Solar-B EIS

MULLARD SPACE SCIENCE LABORATORY
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DM SLA Cold Survival TV Test

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Distribution

EIS-Science	
EIS-Tech	✓
EIS-Soft	

Change Record

ISSUE	DATE	PAGES CHANGED	COMMENTS
01	27th April 2006	All New	
02	2nd May 2006	2, 3, 4	Slit/Slots not mounted on SLA. Temperature limit change eg -35 -2/+0C rather than -35+2/-0C. Rate of change 1C/min rather than 5C/min. Pictures added
03	2nd May 2006	2, 5-8	Appendixes A and B added.
04	3rd May 2006	All	Change in document title from 'Re-Qualification' to 'Cold Survival' Page 4 edited with test procedures to be run after TV test. Appendixes C and D added.

1.0 Introduction.

The EIS thermal model in the cold survival case shows the SLA getting to a colder temperature than it has previously been qualified to. The new temperature prediction is -26°C. This test is to re-qualify the sub-system to meet this temperature with some margin. A margin of 10°C is normally used by J-side.

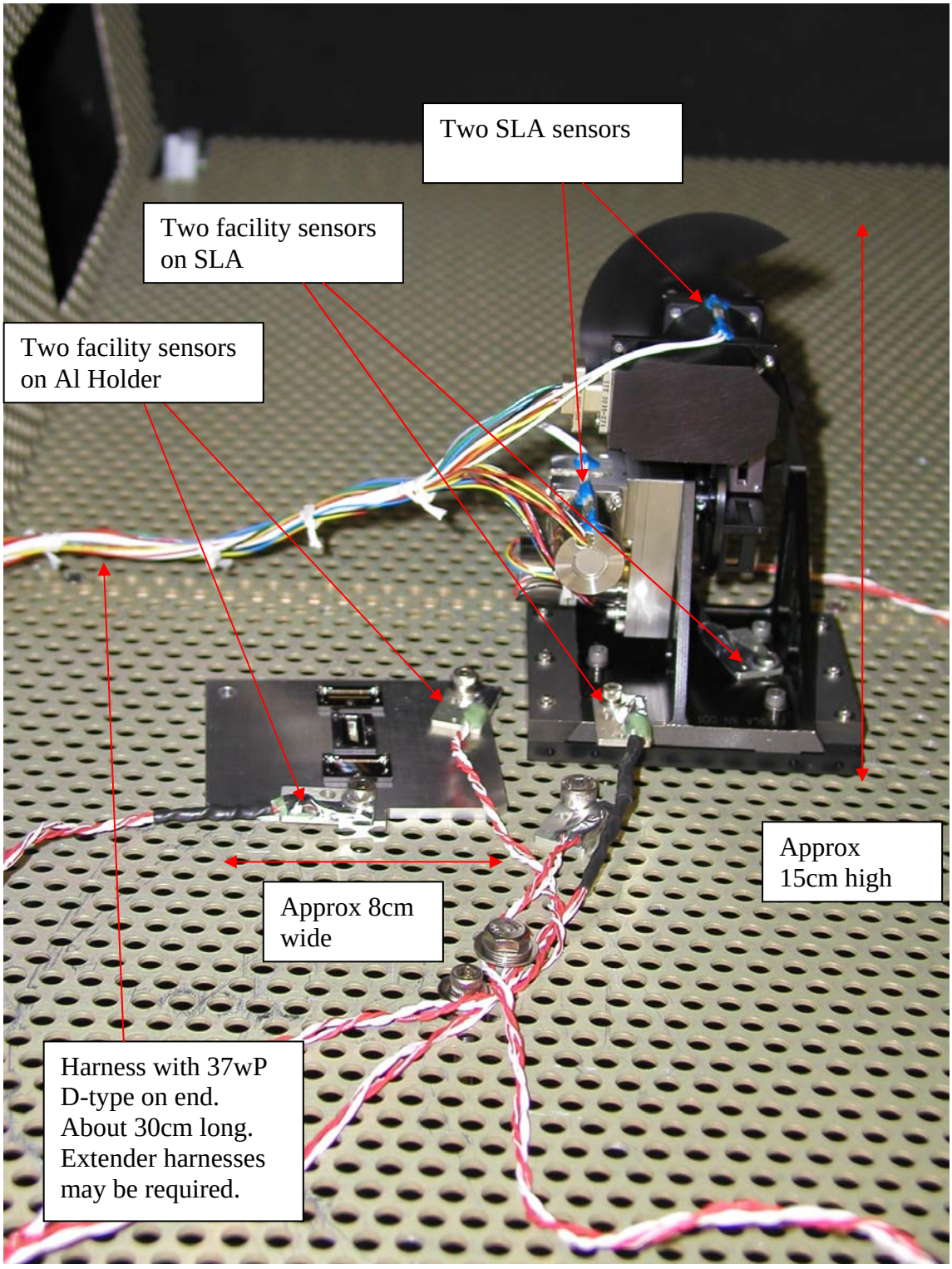
Previous Cold limit in ICD 0°C
Previous cold survival temperature -10°C (also used for SC TV test)
New cold survival temperature -35°C

2.0 Test Procedure.

- The DM SLA will be cleaned using IPA wipes.

- Close up photos of the three Slit/Slots on their Aluminium holder will be taken.

- The DM SLA and Aluminium holder will be placed in the TV chamber.
The harness will be connected to a feed through so that the SLA thermistors can be monitored externally.
The SLA has a 37w plug. Pin out and temperature conversion given at end of document
Pins 4 and 5 are the Slit/Slot motor sensor. Pins 6 and 7 are the Shutter sensor.
Two facility temperature sensors will be fitted to monitor the base temperature of the SLA.
Two facility temperature sensors will be fitted to monitor the Aluminium holder.
The facility temperatures will be logged automatically.
The two SLA thermistors will be logged manually.
The picture below gives a rough layout and idea of the size.

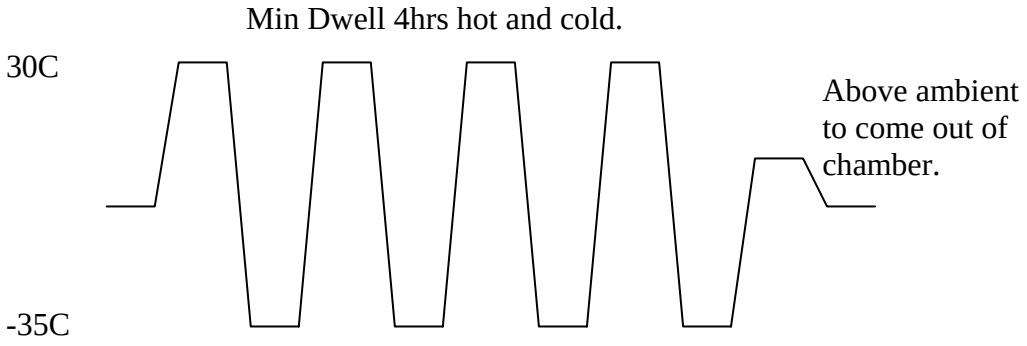

Two SLA sensors
Two facility sensors on SLA
Two facility sensors on Al Holder
Approx 15cm high
Approx 8cm wide
Harness with 37wP D-type on end. About 30cm long. Extender harnesses may be required.

- Check thermistor readings.

- Close chamber and pump.

- Maximum pressure during thermal cycling is 5*10-5mbar.

- Four cycles of -35°C -2°C/+0°C to +30°C -0°C/+2°C will be performed.
Dwell time at temperature limits will be a minimum of four hours.
Maximum rate of change will be 1°C/min.



- The chamber will be brought up to air pressure using dry nitrogen with the SLA temperature above ambient.

- Careful inspection of the SLA and Slit/Slots in the Aluminium holder will be made before moving it.

-The SLA and the Aluminium holder will be moved to a clean bench and a more thorough visual inspected carried out with particular attention to the Slit/Slots.

- Close up photos will be taken of the three Slit/Slots.

- The DM SLA will be re-integrated with the DM system and Appendix C and D tests performed on the Shutter and Slit/Slot mechanisms. Each test procedure will be run three times.

- The three Slit/Slots will be returned to NRL.

- A test report will be generated.

Appendix A. EIS-SLA1 Pin Out

EIS-SLA1: D37F		SOURCE		DESTINATION		
Pin	Signal	Twist with	Pin	Connector	Signal	Notes
1	SP4R	2,3,20,21	4	EIS-MHC2:D15M	SP4R	SLA stepper phase 4 return
2	SP3R	1,3,20,21	3	"	SP3R	SLA stepper phase 3 return
3	SP1R	1,2,20,21	1	"	SP1R	SLA stepper phase 1 return
4	ETS22RTN	5	23	EIS-MHC6:D25M	TMON0RTN	Temperature monitor return
5	ETS22	4	10	"	T0MON4	Group 0 temperature monitor 4
6	ETS23RTN	7	24	"	TMON0RTN	Temperature monitor return
7	ETS23	6	11	"	T0MON5	Group 0 temperature monitor
8	SLA3	9,10	15	EIS-MHC2:D15M	SLA3	Shutter Drive 3
9	SLA2	8,10	13	"	SLA2	Shutter Drive 2
10	SLA1	8,9	14	"	SLA1	Shutter Drive 1
11	n/c					
12	n/c					
13	n/c					
14	n/c					
15	n/c					
16	n/c					
17	n/c					
18	n/c					
19	**SGND**	**-**	**13**	**EIS-MHC6:D25M**	**SGND**	**Overall Foil**
19	**SGND**	**-**	**5**	**EIS-MHC2:D15M**	**SGND**	**Overall Foil**
20	SLASRC	1,2,3,21	8	EIS-MHC2:D15M	SLASRC	SLA stepper motor source
21	SP2R	1,2,3,20	2	"	SP2R	SLA stepper phase 2 return
22	n/c					
23	RSHLD	-	17	EIS-MHC6:D25M	RSHLD	Shield over 24,25,27,28,30,31
24	S4_A	25,27,28,30, 31	9	EIS-MHC6:D25M	S4_A	Resolver A – Slit/Slot (M27500C24RC6509) -WH
25	S3_A	24,27,28,30, 31	8	"	S3_A	Resolver A – Slit/Slot (M27500C24RC6509) -BL
26	RSHLD	-				n/c
27	S2_A	24,25,28,30, 31	7	"	S2_A	Resolver A – Slit/Slot (M27500C24RC6509) -GN
28	S1_A	24,25,27,30, 31	6	"	S1_A	Resolver A – Slit/Slot (M27500C24RC6509) -RD
29	RSHLD	-				n/c
30	R_REF+	24,25,27,28, 31	4	"	R_REF+	Resolver Reference + (M27500C24RC6509) -BK
31	R_REF-	24,25,27,28, 30	5	"	R_REF-	Resolver Reference - (M27500C24RC6509) -OR
32	SLAERTN	33	6	EIS-MHC2:D15M	SLAERTN	Shutter encoder return
33	SENCSRC	32	7	"	SENCSRC	Shutter encoder source
34	SLA1ENC	35,36,37	9	"	SLA1ENC	Shutter encoder sense 1
35	SLA3ENC	34,36,37	11	"	SLA2ENC	Shutter encoder sense 2
36	SLA2ENC	34,35,37	10	"	SLA3ENC	Shutter encoder sense 3
37	SLAPSR	34,35,36	12	"	SLAPSR	Shutter encoder photo-sensor return

APPENDIX B. Thermistor Temperature Table

°F	°C	OHMS	°F	°C	OHMS	°F	°C	OHMS	°F	°C	OHMS
-112.0	-80	1,660,000	-52.6	-47	122,100	6.8	-14	15,540	66.2	19	2944
-110.2	-79	1,518,000	-50.8	-46	113,900	8.6	-13	14,700	68.0	20	2814
-108.4	-78	1,390,000	-49.0	-45	106,300	10.4	-12	13,910	69.8	21	2690
-106.6	-77	1,273,000	-47.2	-44	99,260	12.2	-11	13,160	71.6	22	2572
-104.8	-76	1,167,000	-45.4	-43	92,720	14.0	-10	12,460	73.4	23	2460
-103.0	-75	1,071,000	-43.6	-42	86,650	15.8	-9	11,810	75.2	24	2354
-101.2	-74	982,800	-41.8	-41	81,020	17.6	-8	11,190	77.0	25	2252
-99.4	-73	902,700	-40.0	-40	75,790	19.4	-7	10,600	78.8	26	2156
-97.6	-72	829,700	-38.2	-39	70,930	21.2	-6	10,050	80.6	27	2064
-95.8	-71	763,100	-36.4	-38	66,410	23.0	-5	9534	82.4	28	1977
-94.0	-70	702,300	-34.6	-37	62,210	24.8	-4	9046	84.2	29	1894
-92.2	-69	646,700	-32.8	-36	58,300	26.6	-3	8586	86.0	30	1815
-90.4	-68	595,900	-31.0	-35	54,660	28.4	-2	8151	87.8	31	1739
-88.6	-67	549,400	-29.2	-34	51,270	30.2	-1	7741	89.6	32	1667
-86.8	-66	506,900	-27.4	-33	48,110	32.0	0	7355	91.4	33	1599
-85.0	-65	467,900	-25.6	-32	45,170	33.8	1	6989	93.2	34	1533
-83.2	-64	432,200	-23.8	-31	42,420	35.6	2	6644	95.0	35	1471
-81.4	-63	399,500	-22.0	-30	39,860	37.4	3	6319	96.8	36	1412
-79.6	-62	369,400	-20.2	-29	37,470	39.2	4	6011	98.6	37	1355
-77.8	-61	341,800	-18.4	-28	35,240	41.0	5	5719	100.4	38	1301
-76.0	-60	316,500	-16.6	-27	33,150	42.8	6	5444	102.2	39	1249
-74.2	-59	293,200	-14.8	-26	31,200	44.6	7	5183	104.0	40	1200
-72.4	-58	271,700	-13.0	-25	29,380	46.4	8	4937	105.8	41	1152
-70.6	-57	252,000	-11.2	-24	27,670	48.2	9	4703	107.6	42	1107
-68.8	-56	233,800	-9.4	-23	26,070	50.0	10	4482	109.4	43	1064
-67.0	-55	217,100	-7.6	-22	24,580	51.8	11	4273	111.2	44	1023
-65.2	-54	201,700	-5.8	-21	23,180	53.6	12	4074	113.0	45	983.8
-63.4	-53	187,400	-4.0	-20	21,870	55.4	13	3886	114.8	46	946.2
-61.6	-52	174,300	-2.2	-19	20,640	57.2	14	3708	116.6	47	910.2
-59.8	-51	162,200	-0.4	-18	19,480	59.0	15	3539	118.4	48	875.8
-58.0	-50	151,000	1.4	-17	18,400	60.8	16	3378	120.2	49	842.8
-56.2	-49	140,600	3.2	-16	17,390	62.6	17	3226	122.0	50	811.3
-54.4	-48	131,000	5.0	-15	16,430	64.4	18	3081	123.8	51	781.1

APPENDIX B. Thermistor Temperature Table (continued)

°F	°C	OHMS	°F	°C	OHMS	°F	°C	OHMS	°F	°C	OHMS
125.6	52	752.2	185.0	85	240.9	244.4	118	92.5	303.8	151	40.9
127.4	53	724.5	186.8	86	233.4	246.2	119	90.0	305.6	152	40.0
129.2	54	697.9	188.6	87	226.2	248.0	120	87.7	307.4	153	39.1
131.0	55	672.5	190.4	88	219.3	249.8	121	85.4	309.2	154	38.2
132.8	56	648.1	192.2	89	212.6	251.6	122	83.2	311.0	155	37.3
134.6	57	624.8	194.0	90	206.1	253.4	123	81.1	312.8	156	36.5
136.4	58	602.4	195.8	91	199.9	255.2	124	79.0	314.6	157	35.7
138.2	59	580.9	197.6	92	193.9	257.0	125	77.0	316.4	158	34.9
140.0	60	560.3	199.4	93	188.1	258.8	126	75.0	318.2	159	34.1
141.8	61	540.5	201.2	94	182.5	260.6	127	73.1	320.0	160	33.4
143.6	62	521.5	203.0	95	177.1	262.4	128	71.3	321.8	161	32.7
145.4	63	503.3	204.8	96	171.9	264.2	129	69.5	323.6	162	32.0
147.2	64	485.8	206.6	97	166.9	266.0	130	67.8	325.4	163	31.3
149.0	65	469.0	208.4	98	162.0	267.8	131	66.1	327.2	164	30.6
150.8	66	452.9	210.2	99	157.3	269.6	132	64.4	329.0	165	29.9
152.6	67	437.4	212.0	100	152.8	271.4	133	62.9	330.8	166	29.3
154.4	68	422.5	213.8	101	148.4	273.2	134	61.3	332.6	167	28.7
156.2	69	408.2	215.6	102	144.2	275.0	135	59.8	334.4	168	28.1
158.0	70	394.5	217.4	103	140.1	276.8	136	58.4	336.2	169	27.5
159.8	71	381.2	219.2	104	136.1	278.6	137	57.0	338.0	170	26.9
161.6	72	368.5	221.0	105	132.3	280.4	138	55.6	339.8	171	26.3
163.4	73	356.2	222.8	106	128.6	282.2	139	54.3	341.6	172	25.9
165.2	74	344.5	224.6	107	125.0	284.0	140	53.0	343.4	173	25.2
167.0	75	333.1	226.4	108	121.6	285.8	141	51.7	345.2	174	24.7
168.8	76	322.3	228.2	109	118.2	287.6	142	50.5	347.0	175	24.2
170.6	77	311.8	230.0	110	115.0	289.4	143	49.3	348.8	176	23.7
172.4	78	301.7	231.8	111	111.8	291.2	144	48.2	350.6	177	23.2
174.2	79	292.0	233.6	112	108.8	293.0	145	47.0	352.4	178	22.8
176.0	80	282.7	235.4	113	105.8	294.8	146	45.9	354.2	179	22.3
177.8	81	273.7	237.2	114	103.0	296.6	147	44.9	356.0	180	21.9
179.6	82	265.0	239.0	115	100.2	298.4	148	43.8	357.8	181	21.4
181.4	83	256.7	240.8	116	97.6	300.2	149	42.8	359.6	182	21.0
183.2	84	248.6	242.6	117	95.0	302.0	150	41.8	361.4	183	20.6

APPENDIX B. Thermistor Temperature Table (continued)

°F	°C	OHMS	°F	°C	OHMS	°F	°C	OHMS	°F	°C	OHMS
363.2	184	20.2	422.6	217	10.9	482.0	250	6.4			
365.0	185	19.8	424.4	218	10.8						
366.8	186	19.4	426.2	219	10.6						
368.6	187	19.0	428.0	220	10.4						
370.4	188	18.6	429.8	221	10.2						
372.2	189	18.3	431.6	222	10.1						
374.0	190	17.9	433.4	223	9.9						
375.8	191	17.6	435.2	224	9.7						
377.6	192	17.2	437.0	225	9.6						
379.4	193	16.9	438.8	226	9.4						
381.2	194	16.6	440.6	227	9.2						
383.0	195	16.3	442.4	228	9.1						
384.8	196	16.0	444.2	229	8.9						
386.6	197	15.7	446.0	230	8.8						
388.4	198	15.4	447.8	231	8.7						
390.2	199	15.1	449.6	232	8.5						
392.0	200	14.9	451.4	233	8.4						
393.8	201	14.6	453.2	234	8.2						
395.6	202	14.3	455.0	235	8.1						
397.4	203	14.0	456.8	236	8.0						
399.2	204	13.8	458.6	237	7.9						
401.0	205	13.5	460.4	238	7.7						
402.8	206	13.3	462.2	239	7.6						
404.6	207	13.1	464.0	240	7.5						
406.4	208	12.8	465.8	241	7.4						
408.2	209	12.6	467.6	242	7.3						
410.0	210	12.4	469.4	243	7.1						
411.8	211	12.2	471.2	244	7.0						
413.6	212	11.9	473.0	245	6.9						
415.4	213	11.7	474.8	246	6.8						
417.2	214	11.5	476.6	247	6.7						
419.0	215	11.3	478.4	248	6.6						
420.8	216	11.1	480.2	249	6.5						

Appendix C. Shutter Test Procedure

```
# SHUTTER_TEST
# run shutter_test
# NOTE: Prior to the start of this test, verify that version 4.1 is loaded into MHC
RAM (see Paragraph 4.0).
# Set the delay tick to 1 sec
set_delay 1000.00
# Turn off MHC heaters
run mhc_htr_off
# Issue MEMORY_MODE command to shift operations to RAM (0xFFFF).
# bytes 0x6B, 0x88, 0x11, 0, 2, 0xFF, 0xFF
# taskdelay 20
# Issue ABORT command.
# bytes 0x51, 0xE8, 0x81
# View HK word 72  “STATUS_CODE” and verify bit 6 is clear (System running
from RAM).
taskdelay 20
# SHUTTER_OPEN, SHUTTER_CLOSE and RESET
# Issue MOTOR_ENABLE command.
bytes 0x54, 0xE8, 0x8E
taskdelay 20
# Issue FIND_SHUTTER_INDEX command. Verify visually that Shutter is in Index
position.
bytes 0x5A, 0x60, 0x09
taskdelay 20
# Issue SHUTTER_OPEN command with exposure time = 65535 ms by sending
MSW = 0x0; LSW = 0xFFFF.
bytes 0x61, 0x48, 0x1D, 0, 4, 0, 0, 0xFF, 0xFF
taskdelay 20
# Issue RESET command.
bytes 0x52, 0xE8, 0x18
taskdelay 30
# Issue ABORT command.
bytes 0x51, 0xE8, 0x81
taskdelay 20
# Issue MOTOR_ENABLE command.
bytes 0x54, 0xE8, 0x8E
taskdelay 20
# Issue FIND_SHUTTER_INDEX command.
bytes 0x5A, 0x60, 0x09
taskdelay 20
# Issue SHUTTER_OPEN command with exposure time = 5000 ms by sending MSW
= 0x0; LSW = 0x1388.
bytes 0x61, 0x48, 0x1D, 0, 4, 0, 0, 0x13, 0x88
# WAIT for Shutter to close.
taskdelay 20
# Issue SHUTTER_CLOSE command.
bytes 0x53, 0xA0, 0x9C
```

View HK words 53 “SHUT_OPT_MS” and 54 “SHUT_OPT_LS” for the MSW and LSW of the Shutter Open time. Convert 32 bit word sent by MHC from hex to decimal to obtain the exposure time. SWICD Command Response Type 6 format.
Record Value: _____
taskdelay 30
Issue SHUTTER_OPEN command with exposure time = 75 ms by sending MSW = 0x0; LSW = 0x004B.
bytes 0x61, 0x48, 0x1D, 0, 4, 0, 0, 0, 0x4B
WAIT for Shutter to close.
taskdelay 10
Issue SHUTTER_CLOSE command.
bytes 0x53, 0xA0, 0x9C
View HK words 53 “SHUT_OPT_MS” and 54 “SHUT_OPT_LS” for the MSW and LSW of the Shutter Open time. Convert 32 bit word sent by MHC from hex to decimal to obtain the exposure time. SWICD Command Response Type 6 format.
Record Value: _____
taskdelay 30
MOTOR_ENABLE
Set FSW to standard initial configuration by issuing a DEFAULT_RESET.
bytes 0x59, 0x88, 0x87
taskdelay 20
Issue SAFE command to disable MOTOR_ENABLE
bytes 0x50, 0x28, 0x1B
taskdelay 20
Issue FIND_SHUTTER_INDEX command.
bytes 0x5A, 0x60, 0x09
View HK word 69 “NACK_EC_LS” and verify bit 14 is set. ("Selected command function not enabled")
taskdelay 20
Issue CLEAR_ERR command.
bytes 0x58, 0xE8, 0x24
taskdelay 20
Issue MOTOR_ENABLE command.
bytes 0x54, 0xE8, 0x8E
taskdelay 20
Issue FIND_SHUTTER_INDEX command. Verify visually that Shutter is in Index position.
bytes 0x5A, 0x60, 0x09
taskdelay 20
Set the parameter SHUTTER_MAX_RUN_TIME to 40 ms by sending 40 [0x0028].
bytes 0x6F, 0xC0, 0x95, 0, 4, 0x88, 0xEE, 0, 0x28
taskdelay 20
Issue FIND_SHUTTER_INDEX
bytes 0x5A, 0x60, 0x09
View HK word 69 “NACK_EC_LS” and verify bit 2 is set. ("Function timed out")
taskdelay 20
Issue CLEAR_ERR command.
bytes 0x58, 0xE8, 0x24
taskdelay 20

Set the parameter SHUTTER_MAX_RUN_TIME to 400 ms by sending 400 [0x0190].
bytes 0x6F, 0xC0, 0x95, 0, 4, 0x88, 0xEE, 1, 0x90
taskdelay 20
Issue FIND_SHUTTER_INDEX. Verify visually that Shutter is in Index position.
bytes 0x5A, 0x60, 0x09
View HK word 69 “NACK_EC_LS” and verify bit 2 is clear. ("Function timed out")
taskdelay 20
SHUTTER_MAX_STEPS
Issue CLEAR_ERR command.
bytes 0x58, 0xE8, 0x24
taskdelay 20
Issue FIND_SHUTTER_INDEX command. Verify visually that Shutter is in Index position.
bytes 0x5A, 0x60, 0x09
taskdelay 20
Set the parameter SHUTTER_MAX_STEPS to 30 steps by sending 30 [0x001E].
bytes 0x6F, 0xC0, 0x95, 0, 4, 0x60, 0x6F, 0, 0x1E
taskdelay 20
Issue FIND_SHUTTER_INDEX command.
bytes 0x5A, 0x60, 0x09
View HK word 69 “NACK_EC_LS” and verify bit 5 is set. ("Run Limit Reached") (typ. value 0x4400)
taskdelay 20
Issue CLEAR_ERR command.
bytes 0x58, 0xE8, 0x24
taskdelay 20
Set the parameter SHUTTER_MAX_STEPS to 40 step by sending 40 [0x0028].
bytes 0x6F, 0xC0, 0x95, 0, 4, 0x60, 0x6F, 0, 0x28
taskdelay 20
Issue FIND_SHUTTER_INDEX command. Verify visually that Shutter is in Index position.
bytes 0x5A, 0x60, 0x09
View HK word 69 “NACK_EC_LS” and verify bit 5 is clear. ("Run Limit Reached") (typ. value 0x0000)
taskdelay 20

Appendix D. Slit/Slot Test Procedure

SLIT_SLOT_AUTO_RUN
run slit_slot_auto_test
NOTE: Prior to the start of this test, verify that version 4.1 is loaded into MHC RAM (see Paragraph 4.0).
Set the delay tick to 1 sec
set_delay 1000.00
Turn off MHC heaters
run mhc_htr_off
Issue MEMORY_MODE command to shift operations to RAM (0xFFFF).
bytes 0x6B, 0x88, 0x11, 0, 2, 0xFF, 0xFF
taskdelay 60
Issue ABORT command.
bytes 0x51, 0xE8, 0x81
View HK word 72 "STATUS_CODE" and verify bit 6 is clear (System running from RAM)
taskdelay 15
SLIT_SLOT_AUTO and SLIT_SLOT_MANUAL
Issue MOTOR_ENABLE command.
bytes 0x54, 0xE8, 0x8E
taskdelay 15
Issue SLIT_SLOT_AUTO command in the FORWARD direction to position 1 [0x0001]. Motor will not move if already in Position 1.
bytes 0x73, 0x60, 0x9F, 0, 4, 0, 1, 0, 1
View HK word 49 "SS_POS" and verify the returned 16-bit value. (RDC value = 49216 [0xC040] (+/- 75)
taskdelay 120
Issue SLIT_SLOT_AUTO command in the FORWARD direction to position 2 [0x0002].
bytes 0x73, 0x60, 0x9F, 0, 4, 0, 1, 0, 2
View HK word 49 "SS_POS" and verify the returned 16-bit value. (RDC value = 32823 [0x8037] (+/- 75)
taskdelay 60
Issue SLIT_SLOT_AUTO command in the FORWARD direction to position 3 [0x0003].
bytes 0x73, 0x60, 0x9F, 0, 4, 0, 1, 0, 3
View HK word 49 "SS_POS" and verify the returned 16-bit value. (RDC value = 16514 [0x4082] (+/- 75)
taskdelay 60
Issue SLIT_SLOT_AUTO command in the FORWARD direction to position 0 [0x0000].
bytes 0x73, 0x60, 0x9F, 0, 4, 0, 1, 0, 0
View HK word 49 "SS_POS" and verify the returned 16-bit value. (RDC value = 64 [0x0040] (+/- 75)
taskdelay 60
Issue SLIT_SLOT_AUTO command in the REVERSE direction to position 3 [0x0003].
bytes 0x73, 0x60, 0x9F, 0, 4, 0xFF, 0xFF, 0, 3

View HK word 49 “SS_POS” and verify the returned 16-bit value. (RDC value = 16514 [0x4082] (+/- 75)
taskdelay 60
Issue SLIT_SLOT_AUTO command in the REVERSE direction to position 2 [0x0002].
bytes 0x73, 0x60, 0x9F, 0, 4, 0xFF, 0xFF, 0, 2
View HK word 49 “SS_POS” and verify the returned 16-bit value. (RDC value = 32823 [0x8037] (+/- 75).
taskdelay 60
Issue SLIT_SLOT_AUTO command in the REVERSE direction to position 1 [0x0001].
bytes 0x73, 0x60, 0x9F, 0, 4, 0xFF, 0xFF, 0, 1
View HK word 49 “SS_POS” and verify the returned 16-bit value. (RDC value = 49216 [0xC040] (+/- 75)
taskdelay 60
Issue SLIT_SLOT_AUTO command in the REVERSE direction to position 0 [0x0000].
bytes 0x73, 0x60, 0x9F, 0, 4, 0xFF, 0xFF, 0, 0
View HK word 49 “SS_POS” and verify the returned 16-bit value. (RDC value = 64 [0x0040] (+/- 75)
taskdelay 60
Issue SLIT_SLOT_MANUAL command in the FORWARD direction with 324 [0x0144] steps.
bytes 0x74, 0xA0, 0xA0, 0, 4, 0, 1, 1, 0x44
taskdelay 60
Issue SLIT_SLOT_MANUAL command in the FORWARD direction with 324 [0x0144] steps.
bytes 0x74, 0xA0, 0xA0, 0, 4, 0, 1, 1, 0x44
taskdelay 60
Issue SLIT_SLOT_MANUAL command in the FORWARD direction with 324 [0x0144] steps.
bytes 0x74, 0xA0, 0xA0, 0, 4, 0, 1, 1, 0x44
taskdelay 60
Issue SLIT_SLOT_MANUAL command in the FORWARD direction with 324 [0x0144] steps.
bytes 0x74, 0xA0, 0xA0, 0, 4, 0, 1, 1, 0x44
View HK word 49 “SS_POS” and verify the returned 16-bit value. (RDC value = 64 [0x0040] (+/- 75)
taskdelay 60
Issue SLIT_SLOT_AUTO command in the REVERSE direction to position 0 [0x0000].
bytes 0x73, 0x60, 0x9F, 0, 4, 0xFF, 0xFF, 0, 0
taskdelay 90
Issue SLIT_SLOT_MANUAL command in the REVERSE direction with 324 [0x0144] steps.
bytes 0x74, 0xA0, 0xA0, 0, 4, 0xFF, 0xFF, 1, 0x44
taskdelay 60
Issue SLIT_SLOT_MANUAL command in the REVERSE direction with 324 [0x0144] steps.
bytes 0x74, 0xA0, 0xA0, 0, 4, 0xFF, 0xFF, 1, 0x44

taskdelay 60
Issue SLIT_SLOT_MANUAL command in the REVERSE direction with 324 [0x0144] steps.
bytes 0x74, 0xA0, 0xA0, 0, 4, 0xFF, 0xFF, 1, 0x44
taskdelay 60
Issue SLIT_SLOT_MANUAL command in the REVERSE direction with 324 [0x0144] steps.
bytes 0x74, 0xA0, 0xA0, 0, 4, 0xFF, 0xFF, 1, 0x44
View HK word 49 “SS_POS” and verify the returned 16-bit value. (RDC value = 60 [0x003C] (+/- 75)
taskdelay 60
MOTOR_ENABLE and SS_MAX_RUN_TIME
Issue SAFE Command to disable MOTOR ENABLE.
bytes 0x50, 0x28, 0x1B
taskdelay 20
Issue SLIT_SLOT_AUTO command in the FORWARD direction to position 0 [0x0000].
bytes 0x73, 0x60, 0x9F, 0, 4, 0, 1, 0, 0
View HK word 69 “NACK_EC_LS” and verify bit 14 is set. ("Selected command function not enabled") (typ. value 0x0002)
taskdelay 20
Issue CLEAR_ERR command.
bytes 0x58, 0xE8, 0x24
taskdelay 20
Issue SLIT_SLOT_MANUAL command in the FORWARD direction with 101 [0x0065] steps.
bytes 0x74, 0xA0, 0xA0, 0, 4, 0, 1, 0, 0x65
View HK word 69 “NACK_EC_LS” and verify bit 14 is set. ("Selected command function not enabled") (typ. value 0x0002)
taskdelay 20
Issue CLEAR_ERR command.
bytes 0x58, 0xE8, 0x24
taskdelay 20
Issue MOTOR_ENABLE command.
bytes 0x54, 0xE8, 0x8E
taskdelay 20
Set the parameter SS_MAX_RUN_TIME to 1000 ms by sending 10 [0x000A].
bytes 0x6F, 0xC0, 0x95, 0, 4, 0x60, 0xF9, 0, 0x0A
taskdelay 20
Issue SLIT_SLOT_MANUAL command in the FORWARD direction with 50 [0x0032] steps.
bytes 0x74, 0xA0, 0xA0, 0, 4, 0, 1, 0, 0x32
View HK word 69 “NACK_EC_LS” and verify bit 5 is set. ("Run Limit Reached") (typ. value 0x0400)
taskdelay 30
Issue CLEAR_ERR command.
bytes 0x58, 0xE8, 0x24
taskdelay 20
Issue SLIT_SLOT_MANUAL command in the REVERSE direction with 10 [0x000A] step.

bytes 0x74, 0xA0, 0xA0, 0, 4, 0xFF, 0xFF, 0, 0x0A
View HK word 69 “NACK_EC_LS” and verify bit 5 is clear ("Run Limit Reached "). (typ. value 0x0000)
taskdelay 30
SS_MAX_STEPS
Set FSW to standard initial configuration by issuing a DEFAULT_RESET.
bytes 0x59, 0x88, 0x87
taskdelay 20
Issue CLEAR_ERR command.
bytes 0x58, 0xE8, 0x24
taskdelay 20
Issue MOTOR_ENABLE command.
bytes 0x54, 0xE8, 0x8E
taskdelay 20
Issue SLIT_SLOT_AUTO command in the FORWARD direction to position = 0 [0x000].
bytes 0x73, 0x60, 0x9F, 0, 4, 0, 1, 0, 0
View HK word 49 “SS_POS” and verify the returned 16-bit value. (RDC value = 64 [0x0040] (+/- 75)?
taskdelay 60
Set the parameter SS_MAX_STEPS to 300 steps by sending 300 [0x012C].
bytes 0x6F, 0xC0, 0x95, 0, 4, 0xA0, 0xFA, 1, 0x2C
taskdelay 20
Issue SLIT_SLOT_MANUAL in the FORWARD direction with 301 [0x012D] steps.
bytes 0x74, 0xA0, 0xA0, 0, 4, 0, 1, 1, 0x2D
View HK word 69 “NACK_EC_LS” and verify bit 5 is set. ("Run Limit Reached") (typ. value 0x0400)
taskdelay 30
Issue CLEAR_ERR command.
bytes 0x58, 0xE8, 0x24
taskdelay 20
Issue SLIT_SLOT_MANUAL command in the REVERSE direction with 100 [0x0064] steps.
bytes 0x74, 0xA0, 0xA0, 0, 4, 0xFF, 0xFF, 0, 0x64
View HK word 69 “NACK_EC_LS” and verify bit 5 is clear. ("Run Limit Reached") (typ. value 0x0000)
taskdelay 30
Issue SLIT_SLOT_MANUAL command in the REVERSE direction with 200 [0x00C8] steps.
bytes 0x74, 0xA0, 0xA0, 0, 4, 0xFF, 0xFF, 0, 0xC8
View HK word 49 “SS_POS” and record the returned 16-bit value. Value in 57 = value in 51 ±75
taskdelay 30
ABORT, RESET and SAFE
Issue CLEAR_ERR command.
bytes 0x58, 0xE8, 0x24
taskdelay 20
Set the parameter SS_MAX_STEPS to 65535 [0xFFFF].
bytes 0x6F, 0xC0, 0x95, 0, 4, 0xA0, 0xFA, 0xFF, 0xFF

taskdelay 20
Set the parameter SS_MAX_RUN_TIME to 65535 [0xFFFF].
bytes 0x6F, 0xC0, 0x95, 0, 4, 0x60, 0xF9, 0xFF, 0xFF
taskdelay 20
Issue SLIT_SLOT_MANUAL command FORWARD 65535 [0xFFFF].
bytes 0x74, 0xA0, 0xA0, 0, 4, 0, 1, 0xFF, 0xFF
taskdelay 10
Issue ABORT Command.
bytes 0x51, 0xE8, 0x81
taskdelay 20
Issue SLIT_SLOT_MANUAL command FORWARD 65535 [0xFFFF].
bytes 0x74, 0xA0, 0xA0, 0, 4, 0, 1, 0xFF, 0xFF
taskdelay 10
Issue SAFE Command.
bytes 0x50, 0x28, 0x1B
taskdelay 20
Issue MOTOR_ENABLE command.
bytes 0x54, 0xE8, 0x8E
taskdelay 20
Issue SLIT_SLOT_MANUAL command FORWARD 65535 [0xFFFF].
bytes 0x74, 0xA0, 0xA0, 0, 4, 0, 1, 0xFF, 0xFF
taskdelay 10
Issue RESET Command.
bytes 0x52, 0xE8, 0x18
taskdelay 20
Issue ABORT command.
bytes 0x51, 0xE8, 0x81
taskdelay 10
SS_STEP_RATE
Issue CLEAR_ERR command.
bytes 0x58, 0xE8, 0x24
taskdelay 20
Issue MOTOR_ENABLE command.
bytes 0x54, 0xE8, 0x8E
taskdelay 20
Set the parameter SS_STEP_RATE to 1step / 4 ms by sending 4 [0x0004].
bytes 0x6F, 0xC0, 0x95, 0, 4, 0x48, 0x7B, 0, 4
View HK word 69 “NACK_EC_LS” and verify bit 7 is set ("Parameter out of range") (typ. value 0x0100).
taskdelay 20
Issue CLEAR_ERR command.
bytes 0x58, 0xE8, 0x24
taskdelay 20
Set the parameter SS_STEP_RATE to 1step / 5 ms by sending 5 [0x0005].
bytes 0x6F, 0xC0, 0x95, 0, 4, 0x48, 0x7B, 0, 5
taskdelay 20
Set the parameter SS_MAX_RUN_TIME to 900 ms by sending 9 [0x0009].
bytes 0x6F, 0xC0, 0x95, 0, 4, 0x60, 0xF9, 0, 9
taskdelay 20

Issue SLIT_SLOT_MANUAL command FORWARD with 50 steps by sending 50 [0x0032].
bytes 0x74, 0xA0, 0xA0, 0, 4, 0, 1, 0, 0x32
View HK word 69 “NACK_EC_LS” and verify bit 5 is clear ("Run Limit Reached") (typ. value 0x0000).
taskdelay 20
Issue SLIT_SLOT_MANUAL command FORWARD 130 steps by sending 130 [0x0083].
bytes 0x74, 0xA0, 0xA0, 0, 4, 0, 1, 0, 0x83
View HK word 69 “NACK_EC_LS” and verify bit 5 is set ("Run Limit Reached") (typ. value 0x0400).
taskdelay 20
RESOLVER_CTL
Set FSW to standard initial configuration by issuing a DEFAULT_RESET.
bytes 0x59, 0x88, 0x87
taskdelay 20
Issue CLEAR_ERR command.
bytes 0x58, 0xE8, 0x24
taskdelay 20
Issue MOTOR_ENABLE command.
bytes 0x54, 0xE8, 0x8E
taskdelay 20
Issue SLIT_SLOT_AUTO command in the FORWARD direction to position 0 by sending 0[0x0000].
bytes 0x73, 0x60, 0x9F, 0, 4, 0, 1, 0, 0
taskdelay 120
Issue RESOLVER_CTL command set to 1 [0x0001] to turn the resolver off.
bytes 0x72, 0, 0x99, 0, 2, 0, 1
taskdelay 20
Issue SLIT_SLOT_MANUAL command in the FORWARD direction with 324 [0x0144] steps.
bytes 0x74, 0xA0, 0xA0, 0, 4, 0, 1, 1, 0x44
View HK word 49 “SS_POS” and verify returned value = 0 [0x0000].
taskdelay 120
Issue RESOLVER_CTL command set to 2 [0x0002] to turn the resolver on.
bytes 0x72, 0, 0x99, 0, 2, 0, 2
taskdelay 20
Issue SLIT_SLOT_AUTO command in the FORWARD direction to position 1 by sending 1[0x0001]. Motor will only move if not already in position 1.
bytes 0x73, 0x60, 0x9F, 0, 4, 0, 1, 0, 1
View HK word 49 “SS_POS”. Returned value = 49216 [0xC040] (+/- 75)?
taskdelay 120
Issue RESOLVER_CTL command set to 3 [0x0003] to re# Turn the resolver to the default auto.
bytes 0x72, 0, 0x99, 0, 2, 0, 3
taskdelay 20
Issue SLIT_SLOT_AUTO command in the FORWARD to position 2 by sending 2 [0x0002].
bytes 0x73, 0x60, 0x9F, 0, 4, 0, 1, 0, 2
View HK word 49 “SS_POS”. Returned value = 32823 [0x8037] (+/- 75)?

taskdelay 120
SS_HOLD_TIME
Issue CLEAR_ERR command.
bytes 0x58, 0xE8, 0x24
taskdelay 20
Set the parameter SS_HOLD_TIME to 2 seconds 2000 [0x07D0].
bytes 0x6F, 0xC0, 0x95, 0, 4, 0, 0xFF, 0x07, 0xD0
taskdelay 20
Issue SLIT_SLOT_MANUAL command FORWARD 324 steps by sending 324 [0x0144] and verify that the power source remains in HIGH CURRENT state for approximately two (2) seconds after the move has been completed.
bytes 0x74, 0xA0, 0xA0, 0, 4, 0, 1, 1, 0x44
taskdelay 60