Interoffice Correspondence
TRW Space & Electronics Group

trw

Subject:	Date:	From:
ISIM Caution and Redline Limits During ISIM & Observatory Level TV Testing	3/21/18 AXAF.97.323.056	J.A. Vogrin Joseph.vogrin@trw.com
To: Lee Harper	cc: Distribution	Location, Phone R9/1408, 310-81-30478

This IOC documents the agreements between MIT, SAO, Ball and TRW with respect to allowable temperatures and alarm and caution limits on the SIs, the SIM, and test equipment to be used during ISIM level TV testing at Ball and AXAF Observatory level testing at TRW. Also identified are the target temperatures to be used during functional testing at TRW. The definition of these terms with respect to the maximum and minimum allowable temperatures is shown graphically in Figure 1.

Minimum and maximum survival limits and operational limits are defined in Tables 1 through 5. Alarm, alert, and target temperatures are defined in Tables 6 through 10.

Flight telemetry locations and thermal design features for the HRC, ACIS, FLCA and RCTU are shown in the attached Figures 1 through 9.

For your information, during functional testing at TRW, the following ISIM heater configuration will apply:

-ACIS (SS, PSMC, and detector housing) and HRC survival heaters enabled but not operating because the temperature will be too high (except for possibly the HRC detector heater)

-SIM structure survival heaters enabled to protect against an under-temperature condition

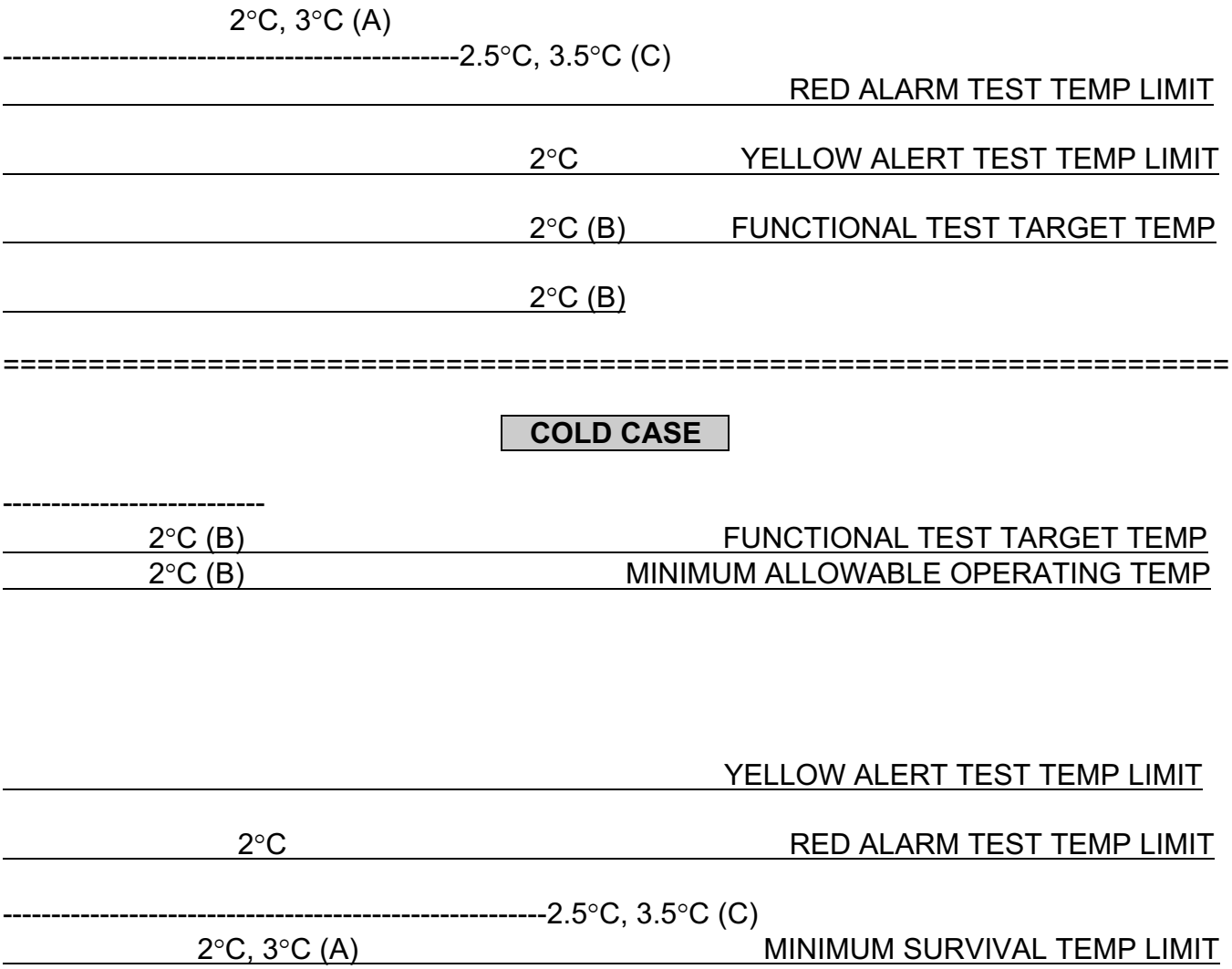
-FLCA and RCTU survival heaters enabled but not operating because the temperature will be too high

-ACIS, FLCA, RCTU trim heaters disabled.

-SIM flexure trim heaters and translation table trim heaters at the HRC and ACIS attachment locations enabled.

HOT CASE

MAXIMUM ALLOWABLE OPERATING TEMP



NOTES: (A) TEMPERATURE MEASUREMENT ERROR. 3°C IS FOR THE ACIS DETECTOR ASSEMBLY, PMSC AND SIM TURTLE SHELL THERMISTORS. REST OF THERMISTORS ARE 2°C.
(B) ±2°C CONTROL BAND AT FUNCTIONAL TEST TARGET TEMP
(C) 3.5°C IS FOR THE ACIS DETECTOR ASSEMBLY, PMSC AND SIM TURTLE SHELL THERMISTORS. REST OF THERMISTORS ARE 2.5°C.

FIGURE 1: ISIM TEMPERATURE LIMIT AND FUNCTIONAL TEST CONTROL BAND TEMPERATURE DEFINITION

TABLE 1: ACIS DETECTOR ASSEMBLY AND PSMC TEMPERATURE (°C) LIMITS

LOCATION	FLIGHT MNEMONIC	SURVIVAL MIN/MAX	OPERATING MIN/MAX
Cold Radiator A	1CRAT	-155/+40	-130/+25
Cold Radiator B	1CRBT	-155/+40	-130/+25
Detector Assy Camera Body A	1CBAT	-76/+40	-61/+25
Detector Assy Camera Body B	1CBBT	-76/+40	-61/+25
Detector Assy Collimator Top A	1DACTAT	-56/+40	-26/+25
Detector Assy Collimator Top A	1DACTBT	-56/+40	-26/+25
Open Actuator Housing Temp A	1OAHAT	-60/+40	-38/+25
Open Actuator Housing Temp B	1OAHBT	-60/+40	-38/+25
Warm Radiator Temp A	1WRAT	-107/+40	-90/+25
Warm Radiator Temp B	1WRBT	-107/+40	-90/+25
PSMC DEA Power Suppy Temp A	1PDEAAT	-40/+62	-25/+62 +70 (A)
PSMC DEA Power Suppy Temp B	1PDEABT	-40/+62	-25/+62 +70 (A)
PSMC Temp 1A	1PINIAT	-40/+40	-25/+35 +46 (Protoflt) (A)

Notes: (A) Temperature during ISIM TV test with 6 ACIS CCDs operating with HRC in the view position shall not exceed 46°C for 1PINIAT and 70°C for 1PDEAAT and 1PDEABT. For all other ISIM Observatory testing, temperature of 1PINIAT will be maintained below 35°C, and temperature of 1PDEAAT and 1PDEABT will be maintained below 62°C.

CONCUR: _____

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TABLE 2: ACIS DEA/DPA/SS TEMPERATURE (°C) LIMITS

LOCATION	FLIGHT MNEMONIC	SURVIVAL MIN/MAX	OPERATING MIN/MAX
DEA -Z Panel Temp (RT820)	1DEAMZT	-40/+43	-20/+38
DPA -Z Panel Temp (RT830)	1DPAMZT	-40/+43	-20/+43
SS -Y Panel Temp (RT811)	1SSMYT	-40/+43	-20/+43
DPA -Y Panel Temp (RT831)	DPAMYT	-40/+43	-20/+43
SS +Y Panel Temp (RT810)	1SSPYT	-40/+43	-20/+38

CONCUR: _____

ELLEN SEN, MIT

TABLE 3: HRC TEMPERATURE (°C) LIMITS

LOCATION	FLIGHT MNEMONIC	SURVIVAL MIN/MAX	OPERATING MIN/MAX
Detector Housing Temp 1	2DTSTATT	-15/+40	-15/+40
Detector Housing Temp 2	2DCENTRT	-15/+40	-15/+40
FEA Box Temperature	2FHTRMZT	-40/+40	-20/+40
PMT 1 Power Supply 1 Temp	2PMT1T	-40/+50	-40/+50
PMT 2 Power Supply 1 Temp	2PMT2T	-40/+50	-40/+50
CEA Box Temperature	2CHTRPZT	-40/+40	-20/+40
UV Lightshield Top Next to Snout	2UVLSPXT	-50/+50	-50/+50
Conduit -X Face	2CONDMXT	-40/+50	-40/+50
FEA, +Y Radiator at Approximate Center	2FRADPYT	-40/+40	-20/+40
CEA HVPS BRACKET	2CEAHVPT	-40/+50	-20/+50

CONCUR: _____

DAVE BOYD, SAO

TABLE 4: SIM FLIGHT TELEMETRY TEMPERATURE (°C) LIMITS (PAGE 1 OF 2)

LOCATION	SIM ID #	FLIGHT MNEMONIC	SURVIVAL MIN/MAX	OPERATING MIN/MAX
SIM FA Drive Motor A, Abort Htr FA6	FM33	3FAMTRAT	-40/+55	-30/+40
SIM FA Flexure A	FM34	3FAFLAAT	-40/+95	-40/+95
SIM FA Flexure B	FM35	3FAFLBAT	-40/+95	-40/+95
SIM FA Flexure C	FM36	3FAFLCAT	-40/+95	-40/+95
SIM SEA A Box	FM37	3FASEAAT	-42/+42	-21/+38
SIM SEA A Power Supply	FM84	3FAPSAT	-42/+70	-21/+70
SIM FA Struct at Rail -Z, Abort Htr FA6	FM38	3FARALAT	-40/+95	-40/+95
SIM FA Structure at Bearing A (Temp A)	FM39	3FABRAAT	-40/+95	-40/+95
SIM FA Structure at Bearing C (Temp A)	FM40	3FABRCAT	-40/+95	-40/+95
SIM Translation Drive Motor A	FM72	3TRMTRAT	-40/+55	-30/+40
+X Structure @ -Y-Z End, Abort Htr FA6	FM41	3FAMYZAT	-40/+95	-40/+95
+X Structure @ +Y+Z End, Abort Htr FA6	FM42	3FAPYZAT	-40/+95	-40/+95
Focus Drive Motor B Temp, Abort Htr FA6	FM43	3FAMTRBT	-40/+55	-30/+40
SIM FA Flexure A (Temp B)	FM44	3FAFLABT	-40/+95	-40/+95
SIM FA Flexure B (Temp B)	FM45	3FAFLBBT	-40/+95	-40/+95
SIM FA Flexure C (Temp B)	FM46	3FAFLCBT	-40/+95	-40/+95
SIM SEA-B Box	FM47	3FASEABT	-42/+42	-21/+38
SIM SEA-B Power Supply	FM85	3FAPSBT	-42/+42	-21/+70
SIM Translation Drive Motor B	FM73	3TRMTRBT	-40/+55	-30/+40
RCTU Baseplate (+X), Abort Htr TSC2	FM57	3RCTUBPT	-45/+60	-20/+45

CONCUR: _____

DAVE DOOLEY, BALL

TABLE 4: SIM FLIGHT TELEMETRY TEMPERATURE (°C) LIMITS (PAGE 2 OF 2)

LOCATION	SIM ID #	FLIGHT MNEMONIC	SURVIVAL MIN/MAX	OPERATING MIN/MAX
FLCA Baseplate (+X)	FM58	3FLCABPT	-40/+60	-20/+35
BTU Baseplate (+X), Abort Htr TSC2	FM59	3BTU_BPT	-65/+65	-55 /+55
+Y TS, (TMM Node 2457) Near HRC FEA	FM61	3TSPYFET	-100/+95	-100/+95
-Y TS, (TMM Node 2401) Near ACIS DPA	FM64	3TSMYDPT	-100/+95	-100/+95
+Z TS, (TMM Node 2530) Near ACIS SS	FM66	3TSPZSPT	-100/+95	-100/+95
+Z TS, (TMM Node 2532) Near ACIS DEA	FM67	3TSPZDET	-100/+95	-100/+95
-X TS, (TMM Node 2002) Near ACIS SS	FM68	3TSMXSPT	-100/+95	-100/+95
-X TS, (TMM Node 2010) Near HRC CEA	FM70	3TSMXCET	-100/+95	-100/+95
TT, on Top Hat Interior, Abort Heater TSC7 (TMM Node 2805)	FM71	3TTHATT	-103/+95	-103/+95
TT, at HRC Bipod Attach #1, Abort Htr TSC2 (TMM N32133)	FM74	3TTHRC1T	-57/+95	-57/+95
TT, at HRC Bipod Attach #2, Abort Htr TSC2 (TMM N32137)	FM75	3TTHRC2T	-57/+95	-57/+95
TT, at HRC Bipod Attach #3 & ACIS #4 (TMM N32187)	FM76	3TTHRC3T	-57/+95	-57/+95
TT, at ACIS Attach #2, Abort Htr TSC1 (TMM N32210)	FM77	3TTACS2T	-57/+95	-57/+95
TT, at ACIS Attach #3, Abort Htr TSC1 (TMM N32267)	FM78	3TTACS3T	-57/+95	-57/+95
TT, at ACIS Attach #1, Abort Htr TSC1 (TMM N32204)	FM79	3TTACS1T	-57/+95	-57/+95
TT, at Bearing B, Abort Htr TSC4 (TMM N33131)	FM80	3TTBRGBT	-57/+95	-57/+95
TT, at Vent Valve, Abort Htr TSC7 (TMM N32233)	FM81	3TTVALVT	-57/+95	-57/+95
TT, at Rail A, Abort Htr TSC3 (TMM N33301)	FM82	3TTRALAT	-70/+95	-70/+95
TT, at Rail C, Abort Htr TSC5 (TMM N33191)	FM83	3TTRALCT	-57/+95	-57/+95

CONCUR: _____

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TABLE 5: SIM “TEST ONLY” THERMISTOR TEMPERATURE (°C) LIMITS (PAGE 1 OF 3)

LOCATION	SIM ID #	TEST MNEMONIC	SURVIVAL MIN/MAX	OPERATING MIN/MAX
+Y TS, ∠ OF TMM NODE 2452 NEAR HRC FEA	TM33	TS+YHRCT	-100/+95	-100/+95
+Y TS, ∠ OF TMM NODE 2454 NEAR ACIS PSMC	TM34	TS+YPMST	-100/+95	-100/+95
-Z TS, ∠ OF TMM NODE 2055 NEAR BTU	TM35	TS-ZBTUT	-100/+95	-100/+95
-Z TS, ∠ OF TMM NODE 2057 NEAR RCTU	TM36	TS-ZRCTT	-100/+95	-100/+95
-Y TS, ∠ OF TMM NODE 2406 NEAR HRC CEA	TM37	TS-YHRCT	-100/+95	-100/+95
-Y TS, ∠ OF TMM NODE 2408 NEAR BTU	TM38	TS-YBTUT	-100/+95	-100/+95
-X TS, ∠ OF TMM NODE 2005 NEAR ACIS DPA	TM41	TS-XDPAT	-100/+95	-100/+95
-X TS, ∠ OF TMM NODE 2013 NEAR BTU	TM42	TS-XBTUT	-100/+95	-100/+95
-X TS, ∠ OF TMM NODE 2004 NEAR ACIS DEA	TM43	TS-XDEAT	-100/+95	-100/+95
-X TS, ∠ OF TMM NODE 2012 NEAR HRC FEA	TM44	TS-XFEAT	-100/+95	-100/+95
-X TT, ∠ OF TMM NODE 32101	TM45	TTN2171T	-57/+95	-57/+95
-X TT, ∠ OF TMM NODE 32109	TM47	TTN2168T	-57/+95	-57/+95
-X TT, ∠ OF TMM NODE 32141 & 32151	TM50	TTN2141T	-57/+95	-57/+95
-X TT, ∠ OF TMM NODE 32169 & 32170	TM51	TTN2152T	-57/+95	-57/+95
-X TT, ∠ OF TMM NODE 32221	TM52	TTN2111T	-57/+95	-57/+95
-X TT, ∠ OF TMM NODE 32283	TM53	TTN2122T	-57/+95	-57/+95
TT, SIDEWALL EXT., ∠ OF TMM NODE 34311	TM57	TTN2286T	-100/+95	-100/+95
TT, SIDEWALL EXT., ∠ OF TMM NODE 34320	TM58	TTN2288T	-100/+95	-100/+95
TT, SIDEWALL EXT., ∠ OF TMM NODE 34333	TM59	TT22292T	-100/+95	-100/+95
+X TT, AT EDGE OF TT BUT AS CLOSE TO ∠ OF TMM NODE 33128 AS POSSIBLE	TM60	TTN2375T	-57/+95	-57/+95

CONCUR: _____

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TABLE 5: SIM “TEST ONLY” THERMISTOR TEMPERATURE (°C) LIMITS (PAGE 2 OF 3)

LOCATION	SIM ID #	TEST MNEMONIC	SURVIVAL MIN/MAX	OPERATING MIN/MAX
+X TT, AT EDGE OF TT BUT CLOSE TO ⊄ OF TMM NODE 33122	TM61	TTN2371T	-57/+95	-57/+95
+X TT, AT EDGE OF TT BUT CLOSE TO ⊄ OF TMM NODE 33233 & 33253	TM63	TTN2322T	-57/+95	-57/+95
+X TT, AT EDGE OF TT BUT CLOSE TO ⊄ OF TMM NODE 33222	TM64	TTN2311T	-57/+95	-57/+95
-X TT, TOP HAT EXT., ⊄ OF TMM NODE 2801	TM67	TTN2801T	-103/+95	-103/+95
TT, AT HRC BIPOD ATTACHMENT #1A, -Y-Z FOOT (TTM N32134)	TM68	TTHRC1AT	-57/+95	-57/+95
TT, AT HRC BIPOD ATTACHMENT #1B, -Y+Z FOOT (TTM N32144)	TM69	TTHRC1BT	-57/+95	-57/+95
TT, AT HRC BIPOD ATTACHMENT #2A, +Y-Z FOOT (TTM N32137)	TM70	TTHRC2AT	-57/+95	-57/+95
TT, AT HRC BIPOD ATTACHMENT #2B, +Y+Z FOOT (TTM N 32147)	TM71	TTHRC2BT	-57/+95	-57/+95
TT, AT HRC BIPOD ATTACHMENT #3A, -Z+Y FOOT (TTM NODES 32188 & 32189)	TM72	TTHRC3AT	-57/+95	-57/+95
TT, AT HRC BIPOD ATTACHMENT #3B, -Z-Y FOOT (TTM N32185 & 32206)	TM73	TTHRC3BT	-57/+95	-57/+95
TT, AT ACIS COLLIMATOR ATTACHMENT #1 (TMM N32184, N32204)	TM74	TTACIS1T	-57/+95	-57/+95
TT, AT ACIS COLLIMATOR ATTACHMENT #2 (TMM N32190, N32210)	TM75	TTACIS2T	-57/+95	-57/+95
TT, AT ACIS COLLIMATOR ATTACHMENT #3 (TMM N32266)	TM76	TTACIS3T	-57/+95	-57/+95
+Y TS, ⊄ OF TMM NODE 2455, NEAR ACIS DEA	TM113	TS+YDEAT	-100/+95	-100/+95
-Z TS, ⊄ OF TMM NODE 2054, NEAR ACIS PSMC	TM114	TS-ZPSMT	-100/+95	-100/+95
-Z TS, ⊄ OF TMM NODE 2052, NEAR RCTU	TM115	TS-ZRCUT	-100/+95	-100/+95
-Y TS, ⊄ OF TMM NODE 2403, NEAR HRC CEA	TM116	TS-YCEAT	-100/+95	-100/+95
-X TS, ⊄ OF TMM NODE 2007, NEAR HRC DETECTOR	TM117	TS-XHRCT	-100/+95	-100/+95
-X TS, ⊄ OF TMM NODE 2015, NEAR ACIS PSMC	TM118	TS-XPSMT	-100/+95	-100/+95

CONCUR: _____

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TABLE 5: SIM “TEST ONLY” THERMISTOR TEMPERATURE (°C) LIMITS (PAGE 3 OF 3)

LOCATION	SIM ID #	TEST MNEMONIC	MIN/MAX
SOLAR SIMULATOR, ZONE 1	TM49, TM54, TM55, TM100	SOLSM1AT, SOLSM1BT, SOLSMICT, SOLSMIDT	NA/51
SOLAR SIMULATOR, ZONE 2	TM101 THRU TM104	SOLSM2AT, SOLSM2BT, SOLSM2CT, SOLSM2DT	NA/51
SOLAR SIMULATOR, ZONE 3	TM105 THRU TM108	SOLSM3AT, SOLSM3BT, SOLSM3CT, SOLSM3DT	NA/51
OBA SIMULATOR 2, CENTER LEFT	TM46	OBASIM1T	-30/51
OBA SIMULATOR 2, CENTER RIGHT	TM48	OBASIM2T	-30/51
CHAMBER SUPPORT STRUCTURE LEG	TM109	FXTURE1	NA/NA
CHAMBER SUPPORT STRUCTURE LEG	TM110	FXTURE2	NA/NA
WIRE BUNDLE GUARD HEATER	TM111	GRD1	-130/51
WIRE BUNDLE GUARD HEATER	TM112	GRD2	-130/51

CONCUR: _____

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TABLE 6: ACIS DETECTOR ASSEMBLY AND PSMC ALARM, ALERT AND TARGET TEMPERATURE (°C) LIMITS

Subsystem/Location **ACIS**	SIM ID #	Thermistor Mnemonic	TV Test Temp Limits					
			Mini mum		Target Temp		Maxi mum	
			Alarm	Alert (A)	Minimum	Maximum	Alert (A)	Alarm
Cold Radiator A	FM05	1CRAT	-151.5	-149.5	NA (C)	NA (C)	34.5	36.5
Cold Radiator B	FM06	1CRBT	-151.5	-149.5	NA (C)	NA (C)	34.5	36.5
Detector Assy Camera Body A	FM07	1CBAT	-75.5 (D)	-75 (D)	NA (E)	NA (E)	34.5	36.5
Detector Assy Camera Body B	FM08	1CBBT	-75.5 (D)	-75 (D)	NA (E)	NA (E)	34.5	36.5
Detector Assy Collimator Top A	FM09	1DACTAT	-52.5	-50.5	NA (C)	NA (C)	34.5	36.5
Detector Assy Collimator Top A	FM10	1DACTBT	-52.5	-50.5	NA (C)	NA (C)	34.5	36.5
Open Actuator Housing Temp A	FM15	1OAHAT	-56.5	-54.5	NA (C)	NA (C)	34.5	36.5
Open Actuator Housing Temp B	FM16	1OAHBT	-56.5	-54.5	NA (C)	NA (C)	34.5	36.5
Warm Radiator Temp A	FM17	1WRAT	-103.5	-101.5	NA (C)	NA (C)	34.5	36.5
Warm Radiator Temp B	FM18	1WRBT	-103.5	-101.5	NA (C)	NA (C)	34.5	36.5
PSMC DEA Power Suppy Temp A	FM19	1PDEAAT	-36.5	-34.5	NA (C)	NA (C)	56.5	58.5
PSMC DEA Power Suppy Temp B	FM20	1PDEABT	-36.5	-34.5	NA (C)	NA (C)	56.5	58.5
PSMC Temp 1A	FM21	1PINIAT	-36.5	-34.5	-18±2	27.5±2	29.5 (B)	31.5 (B)

Notes: (A) Maximum and minimum alert limits may be exceeded with caution during thermal balance testing at the ISIM and Observatory level at the discretion of thermal engineering to facilitate temperature stabilization provided red limits are not exceeded except as noted below for PSMC.

(B) It is acceptable for the PSMC to exceed the noted maximum alert limit during ISIM TV test with 6 ACIS CCDs operating with HRC in the view position provided the maximum protoflight limit of 46°C (as corrected for thermistor accuracy) is not exceeded.

(C) No target temperatures for these items. Temperatures will be maintained within alert limits during functional testing.

(D) No allowance for thermistor accuracy is included for this item as the survival heater setpoint (~ -71°C for primary and ~ -74°C for redundant) is too close to the minimum allowable temperature of -76°C. Survival heater will be controlling for only as long as it takes to verify proper operation. Rest of time, unit will be controlled by the primary survival heater or by the ACIS operational heater at ~ -60°C.

(E) No target temperature for this item as this item cannot be controlled by environmental heat sources. During all ACIS functional testing the detector housing will be maintained at ~ -60°C by ACIS operational heaters.

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NEIL TICE (LMA) ELLEN SEN (MIT)

TABLE 7:ACIS DEA, DPA, AND SS ALARM, ALERT, AND TARGET TEMPERATURE (°C) LIMITS

Subsystem/Location **ACIS (continued)**	SIM ID #	Thermistor Mnemonic	TV Test Temp Limits					
			Mini mum		Target Temp		Maxi mum	
			Alarm	Alert (A)	Minimum	Maximum	Alert (A)	Alarm
DEA -Z Panel Temp (RT820)	FM11	1DEAMZT	-37.5	-35.5	-18±2	31.5±2	33.5	35.5
DPA -Z Panel Temp (RT830)	FM13	1DPAMZT	-37.5	-35.5	-18±2	36.5±2	38.5	40.5
SS -Y Panel Temp (RT811)	FM22	1SSMYT	-37.5	-35.5	-18±2	36.5±2	38.5	40.5
DPA -Y Panel Temp (RT831)	FM14	DPAMYT	-37.5	-35.5	-18±2	36.5±2	38.5	40.5
SS +Y Panel Temp (RT810)	FM12	1SSPYT	-37.5	-35.5	-18±2	31.5±2	33.5	35.5

Notes: (A) Maximum and minimum alert limits may be exceeded with caution during thermal balance testing at the ISIM and Observatory level at the discretion of thermal engineering to facilitate temperature stabilization provided red limits are not exceeded.

CONCUR: _____

ELLEN SEN, MIT

TABLE 8: HRC ALARM, ALERT, AND TARGET TEMPERATURE (°C) LIMITS

Subsystem/Location **HRC**	SIM ID #	Thermistor Mnemonic	TV Test Temp Limits					
			Mini mum		Target Temp		Maxi mum	
			Alarm	Alert (A)	Minimum	Maximum	Alert (A)	Alarm
Detector Housing Temp 1	FM24	2DTSTATT	-12.5	-10.5	NA (B)	NA (B)	35.5	37.5
Detector Housing Temp 2	FM25	2DCENTRT	-12.5	-10.5	NA (B)	NA (B)	35.5	37.5
FEA Box Temperature	FM26	2FHTRMZT	-37.5	-35.5	-18±2	33.5±2	35.5	37.5
Photo-multiplier Tube 1 Temp	FM27	2PMT1T	-37.5	-35.5	NA (B)	NA (B)	45.5	47.5
Photo-multiplier Tube 2 Temp	FM28	2PMT2T	-37.5	-35.5	NA (B)	NA (B)	45.5	47.5
CEA Box Temperature	FM23	2CHTRPZT	-37.5	-35.5	-18±2	33.5±2	35.5	37.5
UV Lightshield Top Next to Snout	FM29	2UVLSPXT	-47.5	-45.5	NA (B)	NA (B)	45.5	47.5
Conduit -X Face	FM30	2CONDMX	-37.5	-35.5	NA (B)	NA (B)	45.5	47.5
FEA Radiator at Approx. Center	FM31	2FRADPYT	-37.5	-35.5	-18±2	33.5±2	45.5	47.5
CEA HVPS Bracket	FM32	2CEAHVPT	-37.5	-35.5	NA	NA	45.5	47.5

Notes: (A) Maximum and minimum alert limits may be exceeded with caution during thermal balance testing at the ISIM and Observatory level at the discretion of thermal engineering to facilitate temperature stabilization provided alarm limits are not exceeded.

(B) No target temperatures for these items. Temperatures will be maintained within alert limits during functional testing.

CONCUR: _____

Dave Boyd, SAO

TABLE 9: SIM FLIGHT TELEMETRY ALARM, ALERT, AND TARGET TEMPERATURE (°C) LIMITS (PAGE 1 0F 2)

Subsystem/Location SIM	SIM ID #	Thermistor Mnemonic	TV Test Temp Limits					
			Mini mum		Target Temp		Maxi mum	
			Alarm	Alert (A)	Minimum	Maximum	Alert (A)	Alarm
SIM FA Drive Motor A, Abort Htr	FM33	3FAMTRAT	-37.5	-35.5	NA (B)	NA (B)	35.5	37.5
SIM FA Flexure A	FM34	3FAFLAAT	-37.5	-35.5	~+10 (C)	~+10 (C)	90.5	92.5
SIM FA Flexure B	FM35	3FAFLBAT	-37.5	-35.5	~+10 (C)	~+10 (C)	90.5	92.5
SIM FA Flexure C	FM36	3FAFLCAT	-37.5	-35.5	~+10 (C)	~+10 (C)	90.5	92.5
SIM SEA A Box	FM37	3FASEAA	-39.5	-37.5	NA (B)	NA (B)	33.5	35.5
SIM SEA A Power Supply	FM84	3FAPSAT	-39.5	-37.5	NA (B)	NA (B)	65.5	67.5
SIM FA Struct at Rail -Z, Abort Htr FA6	FM38	3FARALA	-37.5	-35.5	NA (B)	NA (B)	90.5	92.5
SIM FA Struct at Bearing A (Temp A)	FM39	3FABRAAT	-37.5	-35.5	NA (B)	NA (B)	90.5	92.5
SIM FA Struct at Bearing C (Temp A)	FM40	3FABRCAT	-37.5	-35.5	NA (B)	NA (B)	90.5	92.5
SIM Translation Drive Motor A	FM72	3TRMTRAT	-37.5	-35.5	NA (B)	NA (B)	35.5	37.5
+X Struct @ -Y-Z End, Abort Htr	FM41	3FAMYZA	-37.5	-35.5	NA (B)	NA (B)	90.5	92.5
+X Struct @ +Y+Z End, Abt Htr FA6	FM42	3FAPYZAT	-37.5	-35.5	NA (B)	NA (B)	90.5	92.5
FA Drive Mtr B Temp, Abtt Htr FA6	FM43	7FAMTRAT	-37.5	-35.5	NA (B)	NA (B)	35.5	37.5
SIM FA Flexure A (Temp B)	FM44	7FAFLAAT	-37.5	-35.5	~+10 (C)	~+10 (C)	90.5	92.5
SIM FA Flexure B (Temp B)	FM45	7FAFLBAT	-37.5	-35.5	~+10 (C)	~+10 (C)	90.5	92.5
SIM FA Flexure C (Temp B)	FM46	7FAFLCAT	-37.5	-35.5	~+10 (C)	~+10 (C)	90.5	92.5
SIM SEA-B Box	FM47	7FASEAA	-39.5	-37.5	NA (B)	NA (B)	33.5	35.5
SIM SEA-B Power Supply	FM85	7FAPSAT	-39.5	-37.5	NA (B)	NA (B)	65.5	67.5
SIM Translation Drive Motor B	FM73	7TRMTRAT	-37.5	-35.5	NA (B)	NA (B)	35.5	37.5
RCTU Baseplate (+X), Abort Htr TSC2	FM57	3RCTUBPT	-42.5	-40.5	NA (B)	NA (B)	40.5	42.5

Notes: (A) Maximum and minimum alert limits may be exceeded with caution during thermal balance testing at the ISIM and Observatory level at the discretion of thermal engineering to facilitate temperature stabilization provided red limits are not exceeded.

(B) No target temperatures for these items. Temperatures will be maintained within alert limits during functional testing.

(C) Temperature will be maintained by operational (trim) heaters.

CONCUR: _____

Dave Dooley, Ball

TABLE 9: SIM FLIGHT TELEMETRY ALARM, ALERT, AND TARGET TEMPERATURE (°C) LIMITS (PAGE 2 0F 2)

Subsystem/Location SIM (continued)	SIM ID #	Thermistor Mnemonic	TV Test Temp Limits					
			Mini mum		Target Temp		Maxi mum	
			Alarm	Alert (A)	Minimum	Maximum	Alert (A)	Alarm
FLCA Baseplate (+X)	FM58	3FLCABPT	-37.5	-35.5	-18±2	28.5±2	30.5 (B)	32.5 (B)
BTU Baseplate (+X), Abort Htr TSC2	FM59	3BTU_BPT	-62.5	-60.5	-53±2	48.5±2	50.5	52.5
+Y TS, (TMM Node 2457) Near HRC FEA	FM61	3TSPYFET	-96.5	-94.5	NA (B)	NA (B)	89.5	91.5
-Y TS, (TMM Node 2401) Near ACIS DPA	FM64	3TSMYDPT	-96.5	-94.5	NA (B)	NA (B)	89.5	91.5
+Z TS, (TMM Node 2530) Near ACIS SS	FM66	3TSPZSPT	-96.5	-94.5	NA (B)	NA (B)	89.5	91.5
+Z TS, (TMM Node 2532) Near ACIS DEA	FM67	3TSPZDET	-96.5	-94.5	NA (B)	NA (B)	89.5	91.5
-X TS, (TMM Node 2002) Near ACIS SS	FM68	3TSMXSPT	-96.5	-94.5	NA (B)	NA (B)	89.5	91.5
-X TS, (TMM Node 2010) Near HRC CEA	FM70	3TSMXCET	-96.5	-94.5	NA (B)	NA (B)	89.5	91.5
TT, on Top Hat Interior, Abort Heater TSC7	FM71	3TTHATT	-96.5	-94.5	NA (B)	NA (B)	89.5	91.5
TT, at HRC Bipod Attach #1, Abort Htr TSC2	FM74	3TTHRC1T	-54.5	-52.5	NA (B)	NA (B)	90.5	92.5
TT, at HRC Bipod Attach #2, Abort Htr TSC2	FM75	3TTHRC2T	-54.5	-52.5	NA (B)	NA (B)	90.5	92.5
TT, at HRC Bipod Attach #3 & ACIS #4	FM76	3TTHRC3T	-54.5	-52.5	NA (B)	NA (B)	90.5	92.5
TT, at ACIS Attach #2, Abort Htr TSC1	FM77	3TTACS2T	-54.5	-52.5	NA (B)	NA (B)	90.5	92.5
TT, at ACIS Attach #3, Abort Htr TSC1	FM78	3TTACS3T	-54.5	-52.5	NA (B)	NA (B)	90.5	92.5
TT, at ACIS Attach #1, Abort Htr TSC1	FM79	3TTACS1T	-54.5	-52.5	NA (B)	NA (B)	90.5	92.5
TT, at Bearing B, Abort Htr TSC4	FM80	3TTBRGBT	-54.5	-52.5	NA (B)	NA (B)	90.5	92.5
TT, at Vent Valve, Abort Htr TSC7	FM81	3TTVALVT	-54.5	-52.5	NA (B)	NA (B)	90.5	92.5
TT, at Rail A, Abort Htr TSC3	FM82	3TTRALAT	-67.5	-65.5	NA (B)	NA (B)	90.5	92.5
TT, at Rail C, Abort Htr TSC5	FM83	3TTRALC	-54.5	-52.5	NA (B)	NA (B)	90.5	92.5

Notes: (A) Maximum and minimum alert limits may be exceeded with caution during thermal balance testing at the ISIM and Observatory level at the discretion of thermal engineering to facilitate temperature stabilization provided red limits are not exceeded.

(B) No target temperatures for these items. Temperatures will be maintained within alert limits during functional testing.

CONCUR: _____

Dave Dooley, Ball

TABLE 10: SIM TEST TELEMETRY ALARM, ALERT, AND TARGET TEMPERATURE (°C) LIMITS (PAGE 1 0F 3)

Subsystem/Location SIM	SIM ID #	Thermistor Mnemonic	TV Test Temp Limits					
			Mini mum		Target Temp		Maxi mum	
			Alarm	Alert (A)	Minimum	Maximum	Alert (A)	Alarm
+Y TS, ∝ OF TMM NODE 2452 NEAR HRC FEA	TM33	TS+YHRCT	-97.5	-95.5	NA (B)	NA (B)	90.5	92.5
+Y TS, ∝ OF TMM NODE 2454 NEAR ACIS PSMC	TM34	TS+YPMST	-97.5	-95.5	NA (B)	NA (B)	90.5	92.5
-Z TS, ∝ OF TMM NODE 2055 NEAR BTU	TM35	TS-ZBTUT	-97.5	-95.5	NA (B)	NA (B)	90.5	92.5
-Z TS, ∝ OF TMM NODE 2057 NEAR RCTU	TM36	TS-ZRCTT	-97.5	-95.5	NA (B)	NA (B)	90.5	92.5
-Y TS, ∝ OF TMM NODE 2406 NEAR HRC CEA	TM37	TS-YHRCT	-97.5	-95.5	NA (B)	NA (B)	90.5	92.5
-Y TS, ∝ OF TMM NODE 2408 NEAR BTU	TM38	TS-YBTUT	-97.5	-95.5	NA (B)	NA (B)	90.5	92.5
-X TS, ∝ OF TMM NODE 2005 NEAR ACIS DPA	TM41	TS-XDPAT	-97.5	-95.5	NA (B)	NA (B)	90.5	92.5
-X TS, ∝ OF TMM NODE 2013 NEAR BTU	TM42	TS-XBTUT	-97.5	-95.5	NA (B)	NA (B)	90.5	92.5
-X TS, ∝ OF TMM NODE 2004 NEAR ACIS DEA	TM43	TS-XDEAT	-97.5	-95.5	NA (B)	NA (B)	90.5	92.5
-X TS, ∝ OF TMM NODE 2012 NEAR HRC FEA	TM44	TS-XFEAT	-97.5	-95.5	NA (B)	NA (B)	90.5	92.5
-X TT, ∝ OF TMM NODE 32101	TM45	TTN2171T	-54.5	-52.5	NA (B)	NA (B)	90.5	92.5
-X TT, ∝ OF TMM NODE 32109	TM47	TTN2168T	-54.5	-52.5	NA (B)	NA (B)	90.5	92.5
-X TT, ∝ OF TMM N32141, N32151	TM50	TTN2141T	-54.5	-52.5	NA (B)	NA (B)	90.5	92.5
-X TT, ∝ OF TMM N32169, N32170	TM51	TTN2152T	-54.5	-52.5	NA (B)	NA (B)	90.5	92.5
-X TT, ∝ OF TMM N32221	TM52	TTN2111T	-54.5	-52.5	NA (B)	NA (B)	90.5	92.5
-X TT, ∝ OF TMM NODE 32283	TM53	TTN2122T	-54.5	-52.5	NA (B)	NA (B)	90.5	92.5
TT, SIDEWALL EXT., ∝ OF TMM NODE 34311	TM57	TTN2286T	-97.5	-95.5	NA (B)	NA (B)	90.5	92.5
TT, SIDEWALL EXT., ∝ OF TMM NODE 34320	TM58	TTN2288T	-97.5	-95.5	NA (B)	NA (B)	90.5	92.5
TT, SIDEWALL EXT., ∝ OF TMM NODE 34333	TM59	TT22292T	-97.5	-95.5	NA (B)	NA (B)	90.5	92.5
+X TT, AT EDGE OF TT BUT AS CLOSE TO ∝ OF TMM NODE 33128 AS POSSIBLE	TM60	TTN2375T	-54.5	-52.5	NA (B)	NA (B)	90.5	92.5

Notes: (A) Maximum and minimum alert limits may be exceeded with caution during thermal balance testing at the stabilization provided red limits are not exceeded.

(B) No target temperatures for these items. Temperatures will be maintained within alert limits during functional testing.

(C) Temperature will be maintained by operational (trim) heaters.

CONCUR: _____

Dave Dooley, Ball

TABLE 10: SIM TEST TELEMETRY ALARM, ALERT, AND TARGET TEMPERATURE (°C) LIMITS (PAGE 2 0F 3)

Subsystem/Location SIM (continued)	SIM ID #	Thermistor Mnemonic	TV Test Temp Limits					
			Mini mum		Target Temp		Maxi mum	
			Alarm	Alert (A)	Minimum	Maximum	Alert (A)	Alarm
+X TT EDGE, TMM N33233 & N33122	TM61	TTN2371T	-54.5	-52.5	NA (B)	NA (B)	90.5	92.5
+X TT EDGE BUT CLOSE TO ⊄ OF TMM N33253	TM63	TTN2322T	-54.5	-52.5	NA (B)	NA (B)	90.5	92.5
+X TT EDGE BUT CLOSE TO ⊄ OF TMM N33222	TM64	TTN2311T	-54.5	-52.5	NA (B)	NA (B)	90.5	92.5
-X TT, TOP HAT EXT., ⊄ OF TMM N2801	TM67	TTN2801T	-100.5	-98.5	NA (B)	NA (B)	90.5	92.5
TT, AT HRC BIPOD ATTACH #1A, -Y-Z FOOT	TM68	TTHRC1AT	-54.5	-52.5	~-10 (C)	~-10 (C)	90.5	92.5
TT, AT HRC BIPOD ATTACH #1B, -Y+Z FOOT	TM69	TTHRC1BT	-54.5	-52.5	~-10 (C)	~-10 (C)	90.5	92.5
TT, AT HRC BIPOD ATTACH #2A, +Y-Z FOOT	TM70	TTHRC2AT	-54.5	-52.5	~-10 (C)	~-10 (C)	90.5	92.5
TT, AT HRC BIPOD ATTACH #2B, +Y+Z FOOT	TM71	TTHRC2BT	-54.5	-52.5	~-10 (C)	~-10 (C)	90.5	92.5
TT, AT HRC BIPOD ATTACH #3A, -Z+Y FOOT	TM72	TTHRC3AT	-54.5	-52.5	~-10 (C)	~-10 (C)	90.5	92.5
TT, AT HRC BIPOD ATTACH #3B, -Z-Y FOOT	TM73	TTHRC3BT	-54.5	-52.5	~-10 (C)	~-10 (C)	90.5	92.5
TT, AT ACIS COLLIMATOR ATTACH #1	TM74	TTACIS1T	-54.5	-52.5	~-10 (C)	~-10 (C)	90.5	92.5
TT, AT ACIS COLLIMATOR ATTACH #2	TM75	TTACIS2T	-54.5	-52.5	~-10 (C)	~-10 (C)	90.5	92.5
TT, AT ACIS COLLIMATOR ATTACH #3	TM76	TTACIS3T	-54.5	-52.5	~-10 (C)	~-10 (C)	90.5	92.5
+Y TS, ⊄ OF TMM N2455, NEAR ACIS DEA	TM113	TS+YDEAT	-97.5	-95.5	NA (B)	NA (B)	90.5	92.5
-Z TS, ⊄ OF TMM N2054, NEAR ACIS PSMC	TM114	TS-ZPSMT	-97.5	-95.5	NA (B)	NA (B)	90.5	92.5
-Z TS, ⊄ OF TMM N2052, NEAR RCTU	TM115	TS-ZRCUT	-97.5	-95.5	NA (B)	NA (B)	90.5	92.5
-Y TS, ⊄ OF TMM N2403, NEAR HRC CEA	TM116	TS-YCEAT	-97.5	-95.5	NA (B)	NA (B)	90.5	92.5
-X TS, ⊄ OF TMM N2007, NEAR HRC DET.	TM117	TS-XHRCT	-97.5	-95.5	NA (B)	NA (B)	90.5	92.5
-X TS, ⊄ OF TMM N2015, NEAR ACIS PSMC	TM118	TS-XPSMT	-97.5	-95.5	NA (B)	NA (B)	90.5	92.5

Notes: (A) Maximum and minimum alert limits may be exceeded with caution during thermal balance testing at the ISIM and Observatory level at the discretion of thermal engineering to facilitate temperature stabilization provided red limits are not exceeded.

(B) No target temperature. Temperatures will be maintained within alert limits during functional testing.

(C) Temperature will be maintained by operational (trim) heaters.

CONCUR: _____

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TABLE 10: SIM TEST TELEMETRY ALARM, ALERT, AND TARGET TEMPERATURE (°C) LIMITS (PAGE 3 0F 3)

Subsystem/Location SIM (continued)	SIM ID #	Thermistor Mnemonic	TV Test Limits (B)			
			Mini mum		Maxi mum	
			Alarm	Alert (A)	Alert (A)	Alarm
SOLAR SIMULATOR, ZONE 1	TM49, TM54, TM55, TM100	SOLSM1AT, SOLSM1BT, SOLSM1CT, SOLSM1DT,	NA	NA	47	49
SOLAR SIMULATOR, ZONE 2	TM101 THRU TM104	SOLSM2AT, SOLSM2BT, SOLSM2CT, SOLSM2DT,	NA	NA	47	49
SOLAR SIMULATOR, ZONE 3	TM105 THRU TM108	SOLSM3AT, SOLSM3BT, SOLSM3CT, SOLSM3DT,	NA	NA	47	49
OBA SIMULATOR 2, CENTER LEFT	TM46	OBASIM1T	-28	-26	47	49
OBA SIMULATOR 2, CENTER	TM48	OBASIM2T	-28	-26	47	49
CHAMBER SUP. STRUCTURE LEG	TM109	FXTURE1	NA	NA	NA	NA
CHAMBER SUP. STRUCTURE LEG	TM110	FXTURE2	NA	NA	NA	NA
WIRE BUNDLE GUARD HEATER	TM111	GRD1	-128	-126	47	49
WIRE BUNDLE GUARD HEATER	TM112	GRD2	-128	-126	47	49

Notes: (A) Maximum and minimum alert limits may be exceeded with caution during thermal balance testing at the ISIM and Observatory level at the discretion of thermal engineering to facilitate temperature stabilization provided red limits are not exceeded.

(B) No target temperature. Temperatures will be maintained within alert limits during functional testing.

CONCUR: _____

Dave Dooley, Ball