

Massachusetts Institute of Technology
Instrumentation Laboratory
Cambridge, Massachusetts

Flight 501 Memo # 14

TO: Distribution
FROM: Jay A. Sampson
DATE: August 31, 1967
SUBJECT: Values Used for the Final Verification of the
AS-501 Prelaunch Erasable Memory Data Load
on the MIT/IL Digital Simulator

The following is a list of the terms, their definitions, SOLRUM55 addresses, scale factors and units, decimal values, and octal equivalents used to verify the final prelaunch erasable memory data load for AS-501.

This data was incorporated into an end-to-end digital simulation of the mission (600 seconds of prelaunch alignment through Pacific splash-down) based on a lift-off at 1300 G. M. T. on October 15, 1967.

The only parameters expected to change are DTEPOCH (launch date dependant), Cold Soak gimbal angles, (launch time and launch month dependant), azimuth and elevation of prelaunch alignment optical verification targets (yet to be determined), final IMU Compensation parameters, and the two MCP gimbal pot settings (CGY, CGZ).

ERASABLE NAME ***** DEFINITION FOR ERASABLE DATA LOAD ***** SCALE FACTOR(O) ***** DECIMAL/OCTAL VALUE ***** SOCIAL LOAD *****

IMU COMPENSATION

ADDRESS	SCALE FACTOR(O)	DECIMAL/OCTAL VALUE	SOCIAL LOAD
0744	2 ⁻⁶ (GYRO PULSES/ CENTI-SEC)	00063 (1)	00063
0745		76250	76250
0746		76333	76333
0747	GYRO PULSES/ PIPA PULSE	77770	77770
0750		77772	77772
0751		00033	00033
0752	GYRO PULSES/ PIPA PULSE	77775	77775
0753		00006	00006
0754		77767	77767
0736	2 ⁻⁸ (PIPA PULSES/ CENTI-SEC)	02063	02063
0740		02413	02413
0742		72313	72313
0737	2 ⁻¹¹ (PIPA COUNTS/PIPA COUNT)	44571	44571
0741		72541	72541
0743		13110	13110

PRELAUNCH ALIGNMENT

ADDRESS	SCALE FACTOR(O)	DECIMAL/OCTAL VALUE	SOCIAL LOAD
1073	2 ⁸ CENTI-SEC	7233939 B-28	00571 20623
1352	1 REVOLUTION	20FC -0.25	67777 77777
1314	1 REVOLUTION	20FC 0.0794676395	02426 00022

AZIMUTH	AZIMUTH OF STABLE OFFER Z-AXIS EAST OF NORTH	1016	1 REVOLUTION	2481 0.2	(5)	06314 31463
POLYCENTR	TRANSFER TO PITCH MONITOR POLYCENTRAL ROUTINE	1473	-	TC POLY		05554
POLYEND	TRANSFER AT END OF POLYCENTRAL ROUTINE	1213	-	TC DANZIG		04024
POLYCOFF + 00	COEFFICIENT A ₀ OF THE POLYCENTRAL ROUTINE	1375	14 REV.	ZDFC +1.35000028 E-3	B-4	00001 13453
POLYCOFF + 20		1377		ZDFC +7.47775276 E-7	B+10	00017 34652
POLYCOFF + 40	A + AT + AT ² + + AT ⁶	1601	16 REV	ZDFC +5.27386944 E-9	B+24	01603 35205
POLYCOFF + 60	0 1 2 6	1603	14N	ZDFC +1.47743111 E-13	B+36	01231 14015
POLYCOFF + 80		1605	2 CENTISEC	ZDFC -5.15861357 E-17	B+52	64174 40131
POLYCOFF +100		1607		ZDEC +6.47052776 E-21	B+66	17216 14327
POLYCOFF +120		1611	28	ZDEC -1.60920006 E-25	B+80	71614 64244
TROLL	TIME FROM LIFT-OFF AT WHICH ROLL MONITOR BEGINS	1562	2 CENTI-SEC	ZDEC 900 B-28	(16)	00000 01604
TPITCH	TIME FROM LIFT-OFF AT WHICH PITCH MONITOR BEGINS	1564	28	ZDEC 1070 B-28		00000 02056
TENDPITCH	TIME PITCH MONITOR IS ON	1566	28	ZDEC 13400 B-26		00000 32150
MAXROLL	FINAL ROLL ANGLE MINUS INITIAL ROLL ANGLE	1702	1 REVOLUTION	ZDFC 0.05	(17)	01463 06315
1/RLLRTE	ONE OVER DESIRED ROLL RATE	1700	28	ZDFC 3.6 E4 B-28	(8)	00002 06240
TTURCKY	NOMINAL TIME FROM END OF PITCH MONITOR TO START OF TUMBLE MONITOR	1572	14	ZDEC 4345 B-14		10357
TAZ	AZIMUTH OF LANDMARK 1 AT LAUNCH SITE	1346	ICLU SCALING		(9)	
TAZ +1	AZIMUTH OF LANDMARK 2 AT LAUNCH SITE	1347				
TEL	ELEVATION OF LANDMARK 1 AT LAUNCH SITE	1350	1/4 REV			
TEL +1	ELEVATION OF LANDMARK 2 AT LAUNCH SITE	1351				
TAILTIME	NOMINAL FLIGHT TIME TO ATLANTIC TARGET	1617	28	ZDFC 140000 B-28	(10)	00010 21340
RT-ROLL	POST-LIFT AERIAL TARGET VECTOR AT LIFT-OFF + TAILTIME IN IC COORDINATES, ASSUMING THE PLATFORM WAS IDENTICAL AT LIFT-OFF	1621	HALF-UNIT VECTOR	ZDFC +3.288395100 E-1	B-1	10354 10866

RTATLAN1 +2	1623		ZDEC +1.43266770 E-2 B-1	00165 13551
RTATLAN1 +4	1625		ZDFC +8.486009140 E-1 B-1	15447 27507
TPACIF1	1627		ZDFC 3072142 B-25 (11)	00274 27256
RTPACIF1	1631		ZDEC +8.318152196 E-1 B-1	15236 07275
RTPACIF1 +2	1633		ZDEC +5.965946720 E-2 B-1	00750 27276
RTPACIF1 +4	1635		ZDEC +5.518371018 E-1 B-1	10650 24622
UNITW	1043		ZDEC +0.476817607 B-1 (12)	07522 17573
UNITW +2	1045		ZDEC -0.8334945071 B-1	62510 44121
UNITW +4	1047		ZDEC +0.271290099 B-1	04256 15045
RN	0765		ZDEC +6.373394217 E+6 B-25	06050 00222
RN +2	0767		ZDEC +1.707372500 E+4 B-25	00010 12616
RN +4	0771		ZDEC -5.546831000 E+3 B-25	77775 51250

MISSION CONTROL PROGRAM

TDECAY	1560		¹⁴ 2 CENTI-SEC DEC -49 B-14	77716
DELTA	1027		⁹ 2 CENTI-SECS ZDEC 200 B-9	14400 00000
NSHIFT	1040		ZEC -5	77772
XSHIFT	1041		ZEC 9	00011
ESQIVR)	1546		⁴ 2 ZDEC 0.35216172 B-4 (13)	00550 24225
ESQIVR) +2	1550		ZDFC 0.99814412 B-4	01776 03140
SEMILAT	1552		²⁷ 2 METERS ZDEC 1.0033120 E+7 B-27	02910 27700
SEMILAT +2	1554		ZDFC 1.2769026 E+7 B-27	03031 05110

TFP41N	TIME-TO-FREE-FALL AT WHICH TO COMPUTE SPS2 IGNITION IN 2 MINUTES	1676	2 ²⁸ CENTI-SEC	2DEC 68700 E-28	(14)	00004 06134
TFP40M	VALUE OF TFF TO USE TO COMPUTE TIME-OF-COAST IF TFF IS NOT COMPUTABLE	1720	2 ²⁸ CENTI-SEC	2DEC 1620000 E-28	(15)	00142 34040
CGY	SPS1 C.G. ROTATION ABOUT Y/C Y-AXIS	1704	RADIANS	2DEC 0.0229	(16)	00567 06144
CGY +2	SPS2 C.G. ROTATION ABOUT Y/C Y-AXIS	1706		2DEC 0.0297		00746 23205
CGZ	SPS1 C.G. ROTATION ABOUT Y/C Z-AXIS	1710		2DEC 0.0833		02224 31141
CGZ +2	SPS2 C.G. ROTATION ABOUT Y/C Z-AXIS	1712		2DEC 0.0995		03136 06220
ATDT	SPS1 INTEGRATED INITIAL THRUST ACC. MAG.	1714	5 2 M/CENTISEC	2DEC 9.589 E-2 B-5	(17)	00061 03040
ATDT +2	SPS2 INTEGRATED INITIAL THRUST ACC. MAG.	1716		2DEC 30.48 E-2 B-5		00234 01660
S2SWITCH	SWITCH TO RE-COMPUTE SPS2 BURN ATTITUDE	1722	-	OCT 0		00000
REFSWITCH	SWITCH TO FORCE 280K FT FF REFERENCE	1723	-	OCT 0		00000
REDOSPS1	SWITCH TO REPEAT SPS1 AT SPS2 IGNITION	1724	-	OCT 0		00000
ANGLEX	DESIRED COLD SOAK ANGULAR RATE X	1673	ICDU SCALING	OCT 11355	(18)	11355
ANGLEY		1674		OCT 61462		61462
ANGLEZ		1675		OCT 02261		02261
UPTIME	TIME TO INCORPORATE 1ST R.V.I. UPDATE	1671	2 ²⁸ CENTI-SEC	OCT 37777	(19)	37777
UPTIME +1		1672	14 CENTI-SEC	OCT 37777		37777

NOTES

- 0) SCALE FACTOR IS THE MAXIMUM VALUE THAT CAN BE REPRESENTED IN THE ACC FOR THIS VARIABLE
- 1) PRELIMINARY INERTIAL PERFORMANCE PARAMETERS FOR G+N 122 INV 57111 AS OF AUGUST 18, 1967
- 2) ASSUMES ACC CLOCK ZEROED AT MIDNIGHT BEFORE OCTOBER 15, 1967
- 3) DUE WEST
- 4) 28 DEG, 36 MIN, 30.32 SEC OR 28.60842222 DEG GEODETIC LATITUDE
- 5) 72 DEGS
- 6) ADJUSTED TO ACCOUNT FOR CDU DRIVE LAG
- 7) 18 DEGS
- 8) DESIRED ROLL RATE = 1 DEG/SEC
- 9) V21 N66 DSKY LOAD - NOT VERIFIED WITH DIGITAL SIMULATOR
- 10) 28.29028886 DEG N GEODETIC LAT, -17.5 DEG E LONG, AT 1400.00 SECS AFTER LIFT-OFF
- 11) 30.04649677 DEG N GEODETIC LAT, -171.0 DEG E LONG, AT 30.721.42 SECS AFTER LIFT-OFF
- 12) 28.60842222 DEG N GEODETIC LAT, 274.3958666 DEG E LONG, 124.0 METERS ABOVE FISHER ELLIPSOID AT LAUNCH SITE
- 13) SPS1 E = 0.9994490037, A = 15.487, 2.3 METERS
SPS2 E = 0.9990716280, A = 6.891, 0.65, 630.5 METERS
- 14) 11 MINUTES, 27 SECONDS
- 15) 4 HOURS, 30 MINUTES
- 16) 1.31 DEGS, 1.70 DEGS, 4.77 DEGS, 5.70 DEGS
- 17) CORRESPONDS TO VELOCITY INCREMENTS OF 0.09585, 0.3048 METER/CENTISEC
- 18) 53.23 DEGS, 278.99 DEGS, 13.19 DEGS
- 19) INITIALIZED TO 31 DAYS, 1 HOUR, 29 MINUTES, 14.55 SECONDS