

6/11/69

Volume II LM Data Book
Subsystem Performance Data-GN&C

LM5/4.5.1.4 Guidance Computer Erasable Memory Constants (NASA DATA SOURCE)

The following listings pertain to the LM Guidance Computer (LGC) pad loaded erasable memory constants. Mission time computed constants, such as state vectors, etc., are not included.

Table LM5/4.5.1-1 contains a tabular listing of the erasable load, both mission tape parameters and launch tape parameters. The remarks column contains a short description of the use of the constant.

The "Rev" column denotes the number of revisions to the value of the corresponding parameter that have been incorporated in publications of the Apollo 11 erasable load.

(NASA DATA SOURCE)

Table LM5/4.5.1-1 G PRELAUNCH ERASABLE LOAD (LUMINARY 99)

MISSION TAPE

REV	MNEMONIC	ADDRESS	VALUE	SF	OCTAL	REMARKS
	FLAGWORD 3	0077	02000 octal	-	02000	
	FIAGWORD 8	0104	00000 octal	-	00000	
	FLAGWORD 10	0106	00000 octal	-	00000	
**	DUMPCNT	0333	2 dumps	3	10000	
*	E3J22R2M	1352	92.0479047931E15 m ⁵ /cs ²	58	12160	
*	E32C31RM	1353	13.1289255968E22 m ⁶ /cs ²	80	03363	
*	RADSCALE	1354, 1355	0 m/cs	7	00000,00000	
*	SKALSKAL	1356	0	0	00000	
*	GCOMP SW	1477	0	-	00000	
	TERCSM	1570	37777 octal	-	37777	To inhibit initial POO integration

Table LM5/4.5.1-1 G PRELAUNCH ERASABLE LOAD (LUMINARY 99) (Cont)

(NASA DATA SOURCE)

MISSION TAPE

REV	MNEMONIC	ADDRESS	VALUE	SF	OCTAL	REMARKS
	TETLEM	1642	37777 octal		37777	To inhibit initial POO integration
*	X789	1700, 1701	0.0 radians	*	00000, 00000	
*	X789+2	1702, 1703	0.0 radians	*	00000, 00000	
*	X789+4	1704, 1705	0.0 radians	*	00000, 00000	
2	REFSMAT	1733, 1734	0.68020001	1	12704, 06264	rev 2 of mission tape
*	RANGEVAR	1770, 1771	$0.1111111111 \times 10^{-4}$	-12	01351, 24734	
*	RATEVAR	1772, 1773	1.877777×10^{-5}	-12	02354, 04750	
*	RVARMIN	1774	66 m ²	12	00410	
*	VVARMIN	1775	$0.17445 \times 10^{-5} \text{ m}^2/\text{cs}^2$	-12	00165	

*5 for earth; 3 for moon

Table LM5/4.5.1-1 G PRELAUNCH ERASABLE LOAD (LUMINARY 99) (Cont) (NASA DATA SOURCE)

MISSION TAPE

REV	MNEMONIC	ADDRESS	VALUE	SF	OCTAL	REMARKS
*	WRENDPOS	2000	3048 m	14	05750	10,000 ft
*	WRENDVEL	2001	0.03048 m/cs	0	00763	10 ft/sec
*	WSHAFT	2002	0.015 radians	-5	17270	15 m rad
*	WTRUN	2003	0.015 radians	-5	17270	15 m rad
*	RMAX	2004	609.6 m	19	00023	2000 ft
*	VMAX	2005	0.006096 m/cs	7	00001	2 ft/sec
*	WSURFPOS	2006	16000 m	14	37200	
*	WSURFVEL	2007	0.03 m/cs	0	00754	
*	SHAFTVAR	2010	$1 \times 10^{-6} \text{ rad}^2$	-12	00103	1 (m rad)^2
*	TRUNVAR	2011	$1 \times 10^{-6} \text{ rad}^2$	-12	00103	1 (m rad)^2

Table LM5/4.5.1-1 G PRELAUNCH ERASABLE LOAD (LUMINARY 99) (Cont) (NASA DATA SOURCE)

MISSION TAPE

REV	MNEMONIC	ADDRESS	VALUE	SF	OCTAL	REMARKS
*	AGSK	2020,2021	32400000 cs	28	03671,21200	90 hr
*	TLAND	2400,2401	36304920 cs	28	04247,34030	100.847 hrs GET 100:50:49.20 GET
*	RBRFG	2402,2403	52.37530800 m	24	00000,01506	171.835 ft
*	RBRFG+2	2404,2405	0.0 m	24	00000,00000	0.0 ft
*	RBRFG+4	2406,2407	-3254.836061 m	24	77774,72222	-10678.596 ft
*	VBRFG	2410,2411	-0.3227100480 m/cs	10	77772,72612	-105.876 ft/sec
*	VBRFG+2	2412,2413	0.0 m/cs	10	00000,00000	0.0 ft/sec
*	VBRFG+4	2414,2415	-0.0031699200 m/cs	10	77777,76300	-1.040 ft/sec
*	ABRFG	2416,2417	0.000019022568 m/cs ²	-4	00004,37445	0.6241 ft/sec ²
*	ABRFG+2	2420,2421	0.0 m/cs ²	-4	00000,00000	0.0 ft/sec ²

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Table LM5/4.5.1-1 G PRELAUNCH ERASABLE LOAD (LUMINARY 99) (Cont) (NASA DATA SOURCE)

MISSION TAPE

REV	MNEMONIC	ADDRESS	VALUE	SF	OCTAL	REMARKS
*	AERFG+4	2422,2423	-0.000277502112 m/cs ²	-4	77667,50111	-9.1044 ft/sec ²
*	VERFG*	2424,2425	-0.0570585600	13	77777, 74261	-18.72 ft/sec
*	AERFG*	2426,2427	-0.001665012672 m/cs ²	-4	77113,60670	-54.6264 ft/sec ²
*	JERFG*	2430,2431	-0.5738399496 x 10 ⁻⁸ m/cs ³	-21	77472, 72437	-0.01882677 ft/sec ³
*	GAINBRAK	2432, 2433	1.0	0	37777, 37777	1.0
*	TOGFBRAK	2434	3000 cs	17	00567	30 sec
*	TOGIBRAK	2435	90000 cs	17	25762	900 sec
*	RAPFG	2436, 2437	33.85870800 m	24	00000, 01036	111.085 ft
*	RAPFG+2	2440, 2441	0.0 m	24	00000, 00000	0.0 ft
*	RAPFG+4	2442, 2443	-8.166811200 m	24	77777, 77574	-26.794 ft

Table LM5/4.5.1-1 G PRELAUNCH ERASABLE LOAD (LUMINARY 99) (Cont) (NASA DATA SOURCE)

MISSION TAPE

REV	MNEMONIC	ADDRESS	VALUE	SF	OCTAL	REMARKS
*	VAPFG	2444, 2445	-0.0152186640 m/cs	10	77777, 70152	-4.993 ft/sec
*	VAPFG+2	2446, 2447	0.0 m/cs	10	00000, 00000	0.0 ft/sec
*	VAPFG+4	2450, 2451	0.0007559040 m/cs	10	00000, 00306	0.248 ft/sec
*	AAPFG	2452, 2453	-0.07997952 x 10 ⁻⁴ m/cs ²	-4	77775, 74720	-0.2624 ft/sec ²
*	AAPFG+2	2454, 2455	0.0 m/cs ²	-4	00000, 00000	0.0 ft/sec ²
*	AAPFG+4	2456, 2457	-0.1560576 x 10 ⁻⁴ m/cs ²	-4	77773, 75055	-0.5120 ft/sec ²
*	VAPFG*	2460, 2461	0.0136062720 m/cs	13	00000, 00676	4.464 ft/sec
*	AAPFG*	2462, 2463	-0.9363456 x 10 ⁻⁴ m/cs	-4	77747, 56422	-3.072 ft/sec ²
*	JAPFG*	2464, 2465	0.5509930560 x 10 ⁻⁹ m/cs ³	-21	00022, 35646	0.0018077200 ft/sec ³
* 1	GAINAPPR	2466, 2467	0	0	00000, 00000	0

Table LM5/4.5.1-1 G PRELAUNCH ERASABLE LOAD (LUMINARY 99) (Cont) (NASA DATA SOURCE)

MISSION TAPE

REV	MNEMONIC	ADDRESS	VALUE	SF	OCTAL	REMARKS
*	TCGFAPPR	2470	3000 cs	17	00567	30 sec
*	TCGIAPPR	2471	20000 cs	17	04704	200 sec
*	VIGN	2472, 2473	16.90256208 m/cs	10	00416, 16071	5545.46 ft/sec
*	RIGNX	2474, 2475	-39782.453328 m	24	77731, 44630	-130519.86 ft
*	1 RIGNZ	2476, 2477	-436655.657 m	24	77125, 62404	-1432597.3 ft
*	1 KIGNX/B4	2500, 2501	-0.617631	4	76607, 61356	
*	KIGNY/B8	2502, 2503	-2.4770341207 x 10 ⁻⁶ m ⁻¹	-16	72634, 51602	-0.755 x 10 ⁻⁶ ft/ft ²
*	KIGNV/B4	2504, 2505	-41000 cs	18	72775, 57777	-410 sec
*	1 LOWCRIT	2506	2124.4 DPS throttle pulses	14	04114	5985 lbf
*	1 HIGHCRIT	2507	2348.0 DPS throttle pulses	14	04454	6615 lbf

Table LM5/4.5.1-1 G PRELAUNCH ERASABLE LOAD (LUMINARY 99). (Cont) (NASA DATA SOURCE)

MISSION TAPE

REV	MNEMONIC	ADDRESS	VALUE	SF	OCTAL	REMARKS
*	V2FG	2510, 2511	-0.009144 m/cs	10	77777, 73242	-3.0 ft/sec
*	V2FG+2	2512, 2513	0 m/cs	10	00000, 00000	0
*	V2FG+4	2514, 2515	0 m/cs	10	00000, 00000	0
*	TAUVERT	2516, 2517	1000 cs	14	01750	10.0 sec
*	DELQFIX	2520, 2521	60.96 m	24	00000, 01717	200 ft
*	LRALPHA1	2522	0.0163371759 rev	-1	01027	5°52.883'
*	LRBETA1	2523	0.0665287037 rev	-1	04204	23°57.02'
*	LRALPHA2	2524	0.0161680555 rev	-1	01022	5°49.23'
*	LRBETA2	2525	0.0001361111 rev	-1	00004	0°2.94'
*	LRVMAX	2526	6.096 m/cs	7	01414	2,000 ft/sec

stow position
hover position

Table LM5/4.5.1-1 G PRELAUNCH ERASABLE LOAD (LUMINARY 99) (Cont) (NASA DATA SOURCE)

MISSION TAPE

REV	MNEMONIC	ADDRESS	VALUE	SF	OCTAL	REMARKS
*	LRVF	2527	0.6096 m/cs	7	00116	200 ft/sec
*	LRWVZ	2530	0.3	0	11463	
*	LRWVY	2531	0.3	0	11463	
*	LRWVX	2532	0.3	0	11463	
*	LRWVFZ	2533	0.2	0	06315	0.2
*	LRWVFY	2534	0.2	0	06315	0.2
*	LRWVFX	2535	0.2	0	06315	0.2
*	LRWVFF	2536	0.1	0	03146	0.1
*	RODSALE	2537	0.003048 m/cs	-7	14370	1.0 ft/sec
*	TAUROD	2540, 2541	150 cs	9	11300, 00000	1.5 sec

Table LM5/4.5.1-1 G PRELAUNCH ERASABLE LOAD (LUMINARY 99) (Cont) (NASA DATA SOURCE)

MISSION TAPE

REV	MNEMONIC	ADDRESS	VALUE	SF	OCTAL	REMARKS
*	LAG/TAU	2542, 2543	0.413333	0	15164, 01420	0.413333
*	MINFORCE	2544, 2545	0.4359257183 $\frac{\text{kg m}}{\text{cs}^2}$	12	00001, 27631	980.0 lb
*	MAXFORCE	2546, 2547	2.802379618 $\frac{\text{kg m}}{\text{cs}^2}$	12	00013, 06551	6300.0 lbs
*	ABTCOF	2550, 2551	2.4755856 x 10 ⁻¹⁵ m/cs ⁴	-44	01311, 21176	8.122 E-7 ft/sec ⁴
*	ABTCOF+2	2552, 2553	-0.3486912 x 10 ⁻⁹ m/cs ³	-27	76401, 47023	-1.144 E-3 ft/sec ³
*	ABTCOF+4	2554, 2555	0.054059328 x 10 ⁻⁴ m/cs ²	-10	00132, 26223	0.17736 ft/sec ²
*	ABTCOF+6	2556, 2557	17.19675504 m/cs	+7	04231, 05721	5641.98 ft/sec
*	ABTCOF+8	2560, 2561	2.337816 x 10 ⁻¹⁵ m/cs ⁴	-44	01241, 32430	7.670 E-7 ft/sec ⁴
*	ABTCOF+10	2562, 2563	-0.3236976 x 10 ⁻⁹ m/cs ³	-27	76470, 45634	-1.062 E-3 ft/sec ³
*	ABTCOF+12	2564, 2565	0.042065448 x 10 ⁻⁴ m/cs ²	-10	00106, 22276	0.13801 ft/sec ²

} descent

} ascent

Table LM5/4.5.1-1 G PRELAUNCH ERASABLE LOAD (LUMINARY 99) (Cont) (NASA DATA SOURCE)

MISSION TAPE

REV	MNEMONIC	ADDRESS	VALUE	SF	OCTAL	REMARKS
*	ABTCOF+14	2566, 2567	17.20525896 m/cs	+7	04232, 10573	5644.77 ft/sec ascent (cont'd)
*	VMIN	2570, 2571	16.80972 m/cs	7	04147, 24472	5515 ft/sec
*	YLIM	2572, 2573	15186.4 m	24	00016, 32446	8.2 n.mi.
*	ABTRDOT	2574, 2575	0.059436 m/cs	7	00007, 23346	19.5 ft/sec
*	COSTHET1	2576, 2577	0	-8	00000, 00000	
*	COSTHET2	2600, 2601	0.8660254037	+2	06733, 07535	
*	ROLLTIME	3001	2926 cs	14	05556	29.26 sec
*	PITTIME	3002	2329 cs	14	04431	23.29 sec
*	DKTRAP	3003	-0.0038888888 rev/sec	-3	77001	
*	DKOMEGAN	3004	10	14	00012	

Table LM5/4.5.1-1 G PRELAUNCH ERASABLE LOAD (LUMINARY 99) (Cont) (NASA DATA SOURCE)

MISSION TAPE

REV	MNEMONIC	ADDRESS	VALUE	SF	OCTAL	REMARKS
*	DKKAOSN	3005	60	14	00074	
*	LMTRAP	3006	-0.0038888888 rev/sec	-3	77001	
*	LMOMEGAN	3007	0	14	00000	
*	LMKAOSN	3010	60	14	00074	
*	DKDB	3011	256 rev ⁻¹	15	00200	
*	IGNAOSQ	3012	0.0216666667 rev/sec ²	-2	02614	7.8 deg/sec ²
*	IGNAOSR	3013	0.0007694444 rev/sec ²	-2	00062	0.277 deg/sec ²
*	DOWNTORK	3113	0 jet seconds	5	00000	
*	DOWNTORK+1	3114	0 jet seconds	5	00000	
*	DOWNTORK+2	3115	0 jet seconds	5	00000	

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Table LM5/4.5.1-1 G PRELAUNCH ERASABLE LOAD (LUMINARY 99) (Cont) (NASA DATA SOURCE)

MISSION TAPE

REV	MNEMONIC	ADDRESS	VALUE	SF	OCTAL	REMARKS
*	DOWNTORK+3	3116	0 jet seconds	5	00000	
*	DOWNTORK+4	3117	0 jet seconds	5	00000	
*	DOWNTORK+5	3120	0 jet seconds	5	00000	
*	ATIGINC	3400,3401	18000 cs	28	00001,03120	3 min
*	PTIGINC	3402,3403	18000 cs	28	00001,03120	3 min
*	AOTAZ	3404	-0.1668666667 rev	-1	65244	-60.072° (2's comp)
*	AOTAZ+1	3405	-0.0004277778 rev	-1	77762	-0.154° (2's comp)
*	AOTAZ+2	3406	0.1659444444 rev	-1	12476	59.740°
*	AOTAZ+3	3407	0.3332305556 rev	-1	25247	119.963°
*	AOTAZ+4	3410	0.4997944444 rev	-1	37771	179.926°

Table LM5/4.5.1-1 G PRELAUNCH ERASABLE LOAD (LUMINARY 99) (Cont) (NASA DATA SOURCE)

MISSION TAPE

REV	MNEMONIC	ADDRESS	VALUE	SF	OCTAL	REMARKS
	AOTAZ+5	3411	-0.3337527778 rev	-1	52510	-120.151°
	AOTEL	3412	0.1249805556 rev	-1	07777	44.993°
	AOTEL+1	3413	0.1251694444 rev	-1	10006	45.061°
	AOTEL+2	3414	0.1251750000 rev	-1	10006	45.063°
	AOTEL+3	3415	0.1249888889 rev	-1	10000	44.996°
	AOTEL+4	3416	0.1248027778 rev	-1	07772	44.929°
	AOTEL+5	3417	0.1247972222 rev	-1	07771	44.927°
	LRHMAX	3420	15240 m	14	35610	50,000 ft
1	LRWH	3421	0.35	-1	13146	
	ZOOMTIME	3422	2600 cs	14	05050	26 sec

Table LM5/4.5.1-1 G PRELAUNCH ERASABLE LOAD (LUMINARY 99) (Cont) (NASA DATA SOURCE)

MISSION TAPE

REV	MNEMONIC	ADDRESS	VALUE	SF	OCTAL	REMARKS
	TENDBRAK	3423	6200 cs	17	01407	62 sec
	TENDAPPR	3424	1200 cs	17	00226	12 sec
	DELTTFAP	3425	-11000 cs	17	75240	-110.0 sec
	LEADTIME	3426	-220 cs	17	77743	2.2 sec (a negative number for coding ease)
	RPCRTIME	3427	6200 cs	17	01407	62 sec
	RPCRTQSW	3430	-1	+1	57777	
1	TNEWA	3431, 3432	20000,00000 octal	28	20000,00000	A large number (about 2 weeks) to prevent re- cycling the Lambert solution.

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Table LM5/4.5.1-1 G PRELAUNCH ERASABLE LOAD (LUMINARY 99) (Cont) (NASA DATA SOURCE)

LAUNCH TAPE

REV	MNEMONIC	ADDRESS	VALUE	SF	OCTAL	REMARKS
	MASS	1244,1245	15269.7 kg	16	07351, 15463	33664.0 lbs at DOI ignition
**	LEMMASS	1331	15269.7 kg	16	07351	33664.0 lbs at DOI ignition
**	CSMASS	1332	16542.7 kg	16	10050	36470.4 lbs
*	2 PBIASX	1452	0.0065994262 PIPA counts/cs	-5	06604	+0.66 cm/sec ²
*	2 PIPASCFX	1453	-0.0002700090	-9	73446	-270 ppm
*	2 PBIASY	1454	0.0009994506 PIPA counts/cs	-5	01014	+0.10 cm/sec ²
*	2 PIPASCFY	1455	-0.0011500120	-9	55120	-1150 ppm
*	2 PBIASZ	1456	0.0020008087 PIPA counts/cs	-5	02031	+0.20 cm/sec ²
*	2 PIPASCFZ	1457	-0.0006200075	-9	65656	-620 ppm
*	2 NBDX	1460	-0.0003890991 gyro pulses/cs	-5	77463	-1.6 meru

Table LM5/4.5.1-1 G PRELAUNCH ERASABLE LOAD (LUMINARY 99) (Cont) (NASA DATA SOURCE)

LAUNCH TAPE

REV	MNEMONIC	ADDRESS	VALUE	SF	OCTAL	REMARKS
* 2	NBDY	1461	0.0009231567 gyro pulses/ cs	-5	00744	+3.8 meru
* 2	NBDZ	1462	0.0010681152 gyro pulses/ cs	-5	01060	+4.4 meru
* 2	ADIAX	1463	0.0004959106 gyro pulses/ cm sec ²	-5	00404	+10.0 meru/g
* 2	ADIAY	1464	0.0001487731 gyro pulses/cm sec ²	-5	00116	+3.0 meru/g
* 2	ADIAZ	1465	-0.0001487731 gyro pulses/cm sec ²	-5	77661	-3.0 meru/g
* 2	ADSRAX	1466	0.0002975463 gyro pulses/cm sec ²	-5	00234	+6.0 meru/g
* 2	ADSRAY	1467	-0.0002479553 gyro pulses/cm sec ²	-5	77575	-5.0 meru/g
* 2	ADSRAZ	1470	-0.0002479553 gyro pulses/cm sec ²	-5	77575	-5.0 meru/g

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Table LM5/4.5.1-1 G PRELAUNCH ERASABLE LOAD (LUMINARY 99) (Cont) (NASA DATA SOURCE)

LAUNCH TAPE

REV	MNEMONIC	ADDRESS	VALUE	SF	OCTAL	REMARKS
	TEPHEM	1706-1710	134472000 cs	42	00000, 20017 20500	For launch on July 16 at 13:32 GMT in 1969
	AZO	1711, 1712	0.7746616521 rev	0	30624, 01636	
	-AYO	1713, 1714	-0.0000395943	0	77777, 53172	
	AXO	1715, 1716	0.0000421325	0	00000, 26056	
	REFSMMAT+2	1735, 1736	0.67020001	1	12562, 10723	rev 2 of launch tape
	REFSMMAT+4	1737, 1740	0.07161332	1	01112, 25001	TEPHEM for July 16, 13:32 GMT
	504LM	2012, 2113		0	77775, 46355	
	504LM+2	2014, 2015		0	77766, 72372	
	504LM+4	2016, 2017		0	77777, 52552	
	RLS	2022, 2023	1588471.994 m	27	00301, 34760	
	RLS+2	2024, 2025	697547.4954 m	27	00125, 04627	
	RLS+4	2026, 2027	21616.9998 m	27	00002, 24342	
	HIASCENT	3000	5023.6 kg	16	02350	11075.1 lbs

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