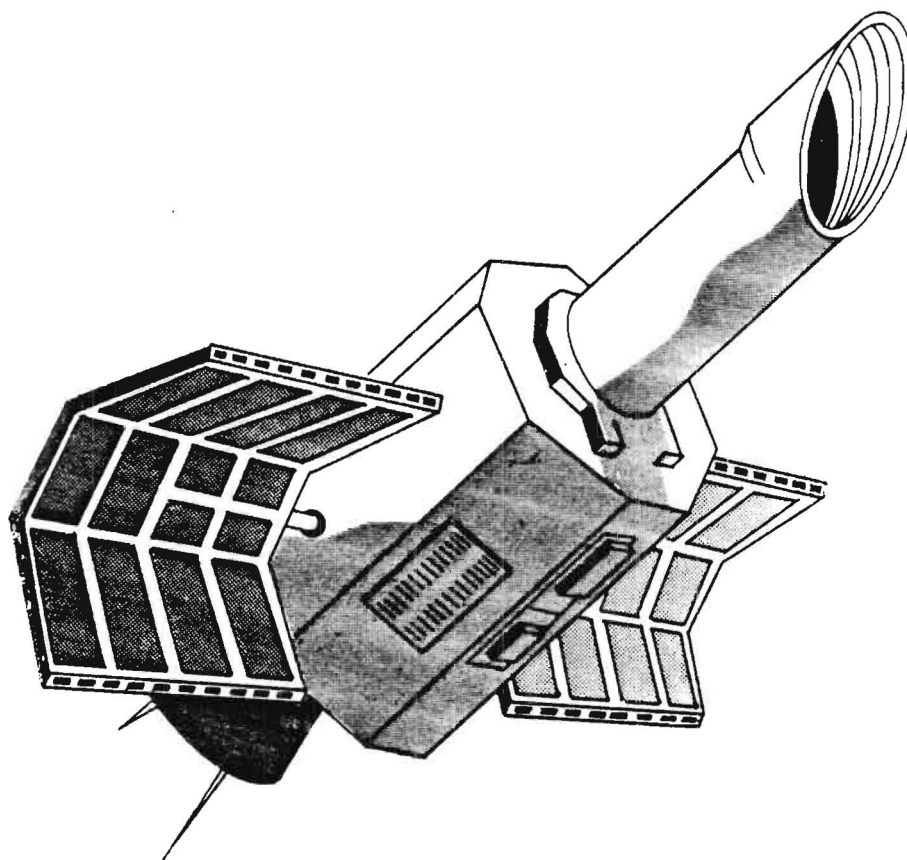


# INTERNATIONAL ULTRAVIOLET EXPLORER

## TELEMETRY AND COMMAND HANDBOOK



**Goddard Space Flight Center**

**GREENBELT, MARYLAND**

**NASA**

National Aeronautics and  
Space Administration

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## TELEMETRY AND COMMAND DOCUMENT

THIS DOCUMENT IS ONE VOLUME OF A LARGER DOCUMENT WHICH WILL BECOME THE FLIGHT OPERATIONS MANUAL FOR THE IUE SPACECRAFT.

THE TELEMETRY AND COMMAND PORTION IS CONTAINED IN VOLUME ONE. A BIT BY BIT DESCRIPTION OF THE COMMAND STRUCTURE AND TELEMETRY DATA IS PROVIDED. DETAILED DESCRIPTIONS OR EXPLANATIONS OF HOW THE VARIOUS SUBSYSTEMS FUNCTION HAVE PURPOSELY BEEN OMITTED FROM THIS VOLUME IN ORDER TO PROVIDE A CONCISE INFORMATION SOURCE, WITHOUT A LARGE AMOUNT OF TEXT. DETAILED DESCRIPTION OF SYSTEMS WILL BE PROVIDED, WHERE NECESSARY, IN APPROPRIATE SUBSYSTEMS VOLUMES.

THE INFORMATION CONTAINED HEREIN IS EXPECTED TO UNDERGO SOME CHANGES AS WELL AS ADDITIONS AS MORE INFORMATION BECOMES AVAILABLE. FOR THIS REASON, UPDATED ISSUES WILL BE PRODUCED ON AN UNPREDICTABLE FREQUENCY. TO VERIFY THE CURRENT ISSUE IS BEING USED, CONTACT THE IUE-OCC AT EXTENSION 8625 FOR THE DATE OF THE MOST RECENT PUBLICATION.

THE CCIL LANGUAGE REQUIRED MORE BREAKDOWN OF TELEMETRY THAN FOR I&T. THEREFORE FROM THIS ISSUE ON WE WILL BE ADDING THE ALTERNATIVE NAMES FOR TELEMETRY AS THEY EXIST IN CCIL.

	(8)								(6)								(37)																(7)																	
LEADING ZEROS	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	1	2	3	4	5	6
REAL TIME IMPULSE	1	ADDRESS								0	IMPULSE								SERIAL DATA																PARITY															
SERIAL	1	XX								1	XX								XX																XXXXXXXXXXXX															
OBC CMDS IMPULSE	*	*****								0	IMPULSE								SERIAL DATA																*****															
SERIAL	*	*****								1	XX								XX																*****															

REAL TIME COMMAND = 60 BITS; OBC COMMAND = 44 BITS (BITS 9-52)

BITS SYNC : LEADING ZEROS FOLLOWED BY '1'.

BITS 1- 8: SPACECRAFT AND DECODER ADDRESS; 1=00100010 HEX 22  
2=10110101 HEX B5

BITS 9: SERIAL COMMAND=1, IMPULSE COMMAND=0.

BITS 10-15: SERIAL COMMAND ADDRESS. (MSB=15, DON'T CARE IF BIT 9=0, IMPULSE)

BITS 16-22: IMPULSE COMMAND ADDRESS (LSB=16) (WHEN BIT 9=0)

BITS 16-52: SERIAL DATA (MSB=16) (WHEN BIT 9=1)

BITS 53-59: PARITY.

LET  $M(X) = \text{BITS } 9-52 = P_0 + P_1X + P_2X^{**2} + \dots + P_{43}X^{**43}$   
 $G(X) = \text{POLYNOMIAL} = 1 + X^{**2} + X^{**6} + X^{**7}$   
 $R(X) = \text{PARITY} = R_0 + R_1X + R_2X^{**2} + \dots + R_6X^{**6}$   
N=NUMBER OF BITS INCLUDING PARITY BITS  
K=NUMBER OF BITS IN 'M'  
 $Q(X) = \text{RESIDULE TERM}$   
THEN  $R(X)/G(X) + Q(X) = X^{*(N-K)} * M(X)/G(X)$

BITS 60: EXECUTE.

COMMAND	SW	ARGUMENTS AND RANGE
:IMP		N,N,--- 0.LE.N.LE.127
:CRU		[<ON> <OFF>],N,N,--- 1.LE.N.LE.64
:VAM (2)	DMU	<PPR NAME>
:DMU (2)	DMU	IA2=,IA1=,XVAM=,XCLK=,AROM=,CFMT=,TFMT=,TMROM=,CODED=,MXR=,SRATE=; 0-15 0-15 0-1 0-1 0 0-3 0-1 0-3 0-1 0-6 0-5
:OBC (2)	OBC	[<RESET> <GO> <HLOAD>,N <CMND>,CODE,N <SLOAD>,A,B <DUMP> <FIX1> <FIX2>  <SDUMP>,A <HDUMP>,A <LDBLK>,A <PATCH>,A,B{,---Z}]
:PRECESS (1)		PSUN=,PLONG=,PESUN=,PSTART=,PFIRE=; 0-1 0-15 0-1 0-127 0-255
:NUTAT (1)		ZERADJ=,TADJ=,TGA=,NUTIN=,NUTEN=; 0-15 0-15 0-1 0-1 1
:EV (2)	EV	LPUL=,PHASE=,ACC=,EVC=,HPUL=,EVE=,VALVE=,ENG=,FIRE=; 0-1 0-1 0-1 0-1 0-1 0-1 V1-V7 J1-J12
:RW (2)	RW	RWMODE=,RWENAB=,REDUN=,ROLL=,YAW=,PITCH=; 0-15 0-1 0-255 0-255 0-255 0-255
:PAS (2)	PAS	PASMOD=,PASCLK=,PASDIR=,PASIMAX=,PASLEW=,PASCAN=,PASSUN=,PASMIN=; 0-1 0-3 0-1 0-360. 0-1 0-1 0-1 0-360.
:IRA (2)	IRA	IRACOLD=,IRAQB=,IRABD=,IRABA=,IRAMC=,IRAGYR=,IRAHR=; 0-1 0-1 0-1023 0-7 GY1-GY6 GY1-GY6 GY1-GY6
:FES (2)	FES	FESX=,FESY=,FESL=,FLAP=,FESXF=,FESYF=,FESTE=,FESTSR=,FESTHD=,FESSM=; -63-63 -63-63 0-63 0-1 0-31 0-31 0-1 0-1 0-3 0-2
:LVSW (2)	LVSW	MUX2=,MUX1=,MEC2=,MEC1=,SWR=,SWP=,LWR=,LWP=,FES2=,FES1=; ARGUMENTS ARE <ON> OR <OFF>. FOR NO ARGUMENT ALL OFF.
:APER (2)	MECH	{[<CLOSE> <OPEN>]}
:CAMSEL (2)	MECH	{[<SWR> <SWP> <LWR> <LWP>]}
:DISP (2)	MECH	{[<SWL> <SWH> <LWL> <LWH>]}
:FOCUS (2)	MECH	FOC=; 1,2,4,8
:SIALGN (4)	CAM	G3=,YAL=,XAL=; G3D,G3F YAN,YAMC XAN,XAMC
:SIHTR (4)	CAM	HTR=,SEC=,G1=; HTL,HTH SEC1-SEC4 G1C0,G1ED,G1EF,G1RD
:SIUVC (4)	CAM	UVC=; UVC1-4
:SIMODE (4)	CAM	SZ=,<WLC>,<TF2>,<FB>,<TF1>,<UVF>,<EX>,<ER>,<RDER>,<RDLO>,<RDHI>,<STBY> 0-3
:SCAN (4)	CAM	ISA=,ILA=,LSR=,SSR=; 0-1023 0-1023 0-1023 0-1023

TYPE	ADD	CODE	FUNCTION
IMP	2	PWRBR1OF	BOOST REGULATOR 1 OFF
IMP	4	PWRBR2OF	BOOST REGULATOR 2 OFF
IMP	14	BAT3RD1	BATTERY 3RD ELECTRODE 1 OFF
IMP	16	BAT3RD2	BATTERY 3RD ELECTRODE 2 OFF
IMP	29	ALRD1SAB	AUTOMATIC LOAD REMOVAL DISABLE
IMP	60	FE1SFCC	FOCUS ELECTRONICS 1 START FOCUS
IMP	61	FE2SFCC	FOCUS ELECTRONICS 2 START FOCUS
IMP	22	BAT1UV	BATTERY NO. 1 UV DETECTOR OFF
IMP	24	BAT2UV	BATTERY NO. 2 UV DETECTOR OFF
IMP	26	28VUVDET	+28 V UV DETECTOR OFF
IMP	28	28VOCDET	+28 OC DETECTOR OFF
IMP	48	CMDDEC	COMMAND DECODER OFF
IMP	103	SA1DPLY	SOLAR ARRAY DEPLOY SYS 1 FIRE
IMP	104	SA2DPLY	SOLAR ARRAY DEPLOY SYS 2 FIRE
IMP	105	SIDUSTCV	SI DUST COVER DEPLOY FIRE
IMP	106	APOGMOTR	APOGEE BOOST MOTOR FIRE
SER	20	EEAAFCCD	EEA MECFOC A FOCUS DRIVE BITS 34-37
SER	28	EEABFOCD	EEA MECFOC B FOCUS DRIVE BITS 34-37
SER	24	IRAGYRA	IRA A GYRO SELECT IRAGYR BITS 11-16 'NEVER 0' FOR THIS CMD
SER	32	IRAGYRB	IRA B GYRO SELECT IRAGYR BITS 11-16 'NEVER 0' FOR THIS CMD
SER	8	CRUGYR1	CRU RELAY 5 GYRO #1 OFF
SER	8	CRUGYR2	CRU RELAY 16 GYRO #2 OFF
SER	8	CRUGYR3	CRU RELAY 27 GYRO #3 OFF
SER	8	CRUPITCH	CRU RELAY 26 PITCH WHEEL DRIVE OFF
SER	8	CRUYAW	CRU RELAY 37 YAW WHEEL DRIVE OFF
SER	8	CRUGYR4	CRU RELAY 38 GYRO #4 OFF
SER	8	CRUGYR5	CRU RELAY 44 GYRO #5 OFF
SER	8	CRUROLL	CRU RELAY 48 ROLL WHEEL DRIVER OFF
SER	8	CRUREDUN	CRU RELAY 51 RED WHEEL DRIVER OFF
SER	8	CRUGYR6	CRU RELAY 60 GYRO #6 OFF
SER	8	CRUPYRO1	CRU RELAY 61 PYRO ARM # 1 ARM
SER	8	CRUMOTO1	CRU RELAY 62 MOTOR ARM # 1 ARM
SER	8	CRUMOTO2	CRU RELAY 63 MOTOR ARM # 2 ARM
SER	8	CRUPYRO2	CRU RELAY 64 PYRO ARM # 2 ARM
SER	5	CEAWDAA	CEA WHEEL COMMAND A ALL
SER	13	CEAWDAB	CEA WHEEL COMMAND B ALL
SER	21	CEAENGA	CEA ENGINE VALVE CONTROL A ALL
SER	29	CEAENGB	CEA ENGINE VALVE CONTROL B ALL
SER	8	CRUSSE2	CRU RELAY 9 SUN SHUTTER ELECTRONICS. OFF
SER	8	CRUEV1	CRU RELAY 3 ENGINE VALVE DRIVER 1 OFF
SER	8	CRUOBC2	CRU RELAY 10 OBC 2 +28V OFF
SER	8	CRUEV2	CRU RELAY 14ENGINE VALVE DRIVER 2 OFF
SER	8	CRUSSDD	CRU RELAY 20 SUN SHUTTER DIR-DR. OFF
SER	8	CRUFSS1	CRU RELAY 59 OBC POWER 1 OFF
SER	8	CRUOBC1	CRU RELAY 43 OBC POWER 1 OFF
SER	8	CRUOBCP2	CRU RELAY 50 OBC CONFIG POWER 2 OFF
SER	8	CRUFSS2	CRU RELAY 53 FSS 2 OFF
MISSION MODE CRITICAL COMMANDS			
IMP	19	CPU2OFF	CPU NO. 2 - OFF
IMP	50	CPU1OFF	CPU NO. 1 - OFF
IMP	53	MEM1UOFF	UPPER MEMORY BUS OFF 1
IMP	55	MEM1LOFF	LOWER MEMORY BUS OFF 1
IMP	57	MEM2UOFF	UPPER MEMORY BUSS OFF 2
IMP	59	MEM2LOFF	LOWER MEMORY BUS OFF 2

CMD#	SYS	FUNCTION	VERIFICATION	HEX
0		NOT USED	N/A	000
1	PWR	BOOST REGULATOR NO.1 ON	DSC CH.12 BIT 8=0	100
2	PWR	BOOST REGULATOR NO.1 OFF	DSC CH.12 BIT 8=1	080
3	PWR	BOOST REGULATOR NO.2 ON	DSC CH.13 BIT 8=0	180
4	PWR	BOOST REGULATOR NO.2 OFF	DSC CH.13 BIT 8=1	040
5	PWR	CHARGE REGULATOR NO.1 ON	DSC CH.12 BIT 6=0	140
6	PWR	CHARGE REGULATOR NO.1 TRICKLE CH	DSC CH.12 BIT 6=1	0C0
7	PWR	BATTERY NO.1 TRICKLE CHARGE HI	DSC CH.12 BIT 5=0	1C0
8	PWR	BATTERY NO.1 TRICKLE CHARGE LO	DSC CH.12 BIT 5=1	020
9	PWR	CHARGE REGULATOR NO.2 ON	DSC CH.13 BIT 6=0	120
10	PWR	CHARGE REGULATOR NO.2 TRICKLE CH	DSC CH.13 BIT 6=1	0A0
11	PWR	BATTERY NO.2 TRICKLE CHARGE HI	DSC CH.13 BIT 5=0	1A0
12	PWR	BATTERY NO.2 TRICKLE CHARGE LO	DSC CH.13 BIT 5=1	060
13	PWR	BATTERY&3RD ELECTRODE NO.1 ON	DSC CH.12 BIT 7=0 & BIT 1=0	160
14	PWR	BATTERY&3RD ELECTRODE NO.1 OFF	DSC CH.12 BIT 7=1 & BIT 1=1	0E0
15	PWR	BATTERY&3RD ELECTRODE NO.2 ON	DSC CH.13 BIT 7=0 & BIT 2=0	1E0
16	PWR	BATTERY&3RD ELECTRODE NO.2 OFF	DSC CH.13 BIT 7=1 & BIT 2=1	010
17		SPARE		110
18	PWR	3RD ELECTRODE NO.1 OFF	DSC CH.12 BIT 1=1 NOTE 2	090
19	OBC	OBC 2 CPU OFF	DSC CH.10	190
20	PWR	3RD ELECTRODE NO.2 OFF	DSC CH.13 BIT 2=1 NOTE 2	050
21	PWR	BATTERY NO.1 UV DETECTOR ON	DSC CH.12 BIT 4=0	150
22	PWR	BATTERY NO.1 UV DETECTOR OFF	DSC CH.12 BIT 4=1	0D0
23	PWR	BATTERY NO.2 UV DETECTOR ON	DSC CH.13 BIT 4=0	1D0
24	PWR	BATTERY NO.2 UV DETECTOR OFF	DSC CH.13 BIT 4=1	030
25	PWR	+28 BUS UV DETECTOR ON	DSC CH.12 BIT 2=0	130
26	PWR	+28 BUS UV DETECTOR OFF	DSC CH.12 BIT 2=1	0B0
27	PWR	+28 BUS OC DETECTOR ON	DSC CH.12 BIT 3=0	1B0
28	PWR	+28 BUS OC DETECTOR OFF	DSC CH.12 BIT 3=1	070
29	PWR	AUTOMATIC LOAD REMOVE DISABLE	DSC CH.13 BIT 3=1 NOTE 3	170
30	PWR	AUTOMATIC LOAD REMOVE ENABLE	DSC CH.13 BIT 3=0	0F0
31	RF	VHF NO.1 TRANSMITTER ON	ASC1 CH.4>3.8V	1F0
32	RF	VHF NO.1 TRANSMITTER OFF	ASC1 CH.4<0.1V	008
33	RF	VHF NO.1 RANGING ON	OBSERVE RANGING DATA	108
34	RF	VHF NO.1 RANGING OFF	RANGING DATA LOSS	088
35	RF	NO.1 MOD SOURCE NO.1 (DMU 1)	OBSERVE TM WITH DMU 1 ON	188
36	RF	NO.1 MOD SOURCE NO.2 (DMU 2)	OBSERVE TM WITH DMU 2 ON	048
37	RF	VHF NO.2 TRANSMITTER ON	ASC1 CH.5>3.8V	148
38	RF	VHF NO.2 TRANSMITTER OFF	ASC1 CH.5<0.1V	0C8
39	RF	VHF NO.2 RANGING ON	OBSERVE RANGING DATA	1C8
40	RF	VHF NO.2 RANGING OFF	RANGING DATA LOSS	028
41	RF	NO.2 MOD SOURCE NO.1 (DMU 1)	OBSERVE TM WITH DMU 1 ON	128
42	RF	NO.2 MOD SOURCE NO.2 (DMU 2)	OBSERVE TM WITH DMU 2 ON	0A8
43	SI	EEA LOW VOLTAGE SW-SELECT P.S.1	NDT	1A8
44	SI	EEA LOW VOLTAGE SW-SELECT P.S.2	NDT	068
45	SI	SUN SHUTTER OPEN	STATUS BITS 7=0,6=0	168
46	SI	SUN SHUTTER CLOSE	STATUS BITS 6=1,7=1	0E8
47	SI	EEA LOW VOLTAGE SW.-ALL LOADS OFF	NDT	1E8
48	CMD	COMMAND DECODER OFF (NOTE 1)	NO.1=SB 20/NO.2=SB 21 =0	018
49	OBC	OBC NO.1 CPU ON	DSC CH.9	118
50	OBC	OBC NO.1 CPU OFF	DSC CH.9	098
51	OBC	OBC NO.2 CPU ON	DSC CH.10	198
52	OBC	OBC 1 UPPER MEMORY BUS ON	DSC CH.18 = 1 (FF)	058
53	OBC	OBC 1 UPPER MEMORY BUS OFF	DSC CH.18 = 0 (00)	158
54	OBC	OBC 1 LOWER MEMORY BUS ON	DSC CH.19 = 1 (FF)	0D8
55	OBC	OBC 1 LOWER MEMORY BUS OFF	DSC CH.19 = 0 (00)	1D8
56	OBC	OBC 2 UPPER MEMORY BUS ON	DSC CH.20 = 1 (FF)	038
57	OBC	OBC 2 UPPER MEMORY BUS OFF	DSC CH.20 = 0 (00)	138



CMD#	SYS	FUNCTION	VERIFICATION	HEX
58	OBC	OBC 2 LOWER MEMORY BUS ON	DSC CH.21 = 1 (FF)	0B8
59	OBC	OBC 2 LOWER MEMORY BUS OFF	DSC CH.21 = 0 (00)	1B8
60	SI	FOCUS ELECTRONICS 1-START FOCUS	EXPERIMENT DATA VERIFY	078
61	SI	FOCUS ELECTRONICS 2-START FOCUS	EXPERIMENT DATA VERIFY	178
62	SI	FINE ERROR SENSOR 1-SEARCH ADVANCE	EXPERIMENT DATA VERIFY	0F8
63	SI	FINE ERROR SENSOR 2-SEARCH ADVANCE	EXPERIMENT DATA VERIFY	1F8
64		SPARE		004
65	ACS	PITCH WHEEL DRIVER-CONVERTER 1	NO DIRECT VERIFY	104
66	ACS	PITCH WHEEL DRIVER-CONVERTER 2	NO DIRECT VERIFY	084
67	ACS	YAW WHEEL DRIVER-CONVERTER 1	NO DIRECT VERIFY	184
68	ACS	YAW WHEEL DRIVER-CONVERTER 2	NO DIRECT VERIFY	044
69	ACS	ROLL WHEEL DRIVER-CONVERTER 1	NO DIRECT VERIFY	144
70	ACS	ROLL WHEEL DRIVER-CONVERTER 2	NO DIRECT VERIFY	0C4
71	ACS	REDUNDANT WHEEL DRIVER-CONVERTER 1	NO DIRECT VERIFY	1C4
72	ACS	REDUNDANT WHEEL DRIVER-CONVERTER 2	NO DIRECT VERIFY	024
73	ACS	PRECESSION/NUTATION-CONVERTER 1	NO DIRECT VERIFY	124
74	ACS	PRECESSION/NUTATION-CONVERTER 2	NO DIRECT VERIFY	0A4
75	ACS	COMPENSATION/MIXING-CONVERTER 1	DSC-CH8 BIT 1	1A4
76	ACS	COMPENSATION/MIXING-CONVERTER 2	1 = ON (TCMONOFF)	064
77	ACS	WHEEL CMD D/A 1-CONVERTER 1	NO DIRECT VERIFY	164
78	ACS	WHEEL CMD D/A 1-CONVERTER 2	NO DIRECT VERIFY	0E4
79	ACS	WHEEL CMD D/A 2-CONVERTER 1	NO DIRECT VERIFY	1E4
80	ACS	WHEEL CMD D/A 2-CONVERTER 2	NO DIRECT VERIFY	014
81	ACS	ACCELEROMETER A-CONVERTER 1	NO DIRECT VERIFY	114
82	ACS	ACCELEROMETER A-CONVERTER 2	NO DIRECT VERIFY	094
83	ACS	ACCELEROMETER B-CONVERTER 1	NO DIRECT VERIFY	194
84	ACS	ACCELEROMETER B-CONVERTER 2	NO DIRECT VERIFY	054
85	HAPS	HAPS HTR/TM MODULE-CONVERTER 1	NO DIRECT VERIFY	154
86	HAPS	HAPS HTR/TM MODULE-CONVERTER 2	NO DIRECT VERIFY	0D4
87	HAPS	E/V CMD LOGIC 1-CONVERTER 1	NO DIRECT VERIFY	1D4
88	HAPS	E/V CMD LOGIC 1-CONVERTER 2	NO DIRECT VERIFY	034
89	HAPS	E/V CMD LOGIC 2-CONVERTER 1	NO DIRECT VERIFY	134
90	HAPS	E/V CMD LOGIC 2-CONVERTER 2	NO DIRECT VERIFY	0B4
91	HAPS	HAPS HEATER GROUP 1 ON	DSC 11 BIT 1=1	1B4
92	HAPS	HAPS HEATER GROUP 1 OFF	DSC 11 BIT 1=0	074
93	HAPS	HAPS HEATER GROUP 4 ON	DSC 11 BIT 2=1	174
94	HAPS	HAPS HEATER GROUP 4 OFF	DSC 11 BIT 2=0	0F4
95	HAPS	HAPS HEATER GROUP 6 ON	DSC 11 BIT 3=1	1F4
96	HAPS	HAPS HEATER GROUP 6 OFF	DSC 11 BIT 3=0	00C
97	HAPS	HAPS HEATER GROUP 7 ON	DSC 11 BIT 4=1	10C
98	HAPS	HAPS HEATER GROUP 7 OFF	DSC 11 BIT 4=0	08C
99	HAPS	ARM HAPS HEATER GROUPS 2,3,5	DSC 11 BIT 5=1	18C
100	HAPS	DISARM HAPS HEATER GROUPS 2,3,5	DSC 11 BIT 5=0	04C
101	HAPS	HAPS HEATER GROUP 2 ON	DSC 11 BIT 6=1	14C
102	HAPS	HAPS HEATER GROUP 2 OFF	DSC 11 BIT 6=0	0CC
103	PYRO	SOLAR ARRAY DEPLOY-PRIMARY SYS FIRE	STATUS BIT 4=0	1CC
104	PYRO	SOLAR ARRAY DEPLOY-REDUNDT SYS FIRE	STATUS BIT 5=0	02C
105	PYRO	SI DUST COVER DEPLOY-FIRE	EXP. DATA	12C
106	PYRO	APOGEE BOOST MOTOR-FIRE	ASC-3 CH.19	0AC
107	HAPS	HAPS HEATER GROUP 3 ON	DSC 11 BIT 7=1	1AC
108	HAPS	HAPS HEATER GROUP 3 OFF	DSC 11 BIT 7=0	06C
109	HAPS	HAPS HEATER GROUP 5 ON	DSC 11 BIT 8=1	16C
110	HAPS	HAPS HEATER GROUP 5 OFF	DSC 11 BIT 8=0	0EC
111		SPARE		1EC
112	CMD	COMMAND DECODER ON (NOTE 1)	NO.1=SB 20/NO.2=SB 21 =1	01C
113	ACS	FSS NO.1-SENSOR HEAD TOGGLE	DSC 2 BIT 16 (NOTE 4)	11C
114	ACS	FSS NO.2-SENSOR HEAD TOGGLE	DSC 3 BIT 16 (NOTE 4)	09C

CMD#	SYS	FUNCTION	VERIFICATION	HEX
115		SPARE		19C
116		SPARE		05C
117		SPARE		15C
118		SPARE		0DC
119		SPARE		1DC
120	CMD	COMMAND DECODER ON (NOTE 1)	NO.1=SB 20/NO.2=SB 21 =1	03C
121		SPARE		13C
122		SPARE		08C
123		SPARE		18C
124		SPARE		07C
125		SPARE		17C
126		SPARE		0FC
127		SPARE		1FC

NOTE:

1. IMPULSE COMMANDS 0 THROUGH 47, 64 THROUGH 111, AND ALL SERIAL COMMANDS ARE DISABLED BY IMPULSE COMMAND 48. THEY ARE ENABLED BY IMPULSE COMMAND 112. IMPULSE COMMAND 120 ENABLES THE ABOVE COMMANDS ON THE DECODER WHICH IS NOT BEING ADDRESSED.
  2. PERMITS BATTERY TO BE ON WITH 3RD ELECTRODE OFF.
  3. IF AUTO LOAD REMOVE IS DISABLED, FAULT DETECTORS CAN BE MONITORED ON DSC 13 BIT 1.
  4. EACH FINE SUN SENSOR HAS TWO HEADS. BIT=0 SAYS HEAD 1 SELECTED.
- NOTE: THE HEX COLUMN LISTS THE THREE HEX DIGITS THAT CHANGE BETWEEN IMPULSE COMMANDS. SEE COMMAND FORMAT BITS 13-24.

ADDRESS DEC	HEX	MNEMONIC	SUBSYSTEM AND FUNCTION
00	80		NOT USED
01	C0	OBC	OBC NO.1 LOAD AND CONTROL
02	A0		N/A
03	E0		N/A
04	90	LVSU	EEA-L.V.SWITCH-REGISTER A
05	D0	RW	CEA-WHEEL CMD-REGISTER 1
06	B0	DMU	DMU 1-CONTROL
07	F0	VAM	DMU 1-VAM LOAD
08	88	CRU	CRU CONTROL
09	C8	OBC	OBC NO.2 LOAD AND CONTROL
10	AB		N/A
11	E8		N/A
12	98	LVSU	EEA-L.V.SWITCH-REGISTER B
13	D8	RW	CEA-WHEEL CMD-REGISTER 2
14	B8	DMU	DMU 2-CONTROL
15	F8	VAM	DMU 2-VAM LOAD
16	84		N/A
17	C4		N/A
18	A4	SCAN	SSCL NO.1-SCAN PARAMETERS
19	E4	SIMODE	SSCL NO. 1 MODE CONTROL (SIALGN,SIHTR,SIUVC)
20	94	APER	EEA-MECHANISM CONTROL-REGISTER A (CAMSEL,DISP,FOCUS)
21	D4	EV	CEA-ENGINE/VALVE CONTROL-REGISTER 1
22	B4		N/A
23	F4		N/A
24	8C	IRA	IRA-MODE AND GYRO BIAS-CE NO.1
25	CC		N/A
26	AC	SCAN	SSCL NO.2-SCAN PARAMETERS
27	EC	SIMODE	SSCL NO. 2-MODE CONTROL (SIALGN,SIHTR,SIUVC)
28	9C	APER	EEA-MECHANISM CONTROL-REGISTER B (CAMSEL,DISP,FOCUS)
29	DC	EV	CEA-ENGINE/VALVE CONTROL-REGISTER 2
30	BC		N/A
31	FC		N/A
32	82	IRA	IRA-MODE AND GYRO BIAS-CE NO.2
33	C2		N/A
34	A2	SCAN	SSCL NO.3-SCAN PARAMETERS
35	E2	SIMODE	SSCL NO. 3 MODE CONTROL (SIALGN,SIHTR,SIUVC)
36	92		N/A
37	D2	PRECESS	CEA-PRECESSION/NUTATION CONTROL (NUTAT)
38	B2	PAS	PAS NO.1-MODE CONTROL
39	F2	FES	FINE ERROR SENSOR NO.1-MODE CONTROL
40	8A		N/A
41	CA		N/A
42	AA	SCAN	SSCL NO.4-SCAN PARAMETERS
43	EA	SIMODE	SSCL NO. 4 MODE CONTROL (SIALGN,SIHTR,SIUVC)
44	9A		N/A
45	DA		N/A
46	BA	PAS	PAS NO.2-MODE CONTROL
47	FA	FES	FINE ERROR SENSOR NO.2-MODE CONTROL

NA NOT ASSIGNED  
HEX ADDRESS HAS BEEN FLOPPED

(13)	(14)	(10)
+	+	+
NOTUSED	CONTRCL(ON/OFF)	RELAY I.D.
+	+	+

CMD	SYS	FUNCTION	TELEMETRY STATUS	*ON	OFF	**ID
1	EEA	POWER SUPPLY NO.1	ASC2-57 <0.1V=OFF >4.0V=ON	27	26	37
2	EEA	SEC. MIRROR HTR CIRCUIT NO.1	NDT	27	26	36
3	ACS	ENGINE/VALVE DRIVER NO.1	SB-22 0=OFF 1=ON	27	26	35
4	ACS	WDA POWER SUPPLY NO.1	ASC2-0 <0.1V=OFF >3V=ON	27	26	34
5	ACS	IRA GYRO NO.1	DSC-0/1 BIT 21 0=OFF 1=ON	27	26	33
6	DMU	DATA SYSTEM NO.1	SB-8 0=OFF 1=ON	27	26	32
7	SBAND	TRANSMITTER POWER RELAY A	ASC1-2/3 <0.1V=OFF>3.5V=ON	27	26	31
8	SI	MODE SELECT NO.2	NDT	27	26	30
9	SI	SUN SHUTTER ELECTRONICS	NDT	27	26	29
10	OBC	OBC NO.2 POWER	ASC2-55 <.1V=OFF >4.5V=ON	27	26	28
11	SI	CAL LAMP PWR SUPPLY NO.1	DSC-30 0=OFF 1=ON	25	24	37
12	EEA	POWER SUPPLY NO.2	ASC2-59 0.0V=OFF 4.5V=ON	25	24	36
13	SI	MODE SELECT NO.1	NDT	25	24	35
14	ACS	ENGINE/VALVE DRIVER NO.2	SB-23 0=OFF 1=ON	25	24	34
15	ACS	WDA POWER SUPPLY NO.2	ASC2-5 <0.1V=OFF >3V=ON	25	24	33
16	ACS	IRA GYRO NO.2	DSC-0/1 BIT 22 0=OFF 1=ON	25	24	32
17	DMU	DATA SYSTEM NO.2	SB-19 0=OFF 1=ON	25	24	31
18	SI	FOCUS DRIVE NO.1	NDT	25	24	30
19	SI	SCEM NO.4 SHORT WAVE REDUNDANT	DSC-27 0=OFF 1=ON	25	24	29
20	SI	SUN SHUTTER DIRECT DRIVE	NDT	25	24	28
21	ACS	FINE DIGITAL SUN SENSOR NO.1 FSS	ASC1-59 <0.1V=OFF >3V=ON	23	22	37
22	SI	CAL LAMP PWR SUPPLY NO.2	DSC-31 0=OFF 1=ON	23	22	36
23	SI	PRI. MIRROR HTR CIRCUIT NO.1	NDT	23	22	35
24	SI	SCEM NO.1 LONG WAVE PRIME	DSC-24 0=OFF 1=ON	23	22	34
25	SBAND	POWER AMP NO.1	SB-9 0=OFF 1=ON	23	22	33
26	ACS	PITCH WHEEL DRIVER +28V	ASC2-7 <24V=ON	23	22	32
27	ACS	IRA GYRO NO.3	DSC-0/1 BIT 23 0=OFF 1=ON	23	22	31
28	ACS	IRA COMMON ELECTRONICS NO. 1	DSC-0 BIT 13 0=OFF 1=ON	23	22	30
29	SI	FOCUS DRIVE NO.2	NDT	23	22	29
30	SI	SUN SHUTTER DIRECTION SEL.	NDT	23	22	28
31	ACS	PAS NO.1	DSC-28 0=OFF 1=ON	21	20	37
32	ACS	IRA COMMON ELECTRONICS NO. 2	DSC-1 BIT 14 0=OFF 1=ON	21	20	36
33	SI	FOCUS POSITION ELECTRONICS	NDT	21	20	35
34	SI	PRI. MIRROR HTR CIRCUIT NO.2	NDT	21	20	34
35	SI	SCEM NO.2 LONG WAVE REDUNDANT	DSC-25 0=OFF 1=ON	21	20	33
36	SBAND	POWER AMP NO.2	SB-10 0=OFF 1=ON	21	20	32
37	ACS	YAW WHEEL DRIVER +28V	ASC2-8 <24V=ON	21	20	31
38	ACS	IRA GYRO NO.4	DSC-0/1 BIT 24 0=OFF 1=ON	21	20	30
39	OBC	OBC NO.1 CONFIGURATION PWR.	ASC2-3 <.1V=OFF >4.5V=ON	21	20	29
40	SI	FOCUS LAUNCH HOLD	NDT	21	20	28
41	SI	APERTURE SELECT NO.1	NDT	19	18	37
42	SBAND	POWER AMP NO.3	SB-11 0=OFF 1=ON	19	18	36
43	HAPS	ARM HEATER GROUP NO.1	NDT	19	18	35
44	ACS	IRA GYRO NO.5	DSC-0/1 BIT 25 0=OFF 1=ON	19	18	34
45	ACS	PAS NO.2	DSC-29 0=OFF 1=ON	19	18	33
46	SI	CAMERA SELECT NO.1&DECK HEATER NO.1	NDT	19	18	32
47	SI	SEC. MIRROR HTR CIRCUIT NO.2	NDT	19	18	31
48	ACS	ROLL WHEEL DRIVER +28V	ASC2-9 <24V=ON	19	18	30

CMD	SYS	FUNCTION	TELEMETRY STATUS	*ON	OFF	**ID
49	SBAND	TRANSMITTER 1/2 SELECT	ASC1-2 XMTR1 >3.5V=ON	19	18	29
			ASC1-3 XMTR2 >3.5V=ON			
50	OBC	OBC NO.2 CONFIGURATION PWR.	ASC2-55 <.1V=OFF >4.5V=ON	19	18	28
51	ACS	REDUNDANT WHEEL DRIVER +28V	ASC2-10 <24V=ON	17	16	37
52	SI	APERTURE SELECT NO.2	NDT	17	16	36
53	ACS	FINE DIGITAL SUN SENSOR NO.2 FSS	ASC1-60 <0.1V=OFF >3V=ON	17	16	35
54	ACS	SPIN MODE SUN SENSOR-SMSS	ASC2-1 <0.1V=OFF >3V=ON	17	16	34
55	SI	CAMERA SELECT NO.2&DECK HEATER NO.2	NDT	17	16	33
56	SBAND	TRANSMITTER POWER RELAY B	ASC1-2/3 <0.1V=OFF>3.5V=ON	17	16	32
57	SBAND	POWER AMP NO.4	SB-12 0=OFF 1=ON	17	16	31
58	SI	SCEM NO.3 SHORT WAVE PRIME	DSC-26 0=OFF 1=ON	17	16	30
59	OBC	OBC NO.1 POWER	ASC2-3 <0.1V=OFF >4.5V=ON	17	16	29
60	ACS	IRA GYRO NO.6	DSC-0/1 BIT 26 0=OFF 1=ON	17	16	28
61	PYRO	SOLAR ARRAY & SI COVER ARM1	DSC-23 0=DISARM 1=ARM	15	14	37
62	PYRO	APOGEE BOOST MOTOR ARM1	DSC-22 0=DISARM 1=ARM	15	14	36
63	PYRO	APOGEE BOOST MOTOR ARM2	DSC-22 0=DISARM 1=ARM	15	14	35
64	PYRO	SOLAR ARRAY & SI COVER ARM2	DSC-23 0=DISARM 1=ARM	15	14	34

NOTE:

DSC=DIGITAL SUB COM  
ASC=ANALOG SUB COM  
SB=STATUS BIT  
NDT=NO DIRECT TELEMETRY

BIT STRUCTURE:

BITS 1 THRU 13 NOT USED  
BITS 14 THRU 27 ARE CONTROL BITS  
BITS 28 THRU 37 ARE RELAY I.D.BITS

\* ON AND OFF REFER TO CONTROL BIT.  
\*\* ID REFERES TO RELAY ID FIELD.

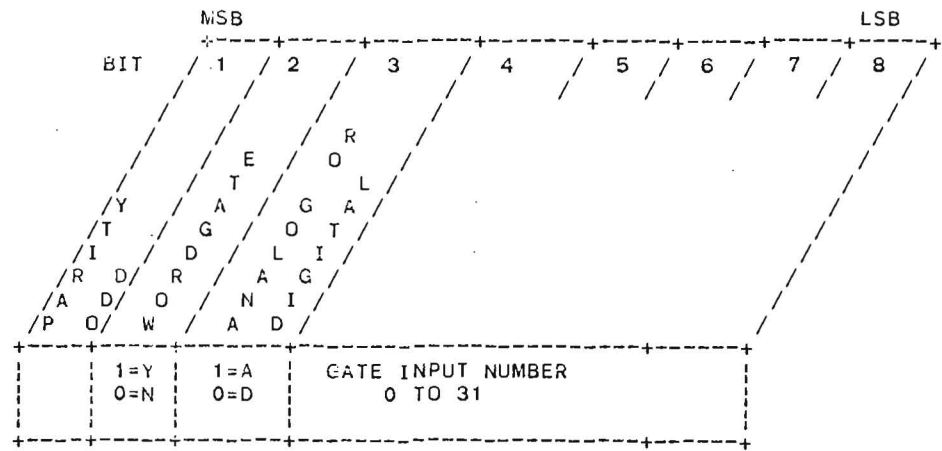
SERIAL COMMAND 8 HEX ADDRESS 88

(13)	(4)	(4)	(1)	(1)	(1)	(1)	(2)	(1)	(2)	(1)	(3)	(3)
N/A	IA2	IA1	N/A	XVAM	XCLK	0	CFMT	TFMT	TMROM	CODED	MXR	SRATE
1												37

MNEMONIC	BIT NO.	FUNCTION
N/A	1-13	NOT USED
IA2	14-17	INDIRECT ADDRESS NO.2 (RCM LSB=1)
IA1	18-21	INDIRECT ADDRESS NO.1 (RCM LSB=0)
N/A	22	NOT USED
XVAM	23	0=CYCLE T/M VAM, LOAD OBC VAM 1=CYCLE OBC VAM, LOAD T/M VAM
XCLK	24	1=REDUNDANT CLOCK 0=MAIN CLOCK
AROM	25	0=ADDRESS SINGLE FORMAT 1=ALTERNAT FORMAT(NOT USED ON IUE)
CFMT	26-27	COMPUTER FORMAT 0=DIRECT 2=OBC VAM 1=NOP 3=ROM
TFMT	28	TELEMETRY FORMAT 0=VAM 1=ROM
TMROM	29-30	0=1A, XFER ORBIT 2=1B, SI VIDEO 1=2A, MISSION 3=2B, OBC MEMORY
CODED	31	0=BLOCK CODE (UNCODED) 1=CONVOLUTIONAL (CODED)
MXR	32-34	MULTIPLEX RATIO: 0=ALL TM 4= 8:1 1=1:1 5=16:1 2=2:1 6=32:1 3=4:1
SRATE	35-37	TRANSFER RATIO: 0=80 KB 3=10 KB 1=40 KB 4= 5 KB 2=20 KB 5=2.5KB

BIT 1 IS THE MSB AND FIRST BIT OUT OF THE CMD.DECODER

DMU-1 SERIAL CMD.NO.6 HEX ADDRESS B0  
DMU-2 SERIAL CMD.NO.14 HEX ADDRESS B8



VAM WORD BIT DEFINITIONS

NOTE: THE VAM IS LOADED IN 28 COMMANDS WITH THE FIRST 8 BITS OF THE FIRST COMMAND DON'T CARES. THEN WORD 127 FOLLOWED BY WORDS 0,1,...,126 IN SEQUENCE. LAST 4 BITS OF LAST COMMAND ARE DON'T CARES. ALL COMMANDS SHOULD BE SENT AS A BLOCK.

BIT 1 IS THE MSB AND FIRST BIT OUT OF THE CMD.DECODER

DMU-1 SERIAL CMD NO. 7 HEX ADDRESS F0  
 DMU-2 SERIAL CMD NO. 15 HEX ADDRESS F8

	(11)	(8)	(18)
	NOT USED	FUNCTION	DATA WORD
	1	12	20 37
ARGUMENT	FUNCTION	DEFINITION	
RESET	X'80'	HALT, RESET, AND CLEAR OBC (SETS BANK 0-DOES'T CLEAR MEMORY)	
GO	X'81'	INITIATE OBC (INTERRUPT 0)	
HLOAD, N	X'82'	LOAD FIXED MEMORY BANK (N=BANK#-IF N=1 SEND FUNCTION 86- IF N=2 SEND FUNCTION 87 - GENERATES 4096 COMMANDS)	
CMND, CODE, N	X'83'	EXECUTIVE REQUEST (INTERRUPT 10) DATA WORD MAKEUP: <pre> +-----+  CODE1 N     CODE RANGE=0-63 +-----+   N RANGE=0-4095 20  26 37 CODE  N 0  ADDRESS SELECT   N=0 ROM           N=1 DIRECT 1  SOFTWARE DUMP    N=BANK (0,1,2) 2  SOFTWARE LOAD    N=NUMBER WORDS(1-32+2CNTRL WD) 3  WORKER ON        N=WORKER # (0-22) 4  WORKER OFF       N=WORKER # (0-22) 5  CMD DECODER      N=0 DEC # 1     N=1 DEC # 2 6  ROM SELECT       N=0 3A          N=1 3B 7  RESET ERROR FRAME N=0 ZERO FRAME 0 8  STATION ID       N=0 XFER  N=1 GSFC  N=2 VILFRA 9  MONITOR MODE     N=0 CMD MODE  N=1 MONITOR MODE 10 SLEW ALL AXIS LO GAIN N=0ZEROS OUT SLEW, GOES TO HOLD MODE 11 OBC TLM IN (BANK1)N=0 40K N=1 20K N=2 10K N=3 5KB                         N=4 2.5KB 12 SAFE CMDS        N=1 FESOFF N=2 CLOSE SHUTTER     (ANY COMBINATIONS) N=4 CAMERA OFF 13 RGDY N=0 SAVE N=1 RESTORE 14 RATE TACH SWITCH N=0 ENABLE     N=1 DISABLE 15 FAULT            N=0 SET ERROR BIT, N=1 DON'T MON 16 ACS FLAG SWITCH  N=MODE BITS * 17 DELTA V BURN     N=DURATION IN .1024 SEC. 18 W/G CMD ENABLE   N=0 ALLOW CMDS, N=1 DISABLE </pre>	
SLOAD, A, B {,CMSUM}	X'84'	SOFTWARE LOAD X'83', CODE=2, N=B-A+3 A=FIRST ADDRESS X'84', A B=LAST ADDRESS X'84', FIRST DATA WORD X'84', ----- X'84', LAST DATA WORD X'84', CHECKSUM	
DUMP	X'85'	DUMP MEMORY BANK SET BY RESET 0, X'86' 1, OR X'87' 2.	
FIX1	X'86'	SET FIXED BANK 1.	
FIX2	X'87'	SET FIXED BANK 2.	

BIT 1 IS MSB AND FIRST BIT OUT OF CMD DECODER.  
OBC 1 SERIAL CMD 1 HEX C0  
OBC 2 SERIAL CMD 9 HEX C8



ARGUMENT	FUNCTION	DEFINITION
SDUMP,A		SELECT BANK DUMP(SENDS COMMAND 'CMND,1,A' WHERE A=0,1,OR2
HDUMP,A		HARDWARE DUMP SENDS COMMANDS: 'RESET'-'FIX(A)'-'DUMP'
LDBLK,A		LOAD BLOCK A=BLOCK NUMBER X'83',CODE=2,N=NUMBER DATA WORDS + 2 X'84',MSB+A X'84',FIRST DATA WORD X'84',----- X'84',LAST DATA WORD X'84',CHECK SUM
PATCH,A,B<, ....,Z>		SOFTWARE PATCH A=FIRST ADDRESS B-Z=DATA WORDS X'83',CODE=2,N=NUMBER DATA WORDS + 2 X'84',A X'84',B X'84',--- X'84',Z X'84',CHECKSUM

LIST OF OBC 'WORKERS'. A WORKER IS AN OBC APPLICATIONS PROGRAM.

NO.	STARTUP	WORKER	ROUTINE	WORKER FUNCTION
0	RUN	FLTX	YES	FLIGHT EXECUTIVE
1	OFF	W0	YES	SLEW AND HOLD ATTITUDE CONTROL
2	OFF	DB11	YES	MANEUVER PROCESSOR
4	ON	EXP	YES	EXPOSURE TIME(AFTER DB14)
5	ON	BRL	YES	BRIGHT LIGHT PROTECTION
6	ON	PNT	YES	POINTING CONSTRAINT
7	ON	MEMY	YES	MEMORY SUM CHECK(TURNED OFF FOR CHANGE)
8	ON	CPUT	YES	CPU FUNCTIONAL TEST
9	ON	DIAO	YES	ACS (WORKER 0) TIME OUT
10	OFF	RATE	YES	RATE ARREST MODE
11	OFF	TACH	NO	WHEEL SPEED HOLD MODE
12	OFF	SATT	NO	SAFE ATTITUDE
17	OFF	SAFE	NO	SHUTDOWN FES,CAMERA,SHUTTER
13	OFF	CDTT	NO	CMD DECODER TEST
18	OFF	DLY	NO	DELAY COMMANDS--USED FOR JET FIRES AND ABM FIRE
19	OFF	S/W LOAD	YES	CONTROL SOFTWARE LOADS-EXECUTIVE REQUEST
20	OFF	SUNA	NO	SUN ACQUISITION/DELTA V BURN
21				
22	OFF	ABG	NO	ZERO OUT ABG

\* BIT(N)

- 1 SUN ACQUISITION OR DELTA VELOCITY JET MAPPER 0=SUN-ACQ,1=DELTA
- 2 PRECESSION SENSOR SELECT 0=SMSS,1=PAS
- 3 NUTATION ACCEL. SELECT 0=AC A,1=AC B
- 4 JET SELECT 0=PRIME,1=SECONDARY
- 5 SUN ACQUISITION DELTA V PITCH CONTROL LAW 0=E+DE,1=DE
- 6 SUN ACQUISITION DELTA V YAW CONTROL LAW 0=E+DE,1=DE
- 7 SUN ACQUISITION DELTA V ROLL CONTROL LAW 0=E+DE,1=DE
- 8 EV SELECT 0=NO.1,1=NO.2
- 9
- 10
- 11
- 12

:NUTAT

	(5)	(4)	(4)	(1)	(1)	(1)	(21)
	NOT USED	ZERADJ	TADJ	TGA	NUTIN	NUTEN	NOT USED
	1	6	10	14	15	16	17 37
MNEUMONIC	BITS	FUNCTION					
NOT USED	1-5	SET TO ZERO					
ZERADJ	6-9	ZERO CROSSING ADJUST $(-.14 + ZERADJ * .017V)(+/- 5\%)$					
TADJ	10-13	THRESHOLD ADJUST (BIT 10=MSB) $(.014V/COUNT REF AT 4.96V)$					
TGA	14	GAIN ADJUST $0 = -0.52V + TADJ * 0.0147V(+/-5\%)(PRE ABM)$ $1 = -0.72V + TADJ * 0.0147V(+/-5\%)(POST ABM)$					
NUTIN	15	NUTATION ON WHEN 0 NUTATION OFF WHEN 1					
NUTEN	16	NUTATION REGISTER UPDATE (BITS 1-15) ALWAYS '1' FOR NUTATION					
NOT USED	17-37	SET TO ZERO'S.					

:PRECESS

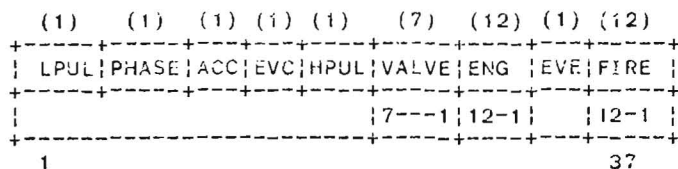
	(14)	(2)	(1)	(4)	(1)	(7)	(8)
	NOT USED	'11'	PSUN	PLONG	PESUN	PSTART	PFIRE
	1	15	17	18	22	23	30 37
MNEUMONICS	BITS	FUNCTION					
NOT USED	1-14	SET TO ZERO'S					
	15-16	SET TO '11' TO INHIBIT NUTATION					
PSUN	17	SUN PULSE				0=SELECT SMSS PULSE 1=SELECT PAS PULSE	
PLONG	18-21	SECTOR FIRE COUNT (0-15)					
PESUN	22	FIRE PULSE				0=SUN DISABLE ** 1=FIRE ON SUN PULSE	
PSTART	23-29	START SECTOR (0-127)					
PFIRE	30-37	NUMBER OF PRECESSION FIRINGS (0-255)					

BIT 1 IS THE MSB AND FIRST BIT OUT OF THE CMD.DECODER

SERIAL CMD NO.37 HEX ADDRESS D2  
THE 5 VOLT 5% POWER SUPPLY IS USED FOR REFERENCE FOR  
ZERADJ, TADJ AND TGA.

'NOT USED' IMPLIES SET TO ZEROS

\*\* IF BIT 22 IS SET TO ONE, THEN 'PSTART' SHOULD BE SET TO ZERO.  
NOT SETTING 'PSTART' TO ZERO WILL RESULT IN THE PRECESSION  
JETS FIRING AT BOTH ZERO SECTOR AND THAT SPECIFIED IN  
'PSTART' FOR THE DURATION SPECIFIED IN 'PLONG'

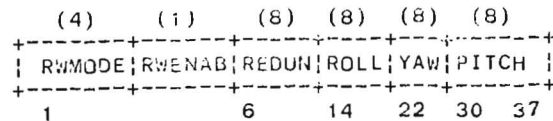


MNEMONIC	BIT NO.	FUNCTION	
LPUL	1	LOW THRUST ENGINE MODE	0=CONTINUOUS 1=PULSE
PHASE	2	ACCELEROMETER PHASE:	0=NON-INVERT 1=INVERT
ACC	3	ACCELEROMETER SELECT:	0=ACCELEROMETER NO. 1 1=ACCELEROMETER NO. 2
EVC	4	MODE CONTROL:	0=SECONDARY MODE CONTROL 1=PRIMARY MODE CONTROL
HPUL	5	HIGH THRUST ENGINES MODE	0=CONTINUOUS 1=PULSE
VALVE	6-12	VALVES:	0=CLOSE VALVES 1=OPEN VALVES
ENG	13-24	ENGINE ENABLE:	0=DISABLE ENGINES 1=ENABLE ENGINES
EVE	25	E/V ENABLE:	0=DISABLE BITS 1-24 1=ENABLE BITS 1-24
FIRE	26-37	ENGINE FIRE:	0=ENGINE SHUTDOWN 1=ENGINE FIRE

BIT 1 IS THE MSB AND IS FIRST OUT OF THE DECODER

EV-1 SERIAL CMD NO. 21 HEX ADDRESS D4  
EV-2 SERIAL CMD NO. 29 HEX ADDRESS DC

'VALVE' CAN BE SET WITH CONSTANTS V1-V7 FOR VALVES 1-7.  
'ENG' AND 'FIRE' CAN BE SET WITH CONSTANTS J1-J12 FOR JETS 1-12



MNEMONIC	BIT	FUNCTION
RWMODE	1-4	MODE DECODER
		0000 RESET
		0001 R1,CSS SUN ACQ. JET-IRA RATE1(GYRO1,3,5)
		0010 R1,CSS,S3 SUN ACQ. WHEEL-IRA RATE1(GYRO1,3,5)
		0011 R2,CSS SUN ACQ. JETS-IRA RATE2(GYRO2,4,6)
		0100 R2,CSS,S3 SUN ACQ. WHEEL-IRA RATE2(GYRO2,4,6)
		0101 R1 JET RATE DAMP-IRA RATE1(GYRO1,3,5)
		0110 R1,S3 WHEEL HOLD-IRA RATE1(GYRO1,3,5)
		0111 R2 JET RATE DAMP-IRA RATE2(GYRO2,4,6)
		1000 RESET
		1001 R2,S3 WHEEL HOLD-IRA RATE2(GYROS2,4,6)
		1010 CSS,S3 WHEEL SUNBATH-POWER RESTORE MODE
		1011 S1 DIGHOLD,SLEW,MODE,GRADCNTRL,OPNLOOP
		1100 S2 DIGHOLD,SLEW,MODE,GRNDCNTRL,OPNLOOP
		1101 RESET
		1110 RESET
		1111 RESET
RWENAB	5	REACTION WHEEL MODE CONTROL 0=DISABLE 1=ENABLE
REDUN	6-13	REDUNDANT WHEEL CMD (0-255) 13=MSB ; SUPPLIED TO CCIL/PCL
ROLL	14-21	ROLL WHEEL CMD (0-255) 21=MSB ; IN INTEGER (0-255).
YAW	22-29	YAW WHEEL CMD (0-255) 29=MSB ;
PITCH	30-37	PITCH WHEEL CMD (0-255) 37=MSB ;

SYMBOL	DEFINITION
R1	ENABLE RATE 1 TO C&M CARD
R2	ENABLE RATE 2 TO C&M CARD
CSS	ENABLE COARSE SUN SENSOR
S3	C&M CMD TO WHEEL DRIVER
S1	ENABLE D/A 1 TO WHEEL DRIVER
S2	ENABLE D/A 2 TO WHEEL DRIVER

DIGITAL TO ANALOG VALUES: MINUS FULL SCALE (CCW) = X'FF' (CCIL/PCL REQUIRE  
 ZERO = X'80' POSITIVE INTEGER  
 PLUS FULL SCALE (CW) = X'00' 0-255)  
 EACH COUNT IS WORTH 20 MV.

BIT 1 IS THE MSB AND FIRST BIT OUT OF THE COMMAND DECODER

RW-1 SERIAL CMD. 5 HEX ADDRESS D0  
 RW-2 SERIAL CMD. 13 HEX ADDRESS D8

(12)	(1)	(2)	(1)	(9)	(1)	(1)	(1)	(9)
N/A	PASMOD	PASCLK	PASDIR	PASMAX	PASLEW	PASCAN	PASSUN	PASMIN
1								37

MNEMONIC	BIT #	FUNCTION
N/A	1-12	NOT USED
PASMOD	13	0=SPHERICAL MODE 1=PLANAR MODE
PASCLK	14-15	0=1250 HZ CLOCK, 78.0 STEPS PER SECOND 1= 625 HZ CLOCK, 39.0 STEPS PER SECOND 2= 312 HZ CLOCK, 19.5 STEPS PER SECOND 3= 156 HZ CLOCK, 9.8 STEPS PER SECOND
PASDIR	16	0=CCW SCAN DIRECTION. 1= CW SCAN DIRECTION.
PASMAX	17-25	THETA MAXIMUM ANGLE
PASLEW	26	0=SLEW DISABLE. 1=SLEW ENABLE.
PASCAN	27	0=SELECT CONTINUOUS SUBMODE SCAN 1=SELECT SECTOR SCAN
PASSUN	28	0=SELECT PAS SUN SENSOR 1=SELECT SMSS SUN SENSOR
PASMIN	29-37	THETA MINIMUM ANGLE

BIT 1 IS THE MSB AND THE FIRST BIT OUT OF THE COMMAND DECODER.

PAS - 1 SERIAL COMMAND #38 HEX ADDRESS B2.  
PAS - 2 SERIAL COMMAND #46 HEX ADDRESS BA.

(4)	(5)	(5)	(6)	(1)	(1)	(10)	(3)
NOT	IRAMC	IRAGYR	IRAHTR	IRACOLD	IRAQB	IRABD	IRABA
USED	6---1	6---1	6---1				Y R P
1	5	11	17	23			37

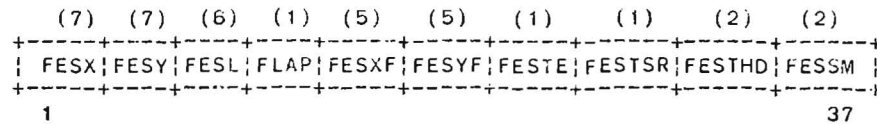
MNEMONIC	BIT NO.	FUNCTION	
NOT USED	1-4	NOT USED	
IRAMC	5-10	MODE CONTROL	0=RATE 1=HOLD/SLEW
IRAGYR	11-16	GYRO SELECT	0=OFF 1=ON
IRAHTR	17-22	HEATER SELECT	0=LO(4.5 WATTS) 1=HI(12 WATTS)
IRACOLD	23	RATE COLD	0=RATE NORMAL BITS(5-10) 1=RATE COLD BITS(5-10) NOT USED HOLD/SLEW MODE
IRAQB	24	QUALIFIER BIT	0=DISABLE BITS 1-23 1=ENABLE BITS 1-23
IRABD	25-34	BIAS DATA BIT 25=MSB BIT 25 SIGN BIT 1=PLUS BIT 26-34 = DATA BITS .05 ARC SEC/BIT	
IRABA	35-37	BIAS ADDRESS	000=DISABLE 001=PITCH ACTIVE 010=ROLL ACTIVE 100=YAW ACTIVE

BIT 1 IS THE MSB AND FIRST BIT OUT OF THE DECODER

IRA-1 SERIAL CMD.NO.24 HEX ADDRESS 8C

IRA-2 SERIAL CMD.NO.32 HEX ADDRESS 82

'IRAMC', 'IRAGYR', 'IRAHTR' CAN BE SET WITH CONSTANTS GY1-GY6 FOR GYROS 1-6.



MNEMONIC	BIT NO.	FUNCTION
FESX	1-7	FRAME START COORDINATE COURSE OFFSET. MSB=1 (-63 TO 63)
FESY	8-14	LINE START COORDINATE COURSE OFFSET. MSB=8 (-63 TO 63)
FESL	15-20	FRAME AND LINE LENGTH (0 TO 63) LSB=8,64 ARC-SEC
FLAP	21	UNDERLAP,0=OVERLAP 1=UNDERLAP
FESXF	22-26	HORIZONTAL FINE POSITIONING FRAME 5 LSB(0 TO 31) LSB=0.27 A
FESYF	27-31	VERTICAL FINE POSITIONING LINE 5 LSB(0 TO 31) LSB=0.27 ARC-S
FESTE*	32	TRACK ENABLE 0=MAP ONLY 1=MAP THEN TRACK
FESTSR***	33	TRACK SCAN RATE CHANGE 0=FAST 1=SLOW
FESTHD**	34-35	THRESHOLD,0=+11 1=+10 2=+9 3=+8
FESSM	36-37	SYSTEM MODE 0=PRIMARY 1=SEARCH AND TRACK 2=FIELD CAMERA 3=NOT USED

BIT 1 IS THE MSB AND FIRST BIT OUT OF THE CMD.DECODER

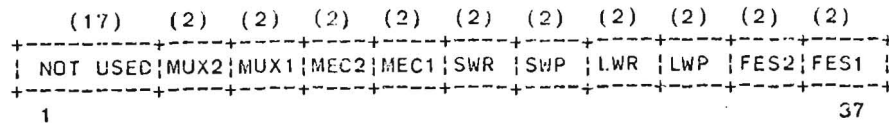
FES 1 SERIAL CMD.NO.39 HEX ADDRESS F2  
FES 2 SERIAL CMD.NO.47 HEX ADDRESS FA

NOTE: WHILE IN FESSM=2 AND FESTE=1, FESTHD SETTING ARE NOT ABSOLUTE  
BUT DEPEND ON WHETHER FES1 OR FES2 IS USED AND THD TELEMETRY  
BIT RATE. THIS IS LEFT TO THE USER.

\* IGNORED IF FESSM=0

\*\* IGNORED IF FESTE=0

\*\*\* IN FESSM=2, FESTSR IS MEANINGFUL ONLY IF FESTE=1



MNEMONIC	BIT NO.	FUNCTION	
NOT USED	1-17	NOT USED	
MUX2	18	MUX NO.2	1=ON 0=OFF
	19	MUX NO.2	1=ENABLE
MUX1	20	MUX NO.1	1=ON 0=OFF
	21	MUX NO.1	1=ENABLE
MEC2	22	MEC NO.2	1=ON 0=OFF
	23	MEC NO.2	1=ENABLE
MEC1	24	MEC NO.1	1=ON 0=OFF
	25	MEC NO.1	1=ENABLE
SWR	26	CAMERA NO.4	1=ON 0=OFF
	27	CAMERA NO.4	1=ENABLE
SWP	28	CAMERA NO.3	1=ON 0=OFF
	29	CAMERA NO.3	1=ENABLE
LWR	30	CAMERA NO.2	1=ON 0=OFF
	31	CAMERA NO.2	1=ENABLE
LWP	32	CAMERA NO.1	1=ON 0=OFF
	33	CAMERA NO.1	1=ENABLE
FES2	34	FES NO.2	1=ON 0=OFF
	35	FES NO.2	1=ENABLE
FES1	36	FES NO.1	1=ON 0=OFF
	37	FES NO.1	1=ENABLE

BIT 1 IS THE MSB AND FIRST BIT OUT OF THE CMD.DECODER

LVSW-1 SERIAL CMD.NO.4 HEX ADDRESS 90  
 LVSW-2 SERIAL CMD.NO.12 HEX ADDRESS 98



```

(19) (1) (1) (1) (15)
+-----+-----+-----+-----+
|N/A| 1 |CLOSE|OPEN|N/A|
+-----+-----+-----+-----+
1 20 21 22 37

ARGUMENT BIT FUNCTION

(NONE) 20 DESELECT APERTURE (BITS 21-22=0)
CLOSE 21 CLOSE APERTURE
OPEN 22 OPEN APERTURE

:CAMSEL
(22) (1) (1) (1) (1) (10)
+-----+-----+-----+-----+
|N/A| 1 |SWR|SWP|LWR|LWP|N/A|
+-----+-----+-----+-----+
1 23 24 25 26 27 37

ARGUMENT BIT FUNCTION

(NONE) 23 DESELECT CAMERAS (BITS 24-27=0)
SWR 24 SELECT SHORT WAVE REDUNDANT CAMERA
SWP 25 SELECT SHORT WAVE PRIME CAMERA
LWR 26 SELECT LONG WAVE REDUNDANT CAMERA
LWP 27 SELECT LONG WAVE PRIME CAMERA

:DISP
(27) (1) (1) (1) (1) (1) (5)
+-----+-----+-----+-----+
|N/A| 1 |SWL|SWH|LWL|LWH|N/A|
+-----+-----+-----+-----+
1 28 29 30 31 32 37

ARGUMENT BIT FUNCTION

(NONE) 28 DESELECT DISPERSION (BITS 29-32=0)
SWL 29 SHORT WAVELENGTH LOW DISPERSION
SWH 30 SHORT WAVELENGTH HIGH DISPERSION
LWL 31 LONG WAVELENGTH LOW DISPERSION
LWH 32 LONG WAVELENGTH HIGH DISPERSION

:FOCUS
(32) (1) (4)
+-----+-----+
|N/A| 1 |FOC|
+-----+-----+
1 33 37

MNEMONIC BITS FUNCTION

FOC 34-37 FOCUS DRIVE SELECT 8=PHI2B
4=PHI1B
2=PHI2A
1=PHI1A

```

BIT 1 IS THE MSB AND THE FIRST BIT OUT OF THE CMD DECODER  
 ALL NON APPLICABLE FIELDS SHOULD BE SET TO 0.  
 THE ARGUMENTS FOR ANY COMMAND ARE MUTUALLY EXCLUSIVE.  
 MECH 1 SERIAL CMND 20, HEX ADDRESS 94  
 MECH 2 SERIAL CMND 28, HEX ADDRESS 9C

```

(1) (7) (1) (7) (1) (7) (13)
+-----+-----+-----+-----+
| 1 | G3 | 0 | YAL | 0 | XAL | N/A |
+-----+-----+-----+-----+
1                                     37

```

SYMBOL	BIT	FUNCTION
G3	2- 8	GRID 3 DAC SETTING
YAL	10-16	Y-ALIGNMENT DAC
XAL	18-24	X-ALIGNMENT DAC

G3D(\*)=GRID 3 DEFOCUSED  
G3F(\*)=GRID 3 FOCUSED  
YAN(\*)=Y-ALIGNMENT NORMAL  
YAMC(\*)=Y-ALIGNMENT MINIMAL CNTRD  
XAN(\*)=X-ALIGNMENT NORMAL  
XAMC(\*)=X-ALIGNMENT MINIMAL CNTRD

:SIHTR

```

(1) (7) (1) (7) (1) (7) (13)
+-----+-----+-----+-----+
| 0 | HTR| 1 | SEC | 0 | G1 | N/A |
+-----+-----+-----+-----+
1                                     37

```

SYMBOL	BIT	FUNCTION
HTR	2- 8	HEATER VOLTAGE
SEC	10-16	SECONDARY HIGH VOLTAGE GAIN SETTING
G1	18-24	GRID 1 DAC SETTING

HTL(\*)=HEATER VOLTAGE LOW  
HTH(\*)=HEATER VOLTAGE HIGH  
SEC1(\*)=MAX GAIN (EXPOSE)  
SEC2(\*)=MED GAIN (EXPOSE)  
SEC3(\*)=MIN GAIN (EXPOSE)  
SEC4(\*)=PREP GAIN  
SECMX(\*)=MAX. SEC  
G1CO(\*)=GRID 1 CUTOFF  
G1ED(\*)=GRID 1 ERASE DEFOCUSED  
G1EF(\*)=GRID 1 ERASE FOCUSED  
G1RD(\*)=GRID 1 READ  
G1MX(\*)=GRID 1 VOLTAGE

:SIUVC

```

(1) (7) (1) (7) (1) (7) (13)
+-----+-----+-----+-----+
| 0 | N/A | 0 | N/A | 1 | UVC | N/A |
+-----+-----+-----+-----+
1                                     37

```

SYMBOL	BIT	FUNCTION
UVC	18-24	UVC GAIN SETTING

UVC1(\*)=MAX GAIN (EXPOSE)  
UVC2(\*)=MED GAIN (EXPOSE)  
UVC3(\*)=MIN GAIN (EXPOSE)  
UVC4(\*)=PREP  
UVCOF(\*)=UVC CUTOFF  
UVCMX(\*)=MAX.UVC

BIT 1 IS THE MSB AND THE FIRST BIT OUT OF THE DECODER.  
CAM(LWP)NO.1 SERIAL CMD NO.19 HEX ADDRESS E4  
CAM(LWR)NO.2 SERIAL CMD NO.27 HEX ADDRESS EC  
CAM(SWP)NO.3 SERIAL CMD NO.35 HEX ADDRESS E2  
CAM(SWR)NO.4 SERIAL CMD NO.43 HEX ADDRESS EA

\* A VALUE FROM 1-4. EXPLICIT IN PCL. IMPLICIT WITH 'SW CAM,\*' IN CCIL.  
ALL NON APPLICABLE BITS SHOULD BE SET TO ZERO.

(24)	(1)	(12)
NOTAPPLICABLE	1	MODE
1	25	37

:SIMODE

ARGUMENT BITS FUNCTION  
MODE 26-37 BITS ASSIGNED FROM FOLLOWING ARGUMENTS:

WLC	26	WAVELENGTH CALIBRATION LAMP
TF2	27	TUNGSTEN FLOOD LAMP ENABLE PS # 2
SZ	28-29	STEP SIZE (BIT 28=MSB)
FB	35	FUDICIAL AND BACKHOLE LAMP ENABLE
TF1	36	TUNGSTEN FLOOD LAMP ENABLE PS # 1
UVF	37	UV FLOOD LAMP ENABLE

ARGUMENT	COMMAND BITS					FUNCTION
MODE	30	31	32	33	34	
EX	1	0	0	0	1	EXPOSE
ER	0	0	1	0	1	ERASE FAST
RDER	0	0	0	1	1	ERASE READ RATE
RDLO	0	1	0	1	1	READ LO GAIN
RDHI	0	1	0	1	0	READ HI GAIN
STBY	0	0	0	0	1	STANDBY

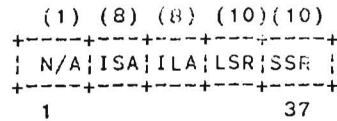
BIT 1 IS THE MSB AND THE FIRST BIT OUT OF THE DECODER.

CAM(LWP)NO.1 SERIAL CMD NO.19 HEX ADDRESS E4  
 CAM(LWR)NO.2 SERIAL CMD NO.27 HEX ADDRESS EC  
 CAM(SWP)NO.3 SERIAL CMD NO.35 HEX ADDRESS E2  
 CAM(SWR)NO.4 SERIAL CMD NO.43 HEX ADDRESS EA

NOTE:

SZ IS A VARIABLE PICKED UP AS LAST ASSIGNED AND CANNOT BE ASSIGNED IN COMMAND  
 NORMAL VALUE IS 1.

ALL NOT APPLICABLE BITS SHOULD BE SET TO 0.



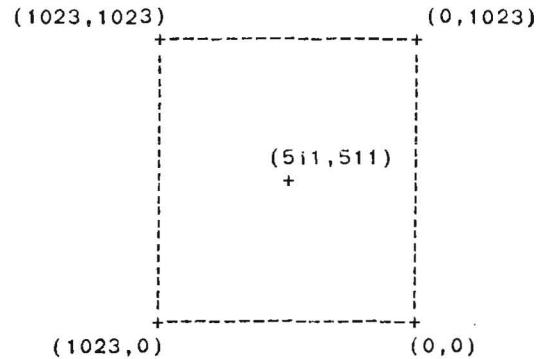
MNEMONIC	BIT NO.	FUNCTION
N/A	1	NOT USED
ISA	2-9	STARTING SAMPLE (INITIAL SAMPLE ADDRESS-895)
ILA	10-17	STARTING LINE (INITIAL LINE ADDRESS-895)
LSR	18-27	NUMBER OF LINES (LINE SCAN RANGE-768)
SSR	28-37	NUMBER OF SAMPLES PER LINE (SAMPLE SCAN RANGE-768)

BIT 1 IS THE MSB AND FIRST BIT OUT OF CMD.DECODER  
MNEUMONICS ARE 4 ELEMENT ARRAYS INDEXED BY CAMERA NUMBER.

CAM(LWP)NO.1 SERIAL CMD NO.18 HEX ADDRESS A4  
CAM(LWR)NO.2 SERIAL CMD NO.26 HEX ADDRESS AC  
CAM(SWP)NO.3 SERIAL CMD NO.34 HEX ADDRESS A2  
CAM(SWR)NO.4 SERIAL CMD NO.42 HEX ADDRESS AA

ISA,ILA EXAMPLES:  
INPUT (DEC.) 8 BIT CMD.FIELD (HEX) 10 BIT SSCL REGISTER (HEX)

1023,1023	FF,FF	3FF,3FF
896,896	E0,E0	383,383
512,512	80,80	203,203



ISA,ILA ORIENTATION  
(OPERATOR INPUT)

\*\*\*\*\*COMMAND DECODER\*\*\*\*\*

DISABLE CMDS. ON ADDRESSED ENC. :IMP 48 CMDEC1 OR CMDEC2 1=ON  
 ENABLES CMDS. ON ADDRESSED ENC. :IMP 112 CMDEC1 OR CMDEC2 0=OFF  
 ENABLES CMDS.ON ENCODER NOT ADDR. :IMP 120 CMDEC1 OR CMDEC2 1=ON

\*\*\*\*\*COMPENSATION & MIXING\*\*\*\*\*

COMPENSATION/MIXING-CONVERTER 1 :IMP 75 NDT  
 COMPENSATION/MIXING-CONVERTER 2 :IMP 76 NDT

\*\*\*\*\* DATA MULTIPLEXER UNIT \*\*\*\*\*

DMU 1-CONTROL :CRU ON,6 TM=TDMU,WD61,FC2,B8 (1)  
 DMU 2-CONTROL :CRU ON,17 TM=TDMU,WD63,FC2,B3 (1)  
 VAM SERIAL COMMAND :VAM SEE TELEMETRY LISTINGS  
 DMU SERIAL COMMAND :DMU SEE TELEMETRY LISTINGS

\*\*\*\*\*FINE ERROR SENSOR\*\*\*\*\*

FES1 SEARCH ADVANCE :IMP 62 NO DIRECT VERIFY  
 FES2 SEARCH ADVANCE :IMP 63 NO DIRECT VERIFY  
 FES COMMANDS :FES SEE TELEMETRY LISTINGS

\*\*\*\*\*FINE SUN SENSOR\*\*\*\*\*

FSS NO.1 SENSOR HEAD TOGGLE :IMP 113 DSC 2 BIT 16 0=HEAD NO.1  
 FSS NO.2 SENSOR HEAD TOGGLE :IMP 114 DSC 3 BIT 16 0=HEAD NO.1  
 FINE SUN SENSOR#1 PWR ON :CRU ON,21 AS1CH-59 <0.1=OFF >3V=ON  
 FINE SUN SENSOR#2 PWR ON :CRU ON,53 AS1CH-60 <0.1=OFF >3V=ON

\*\*\*\*\*HYDRAZINE SYSTEM\*\*\*\*\*

ENGINE/VALVE DRIVER #2 28V. SUP. :CRU ON,14 EVD2 ON=1,OFF=0  
 ENGINE/VALVE DRIVER #1 28V. SUP. :CRU ON,3 EVD1 ON=1,OFF=0  
 WDA POWER SUPPLY NO 1(2) :CRU ON,4(15) AS2CH00(05)>3V=ON  
 ARM HAPS HEATER GROUPS 1,4,6,7 :CRU ON,43 NO DIRECT VERIFICATION  
 ARM HAPS HEATER GROUPS 2,3,5 :IMP 99 HYDHTRM = 1  
 E/V CMD LOGIC 1 TO CONVERTER 1 :IMP 87 NO DIRECT VERIFY  
 E/V CMD LOGIC 1 TO CONVERTER 2 :IMP 88 NO DIRECT VERIFY  
 E/V CMD LOGIC 2 TO CONVERTER 1 :IMP 89 NO DIRECT VERIFY  
 E/V CMD LOGIC 2 TO CONVERTER 2 :IMP 90 NO DIRECT VERIFY  
 HAPS HTR/TM MODULE TO CONVERTER 1 :IMP 85 NO DIRECT VERIFY  
 HAPS HTR/TM MODULE TO CONVERTER 2 :IMP 86 NO DIRECT VERIFY  
 TURN ON GROUP 1 HEATERS :IMP 91 HYDHTR1 = 1  
 TURN OFF GROUP 1 HEATERS :IMP 92 HYDHTR1 = 0  
 TURN ON GROUP 4 HEATERS :IMP 93 HYDHTR4 = 1  
 TURN OFF GROUP 4 HEATERS :IMP 94 HYDHTR4 = 0  
 TURN ON GROUP 6 HEATERS :IMP 95 HYDHTR6 = 1  
 TURN OFF GROUP 6 HEATERS :IMP 96 HYDHTR6 = 0  
 TURN ON GROUP 7 HEATERS :IMP 97 HYDHTR7 = 1  
 TURN OFF GROUP 7 HEATERS :IMP 98 HYDHTR7 = 0  
 DISARM HAPS HEATER GROUPS 2,3,5 :IMP 100 HYDHTRM = 0  
 TURN ON GROUP 2 HEATERS :IMP 101 HYDHTR2 = 1  
 TURN OFF GROUP 2 HEATERS :IMP 102 HYDHTR2 = 0  
 TURN ON GROUP 3 HEATERS :IMP 107 HYDHTR3 = 1  
 TURN OFF GROUP 3 HEATERS :IMP 108 HYDHTR3 = 0  
 TURN ON GROUP 5 HEATERS :IMP 109 HYDHTR5 = 1

TURN OFF GROUP 5 HEATERS :IMP 110 HYDTR5 = 0  
HAPS SYSTEM SERIAL COMMAND :EV SEE TELEMETRY SECTION

\*\*\*\*\*IRA SYSTEM\*\*\*\*\*

CONTROL ELECTRONICS #A ON :CRU ON,28 DSO/1 B'13'=1/0 IRACE  
CONTROL ELECTRONICS #B ON :CRU ON,32 DSO/1 B'14'=1/0 IRACE  
GYRO#1 PWR SUPPLY ON :CRU ON,5 DSO/1 B'21'=1/0 IRAGY  
GYRO#2 PWR SUPPLY ON :CRU ON,16 DSO/1 B'22'=1/0 IRAGY  
GYRO#3 PWR SUPPLY ON :CRU ON,27 DSO/1 B'23'=1/0 IRAGY  
GYRO#4 PWR SUPPLY ON :CRU ON,38 DSO/1 B'24'=1/0 IRAGY  
GYRO#5 PWR SUPPLY ON :CRU ON,44 DSO/1 B'25'=1/0 IRAGY  
GYRO#6 PWR SUPPLY ON :CRU ON,60 DSO/1 B'26'=1/0 IRAGY  
IRA GYRO COMMAND :IRA SEE TELEM LIST

\*\*\*\*\*LOW VOLTAGE SWITCH\*\*\*\*\*

EEA LOW VOLTAGE SW-SELECT P.S. 1 :IMP 43 NDT  
EEA LOW VOLTAGE SW-SELECT P.S. 2 :IMP 44 NDT  
EEA LOW VOLTAGE SW-ALL LOADS OFF :IMP 47 NDT  
EEA POWER SUPPLY NO.1 ON/OFF :CRU ON,1 ASC2CH57<.1V=OFF,>4V=ON  
EEA POWER SUPPLY NO.2 ON/OFF :CRU ON,12 ASC2CH59<.1V=OFF,>4V=ON  
LOW VOLTAGE SWITCH SERIAL COMMAND :LVSW SEE TELEMETRY LISTINGS

\*\*\*\*\*MECHANISMS\*\*\*\*\*

SUN SHUTTER OPEN :IMP 45 SSOPEN=0(OOPEN)  
SUN SHUTTER CLOSE :IMP 46 SSCLOS=1(CLOSE)  
SUN SHUTTER DIRECT DRIVE :CRU ON,20 NO DIRECT VERIFY  
SUN SHUTTER DIRECT SELECT :CRU ON,30 NO DIRECT VERIFY  
SUN SHUTTER ELECTRONICS :CRU ON,9 NO DIRECT VERIFY  
FOCUS DRIVE NO.1 :CRU ON,18 NO DIRECT VERIFY  
FOCUS DRIVE NO.2 :CRU ON,29 NO DIRECT VERIFY  
FOCUS DRIVE SELECT SERIAL CMDS. :FOCUS SEE TELEMETRY LISTING  
FOCUS LAUNCH HOLD :CRU ON,40 NO DIRECT VERIFY  
FOCUS POSITION ELECTRONICS :CRU ON,33 NO DIRECT VERIFY  
FOCUS ELECTRONICS 1 - START FOCUS :IMP 60 NO DIRECT VERIFY  
FOCUS ELECTRONICS 2 - START FOCUS :IMP 61 NO DIRECT VERIFY  
CAMERA SELECT NO.1& DECK HTR NO.1 :CRU ON,46 NO DIRECT VERIFY  
CAMERA SELECT NO.2& DECK HTR NO.2 :CRU ON,55 NO DIRECT VERIFY  
CAMERA SELECT SERIAL COMMANDS :CAMSEL SEE TELEMETRY LISTING  
MODE SELECT NO.1 :CRU ON,13 NO DIRECT VERIFY  
MODE SELECT NO.2 :CRU ON,8 NO DIRECT VERIFY  
DISPERSION SELECT SERIAL CMDS. :DISP SEE TELEMETRY LISTING  
APERTURE SELECT NO.1 :CRU ON,41 NO DIRECT VERIFY  
APERTURE SELECT NO.2 :CRU ON,52 NO DIRECT VERIFY  
APERTURE SERIAL COMMANDS :APER SEE TELEMETRY LISTING

\*\*\*\*\*ON BOARD COMPUTER\*\*\*\*\*

OBC NO.1 CPU ON :IMP 49 DSC CH09=FALSE=ZERO  
OBC NO.1 CPU OFF :IMP 50 DSC CH09=TRUE =NON-ZERO  
OBC NO.1 UPPER MEMORY BUS ON :IMP 52 DSC CH18=TRUE =NON-ZERO  
OBC NO.1 UPPER MEMORY BUS OFF :IMP 53 DSC CH18=FALSE=ZERO  
OBC NO.1 LOWER MEMORY BUS ON :IMP 54 DSC CH19=TRUE =NON-ZERO  
OBC NO.1 LOWER MEMORY BUS OFF :IMP 55 DSC CH19=FALSE=ZERO  
OBC NO.2 CPU ON :IMP 51 DSC CH10=FALSE=ZERO  
OBC NO.2 CPU OFF :IMP 19 DSC CH10=TRUE=NON-ZERO  
OBC NO.2 UPPER MEMORY BUS ON :IMP 56 DSC CH20=TRUE =NON-ZERO

OBC NO.2 UPPER MEMORY BUS OFF	:IMP 57	DSC CH20=FALSE=ZERO
OBC NO.2 LOWER MEMORY BUS ON	:IMP 58	DSC CH21=TRUE =NON-ZERO
OBC NO.2 LOWER MEMORY BUS OFF	:IMP 59	DSC CH21=FALSE=ZERO
OBC NO.2 CONVERTER POWER ON/OFF	:CRU ON,10	ASC2CH55<.1V=OFF,>4.5V=ON
OBC NO.1 CONFIGURATION PWR ON/OFF	:CRU ON,39	ASC2CH03<.1V=OFF,>3.5V=ON
OBC NO.1 CONVERTER POWER ON/OFF	:CRU ON,59	SC2CH03<.1V=OFF,>4.5V=ON
OBC NO.2 CONFIGURATION PWR ON/OFF	:CRU ON,50	ASC2CH55<.1V=OFF,>3.5V=ON
OBC SERIAL COMMANDS	:OBC	SEE TELEMETRY LISTINGS

\*\*\*\*\* PRECESSION/NUTATION-CONTROL \*\*\*\*\*

PRECESSION/NUTATION CARD PS 1	:IMP 73	NO DIRECT VERIFY
PRECESSION/NUTATION CARD PS 2	:IMP 74	NO DIRECT VERIFY
ACCELEROMETER A PS 1	:IMP 81	NO DIRECT VERIFY
ACCELEROMETER A PS 2	:IMP 82	NO DIRECT VERIFY
ACCELEROMETER B PS 1	:IMP 83	NO DIRECT VERIFY
ACCELEROMETER B PS 2	:IMP 84	NO DIRECT VERIFY
PRECESSION SERIAL COMMAND	:PRECESS	SEE TELEMETRY LISTINGS
NUTATION SERIAL COMMAND	:NUTAT	SEE TELEMETRY LISTINGS

\*\*\*\*\* PANORAMIC ATTITUDE SENSOR \*\*\*\*\*

PAS#1 POWER ON	:CRU ON,31	PASPWR#1 0=OFF 1=ON DSC-28
PAS#2 POWER ON	:CRU ON,45	PASPWR#2 0=OFF 1=ON DSC-29
PAS SERIAL COMMAND	:PAS	SEE TLM LISTING

\*\*\*\*\* POWER SYSTEM \*\*\*\*\*

BOOST REGULATOR NO.1 ON	:IMP 1	DSC CH.12 BIT 8=0
BOOST REGULATOR NO.1 OFF	:IMP 2	DSC CH.12 BIT 8=1
BOOST REGULATOR NO.2 ON	:IMP 3	DSC CH.13 BIT 8=0
BOOST REGULATOR NO.2 OFF	:IMP 4	DSC CH.13 BIT 8=1
CHARGE REGULATOR NO.1 ON	:IMP 5	DSC CH.12 BIT 6=0
CHARGE REGULATOR NO.1 TR.CHG.	:IMP 6	DSC CH.12 BIT 6=1
BATTERY NO.1 TR.CHG. HI	:IMP 7	DSC CH.12 BIT 5=0
BATTERY NO.1 TR.CHG. LO	:IMP 8	DSC CH.12 BIT 5=1
CHARGE REGULATOR NO.2 ON	:IMP 9	DSC CH.13 BIT 6=0
CHARGE REGULATOR NO.2 TR.CHG.	:IMP 10	DSC CH.13 BIT 6=1
BATTERY NO.2 TR.CHG. HI	:IMP 11	DSC CH.13 BIT 5=0
BATTERY NO.2 TR.CHG. LO	:IMP 12	DSC CH.13 BIT 5=1
BATTERY & 3RD ELEC. NO.1 ON	:IMP 13	DSC CH.12 BIT 7=0,BIT 1=0
BATTERY & 3RD ELEC. NO.1 OFF	:IMP 14	DSC CH.12 BIT 7=1,BIT 1=1
BATTERY & 3RD ELEC. NO.2 ON	:IMP 15	DSC CH.13 BIT 7=0,BIT 2=0
BATTERY & 3RD ELEC. NO.2 OFF	:IMP 16	DSC CH.13 BIT 7=1,BIT 2=1
3RD ELECTRODE NO.1 OFF	:IMP 18	DSC CH.12 BIT 1=1
3RD ELECTRODE NO.2 OFF	:IMP 20	DSC CH.13 BIT 2=1
BATTERY NO.1 UV DETECTOR ON	:IMP 21	DSC CH.12 BIT 4=0
BATTERY NO.1 UV DETECTOR OFF	:IMP 22	DSC CH.12 BIT 4=1
BATTERY NO.2 UV DETECTOR ON	:IMP 23	DSC CH.13 BIT 4=0
BATTERY NO.2 UV DETECTOR OFF	:IMP 24	DSC CH.13 BIT 4=1
+28V BUS UV DETECTOR ON	:IMP 25	DSC CH.12 BIT 2=0
+28V BUS UV DETECTOR OFF	:IMP 26	DSC CH.12 BIT 2=1
+28V BUS OC DETECTOR ON	:IMP 27	DSC CH.12 BIT 3=0
+28V BUS OC DETECTOR OFF	:IMP 28	DSC CH.12 BIT 3=1
AUTOMATIC LOAD REMOVE DISABLE	:IMP 29	DSC CH.13 BIT 3=1
AUTOMATIC LOAD REMOVE ENABLE	:IMP 30	DSC CH.13 BIT 3=0

\*\*\*\*\* PYRD SYSTEM \*\*\*\*\*

ARM PYRO BUSS WITH BATTERY #1	:CRU ON,61	PYROARM = 1
ARM PYRO BUSS WITH BATTERY #2	:CRU ON,64	PYROARM = 1
DISARM PYRO BUSS (SA & DUST COVER)	:CRU OFF,61,64	PYROARM = 0
FIRE PRIMARY (INBOARD) S A PYROS	:IMP 103	NDV. OBSERVE BUSS VOLTS
FIRE BACKUP SOLAR ARRAY PYROS	:IMP 104	(SCBUS) OR DEPLOYMENT
		(SAD1=0,SAD2=0,DEPLOYED)
ARM ABM FUSE WITH BATTERY #1	:CRU ON,62	ABMARM = 1
ARM ABM FUSE WITH BATTERY #2	:CRU ON,63	ABMARM = 1
DISARM ABM FUSE	:CRU OFF,62,63	ABMARM = 0
IGNITE APER. BOOST MOTOR FUSES	:IMP 106	ACCELA OR ACCELB OR ABM
		TEMP AS3CH19
DEPLOY S. 1. DUST COVER	:IMP 105	(SCBUS OR SI OBSERV'NS)

\*\*\*\*\*VHF SYSTEM\*\*\*\*\*

VHF NO.1 TRANSMITTER ON	:IMP 31	ASC1 CH.4 > 3.8 VOLT
VHF NO.1 TRANSMITTER OFF	:IMP 32	ASC1 CH.4 < 0.1 VOLT
VHF NO.1 RANGING ON	:IMP 33	OBSERVE RANGING DATA
VHF NO.1 RANGING OFF	:IMP 34	RANGING DATA LOSS
NO.1 MOD SOURCE NO.1 (DMU 1)	:IMP 35	OBSERVE TM WITH DMU 1 ON
NO.1 MOD SOURCE NO.2 (DMU 2)	:IMP 36	OBSERVE TM WITH DMU 2 ON
VHF NO.2 TRANSMITTER ON	:IMP 37	ASC1 CH.5 > 3.8 VOLT
VHF NO.2 TRANSMITTER OFF	:IMP 38	ASC1 CH.5 < 0.1 VOLT
VHF NO.2 RANGING ON	:IMP 39	OBSERVE RANGING DATA
VHF NO.2 RANGING OFF	:IMP 40	RANGING DATA LOSS
NO.2 MOD SOURCE NO.1 (DMU 1)	:IMP 41	OBSERVE TM WITH DMU 1 ON
NO.2 MOD SOURCE NO.2 (DMU 2)	:IMP 42	OBSERVE TM WITH DMU 2 ON

\*\*\*\*\*S-BAND SYSTEM\*\*\*\*\*

S-BAND POWER RELAY A	:CRU ON,7	RELAY A AND/OR B MUST BE
		CLOSED
S-BAND POWER RELAY B	:CRU ON,56	FOR S-BAND POWER TO BE ON
S-BAND SELECT 1 OR 2	:CRU ON,49	ASC1 CH.2 4.0VOLT=1 ON,
		CH.3 4.0VOLT=2 ON
POWER AMP NO.1	:CRU ON,25	SBPA1 0=OFF,1=ON
POWER AMP NO.2	:CRU ON,36	SBPA2 0=OFF,1=ON
POWER AMP NO.3	:CRU ON,42	SBPA3 0=OFF,1=ON
POWER AMP NO.4	:CRU ON,57	SBPA4 0=OFF,1=ON

\*\*\*\*\*REACTION WHEEL COMMANDS\*\*\*\*\*

PITCH WHEEL DRIVER	PS 1	:IMP 65	NO DIRECT VERIFY
PITCH WHEEL DRIVER	PS 2	:IMP 66	NO DIRECT VERIFY
YAW WHEEL DRIVER	PS 1	:IMP 67	NO DIRECT VERIFY
YAW WHEEL DRIVER	PS 2	:IMP 68	NO DIRECT VERIFY
ROLL WHEEL DRIVER	PS 1	:IMP 69	NO DIRECT VERIFY
ROLL WHEEL DRIVER	PS 2	:IMP 70	NO DIRECT VERIFY
REDUN WHEEL DRIVER	PS 1	:IMP 71	NO DIRECT VERIFY
REDUN WHEEL DRIVER	PS 2	:IMP 72	NO DIRECT VERIFY
WHEEL CMD D/A NO.1	PS 1	:IMP 77	NO DIRECT VERIFY
WHEEL CMD D/A NO.1	PS 2	:IMP 78	NO DIRECT VERIFY
WHEEL CMD D/A NO21	PS 1	:IMP 79	NO DIRECT VERIFY
WHEEL CMD D/A NO21	PS 2	:IMP 80	NO DIRECT VERIFY
+28V POWER TO WDA-PS1		:CRU ON,4	ASC2-0 <0.1V=OFF >3.0V=D
+28V POWER TO WDA-PS2		:CRU ON,15	ASC2-5 <0.1V=OFF >3.0V=D
+28V POWER TO PITCH WHEEL DRIVER		:CRU ON,26	ASC2-7 >0.1V=ON
+28V POWER TO YAW WHEEL DRIVER		:CRU ON,37	ASC2-8 >0.1V=ON



```

+28V POWER TO RED WHEEL DRIVE R :CRU ON,48      ASC2-9 >0.1V=ON
+28V POWER TO RED WHEEL DRIVE R :CRU ON,51      ASC2-10 >0.1V=0
REACTION WHEEL SERIAL COMMAND   :RW           SEE TELEMETRY LISTINGS

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*****SPIN MODE SUN SENSOR*****

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SPIN MODE SUN SENSOR ON/OFF      :CRU ON,54      AS2CH02<.1V=OFF,>=ON

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*****SCIENTIFIC INSTRUMENT*****

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CAL LAMP PWR SUPPLY NO.1         :CRU ON,11      DSC 30 1=ON 0=OFF
CAL LAMP PWR SUPPLY NO.2         :CRU ON,22      DSC 31 1=ON 0=OFF
SCEM NO.4 SHORT WAVE REDUNDANT   :CRU ON,19      DSC 27 1=ON 0=OFF
SCEM NO.1 LONG WAVE PRIME        :CRU ON,24      DSC 24 1=ON 0=OFF
SCEM NO.2 LONG WAVE REDUNDANT    :CRU ON,35      DSC 25 1=ON 0=OFF
SEC. MIRROR HTR.CIRCUIT NO.1     :CRU ON,2       NO DIRECT VERIFY
SEC MIRROR HTR CIRCUIT NO.2      :CRU ON,47      NO DIRECT VERIFY
SCEM NO.3 SHORT WAVE PRIME       :CRU ON,58      NO DIRECT VERIFY
PRIM MIRROR HTR CIRCUIT NO.1     :CRU ON,23      NO DIRECT VERIFY
PRIM.MIRROR HTR.CIRCUIT NO.2     :CRU ON,34      NO DIRECT VERIFY
CAMERA FOCUS AND ALIGNMENT       :SIALGN        SEE TELEMETRY LISTINGS
CAMERA HTR,SEC.VOLTAGE,DAC SETTING:SIHTR        SEE TELEMETRY LISTINGS
UVC DAC SETTING                  :SIUVC         SEE TELEMETRY LISTINGS
SCAN CAMERA MODE CONTROL          :SIMODE        SEE TELEMETRY LISTINGS
SSCL SCAN PARAMETER              :SCAN          SEE TELEMETRY LISTINGS

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BIT RATE=1.25KB/SEC

AVERAGE SAMPLE TIME

MF	0.819	SEC
ASC1	3.28	SEC
ASC2	3.28	SEC
ASC3	3.28	SEC
DSC	3.28	SEC
ESC	26.24	SEC

0 S/C I	1 ACCEL A	2 ACCEL B	3 COMP ACCEL LEVEL	4 #	5 #	6 #	7 #	8 #	9 #	10 #	11 #	12 #	13 #	14 #	15 #
								ANALOG SUBCOM 1 (64)				ANALOG SUBCOM 3 (32)			
16 S/C I	17 BUSS V 27/29	18 #	19 SMSS	20 #	21 #	22 #	23 #	24 #	25 #	26 #	27 #	28 #	29 #	30 #	31 #
								ANALOG SUBCOM 1 (64)				ANALOG SUBCOM 3 (32)			
32 S/C I	33 ACCEL A	34 ACCEL B	35 COMP ACCEL LEVEL	36 PITCH ERROR (CSS)	37 ROLL ERROR (CSS)	38 **#	39 **	40 **	41 **	42 **	43 **	44 **	45 **	46 **	47 **
												PAS/FES DATA			
48 S/C I	49 BUSS V 27/29	50 DMU RAD MON	51 **	52 **	53 **	54 **	55 **	56 **	57 **	58 CMDEX COUNT # 1	59 CMDEX COUNT # 2	60 FRAME COUNT	61 #	62 #	63 #
								OBC DATA				STATUS GROUP			
64 S/C I	65 ACCEL A	66 ACCEL B	67 COMP ACCEL LEVEL	68 #	69 #	70 #	71 #	72 #	73 #	74 #	75 #	76 EXPERIMENT SUBCOM 1(64)	77 #	78 EXPERIMENT SUBCOM 2(64)	79 #
												ANALOG SUBCOM 2 (64)			
80 S/C I	81 BUSS V 27/29	82 PITCH RATE 1	83 YAW RATE 1	84 ROLL RATE 1	85 PITCH RATE 2	86 YAW RATE 2	87 ROLL RATE 2	88 #	89 #	90 #	91 #	92 #	93 #	94 #	95 #
												DIGITAL SUBCOM			
96 S/C I	97 ACCEL A	98 ACCEL B	99 COMP ACCEL LEVEL	100 PITCH WHEEL CMD	101 YAW WHEEL CMD	102 ROLL WHEEL CMD	103 S/C V 0-30	104 #	105 #	106 #	107 #	108 #	109 #	110 #	111 #
												DIGITAL SUBCOM			
112 S/C I	113 BUSS V 27/29	114 DMU CAL	115 #	116 #	117 #	118 #	119 #	120 #	121 #	122 #	123 #	124 #	125 #	126 #	127 #
												ANALOG SUBCOM 2(64)			
												FRAME PARITY		FRAME SYNC	

\* INDIRECT ADDRESS REGISTER 1 | FRAME SYNC NORMAL HEX(FAF320)  
 \*\* INDIRECT ADDRESS REGISTER 2 | FOR CONVOLVED HEX(9FBE)  
 # WORD GATE REQUIRED | CONVOLVED HAS ONLY 16 BITS SYNC CODE  
 MF MINOR FRAME

BIT RATE=40KB/SEC

AVERAGE SAMPLE TIME		
MF	25.6	MSEC
ASC1	1.64	SEC
ASC2	1.64	SEC
ASC3	.82	SEC
DSC	1.64	SEC
ESC	1.64	SEC

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CAMERA ANALOG VIDEO DATA															
**H	**H	**H	**H	**H	**H	**H	**H	**H	**H	**H	**H	**H	**H	**H	**H
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
CAMERA ANALOG VIDEO DATA															
**H	**H	**H	**H	**H	**H	**H	**H	**H	**H	**H	**H	**H	**H	**H	**H
32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
CAMERA ANALOG VIDEO DATA															
**H	**H	**H	**H	**H	**H	**H	**H	**H	**H	**H	**H	**H	**H	**H	**H
48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
ASC1 #	ASC2 #	ASC3 #	*H	*H	*H	OSC DATA #	*H	*H	*H	CMDEX COUNT # 1	CMDEX COUNT # 2	FRAME COUNT	STATUS GROUP		
64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79
CAMERA ANALOG VIDEO DATA															
**H	**H	**H	**H	**H	**H	**H	**H	**H	**H	**H	**H	**H	**H	**H	**H
80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
CAMERA ANALOG VIDEO DATA															
**H	**H	**H	**H	**H	**H	**H	**H	**H	**H	**H	**H	**H	**H	**H	**H
96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111
CAMERA ANALOG VIDEO DATA															
**H	**H	**H	**H	**H	**H	**H	**H	**H	**H	**H	**H	**H	**H	**H	**H
112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127
DSC #	S/C I	ESC1 #	ESC2 #	**H	**	**	**	**	**	**	FRAME CODE	PARITY WORD	FRAME SYNC		

\* INDIRECT ADDRESS REGISTER 1  
 \*\* INDIRECT ADDRESS REGISTER 2  
 # WORD GATE REQUIRED  
 MF MINOR FRAME

BIT RATE=40KB/SEC		
AVERAGE SAMPLE TIME		
MF	25.6	MSEC
ASC1	.41	SEC
ASC2	.41	SEC
ASC3	.82	SEC
DSC	.41	SEC
ESC	.82	SEC

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
FES DATA							DMU CAL RAMP	CAMERA1 STATUS	GYRO 1A	GYRO 1B	GYRO 2A	GYRO 2B	GYRO 3A	GYRO 3B		
*#	*	*	*	*	*	*	#	#	#	#	#	#	#	#	#	
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
FES DATA							DMU RAD MON	CAMERA2 STATUS	GYRO 4A	GYRO 4B	GYRO 5A	GYRO 5B	GYRO 6A	GYRO 6B		
*#	*	*	*	*	*	*	#	#	#	#	#	#	#	#	#	
32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	
FES DATA							PITCH ERROR CSS	CAMERA3 STATUS	BUSS I	BUSS V 27/29	DIGITAL SUBCOM					
*#	*	*	*	*	*	*	#	#	#	#	#	#	#	#	#	
48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	
FES DATA							ROLL ERROR CSS	CAMERA4 STATUS	CMDX COUNT 1	CMDX COUNT 2	FRAME COUNT	STATUS GROUP				
*#	*	*	*	*	*	*	#	#	#	#	#	#	#	#	#	
64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	
FES DATA							EXPERIMENT SUBCOM-SYS1	# 64	#	#	OBC 1 DATA					
*#	*	*	*	*	*	*	#	#	#	#	#	#	#	#	#	
80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	
FES DATA							EXPERIMENT SUBCOM-SYS2	# 64	#	#	OBC 2 DATA					
*#	*	*	*	*	*	*	#	#	#	#	#	#	#	#	#	
96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	
FES DATA							ANALOG SUBCOM 1				ANALOG SUBCOM 2					ANALOG SUBCOM3
*#	*	*	*	*	*	*	#	#	# 64	#	#	#	# 64	#	# 32	
112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	
FES/PAS DATA											BUSS V 0,30	FRAME PARITY CODE	FRAME SYNC			
**#	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	

\* INDIRECT ADDRESS REGISTER 1  
 \*\* INDIRECT ADDRESS REGISTER 2  
 # WORD GATE REQUIRED  
 MF MINOR FRAME

BIT RATE=40KB/SEC

AVERAGE SAMPLE TIME

MF	25.6	MSEC
ASC1	1.64	SEC
ASC2	1.64	SEC
ASC3	.82	SEC
DSC	.82	SEC
ESC	1.64	SEC

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
OBC MEMORY DUMP (DIGITAL)																
**#	**	**	**	**#	**	**	**	**#	**	**	**	**#	**	**	**	
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
OBC MEMORY DUMP (DIGITAL)																
**#	**	**	**	**#	**	**	**	**#	**	**	**	**#	**	**	**	
32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	
OBC MEMORY DUMP (DIGITAL)																
**#	**	**	**	**#	**	**	**	**#	**	**	**	**#	**	**	**	
48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	
ASC1 #	ASC2 #	ASC3 #	*#	*#	*#	*#	*#	*#	*#	CMDEX COUNT # 1	CMDEX COUNT # 2	FRAME COUNT	STATUS GROUP			
64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	
OBC MEMORY DUMP (DIGITAL)																
**#	**	**	**	**#	**	**	**	**#	**	**	**	**#	**	**	**	
80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	
OBC MEMORY DUMP (DIGITAL)																
**#	**	**	**	**#	**	**	**	**#	**	**	**	**#	**	**	**	
96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	
OBC MEMORY DUMP (DIGITAL)																
**#	**	**	**	**#	**	**	**	**#	**	**	**	**#	**	**	**	
112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	
DSC #	DSC #	ESC1 #	ESC2 #	DMU CAL RAMP	DMU RAD MOM	BUSS VOLTS 0-30V	DMU 2-5V CAL2M	27-29 VOLTS	DMU 2-5V BUSS	DMU 2-5V CAL	S/C BUSS I	FRAME PARTY WORD	FRAME PARTY WORD	FRAME SYNC	FRAME SYNC	FRAME SYNC

\* INDIRECT ADDRESS REGISTER 1  
 \*\* INDIRECT ADDRESS REGISTER 2  
 # WORD GATE REQUIRED  
 MF MINOR FRAME

OBC FORMAT - 3B TRANSFER AND MISSION ORBIT  
SAME AS 3A WITH FES2 DATA

BIT RATE=40KB/SEC		
AVERAGE SAMPLE TIME		
MF	25.6	MSEC
ASC1	204.8	MSEC
ASC2	204.8	MSEC
ASC3	204.8	MSEC

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	ACCEL	ACCEL	PAS	SMSS	S/C	S/C	GYRO	GYRO	GYRO	GYRO	GYRO	GYRO	GYRO	GYRO	GYRO
	A	B	1/2 S	S	BUSS	BUSSV	1A	1B	2A	2B	3A	3B	4A	4B	5A
	#	#	PULSE	PULSE	I	27/29	#	#	#	#	#	#	#	#	#
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
GYRO	GYRO	GYRO	0	0	PITCH	ROLL			ASC1						0
5B	6A	6B			ERROR	ERROR	#	#	#	#	#	#	#	#	
	#														
32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
	ACCEL	ACCEL	PAS	SMSS	S/C	S/C	GYRO	GYRO	GYRO	GYRO	GYRO	GYRO	GYRO	GYRO	GYRO
	A	B	1/2 S	S	BUSS	BUSSV	1A	1B	2A	2B	3A	3B	4A	4B	5A
	#	#	PULSE	PULSE	I	27/29	#	#	#	#	#	#	#	#	#
48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
GYRO	GYRO	GYRO	0	1	1	CMD	CMD					FES 1			0
5B	6A	6B				CT1	CT2	#	#						
	#					#	#								
64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79
	ACCEL	ACCEL	PAS	SMSS	S/C	S/C	GYRO	GYRO	GYRO	GYRO	GYRO	GYRO	GYRO	GYRO	GYRO
	A	B	1/2 S	S	BUSS	BUSSV	1A	1B	2A	2B	3A	3B	4A	4B	5A
	#	#	PULSE	PULSE	I	27/29	#	#	#	#	#	#	#	#	#
80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
GYRO	GYRO	GYRO	1	0		ASC 3			ASC2						0
5B	6A	6B			#	#	#	#	#	#	#	#	#	#	
	#														
96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111
	ACCEL	ACCEL	PAS	SMSS	S/C	S/C	GYRO	GYRO	GYRO	GYRO	GYRO	GYRO	GYRO	GYRO	GYRO
	A	B	1/2 S	S	BUSS	BUSSV	1A	1B	2A	2B	3A	3B	4A	4B	5A
	#	#	PULSE	PULSE	I	27/29	#	#	#	#	#	#	#	#	#
112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127
GYRO	GYRO	GYRO	1	1	ASC	ASC	0			NOT USED					0
5B	6A	6B			3	3		#	#						
	#				#	#									

NOTE: '1''S ARE SIMULATED USING S/C BUSS VOLTS 0-30V. APPROX=235 COUNTS  
'0''S ARE SIMULATED USING DMC-30.

# WORD GATE REQUIRED  
MF MINOR FRAME

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		FES 1					ACC A	ACC B					OBC 1		
#									#	#	#	#	#	#	#
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
	CAM1		CAM2		GYRO1		GYRO2		GYRC3		GYRO4		GYRO5		GYRO6
#		#		#		#		#		#		#		#	
32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
PITCH R1	YAW R1	ROLL R1	PITCH R2	YAW R2	ROLL R2						PAS 1				
#						#									
48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
ASC1	ASC2	ASC3	DSC	DSC	EM1	EM2	BUSS VOLT 0-30	PAS SUN	S/C I	CMD CT1	CMD CT2	FRAME CGUNT		STATUS GROUP	
#	#	#	#	#	#	#		#		#	#				
64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79
		FES 2					ACC A	ACC B					OBC 2		
#									#	#	#	#	#	#	#
80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
	CAM3		CAM4		GYRO1		GYRO2		GYRO3		GYRO4		GYRO5		GYRO6
#		#		#		#		#		#		#		#	
96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111
PITCH CMD	YAW CMD	ROLL CMD	CSSP ERROR	CSSR ERROR	COM ACCEL					PAS 2					
#						#									
112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127
A TEST	REM	D TEST	D TEST	RAMP	DMU RAD	2.5 CALIB	S/C VOLT 27-29	SMS SUN	SMS ANGLE		BLOCK CODE			SYNC	
#		#	#			#		#	#						

# WORD GATE REQUIRED

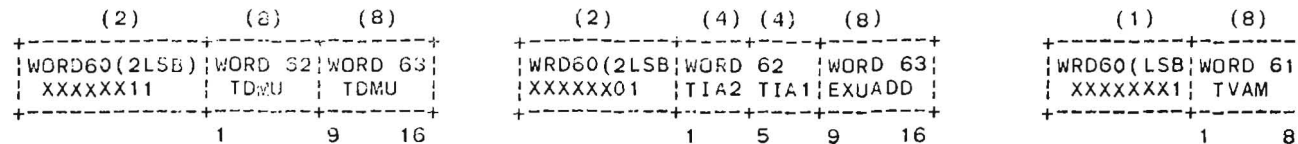
WORD 60(2LSB)	WORD 61	WORD 62	WORD 63
FRAME COUNT 00	SPACECRAFT CLOCK 8 MSB'S	SPACECRAFT CLOCK BITS 9-16	SPACECRAFT CLOCK 8 LSB'S
FRAME COUNT 01	VARIABLE MEMORY READOUT	INDIRECT ADDRESS REGISTER**	EXECUTE ADDRESS READOUT
FRAME COUNT 10	STATUS REGISTER BITS 1-8	STATUS REGISTER BITS 9-16	STATUS REGISTER BITS 17-24
FRAME COUNT 11	VARIABLE MEMORY READOUT	DMU STATUS REGISTER BITS 1-8	DMU STATUS REGISTER BITS 9-16

\*\* INDIRECT ADDRESS REGISTERS ARE 4 BITS EACH CONTAINED IN WORD 62 AT FRAME COUNT 01. REGISTER 2 IN LEFT 4 BITS.

SPACECRAFT CLOCK IS A 24 BIT REGISTER. EACH BIT IS WORTH 0.4088 SECONDS.  
MAXIMUM COUNT IS 79.536 DAYS

THE EXECUTE ADDRESS REFERS TO THE DATA MULTIPLEXER EXECUTION ADDRESS. THIS DATA WOULD BE USED TO CHECK VAM EXECUTION, FRAME LENGTH ERRORS, AND PROPER TIME SHARING WITH OBC AND GROUND TELEMETRY. COMPLETE CYCLE EVERY 1024 MINOR FRAMES.

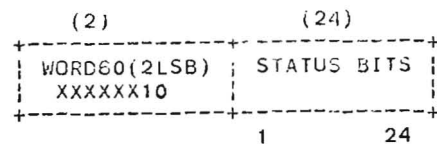




MNEUMONIC	BIT NO.	FUNCTION	
TDMU	1	NOT USED	
	2	0=CYCLE T/M VAM, LOAD OBC VAM 1=CYCLE OBC VAM, LOAD T/M VAM	
	3	0=REDUNDANT CLOCK 1=MAIN CLOCK	
	4	0=ADDRESS SINGLE FORMAT 1=ADDRESS ALTERNAT FORMATS(NOT USED)	
(TCFMT)	5-8*	COMPUTER FORMAT	0=DIRECT 2=OBC VAM 1=NOP 3=ROM
(TFORMAT)	7	TELEMETRY FORMAT(DERIVED '1A' ETC)	0=VAM 1=ROM
	8-9*	TELEMETRY DATA SELECTED	0=1A 2=1B 1=2A 3=2B
(TBITRATE)	10	0=BLOCK CODE (DERIVED '1.25KB' ETC) 1=CONVOLUTIONAL(CODED)	
	11-13*	MULTIPLEX RATIO	0=ALL TLM 4= 8:1 1=1:1 5=16:1 2=2:1 6=32:1 3=4:1
	14-16*	TRANSFER RATIO	0=80 KB 3=10 KB 1=40 KB 4= 5 KB 2=20 KB 5=2.5KB
TIA#2	1-4*	INDIRECT ADDRESS REGISTER 2	
TIA#1	5-8*	INDIRECT ADDRESS REGISTER 1	
EXUADD	9-16*	EXECUTION ADDRESS GROUND TELEMETRY. ARRAY BY 128	
COMADD		EXECUTION ADDRESS OBC TELEMETRY. ARRAY BY 128 REQUIRES 4 MAJOR (1024 MINOR) FRAMES TO COMPLETE.	
TVAM	1-8	WORD 60=00000001 VAM WORD 0 WORD 60=00000011 VAM WORD 127 WORD 60=00000101 VAM WORD 126 ... .. WORD 60=11111111 VAM WORD 1	ARRAY BY 128

\* LEAST SIGNIFICANT BIT.

SB#8 DATSYS1 DATA SYSTEM 1 ON/OFF	AMC-0 ASC1	
SB#19 DATSYS2 DATA SYSTEM 2 ON/OFF	AMC-8 ASC2	
SB#1 VAMPAR VAM PARITY	AMC-14 ASC3	
AMC-3 DMURAD DMU RADIATION MONITOR	AMC-2 ATEST	TEST IMPUT
AMC-5 DMUCAL DMU A/D CONV CAL(RAMP)	ASC1-8	DATA SYSTEM 2.5V CAL
AMC-7 DMUR DMU A/D CONV REMAINDER	ASC1-25	DATA SYSTEM TEMP
AMC-9 CAL2P5 DMU 2.5V CAL	ASC1-31	MISSION ADAPT MODULE TEMP
AMC-13 CAL2M DMU 2.5V CAL AT 2 MEG	ASC1-9	SIGNAL GROUND
COMMAND DECGDER		
SB#13 CDATA1 DEC 1 DATA PRESENT1=DP	SB#21 CMDEC2 DEC 2 ON/OFF	1=ON
SB#14 CADD1 DEC 1 NOT ADDRESS 1=NA	ASC1-0	DEC 1 +10V
SB#15 CPAR1 DEC 1 NOT PARITY 1=NP	ASC1-1	DEC 1 -10V
SB#16 CDATA2 DEC 2 DATA PRESENT1=DP	ASC1-16	DEC #1/2 TEMP
SB#17 CADD2 DEC 2 NOT ADDRESS 1=NA	ASC1-35	DEC 2 +10V
SB#18 CPAR2 DEC 2 NOT PARITY 1=DP	ASC2-63	DEC 2 -10V
SB#20 CMDEC1 DEC 1 ON/OFF 1=ON		
DMC-0 CTR1 CMD CTR NO 1	DMC-14 CTR2	CMD CTR NO 2



MNEMONIC	BIT NO.	FUNCTION	STATUS
VAMPAR	1	VARIABLE ADDRESS MEMORY PARITY	1=ERROR
SEPSW1	2	3RD STAGE SEPARATION SW.NO.1	1=SEPARATED
SEPSW2	3	3RD STAGE SEPARATION SW.NO.2	1=SEPARATED
SAD1	4	SOLAR ARRAY NO.1 DEPLOYED	0=DEPLOYED,1=FOLDED
SAD2	5	SOLAR ARRAY NO.2 DEPLOYED	0=DEPLOYED,1=FOLDED
SSOPEN	6	SI SUNSHUTTER	OPEN 6=0,7=0
SSCLOS	7	SI SUNSHUTTER	CLOSE 6=1,7=1
(SUNSHTR)	6-7		SLEW 6=1,7=0
			BAD 6=0,7=1
DATSYS1	8	DATA SYSTEM NO.1 ON/OFF	1=ON
SBPA1	9	S-BAND PWR. AMP 1 ON/OFF	1=ON
SBPA2	10	S-BAND PWR. AMP 2 ON/OFF	1=ON
SBPA3	11	S-BAND PWR. AMP 3 ON/OFF	1=ON
SBPA4	12	S-BAND PWR. AMP 4 ON/OFF	1=ON
CDATA1	13	COMMAND DECODER 1 DATA PRESENT	1=DP
CADD1	14	COMMAND DECODER 1 NOT ADDRESS	1=NA
CPAR1	15	COMMAND DECODER 1 NOT PARITY	1=NP
CDATA2	16	COMMAND DECODER 2 DATA PRESENT	1=DP
CADD2	17	COMMAND DECODER 2 NOT ADDRESS	1=NA
CPAR2	18	COMMAND DECODER 2 NOT PARITY	1=NP
DATSYS2	19	DATA SYSTEM NO.2 ON/OFF	1=ON
CMDEC1	20	COMMAND DECODER 1 ON/OFF	1=ON
CMDEC2	21	COMMAND DECODER 2 ON/OFF	1=ON
EVD1	22	ENGINE VALVE DRIVER 1 ON/OFF	1=ON
EVD2	23	ENGINE VALVE DRIVER 2 ON/OFF	1=ON
	24	SPARE	

CHANNEL	MNEMONIC	FUNCTION	WD.GATE
0	ASUB1	SUB COM NO.1(64)	YES
1	SCI	S/C SWITCHED LOAD CURRENT	NO
2	ATEST	TEST INPUT	YES
3	DMURAD	DMU RADIATION MONITOR	NO
4	SPECV1	SPECTROGRAPH CAMERA NO.1 VIDEO(LONG WAVE LENGTH PRIME)	YES
5	DMUCAL	DMU-A/D CONVERTER CAL. (RAMP)	NO
6	SPECV3	SPECTROGRAPH CAMERA NO.3 VIDEO(SHORT WAVE LENGTH PRIME)	YES
7	DMUR	DMU A/D CONVERSION REMAINDER	NO
8	ASUB2	SUB COM NO.2(64)	YES
9	CAL2P5	DATAPLEXER 2.5V CAL	NO
10	SPECV2	SPECTROGRAPH CAMERA NO.2 VIDEO(LONG WAVE LENGTH REDUNDANT)	YES
11	SC28V	S/C +28V BUS VOLTAGE (0 TO 30V)	NO
12	SPECV4	SPECTROGRAPH CAMERA NO.4 VIDEO(SHORT WAVE LENGTH REDUNDANT)	YES
13	CAL2M	DATAPLEXER 2.5V CAL AT 2 MEG	NO
14	ASUB3	SUBCOM NO.3 (32)	YES
15	PITCHCM	PITCH WHEEL CMD.(C&M)	NO
16	SCBUS	S/C +28V BUS VOLTAGE (27 TO 29V)	NO
17	YAWCM	YAW WHEEL CMD.(C&M)	NO
18	ACCELA	ACCELEROMETER A	NO*
19	TRRAT1	ROLL RATE 1	NO
20	TPRAT1	PITCH RATE 1	NO
21	TYRAT1	YAW RATE 1	NO
22	EMUX1	EXPERIMENT ANALOG MUX 1	YES
23	CSSPE	CSS PITCH ERROR (C&M)	NO
24	TRRAT2	ROLL RATE 2	NO
25	ROLLCM	ROLL WHEEL CMD.(C&M)	NO
26	ACCELV1	COMPENSATED ACCELERATION LEVEL	NO
27	TPRAT2	PITCH RATE 2	NO
28	ACCELB	ACCELEROMETER B	NO*
29	TYRAT2	YAW RATE 2	NO
30	EMUX2	EXPERIMENT ANALOG MUX 2	YES
31	CSSRE	CSS ROLL ERROR (C&M)	NO

\* IN OBC FORMAT-WORD GATE IS SENT TO IRA (INTERROGATE PULSE)

CHAN	FUNCTION	CHAN	FUNCTION
0	CMD DECODER #1 +10V	32	BATTERY #2 DISCHARGE CURRENT
1	CMD DECODER #1 -10V	33	BATTERY #2 3RD ELECTRODE VOLTS
2	S-BAND XMTR #1 +16V	34	+28V BUSS VOLTAGE (27-29V)
3	S-BAND XMTR #2 +16V	35	CMD DECODER #2 +10V.
4	VHF SYS #1 +12V	36	ESSENTIAL LOAD CURRENT
5	VHF SYS #2 +12	37	DUMP #2 CURRENT
6	VHF REC #1 AGC	38	DUMP #1 CURRENT
7	VHF REC #2 AGC	39	SOLAR ARRAY #1 CURRENT
8	DATA SYSTEM 2.5V CALIBRATE	40	SOLAR ARRAY #2 CURRENT
9	SIGNAL GROUND	41	***SOLAR ARRAY TEMP(COMUTATED)
10	BATTERY #1 VOLTAGE	42	HYDRAZINE PRESSURE TANKS C & G
11	BATTERY #1 CHARGE CURRENT	43	HYDRAZINE PRESSURE TANKS B & F
12	BATTERY #1 DISCHARGE CURRENT	44	HYDRAZINE PRESSURE TANKS D & H
13	BATTERY #1 3RD ELECTRODE VOLTS	45	HYDRAZINE CAT BED #1 TEMP
14	BATTERY #2 VOLTAGE	46	HYDRAZINE CAT BED #2 TEMP
15	BATTERY #2 CHARGE CURRENT	47	HYDRAZINE CAT BED #3 TEMP
16	**CMD DECODER #1/2 TEMP	48	HYDRAZINE CAT BED #4 TEMP
17	S-BAND XMTR #1 TEMP	49	HYDRAZINE CAT BED #5 TEMP
18	S-BAND XMTR #2 TEMP	50	HYDRAZINE CAT BED #6 TEMP
19	**IRA COMMON ELECTRONICS TEMP	51	HYDRAZINE CAT BED #7 TEMP
20	**E/V DRIVER #1/2 TEMP	52	HYDRAZINE CAT BED #8 TEMP
21	POWER MODULE #1 TEMP	53	HYDRAZINE CAT BED #9 TEMP
22	POWER MODULE #2 TEMP	54	HYDRAZINE CAT BED #10 TEMP
23	VHF XMTR #1 TEMP	55	HYDRAZINE CAT BED #11 TEMP
24	VHF XMTR #2 TEMP	56	HYDRAZINE CAT BED #12 TEMP
25	DATA SYSTEM TEMP	57	FINE SUN SENSOR NO 1 ATA
26	**OBC CONVERTER #1/2 TEMP	58	WDA PS #1 +5V
27	**OBC PROCESSOR #1/2 TEMP	59	FINE SUN SENSOR #1 +5V
28	**OBC MEMORY #0/2 TEMP	60	FINE SUN SENSOR #2 +5V
29	BATTERY #1 TEMP	61	SI CAL PS#1 HV CURRENT MONITOR
30	BATTERY #2 TEMP	62	FOCUS MECH.POSITION -(EXTEND)
31	MISSION ADAPTER MODULE TEMP	63	FOCUS MECH.POSITION +(RETRACT)

\*\*\*=MMM/FFF

MMM=READOUT FROM DATA SYSTEM #1

FFF=READOUT FROM DATA SYSTEM #2

\*\*\* SOLAR ARRAY TEMPERATURES ARE SUB COMPUTATED AND STORED IN TSA(1)-TSA(8).  
ORDER MARKED BY GND FOLLOWED C-30V BUS VOLTS THEN & SOLAR ARRAY TEMPS.  
ALL OTHER ASC1 TELEMETRY IS AVAILABLE TO CCIL AS AS1CHXX WHERE XX=CHANNEL.  
ALL OTHER ASC1 TELEMETRY IS AVAILABLE TO PCL AS ASUB1(XX) OR AS1C(XX).

CHAN	FUNCTION	CHAN	FUNCTION
0	WDA P.S. #1 +10V	32	**YAW DRIVER/REDU DRIVER TEMP
1	FLUX PARTICLE MONITOR	33	**PITCH/ROLL DRIVER PHASE A
2	SI CAL P.S. #2HV CURRENTMONITOR	34	**YAW/RED DRIVER PHASE A
3	OBC #1 CONVERTER	35	CEA PITCH WHEEL CMD-1
4	WDA P.S. #2 +5V	36	CEA PITCH WHEEL CMD-2
5	WDA P.S. #2 +10V	37	CEA YAW WHEEL CMD-1
6	**WDA P.S. #1/2 TEMP	38	CEA YAW WHEEL CMD-2
7	PITCHWHEEL DRIVERMOTOR VOLTAGE	39	CEA ROLL WHEEL CMD-1
8	YAW WHEEL DRIVER-MOTOR VOLTAGE	40	CEA ROLL WHEEL CMD-2
9	ROLL WHEEL DRIVERMOTOR VOLTAGE	41	CEA REDUNDANT WHEEL CMD-1
10	REDU WHEEL DRIVERMOTOR VOLTAGE	42	CEA REDUNDANT WHEEL CMD-2
11	PITCH WHEEL DRIVER-TACH	43	GYRO #1 MOTOR CURRENT
12	YAW WHEEL DRIVER-TACH	44	GYRO #1 TEMP
13	ROLL WHEEL DRIVER-TACH	45	GYRO #2 MOTOR CURRENT
14	REDU WHEEL DRIVER-TACH	46	GYRO #2 TEMP
15	**PITCH/ROLL DRIVER TEMP	47	GYRO #3 MOTOR CURRENT
16	**HYDRAZINE TANK B/TANK H TEMP	48	GYRO #3 TEMP
17	**HYDRAZINE TANK G/TANK C TEMP	49	GYRO #4 MOTOR CURRENT
18	**HYDRAZINE TANK D/TANK F TEMP	50	GYRO #4 TEMP
19	HYDRAZINE -Z LINE TEMP	51	GYRO #5 MOTOR CURRENT
20	**HYDR LTE 6 VA/LTE 4 VA TEMP	52	GYRO #5 TEMP
21	HYDRAZINE +Z LINE TEMP	53	GYRO #6 MOTOR CURRENT
22	**HYDR LTE 10 VA/LTE 12VA TEMP	54	GYRO #6 TEMP
23	**HYDR LV 1&3/2&6 MOUNT TEMP	55	OBC #2 CONVERTER
24	**HYDR D SECT LN/F&D VA 3 TEMP	56	EEA CONVERTER #1 +12V
25	**HYDR LTE 7 VA/LTE 3 VA TEMP	57	EEA CONVERTER #1 +5V
26	**HYDR HTE 2 VA/HTE 8 VA TEMP	58	EEA CONVERTER #2 +12
27	**HYDR LTE 1 VA/LTE 9 VA TEMP	59	EEA CONVERTER #2 +5V
28	**HYDR +Y REM/-Y REM TEMP	60	**EEA CONVERTER #1/2 +15V
29	**HYDR -Y REM/+Y REM STRUTTEMP	61	**EEA CONVERTER #1/2 -15V
30	IRA SENSOR TEMP	62	**EEA CONVERTER #1/2 +8V
31	**EEA CONVERTER #1/2 TEMP	63	CMD.DECODER #2 -10V

\*\*=MMM/FFF

MMM=READOUT FROM DATA SYSTEM NO.1

FFF=READOUT FROM DATA SYSTEM NO.2

ALL ASC2 TELEMETRY IS AVAILABLE TO CCIL AS AS2CHXX WHERE XX=CHANNEL.  
 ALL ASC2 TELEMETRY IS AVAILABLE TO PCL AS ASUB2(XX) OR AS2C(XX).

0	IRA PITCH RATE NO.1
1	IRA PITCH RATE NO.2
2	IRA YAW RATE NO.1
3	IRA YAW RATE NO.2
4	IRA ROLL RATE NO.1
5	IRA ROLL RATE NO.2
6	GYRO NO.1 RATE
7	GYRO NO.2 RATE
8	GYRO NO.3 RATE
9	GYRO NO.4 RATE
10	GYRO NO.5 RATE
11	GYRO NO.6 RATE
12	S-BAND POWER AMP.TEMP.
13	FINE SUN SENSOR NO 2 ATA
14	FINE ERROR SENSOR NO.1 TEMP.
15	FINE ERROR SENSOR NO.2 TEMP.
16	**PITCH WHEEL/ROLL WHEEL TEMP.
17	**YAW WHEEL/RED WHEEL TEMP.
18	**FINE SUN SENSOR 1/SPIN MODE SUN SENSOR TEMP.
19	APOGEE BOOST MOTOR TEMP.
20	SI SECONDARY MIRROR TEMP.-MIRROR
21	SI SECONDARY MIRROR TEMP.-FOCUS DRIVE
22	SI PRIMARY MIRROR -LOCATION 1 TEMP.+Y
23	SI PRIMARY MIRROR -LOCATION 2 TEMP.-Y
24	**TELESCOPE TUBE -STA.133,+Z/-Z AXIS TEMP.
25	**TELESCOPE TUBE -STA.92,+Z/-Z AXIS TEMP.
26	PAS SENSOR 1 TEMP.
27	PAS SENSOR 2 TEMP.
28	**TEMP.CAMERA DECK (NEAR LONGWAVE PRIME/NEAR LONGWAVE RED)
29	**TEMP.CAMERA DECK (NEAR SHORTWAVE PRIME/NEAR SHORTWAVE RED)
30	**TEMP.CAMERA DECK (NEAR FES 1/TEMP ACQUISITION DECK)
31	**SPECTROGRAPH COVER TEMP AT STRONG RING +Z/-Z

\*\*MMM/FFF  
MMM=READOUT FROM DATA SYSTEM NO.1  
FFF=READOUT FROM DATA SYSTEM NO.2

ALL ASC3 TELEMETRY IS KNOWN TO CCIL AS AS3CHXX WHERE XX=CHANNEL.  
ALL ASC3 TELEMETRY IS KNOWN TO FCL AS ASUB3(XX) OR AS3C(XX).

CHAN	FUNCTION	CHAN	FUNCTION
0	CAMERA NO.1 UVC EHT STATUS	32	CAMERA NO.3 LINE STATUS
1	CAMERA NO.1 SEC EHT STATUS	33	CAMERA NO.3 FRAME STATUS
2	CAMERA NO.1 G-4 STATUS	34	CAMERA NO.3 FOCUS STATUS
3	CAMERA NO.1 TARGET BIAS STATUS	35	CAMERA NO.3 G-2 STATUS
4	CAMERA NO.1 G-1 STATUS	36	CAMERA NO.3 G-3 STATUS
5	CAMERA NO.1 HEATER CURRENT STATUS	37	CAMERA NO.3 X-ALIGNMENT STATUS
6	CAMERA NO.1 LINE STATUS	38	CAMERA NO.3 Y-ALIGNMENT STATUS
7	CAMERA NO.1 FRAME STATUS	39	CAMERA NO.4 UVC EHT STATUS
8	CAMERA NO.1 FOCUS STATUS	40	CAMERA NO.4 SEC EHT STATUS
9	CAMERA NO.1 G-2 STATUS	41	CAMERA NO.4 G-4 STATUS
10	CAMERA NO.1 G-3 STATUS	42	CAMERA NO.4 TARGET BIAS STATUS
11	CAMERA NO.1 X-ALIGNMENT STATUS	43	CAMERA NO.4 G-1 STATUS
12	CAMERA NO.1 Y-ALIGNMENT STATUS	44	CAMERA NO.4 HEATER CURRENT STATUS
13	CAMERA NO.2 UVC EHT STATUS	45	CAMERA NO.4 LINE STATUS
14	CAMERA NO.2 SEC EHT STATUS	46	CAMERA NO.4 FRAME STATUS
15	CAMERA NO.2 G-4 STATUS	47	CAMERA NO.4 FOCUS STATUS
16	CAMERA NO.2 TARGET BIAS STATUS	48	CAMERA NO.4 G-2 STATUS
17	CAMERA NO.2 G-1 STATUS	49	CAMERA NO.4 G-3 STATUS
18	CAMERA NO.2 HEATER CURRENT STATUS	50	CAMERA NO.4 X-ALIGNMENT STATUS
19	CAMERA NO.2 LINE STATUS	51	CAMERA NO.4 Y-ALIGNMENT STATUS
20	CAMERA NO.2 FRAME STATUS	52	LWP DEFLN COIL TEMP
21	CAMERA NO.2 FOCUS STATUS	53	LWP HEAD AMP/SEC EHT TEMP
22	CAMERA NO.2 G-2 STATUS	54	LWP FRAME DAC/LINE DAC TEMP
23	CAMERA NO.2 G-3 STATUS	55	LWR DEFLN COIL TEMP
24	CAMERA NO.2 X-ALIGNMENT STATUS	56	LWR HEAD AMP/SEC EHT TEMP
25	CAMERA NO.2 Y-ALIGNMENT STATUS	57	LWR FRAME DAC/LINE DAC TEMP
26	CAMERA NO.3 UVC EHT STATUS	58	SWP DEFLN COIL TEMP
27	CAMERA NO.3 SEC EHT STATUS	59	SWP HEAD AMP/SEC EHT TEMP
28	CAMERA NO.3 G-4 STATUS	60	SWP FRAME DAC/LINE DAC TEMP
29	CAMERA NO.3 TARGET BIAS	61	SWR DEFLN COIL TEMP
30	CAMERA NO.3 G-1 STATUS	62	SWR HEAD AMP/SEC EHT TEMP
31	CAMERA NO.3 HEATER CURRENT STATUS	63	SWR FRAME DAC/LINE DAC TEMP

CAMERA NO.1=LONG WAVELENGTH PRIME  
 CAMERA NO.2=LONG WAVELENGTH REDUNDANT  
 CAMERA NO.3=SHORT WAVELENGTH PRIME  
 CAMERA NO.4=SHORT WAVELENGTH REDUNDANT

NOTE: THIS PAGE DOCUMENTS ESC1 AND ESC2. THE THERMISTERS ON CHANNELS 52-63  
 ARE DIFFERENT IN EACH ESC.(ESC1/ESC2)

ALL ESC TELEMETRY IS KNOWN TO CCIL AS ESYCHXX WHERE Y=SUBCOM#,XX=CHANNEL.  
 ALL ESC TELEMETRY IS KNOWN TO PCL AS EMUXY(XX) OR EMUXYC(XX).

GATE#	MNEMONIC	FUNCTION	BITS/W.G.
0	CTR1	COMMAND EXECUTION COUNTER NO. 1	8
1	PASP1	**PAS NO. 1/2 SUN PULSE	8
2	DTEST	TEST INPUT	8
3	FESD1	FINE ERROR SENSOR 1.	56
4	CAMS1	SPECTROGRAPH CAMERA NO.1 POSITION AND STATUS (LONG WAVE LENGTH PRIME)	56
5	SMSP	SPIN MODE SUN SENSOR - SUN PULSE	8
6	CAMS3	SPECTROGRAPH CAMERA NO.3 POSITION AND STATUS (SHORT WAVE LENGTH PRIME)	56
7	PASD1	PAS NO. 1 DATA	80
8	DIG8	SPARE	8
9	PASD2	PAS NO. 2 DATA	80
10	CAMS2	SPECTROGRAPH CAMERA NO.2 POSITION AND STATUS (LONG WAVE LEN. REDUNDANT)	56
11	SMSSEA	SPIN MODE SUN SENSOR ELEVATION ANGLE	16
12	CAMS4	SPECTROGRAPH CAMERA NO.4 POSITION AND STATUS (SHORT WAVE LEN. REDUNDANT)	56
13	FESD2	FINE ERROR SENSOR 2.	56
14	CTR2	COMMAND EXECUTION COUNTER NO. 2	8
15	GYRO1	GYRO NO. 1	16
16	OBC1	OBC NO. 1 DATA	8
17	OBCMD1	OBC NO. 1 MEMORY DUMP	32
18	DIG18	SPARE	8
19	DSUB	DIGITAL SUBCOM	8
20	GYRO3	GYRO NO. 3 DATA	16
21	DIG21	SPARE	8
22	DIG22	SPARE	8
23	GYRO5	GYRO NO. 5 DATA	16
24	DIG24	SPARE	8
25	OBC2	OBC NO. 2 DATA	8
26	OBCMD2	OBC NO. 2 MEMORY DUMP	32
27	GYRO2	GYRO NO. 2 DATA	16
28	DIG28	SPARE	8
29	GYRO4	GYRO NO. 4 DATA	16
30	DIG30	SPARE	8
31	GYRO6	GYRO NO. 6 DATA	16

\*\* MMM/FFF

MMM - READOUT FROM DATA SYSTEM NO. 1

FFF - READOUT FROM DATA SYSTEM NO. 2

W.G. = WORD GATE

I.A. = INDIRECT ADDRESS



CHANNEL	MNEUMONIC	FUNCTION	BITS	SYSTEM
0	IRADAT#1	IRA STATUS NO 1	32	ACS
1	IRADAT#2	IRA STATUS NO 2	32	ACS
2	FSSDAT#1	FINE SUN SENSOR 1 DATA	32	ACS
3	FSSDAT#2	FINE SUN SENSOR 2 DATA	32	ACS
4	EV1	CEA-HYDRAZINE EV CMD STATUS 1	24	ACS
5	EV2	CEA-HYDRAZINE EV CMD STATUS 2	24	ACS
6	TRWMOD#1	CEA-WHEEL MODE STATUS 1	8	ACS
7	TRWMOD#2	CEA-WHEEL MODE STATUS 2	8	ACS
8	TCM	CEA-COMPENSATION & MIXING STATUS	8	ACS
9	CPUPWR#1	CPU 1 ON/OFF	8	OBC
10	CPUPWR#2	CPU 2 ON/OFF	8	OBC
11	HYDHTR	HYDRAZINE-HEATER/TM RELAY STATUS	8	ACS
12	PWRSTA#1	STA US 1	8	PWR
13	PWRSTA#2	STA US 2	8	PWR
14	FESSP#1	FES 1 STAR PRESENCE FLAG	8	SI
15	FESSP#2	FES 2 STAR PRESENCE FLAG	8	SI
16	MECHDATA	EEA MECHANISM ELECTRONICS STATUS	24	SI
17	EEAOVL	EEA LOW VOLTAGE OVERLOAD FLAG	8	SI
18	OBCUB#1	UPPER BUS CONVERTER 1 ON/OFF	8	OBC
19	OBCLB#1	LOWER BUS CONVERTER 1 ON/OFF	8	OBC
20	OBCUB#2	UPPER BUS CONVERTER 2 ON/OFF	8	OBC
21	OBCLB#2	LOWER BUS CONVERTER 2 ON/OFF	8	OBC
22	ABMARM	APOGEE BOOST MOTOR ARM RELAY	8	PYRO
23	PYROARM	SOLAR ARRAY/SI COVER ARM RELAY	8	PYRO
24	C2BV#1	LWP CAM 1 +28V ON/OFF	8	SI
25	C2BV#2	LWR CAM 2 +28V ON/OFF	8	SI
26	C2BV#3	SWP CAM 3 +28V ON/OFF	8	SI
27	C2BV#4	SWR CAM 4 +28V ON/OFF	8	SI
28	PASPWR#1	PAS 1 ON/OFF	8	PAS
29	PASPWR#2	PAS 2 ON/OFF	8	PAS
30	TLAMP#1	CAL PS 1 TUNGSTEN LAMPS ON/OFF	8	SI
31	TLAMP#2	CAL PS 2 TUNGSTEN LAMPS ON/OFF	8	SI

0	1	2	3	4	5	6	7
#	I.R.A.	STATUS	NO. 1	#	I.R.A.	STATUS	NO. 2
8	9	10	11	12	13	14	15
#	FINE SUN SENSOR NO. 1	DATA	#	FINE SUN SENSOR NO. 2	DATA	#	
16	17	18	19	20	21	22	23
#	HAPS E/V CMD. NO. 1	#	HAPS E/V CMD. NO. 2	#	WHEEL MODE 1	#	WHEEL MODE 2
24	25	26	27	28	29	30	31
#	C & M STATUS	#	CPU 1 ON/OFF	#	CPU 2 ON/OFF	#	HAPS HTR STATUS
32	33	34	35	36	37	38	39
#	E.E.A. MECH. ELECT. STATUS	#	E.E.A. CONV OVLD	#	OBC 1 UB RELAYS	#	OBC 1 LB RELAYS
40	41	42	43	44	45	46	47
#	ABM ARM	#	PYRO ARM	#	CAM 1 ON/OFF	#	CAM 2 ON/OFF
48	49	50	51	52	53	54	55
#	SI TUNG LAMP ON/OFF	#	SI TUNG LAMP ON/OFF	#	FINE SUN SENSOR NO. 1 DATA	#	FINE SUN SENSOR NO. 2 DATA
56	57	58	59	60	61	62	63
#	FINE SUN SENSOR NO. 2 DATA	#	HAPS E/V CMD. NO. 1	#	HAPS E/V CMD. NO. 2	#	

# WORD GATE

DSC-12	BIT	FUNCTION		
PWRSTA#1	1-8			
(PS3EV1)	1	3RD ELECTRODE	0=ON	1=OFF
(PSJVBUS)	2	U.V. MAIN BUS DETECTOR	0=ON	1=OFF
(PSOVCD)	3	OVER CURRENT DETECTOR	0=ON	1=OFF
(PSUBAT#1)	4	U.V. BAT NO.1	0=ON	1=OFF
(PSTCHG#1)	5	TRICKLE CHARGER NO.1	0=HI	1=LO
(PSBCHG#1)	6	BATTERY CHARGER NO.1	0=ON	1=OFF (TRICKLE)
(PSSAT#1)	7	BATTERY NO.1	0=ON	1=OFF
(PSBCON#1)	8	BOOST CONVERTER NO.1	0=ENABLE	1=DISABLE
DSC-13	BIT	FUNCTION		
PWRSTA#2	1-8			
(PSALRSIG)	1	AUTO LOAD REMOVAL SIGNAL	0=OFF	1=ON
(PS3EV2)	2	3RD ELECTRODE VOLTAGE NO 2	0=ON	1=OFF
(PSALRST)	3	AUTO LOAD REMOVAL STATUS	0=ENABLE	1=DISABLE
(PSUBAT#2)	4	U.V. BAT NO.2	0=ON	1=OFF
(PSTCHG#2)	5	TRICKLE CHARGER NO.2	0=HI	1=LO
(PSBCHG#2)	6	BATTERY CHARGER NO.2	0=ON	1=OFF (TRICKLE)
(PSSAT#2)	7	BATTERY NO.2	0=ON	1=OFF
(PSBCON#2)	8	BOOST CONVERTER NO.2	0=ENABLE	1=DISABLE
AMC-1	SCI	S/C SWITCHED LOAD CURRENT		
AMC-11	SC28V	+28V BUS VOLTAGE (0-30V)		
AMC-16	SCBUS	+28V BUS VOLTAGE (27-29V)		
ASC1-9		SIGNAL GROUND		
ASC1-10		BATTERY NO 1 VOLTAGE		
ASC1-11		BATTERY NO 1 CHARG CURRENT		
ASC1-12		BATTERY NO 1 DISCHARGE CURRENT		
ASC1-13		BATTERY NO 1 3RD ELECTRODE VOLTAGE		
ASC1-14		BATTERY NO 2 VOLTAGE		
ASC1-15		BATTERY NO 2 CHARGE CURRENT		
ASC1-21		POWER MODULE NO 1 TEMP		
ASC1-22		POWER MODULE NO 2 TEMP		
ASC1-29		BATTERY NO 1 TEMP		
ASC1-30		BATTERY NO 2 TEMP		
ASC1-32		BATTERY NO 2 DISCHARGE CURRENT		
ASC1-33		BATTERY NO 2 3RD ELECTRODE VOLTAGE		
ASC1-34		+28V BUS VOLTAGE (27-29V)		
ASC1-36		ESSENTIAL LOAD CURRENT		
ASC1-37		DUMP 2 CURRENT		
ASC1-38		DUMP 1 CURRENT		
ASC1-39		SOLAR ARRAY NO 1 CURRENT		
ASC1-40		SOLAR ARRAY NO 2 CURRENT		
ASC1-41	TSA	SOLAR ARRAY TEMP (SUBCOMUTATED-BUSV-SGND-TSA(3)-----TSA(8))		

RF SBAND	SB#9	SBPA1	POWER AMP 1 ON/OFF
	SB#10	SBPA2	POWER AMP 2 ON/OFF
	SB#11	SBPA3	POWER AMP 3 ON/OFF
	SB#12	SBPA4	POWER AMP 4 ON/OFF
	ASC1-2		SBAND XMTR 1 +16V
	ASC1-3		SBAND XMTR 2 +16V
	ASC1-17		SBAND XMTR 1 TEMP
	ASC1-16		SBAND XMTR 2 TEMP
	ASC3-12		SBAND PWR AMP TEMP

RF VHF	ASC1-4		VHF 1 +12V
	ASC1-5		VHF 2 +12V
	ASC1-6		VHF REC 1 AGC
	ASC1-7		VHF REC 2 AGC
	ASC1-23		VHF XMTR 1 TEMP
	ASC1-24		VHF XMTR 2 TEMP

ACCELEROMETER

AMC-18	ACCELA	ACCELEROMETER A
AMC-26	ACCELVL	COMPENSATED ACCELERATION LEVEL
AMC-28	ACCELB	ACCELEROMETER B

PYRO/SPECIAL

SB#2	SEPSW1	3RD STAGE SEPARATION SWITCH NO. 1
SB#3	SEPSW2	3RD STAGE SEPARATION SWITCH NO. 2
SB#4	SAD1	SOLAR ARRAY NO 1 DEPLOYED
SB#5	SAD2	SOLAR ARRAY NO 2 DEPLOYED
ASC3-19		APOGEE BOOST MOTOR TEMP
DSC-22		APOGEE BOOST MOTOR ARM RELAY
DSC-23		SOLAR ARRAY/SI COVER ARM RELAY

# OBC TELEMETRY

56 BIT REGISTER: OBC 1 DMC - 16

OBC 2 DMC - 25

FRAME	MSB WORD 1	WORD 2	WORD 3	WORD 4	WORD 5	WORD 6
0	ERRF1	ERRF2	ERRF3	ERRF4	ERRF5	ERRF6
1	ONOFFW	ONOFFW	ONOFFW	OSTAT	OSTAT	OSTAT
2	GCTR1	GCTR2	DMUCOM	DMUCOM	BADSCTR	BITRATE
3	OBCDATA1	OBCDATA1	OBCDATA1/2	OBCDATA2	OBCDATA2	DIAOCTR
4	OBCDATA3	OBCDATA3	OBCDATA3/4	OBCDATA4	OBCDATA4	MEMYCTR
5	OBCDATA5	OBCDATA5	OBCDATA5/6	OBCDATA6	OBCDATA6	
6	HDOVER1	HDOVER1	HDOVER1	HDOVER1	HDOVER2	HDOVER2
7	HDOVER2	HDOVER2	HDOVER3	HDOVER3	HDOVER3	HDOVER3
8	AE1	AE1	AE1	AE2	AE2	AE2
9	BETACMD	BETACMD	FSS1	FSS1	FSS1	FSS1
10	AB1	AB1	AB1	AB2	AB2	AB2
11	AB3	AB3	AB3	ABG1	ABG1	ABG1
12	ABG2	ABG2	ABG2	ABG3	ABG3	ABG3
13	RB1	RB1	RB2	RB2	RB3	RB3
14	BT1	BT1	BT2	BT2	BT3	BT3
15	TBG1	TBG1	TBG2	TBG2	TBG3	TBG3
16	WV1	WV2	WV3	WV4	DB11CTR	IFSSH/ISS/IFSSH
17	SHMODE1	SHMODE2	SHMODE3	SHMODE4	NRER	NRER
18	NDEL1	NDEL1	NDEL2	NDEL2	BETA	BETA
19	NPL	NMI	FSS2	FSS2	FSS2	FSS2
20	SCCLK	SCCLK	OCTR1	OCTR2	SYNCTR	HITCTR
21	CPUTCTR	CPUDIAG	TTACHV1	TTACHV2	TTACHV3	TTACHV4
22	TTACHR1	TTACHR2	TTACHR3	TTACHR4	NRBIAS	NRBIAS
23	DLYCTR	DLYTAG	DLYTAG	LMPTOT	LMPTOT	
24	EXPTOT1	EXPTOT1	EXPTAG1	EXPTAG1	ERRCTR1	MEMDIAG
25	EXPTOT2	EXPTOT2	EXPTAG2	EXPTAG2	ERRCTR2	DB17CTR
26	EXPTOT3	EXPTOT3	EXPTAG3	EXPTAG3	ERRCTR3	DVCTRA
27	EXPTOT4	EXPTOT4	EXPTAG4	EXPTAG4	ERRCTR4	DVCTRB
28	ABG11	ABG11	ABG12	ABG12	BETA	BETA
29	RBG11	RBG11	RBG12	RBG12	NRER	NRER
30	UPCTR	UPCTR	BURNT	BURNT	ACSFLG	ACSFLG
31	TPP	TYP	TRP	TPN	TYN	TRN

WORK  
19  
DATA



## 56 BIT REGISTER: OBC 1 DMC-16

## OBC 2 DMC-25

FRAME	MSB WORD 1	WORD 2	WORD 3	WORD 4	WORD 5	WORD 6
0	ERRF1	ERRF2	ERRF3	ERRF4	ERRF5	ERRF6
1	ONOFFW	ONOFFW	ONOFFW	OSTAT	OSTAT	OSTAT
2	GCTR1	GCTR2	DMUCOM	DMUCOM	BADSCTR	BITRATE
3	OBCDATA1	OBCDATA1	OBCDATA1/2	OBCDATA2	OBCDATA2	DIAOCTR
4	OBCDATA3	OBCDATA3	OBCDATA3/4	OBCDATA4	OBCDATA4	MEMYCTR
5	OBCDATA5	OBCDATA5	OBCDATA5/6	OBCDATA6	OBCDATA6	
6	HDOVER1	HDOVER1	HDOVER1	HDOVER1	HDOVER2	HDOVER2
7	HDOVER2	HDOVER2	HDOVER3	HDOVER3	HDOVER3	HDOVER3
8	AE1	AE1	AE1	AE2	AE2	AE2
9	AEF1	AEF1	AEF1	AEF2	AEF2	AEF2
10	AB1	AB1	AB1	AB2	AB2	AB2
11	AB3	AB3	AB3	ABG1	ABG1	ABG1
12	ABG2	ABG2	ABG2	ABG3	ABG3	ABG3
13	RB1	RB1	RB2	RB2	RB3	RB3
14	BT1	BT1	BT2	BT2	BT3	BT3
15	TBG1	TBG1	TBG2	TBG2	TBG3	TBG3
16	WV1	WV2	WV3	WV4	DB11CTR	
17	SHMODE1	SHMODE2	SHMODE3	SHMODE4	DB11TAG	DB11TAG
18	NDEL1	NDEL1	NDEL2	NDEL2	NDEL3	NDEL3
19	NDEL4	NDEL4	NDEL5	NDEL5	NDEL6	NDEL6
20	SCCLK	SCCLK	OCTR1	OCTR2	SYNCTR	HITCTR
21	CPUTCTR	CPUDIAG	TTACHV1	TTACHV2	TTACHV3	TTACHV4
22	TTACHR1	TTACHR2	TTACHR3	TTACHR4	BRLCT	BRLCT
23	DLYCTR	DLYTAG	DLYTAG	LMPTOT	LMPTOT	CDTTCTR
24	EXPTOT1	EXPTOT1	EXPTAG1	EXPTAG1	ERRCTR1	MEMDIAG
25	EXPTOT2	EXPTOT2	EXPTAG2	EXPTAG2	ERRCTR2	DB17CTR
26	EXPTOT3	EXPTOT3	EXPTAG3	EXPTAG3	ERRCTR3	DVCTRA
27	EXPTOT4	EXPTOT4	EXPTAG4	EXPTAG4	ERRCTR4	DVCTRB

FRAME	MSB WORD 1	WORD 2	WORD 3	WORD 4	WORD 5	WORD 6
28	ABG11	ABG11	ABG12	ABG12	ABG13	ABG13
29	RBG11	RBG11	RBG12	RBG12	RBG13	RBG13
30	UPCTR	UPCTR	BURNT	BURNT	ACSFLG	ACSFLG
31	TPP	TYP	TRP	TPN	TYN	TRN



FRAME	WORD	VARIABLE	BITS	FORMAT	UNITS	VALUE	DISCRIPTION
0	1	ERRFLG1	1 2 3 4 5 6 7 8	FLAGS		8 4 2 1 8 4 2 1	ALARM- REGISTER OVERFLOW IN ACS WORKER ALARM- REGISTER OVERFLOW IN ACS WORKER MAXIMUM VALUE STORED IN ACCUMULATOR ERROR- REQUEST TO TURN ON A WORKER THAT WAS ALREADY ON ALARM- FSS HEAD TOGGLE REQUESTED BY OBC ALARM- FSS HEAD TOGGLE COMMAND SENT BY OBC SPARE ALARM- PROGRAM ATTEMPTED TO BRANCH TO LOCATION 0 IN OBC MEMORY ALARM- FES LOSS OF STAR
0	2	ERRFLG2	1 2 3 4-6 7 8	FLAGS		8 4 2 2 2	ALARM- RATE ARREST WHEEL SPEED VIOLATION WORKER 10 -WHEEL HOLD- TURNED ON ERROR- DATA BLOCK 17 NOT UPLINKED ERROR- CAMERA SPECIFIED IN DATA BLOCK 14 IS ALREADY EXPOSING SPARES ALARM- USER SERVICE PARAMETER IS OUT OF TOLERANCE SPARE
0	3	ERRFLG1	1 2 3 4 5 6 7 8	FLAGS		8 4 2 1 8 4 2 1	ERROR- DATA BLOCK LENGTH WRONG ERROR- DATA BLOCK VERTICAL PARITY WRONG ERROR- INVALID EXECUTIVE REQUEST NUMBER ERROR- WORKER REQUESTED DOESN'T EXIST ERROR- DATA BLOCK NUMBER UPLINKED DOESN'T EXIST ALARM- OBC ATTEMPTED TO WRITE TO PROTECTED MEMORY ERROR- UNEXPECTED EXECUTIVE REQUEST ERROR- ATTEMPTED TO EXPOSE MORE THAN 2 CAMERAS AT A TIME
0	4	ERRFLG1	1 2 3 4 5 6 7-8	FLAGS		8 4 2 1 8 4	ERROR- INVALID SLEW AXIS CODE DETECTED - 08 11 IGNORED ERROR- INVALID DATA BLOCK 14 TURN-ON REQUEST ALARM- 2ND ACS WORKER TURNED ON - ORIGINAL ON WORKER WAS TURNED OFF ALARM- OBC COMMAND QUE OVERFLOW ALARM- WORKER 18 STILL ON - LAST DATA BLOCK OR SOFTWARE LOAD LOST ALARM- NO SUN PRESENCE SEEN ON EITHER FSS HEAD BY OBC SPARES
0	5	ERRFLG5	1 2-4 5 6 7-8	FLAGS		8 8 4	ALARM- RATE ARREST WHEEL SPEED VIOLATION - NO ACTION TAKEN SPARES ALARM- REGISTER OVERFLOW IN WORKER 19 ALARM- INFINITE LOOP DETECTED IN OBC SPARES
0	6	ERRFLG6	1 2 3 4 5 6 7 8	FLAGS		8 2 1 1 4 2 1	ALARM- MEMORY CHECKSUM ERROR SEE FRAME 24, WORD 6 FOR ERROR CODE SPARE ALARM- WORKER 0 TIMEOUT - RESTARTED BY WORKER 8 ALARM- OBC IN MONITOR MODE SPARE ERROR- FES MONITOR COMMANDED WITHOUT FES SELECTED ERROR- OBC COMMAND PATERN VIOLATION COMMAND NOT SENT ERROR- DATA BLOCK NOT BUILT CORRECTLY
1	1-3	ONOFF	1-24	FLAGS			ON/OFF FLAGS FOR WORKERS 1=ON
1	4-6	OSTAT	1	FLAGS			OBC DATA SOURCE 0=ROM 1=DIRECT READ

FRAME	WORD	VARIABLE	BITS	FORMAT	UNITS	DIM	DESCRIPTION
0	1	ERRF1	1* 2 3 4 5 6 7 8	FLAGS		6	'ALARM-REGISTER OVERFLOW OBC ACS WORKER' 'ALARM-SAFE ATTITUDE TIME OUT' (ALMOST ) 'ERROR-ON WORKER TURNON-IGNORED' 'ALARM-SAFE SLEW INITIATED' 'ALARM-BRIGHT LIGHT VIOLATED-SHUTTING DOWN' 'ALARM-POINTING CONSTRAINT-SHUTTING DOWN' ILLEGAL BRANCH TO LOCATION 0 'ALARM-FES DISABLED-LOSS OF STAR'
0	2	ERRF2	1* 2 3 4 5 6 7 8	FLAGS		6	'ALARM-RATE ARREST--WHEEL SPEED VIOLATION' 'ERROR-DATA BLOCK 17 NOT UPLINKED' 'ERROR-DATA BLOCK 14-CAMERA IN EXPOSE' 'ALARM-FES SHUTDOWN INITIATED' 'ALARM-CAMERA STANDBY INITIATED' 'ALARM-SHUTTER SHUTDOWN INITIATED' 'ALARM-USER SERVICEPARAMETEROUTOFTOLERANCE' 'ALARM-TRANSFER ORBIT WORKER ERROR'
0	3	ERRF3	1* 2 3 4 5 6 7 8	FLAGS		6	'ERROR-SOFTWARELOAD-BLOCKLENGTH' 'ERROR-SOFTWARELOAD-VERTICAL PARITY' 'ERROR-EXECUTIVE REQUEST NUMBER' 'ERROR-WORKER REQUESTED DOESN'T EXIST' 'ERROR-DATABLOCK NUMBER DOESN'T EXIST' 'ALARM-MEMORY WRITE PROTECTION' ERROR-UNEXPECTED EXECUTIVE REQUEST 'ALARM-MORE THAN 2 CAMERAS EXPOSING- THIS IS NOT ALLOWED- IGNORED'
0	4	ERRF4	1* 2 3 4 5 6 7 8	FLAGS		6	'ERROR-INVALID SLEW AXIS CODE-DB11 IGNORED' 'ERROR-INVALID DB14 TURN-ON REQUEST' 'ERROR-ATTEMPT TURNON 2ND ACS WORKER INOBC' 'ALARM-OBC COMMAND QUE OVERFLOW' 'ALARM-LAST SW LOAD LOST-BECAUSE OBC BUSY' SPARE SPARE SPARE
0	5	ERRF5	*1-8	FLAGS			1 'ALARM-RATE ARREST VIOLATION'-NO ACTION 2 SPARE 3 SPARE 4 SPARE 5 ALARM-REGISTER OVERFLOW IN WORKER 19 6 INFINITE LOOP
0	6	ERRF6	1* 2 3 4-8	FLAGS			'ALARM-MEMORY CHECKSUM-CHECK F24W6' 'ALARM-CPU TEST-CHECK F21W2' 'ALARM-WORKER 0 TIMEOUT-SWITCHEDTO MONITOR' 4 'ALARM-IN MONITOR MODE' 5 'ERROR-CMD DECODER TEST' 6 'ERROR-FES MTR BUT NO FES' 7 'ERROR-CMD PATTERN VIOLATION IGNORED' 8 'DB17 BUILT INCORRECTLY'
1	1-3	GNOFFW	*1-24	FLAGS			ON/OFF FLAGS FOR WORKERS ON=1
1	4-6	OSTAT	1*	FLAGS			OBC DATA SOURCE 0=ROM 1=DIRECT

FRAME	WORD	VARIABLE	BITS	FORMAT	UNITS	DIM	DESCRIPTION
			2				T/M SYNC 0=OUTOFSYNC 1=IN SYNC
			3				COMP SYNC 0=OUTOFSYNC 1=IN SYNC
			4				CMD DECODER 0=DECODER1 1=DECODER2
			5				ROM SELECT 0=3A 1=3B
			6				EXPFSW SWITCH 0=DISABLED 1=ENABLED
			*7-8				STATION ID 0=XFER 1=GSFC 2=VILSPA
			9				FAULT 0=SET ERROR BIT,1=DON'T
			10				RATETACH SWITCH 0=ENABLE 1=DISABLE
			11-12				SAFE CONDITION 0=SHUTDOWN&SLEW 3=NO ACTION 1=SHUTDOWN 2=SLEW
			13				MONITOR MODE 0=CMD 1=MONITOR
			14				OBC S/W SYSTEM 0=8K 1=4K
			15				SUBCOM SYNC-1=IN SYNC-0=OUT OF SYNC
			16				WORKER 0 0=HOLD 1=SLEW
			17-18				DIAGNOSTIC MODE N=0 OFF N=1 OBC T/M,N=2 STOP CPU
			19				WO CMD ENABLE N=0 ALLOW CMDS N=1 DISABLE
			20-21				SPARE
			22-24				OBC TLM 0=40K 1=20K 2=10K 3=5K 4=2.5K
2	1	GCTR1	*1-8	I			GND CMD CTR#1
2	2	GCTR2	*1-8	I			GND CMD CTR#2
2	3-4	DMJCOM	*1-16	FLAGS			DMU CMD REG
2	5	BADSCTR	*1-8	I			OBC DROP SYNC CTR
2	6	BITRATE	*1-8	I			OBC BITRATE 1=40K,2=20K,4=10K
3	1-5	OBCDATA1	*1-18				WORD 1 DEFINED BY DATA BLOCK 13
			19-22				NOT USED
3		OBCDATA2	23-40				WORD 2 DEFINED BY DATA BLOCK 13
3	6	DIAOCTR	*1-8	I	1		WORKER 0 TIMEOUT VIOLATIONS COUNT.
4	1-5	OBCDATA3	*1-18				WORD 3 DEFINED BY DATA BLOCK 13
			19-22				NOT USED
		OBCDATA4	23-40				WORD 4 DEFINED BY DATA BLOCK 13
4	6	MEMYCTR	*1-8	I	1		MEMORY CHECKSUM VIOLATIONS
5	1-5	OBCDATA5	*1-18				WORD 5 DEFINED BY DATA BLOCK 13
			19-22				NOT USED
		OBCDATA6	23-40				WORD 6 DEFINED BY DATA BLOCK 13
6	1-4	HDOVER1	*1-32	S+1	RAD		RIGHT ASSENSION SINGLE PRECISION FLOATING
6	5-6	HDOVER2	*1-16	S+1	RAD		DECLINATION POINT RADIANS UPLINK
7	1-2	HDOVER2	17-32				
7	3-6	HDOVER3	*1-32	S+1	RAD		ROLL FROM SIGMA BY DB15
8	1-3	AE1	*1-24	I 2'S	RAD	2	FES ANGLE FROM REF P BW=2***-24
8	4-6	AE2	*1-24	I 2'S	RAD	2	FES ANGLE FROM REF Y
9	1-3	AEF1	*1-24	I 2'S	RAD	2	FILTERED AE P BW=2***-28

FRAME	WORD	VARIABLE	BITS	FORMAT	UNITS	DIM	DESCRIPTION	
9	4-6	AEF2	*1-24	I 2'S	RAD	2	FILTERED AE Y	
10	1-3	AB1	*1-24	I 2'S	RAD	3	BODY ANGLE ESTIMATE P BW=2**-22	
10	4-6	AB2	*1-24	I 2'S	RAD	3		Y
11	1-3	AB3	*1-24	I 2'S	RAD	3		R
11	4-6	ABG1	*1-24	I 2'S	RAD	3	GYRO MEASURED BODY ANGLE P BW=2**-22	
12	1-3	ABG2	*1-24	I 2'S	RAD	3		Y
12	4-6	ABG3	*1-24	I 2'S	RAD	3		R
13	1-2	RB1	*1-16	I 2'S	RAD/S	3	BODY RATE ESTIMATE P BW=2**-23	
13	3-4	RB2	*1-16	I 2'S	RAD/S	3		Y
13	5-6	RB3	*1-16	I 2'S	RAD/S	3		R
14	1-2	BT1	*1-16	I 2'S	R/S/S	3	BIAS ACCELERATION P BW=2**-23	
14	3-4	BT2	*1-16	I 2'S	R/S/S	3		Y
14	5-6	BT3	*1-16	I 2'S	R/S/S	3		R
15	1-2	TBG1	*1-16	I 2'S	RAD/S	3	GYRO DRIFT P BW=2**-29	
15	3-4	TBG2	*1-16	I 2'S	RAD/S	3		Y
15	5-6	TBG3	*1-16	I 2'S	RAD/S	3		R
16	1	WV1	*1-8	I 2'S	VOLTS	4	WHEEL VOLTAGE P BW=2**-5	
16	2	WV2	*1-8	I 2'S	VOLTS	4		Y
16	3	WV3	*1-8	I 2'S	VOLTS	4		R
16	4	WV4	*1-8	I 2'S	VOLTS	4		RED
16	5	DB11CTR	*1-8	I			NUMBER OF SLEWS YET TO BE EXECUTED	
16	6						NOT ASSIGNED	
17	1	SHMODE1	*1 2 3 4 5 6 7 8	FLAGS		4	MBO OBC BIT 18 1=KALMAN (FILTER) 0=RAW MC0 17 1=GYRO&FES(FILTER) 0=GYRO P MD0 16 1=SLEW (CNTRLMODE) 0=HOLD P ME0 15 1=HIGH (GAIN) 0=LCW P MA 14 1=ATTITUDE WITH OBC GYROTRIM MK 13 00=NONE TRIM 10=FLT 1ST MK 12 01=GROUND CONTROL 11=FLTLATR MJ0 11 1=DO(READ SLEW CMD)0=DON'T P	
17	2	SHMODE2	*1 2 3 4 5-7 8	FLAGS		4	MB1 OBC BIT 18 1=KALMAN (FILTER) 0=RAW MC1 17 1=GYRO&FES(FILTER) 0=GYRO Y MD1 16 1=SLEW (CNTRLMODE) 0=HOLD Y ME1 15 1=HIGH (GAIN) 0=LOW Y MJ1 14-12 11 1=DO(READ SLEW CMD)0=DON'T Y	
17	3	SHMODE3	*1 2 3 4 5-7 8	FLAGS		4	MB2 OBC BIT 18 1=KALMAN (FILTER) 0=RAW MC2 17 1=GYRO&FES(FILTER) 0=GYRO R MD2 16 1=SLEW (CNTRLMODE) 0=HOLD R ME2 15 1=HIGH (GAIN) 0=LOW R MJ2 14-12 11 1=DO(READ SLEW CMD)0=DON'T R	
17	4	SHMODE4	*1 2	FLAGS		4	OBC BIT 18 MF 17 1=DO(REFINEWHLBIAS)0=DON'T	

FRAME	WORD	VARIABLE	BITS	FORMAT	UNITS	DIM	DESCRIPTION
			3				MG3 16 1=DO(ADD WHL BIAS) 0=DON'T RD
			4				MG2 15 1=DO(ADD WHL BIAS) 0=DON'T R
			5				MG1 14 1=DO(ADD WHL BIAS) 0=DON'T Y
			6				MG0 13 1=DO(ADD WHL BIAS) 0=DON'T P
			7				ML 12 00=DISABLE FES 10=ENABLE
			8				ML 11 01=DISABLE PROCESS 11=AUTO
17	5-6	DB11TAG	*1-16	I	1.024		TIME REMAINING AT SAFE ATTITUDE SECONDS
18	1-2	NDEL1	*1-16	I 2'S		6	DELTA COUNTS/ITERATION FOR GYRD 1
18	3-4	NDEL2	*1-16	I 2'S		6	DELTA COUNTS/ITERATION FOR GYRD 2
18	5-6	NDEL3	*1-16	I 2'S		6	DELTA COUNTS/ITERATION FOR GYRD 3
19	1-2	NDEL4	*1-16	I 2'S		6	DELTA COUNTS/ITERATION FOR GYRD 4
19	3-4	NDEL5	*1-16	I 2'S		6	DELTA COUNTS/ITERATION FOR GYRD 5
19	5-6	NDEL6	*1-16	I 2'S		6	DELTA COUNTS/ITERATION FOR GYRD 6
20	1-2	SCCLK	*1-16	I	.8192		SPACECRAFT CLOCK TIME SECONDS
20	4	OCTR2	*1-8	I			OBC TO DECODER 2 COMMAND COUNTER
20	3	OCTR1	*1-8	I			OBC TO DECODER 1 COMMAND COUNTER
20	5	SYNCTR	*1-8	I			OBC DROP SYNC COUNTER
20	6		*1-8	I			HITCTR OBC
21	1	CPUTCTR	*1-8	I			CPU TEST WORKER ERROR COUNT
21	2	CPUDIAG	*1-8	I			TEST # FAILURE CPU TEST WORKER
21	3	TTACHV1	*1-8	I 2'S	VOLTS		REACTION WHEEL VOLTAGE P BW=2**-5
21	4	TTACHV2	*1-8	I 2'S	VOLTS		(FROM WORKER 10) Y
21	5	TTACHV3	*1-8	I 2'S	VOLTS		R
21	6	TTACHV4	*1-8	I 2'S	VOLTS		RED
22	1	TTACHR1	*1-8	I	VOLTS		TTACH-DRIVER REF VOLTAGES P BW=.02
22	2	TTACHR2	*1-8	I	VOLTS		Y
22	3	TTACHR3	*1-8	I	VOLTS		R
22	4	TTACHR4	*1-8	I	VOLTS		RED
22	5-6	BRLCT	*1-16	I			STAR MAGNITUDE AT VIOLATION
23	1	DLYCTR	*1-8	I			NUMBER OF COMMANDS REMAINING TO BE EXECUTED
23	2-3	DLYTAG	*1-16	I	.1024		TIME UNTIL NEXT CMD -SECONDS
23	4-5	LMPTOT	*1-16	I	52.4S		TOTAL LAMP ON TIME (MAX 500 HRS)
23	6	CDTTCTR	*1-8	I			CMD DECODER WORKER ERROR COUNT
24	1-2	EXPTOT1	*1-16	I	.4096		TOTAL EXPOSURE TIME-SECONDS.
25	1-2	EXPTOT2	*1-16	I	.4096		
26	1-2	EXPTOT3	*1-16	I	.4096		
27	1-2	EXPTOT4	*1-16	I	.4096		
24	3-4	EXPTAG1	*1-16	I	.4096		EXPOSURE COUNTER-SECONDS
25	3-4	EXPTAG2	*1-16	I	.4096		

FRAME	WORD	VARIABLE	BITS	FORMAT	UNITS	DIM	DESCRIPTION
26	3-4	EXPTAG3	*1-16	I	.4096		
27	3-4	EXPTAG4	*1-16	I	.4096		
24	5	ERRCTR1	*1-8	I			FES STAR NOT PRESENT COUNTER
25	5	ERRCTR2	*1-8	I			FES STAR NOT PRESENT COUNTER
26	5	ERRCTR3	*1-8	I			FES STAR NOT PRESENT COUNTER
27	5	ERRCTR4	*1-8	I			FES STAR NOT PRESENT COUNTER
24	6	MEMDIAG	*1 2 3 4 5 6	FLAGS			B0 PARITY ERROR B1 PARITY ERROR B2 PARITY ERROR B0 BOUNDARY ERROR B1 BOUNDARY ERROR B2 BOUNDARY ERROR
25	6	DB17CTR	*1-8	I			OBC DATA BLOCK 17 COUNTER
26	6	DVCTR	*1-8 9-16	I I	.0512		COUNT DELTA V JET TORQUES (IN SECONDS)
28	1-2	ABG11	*1-16	I 2'S	RAD	3	GYRO MEASURED BODY (P)
		ABG12	*1-16	I 2'S	RAD	3	ANGLE FOR W19 (Y)
		ABG13	*1-16	I 2'S	RAD	3	BW=2**-17 (R)
29	1-2	RBG11	*1-16	I 2'S	RAD/S	3	GYRO MEASURED BODY (P)
		RBG12	*1-16	I 2'S	RAD/S	3	RATE FOR W19 (Y)
		RBG13	*1-16	I 2'S	RAD/S	3	BW=2**-18 (R)
30	1-2	UPCTR	*1-16	I	.1024		UP COUNTS TO BURNT (IN SEC)
30	3-4	BURNT	*1-16	I	.1024		DELTA V BURN TIME (IN SEC)
30	5-6	ACSFLG	*1-16	FLAGS			BACK UP MODE FLAGS
31	1	TPP	*1-8	I			W19 COUNTS +P TORQUES
31	2	TYP	*1-8	I			W19 COUNTS +Y TORQUES
31	3	TRP	*1-8	I			W19 COUNTS +R TORQUES
31	4	TPN	*1-8	I			W19 COUNTS -P TORQUES
31	5	TYN	*1-8	I			W19 COUNTS -Y TORQUES
31	6	TRN	*1-8	I			W19 COUNTS -R TORQUES

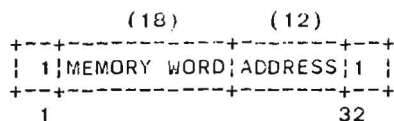
\* INDICATES MSB  
2'S TWO'S COMPLIMENT  
I INTEGER(POSITIVE)

8 BIT FLAGS

DSC 9 CPU NO. 1 , 255=OFF, 0=ON, :IMP 49,50  
 DSC 10 CPU NO. 2 , 255=OFF, 0=ON, :IMP 51,19  
 DSC 18 UPPER MEMORY BUSS 1, 0=OFF, 255=ON, :IMP 52,53  
 DSC 19 LOWER MEMORY BUSS 1, 0=OFF, 255=ON, :IMP 54,55  
 DSC 20 UPPER MEMORY BUSS 2, 0=OFF, 255=ON, :IMP 56,57  
 DSC 21 LOWER MEMORY BUSS 2, 0=OFF, 255=ON, :IMP 58,59

ASC2-3 #1 CONVERTER  
 ASC2-55 #2 CONVERTER  
 ASC1-26 1/2 CONVERTER TEMP  
 ASC1-27 1/2 PROCESSOR TEMP  
 ASC1-28 0/2 MEMORY TEMP

32 BIT REGISTER OBC NO.1 DIGITAL MAIN COM 17  
 OBC NO.2 DIGITAL MAIN COM 26



REQUIRES ROM 2-B SELECTED FOR TELEMETRY

MNEMONIC	BIT NO.	FUNCTION	TELEMETRY
OBCMD1	1-32	OBC NO.1 MEMORY DUMP	DMC-17
OBCMD2	1-32	OBC NO.2 MEMORY DUMP	DMC-26
OBCMDW1	2-19	OBC NO.1 MEM. DUMP W1	DMC-17
OBCMDW2	2-19	OBC NO.2 MEM. DUMP W2	DMC-26
OBCMDA1	20-31	OBC NO.1 MEM. DUMP A1	DMC-17
OBCMDA2	20-31	OBC NO.1 MEM. DUMP A2	DMC-26

DIGITAL SUBCOM CHAN.8 WORD NO.24

8 BIT STATUS REGISTER

(8)  
 +-----+  
 | TCM |  
 +-----+  
 1 8

MNEMONIC	BIT NO.	FUNCTION	MODE CONTROL PRIMARY	SECONDARY
TCM	1-8			
(TCMONOFF)	1	1=ON		
(TCM:MODE)	2	MODE CONTROL 0=PRIMARY 1=SECONDARY		
(TCMPPTCH)	3	1=+PITCH ERROR	ENG 3&7	ENG 3 OR 7
(TCMMPPTCH)	4	1=-PITCH ERROR	ENG 1&9	ENG 1 OR 9
(TCMPYAW)	5	1=+YAW ERROR	ENG 6&10	ENG 6 OR 10
(TCMMYAW)	6	1=-YAW ERROR	ENG 4&12	ENG 4 OR 12
(TCMPROLL)	7	1=+ROLL ERROR	ENG 4&10	ENG 1 & 7
(TCMROLL)	8	1=-ROLL ERROR	ENG 6&12	ENG 3 & 9

-ROLL ERROR FIRES +ROLL JETS,ETC.

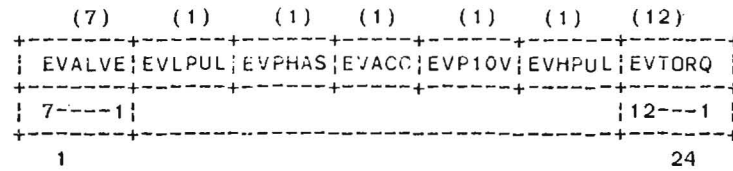
BIT 1 IS THE FIRST BIT OUT OF THE CEA

- AMC-15 PITCH WHEEL CMD (PITCHCM)
- AMC-17 YAW WHEEL CMD (YAWCM)
- AMC-23 CSS PITCH ERROR (CSSPE)
- AMC-25 ROLL WHEEL CMD (ROLLCM)
- AMC-31 CSS ROLL ERROR (CSSRE)



EV-1 DIG.SUBCOM CHAN 4  
 EV-2 DIG.SUBCOM CHAN 5

24 BIT STATUS REGISTER



MNEMONIC	BIT NO.	FUNCTION	
EVALVE	1-7	VALVES	0=CLOSE
(EVALV7)	1		
(EVALV6)	2		
(EVALV5)	3		
(EVALV4)	4		
(EVALV3)	5		
(EVALV2)	6		
(EVALV1)	7		
EVL PUL	8	LOW THRUST ENGINES MODE	0=CONTINUOUS 1=PULSE JETS
EV PHAS	9	ACCELEROMETER PHASE	0=NON-INVERT 1=INVERT
EV ACC	10	ACCELEROMETER SELECT	0=ACCEL.NO. 1 1=ACCEL.NO. 2
EVP10V	11	+10V	0=OFF 1=ON
EVHPUL	12	HIGH THRUST ENGINES MODE	0=CONTINUOUS 1=PULSE THRUSTERS
EVTORQ	13-24	ENGINE FIRE	0=SHUTDOWN ENGINES 1=FIRE ENGINES
(EVTRQ C)	13		
(EVTRQ B)	14		
(EVTRQ A)	15		
(EVTRQ 9)	16		
(EVTRQ 8)	17		
(EVTRQ 7)	18		
(EVTRQ 6)	19		
(EVTRQ 5)	20		
(EVTRQ 4)	21		
(EVTRQ 3)	22		
(EVTRQ 2)	23		
(EVTRQ 1)	24		

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ASC1-20 EV DRIVER NO 1/2 TEMP  
 SB#22 EV DRIVER 1 ON/OFF (EVD1)  
 SB#23 EV DRIVER 2 ON/OFF (EVD2)

(8)

```

+-----+
| HYDHTR |
+-----+

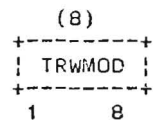
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8 BIT REGISTER DIGITAL SUBCOM CH.NO.11

MNEMONIC	BIT NO.	FUNCTION	COMMANDS	
HYDHTR	1-8			
(HYDHTR1)	1 (MSB)	HEATER GROUP NO.1,1=ON (6.4W PRIMARY CHAMBER LOW THRUST ENGINES NO.1,3,4,6,7,&9)	IMP.91 ON IMP.92 OFF	TO ARM GROUPS 1,4,6,AND 7 USE CRU CMD.43
(HYDHTR4)	2	HEATER GROUP NO.4,1=ON (5.9W PRIMARY HEATERS ON +Y AND -Y REM STRUTS AND MOUNTS,LOW THRUST ENG NO.4&6 VALVES)	IMP 93 ON IMP 94 OFF	CRU CMD 43 TO ARM
(HYDHTR6)	3	HEATER GROUP NO.6,1=ON (5.7W PRIMARY HEATERS ON HIGH THRUST ENGINES 5&11)	IMP 95 ON IMP 96 OFF	CRU CMD 43 TO ARM
(HYDHTR7)	4	HEATER GROUP NO.7,1=ON (12.2W PRIMARY HEATERS ON -Z HYDRAZINE LINES, HYDRAZINE TANKS C,D,F&G)	IMP 97 ON IMP 98 OFF	CRU CMD 43 TO ARM
(HYDHTARM)	5	ARM HEATER GROUPS 2,3&5	IMP 99 ARM IMP 100 DISARM	
(HYDHTR2)	6	HEATER GROUP NO.2,1=ON (BACKUP HEATERS FOR GROUP NO.1)	IMP 101 ON IMP 102 OFF	
(HYDHTR3)	7	HEATER GROUP NO.3,1=ON (BACKUP HEATERS FOR GROUP NO.7, PRIMARY HEATERS ON +Z HYD LINES, HYD TANKS B&H,LTE 10&12 VALVES)(15.2W)	IMP 107 ON IMP 108 OFF	
(HYDHTR5)	8	HEATER GROUP NO.5,1=ON (BACKUP HEATERS FOR GROUP NO.4)	IMP 109 ON IMP 110 OFF	

ASC1-42 PRESSURE TANKS E&G	ASC1-52 CAT BED # 8	ASC2-21 +Z LINE TEMP
ASC1-43 PRESSURE TANKS B&F	ASC1-53 CAT BED # 9	ASC2-22 LTE 10VA/12VA TEMP
ASC1-44 PRESSURE TANKS D&H	ASC1-54 CAT BED # 10	ASC2-23 LV 1&3/2&6 TEMP
ASC1-45 CAT BED #1 TEMP	ASC1-55 CAT BED # 11	ASC2-24 D SECT LN/F&DVA TMP
ASC1-46 CAT BED 2 TEMP	ASC1-56 CAT BED # 12	ASC2-25 LTE 7VA/3VA TEMP
ASC1-47 CAT BED 3 TEMP	ASC2-16 TANK B/H TEMP ASC	2-26 HTE 2VA/8VA TMP
ASC1-48 CAT BED 4 TEMP	ASC2-17 TANK G/C TEMP	ASC2-27 LTE 1VA/9VA TEMP
ASC1-49 CAT BED 5 TEMP	ASC2-18 TANK D/F TEMP	ASC2-28 +Y REM/-Y REM TEMP
ASC1-50 CAT BED 6 TEMP	ASC2-19 -Z LINE TEMP	ASC2-29 -Y REM/+Y REM STRUT TEMP
ASC1-51 CAT BED 7 TEMP	ASC2-20 LTE 6VA/4VA TEMP	

8 BIT STATUS REGISTER



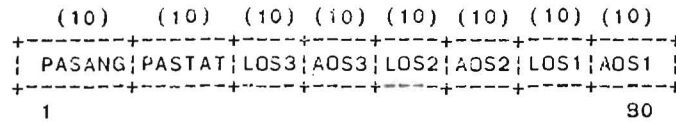
MNEMONIC	BIT NO.	FUNCTION
TRWMD	8	
(TRWMD1)	1	1=ON(10V)
(TRWMD2)	2	1=ENABLE RWMODE
(TRWMD3)	3	S2,1=ENABLE D/A 2 TO WHEEL
(TRWMD4)	4	S1,1=ENABLE D/A 1 TO WHEEL
(TRWMD5)	5	S3,1=ENABLE C AND M CMD.TO WHEEL
(TRWMD6)	6	CSS,1=ENABLE COARSE SUN SENSOR
(TRWMD7)	7	R2,1=ENABLE RATE 2 TO C AND M CARD
(TRWMD8)	8	R1,1=ENABLE RATE 1 TO C AND M CARD

BIT 1 IS THE FIRST BIT OUT OF THE CEA

ASC2-0 WDA PS 1 +10V	ASC2-13 ROLL DRIVE TACK	ASC2-39 CEA ROLL CMD 1
ASC2-4 WDA PS 2 +5V	ASC2-14 REDU DRIVE TACK	ASC2-40 CEA ROLL CMD 2
ASC2-5 WDA PS 2 +10V	ASC2-15 PITCH/ROLL DRTEMP	ASC2-41 CEA REDU CMD 1
ASC2-6 WDA PS 1/2 TEMP	ASC2-32 YAW/REDU DR TEMP	ASC2-42 CEA REDU CMD 2
ASC2-7 PITCH MOTOR VOLTS	ASC2-33 PITCH/ROLL DRPHA	ASC3-16 PITCH/ROLL WH TEMP
ASC2-8 YAW MOTOR VOLTS	ASC2-34 YAW/RED DR PHASA	ASC3-17 YAW/REDU WHEELTEMP
ASC2-9 ROLL MOTOR VOLTS	ASC2-35 CEA PITCH CMD1	ASC1-58 WDA PS 1 +5V
ASC2-10 REDU MOTOR VOLTS	ASC2-36 CEA PITCH CMD 2	
ASC2-11 PITCH DRIVE TACH	ASC2-37 CEA YAW CMD1	
ASC2-12 YAW DRIVE TACH	ASC2-38 CEA YAW CMD2	

80 BIT REGISTER

PAS NO.1 DIGITAL MAINCOM CH.7  
 PAS NO.2 DIGITAL MAINCOM CH.9



MNEMONIC BIT NO. FUNCTION

PASANG 1-10

(TPSAST) 1 0=CCW,1=CW  
 (TPSDAT) 2-10 ENCODER ANGLE BIT 2=MSB

PASTAT 11-20  
 (TPSVAL) 11 1=INVALID DATA  
 (TPSNEW) 12 1=NEW DATA (PLANAR MODE ONLY)  
 (TPSMOD) 13 1=PLANAR MODE  
 (TPSLEW) 14 1=SLEW ENABLE  
 (TPSCAN) 15 1=SECTOR SCAN  
 (TPSSUN) 16 1=SELECT SMSS  
 (TPSCLK) 17-18 0=1250HZ CLK ,78.0HZ STEP  
 1= 625HZ CLK.,39.0HZ STEP  
 2= 312HZ CLK.,19.5HZ STEP  
 3= 156HZ CLK., 9.8HZ STEP

(TPSCND) 19 1=CW SCAN DIRECTION  
 (TPSTAR) 20 1=TARGET OVERFLOW (OVER 3 TARGETS)

		PLANAR MODE	SPHERICAL MODE
LOS3	21 22-30	SIX 9 BIT HYBRID GREY CODES REPRESENTING ENCODER POSITION	SIX 10 BIT COUNTERS
AUS3	31 32-40	BITS 22,32,42,52, 62,72 ARE MSB'S.	BITS 21,31,41,51, 61,71 ARE MSB'S
LOS2	41 42-50		
AOS2	51 52-60	BITS 21,31,41,51 61,71 REPRESENT DIRECTION OF SCAN 1=CW	BITS 30,40,50,60, 70,80 ARE LSB'S.
LOS1	61 62-70		
AOS1	71 72,80		

8 BIT FLAGS

DSC 28 PAS NO. 1, 0=OFF, 255=ON  
 DSC 29 PAS NO. 2, 0=OFF, 255=ON

ASC3-26 PAS 1 SENSOR TEMP  
 ASC3-27 PAS 2 SENSOR TEMP  
 DMC-1 PASP1 PAS NO 1/2 SUN PULSE

32 BIT STATUS REGISTER IRA STATUS REGISTER NO.1 DIG.SUBCOM CH.0  
 IRA STATUS REGISTER NO.2 DIG.SUBCOM CH.1

(4)	(1)	(1)	(6)	(2)	(6)	(6)	(6)
NOT USED	IRAENA	IRARC	IRASYN	IRACE	IRAHT	IRAGY	IRAMCT
			6---1	1-2	1---6	1---6	1---6
1		7	13	15	21	27	32

MNEMONIC	BIT NO.	FUNCTION
	1-4	NOT USED
IRAENA	5	ENABLED BITS 1-23 OF :IRA COMMAND
IRARC	6	IRA RATE COLD 0=RATE COLD; 1=NORMAL RATE
IRASYN	7-12 (IRASY6-1)7-12	1=SYNC,GYRO6-1
IRACE	13-14 (IRAC1-2) 13-14	1=ON,COMMON ELEC.1-2
IRAHT	15-20 (IRAHT1-6)15-20	0=HI,HEATER 1-6 SELECT
IRAGY	21-26 (IRAGY1-6)21-26	1=ON,GYRO 1-6 SELECT
IRAMCT	27-32 (IRMCT1-6)27-32	1=HOLD/SLEW,MODE CONTROL 0=RATE MODE

IRA INCREMENTAL ANGLE

GYRO INTEGRATED RATE

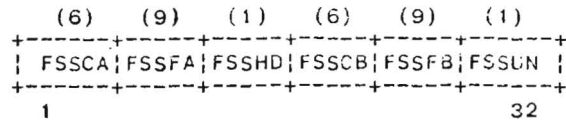
GYRO 1-6 DMC CH. 15,27,20,29,23,31

ASC3-0 PITCH RATE # 1	ASC3-4 ROLL RATE # 1	ASC3-8 GYRO 3 RATE
ASC3-1 PITCH RATE # 2	ASC3-5 ROLL RATE # 2	ASC3-9 GYRO 4 RATE
ASC3-2 YAW RATE # 1	ASC3-6 GYRO 1 RATE	ASC3-10 GYRO 5 RATE
ASC3-3 YAW RATE # 2	ASC3-7 GYRO 2 RATE	ASC3-11 GYRO 6 RATE
ASC2-43 GYRO 1 MOTOR CURR	ASC2-47 GYRO 3 MOTOR CUR	ASC2-51 GYRO 5 MOTOR CURR
ASC2-44 GYRO 1 TEMP	ASC2-48 GYRO 3 TEMP	ASC2-52 GYRO 5 TEMP
ASC2-45 GYRO 2 MOTOR CURR	ASC2-49 GYRO 4 MOTOR CUR	ASC2-53 GYRO 6 MOTOR CURR
ASC2-46 GYRO 2 TEMP	ASC2-50 GYRO 4 TEMP	ASC2-54 GYRO 6 TEMP
ASC2-30 SENSOR TEMP	ASC1-19 COM ELECT TEMP	
AMC-19 TRRAT1 ROLL RATE 1	AMC-20 TPRAT1 PITCHRATE 1	AMC-21 TYRAT1 YAW RATE 1
AMC-24 TRRAT2 ROLL RATE 2	AMC-27 TPRAT2 PITCHRATE 2	AMC-29 TYRAT2 YAW RATE 2

BIT 1 IS THE FIRST BIT OUT OF THE IRA

32 BIT REGISTER

FSS-1 DIGITAL SUBCOM CH.2  
 FSS-2 DIGITAL SUBCOM CH.3



MNEMONIC	BIT NO.	FUNCTION
FSSCA	1-6	COARSE GRAY CODE AXIS-A
FSSFA	7-15	FINE BINARY CODE AXIS-A
FSSHD	16	SENSOR SELECT 0=HEAD 1 1=HEAD 2
FSSCB	17-22	COARSE GRAY CODE AXIS B
FSSFB	23-31	FINE BINARY CODE AXIS B
FSSUN	32	SUN PRESENT 0=NO 1=YES

BIT 1 IS THE FIRST BIT OUT OF THE FSS

BIT 1 IS FSS BIT 6CA (MSB)

BIT 7 IS FSS BIT 9FA (MSB)

BIT 17 IS FSS BIT 6CB (MSB)

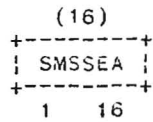
BIT 23 IS FSS BIT 9FB (MSB)

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ASC1-57 FINE SUN SENSOR NO. 1 ATA  
 ASC1-59 FINE SUN SENSOR NO. 1 +5V  
 ASC1-60 FINE SUN SENSOR NO. 2 +5V  
 ASC3-13 FINE SUN SENSOR NO. 2 ATA  
 ASC3-18 FINE SUN SENSOR 1 TEMP(DMU-1)

## 16 BIT REGISTER

DIGITAL MAIN COM CH.11



MNEMONIC	BIT NO.	FUNCTION
SMSSEA	1-9	ELEVATION ANGLE IN GRAY CODE BIT 1 IS THE MSB
	10-15	ZEROS
SMSSEAST	16	1=NEW DATA

BIT 1 IS THE FIRST BIT OUT OF THE SMSS

ELEVATION ANGLE IN DEGREES  
 $BETA = SIGN (0.25 + 0.5 N)$

SIGN=NEG. IF MSB=0

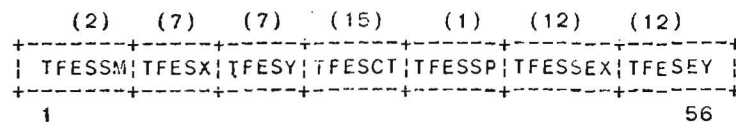
SIGN=POS. IF MSB=1

$N = \text{BIT } 2-9 \text{ GRAY CODE DEC. EQUIVALENT}$

FLUX PARTICLE MONITOR  
 ASC3-18 SPIN MODE SUN SENSOR TEMP (DMU-2)  
 DMC-5 SMSP SPIN MODE SUN SENSOR SUN PULSE.

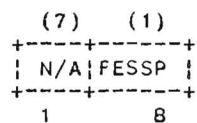
56 BIT DIGITAL STATUS REGISTER

FES-1, DIG. MAIN COM CH. 3  
 FES-2, DIG. MAIN COM CH. 13



MNEMONIC	BIT NO.	FUNCTION
TFESSM	1-2	SYSTEM MODE 0=PRIMARY 1=SEARCH & TRACK 2=FIELD CAMERA 3=NOT USED
TFESX	3-9	FRAME START COORDINATE
TFESY	10-16	LINE START COORDINATE
TFESCT	17-31	STAR MAGNITUDE COUNT
TFESSP	32	STAR PRESENT 0=NO 1=YES/TRACKING
TFESSEX	33-44	X-STAR POSITION
TFESEY	45-56	Y-STAR POSITION

DIGITAL DISCRETE, FES-1 DIG. SUBCOM CH. 14  
 FES-2 DIG. SUBCOM CH. 15



MNEMONIC	BIT NO.	FUNCTION
N/A	1-7	NOT USED
FESSP	8	STAR PRESENCE FLAG 0=NO 1=YES

ASC3-14 FINE ERROR SENSOR NO. 1 TEMP  
 ASC3-15 FINE ERROR SENSOR NO. 2 TEMP



	(4)	(4)	(2)	(2)	(2)	(2)	(2)	(2)	(4)	
	FOCUS1	FOCUS2	FOCLIM	DSTATL	DSTATS	ASTAT	CSTATL	CSTATS	N/A	
	1	5	9	11	13	15	17	19	24	
	MNEUMONIC BIT NO.		FUNCTION							
	FOCUS1	1-4	FOCUS DRIVE 1 POSITION					1=HIGH 0=LOW		
	(FOCS1A#1)1		FOCUS DRIVE 1A-1							
	(FOCS2A#1)2		FOCUS DRIVE 2A-1							
	(FOCS1B#1)3		FOCUS DRIVE 1B-1							
	(FOCS2B#1)4		FOCUS DRIVE 2B-1							
	FOCUS2	5-8	FOCUS DRIVE 2 POSITION					1=HIGH 0=LOW		
	(FOCS1A#2)5		FOCUS DRIVE 1A-2							
	(FOCS2A#2)6		FOCUS DRIVE 2A-2							
	(FOCS1B#2)7		FOCUS DRIVE 1B-2							
	(FOCS2B#2)8		FOCUS DRIVE 2B-2							
	FOCLIM	9-10	FOCAL LIMITS					00=MID,01=MIN 10=MAX,11=BAD		
	DSTATL	11-12	LONG WAVE DISPERSION GRATING					00=SLEW,01=HI 10=LO,11=BAD		
	DSTATS	13-14	SHORT WAVE DISPERSION GRATING					00=SLEW,10=LO 01=HI,11=BAD		
	ASTAT	15-16	APERTURE					10=CLOSE,01=OPEN 00=SLEW,11=BAD		
	CSTATL	17-18	LONG WAVE CAMERA MIRROR					00=SLEW,10=PRIME 01=REDUNDANT,11=BAD		
	CSTATS	19-20	SHORT WAVE CAMERA MIRROR					00=SLEW,10=PRIME 01=REDUNDANT,11=BAD		
	N/A	21-24	NOT USED							

## 8 BIT FLAG

DSC 17 LOW VOLTAGE OVERLOAD, 0=NORMAL, 255=OVERLOAD

ASC1/2-31 EEA CONVERTER 1/2 TEMP	ASC1/2-60 EEA CONVERTER 1/1/2 +15V
ASC2-56 EEA CONVERTER 1 +12V	ASC2-61 EEA CONVERTER 1/2 -15V
ASC2-57 EEA CONVERTER 1 +5V	ASC2-62 EEA CONVERTER 1/2 +8V
ASC2-58 EEA CONVERTER 2 +12V	
ASC1-62 FOCUS MECH POSITION -(EXTEND)	ASC2-59 EEA CONVERTER 2 +5V
ASC1-63 FOCUS MECH POSITION +(RETRACT)	

56 BIT REGISTER CAMERA NO. 1 (LWP) DIGITAL MAIN COM CH.4  
 CAMERA NO. 2 (LWR) DIGITAL MAIN COM CH.10  
 CAMERA NO. 3 (SWP) DIGITAL MAIN COM CH.6  
 CAMERA NO. 4 (SWR) DIGITAL MAIN COM CH.12  
 (3) (1) (1) (2) (2) (1) (1) (7) (10) (10) (10) (10)

CAMID	SCANBT	TWLC	TTUNG	TSTEP	TBHFID	TUVF	TCAMODE	TSSR	TLSR	TISA	TILA
1	4	5	6	7	9	11	10	17	27	37	47 56

MNEMONIC	BIT NO.	FUNCTION
CAMID	1-3	CAMERA I.D.
SCANBT	4	SCAN BIT
TWLC	5	WAVELENGTH CAL STATUS
TTUNG	6,12	TUNGSTEN FLOOD LAMP STATUS.
TSTEP	7-8	STEP SIZE
TBHFID	9	BACK HOLE AND FIDUCIAL LAMP STATUS-
TUVF	11	UV FLOOD STATUS
TCAMOD	10,13-16	

ARGUMENTS	TELEMETRY BITS					FUNCTION
	10	13	14	15	16	
STBY	0	0	0	0	0	STANDBY(AUTO SET BY SCL
STBY	1	0	0	0	0	STANDBY(COMMAND)
EX	1	0	0	0	1	EXPOSE
RDLO	1	1	0	1	0	READ LO GAIN
RDHI	0	1	0	1	0	READ HI GAIN
RDER	1	0	0	1	0	READ-RATE-ERASE
ER	1	0	1	0	0	ERASE

(LGSEL)	10	LOW GAIN SELECT
(TBIAS)	13	TARGET BIAS
(ERASEM)	14	ERASE MODE
(READM)	15	READ MODE
(EXPOSM)	16	EXPOSE MODE
TSSR	17-26	NUMBER SAMPLES (SAMPLE SCAN RANGE) NOTE 1
TLSR	27-36	NUMBER LINES (LINE SCAN RANGE) NOTE 1
TISA	37-46	STARTING SAMPLE (INITIAL SAMPLE ADDRESS) NOTE 2.
TILA	47-56	STARTING LINE (INITIAL LINE ADDRESS) NOTE 2.

NOTE 1 REMAINING AT TIME OF READOUT.

NOTE 2 ADDRESS AT TIME OF READOUT.

BIT 1 IS THE FIRST BIT OUT OF THE SSCL.

8 BIT FLAGS

DSC 24 CAMERA NO 1 +28V (LWP) 0=OFF 255=ON  
 DSC 25 CAMERA NO 2 +28V (LWR) 0=OFF 255=ON  
 DSC 26 CAMERA NO 3 +28V (SWP) 0=OFF 255=ON  
 DSC 27 CAMERA NO 4 123V (SWR) 0=OFF 255=ON  
 DSC 30 CAL PS NO. 1 TUNGSTEN LAMP 0=OFF 255=ON  
 DSC 31 CAL PS NO. 2 TUNGSTEN LAMP 0=OFF 255=ON

AMC-22 ESC1	AMC-6 SPECV3 SSCL SWP VIDEO
AMC-30 ESC2	AMC-10 SPECV2 SSCL LWR VIDEO
AMC-4 SPECV1 SSCL LWP VIDEO	AMC-12 SPECV4 SSCL SWR VIDEO
SB#6 SSOPEN SUN SHUTTER-OPEN	SB#7 SSCLOS SUN SHUTTER-CLOSE
ASC1-61 SI CAL PS1 HV CURRENT	ASC2-2 SI CAL PS2 HV CURRENT
ASC3-20 SI SECONDARY MIRROR TEMP-MIRROR	ASC3-25 TELESCOPE TUBE +2/-2 TEMP STA 92
ASC3-21 SI SECONDARY MIRROR TEMP-FOCUS	ASC3-28 CAMERA DECK (NEAR LWP/LWR) TEMP
ASC3-22 PRIMARY MIRROR-LOC 1 TEMP +Y	ASC3-29 CAMERA DECK SWP/SWR TEMP
ASC3-23 PRIMARY MIRROR-LOC 2 TEMP -Y	ASC3-30 CAMERA DECK (FES1/FES2) TEMP
ASC3-24 TELESCOPE TUBE +2/-2 TEMPSTA133	ASC3-31 SPEC COVER TEMP AT RING +2/-2

DATABLOCK	ROUTINE UPLINK	PROCEDURE EXECUTABLE	BUILT BY	DESCRIPTION
DB0 -DB9	NO	YES	WSTART	SLEW DATA BASE
DB10	YES	YES	GND SYS	SLEWHOLD MODES OF OPERATION
DB11	YES	YES	GND SYS	MANEUVER SLEW DATA
DB12	NO	YES	GND SYS	OBC TLM FRAME SELECT
DB13	NO	YES	GND SYS	SIX OBCDATA ADDRESSES
DB14	YES	YES	GND SYS	EXPOSURE TIME CMNDS.
DB15	YES	YES	GND SYS	HANDOVER INFORMATION
DB16	NO	YES	GND SYS	TACH REFERENCES FOR WHEEL SPEED HOLD
DB17	NO	YES	GND SYS	DELAYED COMMANDS
DB18			WSTART	SUN ACQUISITION BACKUP ACS
DB19	NO	NO	WSTART	DELTA V BURN DATA
DB20	NO	NO	WSTART	PRECESSION BACKUP
DB21	NO	NO	WSTART	NUTATION BACKUP

DATA BLOCK	VARIABLE	DIM	NUMBER WORDS	SCALE	LSBWT	TYPE	INITIAL VALUE	DEFINATION/UNITS
DB0	AB	3	6	D+1	2P-33	VAR	0	BODY ANGLE ESTIMATE-RADIANS
DB0	ABG	3	6	D+1	2P-33	VAR	0	BODY ANGLE FROM GYRO MEASURE-RADIANS
DB0	ABR	3	6	D+1	2P-33	VAR	0	BODY ANGLE RESIDUALS-RADIANS
DB0	RB	3	3	S-8	2P-25	VAR	0	BODY RATE ESTIMATE-RADIANS/SEC
DB0	RBG	3	3	S-8	2P-25	VAR	0	BODY RATE MEASURE-RADIANS/SEC
DB0	RBR	3	3	S-8	2P-25	VAR	0	BODY RATE RESIDUALS-RADIANS/SEC
DB0	BT	3	3	S-8	2P-25	VAR	0	BIAS ACCELERATION ESTIMATE-RAD/SEC/S
DB0	ICOUNT	1	1	S+17	1	VAR	0	ITERATION COUNTER-WHEEL Y BIAS AVE
DB0	IUPC	1	1	S+17	1	VAR	0	ITERATION COUNTER-GYRO CAL LOGIC
DB1	IWHL	1	1	S+17	1	CNST	4	UNUSED WHEEL NUMBER
DB1	IBUP	1	1	S+17	1	CNST	50	# DF ITER. BETWEEN V BIASCOMPUTATION
DB1	NDMAX	1	1	S+17	1	CNST	10,000	UPPER LIMIT GYRO DELTA COUNTS
DB1	NDMIN	1	1	S+17	1	CNST	-10,000	LOWER LIMIT GYRO DELTA COUNTS
DB1	UMAX	3	3	S+9	2P-8	CNST	2.5	MAX CONTROL SIGNAL-VOLTS
DB1	UMAXN	3	3	S+9	2P-8	CNST	-2.5	MIN CONTROL SIGNAL-VOLTS
DB1	VMAX	1	1	S+10	2P-7	CNST	2.5	MAX WHEEL SIGNAL-VOLTS
DB1	VMAXN	1	1	S+10	2P-7	CNST	-2.5	MIN WHEEL SIGNAL-VOLTS
DB1	VB	4	4	S+9	2P-8	VAR		WHEEL BIASES-VOLTS
DB1	TEST1	1	1	S+1	2P-16	CNST	.0018	WHEEL RATE SAT.-LOWER LIMIT-RAD/SEC
DB1	TEST1N	1	1	S+1	2P-16	CNST	-.0018	NEG RATE SAT.-LOWER LIMIT-RAD/SEC
DB1	TEST2	1	1	S+1	2P-16	CNST	.0022	RATE SAT.-UPPER LIMIT-RAD/SEC
DB1	TEST2N	1	1	S+1	2P-16	CNST	-.0022	NEG RATE SAT.-UPPER LIMIT-RAD/SEC
DB1	TEST3	1	1	S+1	2P-16	CNST	.0002	SWITCH LINE WIDTH-R
DB1	TEST3N	1	1	S+1	2P-16	CNST	-.0002	NEG SWITCH LINE WIDTH-R
DB1	IGUP	1	1	S+17	1	CNST	468	# ITER BETWEEN GYRO TRIMS
DB1	IBUPNV	1	1	S+0	2P-17	CNST	.02	1/IBUP
DB1	TEST5	1	1	S-8	2P-25	CNST	.0002	RATE LIMIT SWTCH SLEW TO HOLD-R/S
DB1	TEST5N	1	1	S-8	2P-25	CNST	-.0002	NEG RATE LIMIT SWTCH SLEW-HOLD-R/S

DATA	VARIABLE	DIM	NUMBER	SCALE	LSBWT	TYPE	INITIAL	DEFINATION/UNITS
DB1	ABLIM	1	1	S+1	2P-16	CNST	.01875	ANGLE LIMIT FOR HIGH GAIN HOLD MODE
DB1	NABLIM	1	1	S+1	2P-16	CNST	-.01875	NEG.ANGLE LIMIT FOR HIGH GAIN HOLD MODE
DB2	DT	1	1	S+1	2P-16	CNST	.2048	ITERATION INTERVAL-SECONDS
DB2	GF1(1) GF1(2) GF1(3)	3	3	S+0	2P-17	CNST	.658 .633 .562	FILTER GAINS-GYRO ONLY
DB2	GF2(1) GF2(2) GF2(3)	3	3	S+3	2P-14	CNST	1.61 1.47 1.08	FILTER GAINS-GYRO ONLY
DB2	GF3(1) GF3(2) GF3(3)	3	3	S+4	2P-13	CNST	.922 .829 .243	FILTER GAINS-GYRO ONLY
DB2	GF11(1) GF11(2) GF11(3)	3	3	S+0	2P-17	CNST	.013 .013 .093	FILTER GAINS-GYRO PLUS FES
DB2	GF12(1) GF12(2) GF12(3)	3	3	S+0	2P-17	CNST	.156 .160 .125	FILTER GAINS-GYRO PLUS FES
DB2	GF21(1) GF21(2) GF21(3)	3	3	S+3	2P-14	CNST	.0006 .0006 .031	FILTER GAINS-GYRO PLUS FES
DB2	GF22(1) GF22(2) GF22(3)	3	3	S+0	2P-17	CNST	.420 .388 .279	FILTER GAINS-GYRO PLUS FES
DB2	GF31(1) GF31(2) GF31(3)	3	3	S+0	2P-17	CNST	.002 .0016 .0074	FILTER GAINS-GYRO PLUS FES
DB2	GF32(1) GF32(2) GF32(3)	3	3	S+3	2P-14	CNST	.245 .219 .061	FILTER GAINS-GYRO PLUS FES
DB2	GU1	1	1	S+0	2P-17	CNST	.978	FILTER GAINS-GYRO ANGLE UPDATE
DB2	GU2	1	1	S-4	2P-21	CNST	.0091	FILTER GAINS-GYRO RATE BIAS UPDATE
DB2	TXR	1	1	S+4	2P-13	CNST	4.883	ITERATION RATE 1/DT - 1/SEC
DB3	GFB(1) GFB(2) GFB(3) GFB(4) GFB(5) GFB(6)	6	12	D+2	2P-32	CNST	2.749 -2.528 .777 3.1E-4 1.1E-3 2.7E-4	BUTTERWORTH FILTER COEFFICIENTS USED TO FILTER FES DATA.

DATA	VARIABLE	DIM	NUMBER	SCALE	LSBWT	TYPE	INITIAL	DEFINATION/UNITS
DB3	TEST4	1	1	S-8	2P-25	CNST	.00025	LIMIT:BT-SW TO RAW GYRO-FILTER DIVER
DB3	TEST4N	1	1	S-8	2P-25	CNST	-.00025	NLIMIT:BTSW TO RAW GYRO-FILTER DIVER
DB3	VCONV	1	1	S+7	2P-10	CNST	50.8	CONVERSION VOLTS TO COUNTS/VOLT
DB3	CWTIME	1	1	S-2	2P-19	CNST	.03	INTERVAL CMD WINDOWS-SEC
DB3	WTIME	1	1	S-8	2P-25	CNST	.0002	INTERVAL OBC DATA WORDS-SEC
DB3	PROCTIME	1	1	S-2	2P-19	CNST	.012	ESTIMATE PROCESSING TIME SLEW/HOLD-S
DB3	NUNCER	1	1	S-2	2P-19	CNST	-.004	NEG. UNCERTAINTY ALLOWED BETWEEN CMD WINDOW AND ATTEMPT TO CMD-SEC.
DB3	P1	1	1	S-2	2P-19	CNST	.012	PROC.TIME-MODULES 1 THROUGH 7.
DB3	P2	1	1	S-2	2P-19	CNST	.0237	TIME FROM CMD WINDOW UNTILL CMD IS PROCESSED BY CMD DECODER TO WHEELS.
DB3	A111 A121 A211 A221	1 1 1 1	1 1 1 1	S+0 S+0 S+0 S+0	2P-17 2P-17 2P-17 2P-17	CNST CNST CNST CNST	0 -1 -1 0	XFORM MATRIX FROM FES1 TO P,Y
DB3	A112 A122 A212 A222	1 1 1 1	1 1 1 1	S+0 S+0 S+0 S+0	2P-17 2P-17 2P-17 2P-17	CNST CNST CNST CNST	-.471 -.88213 .88213 -.471	XFORM MATRIX FROM FES2 TO P,Y
DB3	SCALE1	1	1	S-19	2P-36	CNST	.134E-5	CONVERSION FROM FES UNITS TO RADIAN
DB4	WHSF	1	1	S-5	2P-22	CNST	.012056	WHEEL SCALE FACTOR- FT.LB/VOLT
DB4	IBNV(1) IBNV(2) ISNV(3)	3	3	S-2	2P-19	CNST	4.72E-3 4.11E-3 9.15E-3	RECIPROCAL OF MOMENT OF INERTIA P,Y,R
DB4	PS1(1) PS1(2) PS1(3)	3	3	S-11	2P-28	VAR	-2.0E-7 -1.8E-7 -4.0E-7	CONTROL WEIGHTING MATRIX ELEMENTS
DB4	PS2(1) PS2(2) PS2(3)	3	3	S-11	2P-28	VAR	-4.9E-6 -4.2E-6 -9.4E-6	CONTROL WEIGHTING MATRIX ELEMENTS
DB4	PS11(1) PS11(2) PS11(3)	3	3	S-11	2P-28	VAR	-4.1E-7 -3.6E-7 -7.9E-7	CONTROL WEIGHTING MATRIX ELEMENTS
DB4	PSI2(1) PSI2(2) PSI2(3)	3	3	S-11	2P-28	VAR	-6.8E-6 -5.9E-6 -1.3E-5	CONTROL WEIGHTING MATRIX ELEMENTS
DB4	GCB(1) GCB(2)	3	3	S+17	1	CNST	17542 20146	CONTROL BIAS ACCEL. GAINS V/RAD/S/S

DATA	VARIABLE	DIM	NUMBER	SCALE	LSBWT	TYPE	INITIAL	DEFINATION/UNITS
	GCB(3)						9065	
DB4	GCHA(1) GCHA(2) GCHA(3)	3	3	S+17	1	CNST	17542 20146 9065	HIGAIN -ANGLE VOLT/RAD
DB4	GCHR(1) GCHR(2) GCHR(3)	3	3	S+17	1	CNST	24808 28491 12820	HIGAIN RATES -V/RAD/SEC
DB4	GCLA(1) GCLA(2) GCLA(3)	3	3	S+17	1	CNST	175.4 201.5 90.6	LOGAIN - ANGLE -V/RAD
DB4	GCLR(1) GCLR(2) GCLR(3)	3	3	S+17	1	CNST	3508.4 4029.2 1813.1	LOGAIN - RATES -V/RAD/SEC
DB5	TDKY	1	1	S+12	2P-5	CNST	100	DELAY TIME-SEC
DB5	TDLCI	1	1	S-2	2P-19	VAR	.085	DELAY TIME-DATA SAMPLE TO CMD EXECUT
DB5	PH12 PH13 PH23 PH33 PHI12 PHI13 PHI23 PHI33	1 1 1 1 1 1 1 1	1 1 1 1 1 1 1 1	S+0 S+0 S+0 S+0 S+0 S+0 S+0 S+0	2P-17 2P-17 2P-17 2P-17 2P-17 2P-17 2P-17 2P-17	VAR VAR VAR VAR VAR VAR VAR VAR	.085 2.2E-3 .085 .99915 .1198 6.6E-3 .119 .998	STATE XITION MATRIX ELEMENTS
DB5	SK(1) SK(2) SK(3)	3	3	S+13	2P-4	CNST	3157 3626 1632	SCALE FACTOR - SEC.SEC
DB5	LW	3X3	9	S+1	2P-16	CNST	I	WHEEL DIRECTION COSINES
DB5	WL	3X3	9	S+1	2P-16	CNST	I	INVERSE WHEEL DIRECTION COSINES
DB5	TDKYNV	1	1	S+3	2P-14	CNST	.01	RECIPROCAL OF TDKY
DB6	WG(1) WG(2) WG(3) WG(4) WG(5) WG(6)	6	6	S-24	2P-41	CNST	4.90E-8 4.86E-8 4.86E-8 4.86E-8 4.91E-8 4.87E-8	GYRO SCALE FACTORS-RAD/COUNT
DB6	LI(1,1) LI(1,2) LI(1,3) LI(1,4) LI(1,5) LI(1,6)	6	6	S+1	2P-16	CNST	.323 .087 -.237 -.323 -.087 .237	INVERSE OF GYRO DIRECTION COS MATRIX ROW 1 - PITCH
DB6	LI(2,1)	6	6	S+1	2P-16	CNST	.087	INVERSE OF GYRO DIRECTION COS MATRIX



DATA	VARIABLE	DIM	NUMBER	SCALE	LSBWT	TYPE	INITIAL	DEFINATION/UNITS
	LI(2,2) LI(2,3) LI(2,4) LI(2,5) LI(2,6)						.323 .237 -.087 -.323 -.237	ROW 2 - YAW
DB6	LI(3,1) LI(3,2) LI(3,3) LI(3,4) LI(3,5) LI(3,6)	6	6	S+4	2P-13	CNST	1.91 1.91 1.91 1.91 1.91 1.91	INVERSE OF GYRO DIRECTION COS MATRIX ROW 3 - ROLL
DB7	LG(1,1) LG(1,2) LG(1,3)	3	3	S+0	2P-17	CNST	.962 .257 .087	GYRO DIRECTION COS MATRIX-P Y R
DB7	LG(2,1) LG(2,2) LG(2,3)	3	3	S+0	2P-17	CNST	.257 .962 .087	GYRO DIRECTION COS MATRIX-P Y R
DB7	LG(3,1) LG(3,2) LG(3,3)	3	3	S+0	2P-17	CNST	-.704 .704 .087	GYRO DIRECTION COS MATRIX-P Y R
DB7	LG(4,1) LG(4,2) LG(4,3)	3	3	S+0	2P-17	CNST	-.962 -.257 .087	GYRO DIRECTION COS MATRIX-P Y R
DB7	LG(5,1) LG(5,2) LG(5,3)	3	3	S+0	2P-17	CNST	-.257 -.962 .087	GYRO DIRECTION COS MATRIX-P Y R
DB7	LG(6,1) LG(6,2) LG(6,3)	3	3	S+0	2P-17	CNST	.704 -.704 .087	GYRO DIRECTION COS MATRIX-P Y R
DB8	ABD	3	6	D-6	2P-40	VAR	0	DELTA BODY ANGLES-RADIAN
DB8	AGD	6	12	D-6	2P-40	VAR	0	DELTA GYRO ANGLES -RADIAN
DB8	NNEW	6	6	S+17	1	VAR	0	GYRO COUNTS-CURRENT
DB8	NOLD	6	6	S+17	1	VAR	0	GYRO COUNTS-PREVIOUS
DB8	TEST	1	1	S+1	2P-16	VAR	0	DUMMY VARIABLE
DB9	U	3	3	S+9	2P-8	VAR	0	CONTROL VOLTAGES(INTERNAL)-VOLTS
DB9	UV	3	3	S+9	2P-8	VAR	0	DUMMY VOLTAGES(INTERNAL)-VOLTS
DB9	V	4	4	S+10	2P-7	VAR	0	WHEEL VOLTAGES-VOLTS
DB9	VBS	4	4	S+10	2P-7	VAR	0	WHEEL BIAS VOLTAGES-VOLTS
DB9	VS	4	4	S+10	2P-7	VAR	0	RUNNING SUM WHEEL VOLTAGES-VOLTS

DATA	VARIABLE	DIM	NUMBER	SCALE	LSBWT	TYPE	INITIAL	DEFINATION/UNITS
DB9	TRS	1	1	S+1	2P-16	VAR	.1198	TIME FROM OUTPUT TO NEXT SAMPLE-SEC
DB9	NDEL	6	6	S+17	1	VAR	0	DELTA GYRO COUNTS
DB9	AE	2	2	S-7	2P-24	VAR	0	FES MEASUREMENT-P,Y-RAD
DB9	AEF	2	4	D-5	2P-39	VAR	0	FES MEASUREMENT-FILTERED-RAD
DB10	SHMODE1 SHMODE2 SHMODE3 SHMODE4	4	4	OBC		BITS FLAG FLAG FLAG FLAG BITS	0 0 0 0	18 17 16 15 14 13 12 11 MASK MBO MCO MDO MEO MA MK MK MJ0 MB1 MC1 MD1 ME1 MJ1 MB2 MC2 MD2 ME2 MJ2 MF MG3 MG2 MG1 MG0 ML ML 9 8 7 6 5 4 3 2 VALUE VARIABLES DEFINED IN OBC TELEMETRY
DB10	SAC	3	6	D+1	2P-33	CNST	0	CMD SLEW ANGLE-RAD
DB10	SRC	3	3	S-8	2P-25	CNST	0	CMD DELTA SLEW ANGLE-RAD/ITERATION
DB10	ISMAX	3	3	S+17	1	CNST	0	CMD OF ITERATIONS FOR RATE SLEW
DB10	ISLEW	3	3	S+17	1	VAR	0	ITERATION COUNTER FOR RATE SLEW
DB10	BG	3	3	S-14	2P-31	VAR	0	GYRO DRIFT P,Y,R RAD/SEC
DB11		1	1	BITS 1-2		FLAG		SAFE ATTITUDE BITS 00 SHUTDOWN EXPER AND SAFE SLEW 01 SHUTDOWN EXPERIMENT 10 SAFE SLEW 11 NO SAFE ACTION
DB11	DB11TAG SLEWSET	1	1	3-18 BITS 1-2	1.024	I	0	TIME REMAINING AT SAFE ATTITUDE SLEW TYPE
	SLEWANG	2	2	3-10 11- D+1		VAR		10=PITCH 01=ROLL 11=YAW OBC MASK, SLEW MODE OBC VALUE, AND MASK (BITS 11-18) SLEW MAGNITUDE +2 RAD TO -2 RAD NOTE: EACH SLEW LEG REQUIRES 3 WORDS(18BITS EACH). A SAFE ATTITUDE SLEW IS THE FIRST 3 SLEW LEGS FOLLOWING DB11TAG. A TOTAL OF 9 SLEW LEGS IS POSSIBLE INCLUDING SAFE SLEW. DB11 AND DB17 ARE ONLY VARIABLE LENGTH DATA BLOCKS.
DB12	FRM(32)	32	32	1		I2'S	0	DATA BLOCK 12 CONTROLS TELEMETRY FRAME SEQUENCES. VALUE RANGE 0-31 -1 INDICATES RETURN TO FRM(1)
DB13	PADD(6)	6	6	1		I	0	DATA BLOCK 13 CONTAINS 6 ADDRESSES TO BE TELEMETERED IN PROGRAMABLE CBCDATA FRAMES 3,4,AND 5.

DATA	VARIABLE	DIM	NUMBER	SCALE	LSBWT	TYPE	INITIAL	DEFINATION/UNITS
DB14	A B C CAMERA CMD1  TIMETAG CMD2	1   3  1 3	8	BIT1* 2 3 5-18 *1-44 45-54 *1-18 *1-44 45-54	F	FLAG FLAG FLAG I  I		TIMETAG ALTERATION 1=ALTER 0=NEW FES SWITCH 1=ON 0=OFF CAL LAMP 1=ON 0=OFF CAMERA NUMBER CAMERA ON COMMAND NOT USED EXPOSURE TIME CAMERA OFF COMMAND NOT USED
DB15	HGVER	3	3	1		I	0	HANDOVER INFORMATION (RIGHTASCENSION ,DECLINATION,ROLL) THIS DATA BLOCK IS BUILT FROM 12 DATA FRAME DECODED BLSB'S PER WORD.
DB16	TTACHR1  TTACHR2  TTACHR3  TTACHR4	1  1  1  1	4	BIT1 2-10 11-18 1 2-10 11-18 1 2-10 11-18 1 2-10 11-18	*1  *  *  *	I  I		TTACHREFERENCES-WHEN MSB=1 USE NOT USED PITCH REFERENCE  NOT USED YAW REFERENCE  NOT USED ROLL REFERENCE  NOT USED REDU REFERENCE
DB17	CMDDLY CMD	1 3	28	*1-18 *1-44 45-54		I		DELAY BEFORE COMMAND EXECUTION COMMAND NOT USED REPEATED UP TO 7 COMMANDS PER DB17
DB18	LI1(1,1) LI1(1,2) LI1(1,3) LI1(1,4) LI1(1,5) LI1(1,6)	6	6	S+1	2P-16	CNST	.653 .000 -.454 .000 -.199 .000	INVERSE OF GYRO DIRECTION COS MATRIX ROW 1-PITCH WITH JET 8 OFFSET ANGLE (GYROS 1,3,5)
DB18	LI1(2,1) LI1(2,2) LI1(2,3) LI1(2,4) LI1(2,5) LI1(2,6)	6	6	S+1	2P-16	CNST	.147 .000 .492 .000 -.639 .000	INVERSE OF GYRO DIRECTION COS MATRIX ROW 2-YAW WITH JET 8 OFFSET ANGLE (GYRO 1,3,5)
DB18	LI1(3,1) LI1(3,2) LI1(3,3) LI1(3,4) LI1(3,5) LI1(3,6)	6	6	S+4	2P-13	CNST	3.82 0.00 3.82 0.00 3.82 0.00	INVERSE OF GYRO DIRECTION COS MATRIX ROW 3-ROLL WITH JET 8 OFFSET ANGLE (GYROS 1,3,5)
DB18	TXR1	1	1	S+6	2P-11	CNST	19.53	ITERATION RATE 1/DT1 1/SEC

DATA	VARIABLE	DIM	NUMBER	SCALE	LSBWT	TYPE	INITIAL	DEFINATION/UNITS
DB18	WG1	1	1	S-19	2P-36	CNST	.30	GYRO SCALE FACTORS ARSEC/COUNT
DB19	DVPSL	1	1	S+0	2P-17	CNST	-.1	DELTA V SLOPE P
	DVYSL	1	1	S+0	2P-17	CNST	-.1	DELTA V SLOPE Y
	DVRSL	1	1	S+0	2P-17	CNST	-.1	DELTA V SLOPE R
	DVDPON	1	1	S-3	2P-21	CNST	.40	DELTA V INTERCEPT 'ON'P (DEG/SEC)
	DVDYON	1	1	S-3	2P-21	CNST	.40	DELTA V INTERCEPT 'ON'Y (DEG/SEC)
	DVDRON	1	1	S-3	2P-21	CNST	.40	DELTA V INTERCEPT 'ON'R (DEG/SEC)
	DVFPB	1	1	S-3	2P-21	CNST	0.0	DELTA V BIAS P(DEG/SEC)
	DVYB	1	1	S-3	2P-21	CNST	0.0	DELTA V BIAS Y(DEG/SEC)
	DVRB	1	1	S-3	2P-21	CNST	0.0	DELTA V BIAS R(DEG/SEC)
	DVDPJF	1	1	S-3	2P-21	CNST	.3	DELTA V INTERCEPT 'OFF'P(DEG/SEC)
	DVDYOF	1	1	S-3	2P-21	CNST	.3	DELTA V INTERCEPT 'OFF'Y(DEG/SEC)
DVDROF	1	1	S-3	2P-21	CNST	.3	DELTA V INTERCEPT 'OFF'R(DEG/SEC)	
DB19	RDPSL	1	1	S+0	2P-17	CNST	-.1	RATE+POS SLOPE P
	RPYSL	1	1	S+0	2P-17	CNST	-.1	RATE+POS SLOPE Y
	RPRSL	1	1	S+0	2P-17	CNST	-.1	RATE+POS SLOPE R
	RPDPON	1	1	S-3	2P-21	CNST	.40	RATE+POS INTERCEPT P(DEG/SEC)
	RPDYON	1	1	S-3	2P-21	CNST	.40	RATE+POS INTERCEPT Y(DEG/SEC)
	RPDRON	1	1	S-3	2P-21	CNST	.40	RATE+POS INTERCEPT R(DEG/SEC)
	RPPB	1	1	S-3	2P-21	CNST	0.0	RATE+POS BIAS P(DEG/SEC)
	RPYB	1	1	S-3	2P-21	CNST	0.0	RATE+POS BIAS Y(DEG/SEC)
	RPRB	1	1	S-3	2P-21	CNST	0.0	RATE+POS BIAS R(DEG/SEC)
DB19	RAPSL	1	1	S+0	2P-17	CNST	0.0	RATE ONLY SLOPE P
	RAYSL	1	1	S+0	2P-17	CNST	0.0	RATE ONLY SLOPE Y
	RSRSL	1	1	S+0	2P-17	CNST	0.0	RATE ONLY SLOPE R
	RADPON	1	1	S-3	2P-21	CNST	0.4	RATE ONLY INTERCEPT P(DEG/SEC)
	RADYON	1	1	S-3	2P-21	CNST	0.4	RATE ONLY INTERCEPT Y(DEG/SEC)
	RADRON	1	1	S-3	2P-21	CNST	0.4	RATE ONLY INTERCEPT R(DEG/SEC)
	RAPB	1	1	S-3	2P-17	CNST	0.0	RATE ONLY BIAS P(DEG/SEC)
	RAYB	1	1	S-3	2P-17	CNST	0.0	RATE ONLY BIAS Y(DEG/SEC)
	RARB	1	1	S-3	2P-17	CNST	0.0	RATE ONLY BIAS R(DEG/SEC)
DB20	PREDLY	1	1	S+17	25 MS	INTE	10	TIME DELAY BEFORE JET FIRE
	PREOT	1	1	S+17	30 MS	INTE	8	JET ON TIME
	PRESPIN	1	1	S+17	CTS	INTE	200	NO.OF SPINS WITH JET FIRE
DB21	NUTRESH	1	1	S+17	.02V	INTE	200	COMMANDABLE THRESHOLD TO DO NUTATION JET FIRE
	NUTDLY	1	1	S+17	25 MS	INTE	50	TIME DELAY FROM ALGORITHM EVENT TO JET FIRE
	NUTOT	1	1	S+17	30 MS	INTE	10	JET ON TIME
	DEADTIME	1	1	S+17	25 MS	INTE	200	TIME DELAY BEFORE RE-ENTERING THE WORKER

Y=CONVERTED VALUE IN UNITS INDICATED  
X CAN BE OBTAINED BY MULTIPLYING INTEGER TELEMETRY VALUE BY .02.

XX	XX	TTTTTTTTTT	LL	MM	MM		000000	222222222
XX	XX	TTTTTTTTTT	LL	MMM	MMM	**	00000000	22222222222
XX	XX	TT	LL	MMMM	MMMM	** ** *	00	00 22 22
XX	XX	***** TT	LL	MM MM MM MM		** ** *	00	00 22
XX	XX	***** TT	LL	MM MMM	MM	****	00	00 22
XXXX		TT	LL	MM MM	MM	****	00	00 22
XXXX		TT	LL	MM	MM	** ** *	00	00 22
XX	XX	***** TT	LL	MM	MM	** ** *	00	00 22
XX	XX	***** TT	LL	MM	MM	**	00	00 22
XX	XX	TT	LL	MM	MM		00	00 22
XX	XX	TT	LLLLLLLLLLLL	MM	MM	***	00000000	22222222222
XX	XX	TT	LLLLLLLLLLLL	MM	MM	***	000000	22222222222

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+28 BUS V	ASC1-34	Y= 0.400X + 27	VOLTS
+28 BUS V	AMC-10	Y= 0.400X + 27	VOLTS
+28 BUS V	AMC-11	Y= 6.000X	VOLTS
SW LOAD CURRENT	AMC -1	Y= 2.000X	AMPS
ESS LOAD CURRENT	ASC1-36	Y= 0.200X	AMPS
SOLAR ARRAY 1 I	ASC1-39	Y= 2.000X	AMPS
SOLAR ARRAY 2 I	ASC1-40	Y= 2.000X	AMPS
DUMP 1 CURRENT	ASC1-37	Y= -4.000X	AMPS
DUMP 2 CURRENT	ASC1-38	Y= -4.000X	AMPS
BATTERY 1 V	ASC1-10	Y= 6.000X	VOLTS
BATTERY 1 CHARGE I	ASC1-11	Y= 0.400X	AMPS
BATTERY 1 DISCHARGE I	ASC1-12	Y= -4.000X	AMPS
3RD ELECTRODE 1 V	ASC1-13	Y= 0.100X	VOLTS
BATTERY 2 V	ASC1-14	Y= 6.000X	VOLTS
BATTERY 2 CHARGE I	ASC1-15	Y= 0.400X	AMPS
BATTERY 2 DISCHARGE I	ASC1-32	Y= -4.000X	AMPS
3RD ELECTRODE 2V	ASC1-33	Y= 0.100X	VOLTS
MISSION ADAPT MOD T	ASC1-31	SEE POLYNOMIAL NO 1	DEG C CURVE 1
POWER MOD 1 T	ASC1-21	SEE POLYNOMIAL NO 1	DEG C CURVE 1
POWER MOD 2 T	ASC1-22	SEE POLYNOMIAL NO 1	DEG C CURVE 1
BATTERY 1 T	ASC1-29	SEE POLYNOMIAL NO 1	DEG C CURVE 1
BATTERY 2 T	ASC1-30	SEE POLYNOMIAL NO 1	DEG C CURVE 1
SOLAR ARRAY T	ASC1-41	SEE POLYNOMIAL NO 2	DEG C CURVE 2

\*\*\*\*\*VHF SYSTEM\*\*\*\*\*

VHF 1 +12V	ASC1- 4	Y= 2.920X	VOLTS
VHF 1 AGC	ASC1-6	SEE POLYNOMIAL 3	DBM CURVE 3
VHF2 +12V	ASC1- 5	Y= 3.020X	VOLTS
VHF 2 AGC	ASC1-7	SEE POLYNOMIAL 4	DBM CURVE 4

VHF1 T	ASC1-23	SEE POLYNOMIAL NO 1	DEG C CURVE 1
VHF2 T	ASC1-24	SEE POLYNOMIAL NO 1	DEG C CURVE 1

\*\*\*\*\*S BAND SYSTEM\*\*\*\*\*

S-BAND 1 +16V	ASC1- 2	Y= 4.040X	VOLTS
S-BAND 2 +16V	ASC1- 3	Y= 4.310X	VOLTS
S-BAND 1 T	ASC1-17	SEE POLYNOMIAL NO 1	DEG C CURVE 1
S-BAND 2 T	ASC1-18	SEE POLYNOMIAL NO 1	DEG C CURVE 1
S-BAND PWR AMP T	ASC3-12	SEE POLYNOMIAL NO 1	DEG C CURVE 1

\*\*\*\*\*COMMAND SYSTEM\*\*\*\*\*

DECODER 1 + 10	ASC1- 0	Y= 2.000X	VOLTS
DECODER 1 - 10	ASC1-1	Y= -2.000X	VOLTS
DECODER 2 +10	ASC1-35	Y= 2.000X	VOLTS
DECODER 2 -10	ASC2-63	Y= -2.000X	VOLTS
DECODER 1/2 T	ASC1-16	SEE POLYNOMIAL 1	DEG C CURVE 1

\*\*\*\*\*DATA HANDLING SYSTEM\*\*\*\*\*

RADIATION MON	AMC- 3	Y= 1.000X	VOLTS
RAMP V	AMC- 5	Y= 1.000X	VOLTS
A/D REMAINDER	AMC- 7	Y= 1.000X	VOLTS
2.5V CAL SIG	AMC- 9	Y= 1.000X	VOLTS
2.5V CAL @ 2M	AMC-13	Y= 1.000X	VOLTS
2.5V CAL SIG	ASC1- 8	Y= 1.000X	VOLTS
SIG GND	ASC1- 9	Y= 1.000X	VOLTS
DATAPLEXER T	ASC1-25	SEE POLYNOMIAL NO 1	DEG C CURVE 1

\*\*\*\*\*ON BOARD COMPUTER\*\*\*\*\*

OBC 1 PWR	ASC2- 3	Y= 1.000X	VOLTS
OBC 2 PWR	ASC2-55	Y= 1.000X	VOLTS
CONVERTER 1/2 T	ASC1-26	SEE POLYNOMIAL NO 1	DEG C CURVE 1
CPU 1/2 T	ASC1-27	SEE POLYNOMIAL NO 1	DEG C CURVE 1
MEMORY 1/3 T	ASC1-28	SEE POLYNOMIAL NO 1	DEG C CURVE 1

\*\*\*\*\*FLUX PARTICLE MONITOR\*\*\*\*\*

+5V MON	ASC2- 1	Y= 1.000	VOLTS
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\*\*\*\*\*FINE DIGITAL SUN SENSOR\*\*\*\*\*

NO1 +5V MON	ASC1-59	Y= 1.440X	VOLTS
NO2 +5V MON	ASC1-60	Y= 1.440X	VOLTS
FES ATA 1	ASC1-57	Y= 1.000X	VOLTS
FES ATA 2	ASC3-13	Y= 1.000X	VOLTS
FES 1 TEMP	ASC3-14	SEE POLYNOMAIL 1	DEG C
FES 2 TEMP	ASC3-15	SEE POLYNOMAIL 1	DEG C
FSS1/SMSS T	ASC3-18	SEE POLYNOMIAL NO 1	DEG C CURVE 1

\*\*\*\*\*PANORAMIC ATTITUDE SCANNER\*\*\*\*\*

NO1 HEAD T	ASC3-26	SEE POLYNOMIAL NO 1	DEG C CURVE 1
NO2 HEAD T	ASC3-27	SEE POLYNOMIAL NO 1	DEG C CURVE 1

\*\*\*\*\*COARSE SUN SENSORS\*\*\*\*\*

C&M PITCH	AMC-23	Y=-1.331X + 3.24	DEGREES
C&M ROLL	AMC-31	Y=-1.371X + 3.31	DEGREES

\*\*\*\*\*NUTATION SENSORS\*\*\*\*\*

ACCEL NO 1	AMC-18	SEE POLYNOMIAL NO 5A	G'S
ACCEL NO 2	AMC-28	SEE POLYNOMIAL NO 5B	G'S
COMP ACCEL P&N	AMC-26	SEE POLYNOMIAL NO 6	VOLTS CURVE 6

\*\*\*\*\*INERTIAL REFERENCE ASSEMBLY\*\*\*\*\*

GYRO RATE 1	ASC3- 6	Y= -2.000X + 5	DEG/	RATE MODE
			SEC	
GYRO RATE 2	ASC3- 7	Y= -240.000X +600	ARC-	HOLD/SLEW
			SEC/S	
GYRO RATE 3	ASC3- 8	Y= -2.000X + 5	DEG/	RATE MODE
			SEC	
GYRO RATE 4	ASC3- 9	Y= -240.000X+600	ARC-	HOLD/SLEW
			SEC/S	
GYRO RATE 4	ASC3- 9	Y= -2.000X + 5	DEG/	RATE MODE
			SEC	

		$Y = -240.000X + 600$	ARC- SEC/S	HOLD/SLEW
GYRO RATE 5	ASC3- 10	$Y = -2.000X + 5$	DEG/ SEC	RATE MODE
		$Y = -240.000X + 600$	ARC- SEC/S	HOLD/SLEW
GYRO RATE 6	ASC3- 11	$Y = -2.000X + 5$	DEG/ SEC	RATE MODE
		$Y = -240.000X + 600$	ARC- SEC/S	HOLD/SLEW
PITCH RATE 1	ASC3- 0 AMC-20	$Y = -2.000X + 5$	DEG/ SEC	RATE MODE
		$Y = -40.000X + 100$	ARC- SEC/S	HOLD/SLEW
PITCH RATE 2	ASC3- 1 AMC -27	$Y = -2.000X + 5$	DEG/ SEC	RATE MODE
		$Y = -40.000X + 100$	ARC- SEC/S	HOLD/SLEW
YAW RATE 1	ASC3- 2 AMC -21	$Y = -2.000X + 5$	DEG/ SEC	RATE MODE
		$Y = -40.000X + 100$	ARC- SEC/S	HOLD/SLEW
YAW RATE 2	ASC3- 3 AMC-29	$Y = -2.000X + 5$	DEG/ SEC	RATE MODE
		$Y = -40.000 + 100$	ARC- SEC/S	HOLD/SLEW
ROLL RATE 1	ASC3- 4 AMC-19	$Y = -2.000X + 5$	DEG/ SEC	RATE MODE
		$Y = -40.000 + 100$	ARC- SEC/S	HOLD/SLEW
ROLL RATE 2	ASC3- 5 AMC-24	$Y = -2.000X + 5$	DEG/ SEC	RATE MODE
		$Y = -40.000 + 100$	ARC- SEC/S	HOLD/SLEW
GYRO 1 MTR I	ASC2-43	$Y = 100X$	MAMPS	
GYRO 2 MTR I	ASC2-45	$Y = 100X$	MAMPS	
GYRO 3 MTR I	ASC2-47	$Y = 100X$	MAMPS	
GYRO 4 MTR I	ASC2-49	$Y = 100X$	MAMPS	
GYRO 5 MTR I	ASC2-51	$Y = 100X$	MAMPS	
GYRO 6 MTR I	ASC2-53	$Y = 100X$	MAMPS	
GYRO 1 T	ASC2-44	SEE POLYNOMIAL 8	DEG F	



GYRO 2 T	ASC2-46	SEE POLYNOMIAL 8	DEG F
GYRO 3 T	ASC2-48	SEE POLYNOMIAL 8	DEG F
GYRO 4 T	ASC2-50	SEE POLYNOMIAL 8	DEG F
GYRO 5 T	ASC2-52	SEE POLYNOMIAL 8	DEG F
GYRO 6 T	ASC2-54	SEE POLYNOMIAL 8	DEG F
COMM ELECT 1/2	ASC1-19	SEE POLYNOMIAL NO 1	DEG C CURVE 1
IRA SENSOR TEMP	ASC2-30	SEE POLYNOMIAL NO 1	DEG C

\*\*\*\*\*REACTION WHEEL CONTROL SYSTEM\*\*\*\*\*

WDA PS 1 +10	ASC2- 0	Y= 2.960X	VOLTS
WDA PS 1 + 5	ASC1-58	Y= 1.500X	VOLTS
WDA PS 2 +10	ASC2- 5	Y= 2.960X	VOLTS
WDA PS 2 + 5	ASC2- 4	Y= 1.500X	VOLTS
WDA PS 1/2 T	ASC2- 6	SEE POLYNOMIAL 7	DEG C CURVE 7
PITCH MTR V	ASC2- 7	Y= -7.083X + 28.832	VOLTS
YAW MTR V	ASC2- 8	Y= -7.083X + 28.832	VOLTS
ROLL MTR V	ASC2- 9	Y= -7.083X + 28.832	VOLTS
RED MTR V	ASC2-10	Y= -7.083X + 28.832	VOLTS
PITCH MTR TACH	ASC2-11	SEE POLYNOMIAL 9	RPM +=CW, -=CCW
YAW MTR TACH	ASC2-12	SEE POLYNOMIAL 9	RPM +=CW, -=CCW
ROLL MTR TACH	ASC2-13	SEE POLYNOMIAL 10	RPM +=CW, -=CCW
RED MTR TACH	ASC2-14	SEE POLYNOMIAL 9	RPM +=CW, -=CCW
PITCH/ROLL-PHASE A	ASC2-33	Y= 1.000X	VOLTS
YAW/RED -PHASE A	ASC2-34	Y= 1.000X	VOLTS
PITCH/ROLL-DRIVER T	ASC2-15	SEE POLYNOMIAL 7	DEG C CURVE 7
YAW/RED-DRIVER T	ASC2-32	SEE POLYNOMIAL 7	DEG C CURVE 7
PITCH/ROLL-WHEEL T	ASC3-16	SEE POLYNOMIAL 1	DEG C CURVE 1
YAW/RED- WHEEL T	ASC3-17	SEE POLYNOMIAL 1	DEG C CURVE 1
PITCH CMD D/A 1	ASC2-35	Y= -1.000X + 2.5	VOLTS
PITCH CMD D/A 2	ASC2-36	Y= -1.000X + 2.5	VOLTS
YAW CMD D/A 1	ASC2-37	Y= -1.000X + 2.5	VOLTS
YAW CMD D/A 2	ASC2-38	Y= -1.000X + 2.5	VOLTS
ROLL CMD D/A 1	ASC2-39	Y= -1.000X + 2.5	VOLTS
ROLL CMD D/A 2	ASC2-40	Y= -1.000X + 2.5	VOLTS
RED CMD D/A 1	ASC2-41	Y= -1.000X + 2.5	VOLTS
RED CMD D/A 2	ASC2-42	Y= -1.000X + 2.5	VOLTS
PITCH CMD C&M	AMC-15	Y= -2.444X + 6.044	VOLTS
YAW CMD C&M	AMC-17	Y= -2.444X + 6.044	VOLTS
ROLL CMD C&M	AMC-25	Y= -2.444X + 6.044	VOLTS

\*\*\*\*\*HYDRAZINE CONTROL SYSTEM\*\*\*\*\*

ENG/VALVE DRIVER 1/2 T	ASC1-20	SEE POLYNOMIAL 1	DEG C CURVE 1
TANK B/TANK H TEMP	ASC2-16	SEE POLYNOMIAL 1	DEG C CURVE 1
TANK G/TANK C TEMP	ASC2-17	SEE POLYNOMIAL 1	DEG C CURVE 1
TANK D/TANK F TEMP	ASC2-18	SEE POLYNOMIAL 1	DEG C CURVE 1
-Z LINE T	ASC2-19	SEE POLYNOMIAL 1	DEG C CURVE 1
LTE 6/LTE 4 VALVE T	ASC2-20	SEE POLYNOMIAL 1	DEG C CURVE 1

+Z LINE T	ASC2-21	SEE POLYNOMIAL 1	DEG C	CURVE 1
LTE 10/LTE 12 VALVE T	ASC2-22	SEE POLYNOMIAL 1	DEG C	CURVE 1
LV 1&3/LV 2&6 MOUNT T	ASC2-23	SEE POLYNOMIAL 1	DEG C	CURVE 1
D SECT LINE/FD VAL 3 T	ASC2-24	SEE POLYNOMIAL 1	DEG C	CURVE 1
LTE 7/LTE 3 VALVE T	ASC2-25	SEE POLYNOMIAL 1	DEG C	CURVE 1
HTE 2/HTE 8 VALVE T	ASC2-26	SEE POLYNOMIAL 1	DEG C	CURVE 1
LTE 1/LTE 9 VALVE T	ASC2-27	SEE POLYNOMIAL 1	DEG C	CURVE 1
+Y REM/-Y REM T	ASC2-28	SEE POLYNOMIAL 1	DEG C	CURVE 1
-Y REM/+Y REM STRUT T	ASC2-29	SEE POLYNOMIAL 1	DEG C	CURVE 1
CAT BED 1 T	ASC1-45	Y=6.056X + 8.944	DEG C	
CAT BED 2 T	ASC1-46	Y=6.056X + 8.944	DEG C	
CAT BED 3 T	ASC1-47	Y=6.056X + 8.944	DEG C	
CAT BED 4 T	ASC1-48	Y=6.056X + 8.944	DEG C	
CAT BED 5 T	ASC1-49	Y=6.056X + 8.944	DEG C	
CAT BED 6 T	ASC1-50	Y=6.056X + 8.944	DEG C	
CAT BED 7 T	ASC1-51	Y=6.056X + 8.944	DEG C	
CAT BED 8 T	ASC1-52	Y=6.056X + 3.944	DEG C	
CAT BED 9 T	ASC1-53	Y=6.056X + 8.944	DEG C	
CAT BED 10 T	ASC1-54	Y=6.056X + 8.944	DEG C	
CAT BED 11 T	ASC1-55	Y=6.056X + 8.944	DEG C	
CAT BED 12 T	ASC1-56	Y=6.056X + 8.944	DEG C	
TANKS C&G PRESSURE	ASC1-42	Y=1158X/ASC2(0/5)+5.88	PSIA	NOTE 1
TANKS B&F PRESSURE	ASC1-43	Y=1175X/ASC2(0/5)+14.18	PSIA	NOTE 1
TANKS D&H PRESSURE	ASC1-44	Y=1158/ASC2(0/5)+5.88	PSIA	NOTE 1

\*\*\*\*\*PYRO\*\*\*\*\*

APOGEE BOOST MOTOR	ASC3-19	SEE POLYNOMIAL 1	DEG C
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\*\*\*\*\*EXPERIMENT SYSTEM\*\*\*\*\*

EEA CONV 1 +12	ASC2-56	Y= 3.310X	VOLTS
EEA CONV 1 + 5	ASC2-57	Y= 1.100X	VOLTS
EEA CONV 2 +12	ASC2-58	Y= 3.310X	VOLTS
EEA CONV 2 + 5	ASC2-59	Y= 1.100X	VOLTS
EEA CONV 1/2 +15	ASC2-60	Y= 3.310X	VOLTS
EEA CONV 1/2 -15	ASC2-61	Y= 4.921X - 3.921((ASC2 (57/59)))	NOTE 2
EEA CONV 1/2 + 8	ASC2-62	Y= 1.770X	VOLTS
EEA CONV 1/2 T	ASC2-31	SEE POLYNOMIAL 1	DEG C
FOCUS POSITION-EXTEND	ASC1-62	Y= -10.000X	MILLS
FOCUS POSITION-RETRACT	ASC1-63	Y= 10.000X	MILLS
CAL PS1 HV I	ASC1-61	Y= 1.000X	VOLTS
CAL PS2 HV I	ASC2- 2	Y= 1.000X	VOLTS
SI SEC MIR TEMP	ASC3-20	SEE POLYNOMIAL 1	DEG C
SI PRI MIR +Y TEMP	ASC3-22	SEE POLYNOMIAL 1	DEG C
SI SEC MIR FOC TEMP	ASC3-21	SEE POLYNOMIAL 1	DEG C
SI PRI MIR -Y TEMP	ASC3-23	SEE POLYNOMIAL 1	DEG C
TEL STA 133 +Z/-Z TEMP	ASC3-24	SEE POLYNOMIAL 11	DEG C
TEL STA 92 +Z/-Z TEMP	ASC3-25	SEE POLYNOMIAL 11	DEG C
CAMERA DECK TEMP	ASC3-28	SEE POLYNOMIAL 1	DEG C
CAMERA DECK TEMP	ASC3-29	SEE POLYNOMIAL 1	DEG C
CAMERA DECK TEMP	ASC3-30	SEE POLYNOMIAL 1	DEG C
SI UVF LAMP TEMP	ASC3-31	SEE POLYNOMIAL 1	DEG C

\*\*\*\*\*LWP\*\*CAMERA SYSTEM NO. 1\*\*\*\*\*  
UVC EHT ESC-0 Y=-1.282X - 0.026 -0.04689(SECEHT V) KVOLTS

SEC EHT	ESC-1	Y = -1.767X - 0.011	KVOLTS
G4	ESC-2	Y = 90.73X + 0.13	VOLTS
TARGET BIAS G6	ESC-3	Y = 3.091 - 0.006	VOLTS
G1	ESC-4	Y = -28.70X - 0.01	VOLTS
HEATER CURRENT	ESC-5	Y = 48.08X + 0.10	MA
FRAME	ESC-7	Y = 91.07X - 237.0	MA
LINE	ESC-6	Y = 90.56X - 237.1	MA
FOCUS	ESC-8	Y = 14.62X - 0.11	MA
G2	ESC-9	Y = 66.42X + 0.05	VOLTS
G3	ESC-10	Y = 91.07X - 0.10	VOLTS
X-ALIGN	ESC-11	Y = -21.82 + 56.57	MA
Y-ALIGN	ESC-12	Y = -21.91X + 56.66	MA
DEFLN COIL TEMP	ESC 52	SEE POLYNOMIAL 1	DEG C CURVE 1
HEAD AMP/SEC EHT TEMP	ESC 53	SEE POLYNOMIAL 1	DEG C CURVE 1
FRAME DAC/LINE DAC T	ESC 54	SEE POLYNOMIAL 1	DEG C CURVE 1

\*\*\*\*\*LWR\*\*CAMERA SYSTEM NO. 2\*\*\*\*\*

UVC EHT	ESC-13	Y = -1.271X - 0.015 - 0.03135(SECEHT V)	KVOLTS
SEC EHT	ESC-14	Y = -1.771X - 0.010	KVOLTS
G4	ESC-15	Y = 90.53X + 0.32	VOLTS
TARGET BIAS G6	ESC-16	Y = 3.092X + 0.010	VOLTS
G1	ESC-17	Y = -28.60X - 0.03	VOLTS
HEATER CURRENT	ESC-18	Y = 48.39X - 0.16	MA
FRAME	ESC-20	Y = 88.95X - 231.5	MA
LINE	ESC-19	Y = 92.21X - 240.7	MA
FOCUS	ESC-21	Y = 14.66X - 0.24	MA
G2	ESC-22	Y = 66.61X	VOLTS
G3	ESC-23	Y = 90.82X - 0.03	VOLTS
X-ALIGN	ESC-24	Y = -22.11X + 57.53	MA
Y-ALIGN	ESC-25	Y = -22.02X + 57.45	MA
DEFLN COIL TEMP	ESC 55	SEE POLYNOMIAL 1	DEG C CURVE 1
HEAD AMP/SEC EHT TEMP	ESC 56	SEE POLYNOMIAL 1	DEG C CURVE 1
FRAME DAC/LINE DAC T	ESC 57	SEE POLYNOMIAL 1	DEG C CURVE 1

\*\*\*\*\*SWP\*\*CAMERA SYSTEM NO. 3\*\*\*\*\*

UVC EHT	ESC-26	Y = -1.287X - 0.016 - 0.04460(SECEHT V)	KVOLTS
SEC EHT	ESC-27	Y = -1.767X - 0.016	KVOLTS
G4	ESC-28	Y = 90.91X - 0.97	VOLTS
TARGET BIAS G6	ESC-29	Y = 3.092X + 0.002	VOLTS
G1	ESC-30	Y = -28.73X + 0.03	VOLTS
HEATER CURRENT	ESC-31	Y = 48.46X - 0.05	MA
FRAME	ESC-33	Y = 90.99X - 235.7	MA
LINE	ESC-32	Y = 90.93X - 238.2	MA
FOCUS	ESC-34	Y = 14.65X - 0.15	MA
G2	ESC-35	Y = 66.37X + 0.07	VOLTS
G3	ESC-36	Y = 90.50X + 0.44	VOLTS
X-ALIGN	ESC-37	Y = -22.18X + 57.12	MA
Y-ALIGN	ESC-38	Y = -21.93X + 56.58	MA
DEFLN COIL TEMP	ESC 58	SEE POLYNOMIAL 1	DEG C CURVE 1
HEAD AMP/SEC EHT TEMP	ESC 59	SEE POLYNOMIAL 1	DEG C CURVE 1
FRAME DAC/LINE DAC T	ESC 60	SEE POLYNOMIAL 1	DEG C CURVE 1

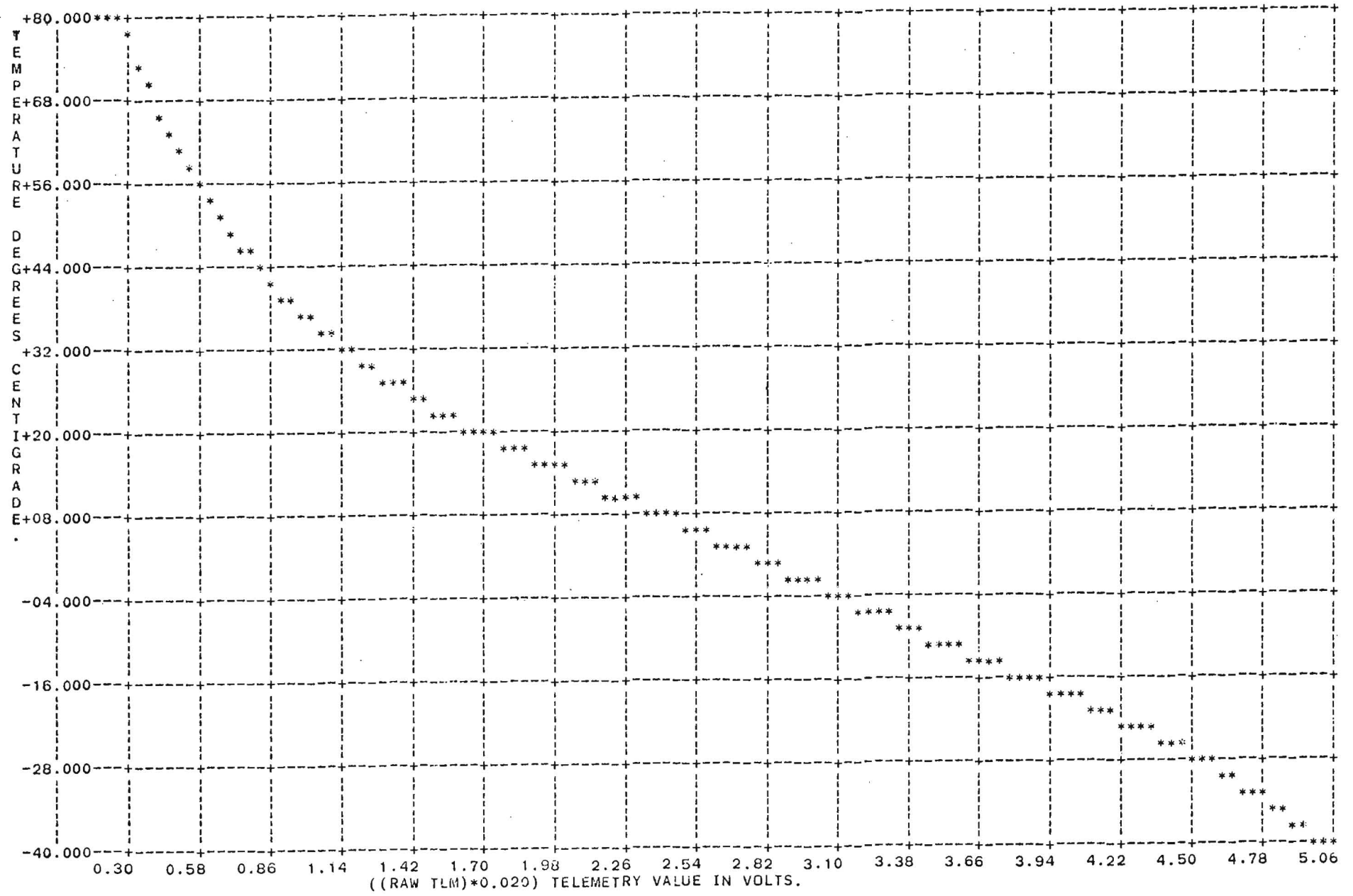
\*\*\*\*\*SWR\*\*CAMERA SYSTEM NO. 4\*\*\*\*\*

UVC EHT	ESC-39	Y = -1.274X - 0.028 - 0.03800(SECEHT V)	KVOLTS
SEC EHT	ESC-40	Y = -1.767X - 0.006	KVOLTS
G4	ESC-41	Y = 90.94X - 0.50	VOLTS

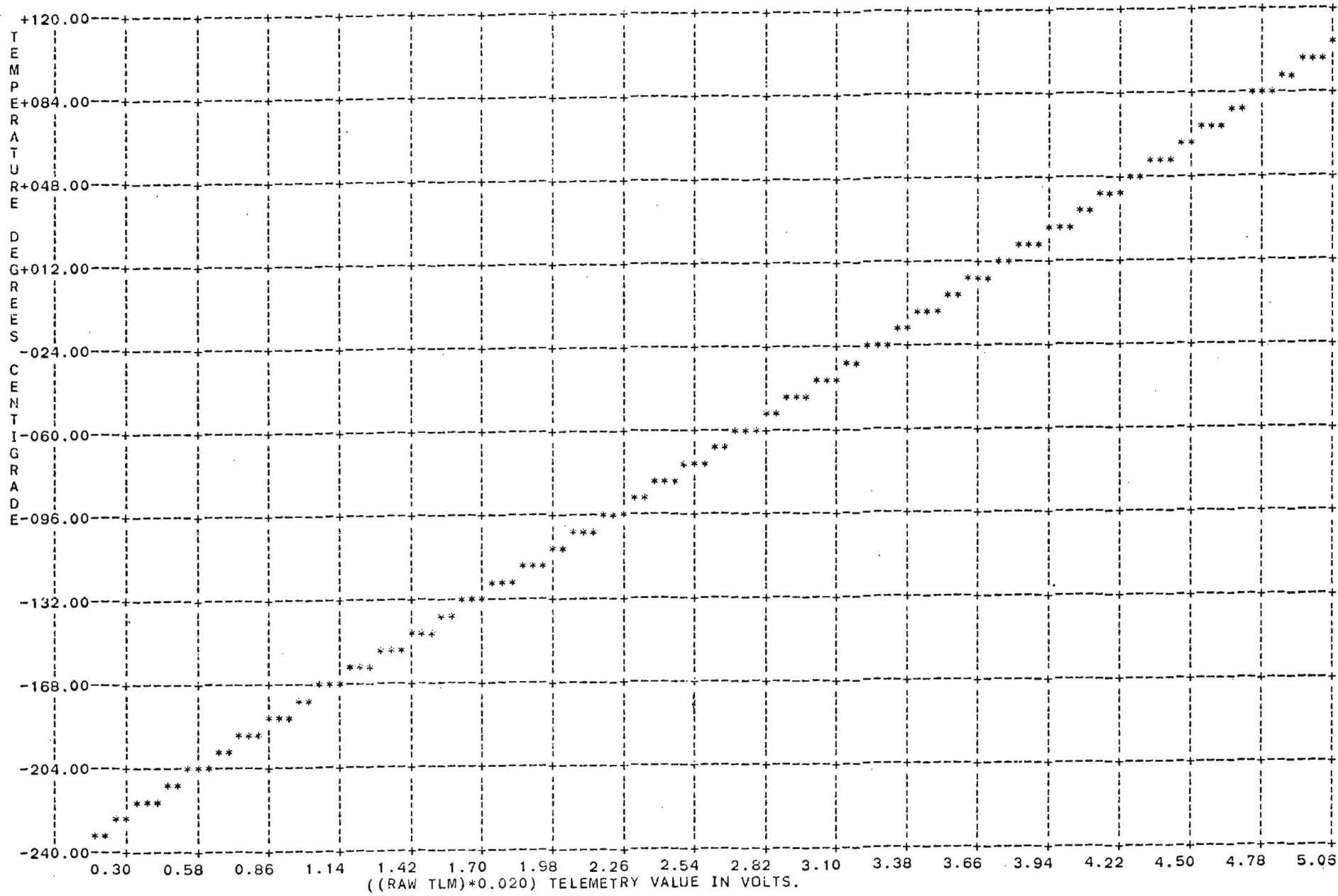
TARGET BIAS G0	ESC-42	Y= 3.075X + 0.008	VOLTS
G1	ESC-43	Y=-28.63X	VOLTS
HEATER CURRENT	ESC-44	Y= 48.55X + 0.56	MA
FRAME	ESC-46	Y= 92.63X - 230.6	MA
LINE	ESC-45	Y= 90.90X - 236.9	MA
FOCUS	ESC-47	Y= 14.65X - 0.15	MA
G2	ESC-48	Y= 67.46X - 5.57	VOLTS
G3	ESC-49	Y= 91.26X + 0.17	VOLTS
X-ALIGN	ESC-50	Y=-21.92X + 57.18	MA
Y-ALIGN	ESC-51	Y=-21.98X + 57.12	MA
DEFLN COIL TEMP	ESC 61	SEE POLYNOMIAL 1	DEG C CURVE 1
HEAD AMP/SEC EHT TEMP	ESC 62	SEE POLYNOMIAL 1	DEG C CURVE 1
FRAME DAC/LINE DAC T	ESC 63	SEE POLYNOMIAL 1	DEG C CURVE 1

NOTE 1: IF USING WDA POWER SUPPLY 1 +10V USE ENGINEERING VALUE FOR ASC2-0  
 IF USING WDA POWER SUPPLY 2 +10V USE ENGINEERING VALUE FOR ASC2-5

NOTE 2: IF USING EEA CONVERTER1 +5V USE ENGINEERING VALUE FOR ASC2-57  
 IF USING EEA CONVERTER2 +5V USE ENGINEERING VALUE FOR ASC2-59

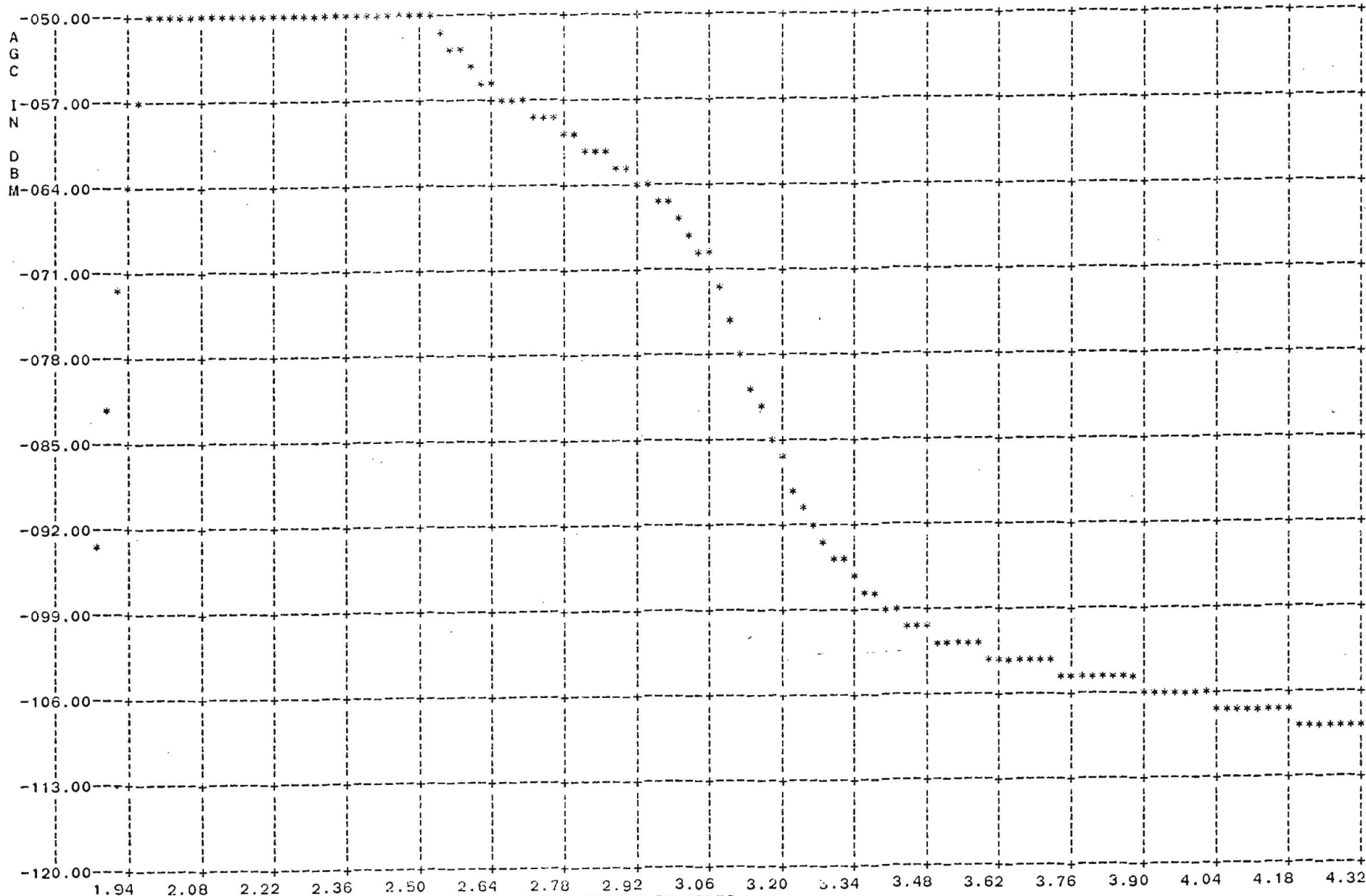


$$Y = (-0.36411D\ 00)X^{**5} + (0.53477D\ 01)X^{**4} + (-0.30540D\ 02)X^{**3} + (0.84903D\ 02)X^{**2} + (-0.13191D\ 03)X^{**1} + (0.10913D\ 03)X^{**0}$$
 FROM .2741V TO 4.9824V                      STD DIVIATION .65579

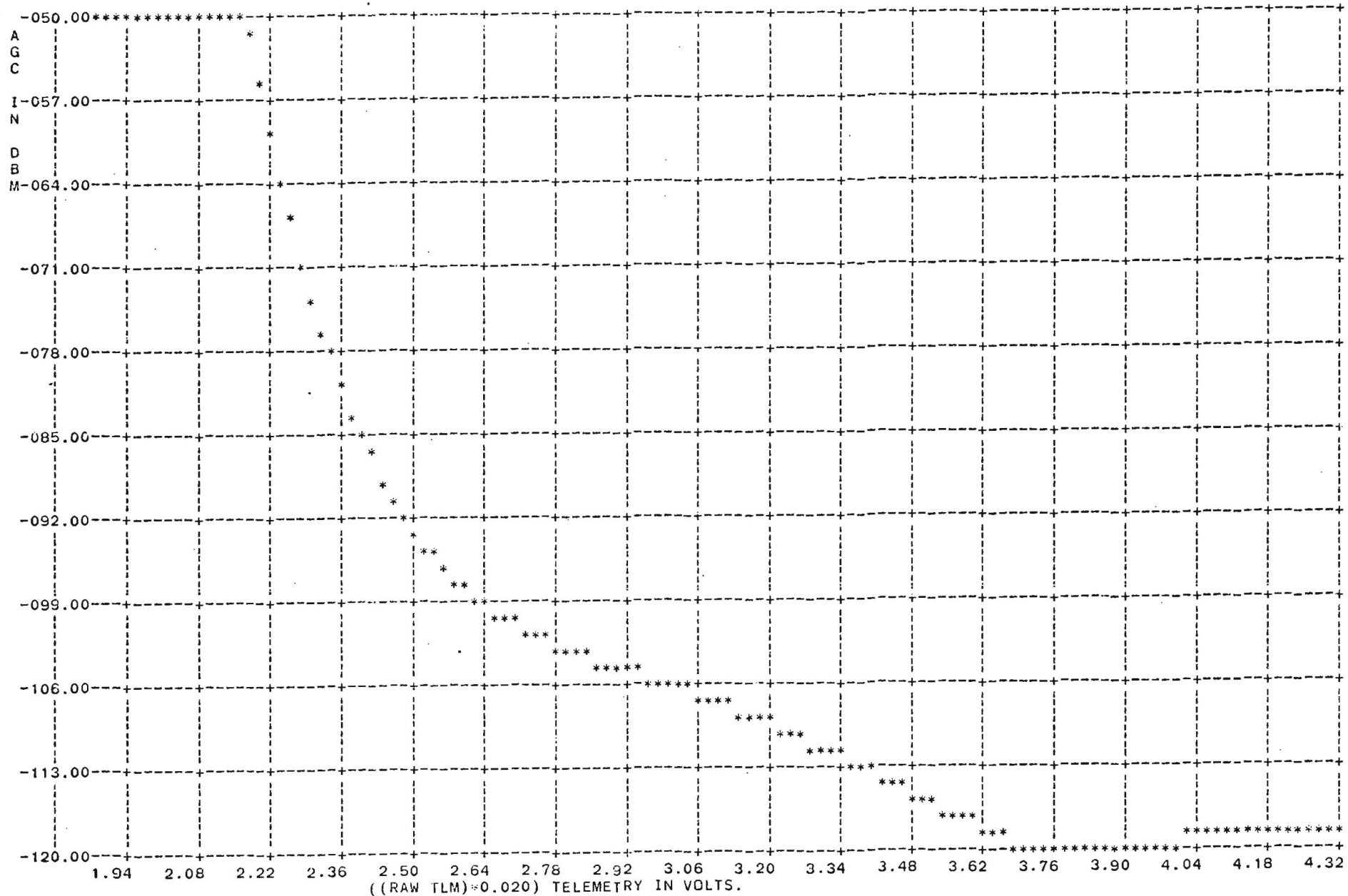


$$Y = (0.90108D-01)X^{**5} + (-0.13837D 01)X^{**4} + (0.78420D 01)X^{**3} + (-0.19003D 02)X^{**2} + (0.85141D 02)X^{**1} + (-0.24792D 03)X^{**0}$$

FROM .097V TO 5.275V                      STD DIVIATION .31572

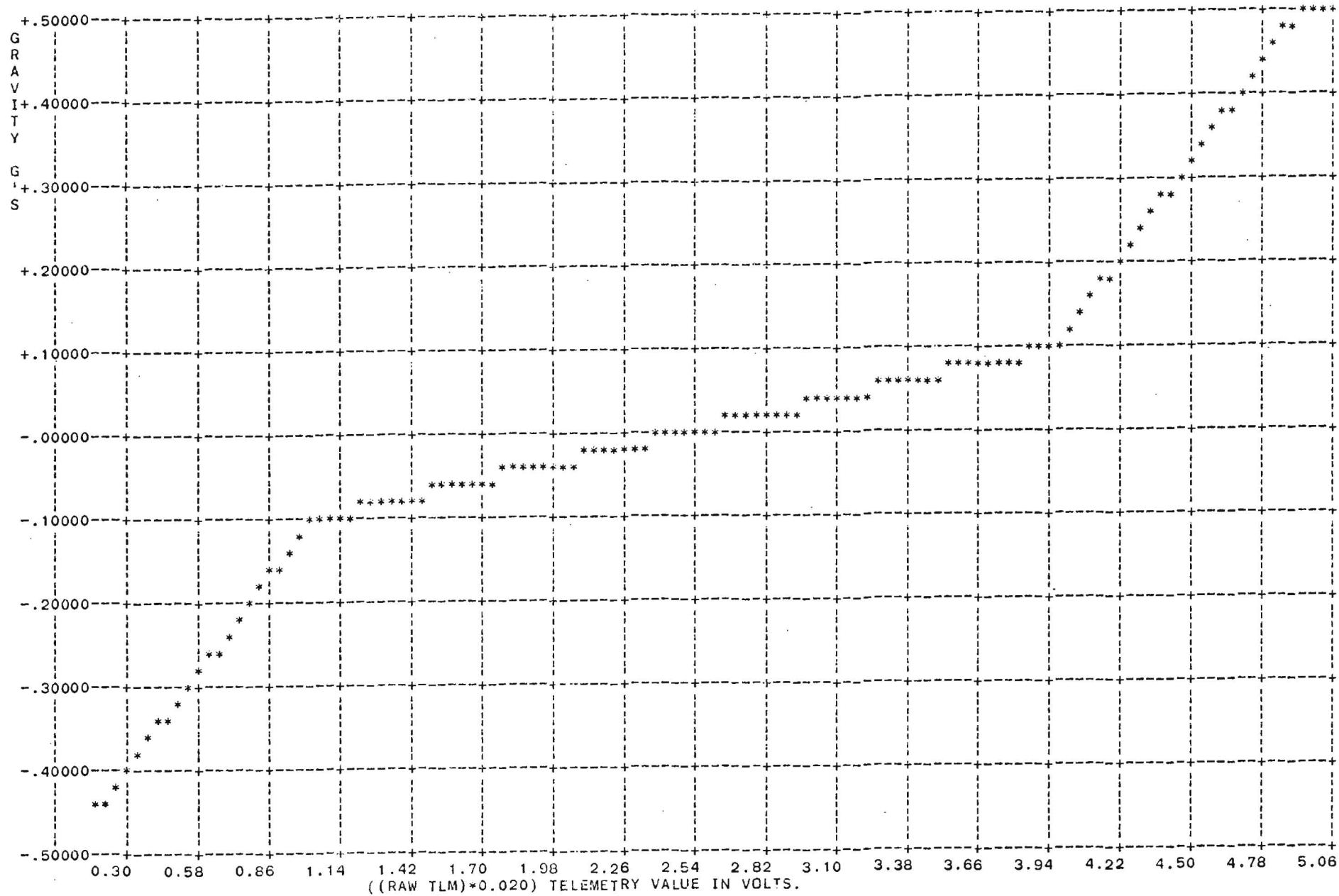


POLY. FROM 0.00 TO 3.06 V      STD DEVIATION    .25580353  
 $Y = (0.37201D\ 03)X^{**5} + (-0.51956D\ 04)X^{**4} + (0.27850D\ 05)X^{**3} + (-0.75454D\ 05)X^{**2} + (0.10147D\ 06)X^{**1} + (-0.54181D\ 05)X^{**0}$   
 POLY. FROM 3.08 TO 5.10 V      STD DEVIATION    .33353925  
 $Y = (-0.28653D\ 02)X^{**5} + (0.59727D\ 03)X^{**4} + (-0.49605D\ 04)X^{**3} + (0.20523D\ 05)X^{**2} + (-0.42314D\ 05)X^{**1} + (0.34696D\ 05)X^{**0}$

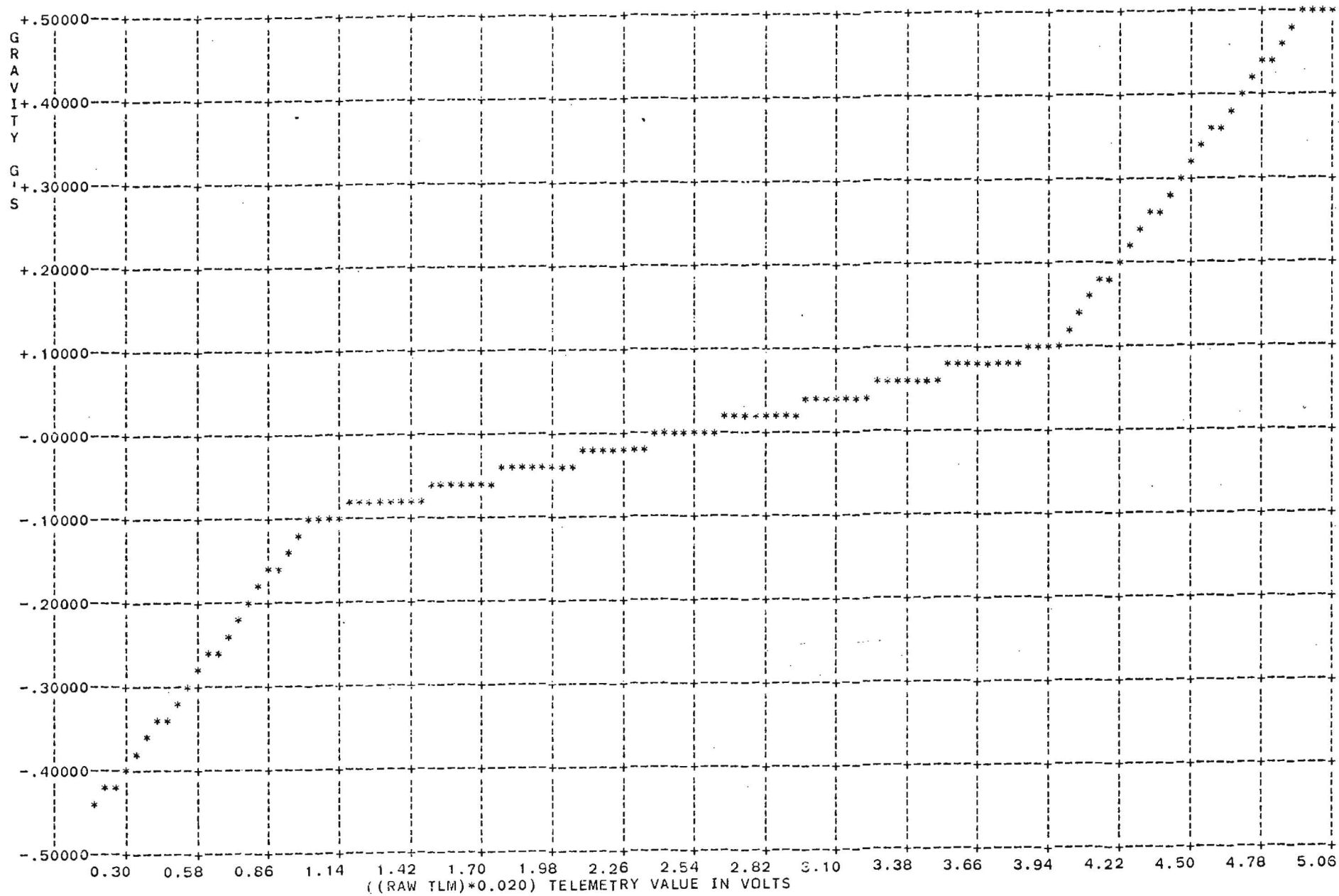


Y = (-0.20280D 02)X\*\*5 + ( 0.35643D 03)X\*\*4 + (-0.24798D 04)X\*\*3 + ( 0.85404D 04)X\*\*2 + (-0.14583D 05)X\*\*1 + ( 0.97926D 04)X\*\*0  
 FROM 2.16V TO 5.00V STD DIVIATION 1.43651

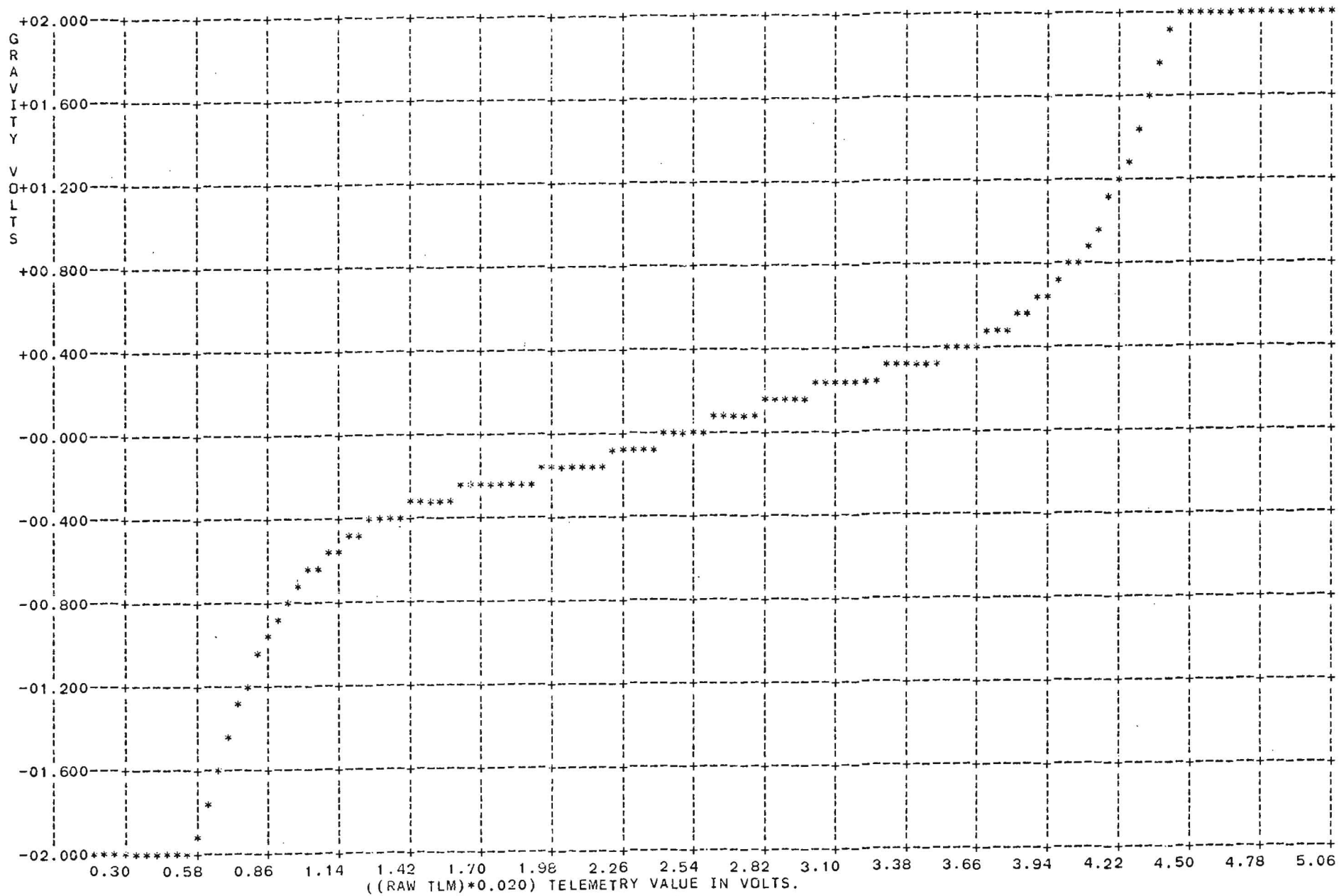




Y= 0.4070X - 0.5198 (0.00 - 1.02V)  
 Y= 0.0681X - 0.1707 (1.04 - 3.96V)  
 Y= 0.4127X - 1.5357 (3.98 - 5.10V)

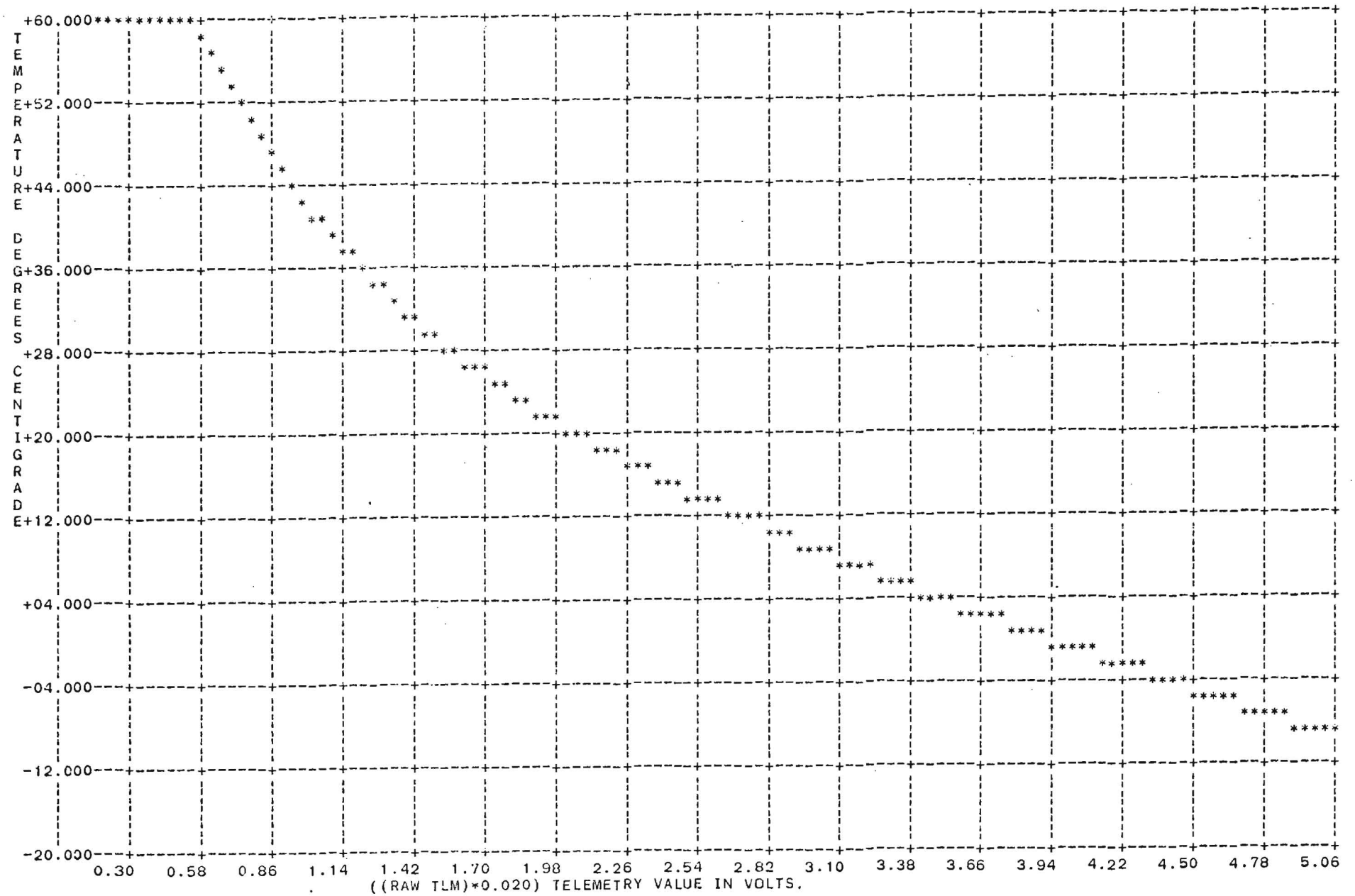


Y= 0.4017X - 0.5154 (0.00 - 1.02V)  
 Y= 0.0677X - 0.1695 (1.04 - 3.96V)  
 Y= 0.4017X - 1.5137 (3.98 - 5.10V)

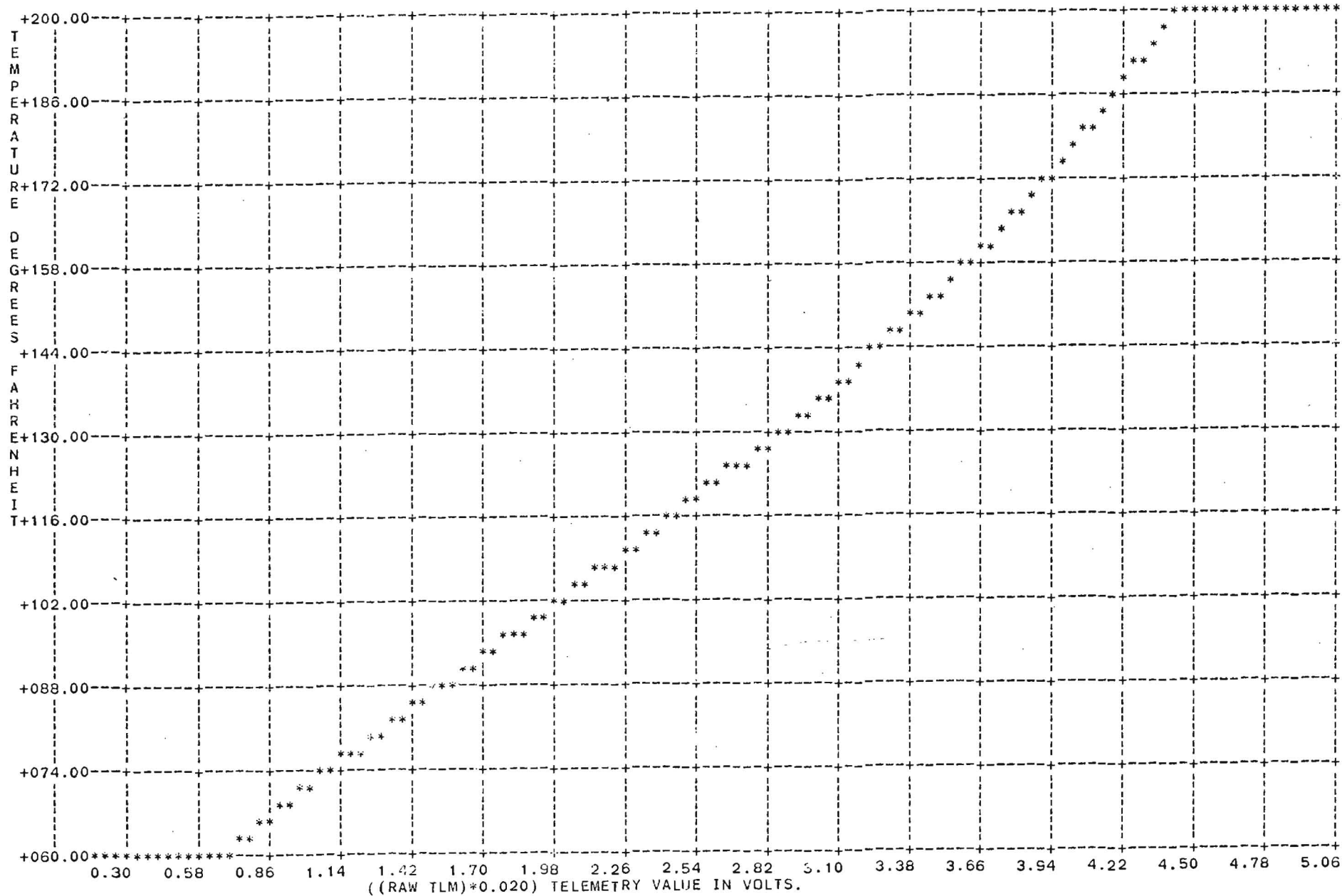


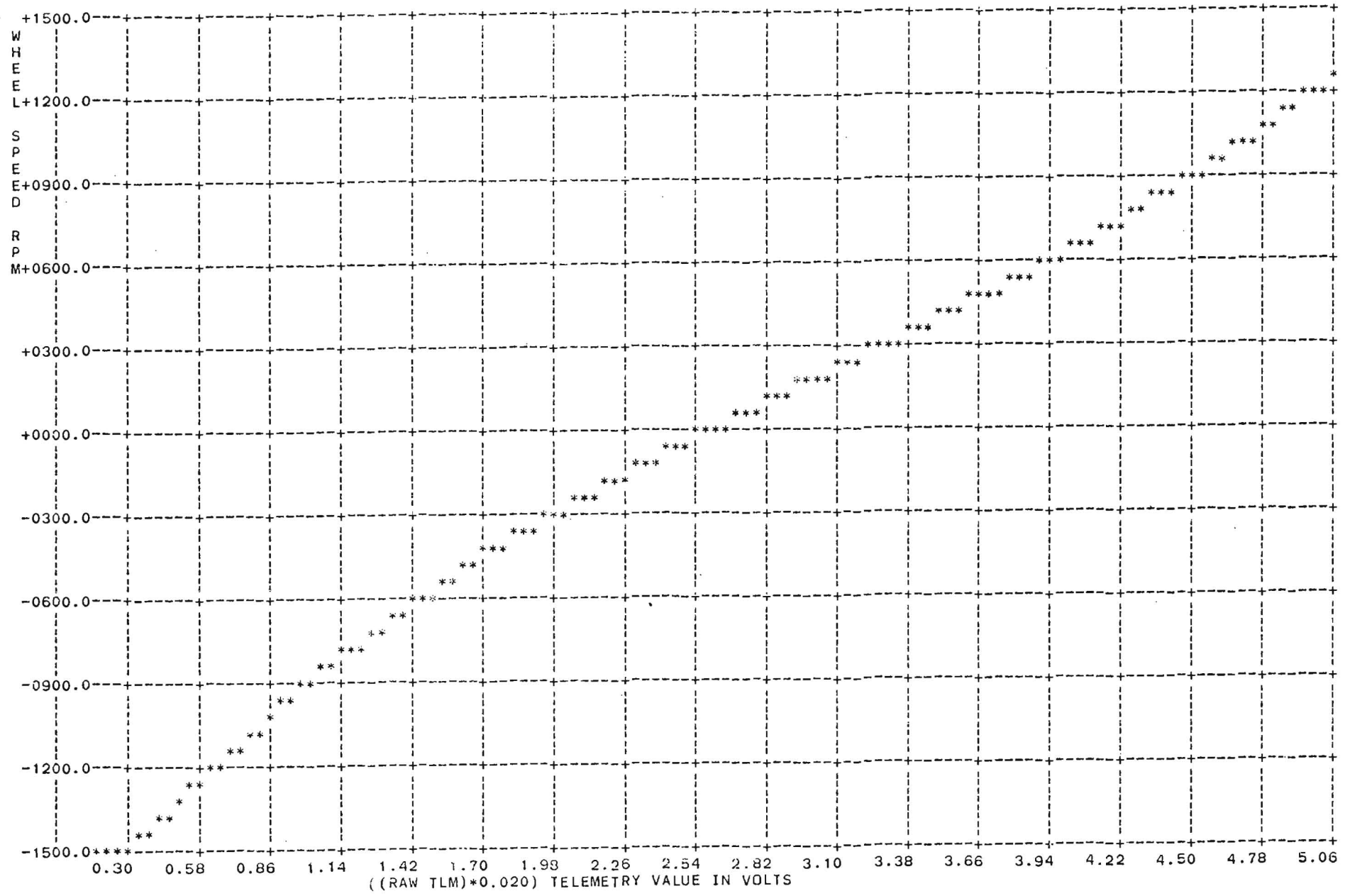
$$Y = (0.89466D-01)X^{**5} + (-0.11259D 01)X^{**4} + (0.54970D 01)X^{**3} + (-0.12961D 02)X^{**2} + (0.15044D 02)X^{**1} + (-0.72503D 01)X^{**0}$$

FROM .6V TO 4.45V                      STD DIVIATION .03193



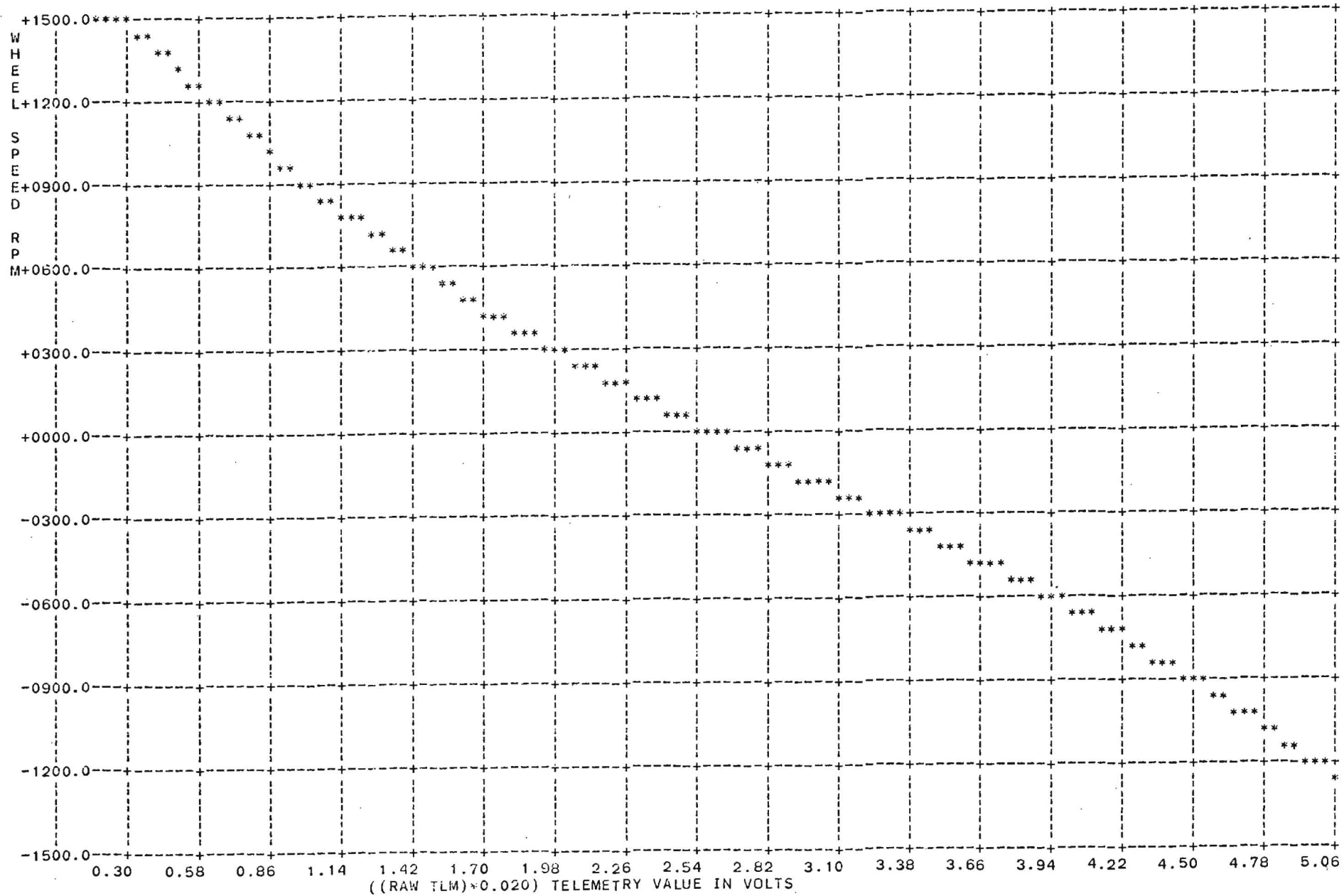
Y = (-0.95457D-01)X\*\*5 + ( 0.16695D 01)X\*\*4 + (-0.11653D 02)X\*\*3 + ( 0.41468D 02)X\*\*2 + (-0.86278D 02)X\*\*1 + ( 0.97095D 02)X\*\*0  
 FROM .6V TO 5.3V                                      STD DIVIATION .11277



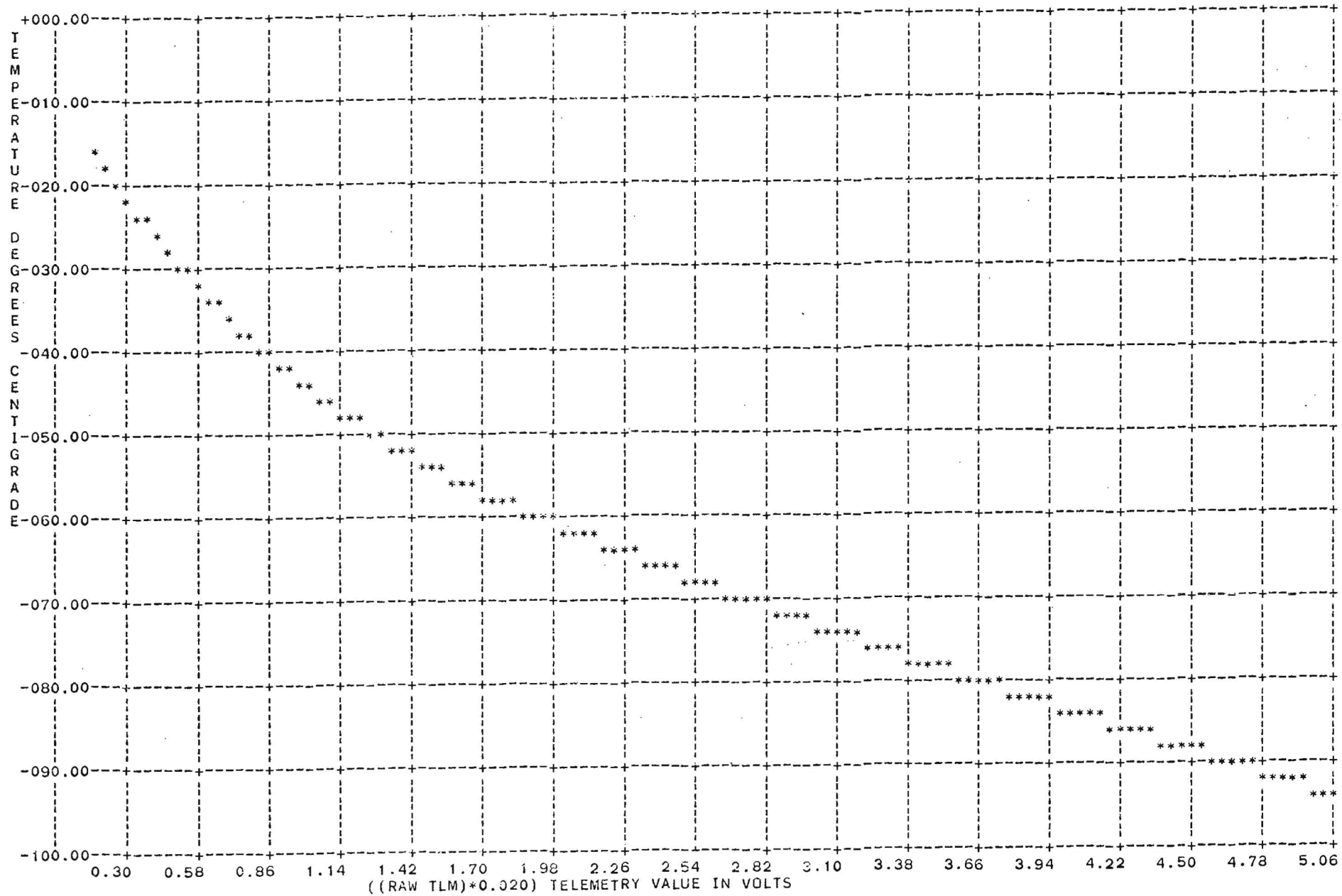


$$Y = (-0.91504D 00)X^{**5} + (0.12463D 02)X^{**4} + (-0.38785D 02)X^{**3} + (-0.78614D 02)X^{**2} + (0.97560D 03)X^{**1} + (-0.17818D 04)X^{**0}$$

FROM .3V TO 5.42V      STD. DIVIATION 4.19233



$$Y = (0.91505D 00)X^{**5} + (-0.12463D 02)X^{**4} + (0.33785D 02)X^{**3} + (0.78614D 02)X^{**2} + (-0.97560D 03)X^{**1} + (0.17818D 04)X^{**0}$$



$$Y = (-0.70085D-01)X^{**5} + (0.12036D 01)X^{**4} + (-0.81678D 01)X^{**3} + (0.27815D 02)X^{**2} + (-0.59043D 02)X^{**1} + (-0.60069D 01)X^{**0}$$



DIRECTIVE	LANG	USE	STATEMENT ARGUMENT FORM
ABORT	C/P	PR/K	{ '<STRING>' }
ABS	C	F	(<EXP>)
ALRMHI	C	F	(<TLMPPR>)
ALRMLD	C	F	(<TLMPPR>)
ASSIGN	C		[CMD CMDP MAN PEN DMT]{, <CONSOLE#>}
BIT	C	F	(<EXP>, <EXP>, ...)
BPARDB	C/P		<DATABLOCK#>, <ARRAYNAME>, <#WORDS>
CALL	C/P	PR	<ENTRYNAME>{, <PARAMETEREXP>...}
CALLTASK	C	SS	<TASK#>
CMDSEQ	C/P		
COLLDUMP	C		{OBC FES VAM SPEC}{, <#MINORFRAME>{, [FMT1A FMT1B FMT2A FMT2B VAM]}}
COMMAND	C/P		<ADDR>, <LENGTH>, <VALUE>{, <LENGTH>, <VALUE>...}
CONSOLE	C		[ALTCONS, <CONSOLE#> EVENT, <EXP> DISP, <EXP>]
CONTINUE	C/P	PR	
CORE	C		<ID>(<BASEADDR>){, <ID>(<BASEADDR>)...}
:CURRENT	C		[{A,D,R}(<DEG>{, <MIN>{, <SEC>}}...)[UPDATE]{, <MIN>{, <SEC>}})
DEVICE	C/P	F	([DEC DMU OBC LVSW FES IRA RW EV MECH PAS CAM])
DISPLAY	C		[<EXP>  '<STRING>']{, [<EXP>  '<STRING>']...}

DIRECTIVE	LANG	USE	STATEMENT ARGUMENT FORM
DMTR	C	SS	{[DISPLAY MODIFY]{,<GROUPNAME>{,<PPRNAME>{,<FIELDNAME> <RELATIVEWORD#>}}}}
DO	C/P	FR	<LABEL> <ID>=<INITIAL#>,<FINAL#>{,<INTERVAL#>}
DRAW	C		{SEND LIB INITLIB [LOADX POINTA POINTR],<EXP>,<EXP> [TEXT LINEA CENT LINER],{(<TYPE>.{,<COLOR>})},<EXP>,<EXP>
DUMP	C		<STARTADDR>,<WORDCOUNT>
ENDSEQ	C/P		
EQV	C		<NEWID>,<OLDID> {,<NEWID>,<OLDID> ...}
EXAMINE	C		[REPLY SERIAL,DMU SCAN MECH EV PRECESS IRA PAS FES RW]
EXEC	C/P		<ENTRYNAME>{,<ARGUMENTEXP>...}
FREEZE	C		
GLBABORT	C		
GO	C/P	K	{<LABEL> <STATEMENT#>}
GOTO	C/P	PR	[<LABEL> <RELATIVEEXP>]
HEX	C	F	(<EXP>)
HOLD	C/P	SS	{<LABEL> <STATEMENT#>}
IF	C/P	PR	<EXP>{,<LABEL> <RELEXP>}
INIT			<FILENAME>{,<AREA>}{,<ARGUMENTEXP>...}
INTEGER	C/P		<ID>{(<BOUNDEXP>)}{,<ID>{(<BOUNDEXP>)}...}
LIMITS	C/P		<TELEMNAME>,[ON OFF],<TELEMNAME>,<LOLIMIT>,<HILIMIT> {,<OFF ON>[RAW ENG]...}
LOAD	C		{EPHEM TARGET}
MANEUVER	C		{GEN}
MANEUVER	C		{CLEAR}
MANEUVER	C		{SAVE,RESTORE}
MOD	C	F	(<EXP1>,<EXP2>)
NEWSYM	C		
NUM	C	F	(<VARNAME>)
OBCKSUM	C		<STARTADDR>,<ENDADDR>

DIRECTIVE	LANG	USE	STATEMENT ARGUMENT FORM
OBCCOMP	C		<STARTADDR>, <ENDADDR>{, ALL}
OBCCOMP	P		<STARTADDR>, <ENDADDR>
OBCCOPY	C		<BANK#>
OBCDB10	C/P		<OPTION>{, <OPTION>...} OPTION ::= [MA MB0 MB1 MB2 MC0 MC1 MC2 MD0 MD1 MD2 ME0 ME1  ME2 MF MG0 MG1 MG2 MG3 MJO MJ1 MJ2 MK ML SAC0  SAC1 SAC2 ISMAX0 ISMAX1 ISMAX2 BGO BG1 BG2]
OBCDB14	C/P		[SWR SWP LWR LWP]{, [FESMTR MODEXP CALLON]...}
OBCDMPRT	C/P		<BANK#>
OBCDMTYP	C/P		<STARTADDR>, <NUMLOC>
OBCEND	C/P		
OBCLDBLK	C		
OBCLDPRT	C/P		<BANK#>
OBCLDTAP	C		
OBCLDTYP	C/P		<STARTADDR>, <NUMLOC>
OBCMRPRT	C		<BANK#>
OBCRECON	C		<BANK#>
OBCSEQ	C/P		
OBCWAIT	C/P		<.1 SECCNDS>
OBSTIME	C		<MONTH>, <DAY>, <YEAR>{, <HOUR>{, <MIN>}}
PAGE	C		<PAGENAME>{, <CONSLE#>}
PEN	C		[ON OFF]{, <PEN#>} CAL, <PEN#>, <VALUE> MODE, REALTIME CLEAR SUBC, <PEN#>, <MFOFFSET>, <STARTMF>, <MFCYCLE>{, <BIT#>} MAIN, <PEN#>, (<MAINCOM>, ...){, <BIT#>} <MAINCOM> ::= [<MFOFFSET> <INTCNT>(<MFOFFSET>, <SPACING>)]
PEND	C/P	PR	
PPR	C		<ID>{(<PPR#>){, <ID>{(<PPR#>)}}}
PPRNUM	C	F	(<PPRNAME>)
PREP	C		<FESING>, [CLEAR MERGE NORM REV MAG IMAGE] <FESDSC>, [CLEAR CENTRD POINT TYPE CT CTN CMAG NORM REV  REV MAG CORR STOFFE DWELL WQUEEZE PRINT]

DIRECTIVE	LANG	USE	STATEMENT ARGUMENT FORM
			<SPEC>, [CLEAR RECON]
PROC	C/P	PR	
RAW	C	F	(<TLMPPR>)
REAL	C/P		<ID>{(<BOUNDEXP>)}{,<ID>{(<BOUNDEXP>)...}}
RECLAIM	C		[CMD CMDP MAN PEN DMT]
RELEASE	C		[CMD CMDP MAN PEN DMT]
RETURN	C/P	PR	
REPLY	C		MSG, <MSG#>, [APPROVE SKIP] OBCTAP, [YES NO] OBCTAP, [APPROVE SKIP] CMD, [APPROVE SKIP CLEAR RETRANS]
SCROLL	C		<COM TARGETS HEADER EVENT CAMSNP SCSNAP FESDSC>, <SPEC>, <NREC>
SELECT	C		<SLEW#>
SEND	C		[HEADER IMAGE], [FES SPEC], {<FILE #>}
:SEND	C/P		{<INTERVAL>, <#TIMES>}
:SEQ	C/P		
SEQWAIT	C/P		<.1 SECONDS>
SET	C		AO, [ON OFF] ALARMS, RECAL BUFFACT, <EXP> CMDMODE, [CMDENC DDPS] DECODER, <EXP> HISTORY, [ALL TLM COM DDPSIN DDPSOUT EVENT ALARM EDS ESA NEW] , [ON OFF], <EXP> MANVER{, [PRE POST], [ON, OFF]...} OVERRIDE, <EXP> POD, <CONSOLE#> SCLOCK, BASE<YEAR> SCLOCK, JAN1 SCLOCK, START, <MON>, <DAY>, <YEAR>, <HOUR>, <MIN>, <SEC>, <MLS> SCLOCK, TICK, <MLS> SKIPSUBC, [ON OFF] EDS, [OFF:ON], <DEVICE NO.> VERIFY, {[OFF OCC SCE]}, {, [OCC SCE]} MFFORMAT, [AUTO FMT1A FMT1B FMT2A FMT2B VAM] MFSTATIC, <EXP> MFQUAL, [GOOD, <EXP> DONTCARE, <EXP> GOOD, <EXP>, DONTCARE, <EP>] ORBIT, <ORBIT#> REQUAL, [OBC VAM FES], <EXP> SAFEACT, [NONE OBC SLEW ALL WARN, <EXP> TIME, <EXP>] SITE, [PRIM SEC], <STATIONNAME>

DIRECTIVE	LANG	USE	STATEMENT ARGUMENT FORM
			SNPPTR, <EXP> TEST, [DDPS RLTIM NRLTIM], <STATIONNAME> TLMDISP, <EXP> TLMIN, [THS DDPS], [ON OFF] THS, [NORM THRU HCONV SCONV]], RATE, <EXP> TRANSMIT, [SINGLE MULTIPLE]
SIGNCN	C		<ASTRONOMER ID>, <USERID>, {<NODATA>}
SIGNOFF	C		
SLEW	C		[A D R PITCH YAW ROLL](<DEG>, <MIN>, <SEC>...)
SLEW	C		TARGATT
SNAP	C		[CONSOLE, <CONSOLE#> VIRTUAL, <PAGENAME>]
STATIC	C		<TELEMETRY NAME>
STEP	C/P		[0 1]
STORE	C		<EVENT COM HDR CAMSNP SCSNAP FESDSC>, <RNUM>, <ITEM>
SUBR	C/P	PR	
SW	C/P		[DMU RW OBC MECH FES PAS IRA CAM LVSW EV], <EXP>
SWITCH	C		<PPRNAME>
TARGATT	C		{[A D R PITCH YAW ROLL](<DEG>{, <MIN>{, <SEC>})...}
TOP	C/P		
TRUEDATE	C		
UNSYNC	C		
:UPLINK	C		[C T S]{, <PASSWORD>}
UNFREEZE	C		
UNSPEC	C	F	(<EXP>)
VAMCOMP	C		<PPRNAME>
VAMCOPY	C		[OBCMASTR TLMMASTR]
VAMPRT	C		<PPRNAME>
VAMRECON	C		
WAIT	C/P		<TIMEEXP> <EXP>, <TIMEEXP> <EXP>, <TIMEEXP>, <MAXTIMEEXP>
WHEELS	C		[LOADED UNLOADED]

DIRECTIVE	LANG	USE	STATEMENT ARGUMENT FORM
			[R P Y X],<RATE>,[R P Y X],<RATE>,...

LANG: C=CCIL P=PCL  
 USE: PR=PROCEDURES ONLY K=KEYIN WHILE PROCEDURE RUNNING SS=SINGLE STATEMENT  
 BLANK=ALL THE ABOVE F=FUNCTION  
 CHAR: <>=TOKEN []=OPTIONS SEPARATED BY ; {}=OPTIONAL

THE PURPOSE OF THE SCE FOUNDATION POOL IS TO PROVIDE A COMMAND BACK-UP CAPABILITY IN THE EVENT OF TOTAL DIGITAL COMMUNICATIONS FAILURE. THE COMMANDS RESIDING IN THE POOL ARE IDENTIFIED BY MARK NUMBER AND WILL BE TRANSMITTED UPON VERBAL REQUEST FROM THE CONTROL CENTER TO THE SCE OPERATOR. THE COMMANDS ARE STORED ON CASSETTE TAPES AND WILL BE LOADED BY THE SCE OPERATOR. THERE ARE TWO CASSETTES WITH IDENTICAL COMMANDS BUT DIFFERENT COMMAND DECODER ADDRESSES. TAPE C01 CONTAINS DECODER ADDRESS 22 AND TAPE C02 CONTAINS DECODER ADDRESS 05.

FOR A MORE DETAILED DESCRIPTION OF EACH COMMAND BIT STRUCTURE, REFER TO THE T&C SCE POOL DOCUMENT DATED AUGUST 10 1977.

IMPULSE COMMANDS (DIRECT 1 TO 1 NUMBER RELATIONSHIP)

MARK NUMBER	IMPULSE CMD	FUNCTION
001	C01	BOOST REG NO.1 ON
002	C02	BOOST REG NO.1 OFF
-	-	
-	-	
127	127	SPARE

\*\*\*\*\*

409	IRA1	GYRO 1 RATE MODE
410	IRA1	GYRO 1,3 RATE MODE
411	IRA1	GYRO 1,3,5 RATE MODE
412	IRA1	GYRO 2 RATE MODE
413	IRA1	GYRO 2,4 RATE MODE
414	IRA1	GYRO 2,4,6 RATE MODE
415	IRA1	GYRO 1 HOLD MODE
416	IRA1	GYRO 1,3 HOLD MODE
417	IRA1	GYRO 1,3,5 HOLD MODE
418	IRA1	GYRO 2 HOLD MODE
419	IRA1	GYRO 2,4 HOLD MODE
420	IRA1	GYRO 2,4,6 HOLD MODE

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421	EV1	CLOSE VALVES
422	EV2	CLOSE VALVES
423	EV1	OPEN VALVES 3,5,7 ENABLE ENGINES 4,10
424	EV1	OPEN VALVES 3,5,7 ENABLE ENGINES 6,12
425	EV1	OPEN VALVES 3,4,6 ENABLE ENGINES 7,3
426	EV1	OPEN VALVES 3,4,6 ENABLE ENGINES 9,1
427	EV1	OPEN VALVES 3,5,7 ENABLE ENGINES 10,6
428	EV1	OPEN VALVES 3,5,7 ENABLE ENGINES 12,4
429	EV1	OPEN VALVES 3,4,5,6,7 ENABLE LOW THRUST ENGINES
430	EV1	OPEN VALVES 1,5,7 ENABLE ENGINES 10,4
431	EV1	OPEN VALVES 1,5,7 ENABLE ENGINES 12,6
432	EV1	OPEN VALVES 1,4,6 ENABLE ENGINES 7,3

CRU COMMANDS (2XX=ON 3XX=OFF)

MARK NUMBER	CRU CMD	FUNCTION
201	01 (ON)	PWR SUPPLY NO.1
301	01 (OFF)	PWR SUPPLY NO.1

202	02 (ON)	SEC.MIRROR HTR CIRCUIT 1
302	02 (OFF)	SEC.MIRROR HTR CIRCUIT 1
-	-	
264	64 (ON)	SOLAR ARRAY,SI COVER ARM2
364	64 (OFF)	SOLAR ARRAY,SI COVER ARM2



SERIAL COMMANDS

MARK NUMBER	UNIT	FUNCTION
375	DMU1	ROM FMT 1A, IA2=7 1.25 KB
376	DMU2	ROM FMT 1A, IA2=7 1.25 KB
377	DMU1	ROM FMT 1A, IA2=7 20 KB
378	DMU2	ROM FMT 1A, IA2=7 20 KB
379	DMU1	ROM FMT 2A, IA2=7 1.25 KB
380	DMU2	ROM FMT 2A, IA2=7 1.25 KB
381	DMU1	ROM FMT 2A, IA2=7 20 KB
382	DMU2	ROM FMT 2A, IA2=7 20 KB
*****		
433	EV1	OPEN VALVES 1,4,6 ENABLE ENGINES 9,1
434	EV1	OPEN VALVES 1,5,7 ENABLE ENGINES 10,6
435	EV1	OPEN VALVES 1,5,7 ENABLE ENGINES 12,4
436	EV1	OPEN VALVES 1,4,5,6,7 ENABLE LOW THRUST ENGINES
437	EV1	OPEN VALVES 2,4,5,6,7 ENABLE LOW THRUST ENGINES
438	EV1	OPEN VALVES 1,5 ENABLE ENGINE 5
439	EV1	OPEN VALVES 2,5 ENABLE ENGINE 5
440	EV1	OPEN VALVES 3,7 ENABLE ENGINE 11
441	EV1	FIRE ENGINE 4,10 +ROLL
442	EV1	FIRE ENGINE 6,12 -ROLL
443	EV1	FIRE ENGINE 7,3 +PITCH
444	EV1	FIRE ENGINE 9,1 -PITCH
445	EV1	FIRE ENGINE 6,10 +YAW
446	EV1	FIRE ENGINE 4,12 -YAW
447	EV1	FIRE ENGINE 1
448	EV1	FIRE ENGINE 3
449	EV1	FIRE ENGINE 4
450	EV1	FIRE ENGINE 6
451	EV1	FIRE ENGINE 7
452	EV1	FIRE ENGINE 9
453	EV1	FIRE ENGINE 10
454	EV1	FIRE ENGINE 12
*****		
475	PAS1	PLANAR MODE,1250 CLOCK,CONT.SCAN
476	PAS2	PLANAR MODE,312 CLOCK,CONT.SCAN
477	PAS1	SPHERICAL MODE,1250 CLOCK,CONT.SCAN
478	PAS2	SPHERICAL MODE,312 CLOCK,CONT.SCAN

COMMAND SEQUENCES

THE 500 SERIES OF COMMAND MARK NUMBERS CONTAIN ONE OR MORE PREVIOUSLY DEFINED MARK NUMBER COMMANDS.

MARK NUMBER	CONTAINS MARK
500	328 IRA COMMON ELECTRONICS 1 OFF
	332 IRA COMMON ELECTRONICS 2 OFF
	228 IRA COMMON ELECTRONICS 1 ON
	205 IRA GYRO 1 ON
	227 IRA GYRO 3 ON
	244 IRA GYRO 5 ON

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501	409	GYRO 1 SELECT (RATE)
502	410	GYRO 1,3 SELECT (RATE)
503	411	GYRO 1,3,5 SELECT (RATE)
504	412	GYRO 2 SELECT (RATE)
505	413	GYRO 2,4 SELECT (RATE)
506	414	GYRO 2,4,6 SELECT (RATE)
507	415	GYRO 1 (HOLD)
508	416	GYRO 1,3 (HOLD)
509	417	GYRO 1,3,5 (HOLD)
510	418	GYRO 2 (HOLD)
511	419	GYRO 2,4 (HOLD)
512	420	GYRO 2,4,6 (HOLD)

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513	303	ENGINE/VALVE DRIVER 1 OFF (ALL JETS OFF)
	314	ENGINE/VALVE DRIVER 2 OFF (ALL JETS OFF)
514	421	CLOSE VALVES EV1 (ALL VALVES CLOSED)
	422	CLOSE VALVES EV2 (ALL VALVES CLOSED)

TLM TBITRATE(KBPS)	OBC BITRATE(KBPS)	MXR	SRATE
80 40 20 10 5 2.5	0 0 0 0 0 0	0=ALL TLM	0 1 2 3 4 5
40 20 10 5 2.5 1.25	40 20 10 5 2.5 1.25	1	0 1 2 3 4 5
20 10 5 2.5 1.25 -----	40 20 10 5 2.5 -----	2	0 1 2 3 4 5
10 5 2.5 1.25 -----	40 20 10 5 -----	3	0 1 2 3 4 5
5 2.5 1.25 -----	40 20 10 -- -- --	4	0 1 2 3 4 5
2.5 1.25 -----	40 20 -- -- -- --	5	0 1 2 3 4 5
1.25 -----	40 -- -- -- -- --	6	0 1 2 3 4 5

DEVICE	FMT	1A	FMT	1B	FMT	2A	FMT	2B
	IA1	IA2	IA1	IA2	IA1	IA2	IA1	IA2
FES#1 DATA		3			3	3		
FES#2 DATA		13			13	13		
PAS#1 DATA		7				7		
PAS#2 DATA		9				9		
OBC#1 DATA	0		0				0	
OBC#2 DATA	9		9				9	
OBC#1 MEM DUMP								1
OBC#2 MEM DUMP								10
CAM#1 VIDEO-LWP>				4				
CAM#2 VIDEO-LWR>				10				
CAM#3 VIDEO-SWP>AMC				6				
CAM#4 VIDEO-SWR>				12				
CAM#1 STATUS>				4				
CAM#2 STATUS>				10				
CAM#3 STATUS>DMC				6				
CAM#4 STATUS>				12				
DMJ RAD. MONITOR				3				
DMJ A/D CON. (RAMP)				5				