Massachusetts Institute of Technology
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Flight 206 Memo # 11

TO: Distribution
FROM: Jay Sampson
DATE: 31 March 1967
SUBJECT: Prelaunch Erasable Memo Load Definition for AS206

Attached is a list of the names, definitions, BURST 116 addresses, units, and scale factors for the AS206 erasable memory data load. Also included are corresponding typical decimal values and their octal equivalents used for Flight 206 digital simulations at MIT/IL, and a list of those erasable memory locations which are initialized by a Fresh Start, but can be overwritten in the erasable memory load if desired.

ERASABLE NAME	DESCRIPTION OF ERASABLE DATA LOAD	ADDRESS	SCALE FACTOR(O)	DECIMAL VALUE		OCTAL LOAD
IMU COMPENSATION						
NBDX	GYRO BIAS DRIFT	1444	2^{-5} (GYRO PULSES/ CENTI-SEC)	DEC -293	(1)	77332
NBDY		1445		DEC -242		77415
NBDZ		1446		DEC 382		00576
ADIAX	ACCELERATION-SENSITIVE GYRO DRIFT ALONG THE INPUT AXIS	1447	2^{-6} (GYRO PULSES/PIPA PULSE)	DEC 286		00436
ADIAY		1450		DEC -832		76277
ADIAZ		1451		DEC 52		00064
ADSRAX	ACCELERATION-SENSITIVE GYRO DRIFT ALONG THE SPIN-REFERENCE AXIS	1452	2^{-6} (GYRO PULSES/PIPA PULSE)	DEC 52		00064
ADSRAY		1453		DEC 78		00116
ADSRAZ		1454		DEC 52		00064
PBIASX	PIPA BIAS FACTOR	1436	2^{-5} (PIPA PULSES/ CENTI-SEC)	DEC 2412		04554
PBIASY		1440		DEC 3353		06433
PBIASZ		1442		DEC -367		77220
PIPASCFX	PIPA SCALE FACTOR	1437	2^{-9} (PIPA COUNTS/PIPA COUNT)	DEC -1426		75155
PIPASCFY		1441		DEC -252		77403
PIPASCFZ		1443		DEC -5285		65532

PRELAUNCH ALIGNMENT AND GUIDANCE REFERENCE RELEASE

PRELMTRX +0D	MATRIX WHICH RELATES STABLE MEMBER INERTIAL FRAME TO VERTICAL, SOUTH, EAST (VSE) EARTH REFERENCE FRAME	2720	HALF-UNIT VECTOR	2DEC +.4330127	(3)	15666	17272
PRELMTRX +2D		2722		2DEC -.132479815		73605	56327
PRELMTRX +4D		2724		2DEC -.212012025		71156	54506
PRELMTRX +6D		2726		2DEC +.25		10000	00000
PRELMTRX +8D		2730		2DEC +.22946177		07257	20033
PRELMTRX +10D		2732		2DEC +.367215597		13600	16566
PRELMTRX +12D		2734		2DEC +.0		00000	00000
PRELMTRX +14D		2736		2DEC -.42402405		62334	71216
PRELMTRX +16D		2740		2DEC +.26495963		10365	03117
AZIMUTH	AZIMUTH OF VEHICLE Z-AXIS EAST OF NORTH	2506	1 REVOLUTION	2DEC -.25	(4)	67777	7777
LATITUDE	LOCAL VERTICAL ASTRONOMICAL LATITUDE LAUNCH PAD 37B	2510	1 REVOLUTION	2DEC +.079255155	(5)	02422	20416
ZSMAZ	DESIRED AZIMUTH OF STABLE MEMBER Z-AXIS EAST OF TRUE NORTH	1751	1 REVOLUTION	2DEC +.088888888	(6)	02660	13301
TILT	ROTATION FROM VERTICAL OF STABLE MEMBER X-AXIS ABOUT Z-AXIS (RIGHT HAND RULE)	1747	1 REVOLUTION	2DEC -.0833333333	(7)	75252	65252
TEPHEM	TRIPLE PRECISION TIME FROM MIDNIGHT JULY 1 OF EPHEMERIS YEAR TO MIDNIGHT G.M.T. OF LAUNCH DAY	1753	2^{42} CENTI-SEC	DEC 8	(8)	00010	
TEPHEM +1		1754	2^{28} CENTI-SEC	2DEC 219876352 B-28		32154	06000
P37BLAT	LOCAL VERTICAL ASTRONOMICAL LATITUDE OF LAUNCH PAD 37B	1760	1 REVOLUTION	2DEC +.079255155	(5)	02422	20416
P37BLONG	LONGITUDE OF LAUNCH PAD 37B	1762	1 REVOLUTION	2DEC +.776208453	(5)	30655	14616
AZO	ANGLE FROM X-Z REFERENCE PLANE (Z ALONG POLAR AXIS, X TOWARD VERNAL EQUINOX) TO GREENWICH MERIDIAN PLANE AT MIDNIGHT JULY 1 OF EPHEMERIS YEAR	1756	1 REVOLUTION	2DEC +.773909	(9)	30607	27147
GLIFTOFF	LIFTOFF DETECTOR ACCELERATION THRESHOLD	1764	2^{4} METER/SEC^{2}	2DEC 10.8 B-4	(10)	25463	06315

RAVEGON	POSITION VECTOR AT GRR IN SM COORDINATES	2114	2^{24} METERS	2DEC +5.514735075 E+6 B-24	12411	17361
RAVEGON +2		2116		2DEC +3.194900363 E+6 B-24	06060	00506
RAVEGON +4		2120		2DEC -1.519853300 E+4 B-24	77761	45026
VAVEGON	VELOCITY VECTOR AT GRR IN SM COORDINATES	2122	2^{7} METERS/ CENTI-SEC	2DEC -1.733975176 E+0 B-7	77442	41505
VAVEGON +2		2124		2DEC +3.003332843 E+0 B-7	00600	15515
VAVEGON +4		2126		2DEC +2.167015833 E+0 B-7	00425	14062
UNITW	POLAR AXIS IN STABLE MEMBER COORDINATES	1040	HALF-UNIT VECTOR	2DEC +0.646434724 B-1	12257	22770
UNITW +2		1042		2DEC -0.164365130 B-1	75275	60525
UNITW +4		1044		2DEC +0.745054529 B-1	13727	17446

MISSION PROGRAM

MASS	INITIAL MASS OF LEM ON GROUND WITH DESCENT STAGE ATTACHED	1320	15 2 KILOGRAMS	2DEC	14209 B-15	(11)	15700	20000
LEMMASS2	INITIAL MASS OF LEM AFTER STAGING HAS OCCURRED	3776	15 2 KILOGRAMS	2DEC	4716 B-15	(12)	04466	00000
DAPBOOLS	DIGITAL AUTOPILOT FLAG WORD	0077	N/A	N/A		(13)	44512	
COUNTBOX	MINIMUM NUMBER OF PASSES THROUGH DAP KALMAN FILTER BEFORE TRIM GIMBAL WILL RELINQUISH CONTROL TO RCS JET CONTROL	3343	14 2	DEC	10	(14)	00012	
DT-LIFT	TIME FROM GRR AT WHICH THE LGC CLOCK IS ZEROED	1742	14 2 CENTI-SEC	DEC	300 B-14	(15)	00454	
DT-LETJT	TIME FROM LIFTOFF TO POST-LET PROGRAM	1743	28 2 CENTI-SEC	2DEC	14500 B-28		00000	34244
RINJECT	MP4 DESIRED INJECTION RADIUS	3435	25 2 METERS	2DEC	6.536510991 E+6 B-25		06167	24770
VINJECT	MP4 DESIRED INJECTION VELOCITY	3437	7 2 M/CS	2DEC	7.828002764 E+1 B-7		23443	32775
VTO-DPS	MP4 PREDICTED TAILOFF VELOCITY	3571	7 2 M/CS	2DEC	.022 B-7	(16)	00002	32071
RP	MP9 DESIRED APOGEE RADIUS	2354	24 2 METERS	2DEC	6.70316160 E+6 B-24		14622	01632
VTAILOFF	MP9 PREDICTED TAILOFF VELOCITY	3573	7 2 M/CS	2DEC	.00255 B-7		00000	12344
CPT6/2	MP11 NORMAL TO DESIRED ORBITAL PLANE IN STABLE MEMBER COORDINATES	2356	HALF-UNIT VECTOR	2DEC	+.5685552786 B-1		11061	23266
CPT6/2 +2		2360		2DEC	-.6172949954 B-1		66077	43643
CPT6/2 +4		2362		2DEC	+.5437754927 B-1		10546	23367
DAPOFFDT	TIME FROM TIG+26 IN MP11 TO DAP TURN-OFF	1345	14 2 CENTI-SEC	DEC	16200	(17)	37510	
R1VEC	MP13 POSITION VECTOR OF DESIRED INTERCEPT POINT IN STABLE MEMBER COORDINATES	2364	25 2 METERS	2DEC	-3.057727511 E+6 B-25		75052	77003
R1VEC +2		2366		2DEC	-5.762165972 E+6 B-25		72402	56117
R1VEC +4		2370		2DEC	-1.244790498 E+6 B-25		76640	46113

TINT	MP13 TIME FROM LIFTOFF TO INTERCEPT	2372	28 2	CENTI-SEC	2DEC	2479416	00227	12470
RCO	MP13 DESIRED RADIUS AT CUTOFF	2374	25 2	METERS	2DEC	6.687648652 E+6 B-25	06301	16405
TGONOM	MP13 INITIAL ESTIMATE FOR BURN INTERVAL	3577	17 2	CENTI-SEC	2DEC	42700 B-17	12331	20000
VCONOM	MP13 INITIAL ESTIMATE FOR VELOCITY AT CUTOFF IN CUTOFF LOCAL VERTICAL COORDINATES	3605	7 2	M/CS	2DEC	+0.13470 E+0 B-7	00021	07566
VCONOM +2		3607			2DEC	+7.43000 E+1 B-7	22446	14632
VCONOM +4		3611			2DEC	+2.01168 E+1 B-7	05016	36323
COS27	COSINE OF ANGLE SUBTENDED BY MP13 BURN	3601	0 2		2DEC	0.86384 (18)	33511	04744
SIN27	SINE OF ANGLE SUBTENDED BY MP13 BURN	3603	0 2		2DEC	0.50377 (18)	20075	30442
VTO-APS	MP13 PREDICTED TAILOFF VELOCITY	3575	7 2	M/CS	2DEC	.021 B-7 (16)	00002	26010
TAG5	PI SWITCH FOR LAMBERT ROUTINE	3621	N/A		2DEC	.5 (19)	20000	00000
KT	MP4, MP13 PARAMETER IN EXPANSION OF EXPONENTIAL SERIES FOR TGO	3626	0 2		2DEC	0.34	12702	21727
MP6TO7	TIME FROM END OF MP6 TO START OF MP7	1772	14 2	SECONDS	DEC	1700	03244	
MPDT78	TIME FROM END OF MP7 TO START OF MP8	2351	14 2	SECONDS	DEC	83	00123	
MP8TO9	TIME FROM END OF MP8 TO START OF MP9	1773	14 2	SECONDS	DEC	10639	24617	
MP9-11DT	TIME FROM END OF MP9 TO START OF MP11	2352	14 2	SECONDS	DEC	1827	03443	
MP11TO13	TIME FROM END OF MP11 TO START OF MP13	2353	14 2	SECONDS	DEC	4858	11372	

ERASABLE NAME	DEFINITION OF FRESH START INITIALIZATION	ADDRESS	SCALE FACTOR(O)	DECIMAL INITIALIZATION	OCTAL EQUIV
FRESH START ERASABLE MEMORY INITIALIZATION(20)					
RSTRTWRD	MISSION PHASE RESTARTABILITY FLAG WORD	1127	N/A	N/A (21)	77777
DAPOFFDT	TIME FROM TIG+26 IN MP11 TO DAP TURN-OFF	1345	2^{14} CENTI-SEC	DEC -0 (22)	77777
STARTDVC	LOW-THRUST DELTA-V MONITOR COUNTER FOR ENGINE ON	1337	2^{14}	DEC 2 (23)	00002
STOPDVC	LOW-THRUST DELTA-V MONITOR COUNTER FOR ENGINE OFF	1340	2^{14}	DEC 2 (23)	00002
SLOSHCTR	DAP TRIM GIMBAL SLOSH COUNTER	1336	2^{14}	DEC 16383 (24)	37777
DAPBOOLS	DIGITAL AUTOPILOT FLAG WORD	0077	N/A	N/A	40512
CDULMIT	MAXIMUM ALLOWABLE DRIFT PERMISSIBLE FOR ANY ONE CDU WHILE DAP IS OFF IN MP11	3405	1/2 REV.	DEC 0.05555555 (25)	01616
DNCDUN	DOWNRUPT DAP-OFF COUNTER	3404	2^{14}	DEC 198 (26)	00306

NOTES
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0) SCALE FACTOR IS THE MAXIMUM VALUE THAT CAN BE REPRESENTED IN THE LGC FOR THIS VARIABLE
1) AVERAGE OF THE LAST 3 MEASURED VALUES AS OF 12/31/66
3) FIXED IMU STABLE MEMBER ORIENTATION WITH RESPECT TO EARTH - X PIPA INPUT AXIS HELD 30 DEG FROM LOCAL VERTICAL (UP), Y PIPA INPUT AXIS POINTS DOWNRANGE AT AZIMUTH OF 122 DEG EAST OF TRUE NORTH AND ELEVATED 30 DEG ABOVE HORIZONTAL, Z PIPA INPUT AXIS POINTS DOWNRANGE AT AZIMUTH OF 32 DEG EAST OF TRUE NORTH AND IS IN HORIZONTAL PLANE
4) DUE WEST
5) LOCATION OF IMU ON PAD 37B - 31.55433106 N LATITUDE, 298.29598618 E LONGITUDE (TRW OPERATIONAL TRAJECTORY), 57.6 METERS ALTITUDE ABOVE FISHER ELLIPSOID
6) 32 DEGREES
7) -30 DEGREES
8) 23,673,600.00 SECONDS FROM JULY 1, 1966 TO MIDNIGHT OF ASSUMED LAUNCH DATE APRIL 1, 1967 G.M.T.
9) 278.60724 DEG TO JULY 1, 1966 EPHEMERIS YEAR
10) APPROXIMATELY 1.1 G (OCTAL 37777 37777 DISABLES LIFTOFF DETECTOR)
11) 31,325 LBS
12) 10,397 LBS
13) ADDITIONAL MASS-GOOD BIT SET BY LOADING OVER FRESH START INITIALIZATION
14) MINIMUM TIME FROM Q,R-AXES RCS CONTROL RELEASE TO Q,R-AXES RCS CONTROL RETURN IS .290 + .2(INTEGER(N/4)) SEC
15) REDUCED BY PROGRAM IF GRR OCCURS VIA LIFTOFF DETECTOR
16) INCLUDES VELOCITY GAINED FROM TIME OF READING PIPAS TO TIME-TO-BURN (TGO) CALCULATION
17) DAP IS SCHEDULED TO BE TURNED OFF FOR 4 SEC IN MP11 BURN BY CHANGING FRESH START INITIALIZATION
18) TRIG FUNCTIONS OF 30.25 DEGREES
19) POSITIVE IF MP13 TRANSFER ANGLE LESS THAN 180 DEG, NEGATIVE IF GREATER THAN 180 DEG
20) THIS INITIALIZATION MAY BE OVERWRITTEN IN PRELAUNCH ERASABLE LOAD
21) EACH BIT INDICATES RESTARTABILITY OF THAT PARTICULAR MISSION PHASE (I.E. BIT NO. = MISSION PHASE NUMBER). IF BIT IS SET, A SPECIFIED PART OF THAT MISSION PHASE IS RESTARTABLE
22) SKIP AUTOMATIC DAP TURN-OFF IF DAPOFFDT IS NEGATIVE OR ZERO
23) ALLOWS 2(N+1) SECONDS OF LOW THRUST UNTIL APPROPRIATE ACTION IS TAKEN
24) ALLOWS 2(N+1) SECONDS OF DPS BURN TIME UNTIL FUEL SLOSH IS ASSUMED TO BE BUILT UP TO A POINT THAT TRIM GIMBAL USAGE SHOULD NO LONGER BE ATTEMPTED
25) 10 DEGREES
26) CDUY,CDUZ SPECIAL DOWNLINK LIST TERMINATED AND DAP TURNED BACK ON AT MOST 0.02(N+2) SECONDS (SEE CDULMIT) AFTER MP11 OR VERB 63 INITIATION