



Prototype Thermal-Vacuum STS Software Limits and Danger Limits	NO. ATM-719	REV. NO.
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The attached tables give the values of limits placed in STS software for the Prototype Thermal Vacuum Tests. These tables have been extracted from ATM-704 in order to form a more convenient reference for use in these tests. Refer to ATM-704 Appendix A for a complete listing.

Also included are danger limits for all parameters. A danger limit is defined as a value which if exceeded, shall cause mandatory actions to be taken to correct the out-of-tolerance condition in order to prevent damage to unit. The corrective actions to be taken are broadly outlined in ATM-721. The exact corrective action to be taken in any situation will be arrived at by test conductor, experimenter, PE and/or PI representative, subsystem PE, or systems engineering at time of out-of-tolerance condition and must take into account other anomalies in operation of unit or history of test.

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The intents of the STS out-of-tolerance print-outs is to provide a warning that corrective action may be required and that necessary planning of personnel notification shall commence.

TABLE T/V-1 - TAPE NUMBER 2335227
CENTRAL STATION HOUSEKEEPING THERMAL VACUUM - PROTOTYPE

Flight Systems 1 & 2

Frame	Parameter	Desig	STS LIMITS				DANGER LIMITS			
			Range Eng.	Units	Octal Min	Octal Max	Range Eng.	Units	Octal Min	Octal Max
1	Converter Input Voltage	AE-3	15.5	17.5V	271	323	15	18.6V	262	332
2	ADC Calibration 0.25V	AE-1	0.25V		14	16	.14	.37V	8	24
3	ADC Calibration 4.75V	AE-2	4.75V		360	364	4.60	4.90V	352	372
4	Thermal Plate #1	AT-3	-15 to 140°F		14	270	-30	160°F	7	326
5	Converter Input Current	AE-4	3.3a	4.5a	246	320	3a	5a	230	340
6	Hot Frame #1	AR-1			276	310	Not Operative		0	377
7	Cold Frame #1	AR-4			127	141	Not Operative		0	377
8	Shunt Reg #1 Current	AE-5	0.3a	min	0	265	0.05a	min	0	313
9	Receiver, 1 KHz Subcarrier Present	AB-1			0	377	NA		0	377
10	BLANK				0	2				
11	BLANK				0	2				
12	Power Distribution, Expts #1 and #2	AB-4			0	310				
13	Shunt Reg #2 Current	AE-6	0.3a	min	0	265	0.05	min	0	313
14	Power Distribution, Expts #3, #4, and #5	AB-5			0	336	NA		0	377
15	Bottom Structure #1	AT-10	-300 to 250°F		26	354	-310	260°F	22	360

Note A: This note applies to the redundant components in the Central Station, in which the temperature sensors are off if the unit is off. During the cold cycle, the operating channels should be monitored to check that no abnormally low temperature below the Danger Limit is experienced.

Note B: Limits quoted are for normal operation. During start-up of the IPU, it is known that the current will be below these values. Start-up values should be recorded, and testing continued.



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Flight Systems 1 & 2

Frame	Parameter	Desig	STS LIMITS				DANGER LIMITS			
			Range Eng.	Units	Octal Min	Octal Max	Range Eng.	Units	Octal Min	Octal Max
16A	Local Osc. Crystal A	AT-21	150°F max		0	346	-25	160°F	14	362
17A	Local Osc. Crystal B	AT-22	150°F max		0	346	-25	160°F	14	362
18A	Transmitter A Crystal	AT-23	150°F max		0	346	-25	160°F	14	362
19A	Transmitter A Heat Sink	AT-24	150°F max		0	346	-25	160°F	14	362
20	PCU Output Voltage #1 (29V)	AE-7	28	29V	310	330	27.5	30.5	304	334
21	Receiver, Prelimiting Level	AE-13			74	350	NA		0	377
22	Trans B, DC Current, Power Doubler	AE-18	180 mA max		0	262	200 mA max		0	313
23	L. P. Amp. Gain (X & Y)	AL-1			0	377	NA		0	377
24	Leveling Mode & Coarse Sensor Mode	AL-5			0	377				
25	BLANK				0	2				
26	#2 Cell Voltage	AX-5			0	377				
27	Sunshield #1	AT-1	-300	250°F	26	354	↓		↓	↓
28	Thermal Plate #2	AT-4	-15	140°F	14	270	-30	160°F	7	326
29	BLANK				0	2	NA		0	377
30	#2 Cell Temperature	AX-2			0	377	NA		0	377
31A	Transmitter B Crystal	AT-25	150°F max		0	346	-25	160°F	14	362
32A	Transmitter B Heat Sink	AT-26	150°F max		0	346	-25	160°F	14	362
33	Analog Data Processor, Base	AT-27	-15	140°F	14	270	-25	160°F	10	326
34	Analog Data Processor, Internal	AT-28	-10	145°F	16	300	-25	160°F	10	326
35	PCU Output Voltage #2 (15V)	AE-8	14.6 - 15.2V		313	335	14.2	15.8	303	345

TABLE T/V-1 (CONT.)

Flight Systems 1 & 2

Frame	Parameter	Desig	STS LIMITS				DANGER LIMITS			
			Range Eng.	Units	Octal Min	Octal Max	Range Eng.	Units	Octal Min	Octal Max
36	Receiver, Local Osc Level	AE-14			50	350	NA		0	377
37	Hot Frame #2	AR-2			276	310	Not Operative		0	377
38	L. O. Amp. Gain (Z)	AL-2			0	377	NA		0	377
39	Thermal Control Status	AL-6			0	377	NA		0	377
40	BLANK				0	2	NA		0	377
41	#3 Cell Voltage	AX-6			0	377	NA			
42	Sunshield #2	AT-2	-300	250°F	26	354	-310 to 260		22	360
43	Thermal Plate #3	AT-5	-15	140°F	14	270	-30 160°F		7	326
44	BLANK				0	2	NA		0	377
45	BLANK				0	2	NA		0	377
46	Digital Data Processor, Base	AT-29	-15	140°F	14	270	-25 160°F		10	326
47	Digital Data Processor, Internal	AT-30	-10	145°F	16	300	-25 160°F		10	326
48	Command Decoder, Base	AT-31	-15	140°F	14	270	-25 160°F		10	326
49	Command Decoder, Internal	AT-32	-10	145°F	16	300	-25 160°F		10	326
50	PCU Output Voltage #3 (12V)	AE-9	11.8	12.2V	307	317	11.0 13.0V		270	332
51	Trans. A, AGC Voltage	AE-15			0	263	NA		0	377
52	Hot Frame #3	AR-3			276	310	Not Operative			
53	Level Direction and Speed	AL-3			0	377	↓			
54	Calibration Status L. P. & S. P.	AL-7			0	377	↓			
55	BLANK				0	2	↓			

TABLE T/V-1 (CONT.)

Frame	Parameter	Desig	STS LIMITS				Flight Systems 1 & 2 DANGER LIMITS			
			Range	Units	Octal		Range	Units	Octal	
			Eng.		Min	Max	Eng.		Min	Max
56	#3 Cell Temperature	AX-3			0	377	NA		0	377
57	BLANK				0	2	NA		0	377
58	Thermal Plate #4	AT-6	-15	140°F	14	270	-30	160°F	7	326
59	Vertical Structure #1	AT-8	-300	250°F	26	354	-310	260°F	22	360
60	Inner Multilayer Insulation	AT-12	-10	145°F	214	304	-30	200°F	172	330
61	Command Demodulator VCO	AT-33	-15	140°F	14	270	-25	160°F	10	310
62	Power Distribution, Base	AT-34	-15	140°F	14	270	-25	160°F	10	310
63	Power Distribution, Internal	AT-35	5	160°F	26	324	-25	170°F	10	335
64	PCU, Power Osc #1	AT-36	5	160°F	26	324	-25	170°F	10	335
65	PCU, Output Voltage #4 (5V)	AE-10	4.8	5.2	310	340	4.6	5.4	274	354
66	Trans. B, AGC Voltage	AE-16			0	263	NA		0	377
67	Cold Frame #2	AR-5			127	141	Not Operative			
68	S. P. Am. Gain (Z)	AL-4			0	377	↓		↓	↓
69	Uncage Status	AL-8			0	377	↓		↓	↓
70	Low Energy Detector Count Rate	AI-1			0	377	↓		↓	↓
71	Thermal Plate #5	AT-7	-15	140°F	14	270	-30	160°F	7	326
72	Outer Multilayer Insulation	AT-13	-300	250°F	26	354	-310	260°F	22	360
73	BLANK				0	2	NA		0	377
74	BLANK				0	2	NA		0	377
75	BLANK				0	2	NA		0	377

TABLE T/V-1 (CONT.)

Frame	Parameter	Desig	STS LIMITS				Flight Systems 1 & 2 DANGER LIMITS			
			Range	Units	Octal		Range	Units	Octal	
			Eng.		Min	Max	Eng.		Min	Max
76	PCU, Power Osc #2	AT-37	5	160°F	26	324	-25	170°F	10	335
77	PCU, Regulator #1	AT-38	5	200°F	26	364	-25	210°F	10	370
78	PCU, Regulator #2	AT-39	5	200°F	26	364	-25	210°F	10	370
79	PCU Output Voltage #5 (-12V)	AE-11	-11.4	-12.2V	174	254			164	264
80	PCU Output Voltage #6 (-6V)	AE-12	-5.8	-6.2V	36	142			26	152
81	Trans. A, DC Current, Power Doubler	AE-17	180	ma max	0	267	200	mA max	0	325
82	Cold Frame #3	AR-6			127	141	Not Operative		0	377
83	#1 Cell Temperature	AX-1			0	377	NA		0	377
84	#1 Cell Voltage	AX-4			0	377	NA		0	377
85	High Energy Detector Count Rate	AI-2			0	377	NA		0	377
86	BLANK				0	2	NA		0	377
87	Vertical Structure #2	AT-9	-300	250°F	26	354	-310	260°F	22	360
88	Bottom Structure #3	AT-11	-300	250°F	26	354	-310	260°F	22	360
89	BLANK				0	2	NA		0	377
90	BLANK				0	2	NA		0	377



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Prototype Thermal Vacuum Tests
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TABLE A-2 Tape 2335230

LSM DATA THERMAL VACUUM TESTING - PROTOTYPE

Flight Systems #1 & #2

ALSEP Words	Parameter	Desig	STS Limits			Danger Limits		
			Range Eng. Units	Decimal Min	Decimal Max	Range Eng. Units	Decimal Min	Decimal Max
17, 49	X-Axis Field	DM-25	0 to <u>+5%</u> *	0	512	NA	0	512
19, 51	Y-Axis Field	DM-26	0 to <u>+5%</u> *	0	512	NA	0	511
21, 53	Z-Axis Field	DM-27	0 to <u>+5%</u> *	0	512	NA	0	511
* Print on Change Mode Operation During IST. See Procedure.								
5-1	Temp #1 (X-Sensor)	DM-1	-10 to 139°F	014	102	-22 to 149°F	010	104
5-2	Temp #2 (Y-Sensor)	DM-2	-10 to 139°F	014	102	-22 to 149°F	010	104
5-3	Temp #3 (Z-Sensor)	DM-3	-10 to 139°F	014	102	-22 to 149°F	010	104
5-4	Temp #4 Base	DM-4	-10 to 139°F	014	102	-22 to 149°F	010	104
5-5	Temp #5 Internal	DM-5	-10 to 139°F	014	102	-22 to 149°F	010	104
5-6	Level Sensor #1	DM-6	-6° to +6°	039	079	-12° to +12°	016	112
5-7	Level Sensor #2	DM-7	-6° to +6°	039	079	-12° to +12°	016	112
5-8	Supply Voltage	DM-8	5.82 to 6.18V	102	106	5.4 to 6.6V	095	118
5-9 to 5-16	Repeat of 5-1 to 5-8 with varying status bits							



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TABLE A-3 - TAPE 2335228

SIDE DATA WORDS 1 AND 2 THERMAL VACUUM TESTING - PROTOTYPE

Flight Systems 1 & 2

ALSEP Word	SIDE Word	Parameter	Desic	STS Limits		Danger Limits			
				Eng. Units	Decimal		Eng. Units	Decimal	
		Min.	Max.		Min.	Max.			
15-E	1	SIDE Frame No.	DI-1		000	127	NA	000	127
31-E	2	+5 Volts Analog	DI-2	4.85 to 5.15V	211	217		001	254
		CCGE	DI-3	10-Bit Data	000	999	NA	000	255
		Temp #1	DI-4	Not Operative	000	004	Not Operative	001	254
		Temp #2	DI-5	-30 to +70°C	32	186	-40 to +80°C	25	205
		Temp #3	DI-6	-30 to +70°C	32	186	-40 to +80°C	25	205
		4.5 KV	DI-7	3.72 to 5.45 KV	204	222	3.72 to 5.45 KV	204	222
		CCGE Range	DI-8		184	236	NA	000	254
		Temp #4	DI-9	-30 to +70°C	25	191	-40 to +80°C	12	215
		Temp #5	DI-10	Not Operative	000	004	Not Operative	000	254
		Ground Plane Voltage*	DI-11	-28 to +28V				001	254
		Solar Cell	DI-12		000	155		000	254
		+60 Volts	DI-13	58.2 to 61.8V	218	224		001	254
		+30 Volts	DI-14	29.1 to 30.9V	192	198		001	254
		+5 Volts Digital	DI-15	4.85 to 5.15V	211	217		001	254
		Ground	DI-16	0 to 0.02V	000	008		001	254
		-5 Volts	DI-17	-4.85 to -5.15	211	217		001	254
		-30 Volts	DI-18	-29.1 to -30.9V	192	198		001	254
		Temp #6	DI-19	-30 to +70°C	108	254	-40 to +80°C	96	254
		-3.5 KV	DI-20	2.9 to 4.25 KV	204	222	2.9 to 4.25 KV	204	222
		+1.0 Volt Cal	DI-21	0.97 to 1.03V	153	157		001	254
		+30 mV Cal	DI-22	28 to 32 mV	020	034		001	254
31-E	2	+A/D Ref. Voltage	DI-23	5.82 to 7.62 V	220	230		001	254

*Sub-Commuted.



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TABLE A-3 (CONT.) Tape 2335228

ALSEP Word	SIDE Word	Parameter	Desic	STS Limits		Danger Limits		
				Eng. Units	Decimal Min. Max.	Eng. Units	Decimal Min. Max.	
31-E	2	Dust Cover and Seal	DI-24		000	255 *	001	254
		-A/D Ref Voltage	DI-25	-5.82 to -1.62V	220	230	001	254
		-1.0 Volt Cal	DI-27	0.97 to 1.03V	153	157	001	254
		-12 Volt Cal	DI-28	-11.82 to -12.8V	244	248	001	254
		+12 Volt Cal	DF-28	11.82 to 12.18 V	244	248	001	254
		Pre-Reg. Duty Factor	DI-29		195	205	001	254
		-30 mV Cal	DI-30	-28 to -32 mV	020	034	001	254
31-E	2	One Time Comm. Reg.	DF-29		000	255*	001	254

*Change only.



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<u>Parameter</u>		<u>SIDE</u> <u>Word</u>	<u>SIDE</u> <u>Frames</u>	<u>STS</u> <u>Limits</u>	<u>Danger Limits</u>
DI 40 - DI 60	HECPA	3	0-119	See Table A-4 ATM-704	001 254
DI 11	Gr. Plane Volt	2		"	001 254
DI 72 - DI 99 DJ 01 - DJ 97	Vel Filter	7	0-119	"	001 254
DJ 98 - DJ 99 DF 00 - DF 04	LECPA	8	0-119	"	001 254
DI 61, DI 62	HE counts	4, 5	0-119	000 1,049,575	000 1,049,575
DF 5, DF 6	LE counts	9, 10	0-119	000 1,049,575	000 1,049,575



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TABLE A-6 Tape Number 2335229
SOLAR WIND SPECTROMETER LIMITS
ENGINEERING AND CALIBRATION DATA
THERMAL VACUUM - PROTOTYPE

SWS Word	Parameter	Design	Flag Bits	LSB	STS Limits			Danger Limits				
					Range Eng. Units	Octal Min.	Octal Max.	Range Eng. Units	Octal Min.	Octal Max.		
112	9mV ± 2%	DW-3	01	XXX0		10	20	NA	0	377		
113	90mV ± 2%	DW-4	01	XXX0		61	71	NA	0	377		
114	900mV ± 2%	DW-5	01	XXX0		214	224	NA	0	377		
115	3000mV ± 2%	DW-6	01	XXX0		303	313	NA	0	377		
116	9000mV ± 2%	DW-7	01	XXX0		367	377	NA	0	377		
117	9mV ± 2%	DW-8	01	XXX0		10	20	NA	0	377		
118	900mV ± 2%	DW-9	01	XXX0		215	225	NA	0	377		
119	9000mV ± 2%	DW-10	01	XXX0		367	377	NA	0	377		
112	Temp. Mod 100	DW-11	01	XXX1	-20	75°C	065	322	-25	100°C	036	334
113	Temp. Mod 200	DW-12	01	XXX1	-20	75°C	065	322	-25	100°C	036	334
114	Temp. Mod 300	DW-13	01	XXX1	-20	75°C	065	322	-25	100°C	036	334
115	Temp Cup Assy.	DW-14	01	XXX1	-90	100°C	036	352	-100	125°C	017	376
116	Sun Angle Sensor	DW-15	01	XXX1			103	113	NA		0	377
117	Programmer Voltage	DW-16	01	XXX1			328	347	NA		0	377
118	Step Gen. Voltage	DW-17	01	XXX1			210	230	NA		0	377
119	Modulation Monitor	DW-18	01	XXX1			245	255	NA		0	377

In LSB column, X signifies either 0 or 1.



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SWS Words	Designation	Flag	STS Limits Octal		Danger Limits Octal	
			Min	Max	Min	Max
0 to 95*	DY-1 to DY-96	00	1	377	NA	0 377
96 to 111*	D DZ-1 to DZ-16	00	1	377	NA	0 377
128 to 183*	DZ-17 to DZ-71	00	1	377	NA	0 377
184, 185	DW-1 & DW-2 Sequence Counter 0 to 2 ¹⁶ -1		0	177777	NA	0 177777
120 to 127**	DW-19 to DW-50	01	See ATM-704		NA	0 377
0, 8, ... 104***	DW-51 to DW-64	01	"	"	NA	0 377
128, 136, ... 176***	DW-65 to DW-71	01	"	"	NA	0 377
0, 8, ... 104***	DW-72 to DW-85	01	"	"	NA	0 377
128, 136, ... 176***	DW-86 to DW-92	01	"	"	NA	0 377

*Science matrix printout, identification of elements in matrix do not need to be specified since all have the same operating and danger limits. Section 5.5.2 of ATM-704 contains description of scientific format.

**ELECT Printout

***ACCAL or DCCAL

TABLE A-7

PROTOTYPE THERMAL VACUUM TESTING
TEMPERATURE MONITOR PROGRAM LIMITS

Expt.	N*	Symbol and Name	Range		STS Limit		Drift Limit	Range		Danger Limits	
			Eng.	Units	Octal Min	Octal Max		Eng.	Units	Octal Min	Octal Max
2335232											
SWS	1	DW-11 Temp. Mod 100	-20	75°C	065	322	14	-25	100°C	036	334
	2	DW-12 Temp. Mod 200	-20	75°C	065	322	14	-25	100°C	036	334
	3	DW-13 Temp. Mod 300	-20	75°C	065	322	14	-25	100°C	036	334
	4	DW-14 Temp. Cup Assy	-90	100°C	036	352	14	-100	125°C	017	376
	5	DW-15 Sun Angle Sensor			60	140	14	NA		0	377
	6	DW-16 Programmer Voltage			320	360	14	NA		0	377
	7	DW-17 Step Generator Voltage			200	300	14	NA		0	377
	8	DW-18 Modulation Monitor			165	265	14	NA		0	377
2335233											
LSM	1	DM-1 Temp. #1	-10 to	139°F	16	146	3	-22 to	149°F	14	150
	2	DM-2 Temp. #2	-10 to	139°F	16	146	3	-22 to	149°F	14	150
	3	DM-3 Temp. #3	-10 to	139°F	16	146	3	-22 to	149°F	14	150
	4	DM-4 Temp. #4	-10 to	139°F	16	146	3	-22 to	149°F	14	150
	5	DM-5 Temp. #5	-10 to	139°F	16	146	3	-22 to	149°F	14	150
PSE	1	DL-7 Sensor Unit Temp.	+100 to	+140°F	0	1776	3				

NOTE: N is the sequence number which identifies the channels on the STS printout.



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<u>Expt.</u>	<u>N*</u>	<u>Symbol and Name</u>	<u>Range</u>		<u>STS Limit</u>		<u>Drift</u>	<u>Range</u>		<u>Danger Limits</u>	
			<u>Eng.</u>	<u>Units</u>	<u>Min</u>	<u>Max</u>		<u>Eng.</u>	<u>Units</u>	<u>Min</u>	<u>Max</u>
		2335231									
SIDE	1	DI-4 Temp. #1	-30	70°C	Not	Operative		-40	80°C	0	377
	2	DI-5 Temp. #2	-30	70°C	41	272		-40	80°C	31	315
	3	DI-6 Temp. #3	-30	70°C	41	272		-40	80°C	31	315
	4	DI-9 Temp. #4	-30	70°C	31	277		-40	80°C	14	327
	5	DI-10 Temp. #5	-30	70°C	Non	Operative		-40	80°C	0	377
	6	DI-19 Temp. #6	-30	70°C	154	376		-40	80°C	140	376