	REF	2	LAST	591	30,3052	61273 0			S22CALRC	
1902					30,3053	77414 0	DMPINCP2	BOFF	EXIT	
1903	REF	8	LAST	596	30,3054	02744 1			INCORFLG	
1904	REF	2	LAST	596	30,3055	60652 0			S22SAVET	SAVE TF AND TEST I=N
1905	REF	33	LAST	595	30,3056	0 5301 0		TC	PHASCHNG	
1906					30,3057	04022 0		OCT	04022	
1907	REF	102	LAST	597	30,3060	0 6006 1		TC	INTPRET	
1908					30,3061	77214 0		CLEAR	VLOAD	
1909	REF	9	LAST	597	30,3062	02664 1			INCORFLG	FLAG=0
1910	REF	3	LAST	596	30,3063	01701 0			X789	
1911					30,3064	77651 0		VSU		
1912	REF	7	LAST	596	30,3065	01207 0			CSMPOS	
1913	REF	9	LAST	596	30,3066	37531 1		STCALL	RCLP	RCL=RL-RC
1914	REF	1			30,3067	60760 0			S22BOX12	
1915					30,3070	66370 0	S22BOX22	AXT,1	SSP	CLEAR W6,W7,W8 (27 ELEMENTS 54 REGS)
1916					30,3071	00066 0		DEC	54	
1917	REF	13	LAST	592	30,3072	00051 0			S1	
1918					30,3073	00006 1		DEC	6	
1919					30,3074	77775 1		VLOAD		
1920	REF	15	LAST	593	30,3075	15332 1			ZEROVECS	
1921	REF	43	LAST	594	30,3076	06643 0	CLRW678	STORE	W +162D,1	
1922					30,3077	67300 0		TIX,1	SLOAD	
1923	REF	1			30,3100	61076 1			CLRW678	
1924	REF	1			30,3101	02007 1			S22WSUBL	

1926	REF	44	LAST	597	30,3102	02621 0		STORE	W +144D
1927	REF	45	LAST	598	30,3103	02631 1		STORE	W +152D
1928	REF	46	LAST	598	30,3104	02641 0		STORE	W +160D
1929					30,3105	43014 0		CLEAR	BOFF
1930	REF	7	LAST	592	30,3106	01663 0			LUNAFLAG
1931	REF	12	LAST	593	30,3107	04343 1			CMOONFLG
1932	REF	1			30,3110	61113 0			S22BX22A
1933					30,3111	77614 1		SET	
1934	REF	8	LAST	598	30,3112	01463 0			LUNAFLAG
1935					30,3113	77624 1	S22BX22A	CALL	
1936	REF	5	LAST	596	30,3114	61322 0			GETTF
1937					30,3115	77624 1		CALL	
1938	REF	2	LAST	528	30,3116	28373 1			LALOTORV
1939					30,3117	43175 0		VLOAD	BOFF
1940	REF	5	LAST	591	30,3120	02152 0			ALPHAV
1941	REF	13	LAST	598	30,3121	04343 1			CMOONFLG
1942	REF	1			30,3122	61124 1			S22BX22B
1943					30,3123	77752 1		VSL2	
1944					30,3124	77650 1	S22BX22B	GOTO	
1945	REF	1			30,3125	60744 0			S22BOX32
1946	REF	103	LAST	597	30,3126	0 6006 1	S22F244X	TC	INTPRET
1947					30,3127	46135 1	S22F244	SLOAD	BHIZ
1948	REF	4	LAST	591	30,3130	02746 0			CXOFF
1949	REF	1			30,3131	61160 1			S22BOX44
1950					30,3132	77776 1		EXIT	
1951	REF	34	LAST	597	30,3133	0 5301 0		TC	PHASCHNG
1952					30,3134	04022 0		OCT	04022
1953	REF	104	LAST	598	30,3135	0 6006 1		TC	INTPRET
1954					30,3136	77745 1		DLOAD	
1955	REF	10	LAST	595	30,3137	03670 0			S22TOFF
1956	REF	31	LAST	591	30,3140	34041 0		STCALL	TDEC1
1957	REF	4	LAST	523	30,3141	27022 1			CSMPREC
1958					30,3142	77775 1		VLOAD	
1959	REF	5	LAST	503	30,3143	00017 1			RATT1
1960	REF	8	LAST	597	30,3144	25207 0		STOVL	CSMPOS
1961	REF	2	LAST	595	30,3145	01215 0			S22UOFF
1962	REF	11	LAST	596	30,3146	25235 1		STOVL	UM
1963	REF	4	LAST	597	30,3147	01701 0			X789
1964					30,3150	43046 1		ABVAL	BOFF
1965	REF	14	LAST	598	30,3151	04343 1			CMOONFLG
1966					30,3152	61154 0			+2
1967					30,3153	77702 1		SR2	
1968	REF	3	LAST	593	30,3154	36241 0		STCALL	ERADM
1969	REF	2	LAST	592	30,3155	61240 0			S22F2410
1970					30,3156	77650 1		GOTO	
1971	REF	1			30,3157	61163 1			S22BX44A
1972					30,3160	77624 1	S22BOX44	CALL	
1973	REF	6	LAST	598	30,3161	61322 0			GETTF
1974	REF	11	LAST	598	30,3162	03670 0		STORE	S22TOFF
1975					30,3163	77214 0	S22BX44A	CLEAR	VLOAD

SET LUNAFLAG, TIME FOR LALOTORV
ERADFLAG,LAT,LONG,ALT SET PREVIOUSLY
CHECK SCALING OF ITEMS,ALT INPUT AND
RL OUTPUT IN ALPHAV BOTH B-29

COMPUTE RL

RL B-29

SCALE RL B-27 FOR MOON

FIG 2.4-4   TEST OFF=0

CALC RC AT OFFSET TIME

RC METERS B-29 OR B-27

U=UOFF

SCALE MOON R0 B-29 FOR S22F2410 SUBR

PRESENT TIME FOR LAT-LONG SETUP

1976	REF	9	LAST	598	30,3164	01663 0			LUNAFLAG	
1977	REF	5	LAST	598	30,3165	01701 0			X789	
1978					30,3166	43014 0		BOFF	SET	
1979	REF	15	LAST	598	30,3167	04343 1			CMOONFLG	
1980	REF	1			30,3170	61173 0			S22BX44B	
1981	REF	10	LAST	599	30,3171	01463 1			LUNAFLAG	SET = 1 FOR LAT-LONG
1982					30,3172	77742 0			VSR2	SCALE RL MOON B-29 FOR LAT-LONG
1983	REF	6	LAST	598	30,3173	16152 0	S22BX44B	STODL	ALPHAV	RL SCALED B-29 FOR LAT-LONG
1984	REF	12	LAST	598	30,3174	03670 0			S22TOFF	EITHER PRESENT OR OFFSET TIME
1985					30,3175	77624 1		CALL		
1986	REF	3	LAST	558	30,3176	26322 0			LAT-LONG	**** ALT OUTPUT ALWAYS B-29
1989					30,3177	77624 1		CALL		DISPLAY LAT/LONG/ALT
1990	REF	1			30,3200	61336 0			LLASPD	
1991					30,3201	77776 1		EXIT		
1992	REF	2	LAST	558	30,3202	3 3656 1		CAF	V06N89B	
1993	REF	143	LAST	597	30,3203	0 4555 0		TC	BANKCALL	
1994	REF	19	LAST	558	30,3204	20624 0		CADR	GOFLASH	
1995	REF	1			30,3205	0 3233 0		TC	S22GTP	V34E TERMINATE
1996					30,3206	0 3210 1		TC	+2	PROCEED SAVE LANDING SITE COORD
1997	REF	1			30,3207	0 3224 0		TC	S22.981X	RECYCLE POINT A IN GSOP
1998	REF	105	LAST	598	30,3210	0 6006 1		TC	INTPRET	
1999					30,3211	70740 0		LXC,1	DLOAD*	
2000	REF	6	LAST	595	30,3212	02750 1			S22LOC	
2001					30,3213	00001 0			0,1	
2002					30,3214	24007 0		STOVL	6D	6-7D= LANDING SITE TIME FOR R-TO-RP
2003	REF	6	LAST	599	30,3215	01701 0			X789	
2004					30,3216	00001 0		STORE	0D	0-5D= LANDING SITE VEC FOR R-TO-RP
2005					30,3217	45135 1		SLOAD	CALL	
2006	REF	6	LAST	592	30,3220	15330 0			HIDPHALF	ANY NON-ZERO FOR MOON
2007	REF	2	LAST	595	30,3221	55366 1			R-TO-RP	CONVERT RLS TO MOON-FIXED COORD
2008	REF	6	LAST	558	30,3222	02026 1		STORE	RLS	LANDING SITE VECTOR
2009					30,3223	77776 1		EXIT		
2010	REF	106	LAST	599	30,3224	0 6006 1	S22.981X	TC	INTPRET	
2011					30,3225	77624 1		CALL		
2012	REF	1			30,3226	61354 1			9DWTO6DW	
20121					30,3227	77776 1		EXIT		GO TO POINT A IN CHAPTER 5
20122	REF	107	LAST	599	30,3230	0 6006 1	S22EXEX	TC	INTPRET	WITHOUT CONVERTING W
2013					30,3231	77650 1		GOTO		
2014	REF	3	LAST	589	30,3232	03703 0			S22RTNEX	
20141	REF	108	LAST	599	30,3233	0 6006 1	S22GTP	TC	INTPRET	CONVERT W BEFORE TC GOTOPOOH
20142					30,3234	77624 1		CALL		
20143	REF	2	LAST	599	30,3235	61354 1			9DWTO6DW	
20144					30,3236	77776 1		EXIT		
20145	REF	27	LAST	597	30,3237	0 4106 1		TC	GOTOPOOH	
2015					30,3240	77201 1	S22F2410	SETPD	VLOAD	COMPUTE FORMULA 2.4.10
2016					30,3241	00001 0			0D	
2017	REF	9	LAST	598	30,3242	01207 0			CSMPOS	RC B-29 EARTH,B-27 MOON
2018					30,3243	50256 0		UNIT	DOT	UNIT ALSO SETS 36D=ABVAL(RC) USED BELOW
2019	REF	12	LAST	598	30,3244	01235 1			UM	

2020					30,,3245	57552 1	SL1	DCOMP	OSOP CHANGE 8/18/67
2021					30,3246	77606 1	PUSH		PD 2D 0D=COSA=-(UM.RC)/ABVAL(RC) B-1
2022					30,3247	44316 0	DSQ	BDSU	
2023	REP	1			30,3250	21654 0		DEC1B2	
2024					30,3251	43125 0	PDDL	BOFF	PD 4D 2D=1-COSA SQ=SINA SQ B-2
2025	REP	4	LAST	598	30,3252	02241 1		ERADM	RO ALWAYS B-29 FROM SETRE
2026	REP	16	LAST	599	30,3253	04343 1		CMOONFLG	
2027					30,3254	61256 1		+2	
2028					30,3255	77712 0	SL2		SCALE RO B-27 FOR MOON
2029					30,3256	56362 0	SR1R	DDV	(RO/RC) B-1
2030					30,3257	00045 0		36D	
2031					30,3260	45316 1	DSQ	DSU	PD 2D (RO/RC) SQ - SINA SQ B-2
2032					30,3261	44366 1	SQRT	BDSU	PD 0D COSA-SQRT(RO/RC)SQ-SINA SQ) B-1
2033					30,3262	77605 1	DMP		DMP RESULT B-28 MOON,B-30 EARTH
2034					30,3263	00045 0		36D	VXSC RESULT B-29 MOON, B-31 EARTH
2035	REP	6	LAST	593	30,3264	00041 1	STORE	S22RHO	RHO FOR W INIT. OF UNKNOWN LMK B-28,B-30
2036					30,3265	77761 1	VXSC		
2037	REP	13	LAST	599	30,3266	01235 1		UM	
2038					30,3267	53352 0	VSL2	VAD	SCALE B-27 MOON,B-29 EARTH AND ADD RC
2039	REP	10	LAST	599	30,3270	01207 0		CSMPOS	
2040	REP	7	LAST	599	30,3271	01701 0	STORE	X789	
2041					30,3272	77616 0	RVQ		B-27 FOR EARTH OR B-29 FOR MOON
2042					30,3273	77350 1	S22CALRC LXA,1	VLOAD	COMPUTE RC B-29 OR B-27
2043	REP	8	LAST	597	30,3274	03673 0		S22EORM	=0 FOR EARTH,-2 FOR MOON
2044	REP	2	LAST	574	30,3275	01573 1		DELTACSM	
2045					30,3276	53257 1	VSR*	VAD	
2046					30,3277	20610 1		7,1	
2047	REP	2	LAST	574	30,3300	01607 1		RCVCSM	
2048	REP	11	LAST	600	30,3301	01207 0	STORE	CSMPOS	
2049					30,3302	77616 0	RVQ		
2050	REP	1			30,3303	00031 0	S2231X13 STORE	S221X3	MULT 3X1 BY 1X3,STORE RESULTING 3X3 IN
2051					30,3304	77131 1	SSP	AXT,2	S22UMRL- S22UMRL +17D
2052	REP	7	LAST	528	30,3305	00052 0		S2	
2053					30,3306	00002 0	DEC	2	
2054					30,3307	00006 1	DEC	6	
2055					30,3310	77770 1	AXT,1		
2056					30,3311	00022 1	DEC	18	
2057					30,3312	73775 0	S2231NXT VLOAD	VXSC*	
2058	REP	2	LAST	600	30,3313	00031 0		S221X3	
2059	REP	3	LAST	593	30,3314	77746 0		S223X1 +6,2	
2060	REP	7	LAST	593	30,3315	07524 0	STORE	S22UMRL +18D,1	
2061					30,3316	61110 0	INCR,1	TIX,2	
2062					30,3317	77771 0	DEC	-6	
2063	REP	1			30,3320	61312 0		S2231NXT	
2064					30,3321	77616 0	RVQ		
2065					30,3322	70740 0	GETTF	LXC,1 DLOAD*	SET MPAC= TF
2066	REP	7	LAST	599	30,3323	02750 1		S22LOC	
2067					30,3324	00001 0		0,1	
2068					30,3325	77616 0	RVQ		

2069					30,3326	43014 0	S22FLGS	SET	SET	INTEGRATION FLAGS
2070	REP	9	LAST	595	30,3327	01476 0			DIM0FLAG	
2071	REP	4	LAST	595	30,3330	01475 0			D6OR9FLG	
2072					30,3331	43014 0		SET	SET	
2073	REP	9	LAST	576	30,3332	01474 1			VINTFLAG	
2074	REP	2	LAST	576	30,3333	01472 1			STATEFLG	
2075					30,3334	43414 1		CLEAR	RVQ	
2076	REP	9	LAST	576	30,3335	01673 1			INTYPFLG	

R2077 SUBROUTINE TO MODIFY ALT AND STORE LAT TO LAT+5 IN LANDLAT TO LANDLAT+5
R2078 PRIOR TO DISPLAY.

2079					30,3336	77745 1	LLASRD	DLOAD		ALT , LANDALT METERS B-29
2080	REP	4	LAST	274	30,3337	01110 0			ALT	
2081	REP	3	LAST	277	30,3340	16362 1		STODL	LANDALT	
2082	REP	5	LAST	276	30,3341	01106 1			LONG	
2083					30,3342	77742 0		SR1		
2084	REP	3	LAST	277	30,3343	02360 0		STORE	LANDLONG	
2085					30,3344	77616 0		RVQ		

R2086 SUBROUTINE TO MODIFY LANDALT AND STORE LANDALT TO LANDALT+5 IN LAT TO
R2087 LAT+5 AFTER LMK DATA LOADED BY ASTRONAUT.

2088					30,3345	77745 1	LLASRDA	DLOAD		ALT , LANDALT METERS B-29
2089	REP	4	LAST	601	30,3346	02362 1			LANDALT	
2090	REP	5	LAST	601	30,3347	15110 0		STODL	ALT	
2091	REP	4	LAST	601	30,3350	02360 0			LANDLONG	
2092					30,3351	77752 1		SL1		
2093	REP	6	LAST	601	30,3352	01106 1		STORE	LONG	
2094					30,3353	77616 0		RVQ		
2095					30,3354	40220 0	9DWTO6DW	STQ	SETPD	
2096	REP	1			30,3355	01214 1			9DWXX	
2097					30,3356	00001 0			0D	
2098					30,3357	41575 0		VLOAD	PUSH	CLEAR WORKING AREA OF PUSHLIST
2099	REP	4	LAST	545	30,3360	15332 1			HI6ZEROS	INCLUDING P
2100					30,3361	41406 0		PUSH	PUSH	PD 18D
2101					30,3362	77731 1		SSP		
2102	REP	1			30,3363	00017 1			9DWJ	J=29 USE 2*29 FOR DP WORDS
2103					30,3364	00072 1		DEC	58	
2104					30,3365	66150 0	9DWI=J	LXA,1	SXA,1	SET I=J
2105	REP	2	LAST	601	30,3366	00016 0			9DWJ	
2106	REP	1			30,3367	00012 1			9DWI	
2107					30,3370	77624 1	9DWEPCAL	CALL		
2108	REP	1			30,3371	61606 0			ROWDOT	
2109					30,3372	77750 0		LXA,1		P VARIES 0-20 INSTEAD OF 20-0
2110	REP	1			30,3373	00010 0			9DWP	
2111	REP	1			30,3374	06641 1		STORE	EMATRIX +40D,1	
2112					30,3375	68110 0		INCR,1	SXA,1	
2113					30,3376	00002 0		DEC	2	
2114	REP	2	LAST	601	30,3377	00010 0			9DWP	
2115					30,3400	46135 1		SLOAD	PHIZ	TEST I=0

2116	REF	2	LAST	601	30,3401	00013 0			9DwI
2117	REF	1			30,3402	61417 1			9DwTESTJ
2118					30,3403	77625 0		DSU	I=I-1
2119	REF	2	LAST	557	30,3404	21646 0			9DwID
2120	REF	3	LAST	602	30,3405	00013 0		STORE	9DwI
2121					30,3406	46025 1		DSU	BHIZ	TEST I=26
2122	REF	1			30,3407	21644 1			9Dw26D
2123	REF	1			30,3410	61413 0			9DwSETI2
2124					30,3411	77650 1		GOTO	NEXT E SUB P
2125	REF	1			30,3412	61370 1			9DwEPCAL
2126					30,3413	52131 0	9DwSETI2 SSP	GOTO	I=2
2127	REF	4	LAST	602	30,3414	00013 0			9DwI
2128					30,3415	00004 0		DEC	4
2129	REF	2	LAST	602	30,3416	61370 1			9DwEPCAL
2130					30,3417	46135 1	9DwTESTJ SLOAD	BHIZ	TEST J=0
2131	REF	3	LAST	601	30,3420	00017 1			9DwJ
2132	REF	1			30,3421	61438 1			9DwFIG6
2133					30,3422	77625 0		DSU	
2134	REF	3	LAST	602	30,3423	21646 0			9DwID
2135	REF	4	LAST	602	30,3424	00017 1		STORE	9DwJ	J=J-1
2136					30,3425	46025 1		DSU	BHIZ	TEST J=26
2137	REF	2	LAST	602	30,3426	21644 1			9Dw26D
2138	REF	1			30,3427	61432 0			9DwSETJ2
2139					30,3430	77650 1		GOTO	
2140	REF	1			30,3431	61365 0			9DwI=J
2141					30,3432	52131 0	9DwSETJ2 SSP	GOTO	SET J=2
2142	REF	5	LAST	602	30,3433	00017 1			9DwJ
2143					30,3434	00004 0		DEC	4
2144	REF	2	LAST	602	30,3435	61365 0			9DwI=J
2145					30,3436	77624 1	9DwFIG6 CALL		
21451	REF	15	LAST	597	30,3437	56741 0			GRP2PC
21452					30,3440	77331 0		SSP	VLOAD	START OF FIGURE 2.4-6
2146	REF	6	LAST	602	30,3441	00017 1			9DwJ	J=29
2147					30,3442	00072 1		DEC	58
2148	REF	5	LAST	601	30,3443	15332 1			HI6ZEROS
2149	REF	3	LAST	601	30,3444	00011 1		STORE	9DwP	P,N,I=0
2150					30,3445	66370 0		AXT,1	SSP
2151					30,3446	00154 1		DEC	108	CLEAR W0 TO W54
2152	REF	14	LAST	597	30,3447	00051 0			S1
2153					30,3450	00006 1			6
2154	REF	47	LAST	598	30,3451	06555 1	CLEARW54 STORE	W +108D,1
2155					30,3452	77700 0		TIX,1	
2156	REF	1			30,3453	61451 0			CLEARW54
2157					30,3454	66150 0	9DwI=JA LXA,1	SXA,1	I=J
2158	REF	7	LAST	602	30,3455	00016 0			9DwJ
2159	REF	5	LAST	602	30,3456	00012 1			9DwI
2160					30,3457	77624 1		CALL	
2161	REF	2	LAST	601	30,3460	61606 0			ROWDOT
2162					30,3461	43750 1		LXA,1	RDSU*
2163	REF	4	LAST	602	30,3462	00010 0			9DwP

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2164	REP	2	LAST	601	30,3463	02641 0			EMATRIX +40D,1	
2165					30,3464	66110 1		INCR,1	SXA,1	-(P+1)
2166					30,3465	00002 0			2	
2167	REP	5	LAST	602	30,3466	00010 0			9DWP	
2168					30,3467	54140 0		LXC,1	XSU,1	-(I+N)
2169	REP	6	LAST	602	30,3470	00012 1			9DWI	
2170	REP	1			30,3471	00014 1			9DWN	
2171					30,3472	71244 0		BPL	DLOAD	TEST WSQ LTE 0
2172	REP	1			30,3473	61477 1			9DWAAA	
2173	REP	6	LAST	602	30,3474	15332 1			HI6ZEROS	W=0
2174					30,3475	77650 1		GOTO		
2175	REP	1			30,3476	61500 0			9DWAAB	
2176					30,3477	77766 1	9DWAAA	SQRT		W= SQRT(WSQ)
2177	REP	48	LAST	602	30,3500	06401 0	9DWAAB	STORE	W,1	
2178	REP	1			30,3501	14001 0		STODL	WORKW	
2179	REP	8	LAST	602	30,3502	00017 1			9DWJ	TEST J=0
2180					30,3503	77630 1		BHIZ		
2181	REP	1			30,3504	61572 0			9DWEXITX	EXIT
2182					30,3505	46135 1	TST2I=0	SLOAD	BHIZ	TEST I=0
2183	REP	7	LAST	603	30,3506	00013 0			9DWI	
2184	REP	1			30,3507	61550 0			9DWN=N+3	
2185					30,3510	77625 0		DSU		
2186	REP	4	LAST	602	30,3511	21646 0			9DWID	
2187	REP	8	LAST	603	30,3512	00013 0		STORE	9DWI	I=I-1
2188					30,3513	46025 1		DSU	BHIZ	TEST I=26
2189	REP	3	LAST	602	30,3514	21644 1			9DW26D	
2190	REP	1			30,3515	61520 1			9DWAAC	
2191					30,3516	77650 1		GOTO		
2192	REP	1			30,3517	61523 1			9DWNEXEP	
2193					30,3520	77731 1	9DWAAC	SSP		I=2
2194	REP	9	LAST	603	30,3521	00013 0			9DWI	
2195					30,3522	00004 0			4	
2196					30,3523	77624 1	9DWNEXEP	CALL		
2197	REP	3	LAST	602	30,3524	61606 0			ROWDOT	
2198					30,3525	43750 1		LXA,1	BDSU*	(EP-ROWI*ROWJ)/W
2199	REP	6	LAST	603	30,3526	00010 0			9DWP	
2200	REP	3	LAST	603	30,3527	02641 0			EMATRIX +40D,1	
2201					30,3530	62071 0		DDV	INCR,1	P=P+1
2202	REP	2	LAST	603	30,3531	00001 0			WORKW	
2203					30,3532	00002 0			2	
2204					30,3533	70130 1		SXA,1	LXC,1	
2205	REP	7	LAST	603	30,3534	00010 0			9DWP	
2206	REP	10	LAST	603	30,3535	00012 1			9DWI	
2207					30,3536	40060 0		XSU,1	BOV	-(I+N)
2208	REP	2	LAST	603	30,3537	00014 1			9DWN	
2209	REP	1			30,3540	61543 1			SETWIN=0	
2210					30,3541	77650 1		GOTO		
2211	REP	1			30,3542	61545 1			9DWSETWX	
2212					30,3543	77745 1	SETWIN=0	DLOAD		W(I+N)=0
2213	REP	7	LAST	603	30,3544	15332 1			HI6ZEROS	

2214	REF	49	LAST	603	30,3545	06401 1	9DWSETWX STORE	W,1	
2215					30,3546	77650 1	GOTO		
2216	REF	1			30,3547	61505 0		TST2I=0	
2217					30,3550	62150 1	9DWN=N+3 LXA,1	INCR,1	N=N+3
2218	REF	3	LAST	603	30,3551	00014 1		9DWN	
2219					30,3552	00006 1		6	
2220					30,3553	67330 0	SXA,1	SLOAD	J=J-1
2221	REF	4	LAST	604	30,3554	00014 1		9DWN	
2222	REF	9	LAST	603	30,3555	00017 1		9DWJ	
2223					30,3556	77625 0	DSU		
2224	REF	5	LAST	603	30,3557	21646 0		9DWID	
2225	REF	10	LAST	604	30,3560	00017 1	STORE	9DWJ	
2226					30,3561	46025 1	DSU	BHIZ	TEST J=26
2227	REF	4	LAST	603	30,3562	21644 1		9DW26D	
2228	REF	1			30,3563	61566 0		SETJ=2A	
2229					30,3564	77650 1	GOTO		
2230	REF	1			30,3565	61454 0		9DWI=JA	
2231					30,3566	52131 0	SETJ=2A SSP	GOTO	J=2
2232	REF	11	LAST	604	30,3567	00017 1		9DWJ	
2233					30,3570	00004 0		4	
2234	REF	2	LAST	604	30,3571	61454 0		9DWI=JA	
2235					30,3572	77824 1	9DWEXITX CALL		
22351	REF	16	LAST	602	30,3573	56741 0		GRP2PC	
22352					30,3574	66370 0	AXT,1	SSP	CLEAR W6,W7,W8 USED TEMP FOR EMATRIX
2236					30,3575	00066 1	DEC	54	
2237	REF	15	LAST	602	30,3576	00051 1		S1	
2238					30,3577	00006 1		6	
2239					30,3600	77775 1	VLOAD		
2240	REF	8	LAST	603	30,3601	15332 1		HI6ZEROS	
2241	REF	50	LAST	604	30,3602	06643 0	9DWEXXXA STORE	W +162D,1	
2242					30,3603	52100 1	TIX,1	GOTO	
2243	REF	1			30,3604	61602 1		9DWEXXXA	
2244	REF	2	LAST	601	30,3605	01214 1		9DWXX	
2245					30,3606	40131 0	ROWDOT SSP	BOV	
2246	REF	1			30,3607	00007 0		XTMP1	
2247					30,3610	00377 1	OCT	377	
2248					30,3611	61612 0		+1	
2249					30,3612	71140 1	LXC,1	LXC,2	
2250	REF	11	LAST	603	30,3613	00012 1		9DWI	
2251	REF	12	LAST	604	30,3614	00016 0		9DWJ	
2252					30,3615	41545 0	DLOAD	PUSH	
2253	REF	9	LAST	604	30,3616	15332 1		HI6ZEROS	
2254					30,3617	56743 1	ROWDOT1 DLOAD*	DMPR*	
2255	REF	51	LAST	604	30,3620	02401 0		W,1	
2256	REF	52	LAST	604	30,3621	75376 1		W,2	
2257					30,3622	41415 1	DAD	PUSH	
2258					30,3623	62000 0	BOV	INCR,1	
2259	REF	1			30,3624	61640 1		ROWDOT3	
2260					30,3625	77771 0	DEC	-6	
2261					30,3626	67314 0	INCR,2 SLOAD		

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2262					30,3627	77771 0		DEC	-6		
2263	REF	2	LAST	604	30,3630	00007 0			XTMP1		
2264					30,3631	70430 1		BHIZ	SR1		
2265	REF	1			30,3632	61636 0			RO&DOT2		
2266	REF	3	LAST	605	30,3633	00007 0		STORE	XTMP1		
2267					30,3634	77650 1		GOTO			
2268	REF	1			30,3635	61617 0			RO&DOT1		
2269					30,3636	77745 1	RO&DOT2	DLOAD			
2270					30,3637	77616 0		RVQ			
2271					30,3640	77614 1	RO&DOT3	CLRGO			
2272	REF	7	LAST	595	30,3641	01631 1			ORBWFLAG		
2273	REF	2	LAST	605	30,3642	61636 0			RO&DOT2		
2274					0000		WORKW	=	0D		
2275					0006		XTMP1	=	6D		
2276					0010		9DwP	=	8D	P	
2277					0012		9DwI	=	10D	I	
2278					0014		9DwN	=	12D	N	
2279					0016		9DwJ	=	14D	J	
2280	REF	3	LAST	598	1214		9DwXX	=	S22UOFF		
2281	REF	16	LAST	596	E7,1501		S22UMRL	=	BVECTOR	18	
2282	REF	9	LAST	597	1256		S22UUT	=	DELTAX	18	
2283					0022		S223X1	=	18D	6	
2284					0030		S221X3	=	24D	6	
2285					0036		S22D	=	30D	2	
2286					0040		S22RHO	=	32D	2	
2287	REF	53	LAST	604	E5,1634		S22RL	=	W +156D	6	
2289					30,3643	00064 0	9Dw26D	2DEC	52 B-14		
2289					30,3644	00000 1					
2290					30,3645	00002 0	9DwID	2DEC	2 B-14		
2290					30,3646	00000 1					
2291					30,3647	10306 0	SCTVAR	2DEC	1.0 E-6 B+18		
2291					30,3650	36750 0					
2292					30,3651	00253 0	IMUVARR	2DEC	0.04 E-6 B+18		
2292					30,3652	31436 1					
2293					30,3653	10000 0	DEC1B2	2DEC	1 B-2		
2293					30,3654	00000 1					
2294					30,3655	01461 0	V06N49EE	VN	00649		
2295					30,3656	01531 1	V06N89B	VN	00689		
2299	REF	5	LAST	574	1214		S22UOFF	=	LEMPOS	6	U SUB OFF
2300	REF	2	LAST	565	23,2000			SETLOC	P20S2		
2301					23,3136			BANK			

P2372   SUBROUTINE NAME'   V89CALL
R2373   MOD NO' 0   DATE' 8 FEB 1968
R2374   MOD BY' DIGITAL DEVEL GROUP   LOG SECTION' P20-P25

R2375   FUNCTIONAL DESCRIPTION'

R2376   CALLED BY VERB 89 ENTER DURING P00. PRIO 10 USED. CALCULATES AND
R2377   DISPLAYS FINAL GIMBAL ANGLES TO POINT CSM +X AXIS OR PREFERRED AXIS
R2378   (UNIT(Z)COS55 DEG + UNIT(X)SIN55 DEG) AT LM.

R2379   1. KEY IN V 89 E ONLY IF IN PROG 00. IF NOT IN P00, OPERATOR ERROR AND
R2380   EXIT R63, OTHERWISE CONTINUE.

R2381   2. IF IN P00, DO IMU STATUS CHECK (R02BOTH). IF IMU ON AND ITS
R2382   ORIENTATION KNOWN TO CGC, CONTINUE.

R2383   3. FLASH DISPLAY V 04 N 06. R2 INDICATES WHICH SPACECRAFT AXIS IS TO
R2384   BE POINTED AT LM.   INITIAL CHOICE IS PREFERRED AXIS. (R2=1).
R2385   ASTRONAUT CAN CHANGE TO (+X) AXIS (R2 NOT= 1) BY V 22 E 2 E. CONTINUE
R2386   AFTER KEYING IN PROCEED.

R2387   4. SET PREFERRED ATTITUDE FLAG ACCORDING TO OPTION DESIRED. SET FLAG
R2388   FOR PREFERRED AXIS. RESET FLAG FOR X AXIS.

R2389   5. CURRENT TIME IS STORED AND R63COMP IS CALLED

R2390   R63COMP JOB'

R2391   UPDATES CSM AND LM STATE VECTORS USING CONIC EQUATIONS

R2392   CALCULATES BOTH PREFERRED AND X AXIS TRACKING ATT FROM CSM TO LM.

R2393   DESIRED GIMBAL ANGLES AS INDICATED BY PREFERRED ATTITUDE FLAG
R2394   ARE STORED FOR LATER R60CSM CALL.

R2395   6. FLASH DISPLAY V 06 N18 AND AWAIT RESPONSE.

R2396   7. RECYCLE- RETURN TO STEP 5.
R2397   TERMINATE- EXIT R63 ROUTINE
R2398   PROCEED- RESET 3AXISFLG AND CALL R60CSM FOR ATTITUDE MANEUVER.
R2399   CALLING SEQUENCE' V 89 E

R2400   SUBROUTINES CALLED' CHKPOOH, R02BOTH, GOXDSPF, R63COMP, R60CSM

R2401   ALARMS   1. OPERATOR ERROR IF NOT IN P00
R2402   2. PROGRAM ALARM IF IMU IS OFF
R2403   3. PROGRAM ALARM IF IMU ORIENTATION IS UNKNOWN

R2404   ERASABLE INITIALIZATION REQUIRED' NONE

R2405   DEBRIS' OPTION1, OPTION1+1, PRPTRKAT(PREP ATT FLAG),P21TIME, 3AXISFLG

24055				23,3136	00000 1	DP1MIN	2DEC	6000	
24055				23,3137	13560 0				
2406	REF	13	LAST 586	E4,1715			EBANK=	P21TIME	
2407				34,3601			BANK	34	
2408	REF	2	LAST 582	34,2000			SETLOC	P20S4	
2409				34,3601			BANK		
2410	REF	1					COUNT*	$$/R63	
2411	REF	144	LAST 599	34,3601	0 4555 0	V89CALL	TC	BANKCALL	IMU STATUS CHECK. RETURNS IF ORIENTATION
2412	REF	3	LAST 555	34,3602	17573 0		CADR	R02BOTH	KNOWN. ALARMS IF NOT.
2413	REF	19	LAST 565	34,3603	3 6214 0		CAF	THREE	ALLOW ASTRONAUT TO SELECT DESIRED
2414	REF	3	LAST 518	34,3604	55«131 1		TS	OPTION1	TRACKING ATTITUDE AXIS.
2415	REF	72	LAST 595	34,3605	3 4712 1		CAF	ONE	
2416	REF	4	LAST 608	34,3606	55«132 1		TS	OPTION1 +1	
2417	REF	1		34,3607	3 3650 1		CAF	VB04N06	V 04 N 06
2418	REF	145	LAST 608	34,3610	0 4555 0		TC	BANKCALL	
2419	REF	20	LAST 599	34,3611	20624 0		CADR	GOFLASH	
2420	REF	26	LAST 511	34,3612	0 5423 1		TC	ENDEXT	TERMINATE
2421				34,3613	0 3615 0		TC	+2	PROCEED
2422				34,3614	0 3607 0		TC	-5	DATA IN. OPTION1 +1 = 1 FOR PREP AXIS
A2423									= 2 FOR X AXIS
2424	REF	5	LAST 608	34,3615	4 1132 1		CS	OPTION1 +1	1 FOR PREP AXIS. 2 FOR X AXIS.
2425	REF	73	LAST 608	34,3616	6 4712 1		AD	ONE	
2426				34,3617	0 0006 1		EXTEND		
2427	REF	1		34,3620	1 3645 1		BZF	SETPAF	
2428	REF	31	LAST 565	34,3621	0 5447 0	RSTPAF	TC	DOWNFLAG	RESET PREP ATT FLAG FOR R63COMP
2429	REF	2	LAST 54	34,3622	00120 1		ADRES	RNGSCPLG	TO DO X AXIS. RESET BIT 10 FLAG 5
2430	REF	109	LAST 599	34,3623	0 6006 1	V89RECL	TC	INTPRET	
2431				34,3624	43234 0		RTB	DAD	
2432	REF	17	LAST 583	34,3625	45505 0			LOADTIME	READ PRESENT TIME
24325	REF	1		34,3626	07137 0			DP1MIN	INTEGRATE TO 1 MIN FROM NOW
2433	REF	14	LAST 608	34,3627	36316 0		STCALL	P21TIME	STORE TIME FOR CALL TO R63COMP. R63COMP
2434	REF	1		34,3630	71461 1			R63COMP	LEAVES DESIRED GIM ANGS IN THETAD,LOS IN
2435				34,3631	77776 1		EXIT		POINTVSM, AND SELECTED AXIS IN SCAXIS.
2436	REF	1		34,3632	3 3651 0		CAF	VB06N18	V 06 N 18
2437	REF	146	LAST 608	34,3633	0 4555 0		TC	BANKCALL	NOUN 18 REFERS TO THE DESIRED GIMBAL
2438	REF	21	LAST 608	34,3634	20624 0		CADR	GOFLASH	
2439	REF	27	LAST 608	34,3635	0 5423 1		TC	ENDEXT	TERMINATE
2440				34,3636	0 3640 0		TC	+2	PROCEED
2441	REF	1		34,3637	0 3623 0		TC	V89RECL	RECYCLE
2442	REF	32	LAST 608	34,3640	0 5447 0		TC	DOWNFLAG	RESET 3 AXIS FLAG
2443	REF	4	LAST 564	34,3641	00124 0		ADRES	3AXISFLG	RESET BIT 6 FLAG 5

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2444	REP	147	LAST	608	34,3642	0 4555 0		TC	BANKCALL
2445	REP	3	LAST	565	34,3643	56000 1		CADR	R60CSM
2446	REP	28	LAST	608	34,3644	1 5423 0		TCF	ENDEXT
2447	REP	30	LAST	565	34,3645	0 5435 0	SETPAF	TC	UPFLAG
2448	REP	3	LAST	608	34,3646	00120 1		ADRES	RNGSCFLG
2449	REP	2	LAST	608	34,3647	0 3623 0		TC	V89R2CL
2450					34,3650	01006 0	VB04N06	VN	0406
2451					34,3651	01422 1	VB06N18	VN	0618
2452	REP	2	LAST	583	34,3461		R63COMP	EQUALS	R63

PERFORMS CSM MANEUVER TO ALIGN SELECTED
SPACECRAFT AXIS TO LOS.

SET PREFERRED ATT FLAG FOR R63COMP
TO DO PREF AXIS. SET BIT 10 FLAG 5.

Line	REF		LAST		Address	Octal	Label	Op	Operand	Comment
P2453					PROGRAM NAME- P23 CISLUNAR MIDCOURSE NAVIGATION					
R2454					MOD NO					
R2455					MOD BY- TOM KNATT					
R2456					FUNCTIONAL DESCRIPTION- DO MIDCOURSE NAVIGATION BY INCORPORATION OF STAR					
R2457					/EARTH AND STAR/MOON OPTICAL MEASUREMENTS.					
R2458					CALLING SEQUENCE- ASTRONAUT OPERATED					
R2459					SUBROUTINES CALLED-R52,R53,R57,R80,ORBITAL INTEGRATION (INTEGRV)					
R2460					INCORP1,INCORP2,LALOTORV,LUNLMKLD,AND DISPLAY INTERFACE ROUTINES.					
R2461					NORMAL EXIT MODES- VIA R00					
R2462					ALARMS- NONE					
R2463					ABORT MODES- NONE					
R2464					ERASABLE INITIALIZATION REQUIRED- PAD-LOADED ERASABLES,ORBWFLAG RESET,					
R24645					REFSMFLG=0 IF IMU OFF AND REFSMFLG=1 IF IMU ON					
R24647					INPUTS BY USER REQUIRED- STAR NUMBER,LANDMARK LAT,LONG/2,ALT OR ID NUMB.					
R24648					IF LANDMARK IS USED, NEAR OR FAR HORIZON IF HORIZON IS USED, AND					
R24649					BODY TO BE MARKED ON(EARTH OR MOON). SEE GSOP CHAPT 4.					
R2465					OUTPUT-UPDATED CMC STATE VECTOR. VECTOR FROM S/C TO HORIZON OR LANDMARK					
R24651					IN POINTAXS. POINTAXS CAN BE USED TO GENERATE THIS VECTOR APART FROM					
R24652					P23 IF DESIRED.					
R2466					DEBRIS-NO USABLE DEBRIS IS GENERATED. RENDWFLG IS RESET FOR P20 UPON					
R24665					COMPLETION OF P23. RUPTREGS AND ERASABLES USED BY DISPLAYS ARE DEBRIS					
2467										
2468	REF	1			31,2021			BANK	31	
2469					31,2000			SETLOC	RT23	
					31,2021			BANK		
2470	REF	1						COUNT	31/S23	
2471	REF	54	LAST	605	E5,1400			EBANK=	W	
24712	REF	33	LAST	608	31,2021	0 5447 0	P23	TC	DOWNFLAG	
24714	REF	4	LAST	555	31,2022	00010 0		ADRES	RNDVZFLG	
2472	REF	10	LAST	590	31,2023	0 5261 1		TC	2PHSCHNG	
2473					31,2024	00004 0		OCT	00004	LEAVE GROUP 4
2474					31,2025	00012 1		OCT	00012	ENTER GROUP 2
2475	REF	1			31,2026	3 4760 1		CAF	PRIO13	
2476	REF	3	LAST	569	31,2027	55∝056 1		TS	PHSPRDT2	
2477	REF	110	LAST	608	31,2030	0 6006 1		TC	INTPRET	
2478					31,2031	43131 0		SSP	CLEAR	
2479	REF	5	LAST	556	31,2032	00302 0			MARKINDX	
2480					31,2033	00001 0			1	
2481	REF	2	LAST	555	31,2034	00666 1			TARG2FLG	
2482					31,2035	66214 0		CLEAR	SSP	TARGET FLAG USED BY R52 AND R53
2483	REF	3	LAST	554	31,2036	00665 1			TARG1FLG	
2484	REF	3	LAST	202	31,2037	00305 1			STARIND	
2485					31,2040	00000 1			0	
2486					31,2041	43131 0		SSP	CLEAR	
2487	REF	6	LAST	209	31,2042	00303 1			BESTI	
2488					31,2043	00000 1			0	
24882	REF	1			31,2044	03267 1			R57FLAG	SET = DO NOT REPERFORM R57
24883					31,2045	77414 0		CLEAR	EXIT	
24884	REF	2	LAST	260	31,2046	04664 1			V94FLAG	SET = ALLOW V94
24885	REF	111	LAST	610	31,2047	0 6006 1	P23.00	TC	INTPRET	

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2489                    31,2050  45014 0    BON    CALL
2490. REF  4 LAST 576   31,2051  01702 0           REFSMFLG      SET NOW AS INPUT, NORMALLY EXTERNAL CONT
2491  REF  1            31,2052  62060 0           P23.05        WHEN ALIGNED,PERFORM MEASUREMENT
2492  REF  1            31,2053  76360 0           R57           DO OPTICS CALIBRATION IF IMU NOT ALIGNED
2493                    31,2054  77624 1    CALL
2494  REF  1            31,2055  31322 0           R53
2495                    31,2056  77650 1    GOTO
2496  REF  1            31,2057  62236 1           P23.60
2500                    31,2060  77414 0  P23.05  CLEAR  EXIT
2501  REF  1            31,2061  04665 0           SAVECFLG      USED TO SAVE SPACE IN P23.65
2502  REF  1            31,2062  3 3050 1   CAF    V05N70        REQUEST RESPONSE AND DISPLAY MEASUREMENT
2503. REF 148 LAST 609  31,2063  0 4555 0   TC     BANKCALL      IDENTIFICATION- STAR,LMK,HOR  IDENT.
2504  REF 22 LAST 608   31,2064  20624 0    CADR   GOFLASH
2505  REF 28 LAST 599   31,2065  0 4106 1   TC     GOTOPOOH      TERMINATE
2506  REF  1            31,2066  0 2070 1   TC     P23.15
2507                    31,2067  0 2062 1   TC     -5            REDISPLAY
2508  REF 19 LAST 589   31,2070  3 1751 0  P23.15  CA     LANDMARK   IF C=2,LUNAFLAG=1. IF C=1,LUNAFLAG=0
2509                    31,2071  0 0006 1   EXTEND
2510                    31,2072  1 2074 1   BZF    +2
2511                    31,2073  0 2075 1   TC     +2
2512  REF  4 LAST 276   31,2074  3 1752 0   CA     HORIZON       SET LUNAFLAG FROM HORIZON OR LANDMARK
2513  REF 23 LAST 574   31,2075  7 4703 0   MASK   BIT8
2514                    31,2076  0 0006 1   EXTEND
2515  REF  1            31,2077  1 2104 1   BZF    P23.16
2516  REF 112 LAST 610  31,2100  0 6006 1   TC     INTPRET
2517                    31,2101  52014 0    SET    GOTO
2518  REF 11 LAST 599   31,2102  01463 1           LUNAFLAG
2519  REF  1            31,2103  62107 0           P23.17
2520  REF 113 LAST 611  31,2104  0 6006 1  P23.16  TC     INTPRET
2521                    31,2105  77614 1    CLEAR
2522  REF 12 LAST 611   31,2106  01663 0           LUNAFLAG
2523                    31,2107  41535 1  P23.17  SLOAD  PUSH
25231 REF  5 LAST 444   31,2110  00736 0           STARCODE
25232                   31,2111  41335 1    SLOAD  DMP
25233 REF  1            31,2112  23055 0           SPSIX
25234                   31,2113  66150 0    LXA,1  SXA,1
25235 REF 259 LAST 596  31,2114  00155 0           MPAC +1
25236 REF  7 LAST 610   31,2115  00302 0           BESTI         BESTI = 6XSTAR NUMBER
25237                   31,2116  77624 1    CALL
25238 REF  1            31,2117  30000 1           LOWMEMRY      NEEDED TO RETRIEVE STAR VECTOR FROM LOW
25239 REF  2 LAST  92   31,2120  02817 0    STORE  STARSAV2      STORE FOR R53,P23. US(IN P23)=STARSAV2
252395                  31,2121  77776 1    EXIT
2524  REF 20 LAST 611   31,2122  3 1751 0   CA     LANDMARK
2525  REF  1            31,2123  7 3052 1   MASK   OCT00077
2526  REF  2 LAST  95   31,2124  55*753 0   TS     IDOFLMK       FOR R3(DE) LUNAFLAG ALREADY SET
2527  REF  5 LAST 611   31,2125  3 1752 0   CA     HORIZON
2528                    31,2126  0 0006 1   EXTEND
2529  REF  1            31,2127  1 2144 0   BZF    P23.12
2530  REF 30 LAST 553   31,2130  7 4706 0   MASK   BIT5          IF D=1,NORFHOR=0(NEAR) .D=2,NORFHOR=1,FAR
2531                    31,2131  0 0006 1   EXTEND
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2532   REP   1              31,2132  1 2137 1            BZF     P23.18
2533   REP 114  LAST  611   31,2133  0 6006 1            TC      INTPRET
2534                        31,2134    52014 0           SET     GOTO
2535   REP   1              31,2135    00064 0                   NORFHOR
2536   REP   1              31,2136    62142 1                   P23.19
2537   REP 115  LAST  612   31,2137  0 6006 1  P23.18    TC      INTPRET
2538                        31,2140    77614 1           CLEAR
2539   REP   2  LAST  612   31,2141    00284 1                   NORFHOR
2540                        31,2142    77776 1  P23.19   EXIT
2544   REP   1              31,2143  0 2156 1            TC      P23.30
2545   REP   3  LAST  611   31,2144  3 1753 1  P23.12    CA      IDOFLMK        IF R2(DE) NONZERO, LMK IS IDENTIFIED
2546                        31,2145  0 0006 1            EXTEND
2547   REP   1              31,2146  1 2150 0            BZF     P23.20         LANDMARK NOT IDENTIFIED
2548   REP   2  LAST  612   31,2147  0 2156 1            TC      P23.30         LANDMARK IS IDENTIFIED
2549   REP   1              31,2150  3 3047 1  P23.20    CAF     V6N89          REQUEST RESPONSE AND DISPLAY LMK DATA
2550   REP 149  LAST  611   31,2151  0 4555 0            TC      BANKCALL       R1=LAT,R2=LONG/2,R3=ALT
2551   REP  23  LAST  611   31,2152    20624 0           CADR    GOFLASH
2552   REP  29  LAST  611   31,2153  0 4106 1            TC      GOTOPOOH
2553   REP   3  LAST  612   31,2154  0 2156 1            TC      P23.30         TERMINATE
2554   REP   2  LAST  612   31,2155  0 2150 1            TC      P23.20
2555   REP 116  LAST  612   31,2156  0 6006 1  P23.30    TC      INTPRET        STORE NEW DATA AND REDISPLAY
2556                        31,2157    77414 0           BON     EXIT
2557   REP   2  LAST  611   31,2160    04705 1                   SAVECFLG
2558   REP   1              31,2161    62265 1                   P23.85
2559   REP   1              31,2162  3 3053 1            CAF     V50N25P
2560   REP 150  LAST  612   31,2163  0 4555 0            TC      BANKCALL
2561   REP   1              31,2164    20751 0           CADR    GOPERF1        GOPERF1 BLANKS OUT R2 AND R3.
2562   REP  30  LAST  612   31,2165  0 4106 1            TC      GOTOPOOH
2563   REP   2  LAST  207   31,2166  0 2173 0            TC      V94ENTER       PROCEED. AUTOCONTROL CMC
2564   REP   1              31,2167  0 2170 0            TC      P23.55         ENTER. MANUAL CONTROL
2565   REP 117  LAST  612   31,2170  0 6006 1  P23.55    TC      INTPRET
2566                        31,2171    77650 1           GOTO
2567   REP   1              31,2172    62224 1                   P23.56
R2568                       VERB 94 BEGINS HERE
2569   REP 118  LAST  612   31,2173  0 6006 1  V94ENTER  TC      INTPRET
2570                        31,2174    77634 0           RTB
2571   REP  18  LAST  608   31,2175    45505 0                   LOADTIME       READ CLOCK
2572   REP   8  LAST  577   31,2176    35225 1           STCALL  MARKTIME
2573   REP   1              31,2177    62272 1                   POINTAXS
2574                        31,2200    53521 1           MXV     UNIT           RETURN LOS IN RCLL AND MPAC
2575   REP  17  LAST  586   31,2201    01736 1                   REFSMMAT
2576   REP   4  LAST  586   31,2202    27357 0           STOVL   POINTVSM
2577   REP   1              31,2203    23056 0                   JCAXIS
2578   REP  14  LAST  587   31,2204    03351 0           STORE   SCAXIS
2579                        31,2205    77776 1           EXIT
2580   REP  34  LAST  610   31,2206  0 5447 0            TC      DOWNFLAG       CLEAR AND GO TO VECPOINT IN R60.
2581   REP   5  LAST  608   31,2207    00124 0           ADRES   3AXISFLG       BIT 6  FLAG 5
2584   REP   1              31,2210  3 3063 1            CAF     R60ADRS
2585   REP   3  LAST  197   31,2211  54 374 0            TS      TEMPFLSH
2586   REP  35  LAST  598   31,2212  0 5301 0            TC      PHASCHNG
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Line	REP			Address	Octal	Loc	Op	Operand	Comment
2587				31,2213	00012 1		OCT	00012	
25871	REP 151	LAST	612	31,2214	0 4555 0	R60CALL	TC	BANKCALL	
25872	REP 4	LAST	609	31,2215	56000 1		CADR	R60CSM	
25873	REP 36	LAST	612	31,2216	0 5301 0		TC	PHASCHNG	
25874				31,2217	04022 0		OCT	04022	
2588	REP 119	LAST	612	31,2220	0 6006 1		TC	INTPRET	
2589				31,2221	77614 1		BON		
2590	REP 2	LAST	610	31,2222	03307 0			R57FLAG	
2591	REP 1			31,2223	62226 0			P23.57	DO NOT REPERFORM R57
2592				31,2224	77624 1	P23.56	CALL		
2593	REP 2	LAST	611	31,2225	76360 0			R57	
2594				31,2226	43014 0	P23.57	SET	SET	
2595	REP 3	LAST	610	31,2227	04464 0			V94FLAG	
2596	REP 3	LAST	613	31,2230	03067 0			R57FLAG	
2597				31,2231	77624 1		CALL		
2598	REP 3	LAST	556	31,2232	30002 0			R52	
2808				31,2233	43014 0		CLEAR	CLEAR	
2809	REP 4	LAST	613	31,2234	04664 1			V94FLAG	
2810	REP 4	LAST	613	31,2235	03267 1			R57FLAG	
2811				31,2236	77776 1	P23.60	EXIT		
2812				31,2237	0 0004 0		INHINT		
2813	REP 32	LAST	590	31,2240	3 1330 0		CA	MARKSTAT	
2814	REP 6	LAST	413	31,2241	7 4747 0		MASK	LOW10	
2815	REP 5	LAST	591	31,2242	55∝242 0		TS	MARKDATA	
2816				31,2243	0 0006 1		EXTEND		
2817	REP 6	LAST	613	31,2244	5 1242 1		INDEX	MARKDATA	
2818				31,2245	3 0001 0		DCA	0	
2819	REP 9	LAST	612	31,2246	53∝225 1		DXCH	MARKTIME	
2820	REP 7	LAST	613	31,2247	51∝242 1		INDEX	MARKDATA	
2821				31,2250	3 0005 1		CA	5	
2822	REP 1			31,2251	57∝754 0		XCH	TRUNION	
2823				31,2252	0 0003 1		RELINT		
2824	REP 1			31,2253	3 3051 0		CAF	V05N71	
2825	REP 152	LAST	613	31,2254	0 4555 0		TC	BANKCALL	
2826	REP 24	LAST	612	31,2255	20624 0		CADR	GOFLASH	
2827	REP 31	LAST	612	31,2256	0 4106 1		TC	GOTOPOOH	TERMINATE
2828	REP 1			31,2257	0 2261 0		TC	P23.85	STORE DATA
2829				31,2260	0 2253 1		TC	-5	REDISPLAY
2830	REP 120	LAST	613	31,2261	0 6006 1	P23.65	TC	INTPRET	
2831				31,2262	77414 0		SET	EXIT	
2832	REP 3	LAST	612	31,2263	04465 1			SAVECFLG	
2833	REP 2	LAST	611	31,2264	0 2070 1		TC	P23.15	
2839				31,2265	45014 0	P23.85	CLEAR	CALL	
2840	REP 8	LAST	590	31,2266	02676 1			RENDWFLG	
2841	REP 2	LAST	612	31,2267	62272 1			POINTAXS	
2842				31,2270	77650 1		GOTO		
2843	REP 1			31,2271	62364 1			R23.55	
R2844	WE BEGIN CALCULATIONS HERE								
R2845	POINTAXIS SUBROUTINE								
2846				31,2272	67220 0	POINTAXS	STO	SLOAD	

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2647	REF	5	LAST	576	31,2273	01150 1			POINTEX	
2648	REF	21	LAST	611	31,2274	02752 0			LANDMARK	IF LANDMARK=0 HORIZON IS DESIRED.
26481					31,2275	67230 1		BHIZ	SLOAD	DO NOT PICK UP LMK VALUES FROM TABLE
26482	REF	1			31,2276	62307 1			R23.05	OR DISPLAY IN HORIZON CASE
26483	REF	4	LAST	612	31,2277	02754 0			IDOFLMK	
2649					31,2300	45030 0		BHIZ	CALL	
2650	REF	1			31,2301	62305 0			R23.0	
2651	REF	1			31,2302	63084 0			LUNLMKLD	
2652					31,2303	77650 1		GOTO		
2653	REF	2	LAST	614	31,2304	62307 1			R23.05	
2654					31,2305	77624 1	R23.0	CALL		MUST BE DONE 2ND TIME, TO ALLOW CHANGES
2655	REF	2	LAST	558	31,2306	61345 1			LLASRDA	
2656					31,2307	71214 0	R23.05	BON	DLOAD	
2657	REF	8	LAST	605	31,2310	01711 1			ORBWFLAG	
2658	REF	1			31,2311	62315 1			R23.1	
26582	REF	1			31,2312	03001 0			WMIDPOS	
26584					31,2313	34001 1		STCALL	0	
2659	REF	2	LAST	570	31,2314	56544 1			INITIALW	INITIALIZE W-MATRIX FIRST PASS IN P23
2660					31,2315	77624 1	R23.1	CALL		
2661	REF	6	LAST	573	31,2316	56343 0			SETINTG	SETUP FOR CSM INTEGRATION
2662					31,2317	43014 0		BOF	SET	
2663	REF	9	LAST	614	31,2320	01751 0			ORBWFLAG	
2664	REF	1			31,2321	62323 1			R23.2	
2665	REF	10	LAST	601	31,2322	01476 0			DIMOFLAG	
2666					31,2323	45014 0	R23.2	SET	CALL	
2667	REF	10	LAST	614	31,2324	01471 1			ORBWFLAG	
2668	REF	9	LAST	591	31,2325	27113 1			INTEGRV	INTEGRATE CSM STATE VEC. TO MARKTIME
2669					31,2326	77776 1		EXIT		
2670	REF	37	LAST	613	31,2327	0 5301 0		TC	PHASCHNG	
2671					31,2330	04022 0		OCT	04022	
2672	REF	121	LAST	613	31,2331	0 6006 1		TC	INTPRET	
2673					31,2332	77624 1		CALL		
2674	REF	1			31,2333	62767 0			RECT.1	PICKUP CSM STATE VECTOR FROM PERM
2675					31,2334	77214 0		BOFF	VLOAD	
2676	REF	1			31,2335	00345 0			ZMEASURE	IN SPHERE OF INFLUENCE OF PRIMARY BODY
2677	REF	1			31,2336	62341 0			R23.3	
2678	REF	4	LAST	87	31,2337	02272 1			ROVV	CALCULATED BY INTEGRATION B29
2679	REF	2	LAST	119	31,2340	03627 1		STORE	RZC	
2680					31,2341	46135 1	R23.3	SLOAD	BHIZ	
2681	REF	22	LAST	614	31,2342	02752 0			LANDMARK	IF LANDMARK = 0, USE HORIZ SUBR
2682	REF	1			31,2343	62353 0			R23.4	
2683					31,2344	77614 1		SET		
2684	REF	5	LAST	591	31,2345	00462 1			ERADFLAG	
2685					31,2346	45145 0		DLOAD	CALL	
2686	REF	10	LAST	613	31,2347	01225 0			MARKTIME	
2687	REF	3	LAST	598	31,2350	26373 1			LALOTORV	
2688					31,2351	77650 1		GOTO		
2689	REF	1			31,2352	62355 0			R23.5	
2690					31,2353	77624 1	R23.4	CALL		
2691	REF	1			31,2354	62527 0			HORIZ	

2692	REP	2	LAST	119	31,2355	03665 1	R23.5	STORE	RL
2693					31,2356	40251 0		VSU	SETPD
2694	REP	3	LAST	614	31,2357	03627 1			RZC
2695					31,2360	00001 0			0
2696	REP	2	LAST	119	31,2361	03657 0		STORE	RCLL
2697					31,2362	77650 1		GOTO	
2698	REP	6	LAST	614	31,2363	01150 1			POINTEX

P2699										
2700					31,2364	41456 0	R23.55	UNIT	PUSH	RCLL IS IN MPAC
2701					31,2365	77775 1		VLOAD		
2702					31,2366	00043 0			34D	RCLL * RCLL
2703					31,2367	24037 0		STOVL	30D	PUSH 30-31 =RCLL*RCLL 32-33=ABVAL RCLL
2704	REP	2	LAST	119	31,2370	03635 1			VZC	
2705					31,2371	54361 1		VXSC	VSR	
2706	REP	1			31,2372	23030 0			ONE/C	
2707					31,2373	20820 1			15D	
2708					31,2374	77655 1		VAD		PUSH UP RCLL(UNIT)
2709					31,2375	77656 1		UNIT		
2710	REP	2	LAST	119	31,2376	27643 0		STOVL	UCLSTAR	
2711	REP	3	LAST	616	31,2377	03635 1			VZC	
2712					31,2400	52342 0		VSR2	VSU	
2713	REP	2	LAST	87	31,2401	02141 1			VESO	
2714					31,2402	54361 1		VXSC	VSR	
2715	REP	2	LAST	616	31,2403	23030 0			ONE/C	
2716					31,2404	20816 1			13D	
2717					31,2405	53455 0		VAD	UNIT	
2718	REP	1			31,2406	02817 0			US	
2719	REP	2	LAST	119	31,2407	03651 0		STORE	USSTAR	
2720					31,2410	72441 0		DOT	SL1	
2721	REP	3	LAST	616	31,2411	03643 0			UCLSTAR	
2722					31,2412	77208 0		PUSH	VLOAD	PD 0,1 = USSTAR(DOT)UCLSTAR
2723	REP	4	LAST	616	31,2413	03643 0			UCLSTAR	
2724					31,2414	57561 1		VXSC	VCOMP	
2725					31,2415	53372 1		VSL1	VAD	
2726	REP	3	LAST	616	31,2416	03651 0			USSTAR	
2727					31,2417	77656 1		UNIT		
2728	REP	17	LAST	605	31,2420	27502 0		STOVL	BVECTOR	USSTAR - COSQ(UCLSTAR
2729	REP	16	LAST	597	31,2421	15332 1			ZEROVECS	
2730	REP	18	LAST	616	31,2422	03510 0		STORE	BVECTOR +6	
2731	REP	19	LAST	616	31,2423	17516 0		STODL	BVECTOR +12D	
2732					31,2424	00001 0			0	
2733					31,2425	57528 1		ACOS	DCOMP	
2734					31,2426	71206 0		PUSH	DLOAD	
273405	REP	17	LAST	616	31,2427	15332 1			ZEROVECS	
27341					31,2430	77776 1		EXIT		
27342	REP	1			31,2431	3 3041 1		CA	VARSUBL	PUT FIXED INTO ERASABLE FOR MSU
27344	REP	63	LAST	561	31,2432	54 001 1		TS	L	INSTRUCTION COMING UP
2735	REP	2	LAST	613	31,2433	3 1754 0		CA	TRUNION	REQUIRED TO CHANGE 2'S COMPLEMENT
27351					31,2434	0 0006 1		EXTEND		TRUNION TO 1'S COMPLEMENT
27352	REP	64	LAST	616	31,2435	20 001 1		MSU	L	TRUNION(2∝S)-00000 CONVERTS TRUNION TO
27353	REP	260	LAST	611	31,2436	54 154 0		TS	MPAC	1'S. VARSUBL=00000
27354	REP	122	LAST	614	31,2437	0 6006 1		TC	INTPRET	
27355					31,2440	67206 1		PUSH	SLOAD	PUSH IS DP. WHEN BDSU IS EXECUTED, 2ND
27356	REP	2	LAST	561	31,2441	01343 1			TRUNBIAS	HALF OF PUSHLIST IS GUARANTEED ZERO FROM
27357					31,2442	77621 1		BDSU		DLOAD ZEROVECS ABOVE
2736					31,2443	43242 1		SR3	DAD	
2737					31,2444	41215 1		DAD	DMP	

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Line	REF		LAST	Address	Octal	Bit	Sym	Op	Operand
2738	REF	1		31,2445	23036	0			TRUN19
2739				31,2446	00041	1			32D
2740				31,2447	52405	1		DMP	SL3
2741	REF	2	LAST 566	31,2450	07107	0			PI/4.0
2742				31,2451	62414	1		BOFF	SL2
2743	REF	17	LAST 600	31,2452	04343	1			CMOONFLG
2744	REF	1		31,2453	62454	0			R23.51
2745	REF	4	LAST 573	31,2454	17524	1	R23.51	STODL	DELTAQ
2746				31,2455	00037	0			30D
2747				31,2456	47005	1		DMP	RTB
2748	REF	1		31,2457	23045	1			TRUNVAR
2749	REF	2	LAST 572	31,2460	45562	1			TPMODE
27491				31,2461	77771	0		TAD	
27492	REF	2	LAST 616	31,2462	23042	0			VARSUBL
2750	REF	11	LAST 596	31,2463	03526	0		STORE	VARIANCE
2751				31,2464	45014	0		CLEAR	CALL
2752	REF	7	LAST 596	31,2465	02666	0			DMENFLG
2753	REF	3	LAST 596	31,2466	75250	1			INCORP1
27531				31,2467	77624	1		CALL	
27532	REF	17	LAST 604	31,2470	56741	0			GRP2PC
2754				31,2471	51575	1		VLOAD	ABVAL
2755	REF	10	LAST 605	31,2472	01285	1			DELTAX +6
2756				31,2473	60414	0		BOF	SR2
2757	REF	18	LAST 617	31,2474	04343	1			CMOONFLG
2758	REF	1		31,2475	62476	0			R23.52
2759	REF	11	LAST 597	31,2476	27504	0	R23.52	STOVL	N49DISP +2
2760	REF	11	LAST 617	31,2477	01257	0			DELTAX
2761				31,2500	77646	0		ABVAL	
2762				31,2501	60414	0		BOF	SR2
2763	REF	19	LAST 617	31,2502	04343	1			CMOONFLG
2764	REF	1		31,2503	62504	1			R23.53
2765	REF	12	LAST 617	31,2504	03502	0	R23.53	STORE	N49DISP
2766				31,2505	77776	1		EXIT	
2767	REF	1		31,2506	3 3046	0	R23.6	CAF	V6N49
2768	REF	153	LAST 613	31,2507	0 4555	0		TC	BANKCALL
2769	REF	10	LAST 597	31,2510	20763	1		CADR	GOFLASHR
2770	REF	1		31,2511	0 2506	0		TC	R23.6
2771	REF	1		31,2512	0 2521	0		TC	R23.7
2772	REF	1		31,2513	0 2047	0		TC	P23.00
2773	REF	21	LAST 597	31,2514	3 4710	0		CAF	BIT3
2774	REF	12	LAST 597	31,2515	0 5415	1		TC	BLANKET
27741	REF	38	LAST 614	31,2516	0 5301	0		TC	PHASCHNG
27742				31,2517	00012	1		OCT	00012
2775	REF	77	LAST 597	31,2520	0 5112	0		TC	ENDOFJOB
2776	REF	123	LAST 616	31,2521	0 6006	1	R23.7	TC	INTPRET
2777				31,2522	45014	0	R23.8	SET	CALL
2778	REF	12	LAST 596	31,2523	00467	1			VEHUPFLG
2779	REF	3	LAST 597	31,2524	75462	0			INCORP2
2780				31,2525	77776	1		EXIT	
2781	REF	32	LAST 613	31,2526	0 4106	1	R23.END	TC	GOTOPOCH

RCLL * RCLL

DISPLAY IS 2-27 IF IN LUNAR SPHERE

DONT ALLOW
INCORPORATE DATA
RECYCLE FOR ANOTHER MARK
BLANK OUT R3

2783					31,2527	40220 0	HORIZ	STQ	SETPD	
2784	REP	1			31,2530	03672 1			SRRETURN	
2785					31,2531	00001 0			0	
2786					31,2532	65345 0		DLOAD	PDDL	PUSH 0-1 = -AYO SCALED B_0
2787	REP	1			31,2533	01714 1			-AYO	
2788	REP	1			31,2534	01716 0			AXO	
2789					31,2535	63325 0		PDDL	PDVL	PUSH 2-3 = +AX SCALED B_0
2790	REP	8	LAST	544	31,2536	15340 1			DPPOSMAX	
2791	REP	2	LAST	616	31,2537	02617 0			US	
2792					31,2540	53435 0		VXV	UNIT	
2793	REP	4	LAST	615	31,2541	03627 1			RZC	
2794	REP	2	LAST	119	31,2542	27621 1		STOVL	UBAR2	
2795					31,2543	53435 0		VXV	UNIT	PUSH UP
2796	REP	3	LAST	618	31,2544	03621 1			UBAR2	
2797	REP	2	LAST	119	31,2545	27605 1		STOVL	UBAR0	
2798	REP	4	LAST	618	31,2546	03621 1			UBAR2	
2799					31,2547	53435 0		VXV	UNIT	
2800	REP	3	LAST	618	31,2550	03605 1			UBAR0	
2801	REP	2	LAST	119	31,2551	03613 0		STORE	UBAR1	
2802					31,2552	50214 0		BON	DOT	
2803	REP	13	LAST	611	31,2553	01703 1			LUNAFLAG	
2804	REP	1			31,2554	62752 0			HORIZ.6	
2805					31,2555	00001 0			0	UBAR1 DOT UZ
2806	REP	7	LAST	599	31,2556	36156 0		STCALL	ALPHAV +4	
2807	REP	1			31,2557	26437 0			GETERAD	
2808					31,2560	65215 1		DAD	PDDL	MPAC HAS RADIUS OF FISHER ELLIPSOID
2809	REP	1			31,2561	01355 0			HORIZALT	PUSH 0-1 = BH SCALED B_{29}
2810	REP	1			31,2562	23032 1			AEARTH	
2811					31,2563	41415 1		DAD	PUSH	PUSH 2-3 = AH B_{29}
2812	REP	2	LAST	618	31,2564	01355 0			HORIZALT	
2813					31,2565	64375 1	HORIZ.1	VLOAD	MXV	
2814	REP	5	LAST	618	31,2566	03627 1			RZC	B_{29}
2815	REP	4	LAST	618	31,2567	03605 1			UBAR0	B_1
2816					31,2570	63372 1		VSL1	PDVL	PUSH 4-9 = RH(XH,YH,ZH) B_{29}
2817	REP	3	LAST	618	31,2571	02617 0			US	
2818					31,2572	76521 0		MXV	VSL1	
2819	REP	5	LAST	618	31,2573	03605 1			UBAR0	
2820					31,2574	77725 1		PDDL		PUSH 10-15 = USH B_1
2821					31,2575	00003 1			2	AH
2822					31,2576	14043 0		STODL	34D	
2823					31,2577	00005 1			4	XH
2824					31,2600	77624 1		CALL		
2825	REP	1			31,2601	62756 1			DIVIDE	
2826					31,2602	41257 1		SR*	DMP	
2827					31,2603	20611 0			8D,1	NOW SCALED B_9
2828	REP 261	LAST	616		31,2604	00155 0			MPAC	
2829					31,2605	14037 0		STODL	30D	
2830					31,2606	00001 0			0	
2831					31,2607	14043 0		STODL	34D	
2832					31,2610	00007 0			6	YH

L   P20-P25

2833					31,2611	77624	1	CALL		
2834	REF	2	LAST	618	31,2612	62756	1		DIVIDE	
2835					31,2613	41257	1	SR*	DMP	
2836					31,2614	20611	0		8D,1	B$_9$
2837	REF	262	LAST	618	31,2615	00155	0		MPAC	B$_{18}$
2838					31,2616	41415	1	DAD	PUSH	PUSH 16-17 =A SCALED B$_{18}$
2839					31,2617	00037	0		30D	
2840					31,2620	75425	0	DSU	SQRT	
2841	REF	1			31,2621	23040	1		1.0B$_{18}$	
2842					31,2622	77725	1	PDDL		PUSH 18-19 SQRT(A-1) B$_9$
2843					31,2623	00021	1		16D	
2844					31,2624	14043	0	STODL	34D	
2845					31,2625	00005	1		4	XH
2846					31,2626	77624	1	CALL		
2847	REF	3	LAST	619	31,2627	62756	1		DIVIDE	
2848					31,2630	65257	1	SR*	PDDL	
2849					31,2631	20622	0		17D,1	PUSH 20-21 = XH/A B$_{29}$
2850					31,2632	00007	0		6	YH
2851					31,2633	77624	1	CALL		
2852	REF	4	LAST	619	31,2634	62756	1		DIVIDE	
2853					31,2635	65257	1	SR*	PDDL	
2854					31,2636	20622	0		17D,1	PUSH 22-23 = YH/A B$_{29}$
2855					31,2637	00021	1		16D	A
2856					31,2640	14043	0	STODL	34D	
2857					31,2641	00023	0		18D	SQRT(A-1)
2858					31,2642	77624	1	CALL		
2859	REF	5	LAST	619	31,2643	62756	1		DIVIDE	
2860					31,2644	77657	0	SR*		
2861					31,2645	20611	0		8D,1	
2862					31,2646	14035	1	STODL	28D	
2863					31,2647	00001	0		0	BH
2864					31,2650	14043	0	STODL	34D	
2865					31,2651	00003	0		2	AH
2866					31,2652	77624	1	CALL		
2867	REF	6	LAST	619	31,2653	62756	1		DIVIDE	
2868					31,2654	41257	1	SR*	DMP	AH/BH SCALED B$_1$
2869					31,2655	20601	0		0,1	
2870					31,2656	00035	1		28D	SQRT(A-1)/A
2871					31,2657	72405	0	DMP	SL1	
2872					31,2660	00007	0		6	YH
2873					31,2661	77725	1	PDDL		
2874					31,2662	00003	1		2	AH
2875					31,2663	14043	0	STODL	34D	
2876					31,2664	00001	0		0	
2877					31,2665	77624	1	CALL		
2878	REF	7	LAST	619	31,2666	62756	1		DIVIDE	
2879					31,2667	41257	1	SR*	DMP	BH/AH SCALED B$_1$
2880					31,2670	20601	1		0,1	
2881					31,2671	00035	1		28D	SQRT (A-1)/A
2882					31,2672	72405	0	DMP	SL1	

2883			31,2673	00005 1		4	XH
2884			31,2674	43325 1	PDDL	DAD	
2885			31,2675	00025 0		20D	XH/A
2886			31,2676	00031 0		24D	ALPHA
2887			31,2677	45325 1	PDDL	DSU	
2888			31,2700	00027 1		22D	YH/A
2889			31,2701	00033 1		26D	BETA
2890			31,2702	40206 1	PUSH	SETPD	
2891			31,2703	00021 1		16D	
2892			31,2704	45345 1	DLOAD	DSU	
2893			31,2705	00025 0		20D	XH/A
2894			31,2706	00031 0		24D	ALPHA
2895			31,2707	43325 1	PDDL	DAD	
2896			31,2710	00027 1		22D	YH/A
2897			31,2711	00033 1		26D	BETA
2898			31,2712	41525 0	PDDL	PUSH	
2899	REP	18 LAST 616	31,2713	15332 1		ZEROVECS	
2900			31,2714	24041 1	STOVL	32D	ZERO THIRD COMP. OF T-0 VECTOR
2901			31,2715	00035 1		28D	
2902			31,2716	53451 1	VSU	UNIT	
2903			31,2717	00005 1		4	RH VECTOR
2904			31,2720	63241 0	DOT	PDVL	PUSH 22-23 A-SUB-ZERO
2905			31,2721	00013 0		10D	USH VECTOR
2906			31,2722	00021 1		16D	T1 VECTOR
2907			31,2723	53451 1	VSU	UNIT	
2908			31,2724	00005 1		4	RH VECTOR
2909			31,2725	41441 0	DOT	PUSH	PUSH 24-25 A-SUB-ONE
2910			31,2726	00013 0		10D	
2911			31,2727	50021 1	BDSU	RVN	
2912			31,2730	00027 1		22D	A-SUB-ZERO
2913	REP	1	31,2731	62740 0		HORIZ.3	
2914			31,2732	77614 1	BON		
2915	REP	3 LAST 612	31,2733	00304 0		NORFHOR	
2916	REP	1	31,2734	62744 1		HORIZ.4	
2917			31,2735	52175 0	HORIZ.2 VLOAD	GOTO	
2918			31,2736	00035 1		28D	T-0 VECTOR
2919	REP	1	31,2737	62746 0		HORIZ.5	
2920			31,2740	52014 0	HORIZ.3 BON	GOTO	
2921	REP	4 LAST 620	31,2741	00304 0		NORFHOR	
2922	REP	1	31,2742	62735 1		HORIZ.2	
2923	REP	2 LAST 620	31,2743	62744 1		HORIZ.4	
2924			31,2744	77775 1	HORIZ.4 VLOAD		
2925			31,2745	00021 1		16D	T1 VECTOR
2926			31,2746	76505 0	HORIZ.5 VXM	VSL1	
2927	REP	6 LAST 618	31,2747	03605 1		UBAR0	
2928			31,2750	77650 1		GOTO	
2929	REP	2 LAST 618	31,2751	03672 1		SRRETURN	
2930			31,2752	41545 0	HORIZ.6 DLOAD	PUSH	
2931	REP	1	31,2753	23034 1		RADMOON	
2932			31,2754	52006 0		PUSH GOTO	

Line	REF		LAST	Addr	Octal	F	Label	Op	Operand	Comment
2933	REF	1		31,2755	62565	0			HORIZ.1	
2934				31,2756	70501	1	DIVIDE	NORM	S21	
2935	REF	24	LAST 596	31,2757	00047	1			X1	
2936				31,2760	14045	0		STODL	36D	
2937				31,2761	00043	0			34D	
2938				31,2762	55301	0		NORM	22DV	
2939	REF	16	LAST 604	31,2763	00051	0			S1	
2940				31,2764	00045	0			36D	
2941				31,2765	43460	1		XSU,1	R/O	
2942	REF	17	LAST 621	31,2766	00050	1			S1	
2943				31,2767	77014	1	RECT.1	BOFF	AXT,2	SR TO SET ZMEASURE = 0 IF MEASUREMENT
2944	REF	20	LAST 617	31,2770	04343	1			CMOONFLG	PLANET AND PRIMARY PLANET ARE THE SAME
2945	REF	1		31,2771	63001	0			RECT.3	OTHERWISE = 1
2946				31,2772	77775	1		DEC	-2	
2947				31,2773	77614	1		BOFF		VEC. AND SCALE B29 AND B7
2948	REF	14	LAST 618	31,2774	01743	0			LUNAFLAG	
2949	REF	1		31,2775	63005	1			RECT.4	
2950				31,2776	52014	0	RECT.2	CLEAR	GOTO	
2951	REF	2	LAST 614	31,2777	00265	0			ZMEASURE	
2952	REF	1		31,3000	63007	0			RECT.5	
2953				31,3001	43174	1	RECT.3	AXT,2	BOFF	
2954				31,3002	00000	1			0	
2955	REF	15	LAST 621	31,3003	01743	0			LUNAFLAG	
2956	REF	1		31,3004	62776	0			RECT.2	
2957				31,3005	77614	1	RECT.4	SET		
2958	REF	3	LAST 621	31,3006	00065	1			ZMEASURE	
2959				31,3007	44575	0	RECT.5	VLOAD	VSR7	
2960	REF	3	LAST 600	31,3010	01573	1			DELTACSM	SCALED B22 OR B18
2961				31,3011	53257	1		VSR*	VAD	
2962				31,3012	57176	0			0,2	
2963	REF	3	LAST 600	31,3013	01607	1			RCVCS4	SCALED B29 OR B27
2964				31,3014	77657	0		VSR*		
2965				31,3015	57176	0			0,2	
2966	REF	6	LAST 618	31,3016	27627	1		STOVL	RZC	NOW SCALED B29
2967	REF	1		31,3017	01601	1			RUVCS4	SCALED B3 OR B-1
2968				31,3020	53702	1		VSR4	VSR*	
2969				31,3021	57176	0			0,2	
2970				31,3022	53655	1		VAD	VSR*	
2971	REF	1		31,3023	01615	1			VCVCS4	SCALED B7 OR B5
2972				31,3024	57176	0			0,2	
2973	REF	4	LAST 616	31,3025	03635	1		STORE	VZC	NOW SCALED B7
2974				31,3026	77616	0			RVO	
2975				31,3027	26305	0	ONE/C	2DEC*	.333564049 E-6 B+21*	
2975				31,3030	05432	1				
2977				31,3031	00302	0	AEARTH	2DEC	6378166 B-29	A AXIS OF EARTH(METERS B-29)
2977				31,3032	24533	1				
2978				31,3033	00065	1	RADMOON	2DEC	1738090 B-29	RADIUS OF MOON IN METERS
2978				31,3034	01265	1				
2979				31,3035	01604	1	TRUN19	OCT	01604	
29791				31,3036	00000	1	TRUN19A	OCT	00000	

2980				31,3037	00000 1	1.0B18	2DEC	1.0 B-18
2980				31,3040	02000 0			
29805				31,3041	00000 1	VARSUBL	DEC	0
298055				31,3042	01505 0	VARSUBL3	2DEC*	3.4299040 E+6 B-26*
298055				31,3043	14100 0			
29806				31,3044	00012 1	TRUNVAR	2DEC	2.5 E-9 B+18
29806				31,3045	27462 1			
2981				31,3046	01461 0	V6N49	VN	0649
2982				31,3047	01531 1	V6N89	VN	0689
2983				31,3050	01306 0	V05N70	VN	0570
2984				31,3051	01307 1	V05N71	VN	0571
2985				31,3052	00077 1	OCT00077	OCT	00077
2986				31,3053	00202 1	V50N25P	OCT	00202
2987				31,3054	00006 1	SPSIX	OCT	00006
2988				31,3055	10461 0	JCAXIS	2DEC	.268649805	TRACK AXIS
2988				31,3056	21675 0		.	
2989				31,3057	00000 1		2DEC	0
2989				31,3060	00000 1			
2990				31,3061	15375 1		2DEC	.421695725
2990				31,3062	02004 1			
2991	REP	1		31,3063	62217 1	R60ADRS	CADR	R60CALL +3
2992				31,3064	77735 0	LUNLMKLD	SLOAD	
2994	REP	5	LAST 614	31,3065	02754 0			IDOFLMK
2995				31,3066	45230 1		BHIZ	DSU
2996	REP	1		31,3067	63101 1			LNLMKEND
2997	REP	6	LAST 604	31,3070	21646 0			9DWID
2998				31,3071	70152 0		SL1	LXC,1
2999	REP	263	LAST 619	31,3072	00154 1			MPAC
3000				31,3073	64743 0		DLOAD*	PDDL*
3001	REP	2	LAST 557	31,3074	23705 1			ALTTAB ,1
3002	REP	2	LAST 558	31,3075	23623 1			LONGTAB,1
3003				31,3076	55523 0		PDDL*	VDEF
3004	REP	2	LAST 558	31,3077	23541 0			LATTAB,1
3005	REP	8	LAST 558	31,3100	01104 0		STORE	LAT
3006				31,3101	77616 0	LNLMKEND	RVQ	
3007	REP	1		14,2000			SETLOC	RT53
3008				14,2000			BANK	
3009				14,2000	43573 1	LOWMEMRY	VLOAD*	RVQ
3010	REP	1		14,2001	31744 1			CATLOG,1
3011				4550			BLOCK	02
3012				4550	0 0006 1	GOTOV56	EXTEND	
3013	REP	1		4551	3 4554 1		DCA	VB56CADR
3014	REP	3	LAST 369	4552	1 5122 1		TCF	SUPDXCHZ
3015	REP	4	LAST 208	E7,1777			EBANK=	WHOCARES
3016	REP	2	LAST 230	4553	02637 1	VB56CADR	2CADR	TRACKTRM
3016				4554	66107 1			
3017	REP	1		4000			SETLOC	PFTAG2
3018				4555			BANK	
3019	REP	1		4555			COUNT*	$$/P20
5000				40,3574			BANK	40

P20 TERMINATES BY GOTOV56 INSTEAD OF
GOTOPOOH

L   P20-P25

5001	REP	1			40,3574		SETLOC	ENDPINS1
5002					40,3574		BANK	
5003	REP	1					COUNT*	$$/EXTVB
5004	REP	124	LAST	617	40,3574	0 6006 1	V67CALL TC	INTPRET
5005					40,3575	77624 1	CALL	
5006	REP	1			40,3576	61656 0		V67WW
5007					40,3577	77776 1	EXIT	
5008	REP	1			40,3600	3 3732 1	V06N99DS CAP	V06N99A
5009	REP	154	LAST	617	40,3601	0 4555 0	TC	BANKCALL
5010	REP	12	LAST	510	40,3602	20465 1	CADR	GOXDSPP
5011	REP	29	LAST	609	40,3603	1 5423 0	TCF	ENDEXT
5012	REP	1			40,3604	0 3610 0	TC	V06N9933
5013	REP	31	LAST	609	40,3605	0 5435 0	TC	UPFLAG
5014	REP	1			40,3606	00210 1	ADRES	V67FLAG
5015	REP	1			40,3607	0 3600 1	TC	V06N99DS
5016	REP	125	LAST	623	40,3610	0 6006 1	V06N9933 TC	INTPRET
5017					40,3611	77414 0	BON	EXIT
5018	REP	2	LAST	623	40,3612	04701 0		V67FLAG
5019					40,3613	61615 1		+2
5020	REP	38	LAST	623	40,3614	1 5423 0	TCF	ENDEXT
5021					40,3615	41345 0	DLOAD	DMP
5022	REP	2	LAST	278	40,3616	02321 0		WWPOS
5023	REP	1			40,3617	21734 1		1/SQRT3
5025					40,3620	71350 0	LXA,1	DLOAD
5026	REP	284	LAST	622	40,3621	00154 1		MPAC
5027	REP	2	LAST	278	40,3622	02323 1		WWVEL
5028					40,3623	73005 0	DMP	LXA,2
5029	REP	2	LAST	623	40,3624	21734 1		1/SQRT3
5030	REP	285	LAST	623	40,3625	00154 1		MPAC
5036					40,3626	45335 0	SLOAD	DSU
5037	REP	2	LAST	278	40,3627	02325 1		WWOPT
5038	REP	1			40,3630	21736 0		V67DEC2
5039					40,3631	51030 0	BHIZ	BPL
5040	REP	1			40,3632	61641 0		V67WORB
5041	REP	1			40,3633	61646 1		V67WMID
5043					40,3634	67130 1	SXA,1	SXA,2
5044	REP	2	LAST	570	40,3635	02000 0		WRENDPOS
5045	REP	1			40,3636	02001 1		WRENDVEL
5046					40,3637	77650 1	GOTO	
5047	REP	1			40,3640	61651 1		V67EXITX
5048					40,3641	67130 1	V67WORB SXA,1	SXA,2
5049	REP	2	LAST	591	40,3642	02004 1		WORBPOS
5050	REP	2	LAST	591	40,3643	02005 0		WORBVEL
5051					40,3644	77650 1	GOTO	
5052	REP	2	LAST	623	40,3645	61651 1		V67EXITX
5053					40,3646	67130 1	V67WMID SXA,1	SXA,2
5054	REP	2	LAST	614	40,3647	03000 1		WMIDPOS
5055	REP	1			40,3650	03001 0		WMIDVEL
5056					40,3651	43014 0	V67EXITX CLEAR	CLEAR
5057	REP	11	LAST	614	40,3652	01671 0		ORBWFLAG

5058	REP	9	LAST	613	40,3653	02676 1			RENDWFLG
5059					40,3654	77776 1		EXIT	
5060	REP	31	LAST	623	40,3655	1 5423 0		TCF	ENDEXT
5061					40,3656	40020 1	V67WW	STQ	BOV
5062	REP	8	LAST	600	40,3657	00051 0			S2
5063					40,3660	61661 1			+1
5064					40,3661	45014 0		CLEAR	CALL
5065	REP	3	LAST	623	40,3662	04661 1			V67FLAG
5066	REP	17	LAST	595	40,3663	27371 1			INTSTALL
5067					40,3664	71331 0		SSP	DLOAD
5068	REP	18	LAST	621	40,3665	00051 0			S1
5069					40,3666	00006 1		DEC	6
5070	REP	19	LAST	620	40,3667	15332 1			ZEROVECS
5071	REP	3	LAST	623	40,3670	02321 0		STORE	WWPOS
5072	REP	3	LAST	623	40,3671	02323 1		STORE	WWVEL
50721	REP	3	LAST	623	40,3672	02325 1		STORE	WWOPT
5073					40,3673	77770 1		AXT,1	
5074					40,3674	00044 1		DEC	36
5075					40,3675	47573 0	NXPOSVEL	VLOAD*	VSQ
5076	REP	55	LAST	610	40,3676	02445 0			W +36D,1
5077					40,3677	77615 0		DAD	
5078	REP	4	LAST	624	40,3700	02321 0			WWPOS
5079	REP	5	LAST	624	40,3701	02321 0		STORE	WWPOS
5080					40,3702	47573 0		VLOAD*	VSQ
5081	REP	56	LAST	624	40,3703	02533 0			W +90D,1
5082					40,3704	77615 0		DAD	
5083	REP	4	LAST	624	40,3705	02323 1			WWVEL
5084	REP	5	LAST	624	40,3706	02323 1		STORE	WWVEL
5085					40,3707	75500 0		TIX,1	SQRT
5086	REP	1			40,3710	61675 1			NXPOSVEL
5087	REP	6	LAST	624	40,3711	16323 1		STODL	WWVEL
5088	REP	6	LAST	624	40,3712	02321 0			WWPOS
5089					40,3713	77766 0		SQRT	
5090	REP	7	LAST	624	40,3714	02321 0		STORE	WWPOS
5091					40,3715	52000 0		BOV	GOTO
5092					40,3716	61720 0			+2
5093	REP	1			40,3717	61724 1			V67XXX
5094					40,3720	77745 1		DLOAD	
5095	REP	9	LAST	618	40,3721	15340 1			DPPOSMAX
5096	REP	8	LAST	624	40,3722	02321 0		STORE	WWPOS
5097	REP	7	LAST	624	40,3723	02323 1		STORE	WWVEL
5098					40,3724	66150 0	V67XXX	LXA,1	SXA,1
5099	REP	9	LAST	624	40,3725	00051 0			S2
5100	REP	12	LAST	557	40,3726	00052 0			OPRET
5101					40,3727	77776 1		EXIT	
5102	REP	39	LAST	578	40,3730	0 4574 0		TC	POSTJUMP
5103	REP	2	LAST	259	40,3731	27406 0		CADR	INTWAKE
5104	REP	11	LAST	496	E4,1720		WWPOS	=	RANGE
5105	REP	7	LAST	497	E4,1722		WWVEL	=	RRATE
5106	REP	12	LAST	497	E4,1724		WWOPT	=	RTHETA

L   P20-P25

5107		40,3732	01543 1	V06N99A	VN	0699
5108		40,3733	22363 1	1/SQRT3	2DEC	0.5773502
5108		40,3734	11620 0			
5109		40,3735	00002 0	V67DEC2	2DEC	2 B-14
5109		40,3736	00000 1			

0001				32,2017			BANK	32	
0002	REP	1		35,2000			SETLOC	P30S1	
0003				35,3544			BANK		
0004	REP	8	LAST 555	E7,1625			EBANK=	+MGA	
0005	REP	1					COUNT	35/P34	
0006				35,3544	77420 1	DISPMGA	STQ	EXIT	USED IN P30
0007	REP	2	LAST 90	35,3545	02370 1			RGEXIT	
0008	REP	2	LAST 473	35,3546	0 3564 0		TC	COMPTGO	
0009	REP	2	LAST 473	35,3547	3 3132 1	DISP45	CAF	V16N45	
0010	REP	155	LAST 623	35,3550	0 4555 0		TC	BANKCALL	
0011	REP	11	LAST 617	35,3551	20763 1		CADR	GOFLASHR	
0012	REP	33	LAST 617	35,3552	0 4106 1		TC	GOTOPOOH	
0013	REP	1		35,3553	0 3560 1		TC	END45	
0014	REP	1		35,3554	0 3547 1		TC	DISP45	
0015	REP	39	LAST 617	35,3555	0 5301 0	P30PHSI	TC	PHASCHNG	
0016				35,3556	00014 1		OCT	14	
0017	REP	78	LAST 617	35,3557	0 5112 0		TCR	ENDOFJOB	
0018	REP	126	LAST 623	35,3560	0 6006 1	END45	TC	INTPRET	
0019				35,3561	52014 0		CLEAR	GOTO	
0020	REP	1		35,3562	03664 0			TIMRFLAG	
0021	REP	3	LAST 626	35,3563	02370 1			RGEXIT	
0022				35,3564	0 0006 1	COMPTGO	EXTEND		USED TO COMPUTE TTOGO
00221	REP	1		35,3565	23«066 0		QXCH	PHSPRDT6	** GROUP 6 TEMPORARY USED ,, BEWARE **
00222	REP	32	LAST 623	35,3566	0 5435 0		TC	UPFLAG	SET TIMRFLAG
00223	REP	2	LAST 626	35,3567	00155 0		ADRES	TIMRFLAG	BIT 11 FLAG 7
00224	REP	125	LAST 586	35,3570	3 4714 1		CAF	ZERO	
00225	REP	1		35,3571	55«145 1		TS	NVWORD1	
00226				35,3572	0 0004 0		INHINT		
00227	REP	74	LAST 608	35,3573	3 4712 1		CAF	ONE	
00228	REP	22	LAST 530	35,3574	0 5140 1		TC	WAITLIST	
00229	REP	27	LAST 522	E7,1412			EBANK=	TIG	
0023	REP	3	LAST 213	35,3575	03172 0		2CADR	CLOKTASK	
0023				35,3576	50067 0				
00231	REP	1ı	LAST 610	35,3577	0 5261 1		TC	2PHSCHNG	
00232				35,3600	40036 0		OCT	40036	6.3SPOT FOR CLOKTASK
00233				35,3601	05024 1		OCT	05024	GROUP 4 CONTINUES HERE
00234				35,3602	13000 0		OCT	13000	
00235	REP	2	LAST 626	35,3603	0 1066 0		TC	PHSPRDT6	

L   P30,P37

P00239 PROGRAM DESCRIPTION P30   DATE 3-6-67

R00245 MOD.I BY S. ZELDIN- TO ADD P31 AND AD APT P30 FOR P31 USE.   22DEC67
R0025   FUNCTIONAL DESCRIPTION
R0026   +30(EXTERNAL DELTA-V TARGETTING PROGRAM)
R0027   ACCEPTS ASTRONAUT INPUTS OF TIG,DELV(LV) AND COMPUTES,FOR DISPLAY,
R0028   APOGEE,PERIGEE,DELV(MAG),MGA ASSOCIATED WITH DESIRED MANEUVER

R0029   P31(GENERAL LAMBERT AIMPOINT GUIDANCE)
R00291 A GROUND RULE FOR P31 IS THE ANGLE BETWEEN THE TARGET VECTOR AND
R00292 POSITION VECTOR AT TIG IS NOT 165-195 DEGREES APART
R0030   BASED ON STORED INPUT OF OFFSET TARGET(B+29) AND DELTA T TRANS,AND
R0031   ASTRONAUT ENTRY OF TIG,P31 COMPUTES REQUIRED VELOCITY FOR MANEUVER
R0032   AND,FOR DISPLAY,APOGEE,PERIGEE,DELV(7AG),+MGA ASSOCIATED WITH
R0033   DESIRED MANEUVER

R0034   THE FOLLOWING SUBROUTINES ARE USED IN P30 AND P31
R0035   S30.1 (P30 ONLY)
R0036   S31.1 (P31 ONLY)
R0037   P30/P31 - DISPLAYS TIG
R0038   CNTUP30 - DISPLAYS DELV(LV)
R00381   PARAM30 - DISPLAYS APOGEE,PERIGEE,DELV(MAG),MGA,TIME FROM TIG,
R00382   MARKS SINCE LAST THRUSTING MANEUVER

R00383 CALLING SEQUENCE VIA JOB FROM V37

R00384 EXIT VIA V37 CALL OR GOTOPOOH

R00385 OUTPUT FOR POWERED FLIGHT
R00386   VTIG   X
R00387   RTIG   XSEE S30.1
R00388   DELVSIN X
R00389   VGDISP
R003891   RTARG X
R003892   TPASS4 X SEE S31.1
R003893   X

0039	REF	1					COUNT	35/P30
003901	REF	1			35,3604	0 3636 1 P30	TC	P30/P31
003903	REF	1			35,3605	0 3655 1	TC	CNTUP30
003905	REF	35	LAST	612	35,3606	0 5447 0	TC	DOWNFLAG	RESET UPDATFLG
003907	REF	15	LAST	576	35,3607	00027 1	ADRES	UPDATFLG	BIT 7 FLAG 1
003909	REF	127	LAST	626	35,3610	0 6006 1	TC	INTPRET
003911					35,3611	77624 1	CALL	
003913	REF	1			35,3612	63102 1		S30.1
003915					35,3613	77776 1	EXIT	
003919	REF	1			35,3614	0 3665 1	TC	PARAM30
003921	REF	33	LAST	626	35,3815	0 5435 0	TC	UPFLAG

003923	REF	3	LAST	520	35,3616	00045 0		ADRES	XDELVFLG	SET XDELVFLG BIT 8 FLAG 2
003925	REF	34	LAST	628	35,3617	1 4106 0		TCF	GOTOPOOH	
003927	REF	2	LAST	627	35,3620	0 3636 1	P31	TC	P30/P31	
003929	REF	36	LAST	627	35,3621	0 5447 0		TC	DOWNFLAG	
003931	REF	16	LAST	627	35,3622	00027 1		ADRES	UPDATFLG	RESET UPDATFLG BIT 7 FLAG 1
003932	REF	37	LAST	628	35,3623	0 5447 0		TC	DOWNFLAG	
003933	REF	3	LAST	480	35,3624	00158 0		ADRES	NORMSW	RESET NORMSW BIT 10 FLAG 7
003934	REF	128	LAST	627	35,3625	0 6006 1		TC	INTPRET	
003935					35,3626	77624 1		CALL		
003937	REF	1			35,3627	63154 1			S31.1	
003939					35,3630	77776 1		EXIT		
003943	REF	2	LAST	627	35,3631	0 3655 1		TC	CNTNUP30	
003945	REF	2	LAST	627	35,3632	0 3665 1		TC	PARAM30	
003947	REF	38	LAST	628	35,3633	0 5447 0		TC	DOWNFLAG	
003949	REF	4	LAST	628	35,3634	00045 0		ADRES	XDELVFLG	BIT 8 FLAG 2
003951	REF	35	LAST	628	35,3635	1 4106 0		TCF	GOTOPOOH	
00396	REF	152	LAST	476	35,3636	56 002 0	P30/P31	XCH	Q	
00397	REF	1			35,3637	55∝664 0		TS	P30/31RT	
0040	REF	34	LAST	627	35,3640	0 5435 0		TC	UPFLAG	
00405	REF	17	LAST	628	35,3641	00027 1		ADRES	UPDATFLG	SET UPDATFLG BIT 7 FLAG 1
0041	REF	35	LAST	628	35,3642	0 5435 0		TC	UPFLAG	
00415	REF	5	LAST	576	35,3643	00031 0		ADRES	TRACKFLG	SET TRACKFLG BIT 5 FLAG 1
0042	REF	1			35,3644	3 3722 0		CAF	V06N33	T OF IGN
0043	REF	158	LAST	626	35,3645	0 4555 0		TC	BANKCALL	
0044	REF	12	LAST	626	35,3646	20763 1		CADR	GOFLASHR	
0045	REF	36	LAST	628	35,3647	1 4106 0		TCF	GOTOPOOH	
00467	REF	2	LAST	628	35,3650	0 1664 1		TC	P30/31RT	
0047	REF	3	LAST	628	35,3651	1 3642 0		TCF	P30/P31 +4	
0048	REF	40	LAST	626	35,3652	0 5301 0		TC	PHASCHNG	
0049					35,3653	00014 1		OCT	00014	
0050	REF	79	LAST	626	35,3654	0 5112 0		TC	ENDOFJOB	
00501	REF	153	LAST	628	35,3655	56 002 0	CNTNUP30	XCH	Q	
00502	REF	1			35,3656	55∝127 0		TS	P30/RET	
0051	REF	2	LAST	472	35,3657	3 3131 1		CAF	V06N81	
0052	REF	157	LAST	628	35,3660	0 4555 0		TC	BANKCALL	
0053	REF	25	LAST	613	35,3661	20624 0		CADR	GOFLASH	
0054	REF	37	LAST	628	35,3662	1 4106 0		TCF	GOTOPOOH	
0055	REF	2	LAST	628	35,3663	0 1127 0		TC	P30/RET	
0056	REF	3	LAST	628	35,3664	1 3657 1		TCF	CNTNUP30 +2	
0067	REF	154	LAST	628	35,3665	56 002 0	PARAM30	XCH	Q	
00675	REF	3	LAST	628	35,3666	55∝664 0		TS	P30/31RT	
0068	REF	1			35,3667	3 3723 0		CAF	V06N42	
0069	REF	158	LAST	628	35,3670	0 4555 0		TC	BANKCALL	
0070	REF	26	LAST	628	35,3671	20624 0		CADR	GOFLASH	
0071	REF	38	LAST	628	35,3672	0 4106 1		TC	GOTOPOOH	ON TERMINATION GOTOPOOH
0072	REF	1			35,3673	1 3675 1		TCF	REFTEST	ON PROCEED GO DO REFTEST

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0073	REF	3	LAST	628	35,3674	1 3667 1		TCP	PARAM30 +2	
0074	REF	19	LAST	554	35,3675	3 4676 1	REFTEST	CAF	BIT13	
0075	REF	36	LAST	578	35,3676	7 0077 0		MASK	STATE +3	REFSMFLAG
0076					35,3677	0 0006 1		EXTEND		
0077	REF	1			35,3700	1 3710 0		BZF	NOTSET	REFSMFLAG =0 , THEN BRANCH TO NOTSET
0078	REF	129	LAST	628	35,3701	0 6006 1		TC	INTPRET	
0079					35,3702	41575 0		VLOAD	PUSH	
0080	REF	6	LAST	520	35,3703	03846 0			DELVSIN	
0081					35,3704	77624 1		CALL		
0082	REF	3	LAST	485	35,3705	10860 0			GET+MGA	
0084					35,3706	77650 1		GOTO		
0085	REF	1			35,3707	73714 1			FLASHMGA	
0086					35,3710	0 0006 1	NOTSET	EXTEND		
0087	REF	1			35,3711	4 3721 1		DCS	MARSDP	
0088	REF	9	LAST	626	35,3712	53∝626 0		DXCH	+MGA	+MGA, +MGA+1 CONTAINS (-00001)
0089	REF	130	LAST	629	35,3713	0 6006 1		TC	INTPRET	
0090					35,3714	77624 1	FLASHMGA	CALL		
0091	REF	1			35,3715	73544 0			DISPMGA	
0092					35,3716	77776 1		EXIT		
00935	REF	4	LAST	628	35,3717	0 1684 1		TC	P30/31RT	
0097					35,3720	00000 1	MARSDP	OCT	00000	(00000) (16440) = (+00001)
0098					35,3721	35100 0		OCT	35100	
A0099										(.01) DEGREES IN THE LOW ORDER REGISTE
0100					35,3722	01441 1	V06N33	VN	0633	
0102					35,3723	01452 0	V06N42	VN	0642	
0103					35,3724	04043 1	V16N35	VN	1635	
0104					35,3725	01455 1	V06N45	VN	0645	

L   P30,P37

P0105   PROGRAM DESCRIPTION S30.1   DATE 9NOV66

R0106   MOD NO 1   LOG SECTION P30,P37
R0107   MOD BY RAMA AIYAWAR **
R01075   MOD.2 BY S.ZELDIN - TO CORRECT MOD.1 FOR COLOSSUS   29DEC67
R0108   FUNCTIONAL DESCRIPTION
R0109   BASED ON STORED TARGET PARAMETERS(R OF IGNITION(RTIG),V OF
R0110   IGNITION(VTIG),TIME OF IGNITION(TIG),DELV(LV),COMPUTE PERIGEE ALTITUDE
R0111   A+OGEE ALTITUDE AND DELTA-V REQUIRED IN REF. COORDS.(DELVSIN)
R0112   CALLING SEQUENCE
R0113   L   CALL
R0114   L+1   S30.1
R0115   NORMAL EXIT MODE
R0116   AT L+2 OR CALLING SEQUENCE (GOTO L+2)
R0117   SUBROUTINES CALLED
R0118   THISPREC
R0119   PERIAPO
R0120   ALARM OR ABORT EXIT MODES
R0121   NONE
R0122   ERASABLE INITIALIZATION REQUIRED
R0123   TIG   TIME OF IGNITION   DP $B_{28}CS$
R0124   DELVSLV   SPECIFIED DELTA-V IN LOCAL VERT.
R0125   COORDS. OF ACTIVE VEHICLE AT
R0126   TIME OF IGNITION   VCT.   B+7M/CS
R0127   OUTPUT
R0128   RTIG   POSITION AT TIG   VCT.   B+29M
R0129   VTIG   VELOCITY AT TIG   VCT.   B+7M
R0130   HAPO   APOGEE ALT.   DP   B+29M
R0131   HPER   PERIGEE ALT.   DP   B+29M
R0132   DELVSIN   DELVSLV IN REF COORDS   VCT.   B+7M/CS
R0133   VGDISP   MAG. OF DELVSIN   DP   B+7M/CS
R0136   DEBRIS QTEMP   TEMP. ERASABLE
R0137   QPRET,MPAC
R0138   PUSHLIST

0139   REF   1   31,2000   SETLOC P30S1A
0140   31,3102   BANK

0141   REF   1   COUNT 35/S30S

0142   31,3102   71220 1 S30.1   STQ   DLOAD
0143   REF   4 LAST 548   31,3103   03657 0   QTEMP
0144   REF 28 LAST 626   31,3104   03413 1   TIG
0145   REF 32 LAST 598   31,3105   34041 0   STCALL TDEC1
0146   REF   5 LAST 508   31,3106   27022 1   THISPREC

0147   31,3107   67175 0   VLOAD SXA,2
0148   REF 16 LAST 586   31,3110   00007 0   VATT
01485   REF 11 LAST 528   31,3111   03746 1   RTX2
0149   REF   2 LAST 121   31,3112   27640 0   STOVL VTIG

TIME IGNITION SCALED AT 2(+28)CS

ENCKE ROUTINE FOR

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0150	REP	20	LAST	586	31,3113	00001	0		RATT
0151	REP	3	LAST	121	31,3114	03632	0	STORE	RTIG
0152	REP	25	LAST	547	31,3115	03540	0	STORE	RACT3
0153					31,3116	53435	0	VXV	UNIT
0154	REP	3	LAST	630	31,3117	03840	0		VTIG
0155	REP	9	LAST	471	31,3120	36617	1	STCALL	UNRM
0156	REP	3	LAST	469	31,3121	72867	0		LOMAT
0157					31,3122	61375	1	VLOAD	VXM
0158	REP	4	LAST	171	31,3123	03405	0		DELVSLV
0159					31,3124	00001	0		0
0160					31,3125	66172	0	VSL1	SXA,1
0161	REP	9	LAST	545	31,3126	03745	1		RTX1
0162	REP	7	LAST	629	31,3127	03646	0	STORE	DELVSIN
0163					31,3130	77646	0	ABVAL	
0164	REP	4	LAST	276	31,3131	27654	0	STOVL	VGDISP	MAG DELV
0165	REP	4	LAST	631	31,3132	03632	0		RTIG
0166					31,3133	53315	0	PDVL	VAD
0167	REP	8	LAST	631	31,3134	03646	0		DELVSIN
0168	REP	4	LAST	631	31,3135	03640	0		VTIG
0169					31,3136	77624	1	CALL	
0170	REP	3	LAST	520	31,3137	45312	0		PERIAPO1
0171					31,3140	77624	1	CALL	
0172	REP	3	LAST	520	31,3141	45422	1		SHIFTR1
01725					31,3142	77624	1	CALL	
01726	REP	3	LAST	513	31,3143	46754	0		MAXCHK
0173	REP	2	LAST	274	31,3144	16366	0	STODL	HPER	PERIGEE ALT B+29
0174					31,3145	00005	1		4D
0175					31,3146	77624	1	CALL	
0176	REP	4	LAST	631	31,3147	45422	1		SHIFTR1
01765					31,3150	77624	1	CALL	
01766	REP	4	LAST	631	31,3151	46754	0		MAXCHK
0177	REP	4	LAST	274	31,3152	36364	0	STCALL	HAPO	APOGEE ALT B+29
0178	REP	5	LAST	630	31,3153	03657	0		QTEMP

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P0181   S31.1 PROGRAM DESCRIPTION   28DEC67
R0182   MOD.1 BY S.ZELDIN

R0183   S31.1 COMPUTES DELV IN REF AND LV COORDS,MAG OF DELV,INTERCEPT TIME,
R0184   APOGEE AND PERIGEE ALT FOR REQUIRED MANEUVER

R0185   CALLING SEQUENCE
R0186   L   CALL
R0187   L +1   S31.1

R0188   NORMAL EXIT MODE
R0189   AT L +2 OF CALLING SEQUENCE(GOTO L+2)
R0190   SUBROUTINES CALLED
R0191   AGAIN
R0192   PERIAPO1
R0193   SHIFTR1
R0194   MIDGIM
R0195   NO ALARM OR ABORT MODES
R0196   INPUT
R0197   DELLT4   DP   +28
R0198   TIG   DP   +28
R01981   RTARG   VCT +29
R01982   OUTPUT
R01983   DELVLVC   VCT +7
R01984   VGDISP   DP   +7
R01985   HAPO   DP   +29
R01986   HPER   DP   +29
R01987   TPASS4   DP   +28
R01988   DEBRIS   - QTEMP

0200					31,3154	71220 1	S31.1	STO	DLOAD	
0201	REF	6	LAST	631	31,3155	03657 0			QTEMP	
0202	REF	29	LAST	630	31,3156	03413 1			TIG	
0203	REF	33	LAST	630	31,3157	34041 0		STCALL	TDEC1	
0204	REF	1			31,3160	61663 0			AGAIN	RETURNS RTX2,RTX1,RATT,VATT,VIPRIME
0205					31,3161	63375 0		VLOAD	PDVL	DELVEET3
0206	REF	5	LAST	631	31,3162	03632 0			RTIG	
0207	REF	12	LAST	547	31,3163	03612 1			VIPRIME	
0208					31,3164	77624 1		CALL		
0209	REF	4	LAST	631	31,3165	45312 0			PERIAPO1	
0210					31,3166	77624 1		CALL		
0211	REF	5	LAST	631	31,3167	45422 1			SHIFTR1	
02115					31,3170	77624 1		CALL		
02116	REF	5	LAST	631	31,3171	46754 0			MAXCHK	
0212	REF	3	LAST	631	31,3172	16366 0		STODL	HPER	B29
0213					31,3173	00005 1			4D	
0214					31,3174	77624 1		CALL		
0215	REF	6	LAST	632	31,3175	45422 1			SHIFTR1	
02155					31,3176	77624 1		CALL		
02156	REF	6	LAST	632	31,3177	46754 0			MAXCHK	
0216	REF	5	LAST	631	31,3200	26364 1		STOVL	HAPO	B29

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0217	REP	15	LAST	545	31,3201	03646 0		DELVEET3	
02175					31,3202	00001 0	STORE	0	
0218					31,3203	45014 0	SET	CALL	
0219	REP	6	LAST	544	31,3204	01072 0		AVFLAG	
0220	REP	1			31,3205	10653 0		MIDGIM	GET DELVLVC B7 FORDISPLAY
0221					31,3206	77646 0	ABVAL		
0222	REP	5	LAST	631	31,3207	17654 0	STODL	VGDISP	B+7 FOR DISPLAY
0223	REP	8	LAST	545	31,3210	03423 1		DELLT4	
0224					31,3211	77615 0	DAD		
0225	REP	30	LAST	632	31,3212	03413 1		TIG	
0226	REP	8	LAST	469	31,3213	37656 0	STCALL	TPASS4	FOR S40.1
0227	REP	7	LAST	632	31,3214	03657 0		QTEMP	

P0327	SUBROUTINE NAME'	DELRSPL			

(CONTINUATION OF V 82 IN CSM IF P11 ACTI

R0329   TRANSFERRED COMPLETELY FROM SUNDISK, P30S REV 33. 9 SEPT 67.
R0330   MOD NO' 0   MOD BY' ZELDIN   DATE'
R0331   MOD NO' 1   MOD BY' RR BAIRNSFATHER   DATE'   11 APR 67
R0332   MOD NO' 2   MOD BY' RR BAIRNSFATHER   DATE'   12 MAY 67   ADD UR.RT CALC WHEN BELOW 300K FT
R0334   MOD NO' 2.1   MOD BY' RR BAIRNSFATHER   DATE' 5 JULY 67   FIX ERROR IN MOD. 2.
R0336   MOD NO' 3   MOD BY' RR BAIRNSFATHER   DATE'   12 JUL 67   CHANGE SIGN OF DISPLAYED ERROR.
R03371 MOD 4   MOD BY   S.ZELDIN   DATE 3 APRIL 68   CHANGE EQUATIONS FOR L/D=.18 WHICH REPLA
R0338   FUNCTION'   CALCULATE (FOR DISPLAY ON CALL) AN APPROXIMATE   MEASURE OF IN-PLANE SPLASH DOWN
R0340   ERROR. IF THE FREE-FALL TRANSFER ANGLE TO 300K FT ABOVE PAD RADIUS IS POSITIVE'
R0342   SPLASH ERROR= -RANGE TO TARGET + FREE-FALL TRANSFER ANGLE + ESTIMATED ENTRY ANGLE.
R0344   THE TARGET LOCATION AT ESTIMATED TIME OF IMPACT IS USED. IF THE FREE-FALL TRANSFER
R0346   ANGLE IS NEGATIVE' SPLASH ERROR= -RANGE TO TARGET
R0347   THE PRESENT TARGET LOCATION IS USED.
R0348   CALLING SEQUENCE   CALLED AFTER SR30.1 IF IN CSM AND IF P11 OPERATING (UNDER CONTROL OF V82)
R0349   SUBROUTINES CALLED'   VGAMCALC, TFF/TRIG, LALOTORV.
R0350   EXIT   RETURN DIRECTLY TO V 82 PROG. AT SPLRET
R0351   ERASABLE INITIALIZATION   LEFT BY SR30.1 AND V82GON1
R0352   OUTPUT' RSP-RREC RANGE IN REVOLUTIONS   DSKY DISPLAY IN N. MI.
R0354   DEBRIS' OPRET, PDL0 ...PDL7 ,PDL10

R03541   THETA(1)
R0355

0356				32,2017			BANK	32	
0357	REP	1		32,2000			SETLOC	DELRSPL1	
0358				32,2017			BANK		
0359	REP	1					COUNT*	$$/P30	PROGRAMS' P30 EXTERNAL DELTA V
0360				32,2017	00011 1	DELRSPL	STORE	8D	
0361				32,2020	45244 1		BPL	DSU	
0362	REP	1		32,2021	64067 1			CANTDO	GONE PAST 300K FT ALT
0363	REP	1		32,2022	18326 1			1BITDP	
0364				32,2023	45000 0		BOV	CALL	
0365	REP	2	LAST 634	32,2024	64067 1			CANTDO	POSMAX INDICATES NO 300K FT SOLUTION.
0366	REP	1		32,2025	55050 1			VGAMCALC	+GAMMA(REV) IN PMAC,V300 MAG(8-7)=PDL 0
0367				32,2026	45006 0		PUSH	CALL	
0368	REP	1		32,2027	58573 0			TFF/TRIG	
0369				32,2030	77624 1		CALL		
0370	REP	1		32,2031	64075 1			AUGEKUGL	
0371				32,2032	65525 0		PDDL	ACOS	T ENTRY PDL 6
0372	REP	1		32,2033	00017 1			CDELF/2	
0373				32,2034	77615 0		DAD		
0374				32,2035	00005 1			4	
0375	REP	2	LAST 89	32,2036	26350 0	GETARG	STOVL	THETA(1)	
0376	REP	7	LAST 434	32,2037	03401 1			LAT(SPL)	
0377	REP	9	LAST 622	32,2040	15104 0		STODL	LAT	
0378	REP	10	LAST 604	32,2041	15332 1			HI6ZEROS	
0379	REP	6	LAST 601	32,2042	15110 0		STODL	ALT	ALT=0 = LAT +4
0381	REP	5	LAST 500	32,2043	01205 1			PIPTIME	

L   P30,P37

0382					32,2044	71214 0		BON	DLOAD	
0383	REP	2	LAST	499	32,2045	03711 0			V37FLAG	
03831					32,2046	64050 0			+2	
03832	REP	6	LAST	509	32,2047	02325 1			TSTART82	
03833					32,2050	43225 0		DSU	DAD	
03834					32,2051	00011 1			8D	
0384					32,2052	45014 0		CLEAR	CALL	
0385	REP	6	LAST	614	32,2053	00662 0			ERADFLAG	
0386	REP	4	LAST	614	32,2054	26373 1			LALOTORV	R RECOV. IN ALPHAV AND MPAC
0387					32,2055	63256 0		UNIT	PDVL	
0388	REP	14	LAST	513	32,2056	02327 0			RONE	
03881					32,2057	50256 0		UNIT	DOT	
0389					32,2060	65552 0		SL1	ARCCOS	
0390					32,2061	77621 1		BDSU		ERROR = THETA EST - THETA TARG
A0391										NEGATIVE NUMBER SIGNIFIES THAT WILL FALL SHORT.
A0392										POSITIVE NUMBER SIGNIFIES THAT WILL OVERSHOOT.
0393	REP	3	LAST	634	32,2062	02350 0			THETA(1)	
0394	REP	3	LAST	275	32,2063	36356 1	DELRDONE	STCALL	RSP-RREC	DOWNRANGE RECOVERY RANGE ERROR /360
03941	REP	1			32,2064	27404 1			INTWAKE0	
03942					32,2065	77624 1		CALL		
0395	REP	1			32,2066	46653 0			SPLRET	
0396					32,2067	65345 0	CANTDO	DLOAD	PDDL	INITIALIZE ERASE TO DOT TARGET AND UR
A0397										FOR RANGE ANGLE.
0398	REP	7	LAST	599	32,2070	15330 0			HIDPHALF	TO PDL 0 FOR DEN IN DDV.
0399	REP	11	LAST	634	32,2071	15332 1			HI6ZEROS	
0400					32,2072	77606 1		PUSH		ZERO TO PDL 2 FOR PHI ENTRY
0401					32,2073	34011 0		STCALL	8D	
0402	REP	1			32,2074	64036 0			GETARG	GO SET RSP-RREC =0
0405					32,2075	77775 1	AUGEKUGL	VLOAD		
0406	REP	1			32,2076	24251 1			X1CON -2	
0407	REP	25	LAST	621	32,2077	14045 0		STODL	X1 -2	
0408					32,2100	00001 0			0	
0409					32,2101	50025 0		DSU	BMN	
0410	REP	1			32,2102	24243 1			V(21K)	
0411	REP	1			32,2103	64130 1			LOOPSET	
0412					32,2104	65060 0		XSU,1	XCHX,2	
0413	REP	19	LAST	624	32,2105	00050 1			S1	
0414	REP	26	LAST	635	32,2106	00046 0			X1	
0415					32,2107	45324 0		XCHX,2	DSU	
0416	REP	20	LAST	635	32,2110	00050 1			S1	
0417	REP	1			32,2111	24231 1			V(3K)	
0418					32,2112	65040 0		BMN	XCHX,2	
0419	REP	2	LAST	635	32,2113	64130 1			LOOPSET	
0420	REP	21	LAST	635	32,2114	00050 1			S1	
0421					32,2115	50025 0		DSU	BMN	
0422	REP	1			32,2116	24241 0			V(4K)	
0423	REP	3	LAST	635	32,2117	64130 1			LOOPSET	
0424					32,2120	65124 0		XCHX,2	XCHX,2	

L   P30,P37

0425	REF	22	LAST	635	32,2121	00050 1			S1
0426	REF	27	LAST	635	32,2122	00048 0			X1
0427					32,2123	50025 0		DSU	BMN
0428	REF	1			32,2124	24225 1			V(400)
0429	REF	4	LAST	635	32,2125	64130 1			LOOPSET
0430					32,2126	77730 0		SXA,1	
0431	REF	23	LAST	636	32,2127	00050 1			S1
0432					32,2130	52110 0	LOOPSET	INCR,1	GOTO
0433					32,2131	00001 0		DEC	1
0434	REF	1			32,2132	64135 1			K1K2LOOP
0435					32,2133	77730 0	K2CALC	SXA,1	
0436	REF	24	LAST	636	32,2134	00050 1			S1
0437					32,2135	44745 1	K1K2LOOP	DLOAD	DSU*
0438					32,2136	00001 0			0
0439	REF	1			32,2137	24240 1			V(32K) +1,1
0440					32,2140	42603 1		DMP*	DAD*
0441	REF	1			32,2141	24224 0			YK1K2 +1,1
0442	REF	1			32,2142	24210 1			CK1K2 +1,1
0443					32,2143	60125 1		PDDL	TIX,1
0444					32,2144	00003 1			2
0445	REF	1			32,2145	64133 1			K2CALC
0446					32,2146	55225 1		DSU	BDDV
04461					32,2147	50000 1		BOV	BMN
04462	REF	1			32,2150	64167 0			MAXPHI
04463	REF	2	LAST	636	32,2151	64167 0			MAXPHI
0447					32,2152	45325 1	PHICALC	PDDL	DSU
0448					32,2153	00001 0			0
0449	REF	1			32,2154	24251 1			V(26K)
0450					32,2155	71244 0		BPL	DLOAD
0451	REF	1			32,2156	64164 0			TGR26
0452	REF	1			32,2157	24245 1			TLESS26
0453					32,2160	77671 1		DDV	
0454					32,2161	00001 0			0
0455					32,2162	43405 1	TENT	DMP	RVQ
0456					32,2163	00005 1			4D
0457					32,2164	52145 0	TGR26	DLOAD	GOTO
0458	REF	1			32,2165	24247 0			TGR26CON
0459	REF	1			32,2166	64162 0			TENT
04591					32,2167	52145 0	MAXPHI	DLOAD	GOTO
04592	REF	1			32,2170	24173 1			MAXPHIC
04593	REF	1			32,2171	64152 0			PHICALC
04594					32,2172	02755 1	MAXPHIC	2DEC	.09259298
04594					32,2173	01307 1			
0460	REF	2 LAST	634 TO	636'	109	109*	COUNT*	$$/P30

PHI ENTRY PDL 4D

2000 NM FOR MAXIMUM PHI ENTRY

A0461
A0462

                                              BELOW
                    ±±±± TABLE IS INDEXED. KEEP IN ORDER δδδ

0463		32,2174	00013 0		2DEC	7.07304526	$E-4$	5500
0463		32,2175	22652 0					
0464		32,2176	00005 1		2DEC	3.08641975	$E-4$	2400
0464		32,2177	01642 0					
0465		32,2200	00005 1		2DEC	3.08641975	$E-4$	2400
0465		32,2201	01642 0					
0466		32,2202	77556 1		2DEC	-8.8888888	$E-3$	-3.2
0466		32,2203	53522 1					
0467		32,2204	00055 1		2DEC	2.7777777	$E-3$	1
0467		32,2205	20266 1					
0468		32,2206	00155 0	CK1K2	2DEC	6.6666666	$E-3$	2.4
0468		32,2207	07202 0					
0469		32,2210	00000 1		2DEC	0		0
0469		32,2211	00000 1					
0470		32,2212	77730 0		2DEC*	-1.86909989	$E-5$ $B7*$	-.443
0470		32,2213	71525 0					
0471		32,2214	00000 1		2DEC	0		
0471		32,2215	00000 1					
0472		32,2216	04445 0		2DEC*	1.11639691	$E-3$ $B7*$	.001225
0472		32,2217	10102 0					
0473		32,2220	03726 1		2DEC*	9.56911636	$E-4$ $B7*$	.00105
0473		32,2221	31201 0					
0474		32,2222	01040 1	YK1K2	2DEC*	2.59733157	$E-4$ $B7*$	.000285
0474		32,2223	26313 1					
0475		32,2224	00234 1	V(400)	2DEC	1.2192	$B-7$	
0475		32,2225	01660 0					
0476		32,2226	25254 0	V(28K)	2DEC	85.344	$B-7$	
0476		32,2227	01014 0					
0477		32,2230	02222 1	V(3K)	2DEC	9.144	$B-7$	
0477		32,2231	15646 1					
0478		32,2232	22223 1	V(24K)	2DEC	73.152	$B-7$	
0478		32,2233	16457 0					
0479		32,2234	25254 0		2DEC	85.344	$B-7$	
0479		32,2235	01014 0					
0480		32,2236	30304 0	V(32K)	2DEC	97.536	$B-7$	
0480		32,2237	23351 1					
0481		32,2240	03030 1	V(4K)	2DEC	12.192	$B-7$	
0481		32,2241	22335 1					
0482		32,2242	20000 0	V(21K)	2DEC	64.000	$B-7$	
0482		32,2243	00000 1					
0483		32,2244	00033 1	TLESS26	2DEC*	5.70146688	$E7$ $B-35*$	8660PHI/V
0483		32,2245	05763 0					
0484		32,2246	00053 1	TGR26CON	2DEC	7.2	$E5$ $B-28$	PHI/3
0484		32,2247	36200 0					
0485		32,2250	23637 1	V(26K)	2DEC	79.248	$B-7$	26000
0485		32,2251	27636 1					
0486		32,2252	00012 1	X1CON	DEC	10		
0487		32,2253	00010 0		DEC	8		
0488		32,2254	00006 1		DEC	6		
A0489								

.±±±± TABLE IS INDEXED. KEEP IN ORDER &&&

L   P30,P37

A0490

L   P30,P37   USER=S PAGE NO. 14   E7 S3

P0491   ..... AVFLAGA/P .....

R0492   SUBROUTINES USED

R0493   UPFLAG
R0494   DOWNFLAG
 0496   REF   2 LAST 626   35,2000   SETLOC P30S1
 0497   35,3726   BANK
 0498   REF 17 LAST 549   E4,1770   EBANK= SUBEXIT
 0499   35,3726 0 0006 1 AVFLAGA   EXTEND   AVFLAG = CSM
 0500   REF 18 LAST 639   35,3727 23=770 0   QXCH   SUBEXIT
 0501   REF 39 LAST 628   35,3730 0 5447 0   TC   DOWNFLAG
 0502   REF   7 LAST 633   35,3731   00050 1   ADRES AVFLAG   BIT 5 FLAG 2
 05025   REF   4 LAST 560   35,3732 3 4753 1   CAF   EBANK7
 05026   REF 29 LAST 565   35,3733 54 003 0   TS   EBANK
 05027   REF   2 LAST 171   E7,1424   EBANK= ECSTEER
 0503   REF 20 LAST 629   35,3734 3 4676 1   CAF   BIT13
 0504   REF   3 LAST 639   35,3735 55=424 0   TS   ECSTEER   SET ECSTEER = 1
 05045   REF   1   35,3736 3 4700 1   CAF   EBANK4
 05046   REF 30 LAST 639   35,3737 54 003 0   TS   EBANK
 05047   REF 19 LAST 639   E4,1770   EBANK= SUBEXIT
 0505   REF 20 LAST 639   35,3740 0 1770 0   TC   SUBEXIT
 0506   35,3741 0 0006 1 AVFLAGP   EXTEND   AVFLAG = LEM
 0507   REF 21 LAST 639   35,3742 23=770 0   QXCH   SUBEXIT
 0508   REF 36 LAST 628   35,3743 0 5435 0   TC   UPFLAG
 0509   REF   8 LAST 639   35,3744   00050 1   ADRES AVFLAG   BIT 5 FLAG 2
 05091   REF 22 LAST 639   35,3745 0 1770 0   TC   SUBEXIT
 0510   35,3746 0 0006 1 P20FLGON   EXTEND
 0511   REF 23 LAST 639   35,3747 23=770 0   QXCH   SUBEXIT
 05111   REF 37 LAST 639   35,3750 0 5435 0   TC   UPFLAG
 05112   REF   6 LAST 628   35,3751   00031 0   ADRES TRACKFLG
 05113   REF 38 LAST 639   35,3752 0 5435 0   TC   UPFLAG
 05114   REF 18 LAST 628   35,3753   00027 1   ADRES UPDATFLG
 0512   REF 24 LAST 639   35,3754 0 1770 0   TC   SUBEXIT

R1000   PROGRAM DESCRIPTION **P40CSM**

1129	REP	14	LAST	274	E6,1466				EBANK=	DAPDATR1	
1130					31,3215				BANK	31	
1131	REP	1			24,2000				SETLOC	P40S	
1132					24,2002				BANK		
1133	REP	1							COUNT	24/P40	
1134	REP	40	LAST	639	24,2002	0 5447 0	P40CSM	TC	DOWNFLAG	
1135	REP	1			24,2003	00023 0		ADRES	ENG2FLAG	
1136	REP	131	LAST	629	24,2004	0 6006 1		TC	INTPRET	
1137					24,2005	43135 1		SLOAD	BOFF	IS THIS AN EXTERNAL DELTA V BURN
1138	REP	4	LAST	639	24,2006	03425 1			ECSTEER	
1139	REP	5	LAST	628	24,2007	01347 0			XDELVFLG	NO CSTEER = ECSTEER
1140	REP	1			24,2010	50013 0			P40S/C	YES CSTEER = ZERO
1141					24,2011	77745 1		DLOAD		
1142	REP	12	LAST	635	24,2012	15332 1			HI6ZEROS	
1143	REP	3	LAST	167	24,2013	17703 0	P40S/C	STODL	CSTEER	SET UP THRUST FOR P40 20,000 LBS
1144	REP	1			24,2014	10335 0			FENG	P41 ENTERS HERE
1145	REP	2	LAST	122	24,2015	17727 0	P40S/F	STODL	F	ORIGINAL TIG MAY BE SLIPPED BY P40S/SV
1146	REP	31	LAST	677	24,2016	03413 1			TIG	SET ORIGINAL TIME OF IGNITION FOR S40.9
1147	REP	2	LAST	115	24,2017	03450 0		STORE	NOMTIG	
1148					24,2020	77776 1		EXIT		
1149	REP	159	LAST	628	24,2021	0 4555 0		TC	BANKCALL	
1150	REP	4	LAST	608	24,2022	17573 0		CADR	R02BOTH	IMU STATUS CHECK
1151	REP	132	LAST	640	24,2023	0 6006 1	P40PVA	TC	INTPRET	
1152					24,2024	77624 1		CALL		
1153	REP	1			24,2025	34000 0			S40.1	COMPUTE VGTIG,UT
1154					24,2026	77624 1		CALL		
1155	REP	1			24,2027	51512 0			S40.2,3	COMPUTE PREFERRED ATTITUDE
1156					24,2030	77414 0		SET	EXIT	
1157	REP	1			24,2031	01073 1			PFRATFLG	
1158	REP	2	LAST	199	24,2032	0 2212 1	P40SXTY	TCR	SETMINDB -1	NARROW DEADBAND FOR MANEUVER (EBANK6)
1159					24,2033	0 0003 1		RELINT		
1160	REP	160	LAST	640	24,2034	0 4555 0		TC	BANKCALL	
1161	REP	5	LAST	613	24,2035	56000 1		CADR	R60CSM	ATTITUDE MANEUVER
1162	REP	75	LAST	626	24,2036	4 4712 0		CS	ONE	FOR UPDATEVG
1163	REP	2	LAST	105	24,2037	55«746 1		TS	NBRCYCLS	
1164	REP	39	LAST	639	24,2040	0 5435 0		TC	UPFLAG	
1165	REP	3	LAST	626	24,2041	00155 0		ADRES	TIMRFLAG	ALLOW CLOCKTASK
1166	REP	1			24,2042	0 2252 0		TC	P41/P40	
1167	REP	1			24,2043	0 2267 0		TC	P41/DSP	P41
1168	REP	1			24,2044	3 2351 1	P40TTOG	CAF	V06N40	INITIALIZE FOR CLOCKTASK WHICH IS CALLED

L   P40-P47

1169	REF	2	LAST	626	24,2045	55*145 1		TS	NVWORD1	BELOW
1170	REF	133	LAST	640	24,2046	0 6006 1		TC	INTPRET	
1171					24,2047	51575 1		VLOAD	ABVAL	FOR R2
1172	REF	5	LAST	169	24,2050	03721 0			VOTIG	
1173	REF	6	LAST	633	24,2051	17654 0		STODL	VGDISP	
11731	REF	13	LAST	640	24,2052	15332 1			HI6ZEROS	
11732	REF	4	LAST	276	24,2053	03426 1		STORE	DVTOTAL	
1174					24,2054	77776 1		EXIT		
1175					24,2055	0 0006 1		EXTEND		
1176	REF	1			24,2056	3 2773 0		DCA	STEERADS	SET FOR UPDATEVG AND TEST FOR STEERING
1177	REF	3	LAST	77	24,2057	53*223 1		DXCH	AVEGEXIT	AFTER AVERAGE G
1178	REF	1			24,2060	3 2344 0	P40GMB	CAF	P40CKLS2	(4.1 PROTECTION)
1179	REF	161	LAST	640	24,2061	0 4555 0		TC	BANKCALL	
1180	REF	2	LAST	612	24,2062	20751 0		CADR	GOPERF1	
1181	REF	1			24,2063	1 2204 1		TCF	POST41	V34
1182	REF	1			24,2064	1 2362 0		TCF	TST,TRIM	V33
1183	REF	38	LAST	575	24,2065	4 4712 0	TRIMONLY	CS	BIT1	SET MRKRTEMP FOR GIMBAL TRIM (-1)
1184	REF	1			24,2066	55*445 1	+1	TS	MRKRTMP	ENTRY FROM TST,TRIM
1185	REF	126	LAST	626	24,2067	3 4714 1		CAF	ZERO	SET CNTR +0 FOR RESTART LOGIC IN S40.6
1186	REF	1			24,2070	55*447 0		TS	CNTR	+0 SAYS NORMAL ENTRY.
A1187										+1 (PRE40.6) SAYS RESTART ENTRY
1188	REF	76	LAST	640	24,2071	3 4712 1		CAF	ONE	
1189	REF	23	LAST	626	24,2072	0 5140 1		TC	WAITLIST	
1190	REF	15	LAST	640	E6,1466			EBANK=	DAPDATR1	
1191	REF	1			24,2073	02051 1		2CADR	S40.6	
1191	REF	1			24,2074	40066 0				
1192	REF	2	LAST	641	24,2075	11*445 1		CCS	MRKRTMP	TEST TO FIND TIME TO WAIT FOR GIMBALTEST
1193	REF	1			24,2076	3 2343 1		CAF	18SEC	PLUS, DELAY FOR 18 SECONDS
1194					24,2077	1 2101 1		TCF	+2	HOLE
1195	REF	1			24,2100	3 2776 0		CAF	5SEC	DELAY FOR TRIM ONLY TASK
1196	REF	162	LAST	641	24,2101	0 4555 0		TC	BANKCALL	
1197	REF	8	LAST	576	24,2102	01732 0		CADR	DELAYJOB	
1198	REF	12	LAST	626	24,2103	0 5261 1		TC	2PHSCHNG	
1199					24,2104	40026 1		OCT	40026	6.2 = PRE40.6(-0CS), CLOKTASK(100CS)
1200					24,2105	00234 1		OCT	00234	4.23 = P40S/SV (PRIO12)
1201	REF	77	LAST	641	24,2106	3 4712 1	P40S/RS	CAF	ONE	
1202	REF	24	LAST	641	24,2107	0 5140 1		TC	WAITLIST	P41/SDP
1203	REF	32	LAST	640	E7,1412			EBANK=	TIG	
1204	REF	4	LAST	626	24,2110	03172 0		2CADR	CLOKTASK	
1204					24,2111	50067 0				
1205					24,2112	0 0003 1		RELINT		
1206	REF	1			24,2113	0 3304 0	P40S/SV	TCR	E7SETTER	JOB, 4.23 PROTECTS, PRIO12
1207	REF	33	LAST	641	E7,1412			EBANK=	TIG	

L   P40-P47

1208	REP	134	LAST	641	24,2114	0 6006 1	TC	INTPRET
1209					24,2115	45345 1	DLOAD	DSU
1210	REP	34	LAST	641	24,2116	03413 1		TIG
1211	REP	1			24,2117	10342 0		SEC29.96
1212	REP	34	LAST	632	24,2120	00041 1	STORE	TDEC$_1$
1213					24,2121	77624 1	CALRB	
1214	REP	1			24,2122	27577 1		MIDTOAV$_1$
1215					24,2123	1 2125 1	TCF	+2
1216	REP	1			24,2124	0 2146 0	TC	P40SNEWM
1217					24,2125	0 0006 1	P40SET EXTEND	
1218	REP	266	LAST	623	24,2126	3 0155 0	DCA	MPAC
1219	REP	9	LAST	210	24,2127	53∝673 0	DXCH	P40TMP
1223					24,2130	0 0006 1	EXTEND	
1224	REP	1			24,2131	4 2776 1	DCS	5SECDP
1225	REP	10	LAST	642	24,2132	21∝673 0	DAS	P40TMP
1226					24,2133	0 0006 1	EXTEND	
1227	REP	11	LAST	642	24,2134	3 1673 1	DCA	P40TMP
1228	REP	2	LAST	417	24,2135	0 5231 1	TC	LONGCALL
1229	REP	35	LAST	642	E7,1412		EBANK=	TIG
1230	REP	3	LAST	209	24,2136	02364 1	2CADR	TIGBLNK
1230					24,2137	50067 0		
1231	REP	41	LAST	628	24,2140	0 5301 0	TC	PHASCHNG
1232					24,2141	20214 1	OCT	20214
1233	REP	80	LAST	628	24,2142	1 5112 1	TCF	ENDOFJOB
1234	REP	163	LAST	641	24,2143	0 4555 0	P40BLNKR TC	BANKCALL
1235	REP	4	LAST	527	24,2144	20607 1	CADR	CLEANDSP
1236	REP	81	LAST	642	24,2145	1 5112 1	TCF	ENDOFJOB
12362	REP	36	LAST	642	E7,1412		EBANK=	TIG
1237					24,2146	0 0006 1	P40SNEWM EXTEND	
1238	REP	5	LAST	301	24,2147	3 1246 0	DCA	PIPTIME$_1$
1239	REP	37	LAST	642	24,2150	53∝413 1	DXCH	TIG
1240					24,2151	0 0006 1	EXTEND	
1241	REP	2	LAST	642	24,2152	3 2342 0	DCA	SEC29.96
1242	REP	38	LAST	642	24,2153	21∝413 1	DAS	TIG
1243	REP	1			24,2154	1 2125 1	TCF	P40SET
1244	REP	16	LAST	641	E6,1466		EBANK=	DAPDATR$_1$
1245	REP	1			24,2155	3 2353 0	POSTBURN CAF	V16N40
1246	REP	164	LAST	642	24,2156	0 4555 0	TC	BANKCALL
1247	REP	1			24,2157	20610 1	CADR	REFLASH
1248	REP	2	LAST	641	24,2160	1 2204 1	TCF	POST41
1249	REP	1			24,2161	1 2163 0	TCF	P40RCS
1250	REP	2	LAST	209	24,2162	1 2155 0	TCF	POSTBURN
1252					24,2163	0 0006 1	P40RCS EXTEND	
1253	REP	1			24,2164	3 2407 0	DCA	ACADN85
1254	REP	4	LAST	641	24,2165	53∝223 1	DXCH	AVEGEXIT
1255	REP	2	LAST	530	24,2166	3 4735 1	CAF	2SECS
1256	REP	165	LAST	642	24,2167	0 4555 0	TC	BANKCALL

RETURN IN BASIC

INTEGRATION TIME GREATER THAN ALLOWED

DELTA TIME TO PREREAD (INT.INIT.)

FOR TIGBLNK

4.21 = TIGBLNK (P40TMP CS)

REMOVE RESIDUE

SET NEW TIG FOR 06 40

FOR LONGCALL OF TIG-30(OR -35)

V34 GO FINISH
PROCEED
RECYCLE
V99N40 ENTERS HERE ON A P40 BYPASS SPS

WAIT FOR CALCN85 VIA AVEGEXIT

L   P40-P47

1257	REP	9	LAST	641	24,2170	01732 0		CADR	DELAYJOB	
1258	REP	3	LAST	640	24,2171	0 2212 1	P40MINDB	TCR	SETMINDB -1	
1259					24,2172	0 0003 1		RELINT		
1260	REP	42	LAST	642	24,2173	0 5301 0	TIGNOW	TC	PHASCHNG	
12602					24,2174	05024 1		OCT	05024	TYPE C GROUP 4 BELOW FOR NOUN 85
12604					24,2175	20000 0		OCT	20000	PRIO 20
12606	REP	1			24,2176	3 2350 0		CAF	V16N85B	
1261	REP	166	LAST	642	24,2177	0 4555 0		TC	BANKCALL	
1262	REP	2	LAST	642	24,2200	20810 1		CADR	REFLASH	FINISH P40/P41
1263	REP	3	LAST	642	24,2201	1 2204 1		TCF	POST41	V03 PROCEED WITH REST OF THE CLEAN-UP
1264	REP	4	LAST	643	24,2202	1 2204 1		TCF	POST41	V32 NOT GSOP RESPONSE BUT REDISPLAY N85
1265	REP	1			24,2203	1 2173 1		TCF	TIGNOW	
1267					24,2204	0 0006 1	POST41	EXTEND		
1268	REP	1			24,2205	3 2405 1		DCA	SERVCADR	
1269	REP	5	LAST	642	24,2206	53~223 1		DXCH	AVEGEXIT	
1271	REP	39	LAST	628	24,2207	1 4106 0		TCF	GOTOPOOH	
1272					24,2210	00056 1	MINDB	DEC	46	
1273					24,2211	00707 1	MAXDB	DEC	455	
12732	REP	17	LAST	642	E6,1466			EBANK= DAPDATR1		
1274					24,2212	0 0004 0	-1	INHINT		ROUTINE FOR SETTING
1275	REP	13	LAST	583	24,2213	3 0032 0	SETMINDB	CA	CDUX	THE MINIMUM DEADBAND
1276	REP	4	LAST	168	24,2214	55~572 1		TS	THETADX	IN AUTOPILOT
1277					24,2215	0 0006 1		EXTEND		
1278	REP	5	LAST	563	24,2216	3 0034 0		DCA	CDUY	
1279	REP	2	LAST	107	24,2217	53~574 1		DXCH	THETADY	SHOULD BE CALLED UNDER
1280	REP	1			24,2220	3 2210 0		CA	MINDB	INTERRUPT INHIBITED
1281	REP	2	LAST	108	24,2221	55~655 1		TS	ADB	EBANK = E6
1282	REP	26	LAST	583	24,2222	4 4707 1		CS	BIT4	
1283	REP	18	LAST	643	24,2223	7 1466 0		MASK	DAPDATR1	
1284	REP	19	LAST	643	24,2224	55~466 0		TS	DAPDATR1	
1285	REP	155	LAST	628	24,2225	0 0002 0		TC	Q	
12852	REP	20	LAST	643	E6,1466			EBANK= DAPDATR1		
1286					24,2226	0 0004 0	-1	INHINT		ROUTINE FOR SETTING
1287	REP	1			24,2227	3 2211 1	SETMAXDB	CA	MAXDB	THE MAXIMUM DEADBAND IN AUTOPILOT
1288	REP	3	LAST	643	24,2230	55~655 1		TS	ADB	
1289	REP	21	LAST	643	24,2231	4 1466 0		CS	DAPDATR1	
1290	REP	27	LAST	643	24,2232	7 4707 1		MASK	BIT4	SHOULD BE CALLED UNDER
1291	REP	22	LAST	643	24,2233	27~466 0		ADS	DAPDATR1	INTERRUPT INHIBITED
1292	REP	156	LAST	643	24,2234	0 0002 0		TC	Q	EBANK = E6

P1293   PROGRAM DESCRIPTION **P41CSM**
 1354   REF 23 LAST 643   E6,1466   EBANK= DAPDATR1
 1355   REF   1   COUNT 24/P41

 1356   REF 40 LAST 640   24,2235   0 5435 0 P41CSM TC   UPFLAG
 1357   REF   2 LAST 640   24,2236   00023 0   ADRES ENG2FLAG   SET FOR RCS

 1358   REF 135 LAST 642   24,2237   0 6006 1   TC   INTPRET
 1359   24,2240   77745 1   DLOAD
 1360   REF 14 LAST 641   24,2241   15332 1   HI6ZEROS   FOR P41 CSTEER =0
 1361   REF   4 LAST 640   24,2242   03703 0   STORE CSTEER

 1362   24,2243   43145 0   DLOAD BON
 1363   REF   1   24,2244   10337 1   PRCS2   2JET THRUST FOR S40.1
 1364   REF   1   24,2245   00700 0   NJETSFLG
 1365   REF   1   24,2246   50015 0   P40S/F   NJETS = 1 2-JET
 1366   24,2247   52015 1   DAD   GOTO   NJETS = 0 4-JET
 1367   REF   2 LAST 644   24,2250   10337 1   PRCS2
 1368   REF   2 LAST 644   24,2251   50015 0   P40S/F

 1369   REF 11 LAST 511   24,2252   4 1011 1 P41/P40 CS   MODREG
 1370   REF 78 LAST 641   24,2253   7 4712 0   MASK ONE   P41EXITS AT CALL LOC +1
 1371   24,2254   0 0006 1   EXTEND
 1372   24,2255   1 2257 1   BZF   +2   P41
 1373   REF 157 LAST 643   24,2256   24 002 0   INCR Q   P40 EXITS AT CALL LOC +2
 1374   REF 158 LAST 644   24,2257   0 0002 0   TC   Q

 1375   REF   4 LAST 430   24,2260   3 4675 1 TIG/0   CAF   PRIO20   TASK (4.4 PROTECTS IN P41)
 1376   REF 18 LAST 575   24,2261   0 5027 1   TC   NOVAC
 1377   REF 24 LAST 644   E6,1466   EBANK= DAPDATR1
 1378   REF   2 LAST 643   24,2262   02173 0   2CADR TIGNOW
 1378   24,2263   50066 1

 1379   REF 41 LAST 640   24,2264   0 5447 0 P40CLK TC   DOWNFLAG
 1380   REF   4 LAST 640   24,2265   00155 0   ADRES TIMRFLAG

 1382   REF 26 LAST 531   24,2266   1 5213 0   TCF   TASKOVER

 1383   REF   1   24,2267   3 2347 0 P41/DSP CAF   V06N85B   SET UP FOR NONFLASH V 06 N85 BY CLOCKJOB
 1384   REF   3 LAST 641   24,2270   55«145 1   TS   NVWORD1

 1385   REF 136 LAST 644   24,2271   0 6006 1   TC   INTPRET
 1386   24,2272   77624 1   CALL   COMPUTE
 1387   REF   1   24,2273   50314 1   P40CNV85   VGTIG IN CTRL COORDS
 1388   24,2274   77776 1   EXIT
 1389   24,2275   0 0006 1   EXTEND   DO CONTROL COORD CALCULATION AFTER AVEG
 1390   REF   2 LAST 642   24,2276   3 2407 0   DCA   ACADN85
 1391   REF   6 LAST 643   24,2277   53«223 1   DXCH AVEGEXIT

1392	REF	13	LAST	641	24,2300	0 5261 1		TC	2PHSCHNG	
1393					24,2301	40036 0		OCT	40036	6.3=CLOKTASK(100CS)
1394					24,2302	00234 1		OCT	234	4.23=P40S/SV(PRIO12)
1395	REF	1			24,2303	1 2106 0		TCF	P40S/RS	
1396	REF	2	LAST	643	24,2304	3 2350 0	P41REDSP	CAF	V16N85B	ENTER FROM P41 SIDE OF TIGAVEG
1397	REF	4	LAST	644	24,2305	55=145 1		TS	NVWORD1	REDISPLAY NONFLASHING
1398	REF	3	LAST	642	24,2306	3 2342 0		CAF	SEC29.96 +1	
1399	REF	25	LAST	641	24,2307	0 5140 1		TC	WAITLIST	
1400	REF	25	LAST	644	E6,1466			EBANK=	DAPDATR1	
1401	REF	2	LAST	208	24,2310	02260 1		2CADR	TIG/0	
1401					24,2311	50066 1				
1402	REF	22	LAST	617	24,2312	4 4710 1		CS	BIT3	4.4 = TIG/0(2996CS), PRECHECK(-0CS)
1403	REF	1			24,2313	1 2513 0		TCF	TIGPHS	
1404					24,2314	40220 0	P40CNV85	STO	SETPD	
1405	REF	1			24,2315	03730 0			OTEMP1	
1406					24,2316	00001 0			0	
1407					24,2317	41575 0		VLOAD	PUSH	
1408	REF	1			24,2320	03721 0			VGPREV	EQUALS VGTIG (TARGETTING INPUT)
1409					24,2321	77624 1		CALL		
1410	REF	1			24,2322	45426 0			S41.1	
1411	REF	6	LAST	277	24,2323	37665 0		STCALL	VGBODY	
1412	REF	2	LAST	645	24,2324	03730 0			OTEMP1	
14122	REF	26	LAST	645	E6,1466			EBANK=	DAPDATR1	
1413	REF	137	LAST	644	24,2325	0 6006 1	CALCN85	TC	INTPRET	
1414					24,2326	77624 1		CALL		
1415	REF	1			24,2327	51016 1			UPDATEVG	NEW VG, S40.8(+MAYBE S40.9)
1416					24,2330	77624 1		CALL		
1417	REF	2	LAST	644	24,2331	50314 1			P40CNV85	COMPUTE VGBODY
1418					24,2332	77776 1		EXIT		
1419	REF	1			24,2333	0 3127 0		TC	SERVXT	
1420					24,2334	02217 1	FENG	2DEC	9.1188544 B-7	SPS THRUST (20500LBS), SC.AT B+7 NEWT/E4
1420					24,2335	06650 1				
1421					24,2336	00013 0	FRCS2	2DEC	.087437837 B-7	RCS ULLAGE (199.6COS10 LBS), SC.AT
1421					24,2337	06112 0				
A1422										B+7 NEWTONS/E+4
1423					24,2340	04700 1	SEC24.96	DEC	2496	
1424					24,2341	00000 1	SEC29.96	2DEC	2996	
1424					24,2342	05664 0				
1425					24,2343	03410 1	18SEC	DEC	1800	
1426					24,2344	00204 1	P40CKLS2	OCT	204	
1427					24,2345	37730 1	40CST5	OCT	37730	40 CS FOR THE T5 CLOCK
1428	REF	4	LAST	379	4377		OCT12	=	TEN	
1429					24,2346	04123 0	V1683	VN	1683	
1430					24,2347	01525 1	V06N85B	VN	0685	
1431					24,2350	04125 0	V16N85B	VN	1685	
1432					24,2351	01450 1	V06N40	VN	0640	
1433					24,2352	24020 0	P40CK99	OCT	24020	BITS 14,12, AND5 FOR LINUS VERB 99
1434					24,2353	04050 0	V16N40	VN	1640	

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1435					24,2354	00027 1	OCT27/24	OCT	27
1436					24,2355	00053 1	OCT53	OCT	53
1437					24,2356	00035 1	OCT35	OCT	35
1438	REF	27	LAST	645	E6,1466			EBANK=	DAPDATR1
1439	REF	4	LAST	255	24,2357	03143 1	T5IDL24	2CADR	T5IDLOC
1439					24,2360	12066 1			
1440					24,2361	00026 0	3MDOT	DEC	86.8175796 B-16 3SEC MASS LOSS (63.8 LBS/SEC), SC.AT
A1441									B+16 KG/SEC (NOTE, EMDOT IS PAD-LOADED,
A1442									BUT 3MDOT IS NOT A CRITICAL QUANTITY, SO
A1443									IT CAN REMAIN IN FIXED MEMORY)
1445	REF	39	LAST	641	24,2362	3 4712 1	TST,TRIM	CAF	BIT1 SET UP FOR GIMB DRIVE TEST AND TRIM (+1)
1446	REF	1			24,2363	1 2066 1		TCF	TRIMONLY +1
1447	REF	2	LAST	641	24,2364	3 2776 0	TIGBLNK	CAF	5SEC CALL TIGAVEG IN FIVE SEC AT TIG-30
1448	REF	26	LAST	645	24,2365	0 5140 1		TC	WAITLIST
1449	REF	39	LAST	642	E7,1412			EBANK=	TIG
1450	REF	2	LAST	209	24,2366	02502 1		2CADR	TIGAVEG
1450					24,2367	50067 0			
1451	REF	127	LAST	641	24,2370	3 4714 1		CAF	ZERO DISABLE HERE, NOT IN P40BLNKR
1452	REF	5	LAST	645	24,2371	55≈145 1		TS	NVWORD1
1453	REF	4	LAST	561	24,2372	3 4761 0		CAF	PRIO14
1454	REF	19	LAST	644	24,2373	0 5027 1		TC	NOVAC
1455	REF	40	LAST	646	E7,1412			EBANK=	TIG
1456	REF	1			24,2374	02143 0		2CADR	P40BLNKR DONT PROTECT-RESTARTS BLANK DSKY
1456	REF	1			24,2375	50067 0			
1457	REF	3	LAST	220	24,2376	4 4362 0		CS	OCT37 4.37 = TIGAVEG (500CS)
1458	REF	2	LAST	430	24,2377	0 4114 1	P40TSK	TC	NEWPHASE
1459					24,2400	00004 0		OCT	4
1460	REF	27	LAST	644	24,2401	0 5213 1		TC	TASKOVER
1461	REF	41	LAST	646	E7,1412			EBANK=	TIG
1462	REF	1			24,2402	02436 1	ACADN83	2CADR	CALCN83
1462	REF	1			24,2403	50067 0			
1463	REF	42	LAST	646	E7,1412			EBANK=	TIG
1464	REF	2	LAST	531	24,2404	03132 1	SERVCADR	2CADR	SERVEXIT
1464					24,2405	76067 1			
1465	REF	28	LAST	646	E6,1466			EBANK=	DAPDATR1
1466	REF	1			24,2406	02325 1	ACADN85	2CADR	CALCN85
1466	REF	1			24,2407	50066 1			

P1467   PROGRAM DESCRIPTION **P47CS**
1508   REP   1   COUNT   24/P47

1509	REP	43	LAST	646	E7,1412			EBANK=	TIG	
1510	REP	167	LAST	643	24,2410	0 4555 0	P47CSM	TC	BANKCALL	IMU STATUS CHECK
1511	REP	5	LAST	640	24,2411	17573 0		CADR	R02BOTH	
1512	REP	138	LAST	645	24,2412	0 6006 1		TC	INTPRET	
1513					24,2413	77824 1		CALRB		
1514	REP	1			24,2414	27573 0			MIDTOAV2	
1515	REP	267	LAST	642	24,2415	30 155 0		CAE	MPAC +1	DELTA TIME TO RPEREAD (LESS THAN 1000
1516	REP	12	LAST	642	24,2416	55×672 1		TS	P40TMP	CS, WITH A TPAGREE, INT.INIT.)
1517	REP	27	LAST	646	24,2417	0 5140 1		TC	WAITLIST	
1518	REP	44	LAST	647	E7,1412			EBANK=	TIG	
1519	REP	2	LAST	210	24,2420	02425 0		2CADR	TIGON	TIGON IS REQUIRED TO MATHCHTAT AND AVEG
1519					24,2421	50067 0				
1520	REP	43	LAST	643	24,2422	0 5301 0		TC	PHASCHNG	
1521					24,2423	40574 0		OCT	40574	A, 4.57 = TIGON (P40TMP CS)
1522	REP	82	LAST	642	24,2424	1 5112 1		TCF	ENDOFJOB	
15222	REP	13	LAST	647	E7,1672			EBANK=	P40TMP	
1523					24,2425	0 0006 1	TIGON	EXTEND		
1524	REP	1			24,2426	3 2403 1		DCA	ACADN83	
1525	REP	7	LAST	644	24,2427	53×223 1		DXCH	AVEGEXIT	
1526	REP	9	LAST	583	24,2430	3 4371 0		CAF	PRIO30	FORCE ZEROING OF N83 BEFORE SERVICER
1527	REP	20	LAST	646	24,2431	0 5027 1		TC	NOVAC	
1528	REP	45	LAST	647	E7,1412			EBANK=	TIG	
1529	REP	2	LAST	208	24,2432	02461 0		2CADR	P47BODY	
1529					24,2433	50067 0				
1530	REP	26	LAST	578	24,2434	4 4711 0		CS	BIT2	4.2 = PRECHECK (-0CS), P47BODY (PRIO30)
1531	REP	2	LAST	645	24,2435	1 2513 0		TCF	TIGPHS	
1532	REP	46	LAST	647	E7,1412			EBANK=	TIG	
1533	REP	139	LAST	647	24,2436	0 6006 1	CALCN83	TC	INTPRET	
15333					24,2437	77601 0		SETPD		SET UP PUSHLIST FOR S41.1
15336					24,2440	00001 0			0	
1534					24,2441	53375 0		VLOAD	VAD	
1535	REP	1			24,2442	03665 1			DELVCTL	
1536	REP	1			24,2443	03433 0			DELVREF	
1537	REP	1			24,2444	03460 0		STORE	DV47TEMP	FOR COPYCYCLE BELOW
1538					24,2445	45006 0		PUSH	CALL	
1539	REP	2	LAST	645	24,2446	45426 0			S41.1	
1540	REP	6	LAST	277	24,2447	37675 1		STCALL	DELVIMU	
1541	REP	2	LAST	531	24,2450	70436 1			S11.1	CALC. VI, H, HDOT FOR NOUN 62
1542					24,2451	77776 1		EXIT		
1543	REP	44	LAST	647	24,2452	0 5301 0		TC	PHASCHNG	
1544					24,2453	10035 0		OCT	10035	

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1545	REF	14	LAST	561	24,2454	3 4715 0		CAF	FIVE
1546	REF	10	LAST	569	24,2455	0 5475 1		TC	GENTRAN
1547	REF	2	LAST	647	24,2456	01457 0		ADRES	DV47TEMP
1548	REF	2	LAST	647	24,2457	01664 1		ADRES	DELVCTL
1549	REF	2	LAST	645	24,2460	0 3127 0		TC	SERVXT
1550	REF	140	LAST	647	24,2461	0 6006 1	P47BODY	TC	INTPRET
1551					24,2462	77775 1		VLOAD	
1552	REF	15	LAST	644	24,2463	15332 1			HI6ZEROS
1553	REF	7	LAST	647	24,2464	03675 0		STORE	DELVIMU
1554	REF	3	LAST	648	24,2465	03685 1		STORE	DELVCTL
1555					24,2466	77776 1		EXIT	
1556	REF	3	LAST	380	24,2467	3 4762 0	P47BOD	CAF	PRIO15
15563	REF	8	LAST	576	24,2470	0 5103 0		TC	PRIOCHNG
155635	REF	45	LAST	647	24,2471	0 5301 0		TC	PHASCHNG
15564					24,2472	05024 1		OCT	05024
15565					24,2473	15000 0		OCT	15000
15566	REF	1			24,2474	3 2346 1	P47/DSP	CAF	V1683
1557	REF	168	LAST	647	24,2475	0 4555 0		TC	BANKCALL
1558	REF	27	LAST	628	24,2476	20624 0		CADR	GOFLASH
1559	REF	40	LAST	643	24,2477	0 4106 1		TC	GOTOPOOH
1560	REF	41	LAST	648	24,2500	0 4106 1		TC	GOTOPOOH
1561	REF	3	LAST	647	24,2501	1 2461 1		TCF	P47BODY

CLEAR DISPLAY AND ACCUMULATOR STORAGE
UPON INITIATION OR-ENTER-RESPONSE

LOWER PRIO THAN CALCN83 (20)
   TO PREVENT INTERRUPTION OF CALCN83

TYPE C GROUP 4 BELOW FOR NOUN 83
PRIO 15

RECYCLE - CLEAR ACCUMULATED VELOCITY

```
P1563   ROUTINE **TIG-30** DESCRIPTION
1588    REF  47  LAST  647   E7,1412                           EBANK= TIG
1589    REF   2  LAST  640 TO  644'   155   155*               COUNT  24/P40

1590    REF   2  LAST  640    24,2502  0 2252 0   TIGAVEG  TC    P41/P40        TASK (4.37 PROTECTS)
1591    REF   1               24,2503  1 2304 0            TCF   P41REDSP       P41

1592    REF   2  LAST  640    24,2504  3 2351 1            CAF   V06N40         UNBLANK DISPLAY
1593    REF   6  LAST  646    24,2505  55∞145 1            TS    NVWORD1

1594    REF   1               24,2506  3 2340 1            CAF   SEC24.96
1595    REF  28  LAST  647    24,2507  0 5140 1            TC    WAITLIST
1596    REF  48  LAST  649    E7,1412                      EBANK= TIG
1597    REF   3  LAST  210    24,2510    02521 0           2CADR  TIG-5
1597                          24,2511    50067 0
1598    REF  23  LAST  569    24,2512  4 6211 1            CS    SIX            4.6 = TIG-5 (2496CS), PRECHECK (-0CS)
1599    REF   3  LAST  646    24,2513  0 4114 1   TIGPHS   TC    NEWPHASE       ENTRY FROM P41REDSP (P41) WITH A=-4, OR
1600                          24,2514    00004 0            OCT   4                  FROM TIGON    (P47) WITH A=-2

1601    REF   2  LAST  530    24,2515  10 763 1   PRECHECK CCS   PHASE5         HAS SERVICER BEEN RESTARTED
1602    REF  28  LAST  646    24,2516  1 5213 0            TCF   TASKOVER       YES, DONT START ANOTHER ONE
1603    REF  40  LAST  624    24,2517  0 4574 0            TC    POSTJUMP
1604    REF   2  LAST  212    24,2520    76604 1           CADR  PREREAD
```

L   P40-P47

P1605   ROUTINE **TIG-5** DESCRIPTION

16242	REF	49	LAST	649	E7,1412			EBANK=	TIG	
1625	REF	3	LAST	646	24,2521	3 2776 0	TIG-5	CAF	5SEC	
1626	REF	29	LAST	649	24,2522	0 5140 1		TC	WAITLIST	
1627	REF	29	LAST	646	E6,1466			EBANK=	DAPDATR1	
1628	REF	3	LAST	211	24,2523	02537 1		2CADR	TIG-0	
1628					24,2524	50066 1				
1629	REF	20	LAST	562	24,2525	4 4702 1		CS	BIT9	WILL CAUSE V99 FLASH
1630	REF	7	LAST	649	24,2526	55=145 1		TS	NVWORD1	
1631	REF	14	LAST	645	24,2527	0 5261 1		TC	2PHSCHNG	
1632					24,2530	40074 0		OCT	40074	A, 4.7 = TIG-0 (500CS)
1633					24,2531	00033 1		OCT	00033	A, 3.3 = S40.13 (PRIO20)
1634	REF	5	LAST	644	24,2532	3 4675 1		CAP	PRIO20	
1635	REF	22	LAST	553	24,2533	0 5042 1		TC	FINDVAC	
1636	REF	6	LAST	207	E7,1427			EBANK=	TGO	
1637	REF	2	LAST	207	24,2534	02404 0		2CADR	S40.13	
1637					24,2535	34067 1				
1638	REF	29	LAST	649	24,2536	1 5213 0		TCF	TASKOVER	

L   P40-P47

P1639   ROUTINES **TIG-0** AND **IGNITION** DESCRIPTION
1648   REF 30 LAST 650   E6,1466   EBANK= DAPDATR1   TASK, 4.7 PHASE, OR 4.77 (-0CS) IN R40
16485   REF   2 LAST 195   24,2537 4 0103 1 TIG-0   CS   FLAGWRD7   SET IGN FLAG
16486   REF 21 LAST 639   24,2540 7 4676 0   MASK   BIT13
16487   REF   3 LAST 651   24,2541 26 103 1   ADS   FLAGWRD7

1649   REF   4 LAST 651   24,2542 30 103 0   CAE   FLAGWRD7   CHECK ASTN FLAG FOR V99 RESPONSE
1650   REF 23 LAST 498   24,2543 7 4677 1   MASK   BIT12
1651   24,2544 0 0006 1   EXTEND
1652   REF 30 LAST 650   24,2545 1 5213 0   BZF   TASKOVER   WAIT FOR V99P

16522   REF   3 LAST 649   24,2546 3 2351 1   CAF   V06N40   CLEAR THE V99 (IN CASE OF A RESTART
16524   REF   8 LAST 650   24,2547 55⍺145 1   TS   NVWORD1   DURING THE V99 SEQUENCE)

1653   REF 46 LAST 648   24,2550 0 5301 0   TC   PHASCHNG   V99P HAS COME ALREADY, DO IGNITION NOW
1654   24,2551   00614 1   OCT   00614   A, 4.61 = IGNITION (-0CS) TBASE OLD

1660   REF 14 LAST 643   24,2552 30 032 0 IGNITION CAE   CDUX   SAVE FOR ROLL DAP REFERENCE OGAD
1661   REF   1   24,2553 55⍺450 0   TS   OGAD   .   V99PJOB (CLOCKJOB) SETS UP IGNITION
1662   24,2554 0 0006 1   EXTEND   TASK (4.61 PROTECTION)
1663   REF 19 LAST 577   24,2555 3 0025 0   DCA   TIME2   FOR RESTARTS
1664   REF   4 LAST 169   24,2556 53⍺337 0   DXCH   TEVENT
1665   REF 10 LAST 583   24,2557 4 0101 0   CS   FLAGWRD5   SET ENGONFLG
1666   REF 35 LAST 577   24,2560 7 4704 1   MASK   BIT7
1667   REF 11 LAST 651   24,2561 26 101 0   ADS   FLAGWRD5
1668   REF 22 LAST 651   24,2562 3 4676 1 SPSON   CAF   BIT13   TURN ON SPS ENGINE
1669   24,2563 0 0006 1   EXTEND
1670   REF 22 LAST 584   24,2564 05 011 1   WOR   DSALMOUT

1671   REF 21 LAST 650   24,2565 3 4702 0 IMPULCHK CAF   BIT9   CHECK FOR IMPULSIVE BURN
1672   REF   8 LAST 474   24,2566 7 0076 1   MASK   FLAGWRD2
1673   REF 148 LAST 584   24,2567 10 000 0   CCS   A
1674   REF   1   24,2570 1 2655 1   TCF   IMPLBURN   IMPULSIVE
1675   REF 13 LAST 538   24,2571 4 0102 0   CS   FLAGWRD6   NON-IMPULSIVE, SET STRULLSW FOR STEERULL
1676   REF 23 LAST 651   24,2572 7 4676 0   MASK   BIT13
1677   REF 14 LAST 651   24,2573 26 102 0   ADS   FLAGWRD6

1678   REF   9 LAST 532   24,2574 4 4105 0 PREPTVC   CS   OCT60000   RESET T5 BITS
1679   REF 15 LAST 651   24,2575 7 0102 0   MASK   FLAGWRD6
1680   REF 16 LAST 651   24,2576 54 102 0   TS   FLAGWRD6

1681   24,2577 0 0006 1   EXTEND   KILL RCS
1682   REF   1   24,2600 3 2360 0   DCA   T5IDL24
1683   REF   8 LAST 539   24,2601 53⍺313 0   DXCH   T5LOC

1684   REF 20 LAST 608   24,2602 4 6214 1   CS   THREE   4.3 = DOTVCON (40CS)
1685   REF   4 LAST 649   24,2603 0 4114 1   TC   NEWPHASE
1686   24,2604   00004 0   OCT   4

1687	REF	1		24,2605	0 5156 0		TC	FIXDELAY
1688		.		24,2606	00050 1		DEC	40

0.4 SECOND DELAY FOR THRUST BUILDUP

1689	REF	40	LAST	646	24,2607	4 4712 0	DOTVCON CS	BIT1
1690	REF	2	LAST	103	24,2610	55=654 0	TS	TVCPHASE
1691	REF	128	LAST	646	24,2611	3 4714 1	CAF	ZERO
1692	REF	2	LAST	103	24,2612	55=661 0	TS	TVCEXPHS
1693	REF	10	LAST	651	24,2613	4 4105 0	CS	OCT80000
1694	REF	17	LAST	651	24,2614	.7 0102 0	MASK	FLAGWRD6
1695	REF	31	LAST	411	24,2615	6 4674 0	AD	BIT15
1696	REF	18	LAST	652	24,2616	54 102 0	TS	FLAGWRD6

SET TVCPHASE = TVCDAPON CALL (FRESHDAP)

SET TVCEXECUTIVE PHASE

SET T5 BITS TO INDICATE TVC TAKEOVER....
        BITS 15,14 = 10

1697	REF	21	LAST	651	24,2617	3 6214 0	CAF	THREE
1698	REF	65	LAST	616	24,2620	54 001 1	TS	L
1699					24,2621	4 0000 0	COM	
1700	REF	2	LAST	181	24,2622	52 765 1	DXCH	-PHASE6

6.3 = CLOKTASK (100CS), DROPPING PRE40.6
        WHICH IS HANDLED NOW BY REDOTVC

1701	REF	15	LAST	648	24,2623	4 4715 1	CS	FIVE
1702	REF	5	LAST	651	24,2624	0 4114 1	TC	NEWPHASE
1703					24,2625	00004 0	OCT	4

4.5 = DOSTRULL (160 CS)

1704	REF	14	LAST	577	24,2626	3 4672 0	CAF	POSMAX
1705	REF	6	LAST	539	24,2627	54 030 0	TS	TIME5
1706					24,2630	0 0006 1	EXTEND	
1707	REF	1			24,2631	3 3001 0	DCA	TVCON2C
1708	REF	9	LAST	651	24,2632	53=313 0	DXCH	T5LOC

SET TIME5 FOR STARTING RIGHT AWAY

(TVCDAPON)
(KILLS RCS DAP)

1709	REF	2	LAST	652	24,2633	0 5156 0	TC	FIXDELAY
1710					24,2634	00240 1	DEC	160

0.4 + 1.6 = 2.0 SEC FOR ULLAGE-OFF AND
        STEERING (IF NON-IMPULSIVE)

1711	REF	24	LAST	651	24,2635	3 4676 1	DOSTRULL CAF	BIT13
1712	REF	19	LAST	652	24,2636	7 0102 0	MASK	FLAGWRD6
1713	REF	149	LAST	651	24,2637	10 000 0	CCS	A
1714	REF	1			24,2640	0 2646 1	TCR	STEERULL
1715	REF	1			24,2641	0 2651 1	TCR	ULAGEOFF

CHECK STRULLSW FOR IMPULSIVE BURN

NON-IMPULSIVE, STEERING AND ULLAGE OFF
ULLAGE OFF (ONLY, OR AGAIN)

1716					24,2642	0 0006 1	EXTEND	
1717	REF	12	LAST	197	24,2643	3 4714 1	DCA	NEG0
1718	REF	3	LAST	197	24,2644	52 761 0	DXCH	-PHASE4

KILL GROUP 4 (DP NEG0 = -0,+0)

1719	REF	31	LAST	651	24,2645	1 5213 0	ENDIGN TCF	TASKOVER
1720	REF	9	LAST	651	24,2646	4 0076 1	STEERULL CS	FLAGWRD2
1721	REF	18	LAST	415	24,2647	7 4700 0.	MASK	BIT11
1722	REF	10	LAST	652	24,2650	26 076 1	ADS	FLAGWRD2

SET STEERSW

1723	REF	129	LAST	652	24,2651	3 4714 1	ULAGEOFF CAF	ZERO
1724					24,2652	0 0006 1	EXTEND	
1725	REF	2	LAST	179	24,2653	01 005 0	WRITE	CHAN5

ZERO CHANNEL 5

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1726	REP	159	LAST	644	24,2654	0 0002 0		TC	Q
1727	REP	25	LAST	652	24,2655	4 4676 0	IMPLBURN	CS	BIT13
17271	REP	20	LAST	652	24,2656	7 0102 0		MASK	FLAGWRD6
17272	REP	21	LAST	653	24,2657	54 102 0		TS	FLAGWRD6
17273	REP	2	LAST	641	24,2660	0 3304 0		TCR	E7SETTER
1728	REP	50	LAST	650	E7,1412			EBANK=	TIG
1729					24,2661	0 0006 1		EXTEND	
1730	REP	7	LAST	650	24,2662	3 1430 1		DCA	TGO
1731	REP	51	LAST	653	24,2663	53∝413 1		DXCH	TIG
1732					24,2664	0 0008 1		EXTEND	
1733	REP	20	LAST	651	24,2665	3 0025 0		DCA	TIME2
1734	REP	52	LAST	653	24,2666	21∝413 1		DAS	TIG
1735	REP	8	LAST	653	24,2667	31∝430 1		CAE	TGO +1
1736	REP	30	LAST	650	24,2670	0 5140 1		TC	WAITLIST
1737	REP	9	LAST	653	E7,1427			EBANK=	TGO
1738	REP	2	LAST	207	24,2671	02706 1		2CADR	ENGINOFF
1738					24,2672	50067 0			
1739	REP	15	LAST	650	24,2673	0 5261 1		TC	2PHSCHNG
1740					24,2674	40153 1		OCT	40153
1741					24,2675	05014 1		OCT	05014
17412					24,2676	77777 0		DEC	-0
1742	REP	22	LAST	651	24,2677	4 4702 1		CS	BIT9
1743	REP	11	LAST	652	24,2700	7 0076 1		MASK	FLAGWRD2
1744	REP	12	LAST	653	24,2701	54 076 1		TS	FLAGWRD2
1745	REP	1			24,2702	0 3307 0		TCR	E6SETTER
1746	REP	31	LAST	651	E6,1466			EBANK=	DAPDATR1
17462	REP	130	LAST	652	24,2703	3 4714 1		CAF	ZERO
17463	REP	2	LAST	210	24,2704	55∝444 0		TS	V97VCNTR
1747	REP	1			24,2705	1 2574 1		TCF	PREPTVC
1753	REP	10	LAST	653	E7,1427			EBANK=	TGO
17532	REP	2	LAST	653	24,2706	0 3307 0	ENGINOFF	TCR	E6SETTER
17533	REP	32	LAST	653	E6,1466			EBANK=	DAPDATR1
1754	REP	4	LAST	274	24,2707	31∝474 1		CAE	CSMMASS
1755	REP	3	LAST	194	24,2710	55∝662 0		TS	MASSTMP
1756	REP	16	LAST	653	24,2711	0 5261 1		TC	2PHSCHNG
1757					24,2712	00003 1		OCT	00003
1758					24,2713	40634 1		OCT	40634
1759	REP	2	LAST	194	24,2714	0 2737 0	DOSPSOFF	TCR	SPSOFF
1760	REP	1			24,2715	4 2354 0		CS	OCT27/24

RESET STRULLSW (COULD BE AN IMPULSIVE
ENGINE FAIL)

PREPARE FOR R1 OF V06N40 (CLOCKTASK)

(TPAGREE IN S40.13, LESS THAN 600CS)

PROTECT....
A, 3.15 = ENGINOFF (TGO+1)....NOTE GROUP
C, DELTAT NEXT, TASK BELOW, IN
-0 CS

RESET IMPULSW, ENGINOFF IS NOW SET UP

SET UP V97VCNTR IN CASE ENGINOFF (MASS-
BACK) ARRIVES BEFORE TVCDAPON

E7 FORCED BY 3.15SPOT VARIABLE DELTA-T
TASK, 3.15 PHASE (TGO+1 CS)   GET E6

COPYCYCLE FOR MASSBACK

KILL GROUP 3 PROTECTION OF ENGINOFF, DO
A, 4.63 = DOSPSOFF (-0CS)
SHUT DOWN SPS, MASS UPDATES, ETC.
(OCTAL 27)

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1761   REF  6  LAST 652    24,2716   0 4114 1            TC    NEWPHASE
1762                       24,2717   00004 0            OCT   4                    4.27 = DOTVCRCS (250 CS)

1763   REF  3  LAST 652    24,2720   0 5156 0            TC    FIXDELAY             2.5 SECOND DELAY FOR SPS TAILOFF
1764                       24,2721   00372 1            DEC   250

1765   REF  2  LAST 199    24,2722   0 2227 1  DOTVCRCS  TCR   SETMAXDB             WIDE DEADBAND FOR CUTOFF TRANSIENT

1766   REF 25  LAST 540    24,2723   0 4633 0            TC    IBNKCALL             SET UP RCS DAP (KILLS TVCDAPS, SETS T5
1767   REF  2  LAST 194    24,2724   42010 0            CADR  RCSDAPON                 BITS, WAITS 0.6SEC FOR TVCEXEC DIE)

17672  REF 26  LAST 654    24,2725   0 4633 0            TC    IBNKCALL             UPDATE WEIGHT/G AND MASS-PROPERTIES FOR
17673  REF  3  LAST 248    24,2726   13207 0            CADR  MASSPROP                 RCS DAP STARTUP IN 0.6 SECONDS

1768   REF  2  LAST 194    24,2727   0 3003 1            TCR   TVCZAP               WIPE OUT TVC, TURN OFF CLOKTASK

1769   REF 47  LAST 651    24,2730   0 5301 0            TC    PHASCHNG
1770                       24,2731   00354 0            OCT   00354                A, 4.35 = POSTBURN (NOVAC, PRIO12)
1771   REF  2  LAST 179    24,2732   3 4603 0            CAF   PRIO12               SET UP POSTBURN V16N40 JOB
1772   REF 21  LAST 647    24,2733   0 5027 1            TC    NOVAC
1773   REF 33  LAST 653    E6,1466                       EBANK= DAPDATR1           (SETMAXDB IN POST41)
1774   REF  3  LAST 642    24,2734   02155 1            2CADR POSTBURN
1774                       24,2735   50066 1
1775   REF 32  LAST 652    24,2736   1 5213 0            TCF   TASKOVER

1776   REF 34  LAST 654    E6,1466                       EBANK= DAPDATR1
1783                       24,2737   0 0006 1  SPSOFF    EXTEND                     ESTABLISH SPSOFF TEVENT
1784   REF 21  LAST 653    24,2740   3 0025 0            DCA   TIME2
1785   REF  5  LAST 651    24,2741   53*337 0            DXCH  TEVENT
1786   REF 36  LAST 651    24,2742   4 4704 1            CS    BIT7                 RESET ENGONFLG
1787   REF 12  LAST 651    24,2743   7 0101 0            MASK  FLAGWRD5
1788   REF 13  LAST 654    24,2744   54 101 0            TS    FLAGWRD5             (RESTARTS WILL SHUT DOWN SPS NOW)
1789   REF 26  LAST 653    24,2745   4 4676 0            CS    BIT13                SHUT DOWN SPS ENGINE
1790                       24,2746   0 0006 1            EXTEND
1791   REF 23  LAST 651    24,2747   03 011 1            WAND  DSALMOUT

1792   REF  3  LAST 653    24,2750   31*444 1  MASSBACK  CAE   V97VCNTR            RESTORE PART OF PRE-DECREMENTED MASS
A1793                                                                                V97VCNTR = VCNTR UNLESS V97 IS
A1794                                                                                ACTIVE. ONLY V97VCNTR IS THEN RIGHT
1795                       24,2751   0 0006 1            EXTEND                       VCNTR COUNTS 1/2-SECONDS IN TVC EXEC
1796   REF  1             24,2752   7 0110 0            MP    EMDOT                    MDOT, SC.AT B+3 KG/CS
1797   REF 150 LAST 652   24,2753   22 000 1            LXCH  A
1798                       24,2754   0 0006 1            EXTEND
1799   REF  9  LAST 511    24,2755   7 4734 1            MP    1SEC                 DEC 100
1800   REF  4  LAST 653    24,2756   6 1662 1            AD    MASSTMP              CORRECTION IS ACCURATE TO 5 CS OF FLOW
1801   REF  5  LAST 653    24,2757   55*474 0            TS    CSMMASS                (1.44 KG OR 0.4 BITS)

1806   REF 32  LAST 652    24,2760   3 4674 0  BESTTRIM  CAF   BIT15                CHECK FOR SWITCHOVER, SELECT BEST TRIMS
1807   REF  9  LAST 574    24,2761   7 0105 1            MASK  FLAGWRD9               FOR NEXT IGNITION (OR REIGNITION)
1808                       24,2762   0 0006 1            EXTEND
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1809	REP	1			24,2763	1 2765 0		BZF	DBARTRIM	PRE-SWITCHOVER
1810	REP	160	LAST	653	24,2764	0 0002 0		TC	Q	POST-SWITCHOVER, SO LEAVE TRIMS AS ARE
18105	REP	2	LAST	102	24,2765	31«621 0	DBARTRIM	CAE	DELPBAR	UPDATE TRIMS WITH DELP,YBAR
1811	REP	12	LAST	275	24,2766	55«425 1		TS	PACTOFF	
1812	REP	2	LAST	102	24,2767	31«623 1		CAE	DELYBAR	
1813	REP	2	LAST	275	24,2770	55«426 1		TS	YACTOFF	
1814	REP	161	LAST	655	24,2771	0 0002 0		TC	Q	
1815	REP	35	LAST	654	E6,1466			EBANK=	DAPDATR1	
1816	REP	1			24,2772	03117 0	STEERADS	2CADR	STEERING	
1816	REP	1			24,2773	50066 1				
1817					24,2774	37703 1	.6SECT5	OCT	37703	
1818					24,2775	00000 1	5SECDP	DEC	0	MAKE DP 5SEC
1819					24,2776	00764 1	5SEC	DEC	500	
18195					24,2777	02202 0	OCT02202	OCT	02202	BITS 2,8,11 FOR CHANNEL 12 TVC/OPTICS
1820	REP	36	LAST	655	E6,1466			EBANK=	DAPDATR1	
1821	REP	1			24,3000	02030 0	TVCON2C	2CADR	TVCDAPON	
1821	REP	1			24,3001	36066 1				
1822					24,3002	0 0004 0	-1	INHINT		
1823	REP	1			24,3003	4 2777 0	TVCZAP	CS	OCT02202	DISABLE TVC AND OPT ERR CNTRS, REENGAGE
1824					24,3004	0 0006 1		EXTEND		OPTICS DAC
1825	REP	26	LAST	539	24,3005	03 012 1		WAND	CHAN12	
1826	REP	41	LAST	652	24,3006	4 4712 0		CS	BIT1	ENABLE T4RUPT OPTICS MONITOR....PERMIT
1827	REP	23	LAST	446	24,3007	55«303 1		TS	OPTIND	OPTICS-ZERO BUT NOT OPTICS-DRIVE
18271	REP	131	LAST	653	24,3010	3 4714 1		CAF	ZERO	CLEAR NVWORD1 IN CASE CLOCKJOB WAITING
18272	REP	9	LAST	651	24,3011	55«145 1		TS	NVWORD1	
1828	REP	19	LAST	652	24,3012	4 4700 0		CS	BIT11	CLEAR TIMRFLAG TO STOP CLOKTASK
1829	REP	5	LAST	651	24,3013	7 0103 1		MASK	FLAGWRD7	
1830	REP	6	LAST	655	24,3014	54 103 1		TS	FLAGWRD7	
1831	REP	162	LAST	655	24,3015	0 0002 0		TC	Q	
1832	REP	37	LAST	655	E6,1466			EBANK=	DAPDATR1	
1833					24,3016	43020 1	UPDATEVG	STQ	BON	
1834	REP	3	LAST	645	24,3017	03730 0			QTEMP1	
1835	REP	6	LAST	640	24,3020	01307 1			XDELVFLG	
1836	REP	1			24,3021	51045 1			CALL40.8	
1837					24,3022	50135 0	SLOAD	RVN		
1838	REP	3	LAST	640	24,3023	03347 1			NBRCYCLS	
1839	REP	1			24,3024	51051 1			SETUP.9	
1840					24,3025	53375 0	VLOAD	VAD		
1841	REP	2	LAST	105	24,3026	03351 0			DELVSUM	
1842	REP	2	LAST	647	24,3027	03433 0			DELVREF	
1843	REP	1			24,3030	03357 0		STORE	DELVSUMP	
1844					24,3031	77776 1		EXIT		
1845	REP	79	LAST	644	24,3032	3 4712 1		CA	ONE	
1846	REP	4	LAST	655	24,3033	6 1746 0		AD	NBRCYCLS	
1847	REP	2	LAST	105	24,3034	55«747 0		TS	NBRCYCLP	

1848	REP	48	LAST	654	24,3035	0 5301 0		TC	PHASCHNG	TYPE B RESTART BELOW AND 5.3 REREADACCS
1849					24,3036	10035 0		OCT	10035	
1850	REP	3	LAST	655	24,3037	3 1747 1		CA	NBRCYCLP	
1851	REP	5	LAST	655	24,3040	55=746 1		TS	NBRCYCLS	
1852	REP	141	LAST	648	24,3041	0 6006 1		TC	INTPRET	
1853					24,3042	77775 1		VLOAD		
1854	REP	2	LAST	655	24,3043	03357 0			DELVSUMP	
1855	REP	3	LAST	655	24,3044	03351 0		STORE	DELVSUM	
1856					24,3045	77624 1	CALL40.8	CALL		
1857	REP	1			24,3046	34130 1			S40.8	
1858					24,3047	77650 1		GOTO		
1859	REP	4	LAST	655	24,3050	03730 0			QTEMP1	
1860					24,3051	67214 1	SETUP.9	BON	SLOAD	
1861	REP	1			24,3052	01310 1			FIRSTFLG	
1862	REP	1			24,3053	51066 0			SURELY.9	
1863	REP	4	LAST	656	24,3054	03350 1			NBRCYCLP	
1864					24,3055	74301 0		NORM	VXSC	
1865	REP	28	LAST	636	24,3056	00047 1			X1	
1866	REP	2	LAST	122	24,3057	03705 0			RDT	
1867					24,3060	53257 1		VSR*	VAD	(NORM HANDLES ZERO PROPERLY)
1868					24,3061	20563 0			0 -14D,1	
1869	REP	1			24,3062	03646 0			VGTEMP	
1870					24,3063	77651 0		VSU		
1871	REP	4	LAST	656	24,3064	03351 0			DELVSUM	
1872	REP	2	LAST	645	24,3065	03721 0		STORE	VGPREV	
1873					24,3066	77776 1	SURELY.9	EXIT		
1874	REP	6	LAST	259	24,3067	3 4676 1		CAF	PRIO10	
1875	REP	23	LAST	650	24,3070	0 5042 1		TC	FINDVAC	
1876	REP	38	LAST	655	E6,1466			EBANK=	DAPDATR1	
1877	REP	1			24,3071	02257 0		2CADR	S40.9	
1877	REP	1			24,3072	34066 0				
1878	REP	17	LAST	653	24,3073	0 5261 1		TC	2PHSCHNG	
1879					24,3074	00051 0		OCT	00051	
1880					24,3075	10035 0		OCT	10035	A, 1.5 = REDO40.9, PRIO 10
1881	REP	142	LAST	656	24,3076	0 6006 1		TC	INTPRET	
1882					24,3077	77775 1		VLOAD		
1883	REP	9	LAST	536	24,3100	01171 1			RN	ACTIVE VEHICLE RADIUS VECTOR AT T1
1884	REP	11	LAST	545	24,3101	27570 0		STOVL	RINIT	
1885	REP	9	LAST	536	24,3102	01177 1			VN	ACTIVE VEHICLE VELOCITY VECTOR AT T1
1886	REP	10	LAST	545	24,3103	17576 0		STODL	VINIT	
1887	REP	6	LAST	634	24,3104	01205 1			PIPTIME	
1888	REP	2	LAST	120	24,3105	03474 0		STORE	TNIT	
1889					24,3106	77621 1		RDSU		
1890	REP	9	LAST	633	24,3107	03656 1			TPASS4	
1891	REP	9	LAST	633	24,3110	27423 1		STOVL	DELLT4	
1892	REP	16	LAST	648	24,3111	15332 1			HI6ZEROS	
1893	REP	5	LAST	656	24,3112	17351 0		STODL	DELVSUM	

Line	REF	LAST	Address	Word	Label	Op	Operand	Comment
1894	REF 17	LAST 656	24,3113	15332 1			HI6ZEROS	
1895	REF 6	LAST 656	24,3114	03347 1	STORE		NBRCYCLS	
1896			24,3115	77650 1	GOTO			
1897	REF 2	LAST 655	24,3116	51045 1			CALL40.8	
1898	REF 39	LAST 656	E6,1466		EBANK=		DAPDATR1	
1899	REF 143	LAST 656	24,3117	0 6006 1	STEERING	TC	INTPRET	
1900			24,3120	77624 1	CALL			
1901	REF 2	LAST 645	24,3121	51016 1			UPDATEVG	
1902			24,3122	77776 1	EXIT			
1903	REF 23	LAST 653	24,3123	3 4702 0	CAP		BIT9	CHECK IMPULSW
1904	REF 13	LAST 653	24,3124	7 0076 1	MASK		FLAGWRD2	
1905	REF 151	LAST 654	24,3125	10 000 0	CCS		A	PRE-IGNITE, REQUEST ENG-OFF, OR POST-OFF
1906			24,3126	1 3131 0	TCP		+3	
1907	REF 41	LAST 649	24,3127	0 4574 0	SERVXT	TC	POSTJUMP	
1908	REF 3	LAST 646	24,3130	77132 1	CADR		SERVEXIT	
1909	REF 27	LAST 654	24,3131	3 4676 1	CAP		BIT13	CHECK ENGINE-ON/-OFF
1910			24,3132	0 0006 1	EXTEND			
1911	REF 24	LAST 654	24,3133	02 011 0	RAND		DSALMOUT	
1912			24,3134	0 0006 1	EXTEND			
1913	REF 3	LAST 648	24,3135	1 3127 1	BZF		SERVXT	ENGINE-OFF, SO PRE-IGNITE OR POST-OFF
1914	REF 3	LAST 653	24,3136	0 3304 0	TCR		E7SETTER	
1916	REF 53	LAST 653	E7,1412		EBANK=		TIG	
1917			24,3137	0 0004 0	INHINT			
1918			24,3140	0 0006 1	EXTEND			
1919	REF 54	LAST 657	24,3141	3 1413 0	DCA		TIG	
1920	REF 288	LAST 647	24,3142	52 155 1	DXCH		MPAC	
1921			24,3143	0 0006 1	EXTEND			
1922	REF 22	LAST 654	24,3144	4 0025 1	DCS		TIME2	
1923	REF 269	LAST 657	24,3145	20 155 1	DAS		MPAC	
1924	REF 1		24,3146	0 7224 1	TCR		DPAGREE	
1925	REF 270	LAST 657	24,3147	30 155 0	CAE		MPAC +1	(LESS THAN 6 (OR 4) SECONDS TO GO)
1926	REF 152	LAST 657	24,3150	10 000 0	CCS		A	PROTECT AGAINST NEG/ZRO W.L. CALL
1927			24,3151	1 3154 0	TCP		+3	
1928			24,3152	1 3154 0	TCP		+2	
1929	REF 132	LAST 655	24,3153	3 4714 1	CAP		ZERO	
1930	REF 80	LAST 655	24,3154	6 4712 1	AD		ONE	
1931	REF 66	LAST 652	24,3155	56 001 0	XCH		L	
1932	REF 133	LAST 657	24,3156	3 4714 1	CA		ZERO	
1933	REF 11	LAST 653	24,3157	53~430 0	DXCH		TGO	
1934	REF 12	LAST 657	24,3160	3 1430 1	CA		TGO +1	
1935	REF 31	LAST 653	24,3161	0 5140 1	TC		WAITLIST	
1936	REF 13	LAST 657	E7,1427		EBANK=		TGO	
1937	REF 3	LAST 653	24,3162	02706 1	2CADR		ENGINOFF	
1937			24,3163	50067 0				
1938	REF 18	LAST 656	24,3164	0 5261 1	TC		2PHSCHNG	
1939			24,3165	40153 1	OCT		40153	A, 3.15 = ENGINOFF (TGO+1)....NOTE GROUP
1940			24,3166	10035 0	OCT		10035	B, 5.3 = REREADAC, AND START BELOW
19402	REF 42	LAST 644	24,3167	0 5447 0	TC		DOWNFLAG	CLEAR IMPULSW, ENGINOFF IS NOW SET UP
19403	REF 2	LAST 199	24,3170	00044 1	ADRES		IMPULSW	RESTARTS OK

1941   REP   4 LAST 657   24,3171 1 3127 1   TCP   SERVXT

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P1942   ROUTINE  **CLOKTASK** DESCRIPTION
19542   REF  55  LAST  657   E7,1412                          EBANK=  TIG
1955    REF  20  LAST  655   24,3172  3 4700 1  CLOKTASK CAF  BIT11           IS TIMRFLAG SET
1956    REF   7  LAST  655   24,3173  7 0103 1           MASK  FLAGWRD7
1957    REF 153  LAST  657   24,3174  10 000 0           CCS   A
1958    REF   1              24,3175  1 3201 0           TCF   CLOCKON
1959    REF  49  LAST  656   24,3176  0 5301 0           TC    PHASCHNG
1960                         24,3177    00006 1           OCT   00006           KILL RESTART
1961    REF  33  LAST  654   24,3200  0 5213 1           TC    TASKOVER

1962                         24,3201  0 0006 1  CLOCKON  EXTEND
1963    REF  23  LAST  657   24,3202  3 0025 0           DCA   TIME2
1964    REF   7  LAST  276   24,3203  53*661 0           DXCH  TTOGO
1965                         24,3204  0 0006 1           EXTEND
1966    REF  56  LAST  659   24,3205  4 1413 1           DCS   TIG
1967    REF   8  LAST  659   24,3206  21*661 0           DAS   TTOGO

1968    REF  10  LAST  654   24,3207  3 4734 0  SETCLOCK CAF  1SEC
1969    REF  32  LAST  657   24,3210  0 5140 1           TC    WAITLIST
1970    REF  57  LAST  659   E7,1412                      EBANK=  TIG
1971    REF   5  LAST  641   24,3211    03172 0           2CADR CLOKTASK
1971                         24,3212    50067 0

1972    REF  10  LAST  655   24,3213  11*145 1           CCS   NVWORD1
1973                         24,3214  1 3217 1           TCF   +3
1974    REF   1              24,3215  1 3227 1           TCF   SETTB6

19742                        24,3216  1 3217 1           TCF   +1
1975    REF   2  LAST  644   24,3217  4 2347 1           CS    V06N85B           CHECK FOR V06N85B (P41)
19752   REF  11  LAST  659   24,3220  6 1145 0           AD    NVWORD1
19753                        24,3221  0 0006 1           EXTEND
19754   REF   1              24,3222  1 3232 0           BZF   SETUPDYN          V06N85, SO UPDATE N85 FOR DYNAMIC DISP

1976    REF   2  LAST  575   24,3223  3 7664 1           CAF   PRIO27
1977    REF  22  LAST  654   24,3224  0 5027 1           TC    NOVAC
1978    REF  40  LAST  657   E6,1466                      EBANK=  DAPDATR1
1979    REF   1              24,3225    03244 0           2CADR CLOCKJOB
1979    REF   1              24,3226    50066 1
1980    REF  12  LAST  532   24,3227  4 0025 1  SETTB6   CS    TIME1             SET GROUP6 TIMEBASE
1981    REF   1              24,3230  55*065 1           TS    TBASE6
1982    REF  34  LAST  659   24,3231  1 5213 0           TCF   TASKOVER

19822   REF   3  LAST  659   24,3232  3 7664 1  SETUPDYN CAF  PRIO27            SET UP A JOB TO UPDATE N85 (FOR P41=V06)
198222  REF  24  LAST  656   24,3233  0 5042 1           TC    FINDVAC
198224  REF  41  LAST  659   E6,1466                      EBANK=  DAPDATR1
198226  REF   1              24,3234    03237 1           2CADR DYNDISP
198226  REF   1              24,3235    50066 1
198228  REF   2  LAST  659   24,3236  1 3227 1           TCF   SETTB6            CLOSE OUT CLOCKTASK
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19823	REF	144	LAST	657	24,3237	0 6006 1	DYNDISP	TC	INTPRET	UPDATE N85 FOR A DYNAMIC V06N85 IN P41,
198232					24,3240	77624 1		CALL		PRIOR TO BLANKING AND AVEG (V16N85)
198234	REF	3	LAST	645	24,3241	50314 1			P40CNV85	
198236					24,3242	77776 1		EXIT		
198238	REF	1			24,3243	1 3254 0		TCF	CKNVWRD1	

P1983   ROUTINE **CLOCKJOB** DESCRIPTION

2003	REP	42	LAST	659	E6,1466			EBANK=	DAPDATR1	
2004	REP	15	LAST	651	24,3244	3 0032 0	CLOCKJOB	CA	CDUX	
200401	REP	1			24,3245	54 772 1		TS	CDUSPOTX	
200402	REP	6	LAST	643	24,3246	3 0033 1		CA	CDUY	
200403	REP	1			24,3247	54 766 1		TS	CDUSPOTY	
200404	REP	9	LAST	563	24,3250	3 0034 0		CA	CDUZ	
200405	REP	1			24,3251	54 770 0		TS	CDUSPOTZ	
200406	REP	169	LAST	648	24,3252	0 4555 0		TC	BANKCALL	
20041	REP	1			24,3253	47510 0		CADR	QUICTRIG	
20042					24,3254	0 0004 0	CKNVWRD1	INHINT		
20044	REP	12	LAST	659	24,3255	11=145 1		CCS	NVWORD1	DETERMINE FUNCTION, INDICATED BY NVWORD1
2005	REP	1			24,3256	1 3301 1		TCP	NOFLASH	
2006	REP	83	LAST	647	24,3257	1 5112 1		TCP	ENDOFJOB	
2007	REP	1			24,3260	1 3270 0		TCP	ENGREQST	SPS ENGINE-ON-ENABLE V99 FLASH
2008	REP	4	LAST	651	24,3261	3 2351 1	FAILDSP	CAF	V06N40	SPS ENGINE-FAILED V97 FLASH
2009	REP	170	LAST	661	24,3262	0 4555 0		TC	BANKCALL	
2010	REP	13	LAST	628	24,3263	20763 1		CADR	GOFLASHR	LINUS MAKES IT A REDO, INHINT OK
2011	REP	1			24,3264	1 3350 0		TCP	V97T	TERMINATE
2012	REP	1			24,3265	1 3403 1		TCP	V97P	PROCEED
2013	REP	1			24,3266	1 3432 0		TCP	V97E	ENTER
2014	REP	1			24,3267	1 3276 0		TCP	PASTERET	
2015	REP	5	LAST	661	24,3270	3 2351 1	ENGREQST	CAF	V06N40	
2016	REP	171	LAST	661	24,3271	0 4555 0		TC	BANKCALL	
2017	REP	14	LAST	661	24,3272	20763 1		CADR	GOFLASHR	LINUS MAKES IT A REDO, INHINT OK
2018	REP	1			24,3273	1 3320 1		TCP	V99T	TERMINATE
2019	REP	1			24,3274	1 3326 1		TCP	V99P	PROCEED
2020	REP	1			24,3275	1 3312 0		TCP	V99E	ENTER
2021	REP	1			24,3276	3 2352 1	PASTERET	CAF	P400K99	IMMED RETURN - SET UP V99 OR V97
2022	REP	2	LAST	384	24,3277	0 5415 1		TCR	LINUS	
2023	REP	84	LAST	661	24,3300	1 5112 1		TCP	ENDOFJOB	
2024	REP	13	LAST	661	24,3301	31=145 0	NOFLASH	CAE	NVWORD1	DISPLAY NVWORD1 NORMALLY
2025	REP	172	LAST	661	24,3302	0 4555 0		TC	BANKCALL	
2026	REP	1			24,3303	20616 1		CADR	REGODSP	
2027	REP	5	LAST	639	24,3304	3 4753 1	E7SETTER	CAF	EBANK7	
2028	REP	31	LAST	639	24,3305	54 003 0		TS	EBANK	
2029	REP	58	LAST	659	E7,1412			EBANK=	TIG	
2030	REP	163	LAST	655	24,3306	0 0002 0		TC	Q	
2031	REP	10	LAST	564	24,3307	3 4752 0	E6SETTER	CAF	EBANK6	SET UP EBANK6
2032	REP	32	LAST	661	24,3310	54 003 0		TS	EBANK	
2033	REP	43	LAST	661	E6,1466			EBANK=	DAPDATR1	

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2034   REP  164  LAST  661    24,3311  0 0002 0          TC    Q

20345  REP   44  LAST  661    E6,1466                  EBANK= DAPDATR1
2035   REP   19  LAST  657    24,3312  0 5261 1  V99E  TC    2PHSCHNG
2036                          24,3313    00006 1        OCT   00006           KILL PRE40.6/CLOKTASK PROTECTION
2037                          24,3314    05024 1        OCT   05024           C, PRIORITY NEXT, JOB BELOW
20372                         24,3315    27000 1        OCT   27000
2038   REP    3  LAST  654    24,3316  0 3002 0  V99EJOB TCR  TVCZAP -1       WIPE OUT TVC, CLOKTASK
2039   REP    2  LAST  642    24,3317  1 2163 0        TCF   P40RCS          V16N85 POST-BURN OPERATIONS

20392  REP   45  LAST  662    E6,1466                  EBANK= DAPDATR1
2040   REP   20  LAST  662    24,3320  0 5261 1  V99T  TC    2PHSCHNG        (ENTRY FROM V97T FLOW TOO)
2041                          24,3321    00006 1        OCT   00006           KILL PRE40.6/CLOKTASK PROTECTION
2042                          24,3322    05024 1        OCT   05024           C, PRIORITY NEXT, JOB BELOW
20422                         24,3323    27000 1        OCT   27000
2043   REP    4  LAST  662    24,3324  0 3002 0  V99TJOB TCR  TVCZAP -1       WIPE OUT TVC, CLOKTASK
2044   REP    5  LAST  643    24,3325  1 2204 1        TCF   POST41          AVEGEXIT, SETMAXDB, GOTOPOOH
2045                          24,3326  0 0004 0  V99P  INHINT
2046   REP    8  LAST  659    24,3327  30 103 0        CAE   FLAGWRD7        CHECK ASTN FLAG FOR PRIOR V99P
2047   REP   24  LAST  651    24,3330  7 4677 1        MASK  BIT12
2048   REP  154  LAST  659    24,3331  10 000 0        CCS   A
20485  REP    1               24,3332  1 3345 1        TCF   V99P/TIG        YES, THIS MUST BE A RESTART ENTRY

20486  REP   25  LAST  662    24,3333  3 4677 0  ASTNV99P CAF BIT12          SET ASTN FLAG
20487  REP    9  LAST  662    24,3334  26 103 1        ADS   FLAGWRD7
2051   REP   10  LAST  662    24,3335  30 103 0        CAE   FLAGWRD7        CHECK IGN FLAG FOR TIG-0 ARRIVAL
2052   REP   28  LAST  657    24,3336  7 4676 0        MASK  BIT13
2053                          24,3337  0 0006 1        EXTEND
2054   REP    2  LAST  662    24,3340  1 3345 1        BZF   V99P/TIG        NO, CLEAR THE V99 AND WAIT FOR TIG-0

2055   REP   42  LAST  655    24,3341  3 4712 1  ENDV99PI CAF BIT1           TIG-0 HAS COME ALREADY
2056   REP   33  LAST  659    24,3342  0 5140 1        TC    WAITLIST        SET UP IGNITION HERE
2057   REP   46  LAST  662    E6,1466                  EBANK= DAPDATR1
2058   REP    2  LAST  210    24,3343    02552 1        2CADR IGNITION
2058                          24,3344    50066 1
20805  REP    6  LAST  661    24,3345  3 2351 1  V99P/TIG CAF V06N40         CLEAR THE V99 FLASH AND WAIT FOR TIG-0
20806  REP   14  LAST  661    24,3346  55=145 1        TS    NVWORD1
2061   REP   85  LAST  661    24,3347  1 5112 1  ENDV99P TCF  ENDOFJOB

20665  REP    6  LAST  654    E6,1474                  EBANK= CSMMASS
2067   REP   21  LAST  662    24,3350  0 5261 1  V97T  TC    2PHSCHNG
2068                          24,3351    00006 1        OCT   00006           KILL GROUP 6 (CLOKTASK)
2069                          24,3352    40674 0        OCT   40674           A, 4.67 = V97TTASK (-0 CS), TBASE NOW
2070   REP   43  LAST  662    24,3353  3 4712 1        CAF   BIT1
2071   REP    4  LAST  429    24,3354  0 5130 0        TC    TWIDDLE
2072   REP    2  LAST  210    24,3355    03357 0        ADRES V97TTASK        KEEP EBANK6 FOR MASSES, SPSOFF, ETC.
2073   REP   86  LAST  662    24,3356  1 5112 1        TCF   ENDOFJOB
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2074	REF	7	LAST	662	E6,1474				EBANK=	CSMMASS	DISABLE CLOCKJOB
2075	REF	134	LAST	657	24,3357	3 4714 1	V97PTASK	CAP	ZERO	
2076	REF	15	LAST	662	24,3360	55∝145 1		TS	NVWORD1	
2077	REF	1			24,3361	3 2361 1		CAF	3MDOT	3 SECONDS OF MDOT (2-4 SEC ENGFAIL
2078	REF	8	LAST	663	24,3362	6 1474 1		AD	CSMMASS	DETECTION) NOT LOST BECAUSE THRUST
2079	REF	5	LAST	654	24,3363	55∝662 0		TS	MASSTMP	FAILED. COPYCYCLE FOR MASSBACK
2080	REF	50	LAST	659	24,3364	0 5301 0		TC	PHASCHNG	
2081					24,3365	05014 1		OCT	05014	C, DELTAT NEXT, TASK BELOW, IN
2082					24,3366	77777 0		DEC	-0	-0 CS
2083	REF	3	LAST	653	24,3367	0 2737 0		TCR	SPSOFF	SHUTDOWN SPS ENGINE, MASS UPDATE, ETC.
2084	REF	51	LAST	663	24,3370	0 5301 0		TC	PHASCHNG	
2085					24,3371	00714 0		OCT	00714	A, 4.71 = V97TRCS (250 CS), TBASE OLD
2086	REF	4	LAST	654	24,3372	0 5156 0		TC	FIXDELAY	DELAY 2.5 SECONDS FOR (POSSIBLE) TAIL-
2087					24,3373	00372 1		DEC	250	OFF (FALSE THRUST-LOSS)
2088	REF	47	LAST	662	E6,1466				EBANK=	DAPDATR1	
2089	REF	27	LAST	654	24,3374	0 4633 0	V97TRCS	TC	IBNKCALL	RCS DAP IN 0.6SEC, SETTING T5 BITS TO
2090	REF	3	LAST	654	24,3375	42010 0		CADR	RCSDAPON	KILL TVCEXEC/TVCROLLDAP STARTS
2091	REF	4	LAST	659	24,3376	3 7664 1		CAF	PRIO27	SET UP V99T FOR TVCZAP AND POST41 (SET-
2092	REF	23	LAST	659	24,3377	0 5027 1		TC	NOVAC	MAXDB AND GOTOPOOH)
2093	REF	48	LAST	663	E6,1466				EBANK=	DAPDATR1	EBANK6 FOR SETMAXDB IN POST41
2094	REF	2	LAST	661	24,3400	03320 0		2CADR	V99T	
2094					24,3401	50066 1					
2095	REF	35	LAST	659	24,3402	1 5213 0	ENDV97T	TCF	TASKOVER	
2096	REF	4	LAST	654	E6,1444				EBANK=	V97VCNTR	
2097	REF	52	LAST	663	24,3403	0 5301 0	V97P	TC	PHASCHNG	
2098					24,3404	40734 0		OCT	40734	A, 4.73 = V97PTASK (-0 CS), TBASE NOW
2099	REF	44	LAST	662	24,3405	3 4712 1		CAF	BIT1	
2100	REF	5	LAST	662	24,3406	0 5130 0		TC	TWIDDLE	
2101	REF	2	LAST	210	24,3407	03411 0		ADRES	V97PTASK	
2102	REF	87	LAST	662	24,3410	1 5112 1		TCF	ENDOFJOB	
2103	REF	5	LAST	663	E6,1444				EBANK=	V97VCNTR	
2104	REF	6	LAST	663	24,3411	31∝444 1	V97PTASK	CAE	V97VCNTR	GET MASS UPDATES (TVCEXEC) GOING AGAIN
2105	REF	2	LAST	103	24,3412	55∝653 1		TS	VCNTR	(ERRORS IF FLASE THRUST-LOSS AND/OR
A2106											POOR SYNCH OF MANUAL ENGINE-ON AND
A2107											THE VERB 97 PROCEED)
2108	REF	7	LAST	662	24,3413	3 2351 1		CAF	V06N40	REDISPLAY V06N40
2109	REF	16	LAST	663	24,3414	55∝145 1		TS	NVWORD1	
2110	REF	41	LAST	644	24,3415	0 5435 0		TC	UPFLAG	SET IDLEFAIL TO ALLOW R41-BYPASS, IN
2111	REF	1			24,3416	00030 1		ADRES	IDLEFAIL	CASE OF UNFAVORABLE S40.8 SYNCH
2112	REF	42	LAST	663	24,3417	0 5435 0		TC	UPFLAG	SET STEERSW TO RE-ENABLE STEERING
2113	REF	1			24,3420	00042 1		ADRES	STEERSW	
2114	REF	53	LAST	663	24,3421	0 5301 0		TC	PHASCHNG	
2115					24,3422	00134 1		OCT	00134	A, 4.13 = R40ENABL (200 CS), TBASE OLD
2116	REF	5	LAST	663	24,3423	0 5156 0		TC	FIXDELAY	WAIT 2 SECONDS, THEN
2117					24,3424	00310 0		DEC	200	

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2118	REP	5	LAST	622	E7,1777			EBANK=	WHOCARES
2119	REP	43	LAST	657	24,3425	0 5447 0	R40ENABL	TC	DOWNFLAG
2120	REP	2	LAST	663	24,3426	00030 1		ADRES	IDLEFAIL
2121	REP	54	LAST	663	24,3427	0 5301 0		TC	PHASCHNG
2122					24,3430	00004 0		OCT	00004
2123	REP	38	LAST	663	24,3431	1 5213 0	ENDV97P	TCF	TASKOVER
2124	REP	6	LAST	664	E7,1777			EBANK=	WHOCARES
2125	REP	55	LAST	664	24,3432	0 5301 0	V97E	TC	PHASCHNG
2126					24,3433	40534 0		OCT	40534
2127	REP	45	LAST	663	24,3434	3 4712 1		CAF	BIT1
2128	REP	34	LAST	662	24,3435	0 5140 1		TC	WAITLIST
2129	REP	59	LAST	661	E7,1412			EBANK=	TIG
2130	REP	2	LAST	210	24,3436	03441 0		2CADR	V97ETASK
2130					24,3437	50067 0			
2131	REP	88	LAST	663	24,3440	1 5112 1		TCF	ENDOFJOB·
2132	REP	60	LAST	664	E7,1412			EBANK=	TIG
2133	REP	5	LAST	233	24,3441	4 4112 0	V97ETASK	CS	OCT24
2134	REP	61	LAST	664	24,3442	55≪412 0		TS	TIG
2135	REP	8	LAST	663	24,3443	3 2351 1		CAF	V06N40
2136	REP	17	LAST	663	24,3444	55≪145 1		TS	NVWORD1
2137	REP	3	LAST	653	24,3445	0 3307 0		TCR	E6SETTER
2138	REP	9	LAST	663	E6,1474			EBANK=	CSMMASS
2139	REP	2	LAST	663	24,3446	3 2361 1		CAF	3MDOT
2140	REP	10	LAST	664	24,3447	6 1474 1		AD	CSMMASS
2141	REP	6	LAST	663	24,3450	55≪662 0		TS	MASSTMP
2142	REP	56	LAST	664	24,3451	0 5301 0		TC	PHASCHNG
2143					24,3452	00754 1		OCT	00754
2145	REP	4	LAST	663	24,3453	0 2737 0	SPSOFF97	TCR	SPSOFF
2146	REP	57	LAST	664	24,3454	0 5301 0		TC	PHASCHNG
2147					24,3455	00114 0		OCT	00114
2148	REP	6	LAST	663	24,3456	0 5156 0		TC	FIXDELAY
2149					24,3457	00372 1		DEC	250
2150	REP	49	LAST	663	E6,1466			EBANK=	DAPDATR1
2151	REP	46	LAST	664	24,3460	3 4712 1	V97E40.6	CAF	BIT1
2152	REP	35	LAST	664	24,3461	0 5140 1		TC	WAITLIST
2153	REP	2	LAST	641	E6,1447			EBANK=	CNTR
2154	REP	2	LAST	212	24,3462	02040 1		2CADR	PRE40.6
2154					24,3463	40066 0			
2155	REP	28	LAST	663	24,3464	0 4633 0		TC	IBNKCALL
2156	REP	4	LAST	663	24,3465	42010 0		CADR	RCSDAPON
A2157									
2158	REP	22	LAST	662	24,3466	0 5261 1		TC	2PHSCHNG
2159					24,3467	00026 0		OCT	00026
2160					24,3470	05014 1		OCT	05014
21602					24,3471	77777 0		DEC	-0

RE-ENABLE R40 BY CLEARING IDLEFAIL

KILL GROUP 4

A, 4.53 = V97ETASK (-0 CS), TBASE NOW

FORCE R1 OF V06N40 TO READ 59X59

REDISPLAY V06N40

RETURN TO EBANK6 FOR REST OF V97ETASK

3 SECONDS OF MDOT (2-4 SEC ENGFAIL
   DETECTION) NOT LOST BECAUSE THRUST
   FAILED....COPYCYCLE FOR MASSBACK

A, 4.75 = SPSOFF97 (-0 CS), TBASE OLD

A, 4.11 = V97E40.6 (250 CS), TBASE OLD
DELAY 2.5 SECONDS FOR (POSSIBLE) TAIL-
   OFF (FALSE THRUST-LOSS)

USE S40.6 RESTART ENTRY TO TRIM ENGINE

RCS DAP IN 0.6SEC, SETTING T5 BITS TO
   KILL TVCEXEC/TVCROLLDAP STARTS.
   LEAVE NARROW DEADBAND FOR REIGNITE

A, 6.2 = PRE40.6 (-0CS), CLOKTASK (1SEC)
C, DELTAT NEXT, TASK BELOW, IN
-0 CS

```
2161   REF  5  LAST  646   24,3472  4 4761 1  QUICKIGN CS    PRIO14      CLEAR ASTNFLAG AND SET IGNFLAG FOR
2162   REF 11  LAST  662   24,3473  7 0103 1           MASK  FLAGWRD7       IMMEDIATE V99 RESPONSE
2163   REF 29  LAST  662   24,3474  6 4876 1           AD    BIT13
2164   REF 12  LAST  665   24,3475  54 103 1           TS    FLAGWRD7
2165   REF  7  LAST  664   24,3476  0 5156 0           TC    FIXDELAY    DELAY TO ALLOW TIME FOR PRE40.6
2166                       24,3477    00036 1           DEC   30

2167   REF 24  LAST  657   24,3500  4 4702 1  V99FLASH CS    BIT9        CAUSE V99 TO FLASH
2168   REF 18  LAST  664   24,3501  55=145 1           TS    NVWORD1
2169   REF 23  LAST  664   24,3502  0 5281 1           TC    2PHSCHNG
2170                       24,3503    40774 1           OCT   40774      A, 4.77 = TIG-0 (-0CS) TBASE FOR PREPTVC
2171                       24,3504    00033 1           OCT   00033      A, 3.3 = S40.13 (PRIO 20)
2172   REF  6  LAST  650   24,3505  3 4675 1           CAF   PRIO20      SET UP TIMEBURN
2173   REF 25  LAST  659   24,3506  0 5042 1           TC    FINDVAC
2174   REF 14  LAST  657   E7,1427                      EBANK= TGO
2175   REF  3  LAST  650   24,3507    02404 0           2CADR S40.13
2175                       24,3510    34067 1
2176   REF 37  LAST  664   24,3511  1 5213 0  ENDV97E  TCF   TASKOVER    WAIT FOR CLOCKJOB (IMMEDIATE) REACTION
A2177                                                                      TO FLASHING V99 RESPONSE
R2178  MOD NO2          LOG SECTION  P40-P47
R2179  MOD BY    ZELDIN
R2180  FUNCTIONAL DESCRIPTION
R2181          COMPUTE INITIAL THRUST DIRECTION(UT) AND INITIAL VALUE OF VG
R2182          VECTOR(VGTIG).
R2183  CALLING SEQUENCE
R2184          L CALL
R2185          L+1          S40.1
R2186  NORMAL EXIT MODE
R2187          AT L+2 OF CALLING SEQUENCE (GOTO L+2)  NORMAL RETURN OR
R2188          ERROR RETURN IF NOSOFLAG =1
R2189  SUBROUTINES CALLED
R2190          CSMPREC
R2191          INITVEL
R2192          CALCGRAV
R2193          MIDGIM
R2194  ALARM OR ABORT EXIT MODES
R2195          L+2 OF CALLING SEQUENCE,UNSOLVABLE CONIC IF NOSOFLAG=1
R2196  ERASABLE INITIALIZATION REQUIRED
R2197          WEIGHT/G   ANTICIPATED MAG. OF VEHICLE MASS    SP B16KGM
R2198          XDELVFLG        1=DELTA-V MANEUVER,0=AIMPT STEER
R2199     IF DELTA-V MANEUVER
R2200          DELVSIN   SPECIFIED DELTA-V REQUIRED IN
R2201                    INERTIAL COORDS. OF ACTIVE VEHICLE
R2202                    AT TIME OF IGNITION             VECTOR B7M/CS
R2203          DELVSAB   MAG. OF DELVSIN                 DP      B7M/CS
R2204          RTIG      POSITION AT TIME OF IGNITION   VECTOR B29M
R2205          VTIG      VELOCITY AT TIME OF IGNITION   VECTOR B7M/CS
R2206          CSTEER = 0               DP
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R2207          IF AIMPOINT STEERING
R2208          IF AIMPT STEER
R2209             TIG       TIME OF IGNITION                     DP    B28CS
R2210             RTARG     POSITION TARGET TIME                 VECTOR B29M
R2211             CSTEER = ECSTEER(GR 0) DP B1
R2212             TPASS4 - TIME OF ARRIVAL AT AIMPOINT
R2213   .OUTPUT
R2214             UT     1/2 UNIT VECTOR ALIGNED WITH THRUST DIRECTION IN REF COOR
R2215             VGTIG     INITIAL VALUE OF VELOCITY
R2216                       TO BE GAINED (INERT. COORD.)         VECTOR B7M/CS
R2217             DELVLVC   VGTIG IN LOC. VERT. COORDS.          B7M/CS
R2218             P         NOMINAL THRUST FOR ENG USED FOR S40.13  DP B7 M-NEWT
R2219             BDT    V REQUIRED AT TIG -V REQUIRED AT (TIG-2SEC)
R2220             -GDT   FOR S40.13                              VECT B7M/CS
R2221             RTIG      CALC IN S40.1B(AIMPT) FOR S40.2,3  VECTOR B29M
R2222                       POSITION AT TIME OF IGNITION
R2223   DEBRIS    QTEMP1
R2224             MPAC,QPRET
R2225             PUSHLIST
R2226                RTX2,RTX1
2227                             14,2002          BANK   14
2228    REP   1                  16,2000          SETLOC P40S1
2229                             16,2000          BANK

2230    REP   1                                   COUNT  16/S40.1

2231                             16,2000  77214 0   S40.1   SET    VLOAD
2232    REP   2  LAST  656       16,2001  01070 1                  FIRSTFLG
2233    REP   1                  16,2002  11456 0                  LO8ZEROS
2234    REP   3  LAST  656       16,2003  03705 0           STORE  BDT
2235                             16,2004  43020 1           STO    BOF
2236    REP   8  LAST  633       16,2005  03657 0                  QTEMP
2237    REP   7  LAST  655       16,2006  01347 0                  XDELVFLG
2238    REP   1                  16,2007  34073 1                  S40.1B       LAMBERT
2239                             16,2010  77201 1           SETPD  VLOAD        EXTERNAL DELTA V
2240                             16,2011  00001 0                  0
2241    REP   5  LAST  631       16,2012  03640 0                  VTIG
2242    REP   11 LAST  656       16,2013  03576 0           STORE  VINIT
2243                             16,2014  53435 0           VXV    UNIT
2244    REP   6  LAST  632       16,2015  03632 0                  RTIG
2245    REP   2  LAST  122       16,2016  27713 1           STOVL  UT           UP IN UT
2246    REP   7  LAST  666       16,2017  03632 0                  RTIG
2247    REP   12 LAST  656       16,2020  03570 0           STORE  RINIT
2248                             16,2021  65236 0           VSQ    PDDL
2249                             16,2022  00045 0                  36D
2250                             16,2023  56205 0           DMP    DDV
2251    REP   1                  16,2024  34127 1                  THETACON
2252                             16,2025  41205 0           DMP    DMP
2253    REP   3  LAST  121       16,2026  03654 0                  DELVSAB
2254    REP   2  LAST  100       16,2027  03076 0                  WEIGHT/G
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Line	REF				Address	Value	S	Op	Operand	Comment
2255					16,2030	77671	1	DDV		
2256	REF	3	LAST	640	16,2031	03727	0		P	
2257					16,2032	24017	1	STOVL	14D	
2258	REF	9	LAST	631	16,2033	03646	0		DELVSIN	
2259					16,2034	74241	0	DOT	VXSC	
2260	REF	3	LAST	666	16,2035	03713	1		UT	
2261	REF	4	LAST	667	16,2036	03713	1		UT	
2262					16,2037	41552	0	VSL2	PUSH	(DELTAV,UP)UP SCALED AT 2(+7) P.D.L. 0
2263					16,2040	65245	1	BVSU	PDDL	DELTA VP SCALED AT 2(+7) P.D.L. 6
2264	REF	10	LAST	667	16,2041	03646	0		DELVSIN	
2265					16,2042	00017	1		14D	
2266					16,2043	63356	1	SIN	PDVL	
2267					16,2044	00007	0		8D	
2268					16,2045	53435	0	VXV	UNIT	
2269	REF	5	LAST	667	16,2046	03713	1		UT	
2270					16,2047	45561	1	VXSC	STADR	
2271	REF	6	LAST	641	16,2050	50056	1	STOVL	VGTIG	UNIT(VPXUP)SIN(THETAT)IN VGTIG
2272					16,2051	65256	0	UNIT	PDDL	UNIT(DELTA VP) IN P.D.L. 6
2273					16,2052	00017	1		14D	
2274					16,2053	74346	0	COS	VXSC	
2275					16,2054	74255	0	VAD	VXSC	
2276	REF	7	LAST	667	16,2055	03721	0		VGTIG	
2277					16,2056	00045	0		36D	
2278					16,2057	53352	0	VSL2	VAD	
2279					16,2060	77626	0	STADR		
2280	REF	8	LAST	667	16,2061	74056	1	STORE	VGTIG	VG IGNITION SCALED AT 2(+7)M/CS
2281					16,2062	77656	1	UNIT		
2282	REF	6	LAST	667	16,2063	27713	1	STOVL	UT	THRUST DIRECTION SCALED AT 2(+1)
2283	REF	9	LAST	667	16,2064	03721	0		VGTIG	
2284					16,2065	43006	0	PUSH	SET	
2285	REF	9	LAST	639	16,2066	01072	0		AVFLAG	
2286					16,2067	77624	1	CALL		
2287	REF	2	LAST	633	16,2070	10653	0		MIDGIM	VGTIG IN LV COOR AT 2(+7)M/CS IN DELVLVC
2288					16,2071	77650	1	GOTO		
2289	REF	9	LAST	666	16,2072	03657	0		QTEMP	
2290					16,2073	45345	1	S40.1B	DLOAD DSU	LAMBERT
2291	REF	62	LAST	664	16,2074	03413	1		TIG	
2292	REF	1			16,2075	36001	0		TWODT	
2293	REF	35	LAST	642	16,2076	14041	1	STODL	TDEC1	
2294	REF	10	LAST	656	16,2077	03656	1		TPASS4	
2295					16,2100	77625	0	DSU		
2296	REF	36	LAST	667	16,2101	00041	1		TDEC1	
2297	REF	10	LAST	656	16,2102	37423	0	STCALL	DELLT4	
2298	REF	2	LAST	632	16,2103	61663	0		AGAIN	
2299					16,2104	77775	1	VLOAD		
2300	REF	13	LAST	632	16,2105	03612	1		VIPRIME	
2301	REF	7	LAST	667	16,2106	17713	1	STODL	UT	
2302	REF	63	LAST	667	16,2107	03413	1		TIG	

2303	REP	37	LAST	667	16,2110	00041 1		STORE	TDEC1
2304					16,2111	77621 1		BDSU	
2305	REP	11	LAST	667	16,2112	03656 1			TPASS4
2306	REP	11	LAST	667	16,2113	37423 0		STCALL	DELLT4
2307	REP	3	LAST	667	16,2114	61663 0			AGAIN
2308					16,2115	41575 0		VLOAD	PUSH
2309	REP	16	LAST	633	16,2116	03846 0			DELVEET3
2310	REP	10	LAST	667	16,2117	03721 0		STORE	VGTIG
2311					16,2120	45014 0		SET	CALL
2312	REP	10	LAST	667	16,2121	01072 0			AVFLAG
2313	REP	3	LAST	667	16,2122	10653 0			MIDGIM
2314					16,2123	52001 1		SETPD	GOTO
2315					16,2124	00001 0			0
2316	REP	1			16,2125	61716 0			CALCGT
2317					16,2126	00024 1	THETACON	2DEC	.31830989 B-8
2317					16,2127	13714 1			
2318	REP	1			30,2000			SETLOC	P40S3
2319					30,3657			BANK	
2320	REP	1						COUNT	24/S40.1
2321					30,3657	04000 0	EP4(45)H	2DEC	.125
2321					30,3660	00000 1			
2322					30,3661	00707 1	EP4(10)H	2DEC	.027777777
2322					30,3662	03434 1			
2323					30,3663	45020 1	AGAIN	STO	CALL
2324	REP	5	LAST	656	30,3664	03730 0			QTEMP1
2325	REP	6	LAST	630	30,3665	27022 1			THISPREC
2326					30,3666	66134 1		SXA,2	SXA,1
2327	REP	12	LAST	630	30,3667	03746 1			RTX2
2328	REP	10	LAST	631	30,3670	03745 1			RTX1
2329					30,3671	77775 1		VLOAD	
2330	REP	21	LAST	631	30,3672	00001 0			RATT
2331	REP	8	LAST	666	30,3673	03632 0		STORE	RTIG
2332	REP	13	LAST	666	30,3674	27570 0		STOVL	RINIT
2333	REP	17	LAST	630	30,3675	00007 0			VATT
2334	REP	6	LAST	666	30,3676	03640 0		STORE	VTIG
2335	REP	12	LAST	666	30,3677	03576 0		STORE	VINIT
2336					30,3700	67201 0		SETPD	SLOAD
2337					30,3701	00001 0			0
2338	REP	18	LAST	657	30,3702	15332 1			HI6ZEROS
2339					30,3703	43125 0		PDDL	BON
2340	REP	1			30,3704	21660 1			EP4(45)H
2341	REP	4	LAST	628	30,3705	03705 0			NORMSW
2342					30,3706	61711 1			+3
2343					30,3707	77745 1		DLOAD	
2344	REP	1			30,3710	21662 0			EP4(10)H
2345					30,3711	45006 0		PUSH	CALL
2346	REP	3	LAST	545	30,3712	22000 1			INITVEL

2347					30,3713	52001 1	SETPD	GOTO
2348					30,3714	00001 0		0
2349	REF	6	LAST	668	30,3715	03730 0		OTEMP1
2350					30,3716	45175 0	CALCOUT VLOAD	CALL
2351	REF	9	LAST	668	30,3717	03832 0		RTIG
2352	REF	2	LAST	528	30,3720	77256 0		CALCGRAV	GDELTAT IN MPAC AT 2(+7)M/CS
2353					30,3721	70372 0	VSL1	V/SC
2354	REF	1			30,3722	21761 1		200CS	G AT 2(-5) M/CS.CS
2355					30,3723	52315 1	PDVL	VSU
2356	REF	14	LAST	667	30,3724	03612 1		VIPRIME
2357	REF	8	LAST	667	30,3725	03713 1		UT
2358					30,3726	52341 0	V/SC	VSU
2359	REF	2	LAST	669	30,3727	21761 1		200CS
2360					30,3730	72561 0	VXSC	VSL2
2361	REF	5	LAST	644	30,3731	03703 0		CSTEER
2362					30,3732	24015 0	STOVL	12D	B.C SCALED AT 2(-5) PDL 12D
2363	REF	11	LAST	668	30,3733	03721 0		VGTIG
2364					30,3734	41456 0	UNIT	PUSH	UG PDL 0 SCALED AT 2(+1)
2365					30,3735	74241 0	DOT	VXSC
2366					30,3736	00015 0		12D
2367					30,3737	00001 0		0
2368					30,3740	51352 1	VSL2	BVSU
2369					30,3741	00015 0		12D
2370					30,3742	14015 0	STODL	12D	Q PDL 12D SCALED AT 2(-5)
2371	REF	4	LAST	667	30,3743	03727 0		P
2372					30,3744	56261 1	SRR	DDV
2373					30,3745	21605 1		4
2374	REF	3	LAST	666	30,3746	03076 0		WEIGHT/G
2375					30,3747	63316 0	DSQ	PDVL	F/MASS SQUARED PDL 6 AT 2(-10)M/(CS.CS)
2376					30,3750	00015 0		12D
2377					30,3751	77636 1	VSQ	
2378					30,3752	75421 1	BDSU	SQRT
2379					30,3753	76561 1	VXSC	VSL1
2380					30,3754	53455 0	VAD	UNIT
2381					30,3755	00015 0		12D
2382	REF	9	LAST	669	30,3756	37713 0	STCALL	UT
2383	REF	10	LAST	667	30,3757	03657 0		OTEMP
2384					30,3760	01440 0	200CS	2DEC	200 B-12
2384					30,3761	00000 1		

P2385		PROGRAM DESCRIPTION S40.2,3 DATE 15,NOV,66							
R2386		MOD NO 2 LOG SECTION P40-P47							
R2387		MOD BY ZELDIN							
R2388		FUNCTIONAL DESCRIPTION							
R2389		COMPUTE GIMBAL ANGLES IF THRUSTING OCCURRED WITH PRESENT IMU							
R2390		ORIENTATION, WINGS LEVEL SPACECRAFT,HEADS UP							
R2391		COMPUTE X AXIS OF ENGINE BELL							
R2392		COMPUTE PREFERRED IMU ORIENTATION(XSCREF)							
R2393		FOR THIS CALCULATION,ASSUME X AXIS OF SC ALONG UT INITIALLY,							
R2394		YSC=UNIT(XXR),ZSC=UNIT(XX(XXR)) AND ROTATE ENGINE BELL ALONG UT							
R2395		NEW SC AXES WILL BE APPROX. WINGS LEVEL AND NEW SC AXES IN REF.							
R2396		COORDS. WILL BE PREFERRED IMU ORIENTATION.							
R2397		COMPUTE DESIRED THRUST DIRECTION IN SM COORDS.							
R2398		CALLING SEQUENCE							
R2399		L CALL							
R2400		L+1 S40.2,3							
R2401		NORMAL EXIT MODE							
R2402		AT L+2 OF CALLING SEQUENCE (GOTO L+2)							
R2403		SUBROUTINES CALLED							
R2404		CALCGA							
R2405		ALARM OR ABORT MODES							
R2406		NONE							
R2407		ERASABLE INITIALIZATION REQUIRED							
R2408		PACTOFF	TOTAL PITCH TRIM ANGLE	SP	AT 1.0795111 REV.				
R2409		YACTOFF	TOTAL YAW TRIM ANGLE	SP	AT 1.0795111 REV.				
R2410		UT	DESIRED THRUST DIRECTION		VECT.B2M/(CS.CS)				
R2411		RTIG	POSITION AT TIME OF IGNITION		VECT. B29M				
R2412		ENG2FLAG	ON=RCS OFF=SPS						
R2413		OUTPUT							
R2414		SCAXIS	UNIT VECT. ALIGNED WITH ENG BELL IN SC COOR B1						
R2415		XSCREF	UNIT VECTORS ALIGNED WITH PREFERRED IMU	B1					
R2416		YSCREF							
R2417		ZSCREF							
R2418		GIMBAL ANGLES IN THETAD							
R2419		POINTVSM	UNIT VECT ALONG DESIRED THRUST DIRECTION IN SM B1						
R2420	DEBRIS								
R2421		PUSHLIST,QPRET,MPAC							
R2422		QTEMP TEMP. ERASABLE							

2423					24,3512		BANK	24	
2424	REF	2	LAST	640	24,2000		SETLOC	P40S	
2425					24,3512		BANK		
2426	REF	1					COUNT*	$$/S40.2	
2427					24,3512	64375 1	S40.2,3	VLOAD	MXV	
2428	REF	10	LAST	669	24,3513	03713 1		UT	
2429	REF	18	LAST	612	24,3514	01736 1		REFSMMAT	
2430					24,3515	44172 0	VSL1	STQ	
2431	REF	11	LAST	669	24,3516	03657 0		QTEMP	
2432	REF	5	LAST	612	24,3517	03357 0	STORE	POINTVSM	THRUST IN SM AT 2
2433					24,3520	43001 1	SETPD	BON	
2434					24,3521	00001 0		0	

2435	REP	3	LAST	644	24,3522	00704	1		ENG2FLAG	
2436	REP	1			24,3523	51633	0		S40.2,3B	
2437					24,3524	77745	1	DLOAD		
2438	REP	19	LAST	668	24,3525	15332	1		HI6ZEROS	
2439					24,3526	67206	1	PUSH	SLOAD	ZERO PDL 0
2440	REP	3	LAST	655	24,3527	03027	1		YACTOFF	
2441					24,3530	72405	0	DMP	SL_1	
2442	REP	1			24,3531	11672	1		TRIMSCAL	
2443					24,3532	41415	1	DAD	PUSH	
2444	REP	1			24,3533	11674	1		YBIAS	
2445					24,3534	65346	0	COS	PDDL	COS(Y +Y0) PDL 2
2446					24,3535	41556	1	SIN	PUSH	SIN(Y +Y0) PDL 4
2447					24,3536	77735	0	SLOAD		
2448	REP	13	LAST	655	24,3537	03026	0		PACTOFF	
2449					24,3540	72405	0	DMP	SL_1	
2450	REP	2	LAST	671	24,3541	11672	1		TRIMSCAL	
2451					24,3542	41415	1	DAD	PUSH	
2452	REP	1			24,3543	11676	0		PBIAS	
2453					24,3544	65346	0	COS	PDDL	COS(P +P0) PDL 6
2454					24,3545	41556	1	SIN	PUSH	SIN(P +P0) PDL 8D
2455	REP	1			24,3546	14323	0	STODL	ZSCREF	SIN(P+P0)
2456					24,3547	00007	0		6	
2457					24,3550	72405	0	DMP	SL_1	
2458					24,3551	00005	1		4	
2459					24,3552	65276	1	DCOMP	PDDL	-SIN(Y+Y0)COS(P+P0) PDL 10
2460					24,3553	00007	0		6	
2461					24,3554	72405	0	DMP	SL_1	
2462					24,3555	00003	1		2	
2463					24,3556	77666	1	VDEF		
2464	REP	1			24,3557	14307	0	STODL	XSCREF	PD POINTER AT 6 NEW SC X AXIS SCALED AT
2465	REP	2	LAST	671	24,3560	00323	0		ZSCREF	
2466					24,3561	72405	0	DMP	SL_1	
2467					24,3562	00005	1		4	
2468					24,3563	41325	0	PDDL	DMP	
2469	REP	3	LAST	671	24,3564	00323	0		ZSCREF	
2470					24,3565	00003	1		2	
2471					24,3566	57552	1	SL_1	DCOMP	
2472					24,3567	77666	1	VDEF		
2473	REP	4	LAST	671	24,3570	14323	0	STODL	ZSCREF	PD POINTER AT 4 NEW SCZ AXIS SCALED AT 2
2474					24,3571	77666	1	VDEF		
2475	REP	1			24,3572	14315	0	STODL	YSCREF	PD POINTER AT0 NEW SC Y AXIS SCALED AT 2
2476	REP	5	LAST	671	24,3573	00323	0		ZSCREF	
2477					24,3574	65325	0	PDDL	PDDL	
2478	REP	2	LAST	671	24,3575	00315	0		YSCREF	
2479	REP	2	LAST	671	24,3576	00307	0		XSCREF	
2480					24,3577	77666	1	VDEF		

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2481   REP  15  LAST  612    24,3600    27351 0        STOVL  SCAXIS      ENGINE BELL SCALED AT 2
2482   REP  11  LAST  670    24,3601    03713 1               UT
2483                         24,3602    53515 0        PDVL   UNIT
2484   REP  10  LAST  669    24,3603    03632 0               RTIG
2485                         24,3604    57435 1        VXV    VCOMP
2486                         24,3605    00001 0               0
2487                         24,3606    41456 0        UNIT   PUSH
2488                         24,3607    77624 1        CALL
2489   REP   1               24,3610    51652 1               TSTRXUT
2490                         24,3611    57435 1        VXV    VCOMP
2491                         24,3612    00001 0               0
2492                         24,3613    63372 1        VSL1   PDVL        2 RF/SC  IN PDL  12D
2493   REP   3  LAST  671    24,3614    00307 0               XSCREP
2494                         24,3615    76505 0        VXM    VSL1
2495                         24,3616    00001 0               0
2496   REP   4  LAST  672    24,3617    24307 0        STOVL  XSCREP      X OF PREP IMU,X OF SC IN REF COOR. AT 2
2497   REP   3  LAST  671    24,3620    00315 0               YSCREP
2498                         24,3621    76505 0        VXM    VSL1
2499                         24,3622    00001 0               0
2500   REP   4  LAST  672    24,3623    24315 0        STOVL  YSCREP      Y OF PREP.IMU,Y OF SC IN REF COOR. AT 2
2501   REP   6  LAST  671    24,3624    00323 0               ZSCREP
2502                         24,3625    76505 0        VXM    VSL1
2503                         24,3626    00001 0               0
2504   REP   7  LAST  672    24,3627    00323 0        STORE  ZSCREP      Z OF PREP. IMU,Z OF SC IN REF COOR. AT 2
2505                         24,3630    52001 1        SETPD  GOTO
2506                         24,3631    00001 0               0
2507   REP  12  LAST  670    24,3632    03657 0               QTEMP
2508                         24,3633    77775 1  S40.2,3B VLOAD
2509   REP   6  LAST  587    24,3634    15330 0               UNITX
2510   REP  16  LAST  672    24,3635    27351 0        STOVL  SCAXIS
2511   REP  12  LAST  672    24,3636    03713 1               UT
2512   REP   5  LAST  672    24,3637    00307 0        STORE  XSCREP
2513                         24,3640    53435 0        VXV    UNIT
2514   REP  11  LAST  672    24,3641    03632 0               RTIG
2515                         24,3642    34007 1        STCALL 6D
2516   REP   2  LAST  672    24,3643    51652 1               TSTRXUT
2517   REP   5  LAST  672    24,3644    00315 0        STORE  YSCREP
2518                         24,3645    57435 1        VXV    VCOMP
2519   REP   6  LAST  672    24,3646    00307 0               XSCREP
2520                         24,3647    77772 0        VSL1
2531   REP   8  LAST  672    24,3650    34323 1        STCALL ZSCREP      ZNB AXIS IN REF COOR
2532   REP  13  LAST  672    24,3651    03657 0               QTEMP
2533                         24,3652    46145 0  TSTRXUT DLOAD BHIZ
2534                         24,3653    00045 0               36D
2535   REP   1               24,3654    51657 1               BADVCTOR
2536                         24,3655    43575 1        VLOAD  RVQ
2537                         24,3656    00007 0               6D
2538                         24,3657    53575 0  BADVCTOR VLOAD UNIT
2539   REP  12  LAST  672    24,3660    03632 0               RTIG
2540                         24,3661    53515 0        PDVL   UNIT
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2541	REF	7	LAST	668	24,3662	03640 0			VTIG	
2542					24,3663	53322 1		VSR3	VAD	
2543					24,3664	53435 0		VXV	UNIT	
2544	REF	13	LAST	672	24,3665	03713 1			UT	
2545					24,3666	77676 0			VCOMP	
2546					24,3667	00007 0			STORE	6D
2547					24,3670	77616 0			RVQ	
2548					24,3671	21215 1	TRIMSCAL	2DEC	1.07975111 B-1	
2548					24,3672	12215 1				
2549					24,3673	00053 1	YBIAS	2DEC	+.00263888889	YAW MECH BIAS (+0.95 DEG, THRUST ON)
2549					24,3674	07423 0				
2550					24,3675	77836 1	PBIAS	2DEC	-.00597222222	PITCH MECH BIAS (-2.15 DEG, THRUST ON)
2550					24,3676	44653 1				
A2551										REFERENCE, TRW 68.6520.3.3-40 27FEB,1968

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R2552 PROGRAM DESCRIPTION S41.1  DATE 8DEC66
R2553 MOD NO1  ·LOG SECTION P40-P47
R2554 MOD BY ZELDIN
R2555 FUNCTIONAL DESCRIPTION
R2556       COMPUTE VELOCITY TO BE GAINED INITIALLY IN REF COORDS.
R2557       TO CONTROL COORDS.
R2558 CALLING SEQUENCE
R2559   L   CALL
R2560   L+1         S41.1
R2561 NORMAL EXIT MODE
R2562       AT L +2 OF CALLING SEQUENCE
R2563 SUBROUTINES CALLED'
R2564       CALCSMSC
R2565       CDUTRIG
R2566 ALARM OR ABORT MODES
R2567       NONE
R2568 ERASABLE INITIALIZATION REQUIRED
R2569       VG IN REF. COORD. PDL L POINTER AT L+5 .S41.1 WILL RETURN WITH
R2570       POINTER AT L (L MUST BE LESS THAN OR = TO 14D)
R2571 OUTPUT
R2572       MPAC CONTAINS VG IN CONTROL COORDS          VECT. B7M/CS
R2573 DEBRIS'
R2574       OTEMP      TEMP· ERASABLE
R2575       QPRET
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2576	REF	1						COUNT	22/S41.1	
2577	REF	1			22,2000			SETLOC	P40S5	
2578					22,3426			BANK		
2579					22,3426	45020 1	S41.1	STQ	CALL	
2580	REF	14	LAST	672	22,3427	03657 0			OTEMP	
2581	REF	5	LAST	585	22,3430	47432 1			CDUTRIG	
2582					22,3431	77775 1		VLOAD		
2583					22,3432	45121 1		MXV	CALL	
2584	REF	19	LAST	670	22,3433	01736 1			REFSMMAT	
2585	REF	3	LAST	585	22,3434	47577 1			*SMNB*	

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2586					22,3435	74321 1		MXV	VXSC
2587	REF	2	LAST	405	22,3436	05004 0			QUADROT
2588	REF	1			22,3437	05443 1			TENBNK14
2589					22,3440	52072 0		VSL5	GOTO
2590	REF	15	LAST	673	22,3441	03657 0			QTEMP
2591					22,3442	24000 1	TENBNK14	2DEC	10. B-4
2591					22,3443	00000 1			

VG IN CONTROL COORD IN MPAC SCALED AT
VG IN CONTROL COORDS. IN MPAC AT 2(+7)

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P2592   NAME        S40.8 - CROSS PRODUCT STEERING
R2593   FUNCTION    (1) UPDATES THE VELOCITY-TO-BE-GAINED VECTOR.
R2594               (2) GENERATES ANGULAR RATE STEERING COMMANDS FOR AUTOPILOT.
R2595               (3) ESTABLISHES ENGINE CUT-OFF SIGNALS AT APPROPRIATE TIMES.
R25952              (4) INITIATES THRUST-FAIL ROUTINE, R40
R2596   CALLING SEQ CALL S40.8
R2597   INPUT       VGPREV   - LAST VALUE OF THE VELOCITY-TO-BE-GAINED VECTOR
R2598                          PRIOR TO UPDATING IN METERS/CS AT +7.
R2599               DELVREF  - CHANGE IN VEHICLE VELOCITY SINCE LAST MEASUREMENT
R2600                          IN METERS/CS AT +7.
R2601               BDT      - EFFECT OF RATE OF CHANGE OF REQUIRED VELOCITY AND
R2602                          GRAVITY DURING DT UPON VELOCITY-TO-BE-GAINED IN
R2603                          METERS/CS AT +7.
R2604               CSTEER   - A SCALAR OF THE STEERING LAW, SC.AT B+1, USED FOR
R2605                          SPS AIMPOINT STEERING MANEUVERS
R2606               IDLEFAIL- A FLAG TO INHIBIT (IDLE) THE THRUST-FAIL ROUTINE
R2607               STEERSW - A SWITCH TO PRECLUDE NEEDLESS CONDUCT OF STEERING
R2608               REFSMMAT, DAPDATR1, PIPTIME
R2609               EREPFRAC, ETDECAY, KPRIMEDT FOR TVC
R2614   OUTPUT      TTOGO    - TIME REMAINING FOR ENGINE BURN IN CS AT +28
R2615               OMEGAC   - DP VECTOR RATE COMMAND, SC.AT  1/(2TVCDT) REVS/SEC
R26152              VG, VGPREV, VGDISP, TGO, TIG, SCALED AS NOTED IN CODING
R26153              STEERSW, IMPULSW, NVWORD1
R26154              REPFRAC, CNTR, VCNTR, VCNTRIMP FOR TVC (R40 INTERFACING)
R2616   DEBRIS      OMEGAXC,+1
R2617   SUBROUTINES USED    - *SMNB* , ALARM


2618   REF    2  LAST  666     16,2000                  SETLOC P40S1
2619                            16,2130                  BANK
2620   REF   50  LAST  664     E6,1466                   EBANK= DAPDATR1
2621   REF.   1                                          COUNT  16/S40.8

2622                            16,2130    44001 0  S40.8   SETPD  STQ
2623                            16,2131    00001 0  SPBIT1          00D
2624   REF   16  LAST  674     16,2132    03657 0                  QTEMP
2625                            16,2133    51375 1          VLOAD  BVSU         CONSTRUCT DELVG, SC.AT B+7  M/CS
2626   REF    3  LAST  655     16,2134    03433 0                  DELVREF
2627   REF    4  LAST  666     16,2135    03705 0                  BDT
2628                            16,2136    77655 1          VAD
2629   REF    3  LAST  656     16,2137    03721 0                  VGPREV
2630   REF    3  LAST  122     16,2140    03460 0          STORE  VG           VELOCITY-TO-BE-GAINED, SC.AT B+7  M/CS

2631                            16,2141    77646 0          ABVAL
2632   REF    7  LAST  641     16,2142    03654 0          STORE  VGDISP       FOR DISPLAY PURPOSES
2633                            16,2143    77776 1          EXIT
2634   REF   58  LAST  664     16,2144   0 5301 0          TC     PHASCHNG
2635                            16,2145    10035 0          OCT    10035       TYPE B  RESTART BELOW AND 5.3 REREADAC

2636   REF  145  LAST  660     16,2146   0 6006 1          TC     INTPRET
2637                            16,2147    77775 1          VLOAD
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2638	REF	4	LAST	675	16,2150	03460 0			VG	
2639	REF	4	LAST	675	16,2151	03721 0		STORE	VGPREV	
2640					16,2152	77214 0		BOFF	VLOAD	
2641	REF	2	LAST	663	16,2153	01344 0			STEERSW	SKIP TGO AND CROSS-PRODUCT
2642	REF	17	LAST	675	16,2154	03657 0			GTEMP	
2643	REF	4	LAST	675	16,2155	03433 0			DELVREF	
2644					16,2156	41446 1		ABVAL	PUSH	CHECK FOR LOTHRUST
2645					16,2157	41335 1		SLOAD	DMP	
26453	REF	1			16,2160	01354 1			DVTHRESH	SC.AT B-2 M/CS
26454	REF	1			16,2161	36011 1			DPB-9	
26456					16,2162	77621 1		BDSU		
2646					16,2163	77440 1		BMN	EXIT	
2647	REF	1			16,2164	40021 0			LOTHRUST	
2648	REF	51	LAST	675	16,2165	31-466 1		CAE	DAPDATR1	ENABLE TVCDAP CG TRACKING
2649	REF	39	LAST	584	16,2166	7 4675 0		MASK	BIT14	
2650	REF	155	LAST	662	16,2167	10 000 0		CCS	A	
2651	REF	47	LAST	664	16,2170	3 4712 1		CAF	BIT1	
2652	REF	156	LAST	676	16,2171	50 000 1		INDEX	A	LM-OFF, LM-ON VALUE
2653	REF	1			16,2172	31-423 0		CAE	EREPFRAC	
2654	REF	2	LAST	103	16,2173	55-652 0		TS	REPFRAC	
2655	REF	146	LAST	675	16,2174	0 6006 1		TC	INTPRET	
2656					16,2175	51375 1	TGOCALC	VLOAD	BVSU	GET DELVG
2657	REF	5	LAST	676	16,2176	03433 0			DELVREF	
2658	REF	5	LAST	675	16,2177	03705 0			BDT	
2659					16,2200	77656 1		UNIT		
2660					16,2201	41441 0		DOT	PUSH	(00D)
2661	REF	5	LAST	676	16,2202	03460 0			VG	
2662					16,2203	56244 0		BPL	DDV	ANGLE SHOULD BE GREATER THAN PI/2
2663	REF	1			16,2204	40013 1			INCRSVG	DISPLAY ALARM IF NOT
2664	REF	1			16,2205	36005 1			2VEXHUST	
2665					16,2206	41215 1		DAD	DMP	(DOT PRODUCT UP FROM 00D)
2666	REF	1			16,2207	11454 1			LODPHALF	
2667					16,2210	70501 1		NORM	SR1	
2668	REF	29	LAST	656	16,2211	00047 1			X1	
2669					16,2212	60325 0		PDDL	NORM	
2670					16,2213	00045 1			36D	(MAG DELVG)
2671	REF	11	LAST	593	16,2214	00050 1			X2	
2672					16,2215	77665 1		BDDV		
2673					16,2216	53664 0		XSU,2	SL*	
2674	REF	30	LAST	676	16,2217	00046 0			X1	
2675					16,2220	57607 1			0 -9D,2	
2676					16,2221	41405 0		DMP	PUSH	(00D)
2677	REF	1			16,2222	36003 1			-FOURDT	
2678					16,2223	54335 0		SLOAD	SR	
2679	REF	1			16,2224	03016 0			ETDECAY	ETDECAY SC.AT B+14 CS
2680					16,2225	20617 0			14D	
2681					16,2226	45421 1		BDSU	STADR	
2682	REF	15	LAST	665	16,2227	74347 1		STORE	TGO	TIME TO GO IN CS. AT +28
2683					16,2230	77615 0		DAD		

2684	REF	7	LAST	656	16,2231	01205 1			PIPTIME	
2685	REF	64	LAST	667	16,2232	17413 1		STODL	TIG	
2686	REF	16	LAST	676	16,2233	03430 0			TGO	
2687					16,2234	50025 0		DSU	BMN	
2688	REF	1			16,2235	36007 0			FOURSEC	
2689	REF	1			16,2236	40000 0			S40.81	
2690					16,2237	74375 0	XPRODUCT	VLOAD	VXSC	
2691	REF	6	LAST	676	16,2240	03705 0			BDT	
2692	REF	6	LAST	669	16,2241	03703 0			CSTEER	
2693					16,2242	52352 1		VSL2	VSU	
2694	REF	6	LAST	676	16,2243	03433 0			DELVREF	
2695					16,2244	63256 0		UNIT	PDVL	
2696	REF	6	LAST	676	16,2245	03460 0			VG	
2697					16,2246	47256 0		UNIT	VXV	
2698					16,2247	45121 1		MXV	CALL	
2699	REF	20	LAST	673	16,2250	01736 1			REFSMMAT	(REFSMMAT/2)
2700	REF	4	LAST	673	16,2251	47577 1			*SMNB*	
2701					16,2252	77761 1		VXSC		
2702	REF	2	LAST	103	16,2253	03245 1			KPRIMEDT	(KPRIMEDT SCIAT PI/8 RAD)
2703	REF	5	LAST	101	16,2254	03126 1	OMEGACLC	STORE	OMEGAC	
2704					16,2255	77650 1		GOTO		
2705	REF	18	LAST	676	16,2256	03657 0			OTEMP	
2706	REF	1			17,2000			SETLOC	DAPS7	
2707					17,2000			BANK		
2708	REF	1						COUNT	17/S40.8	
2709					17,2000	00000 1	TWODT	2DEC	200.0 B-28	2 SEC
2709					17,2001	00310 0				
2710					17,2002	77715 1	-FOURDT	2DEC	-800 B-18	-4(200CS), SC.AT B+18CS (-4 FOR SCALING)
2710					17,2003	77777 0				
2711					17,2004	17602 0	2VEXHUST	2DEC	63.020792 B-7	2(10338.0564 FPS), SC.AT B+7 M/CS
2711					17,2005	25124 1				
2712					17,2006	00000 1	FOURSEC	2DEC	400.0 B-28	4 SEC
2712					17,2007	00620 0				
2713					17,2010	00040 0	DPB-9	2DEC	1 B-9	
2713					17,2011	00000 1				
2714	REF	1			20,2000			SETLOC	DAPS6	
2715					20,2000			BANK		
2716	REF	1						COUNT	20/S40.8	
2717					20,2000	77214 0	S40.81	SET	VLOAD	TGO LESS THAN 4 SECONDS
2718	REF	3	LAST	657	20,2001	01066 0			IMPULSW	FOR ENGINE-OFF CALL
2719	REF	20	LAST	671	20,2002	15332 1			HI6ZEROS	
2720	REF	6	LAST	677	20,2003	03126 1	RATEZRO	STORE	OMEGAC	TVC TO ATTITUDE HOLD
2721					20,2004	77776 1		EXIT		
2722	REF	15	LAST	652	20,2005	3 4672 0		CAF	POSMAX	INHIBIT SWITCHOVER/TVC EG TRACKING
2723	REF	3	LAST	664	20,2006	55«447 0		TS	CNTR	

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2724	REF 147 LAST	676	20,2007	0 6006 1		TC	INTPRET	
2725			20,2010	52014 0		CLEAR	GOTO	
2726	REF 3 LAST	676	20,2011	01264 0			STEERSW	
2727	REF 19 LAST	677	20,2012	03657 0			QTEMP	
2728			20,2013	77776 1	INCRSVG	EXIT		
2729	REF 26 LAST	551	20,2014	0 5537 0		TC	ALARM	
2730			20,2015	01407 0		OCT	01407	
2731	REF 148 LAST	678	20,2016	0 6006 1		TC	INTPRET	
2732			20,2017	77650 1		GOTO		
2733	REF 20 LAST	678	20,2020	03657 0			QTEMP	
2734			20,2021	77214 0	LOTHRUST	BON	VLOAD	
2735	REF 3 LAST	664	20,2022	00711 0			IDLEFAIL	
2736	REF 21 LAST	678	20,2023	03657 0			QTEMP	
2737	REF 21 LAST	677	20,2024	15332 1			HI6ZEROS	
2738	REF 7 LAST	677	20,2025	03126 1		STORE	OMEGAC	
2739			20,2026	77776 1		EXIT		
2740	REF 135 LAST	663	20,2027	4 4714 0		CS	ZERO	
2741	REF 3 LAST	663	20,2030	55=653 1		TS	VCNTR	
2742	REF 2 LAST	103	20,2031	55=663 1		TS	VCNTRIMP	
2743	REF 3 LAST	676	20,2032	55=652 0		TS	REPFRAC	
2744	REF 19 LAST	665	20,2033	55=145 1		TS	NVWORD1	
2745	REF 149 LAST	678	20,2034	0 6006 1		TC	INTPRET	
2746			20,2035	52014 0		CLEAR	GOTO	
2747	REF 4 LAST	678	20,2036	01264 0			STEERSW	
2748	REF 22 LAST	678	20,2037	03657 0			QTEMP	

RESTARTS OK

ALARM INDICATING THAT THRUST IS POINTING
IN WRONG DIRECTION.

THRUST FAILURE (LO-OR-NO) INDICATED
SET BY V97P. ALLOWS 1 BYPASS IN CASE OF
    UNFAVORABLE S40.8 SYNCH
START OF ENGINE-FAIL (R40) OPERATIONS
PUT TVC IN ATTITUDE HOLD

KILL CSMMASS UPDATING
(TVCEXEC LOGIC REQUIRES THIS TOO)
KILL TVCDAP CG TRIM TRACKING
SET UP ENGINE-FAIL V97FLASH (CLOCKJOB)

INHIBIT STEERING AND TGO CALC (MANUAL
    SHUTDOWN IF NOT SET UP AGAIN)
RESTARTS OK

P2749	NAME	S40.9 - VTOGAIN (AIMPOINT MANEUVERS ONLY)			
R2750	FUNCTION	(1) GENERATES REQUIRED VELOCITY AND VELOCITY-TO-BE-GAINED			
R2751		VECTORS FOR USE DURING AIMPOINT MANEUVERS			
R2752		(2) UPDATES THE B VECTOR WHICH IS USED IN THE FINAL			
R2753		CALCULATION OF EXTRAPOLATING THE VELOCITY-TO-BE-GAINED			
R2754	CALLING SEQ	VIA FINDVAC AS NEW JOB.			
R2755	INPUT	RNIT	- ACTIVE VEHICLE RADIUS VECTOR IN METERS AT +29.		
R2756		VNIT	- ACTIVE VEHICLE VELOCITY VECTOR IN METERS/CS AT +7		
R2757		VRPREV	- LAST COMPUTED VELOCITY REQUIRED VECTOR IN		
R2758			METERS/CS AT +7.		
R2759		NOMTIG	- TIME OF IGN. USED IN TARGETTING ROUTINESΣ+28β		
R2760		DELLT4	- TRANSFER TIME FROM PIPTIME TO TARGETΣ+28β		
R2761		TNIT	- TIME OF RNIT AND VNIT IN CS AT +28		
R2762		GDT/2	- HALF OF VELOCITY GAINED IN DELTA T TIME DUE TO		
R2763			ACCERERATION OF GRAVITY IN METERS/CS AT +7.		
R2764		DELVREF	- CHANGE IN VELOCITY DURING LAST 2 SEC IN		
R2765			METERS/CS AT +7.		
R2766		NORMSW	SET=CENTRAL ANGLE BETWEEN RTARG AND RTIG IS BETWEEN		
R2767			165 TO 195 DEGREES		
R2768			RESET=CENTRAL ANGLE OUTSIDE CONE DESCRIBED ABOVE		
R2769	OUTPUT	VGTEMP	- VELOCITY TO BE GAINED VECTOR IN METERS/CS AT +7.		
R2770		COGA	- INPUT OF INITIAL GUESS FOR LAMBERT FROM S40.1 0		
R2771			OR PREVIOUS PASS THRU S40.9		
R2772		GOBL/2	-OBLATENESS TERM IN AVG GRAV CALC-GOBL*RSQ/MU		
R2773		VRPREV	- VELOCITY REQUIRED VECTOR IN METERS/CS AT +7.		
R2774		BDT	- B VECTOR IN METERS/CS AT +7.		
R2775	SUBROUTINES USED	-	INITVEL.		
2776	REF 3 LAST 675	16,2000		SETLOC P40S1	
2777		16,2257		BANK	
2778	REF 7 LAST 657	E6,1746		EBANK= NBRCYCLS	
2779	REF 1			COUNT 16/S40.9	
2780	REF 150 LAST 678	16,2257	0 6006 1	S40.9	TC INTPRET
2781		16,2260	71201 1		SETPD DLOAD
2782		16,2261	00001 0		00D
2783	REF 2 LAST 666	16,2262	11456 0		LO8ZEROS
2784		16,2263	77725 1		PDDL
2785	REF 1	16,2264	34401 0		EP4(45)L
2786		16,2265	71214 0		BON DLOAD
2787	REF 5 LAST 668	16,2266	03705 0		NORMSW
2788		16,2267	34271 1		+2
2789	REF 1	16,2270	34403 1		EP4(10)L
2790		16,2271	77606 1		PUSH
2793		16,2272	45014 0		CLEAR CALL
2794	REF 3 LAST 481	16,2273	00675 0		GUESSW
2795	REF 1	16,2274	22002 0		HAVEGUES
27951		16,2275	77776 1		EXIT
27952	REF 59 LAST 675	16,2276	0 5301 0		TC PHASCHNG
27953		16,2277	05021 1		OCT 05021

SAVE TIME BY NOT REDOING LAMBERT CALCS
C, PRIORITY NEXT, JOB BELOW

L   P40-P47

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27954                        16,2300   10000 0            OCT     10000
27955  REF 151 LAST 679      16,2301   0 6006 1            TC      INTPRET
2796                         16,2302   77614 1   ENDLAMB  BON
2797   REF   3 LAST 666      16,2303   01310 1                    FIRSTFLG
2798   REF   1               16,2304   34322 0                    FIRSTIME
2799                         16,2305   52375 1            VLOAD   VSU
2800   REF  15 LAST 669      16,2306   03612 1                    VIPRIME
2801   REF   2 LAST 120      16,2307   03466 0                    VRPREV
2802                         16,2310   45325 1            PDDL    DSU
2803   REF   3 LAST 656      16,2311   03474 0                    TNIT
2804   REF   2 LAST 120      16,2312   03476 1                    TNITPREV
2805                         16,2313   55281 1            SL      BDDV
2806                         16,2314   20222 1                    17D
2807   REF   1               16,2315   34375 1                    200CSHI
2808                         16,2316   77761 1            VXSC
2809                         16,2317   76451 0            VSU     VSL1
2810   REF   2 LAST  77      16,2320   01207 0                    GDT/2
2811   REF   7 LAST 677      16,2321   03705 0            STORE   BDT
2812                         16,2322   57535 0   FIRSTIME SLOAD   DCOMP
2813   REF  13 LAST 668      16,2323   03747 0                    RTX2
28131                        16,2324   77640 0            BMN
2814   REF   1               16,2325   34342 0                    MOONCASE
2815                         16,2326   53575 0            VLOAD   UNIT
2816   REF  10 LAST 656      16,2327   01171 1                    RN
2817                         16,2330   45345 1            DLOAD   DSU
2818   REF   8 LAST 677      16,2331   01205 1                    PIPTIME
2819   REF   3 LAST 840      16,2332   03450 0                    NOMTIG
2820                         16,2333   56205 0            DMP     DDV
2821   REF   1               16,2334   34377 0                    EARTHMU
2822                         16,2335   00043 0                    34D
2823                         16,2336   53361 0            VXSC    VAD
2824   REF   2 LAST  77      16,2337   01215 0                    GOBL/2
2825   REF   2 LAST 656      16,2340   03646 0                    VGTEMP
2826   REF   3 LAST 680      16,2341   03646 0            STORE   VGTEMP
2827                         16,2342   77776 1   MOONCASE EXIT
2828   REF  60 LAST 679      16,2343   0 5301 0            TC      PHASCHNG
2829                         16,2344   04021 0            OCT     04021

2830   REF 152 LAST 680      16,2345   0 6006 1   COPY40.9 TC      INTPRET
2831                         16,2346   77745 1            DLOAD
2832   REF   4 LAST 680      16,2347   03474 0                    TNIT
2833   REF   3 LAST 680      16,2350   27476 1            STOVL   TNITPREV
2834   REF  16 LAST 680      16,2351   03612 1                    VIPRIME
2835   REF   3 LAST 680      16,2352   03466 0            STORE   VRPREV
2836                         16,2353   77414 0            CLEAR   EXIT
2837   REF   4 LAST 680      16,2354   01270 0                    FIRSTFLG
2838   REF  81 LAST 657      16,2355   4 4712 0    -2      CS      ONE
2839   REF   8 LAST 679      16,2356   55«746 1            TS      NBRCYCLS
2840   REF  61 LAST 680      16,2357   0 5301 0   ENDS40.9 TC      PHASCHNG
2841                         16,2360   00001 0            OCT     00001
```

NOTE   NO TEST IS MADE TO SUBTRACT GOBL
INSIDE 165-195 DEGREE CONE AREA.

C, JOB BELOW

REDO40.9 (RESTART) ENTRY TO END S40.9

2842	REP	89	LAST	664	16,2361	1 5112 1		TCP	ENDOFJOB

28421	REP	153	LAST	680	16,2362	0 6006 1	REDO40.9	TC	INTPRET
28422					16,2363	77775 1		VLOAD	
28423	REP	3	LAST	679	16,2364	11456 0			LO6ZEROS
28424	REP	6	LAST	656	16,2365	17351 0		STODL	DELVSUM
28425	REP	4	LAST	681	16,2366	11456 0			LO6ZEROS
28426	REP	9	LAST	680	16,2367	27347 1		STOVL	NBRCYCLS
284262	REP	5	LAST	676	16,2370	03721 0			VGPREV
284264	REP	4	LAST	680	16,2371	03646 0		STORE	VGTEMP
28427					16,2372	77776 1		EXIT	
28428	REP	1			16,2373	1 2355 1		TCP	ENDS40.9 -2

S40.9 RESTARTS COME HERE TO GRACEFULLY
TERMINATE S40.9 SO THAT IT CAN BE
SET UP WITH LATEST R,V,T NEXT PASS
(TYPE C PHASE POINTS =04021= WILL
FORCE NORMAL S40.9 TERMINATIONS,
RATHER THAN LOSE TIME OF BRAND NEW
PASS -- QUICK OLD DATA BETTER THAN
NONE) NOW CAN GO THRU SETUP.9
WITHOUT DISTURBING VGPREV
STORE 0,0 COVERED NBRCYCLS,P -- FIX UP S

2843					16,2374	01440 0	200CSHI	2DEC	200 B-12
2843					16,2375	00000 1			
2844					16,2376	55340 0	EARTHMU	2DEC*	-3.986032 E10 B-36*
2844					16,2377	61710 0			
2845					16,2400	04000 0	EP4(45)L	2DEC	.125
2845					16,2401	00000 1			
2846					16,2402	00707 1	EP4(10)L	2DEC	.027777777
2846					16,2403	03434 1			

P2847	NAME		S40.13 - TIMEBURN						
R2848	FUNCTION		(1) DETERMINE WHETHER A GIVEN COMBINATION OF VELOCITY-TO-						
R2849			BE-GAINED AND ENGINE CHOICE RESULT IN A BURN TIME SUFFICIENT						
R2850			TO ALLOW STEERING AT THE VEHICLE DURING THE BURN, AND						
R2851			(2) THE MAGNITUDE OF RESULTING BURN TIME - IF IT IS SHORT -						
R2852			AND THE ASSOCIATED TIME OF THE ENGINE-OFF SIGNAL.						
R2853	CALLING SEQ		VIA PINDVAC AS NEW JOB.						
R2854	INPUT		VGTIG - VELOCITY TO BE GAINED VECTOR (METERS/C.S.) AT +7						
R2855			WEIGHT/G - MASS OF VEHICLE IN KGM AT TIG						
R2856			F - ENGINE THRUST IN M.NEWTONS AT +7						
R2857			MDOT - RATE OF DECREASE OF VEHICLE MASS DURING ENGINE BURN						
R2858			IN KILOGRAMS/CENTISECOND AT +3. THIS SCALING MAY						
R2859			REQUIRE MODIFICATION FOR SATURN BURNS.						
R2860	OUTPUT		IMPULSW - ZERO FOR STEERING						
R2861			- ONE FOR ATTITUDE HOLD						
R2862			TGO - TIME TO BURN IN CENTISECONDS AT +14						
R2863			THE QUANTITY M.NEWTON SHALL BE USED TO EXPRESS WEIGHT IN TERMS OF						
R2864			(KILOGRAM*METER)/(CENTISECOND*CENTISECOND)						
R2865			(1) M.NEWTON = (10000) NEWTONS						

2866	REF	17	LAST	677	E7,1427			EBANK=	TGO
2867	REF	1						COUNT	16/40.13
2868	REF	154	LAST	681	16,2404	0 6006 1	S40.13	TC	INTPRET
2869					16,2405	43001 1		SETPD	SET
2870					16,2406	00001 0			00D
2871	REF	4	LAST	677	16,2407	01066 0			IMPULSW
2872					16,2410	51575 1		VLOAD	ABVAL
2873	REF	12	LAST	669	16,2411	03721 0			VGTIG
2874					16,2412	77776 1		EXIT	
2875	REF	37	LAST	654	16,2413	3 4704 0		CAF	BIT7
2876					16,2414	0 0006 1		EXTEND	
2877	REF	4	LAST	583	16,2415	06 031 0		RXOR	CHAN31
2878	REF	38	LAST	682	16,2416	7 4704 1		MASK	BIT7
2879					16,2417	0 0006 1		EXTEND	
2880	REF	1			16,2420	1 2502 0		BZF	NOTADDUL
2881	REF	155	LAST	682	16,2421	0 6006 1		TC	INTPRET
2882					16,2422	56325 0		PDDL	DDV
2883	REF	1			16,2423	36027 1			S40.135
2884	REF	4	LAST	669	16,2424	03076 0			WEIGHT/G
2885					16,2425	72414 0		BON	SL1
2886	REF	2	LAST	644	16,2426	00700 0			NJETSFLG
2887	REF	1			16,2427	34430 1			S40.130
2888					16,2430	77621 1	S40.130	BDSU	
2889					16,2431	56325 0		PDDL	DDV
2890	REF	1			16,2432	36013 0			K1VAL
2891	REF	5	LAST	682	16,2433	03076 0			WEIGHT/G
2892					16,2434	50021 1		BDSU	BMN
2893					16,2435	00001 0			00D
2894	REF	1			16,2436	34461 0			S40.131
2895					16,2437	41325 0		PDDL	DMP

ASSUME NO STEERING UNTIL FOUND OTHERWISE

VELOCITY TO BE GAINED AT +7

TEST +X TRANSLATION

00D = MAG OF VGTIG AT +7
COMPENSATION FOR 2 JET ULLAGE AT +24
MASS IN KGMS AT +16
DOUBLE CORRECTION IF FOUR JETS

00D = MAG OF VGTIG CORRECTED FOR ULLAGE
M.NEWTON-CS AT +24

TGO LESS THAN 100 CS
02D = TEMP1 AT +7

2896	REP	2	LAST	654	16,2440	00111 0			EMDOT	SPS FLOW RATE SC.AT B+3 KG/CS (SP, NOTE)
2900	REP	1			16,2441	36023 0			3.5SEC	350 CS AT +14
2901					16,2442	65221 0		BDSU	PDDL	
2902	REP	6	LAST	682	16,2443	03076 0			WEIGHT/G	
2903	REP	5	LAST	669	16,2444	03727 0			P	P AT +7
2904					16,2445	60405 0		DMP	SR2	
2905	REP	1			16,2446	36025 0			5SECOND	500 CS AT +14
2906					16,2447	41471 0		DDV	PUSH	04D = TEMP2
2907					16,2450	51021 0		BDSU	BPL	
2908					16,2451	00003 1			02D	
2909	REP	1			16,2452	34475 0			S40.133	TGO GREATER THAN 600 CS
2910					16,2453	55345 0		DLOAD	BDDV	
2911					16,2454	43205 1		DMP	DAD	
2912	REP	2	LAST	683	16,2455	36025 0			5SECOND	500 CS AT +14
2913	REP	1			16,2456	36021 1			1SEC2D	100 CS AT +14
2914					16,2457	77650 1		GOTO		
2915	REP	1			16,2460	34466 1			S40.132	
2916					16,2461	41345 0	S40.131	DLOAD	DMP	TGO LESS THAN 100 CS
2917	REP	7	LAST	683	16,2462	03076 0			WEIGHT/G	
2918					16,2463	56215 1		DAD	DDV	
2919	REP	1			16,2464	36015 0			K2VAL	M.NEWTON-CS AT +24
2920	REP	1			16,2465	36017 1			K3VAL	M.NEWTONS AT +10
2921					16,2466	77776 1	S40.132	EXIT		
2922	REP	18	LAST	682	E7,1427				EBANK= TGO	
2923	REP	7	LAST	347	16,2467	0 7226 0		TC	TPAGREE	
2924	REP	271	LAST	657	16,2470	3 0154 1		CA	MPAC	
2925	REP	67	LAST	657	16,2471	56 001 0		XCH	L	
2926	REP	136	LAST	678	16,2472	3 4714 1		CA	ZERO	
2927	REP	19	LAST	683	16,2473	53«430 0		DXCH	TGO	TGO IN CS AT +28
2928	REP	1			16,2474	0 2477 1		TC	S40.134	
2929					16,2475	77414 0	S40.133	CLEAR	EXIT	WILL STEER VEHICLE
2930	REP	5	LAST	682	16,2476	01266 1			IMPULSW	
2931	REP	62	LAST	680	16,2477	0 5301 0	S40.134	TC	PHASCHNG	KILL GROUP 3
2932					16,2500	00003 1		OCT	3	
2933	REP	90	LAST	681	16,2501	1 5112 1		TCF	ENDOFJOB	
2934	REP	156	LAST	682	16,2502	0 6006 1	NOTADDUL	TC	INTPRET	
2935					16,2503	77650 1		GOTO		
2936	REP	2	LAST	682	16,2504	34431 1			S40.130 +1	DO NOT COMPENSATE FOR 7 SEC OF ULLAGE
2937	REP	2	LAST	677	17,2000			SETLOC	DAPS7	
2938					17,2012			BANK		
2939	REP	1						COUNT	17/40.13	
2940					17,2012	00001 0	K1VAL	2DEC	884.52887 B-23	19885 LB-SEC, SC.AT B+23 NEWTON-SEC/E+2
2940					17,2013	27221 0				
2941					17,2014	00000 1	K2VAL	2DEC	293.137805 B-23	6590 LB-SEC, SC.AT B+23 NEWTON-SEC/E+2
2941					17,2015	22244 0				

2942	17,2016	00570 0	K3VAL	2DEC	11.7766668 B-9	26475 LBS, SC.AT B+9 NEWTONS/E+4
2942	17,2017	33235 0				
2943	17,2020	00144 0	1SEC2D	2DEC	100.0 B-14	100.0 CS AT +14
2943	17,2021	00000 1				
2944	17,2022	01274 1	3.5SEC	2DEC	350.0 B-13	350.0 CS AT +13
2944	17,2023	00000 1				
2945	17,2024	00764 1	5SECOND	2DEC	500.0 B-14	500 CS AT +14
2945	17,2025	00000 1				
2946	17,2026	00000 1	S40.135	2DEC	69.6005183 B-23	IMPULSE FROM 7.96 SECS OF 2-JET FIRING
2946	17,2027	04263 1				
A294602						
A294603						7.96(199.6)COS(10) LB-SEC, SC.AT
A294604						B+23 NEWTON-SEC/E+2 (7 SEC ULLAGE
						TO GO, PLUS 0.96 SEC FROM PIPTIME)

P2947   NAME   S40.6 GIMBAL DRIVE TEST AND/OR GIMBAL TRIM
R2948   MOD NO 5   DATE 9 MARCH, 1967
R2949   MOD BY   ENGEL   LOG SECTION P40-P47
R2950   FUNCTIONAL DESCRIPTION
R2951   GIMBAL DRIVE TEST....0,+2,-2,0 DEGREE ENGINE COMMANDS, AT 2 SECOND
R2952   INTERVALS, FIRST IN PITCH, THEN IN YAW. ASTRONAUT VERIFICATION
R2953   OF GIMBAL MOTION ON GPI
R2954   GIMBAL TRIM....AFTER A 4 SECOND DELAY,ENGINE COMMANDED TO
R2955   PRE-COMPUTED TRIM POSITION. ASTRONAUT VERIFICATION ON GPI.
R2956   PRE40.6....RESTART ENTRY TO RE-DO S40.6, ONLY IF RCS IS ON - IF TVC
R2957   IS NOT ON - PRIMARILY TO GET ACTUATORS TRIMMED FOR IGNITION.
R2958   BYPASS 4 SEC DELAY. SPEED IS CRITICAL NEAR IGNITION.
R2959   IF TVC IS ON (TVCDAPON OR LATER) THEN REDOTVC WILL TAKE CARE
R2960   OF RESTARTING ACTUATORS.
R2961   CALLING SEQUENCE....
R2962   WAITLIST, WITH 2CADR FOR S40.6 (OR PRE40.6), WITH EBANK= CNTR
R2963   NORMAL EXIT MODE - FIXDELAY, TASKOVER
R2964   SUBROUTINES CALLED....
R2965   OUTPUT (INTERNAL)
R2966   FIXDELAY
R2967   ALARM OR ABORT EXIT MODES - NONE
R2968   ERASEABLE INITIALIZATION REQUIRED
R2969   CNTR = +0, NORMALLY SET BY THE P40 CALL AT TST,TRIM
R2970   MRKRTMP...POSITIVE FOR GIMBAL DRIVE TEST AND GIMBAL TRIM (BOTH)
R2971   NEGATIVE FOR GIMBAL TRIM ONLY
R2972   PACTOFF, YACTOFF SC AT 85.41 ARCSEC/BIT (V48N48 P,YTRIM)
R2973   ..SC CONT.. SWITCH AT ..CMC.. (A/P CONTROL SWITCH AT ..GNC..)
R2974   ACTIVE SPS GIMBAL MOTOR POWER(S), PITCH, YAW
R2975   OUTPUT
R2976   TVCYAW, TVCPITCH (BITS RELEASED)
R2977   TVC ENABLE AND OPTICS ERROR COUNTER ENABLE
R2978   DEBRIS
R2979   TEMPR60, CNTR
R2980

2981					17,2030			BANK	17	
2982	REF	2	LAST	677	20,2000			SETLOC	DAPS6	
2983					20,2040			BANK		
2984	REF	4	LAST	677	E6,1447			EBANK=	CNTR	
2985	REF	1						COUNT	20/S40.6	
2986	REF	22	LAST	653	20,2040 4 0102 0	PRE40.6	CS	FLAGWRD6	RESTART ENTRY TO S40.6 (DO NOT PERMIT
2987	REF	11	LAST	652	20,2041 7 4105 0		MASK	OCT60000	IF TVC, BITS 15,Y4 = 1,0)
2988					20,2042 0 0006 1		EXTEND			
2989					20,2043 6 2045 1		BZMF	+2		
29892	REF	38	LAST	665	20,2044 1 5213 0		TCF	TASKOVER	TVC, REDOTVC WILL REESTABLISH INTERFACE
2990	REF	48	LAST	676	20,2045 4 4712 0		CS	BIT1	RCS, SO DO S40.6, GIMTRIM ONLY

L   P40-P47

2991	REF	3	LAST	641	20,2046	55«445 1		TS	MRKRTMP	
2992	REF	49	LAST	685	20,2047	3 4712 1		CAF	BIT$_1$	FOR REVISED S40.6 TIMING FOR RESTARTS...
2993	REF	5	LAST	685	20,2050	55«447 0		TS	CNTR	TO INDICATE A RESTART ENTRY (CNTR IS
A2994										NORMALLY +0, BY S40.6)
29945	REF	6	LAST	686	E6,1447			EBANK=	CNTR	
2995	REF	137	LAST	683	20,2051	4 4714 0	S40.6	CS	ZERO	
2996	REF	24	LAST	655	20,2052	55«303 1		TS	OPTIND	INHIBIT OPTICS ACTIVITY
2997	REF	27	LAST	647	20,2053	4 4711 0		CS	BIT$_2$	
2998					20,2054	0 0006 1		EXTEND		DISENABLE OPTICS ERROR COUNTERS (ZERO,
2999	REF	27	LAST	655	20,2055	03 012 1		WAND	CHAN$_{12}$	AND INHIBIT PULSE TRANSMISSION -
										NORMAL STATE)
3000	REF	1			20,2056	3 2143 0		CAF	OCT02200	TVC ENABLE (SPS SERVO AMPS SEE DAC
3001					20,2057	0 0006 1		EXTEND		VOLTAGES) AND DISENGAGE OPTICS/DAC
3002	REF	28	LAST	686	20,2060	05 012 1		WOR	CHAN$_{12}$	
3003	REF	8	LAST	665	20,2061	0 5156 0		TC	FIXDELAY	60MS PROCEDURAL DELAY (40MS MINIMUM) FOR
3004					20,2062	00006 1		DEC	6	RELAY LATCHING
3005	REF	28	LAST	686	20,2063	3 4711 1		CAF	BIT$_2$	ENABLE OPTICS ERROR COUNTERS
3006					20,2064	0 0006 1		EXTEND		
3007	REF	29	LAST	686	20,2065	05 012 1		WOR	CHAN$_{12}$	
3008	REF	9	LAST	686	20,2066	0 5156 0		TC	FIXDELAY	20MS PROCEDURAL DELAY (4MS MINIMUM) FOR
3009					20,2067	00002 0		DEC	2	RELAY LATCHING
3010	REF	7	LAST	686	20,2070	11«447 0	RSTRTST	CCS	CNTR	CHECK FOR RESTART ENTRY (PRE40.6)
3011	REF	1			20,2071	1 2131 1		TCF	GIMTRIM +2	RESTART ENTRY....BYPASS 4 SECOND DELAY
A3012										TST,TRIM SETS +0 ON NORMAL ENTRY
3013	REF	4	LAST	686	20,2072	31«445 0		CAE	MRKRTMP	CHECK FOR TEST/TRIM OR TRIM ONLY
3014	REF	8	LAST	686	20,2073	55«447 0		TS	CNTR	MRKRTMP SAVES CNTR FOR RESTARTS
3015					20,2074	0 0006 1		EXTEND		
3016	REF	2	LAST	686	20,2075	6 2127 1		BZMF	GIMTRIM	(TRIM ONLY)
3017	REF	138	LAST	686	20,2076	4 4714 0	GDTSETUP	CS	ZERO	GIMBAL DRIVE TEST SETUP, FOR PITCH
3018	REF	9	LAST	686	20,2077	55«447 0		TS	CNTR	
3019	REF	1			20,2100	3 2145 0	GIMDTEST	CAF	+2ACTDEG	GIMBAL DRIVE TEST, 1ST INCREMENT
3020	REF	1			20,2101	0 2114 1		TC	OUTPUT	(LEAVES GIMBAL AT +2 DEG)
3021	REF	1			20,2102	3 2144 1		CAF	-4ACTDEG	2ND INCREMENT (LEAVES GIMBAL AT -2)
3022	REF	2	LAST	686	20,2103	0 2114 1		TC	OUTPUT	
3023	REF	2	LAST	686	20,2104	3 2145 0		CAF	+2ACTDEG	3RD INCREMENT (LEAVES GIMBAL AT -0)
3024	REF	3	LAST	686	20,2105	0 2114 1		TC	OUTPUT	
3025	REF	10	LAST	686	20,2106	4 1447 0		CS	CNTR	CHECK FOR COMPLETION OF YAW TEST

L   P40-P47

3026	REF 157	LAST	676	20,2107	10 000 0		CCS	A	COMPLETED, GO TO GIMBAL TRIM ROUTINE
3027	REF 3	LAST	686	20,2110	1 2127 0		TCF	GIMTRIM	
3028	REF 50	LAST	686	20,2111	4 4712 0		CS	BIT1	SET UP YAW TEST
3029	REF 11	LAST	686	20,2112	55=447 0		TS	CNTR	
3030	REF 1			20,2113	1 2100 0		TCF	GIMDTEST	FOR YAW TEST
3031				20,2114	0 0006 1	OUTPUT	EXTEND		OUTPUT THE INCREMENT....SAVE Q
3032	REF 4	LAST	384	20,2115	23=146 0		QXCH	TEMPR60	
3033	REF 12	LAST	687	20,2116	51=447 1		INDEX	CNTR	
3034	REF 1			20,2117	54 054 1		TS	TVCPITCH	
3035	REF 13	LAST	687	20,2120	51=447 1		INDEX	CNTR	
3036	REF 21	LAST	659	20,2121	3 4700 1		CAF	BIT11	
3037				20,2122	0 0006 1		EXTEND		
3038	REF 5	LAST	179	20,2123	05 014 1		WOR	CHAN14	
3039	REF 10	LAST	686	20,2124	0 5156 0		TC	FIXDELAY	WAIT 2SEC, WHILE ASTRONAUT VERIFIES
3040				20,2125	00310 0		DEC	200	GIMBAL MOTION ON GPI
3041	REF 5	LAST	687	20,2126	0 1146 0		TC	TEMPR60	
3042	REF 11	LAST	687	20,2127	0 5156 0	GIMTRIM	TC	FIXDELAY	WAIT 4 SECONDS BEFORE GIMBAL TRIM
3043				20,2130	00620 0		DEC	400	
3044	REF 139	LAST	686	20,2131	4 4714 0	+2	CS	ZERO	PICK UP TRIM VALUES AND OUTPUT THEM
3045	REF 14	LAST	671	20,2132	6 1425 0		AD	PACTOFF	(AVOID +0) ENTRY POINT FROM RSTRTST
3046	REF 2	LAST	687	20,2133	54 054 1		TS	TVCPITCH	ON A RESTART, TO AVOID 4SEC DELAY
3047	REF 140	LAST	687	20,2134	4 4714 0		CS	ZERO	
3048	REF 4	LAST	671	20,2135	6 1426 0		AD	YACTOFF	
3049	REF 1			20,2136	54 053 0		TS	TVCYAW	
3050	REF 2	LAST	165	20,2137	3 4755 1		CAF	PRIO6	RELEASE THE COUNTERS, BITS 11,12
3051				20,2140	0 0006 1		EXTEND		
3052	REF 6	LAST	687	20,2141	05 014 1		WOR	CHAN14	
3053	REF 39	LAST	685	20,2142	1 5213 0	ENDS40.6	TCF	TASKOVER	
30535				20,2143	02200 1	OCT02200	OCT	02200	BITS 8,11 FOR CHANNEL 12 TVC/OPTICS
3054				20,2144	77527 1	-4ACTDEG	DEC	-168	-2(+2ACTDEG), WHOLE BITS, NO ROUNDUP
3055				20,2145	00124 0	+2ACTDEG	DEC	+84	+2 DEG, SC.AT 85.41 ARCSEC/BIT (+84D)

R3056 CALLED BY ..DONOUN46.. (VERB 48), OR DIRECTLY BY ..FRESHDAP.. (RCS DAP) VIA IBNKCALL

| 3058 | REF   1 | | | | | | COUNT | 20/S41.2 |

| 3059 | REF 52 | LAST | 676 | 20,2146 | 3 1466 1 | S41.2 | CA | DAPDATR1 |

3060	REF	22	LAST	652	20,2147	7 6214	1		MASK	THREE	
3061	REF	158	LAST	687	20,2150	6 0000	1		AD	A	
3062	REF	4	LAST	409	20,2151	55«130	0		TS	RATEINDX	
3063					20,2152	0 0004	0		INHINT		
3064	REF	53	LAST	687	20,2153	31«466	1		CAE	DAPDATR1	IS LEM ATTACHED (BITS 14,13 OF DAPDATR1
3065	REF	10	LAST	647	20,2154	7 4371	1		MASK	PRIO30	=10)
3066	REF	1			20,2155	6 7705	1		AD	-BIT14	(OCT57777)
3067					20,2156	0 0006	1		EXTEND		
3068	REF	1			20,2157	1 2164	1		BZF	TOGETHER	YES
3069	REF	29	LAST	686	20,2160	4 4711	0		CS	BIT2	NO, UNSET FLAG
3070	REF	13	LAST	665	20,2161	7 0103	1		MASK	FLAGWRD7	
3071	REF	14	LAST	688	20,2162	54 103	1		TS	FLAGWRD7	
3072					20,2163	1 2167	1		TCF	+4	
3073	REF	15	LAST	688	20,2164	4 0103	1	TOGETHER	CS	FLAGWRD7	ATTACHED, SET FLAG FOR INTEGRATION
3074	REF	30	LAST	688	20,2165	7 4711	0		MASK	BIT2	
3075	REF	16	LAST	688	20,2166	26 103	1		ADS	FLAGWRD7	
3076					20,2167	0 0003	1		RELINT		
3077	REF	54	LAST	688	20,2170	3 1466	1		CA	DAPDATR1	
3078	REF	28	LAST	643	20,2171	7 4707	1		MASK	BIT4	
3079					20,2172	0 0006	1		EXTEND		
3080					20,2173	6 2175	0		BZMF	+2	DEC 46 MEANS NARROW DB
3081	REF	1			20,2174	3 2275	0		CA	DEC409	
3082	REF	1			20,2175	6 2276	0		AD	DEC46	DEC 455 MEANS WIDE DB
3083	REF	4	LAST	643	20,2176	55«655	1		TS	ADB	
3084	REF	55	LAST	688	20,2177	3 1466	1		CA	DAPDATR1	
3085	REF	39	LAST	682	20,2200	7 4704	1		MASK	BIT7	QUAD BD
3086					20,2201	0 0006	1		EXTEND		
3087					20,2202	6 2204	0		BZMF	+2	
3088	REF	82	LAST	680	20,2203	3 4712	1		CA	ONE	
3089	REF	2	LAST	107	20,2204	55«631	0		TS	XTRANS	
3090	REF	56	LAST	688	20,2205	3 1466	1		CA	DAPDATR1	
3091	REF	27	LAST	418	20,2206	7 4701	1		MASK	BIT10	QUAD AC
3092					20,2207	0 0006	1		EXTEND		
3093					20,2210	6 2212	1		BZMF	+2	
3094	REF	83	LAST	688	20,2211	4 4712	0		CS	ONE	
3095	REF	3	LAST	688	20,2212	27«631	0		ADS	XTRANS	
3096					20,2213	0 0004	0		INHINT		
3097					20,2214	0 0006	1		EXTEND		
3098					20,2215	1 2222	0		BZF	+5	CLEAR NJETSFLG (4 JETS, OR NO JETS)
3099	REF	15	LAST	584	20,2216	4 0075	1		CS	FLAGWRD1	SET NJETSFLG (2 JETS, AC OR BD QUADS)
3100	REF	33	LAST	654	20,2217	7 4674	1		MASK	BIT15	NJETSFLG = 1 FOR 2 JET ULLAGE (AC OR BD)
3101	REF	16	LAST	688	20,2220	26 075	1		ADS	FLAGWRD1	

3102					20,2221	1 2225 1	TCP	+4	
3103	REF	34	LAST	688	20,2222	4 4674 1	CS	BIT15	NJETSFLG = 0 FOR 4 JET (OR 0 JET) ULLAGE
3104	REF	17	LAST	688	20,2223	7 0075 1	MASK	FLAGWRD1	
3105	REF	18	LAST	689	20,2224	54 075 1	TS	FLAGWRD1	
3106					20,2225	0 0003 1	RELINT		
3107	REF	2	LAST	274	20,2226	3 1467 0	CA	DAPDATR2	
3108	REF	30	LAST	665	20,2227	7 4676 0	MASK	BIT13	
3109					20,2230	0 0006 1	EXTEND		
3110					20,2231	6 2233 1	BZMF	+2	
3111					20,2232	1 2234 1	TCF	+2	
3112	REF	84	LAST	688	20,2233	4 4712 0	CS	ONE	
3113					20,2234	4 0000 0	COM		
3114	REF	2	LAST	107	20,2235	55∝630 1	TS	ACORBD	MINUS FOR A-C, PLUS FOR B-D
3115	REF	3	LAST	689	20,2236	3 1467 0	CA	DAPDATR2	
3116	REF	28	LAST	688	20,2237	7 4701 1	MASK	BIT10	
3117	REF	159	LAST	688	20,2240	10 000 0	CCS	A	
3118					20,2241	1 2245 1	TCP	+4	
3119	REF	85	LAST	689	20,2242	3 4712 1	CA	ONE	
3120	REF	2	LAST	107	20,2243	55∝626 0	TS	RACFAIL	
3121	REF	1			20,2244	1 2255 0	TCF	BDFAIL	
3122	REF	141	LAST	687	20,2245	3 4714 1	CA	ZERO	
3123	REF	3	LAST	689	20,2246	55∝626 0	TS	RACFAIL	
3124	REF	4	LAST	689	20,2247	3 1467 0	CA	DAPDATR2	
3125	REF	29	LAST	688	20,2250	7 4707 1	MASK	BIT4	
3126	REF	160	LAST	689	20,2251	10 000 0	CCS	A	
3127	REF	2	LAST	689	20,2252	1 2255 0	TCF	BDFAIL	
3128	REF	86	LAST	689	20,2253	4 4712 0	CS	ONE	
3129	REF	4	LAST	689	20,2254	55∝626 0	TS	RACFAIL	
3130	REF	5	LAST	689	20,2255	3 1467 0	BDFAIL	CA	DAPDATR2
3131	REF	40	LAST	688	20,2256	7 4704 1	MASK	BIT7	
3132	REF	161	LAST	689	20,2257	10 000 0	CCS	A	
3133					20,2260	1 2284 1	TCP	+4	
3134	REF	87	LAST	689	20,2261	3 4712 1	CA	ONE	
3135	REF	2	LAST	107	20,2262	55∝627 1	TS	RBDFAIL	
3136	REF	165	LAST	662	20,2263	0 0002 0	TC	Q	
3137	REF	142	LAST	689	20,2264	3 4714 1	CA	ZERO	
3138	REF	3	LAST	689	20,2265	55∝627 1	TS	RBDFAIL	
3139	REF	6	LAST	689	20,2266	3 1467 0	CA	DAPDATR2	
3140	REF	51	LAST	687	20,2267	7 4712 0	MASK	BIT1	
3141	REF	162	LAST	689	20,2270	10 000 0	CCS	A	
3142	REF	166	LAST	689	20,2271	0 0002 0	TC	Q	
3143	REF	88	LAST	689	20,2272	4 4712 0	CS	ONE	
3144	REF	4	LAST	689	20,2273	55∝627 1	TS	RBDFAIL	
3145	REF	167	LAST	689	20,2274	0 0002 0	TC	Q	
R3146	DAPFIG ENTRY VIA TC POSTJUMP AS JOB FROM ..STABLISH.. (VERB 46)								
3147					42,3521		BANK	42	
3148	REF	2	LAST	247	42,2000		SETLOC	EXTVBS	

3149				42,3521			BANK	
3150	REF	25	LAST	665	42,3521	4 4702 1	DAPFIG	CS	BIT_9
3151					42,3522	0 0006 1		EXTEND	
3152	REF	30	LAST	686	42,3523	03 012 1		WAND	$CHAN_{12}$
3153	REF	57	LAST	688	42,3524	31∞466 1		CAE	$DAPDATR_1$
3154					42,3525	0 0006 1		EXTEND	
3155	REF	23	LAST	645	42,3526	7 4710 1		MP	BIT_3
3156	REF	23	LAST	688	42,3527	7 6214 1		MASK	THREE
3157	REF	163	LAST	689	42,3530	50 000 1		INDEX	A
3158					42,3531	1 3532 1		TCF	+1
3159	REF	1			42,3532	1 3544 0		TCF	NODAPUP
3160	REF	1			42,3533	1 3537 1		TCF	RCSDAPUP
3161	REF	2	LAST	690	42,3534	1 3537 1		TCF	RCSDAPUP
3162	REF	42	LAST	657	42,3535	0 4574 0		TC	POSTJUMP
3163	REF	1			42,3536	67211 1		CADR	SATSTKON
3164					42,3537	0 0004 0	RCSDAPUP	INHINT	
3165	REF	29	LAST	664	42,3540	0 4633 0		TCR	IBNKCALL
3166	REF	5	LAST	664	42,3541	42010 0		CADR	RCSDAPON
3167					42,3542	0 0003 1		RELINT	
3168	REF	1			42,3543	1 3561 1		TCF	ENDFIG
3169					42,3544	0 0006 1	NODAPUP	EXTEND	
3170	REF	1			42,3545	3 3564 0		DCA	T_5IDLDAP
3171	REF	10	LAST	652	42,3546	53∞313 0		DXCH	T5LOC
3172	REF	44	LAST	664	42,3547	0 5447 0		TC	DOWNFLAG
31725	REF	1			42,3550	00132 1		ADRES	$DAPBIT_1$
3173	REF	45	LAST	690	42,3551	0 5447 0		TC	DOWNFLAG
31732	REF	1			42,3552	00133 0		ADRES	$DAPBIT_2$
31734					42,3553	0 0004 0		INHINT	
31735	REF	30	LAST	690	42,3554	0 4633 0		TC	IBNKCALL
31736	REF	2	LAST	539	42,3555	42616 0		CADR	ZEROJET
31738					42,3556	0 0003 1		RELINT	
3174	REF	52	LAST	689	42,3557	3 4712 1		CAF	BIT_1
3175	REF	6	LAST	586	42,3560	55∞332 0		TS	HOLDFLAG
3176	REF	43	LAST	690	42,3561	0 4574 0	ENDFIG	TC	POSTJUMP
3177	REF	28	LAST	539	42,3562	66121 0		CADR	GOPIN
3178	REF	15	LAST	687	E6,1425			EBANK=	PACTOFF
3179	REF	5	LAST	646	42,3563	03143 1	T_5IDLDAP	2CADR	T5IDLOC
3179					42,3564	12106 0			
3180					17,2030			BANK	17
3181	REF	3	LAST	685	20,2000			SETLOC	DAPS6
3182					20,2275			BANK	
3183					20,2275	00631 0	DEC_{409}	DEC	409
3184					20,2276	00056 1	DEC_{46}	DEC	46
R3185					CALLED BY ..DONOLN47.. (VERB 48), OR DIRECTLY BY ..FRESHDAP.. (RCS DAP)				

Comments (right column):

TURN OFF SIVB TAKEOVER

DETERMINE VEHICLE CONFIGURATION

RIGHT SHIFT 4 OCTAL DIGITS
(IN CASE BIT 15 IS USED)

BRANCH BASED ON CONFIG....

CM.......ACTIVATE NODAP
  CSM......ACTIVATE RCSDAP
  CSM/LEM..ACTIVATE RCSDAP

CALL TO ACTIVATE RCSDAP, AND RETURN

CAME IN VIA V46, GO OUT VIA GOPIN
T5 IDLE FOR NODAP (DONT WORRY ABOUT T)

RESET T5-USAGE FLAGS FOR NODAP
BIT 15 FLAG 6 = 0

BIT 14 FLAG 6 = 0

ZERO JET CHANNELS IN 14 MS AND THEN
LEAVE THE T6 CLOCK DISABLED.

KILL KALCMANU JOB

CAME IN VIA V46, GO OUT VIA GOPIN

3186	REF	1			20,2277	31∝470 0	S40.14	CAE	IXX	RCS ENTRY
3187					20,2300	0 0006 1		EXTEND		
3188	REF	1			20,2301	7 2324 1		MP	CONTONE	
3189	REF	2	LAST	107	20,2302	55∝623 0		TS	J/M	
3190	REF	1			20,2303	3 1471 1		CA	IAVG	
3191					20,2304	0 0006 1		EXTEND		
3192	REF	2	LAST	691	20,2305	7 2324 1		MP	CONTONE	
3193	REF	2	LAST	107	20,2306	55∝624 1		TS	J/M1	
3194	REF	2	LAST	107	20,2307	55∝625 0		TS	J/M2	
3195					20,2310	0 0006 1		EXTEND		
3196	REF	1			20,2311	3 2326 1		DCA	CONTWO	
3197					20,2312	0 0006 1		EXTEND		
3198	REF	2	LAST	691	20,2313	11∝470 1		DV	IXX	
3199	REF	2	LAST	107	20,2314	55∝620 0		TS	KMJ	
3200					20,2315	0 0006 1		EXTEND		
3201	REF	2	LAST	691	20,2316	3 2326 1		DCA	CONTWO	
3202					20,2317	0 0006 1		EXTEND		
3203	REF	2	LAST	691	20,2320	11∝471 0		DV	IAVG	
3204	REF	2	LAST	107	20,2321	55∝621 1		TS	KMJ1	
3205	REF	2	LAST	107	20,2322	55∝622 1		TS	KMJ2	
3206	REF	168	LAST	689	20,2323	0 0002 0		TC	Q	
3207					20,2324	25137 0	CONTONE	DEC	.662034	2PI/M
3208					20,2325	00023 0	CONTWO	2DEC	.00118	
3208					20,2326	12522 1				
3209	REF	1						COUNT	24/TVNG	
3210					31,3215			BANK	31	
3211	REF	3	LAST	670	24,2000			SETLOC	P40S	
3212					24,3677			BANK		
3213					24,3677	37405 1	POS-2.5	OCT	37405	
3214	REF	58	LAST	690	E6,1466			EBANK=	DAPDATR1	
3215	REF	1			24,3700	02000 0	RCSCADR	2CADR	RCSUP	
3215	REF	1			24,3701	42106 0				
3216					24,3702	37704 0	6SECT5	OCT	37704	
3218	REF	1						COUNT	21/RCSUP	
3219					20,2327			BANK	20	
3220	REF	1			21,2000			SETLOC	DAPS3	
3221					21,2000			BANK		
3222	REF	6	LAST	577	21,2000	22 016 0	RCSUP	LXCH	BANKRUPT	

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3223                          21,2001  0 0006 1        EXTEND
3224   REF   6  LAST  577     21,2002  22 012 1        QXCH    QRUPT

3225   REF   6  LAST  690     21,2003  0 2010 1        TCR     RCSDAPON      ACTIVATE RCS DAP

3226   REF  27  LAST  540     21,2004  1 5222 1        TCF     RESUME

3227   REF  59  LAST  691     E6,1466                          BBANK=  DAPDATR1
3228   REF   2  LAST  200     21,2005  02106 1   RCSADDR  2CADR   RCSATT
3228                          21,2006  42106 0
3229                          21,2007  37704 0   0.6SECT5  OCT    37704

A3230
3231   REF   1                21,2010  3 2007 1   RCSDAPON CAF    0.6SECT5      RCSDAPON ENTRY MUST BE UNDER INT-INHIBIT
3232   REF   7  LAST  652     21,2011  54 030 0    +1      TS     TIME5         0.6 SEC ALLOWS TVCEXEC/ROLLDAP TO DIE
3233   REF   1                21,2012  55 465 0            TS     T5PHASE       ENTRY FROM ROOTOPOO
                                                                               WILL CAUSE FRESHDAP (+1)

3234   REF  10  LAST  539     21,2013  4 1501 0            CS     RCSFLAGS      SET BIT3 TO REINITIALIZE FDAI ERROR
3235   REF  24  LAST  690     21,2014  7 4710 1            MASK   BIT3              DISPLAY, IN CASE SC CONT SWITCH
3236   REF  11  LAST  692     21,2015  27 501 0            ADS    RCSFLAGS          IN SCS NOT GNC (GUIDEMODE PRIMARY)

3237                          21,2016  0 0006 1            EXTEND
3238   REF   1                21,2017  3 2006 0            DCA    RCSADDR       (RCSATT)
3239   REF  11  LAST  690     21,2020  53 313 0            DXCH   T5LOC

3240   REF  12  LAST  685     21,2021  4 4105 0            CS     OCT60000      SET BITS 15,14 TO 01 TO INDICATE
3241   REF  23  LAST  685     21,2022  7 0102 0            MASK   FLAGWRD6          T5 TAKEOVER BY RCSDAP
3242   REF  40  LAST  676     21,2023  6 4675 1            AD     BIT14
3243   REF  24  LAST  692     21,2024  54 102 0            TS     FLAGWRD6      KILLS TVCEXEC AND ROLLDAP STARTS

3244   REF 169  LAST  691     21,2025  0 0002 0            TC     Q             RETURN TO CALLER (TVCDAPOF OR RCSDAPUP)
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