HIRDLS

HIGH RESOLUTION DYNAMICS LIMB SOUNDER

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SSH to IPS Interface Control Document (ICD)

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Log of Changes

Rev.	Date	Section	Change Description
	98-07-17		Initial Release
A	98-11-20	3.2.3	Fig 3.2.3-1: deleted sun sensors A4 and B4
		3.2.5.2.1	Table 3.2.5.2.1-1: deleted signals SSH_SUNSA4_SEN and SSH_SUNSB4_SEN; changed groups to TS4. TS4 Heater Group changed to TS4-3X (5 places).
B	99-11-09	2.1	Added SP-HIR-103, C&TH to Applicable Doc. list.
		3.2.3	Fig 3.2.3-1: 1) changed AD590 sense resistors from 12.1 kΩ to 10.0 kΩ; 2) changed door pot drive voltage from +10 V to +6.9 V; 3) added “50 kΩ" to door pot legend.
		3.2.3.3	Table 3.2.3.3-1: updated sensor part number per Lindgren input.
		3.2.3.4	Second paragraph: “Note” reworded for clarity. Table 3.2.3.4-1: Resolved TBDs for Part No. and Manuf. per Stewart input. Table 3.2.3.4-2: 1) changed supply voltage from +15 Vdc to +6.9 Vdc; 2) changed angular range of pot to “~340°”; 3) resolved TBDs for Part No. and Manuf. per Stewart input.
		3.2.4	First sentence: “Sunshield” corrected to “SVA”. Fig 3.2.4-1: 1) changed AD590 sense resistors from 12.1 kΩ to 10.0 kΩ; 2) changed SVA motor legends from “Winding” to “Motor” for consistency with change to Section 3.2.4.1.
		3.2.4.1	Changed description from A & B windings to A and B motors on a common shaft per Stewart input. Deleted last paragraph in section (was requirement for fold-back current limit on SVA drive). Table 3.2.4.1-1: resolved TBDs for motor Model No. and Manuf. per Stewart input.
		3.2.4.3	Table 3.2.4.3-1: resolved TBDs for Part No. and Manuf. per Stewart input.
		3.2.5.1	Table 3.2.5.1-2: Corrected table number in caption; added missing text, “at end of cable”.
		3.2.5.2.2	Table 3.2.5.2.2-1: changed Function descriptions for SVA motor drive/return signals from “Winding” to “Motor” for consistency with change to Section 3.2.4.1.
		3.3	Deleted obsolete reference to TC-UCB-009.
		4	New acronym list; previous one was for a different document.
C	00-10-31	3.2.3	Figure 3.2.3-1. Modify IPU side of interface depiction of SSH AD590 interface to show MUX’d +10V drive. (CR184)
		3.2.3.3	Table 3.2.3.3-1. SSH Temp. Sensor Characteristics. Added temperature range, accuracy and resolution to table. (CR185)
		3.2.4	Figure 3.2.4-1 Modify IPU side of interface depiction of SVA AD590 interface to show MUX’d +10V drive. (CR184)

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1 SCOPE

This Interface Control Document (ICD) defines the specific design implementation of the Mechanical, Electrical, and Thermal Conductive interfaces between the Sunshield Subsystem (SSH) and the Instrument Processor Subsystem (IPS). The interfaces between these two subsystems are limited to the Electrical interface between the SSH and Instrument Processor Unit (IPU).

2 DOCUMENT REFERENCES

2.1 Applicable Documents

The documents listed below are a part of this ICD to the extent specified herein. In the case of a conflict between the contents of this ICD and any Applicable Document, this ICD shall take precedence.

GSFC 424-28-21-13	Instrument Technical Specification (ITS)	00-02
SP-HIR-200G	IICD System Section	97-12-01
SP-HIR-103	Command & Telemetry Handbook (C&TH)	Current Revision

2.2 Information Documents

The documents listed below are for information only and are explicitly not, by reference, part of this ICD.

SP-HIR-038	Instrument Processor Subsystem Specification Document	Current Revision
SP-HIR-050	Sunshield Subsystem Specification Document	Current Revision

3 INTERFACE REQUIREMENTS

3.1 Interface Configuration

The only interfaces between the IPS and the SSH are in the areas of motor drivers, heater drivers, position sensors, temperature sensors, and sun sensors. There are no power, mechanical, thermal, or optical interfaces between them. The interface configuration is shown in Figure 3.1-1.

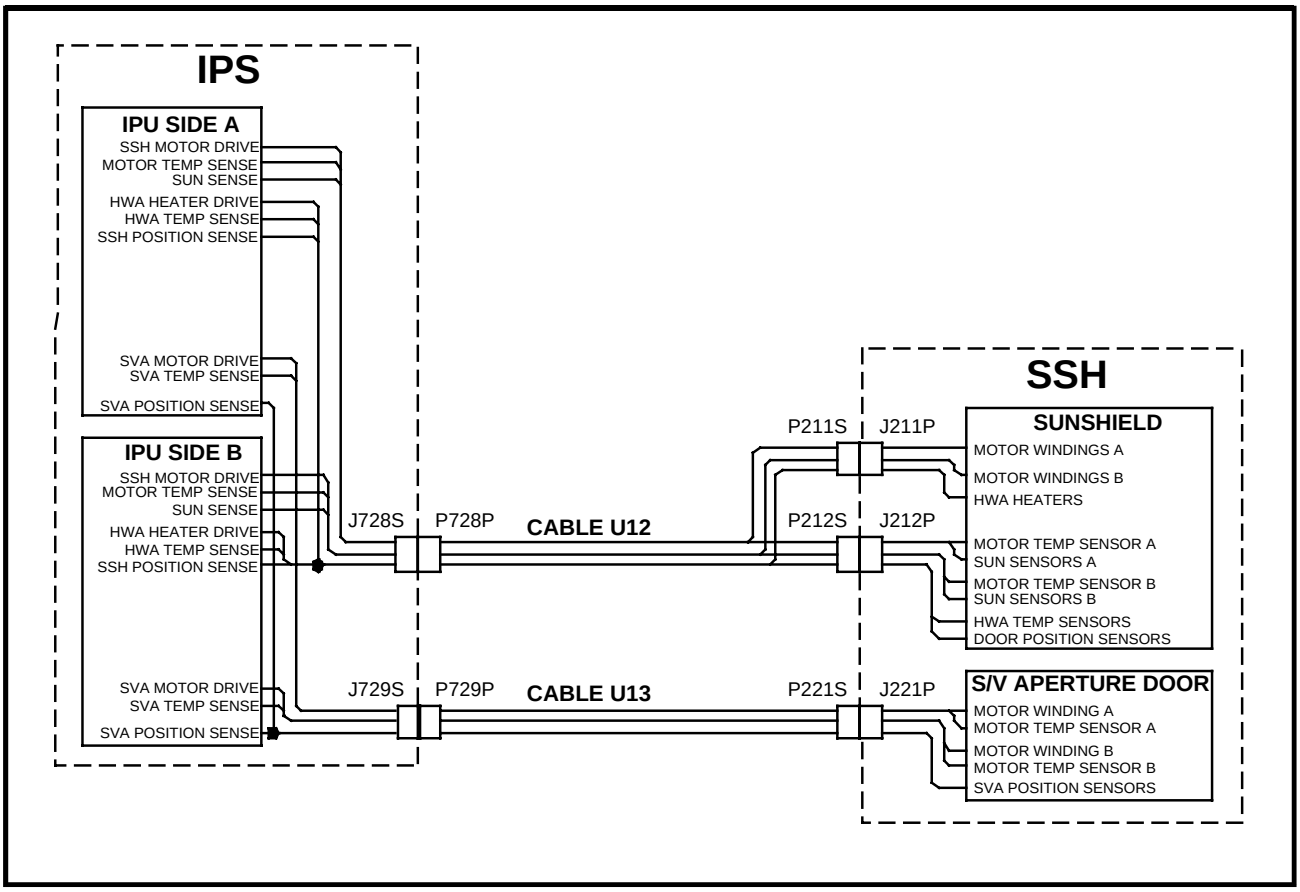

Figure 3.1-1 IPS to SSH Interface Configuration

3.2 Electrical Interface

3.2.1 Grounding and Shielding

3.2.1.1 Primary Power Return

N/A

3.2.1.2 Secondary Power and Signal Return

N/A

3.2.1.3 Equipment Enclosure Grounds

N/A

3.2.1.4 Wire/Cable Shield Grounds

Cables shall have an overall shield connected to chassis ground through the connector shell. Individual shields should be connected to chassis ground through a connector pin.

3.2.2 Power

N/A

3.2.3 Sunshield Control and Monitor

The IPU to Sunshield control and monitor interface consists of fully redundant interfaces to the sun sensors, door drive motor, and theHot Wax Actuator (HWA) of the Hold-down Release Mechanism (HRM), and partially redundant interfaces to the position sensors. The IPU to Sunshield interface is shown schematically in Figure 3.2.3-1.

3.2.3.1 Hot Wax Actuator Characteristics

The HWA is a paraffin actuator with redundancy provided by incorporating two separate heater elements. The HWA A-heater is driven by the A side of the IPU, and the HWA B-heater is driven by the B side of the IPU. Only one HWA heater element may be driven at a time. The Hot Wax Actuator characteristics are shown in Table 3.2.3.1-1.

Characteristic	Value
Manufacturer	Starsys Research
Type No.	SP-MMS-353
Functional Type	Pin-pusher
Power	10 watts (each heater)
Voltage	28 ±0.5 Vdc
Heating Elements	78 Ω ±10% each
Max. Operating Time	300 s from 0 °C
Wire Interface	4 ea. 26 AWG (2 per heating element)
Other	Built-in current-limiting device for heater A

Table 3.2.3.1-1 HWA Characteristics

3.2.3.2 SSH Drive Motor Characteristics

The SSH Drive motor is a three phase brushless stepping motor with redundant windings. The A windings are driven by the A side of the IPU and the B windings are driven by the B side of the IPU. Only one set of windings (A or B) may be driven at a time. The SSH motor characteristics are shown in Table 3.2.3.2-1. The motor drive sequencing shall conform to the following rules:

a. Each motor lead shall be switchable between three conditions, as identified by the following symbols:

+	Connection to +28 Vdc
–	Connection to 0 Vdc (i.e. the 28 V return)
N/C	No connection (or high impedance)

b. All leads on the inactive side (A or B) shall be set to the N/C condition.

c. The active side shall be driven according to the state sequence shown in Table 3.2.3.2-2, where one “pulse” constitutes one state change, forward or backward, in the state sequence.

d. The rotation sense shall be door motion in the opening direction for a top-to-bottom state sequence in Table 3.2.3.2-2 (TBV).

e. Except when the door is being stepped to a new angle, all leads shall be held in the N/C condition to minimize power dissipation in the motor.

f. The first state of a stepping sequence shall be the same as the last state of the previous sequence.

Characteristic	Value
Manufacturer	Astro
Type No.	SP-MMS-354
Functional Type	3 Phase Y Stepper
Supply Voltage	28 Vdc
Stall Power per Phase Pair	6.8 W
Stepping Pulse Frequency	20-30 pulses/s
Motor shaft rotation angle per pulse	30 °
Door rotation angle per pulse	0.1 °
Line to Line Resistance	115 Ω
Line to Line Inductance	33 mH
Peak Allowable Transient Current	0.5 A

Table 3.2.3.2-1 SSH Drive Motor Characteristics

	A-Side Windings			B-Side Windings		
State	Yellow Lead	Red Lead	White Lead	Yel/Whi Lead	Red/Whi Lead	Blk/Whi Lead
0	+	–	N/C	+	–	N/C
1	N/C	–	+	N/C	–	+
2	–	N/C	+	–	N/C	+
3	–	+	N/C	–	+	N/C
4	N/C	+	–	N/C	+	–
5	+	N/C	–	+	N/C	–

Table 3.2.3.2-2 SSH Drive Motor Phase Sequencing

3.2.3.3 SSH Temperature Sensor Characteristics

The SSH contains redundant temperature sensors associated with the Hot Wax Actuator and the SSH Drive Motor. The temperature sensor type is shown in Table 3.2.3.3-1. Refer to manufacturers data sheets for specifications and characteristics.

Sensor	Supply Voltage	Temp. (2)			Manufac-turer
		Range	Accuracy	Resolution	
AD590MF/883B (1)	+10 Vdc (nominal)	-55° to 120°	± 2.00°	200 mK	Analog Devices

(1) Two-terminal IC temperature transducer; current source

(2) Note that these requirements are different than those provided in the ITS paragraph 3.7.7. A larger range is required for this redundant pair of sensors.

Table 3.2.3.3-1 SSH Temperature Sensor Characteristics

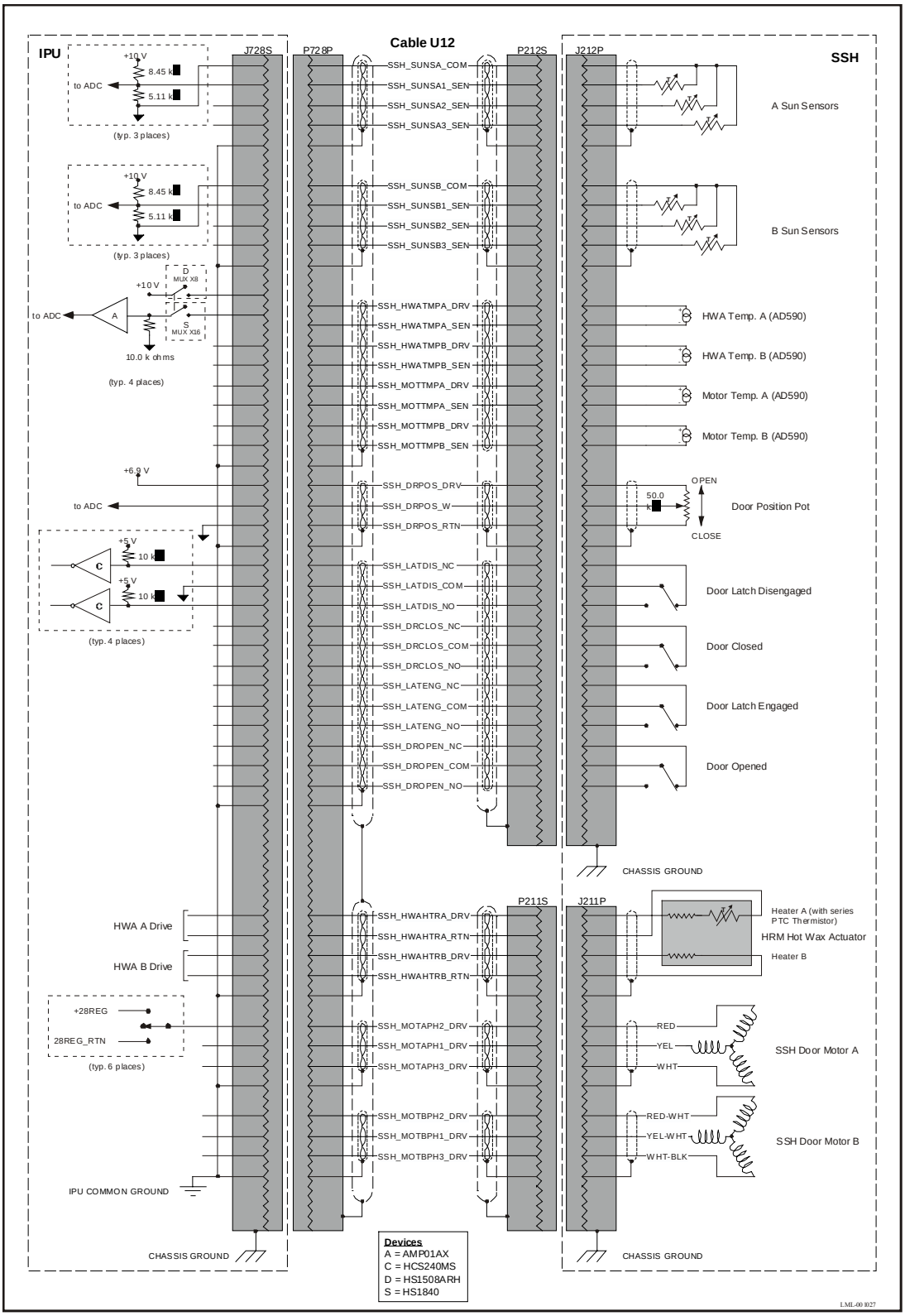

Figure 3.2.3-1 IPU to Sunshield Interface

3.2.3.4 SSH Position Sensor Characteristics

The SSH Position Sensors consist of four microswitches and a door position potentiometer. The Position Sensor types are shown in Tables 3.2.3.4-1 and 3.2.3.4-2. Refer to manufacturers data sheets for specifications and characteristics.

Note: Driving the SSH door in the opening direction shall correspond to the wiper of the Door Position Potentiometer being driven toward the SSH_DRPOS_DRV end.

Sensor Part No.	Supply Voltage	Description	Manufacturer
11HM1	+5 Vdc	SPDT Microswitch	Honeywell

Table 3.2.3.4-1 Door Limit Switch Characteristics

Sensor Part No.	Supply Voltage	Resistance	Max Power	Description	Manufacturer
HR1L004	+6.9 Vdc	50 kΩ	1.5 W	Potentiometer ~340° active range	Betatronix

Table 3.2.3.4-2 Door Angle Sensor Characteristics

3.2.3.5 SSH Sun Sensor Characteristics

The SSH contains redundant banks of sun sensor thermistors. Only one bank is active at a time. The A Sun Sensors are read by the A side of the IPU and the B Sun Sensors are read by the B side of the IPU. The Sun Sensor types are shown in Table 3.2.3.5-1. Refer to manufacturers data sheet for specifications and characteristics.

Sensor Part No.	Resistance	Description	Manufacturer
YSI 44902	2252 Ω @ 25 °C	thermistor	Yellow Springs Instruments

Table 3.2.3.5-1 Sun Sensor Characteristics

3.2.4 Space View Aperture Control & Monitor

The IPU to Space View Aperture (SVA) control and monitor interface consists of fully redundant interfaces to the SVA motor and partially redundant interfaces to the position sensors. The IPU to SVA Interface is shown schematically in Figure 3.2.4-1.

3.2.4.1 SVA Drive Motor Characteristics

The SVA Drive has Prime (A) and Redundant (B) brushed DC motors on a common shaft. Motor A is driven by the A side of the IPU and motor B is driven by the B side of the IPU. Only one motor may be driven at a time; the undriven motor must be open-circuited. The SVA motor characteristics are shown in Table 3.2.4.1-1.

Characteristic	Value
Manufacturer	Kollmorgen
Model	HR2L003
Type	Brushed DC
Supply Voltage	28 V
Current	2.0 A max
Terminal Resistance	24.5 Ω
Terminal Inductance	2.6 mH ±30%
Back EMF Constant	0.056 V/(rad/s) ±10%
Torque Constant	0.056 Nm/A ±10%
Number of Poles	4
Motor Constant	0.012 Nm/W
Other	To be supplied

Table 3.2.4.1-1 SVA Drive Motor Characteristics

The SVA motor supply will be the +28VREG supply from the PCU.

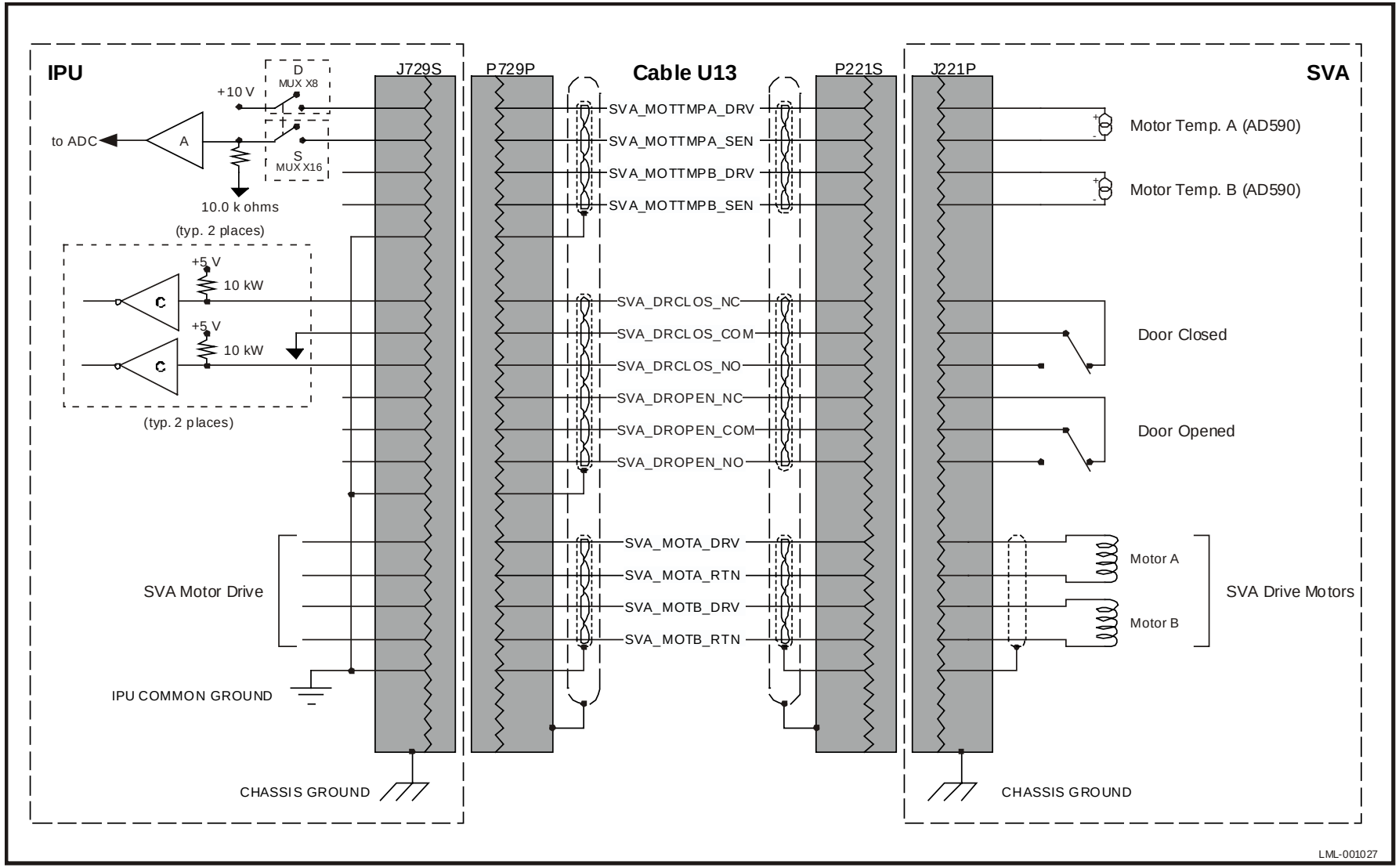

Figure 3.2.4-1 IPU to Space View Aperture Interface

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3.2.4.2 SVA Temperature Sensor Characteristics

The SVA contains a redundant pair of temperature sensors associated with the SVA Drive Motor windings. The temperature sensor type is shown in Table 3.2.4.2-1. Refer manufacturers data sheet for specifications and characteristics.

Sensor Part No.	Supply Voltage	Description	Manufacturer
AD590JF/883	+10 Vdc (nominal)	Two-Terminal IC Temperature Transducer	Analog Devices

Table 3.2.4.2-1 SVA Temperature Sensor Characteristics

3.2.4.3 SVA Position Sensor Characteristics

The SVA Position Sensors consist of two microswitches. The SVA Position Sensor type is shown in Table 3.2.4.3-1. Refer to manufactures data sheet for specifications and characteristics.

Sensor Part No.	Supply Voltage	Description	Manufacturer
11HM1	+5 Vdc	SPDT Microswitch	Honeywell

Table 3.2.4.3-1 SVA Position Sensor Characteristics

3.2.5 Physical Electrical Interface

The electrical interface between the SSH and IPU consists of cables U12 and U13.

3.2.5.1 Connector Definition

Connectors hard mounted on boxes or the structure are referred to as “jacks” (or “receptacles”) and have the letter “J” prefix in the connector number. Connectors located on harnesses, cables or wires are referred to as “plugs” and have the letter “P” prefix in the connector number. The letter “S” or “P” as the suffix of the connector number specifies contact type: “P” for pin and “S” for socket.

The connectors used for the IPU-SSH interface are defined in Table 3.2.5.1-1. The cable designation is U12. The cable has a single connector at the IPU end, and two connectors at the SSH end.

U12	Connector Designation	GSFC PPL-21 Type	Description
Receptacle on IPU	J728S	311P407-4S-B-12	62 way DD-type FEMALE
Plug at IPU end of cable	P728P	311P407-4P-B-12	62 way DD-type MALE
Receptacles on SSH	J211P	311P407-1P-B-12	15 way DD-type MALE
	J212P	311P407-3P-B-12	44 way DD-type MALE
Plugs at SSH end of cable	P211S	311P407-1S-B-12	15 way DD-type FEMALE
	P212S	311P407-3S-B-12	44 way DD-type FEMALE

Table 3.2.5.1-1 IPU-SSH Interface Connectors

The connectors used for the IPU-SVA interface are defined in Table 3.2.5.1-2. The cable designation is U13. The cable has a single connector at the IPU end and a single connector at the SVA end.

U13	Connector Designation	GSFC PPL Type	Description
Receptacle on IPU	J729S	311P407-2S-B12	26 way DD-type FEMALE
Plug at IPU end of cable	P729P	311P407-2P-B12	26 way DD-type MALE
Receptacle on SVA	J221P	311P407-1P-B12	15 way DD-type MALE
Plug at SVA end of cable	P221S	311P407-1S-B12	15 way DD-type FEMALE

Table 3.2.5.1-2 IPU-SVA Interface Connectors

3.2.5.2 Cable Configuration and Connector Pinout Definition

The cable configuration and connector pinout definitions for Cable U12 and Cable U13 are listed in the following subsections.

3.2.5.2.1 Cable U12 Configuration and Connector Pinouts

The cable configuration and connector pinout definitions for Cable U12 (IPU to SSH Control and Monitor) are shown in Table 3.2.5.2.1-1.

Table 3.2.5.2.1-1 Cable U-12 Configuration and Pinout

IPU									
P728P	**<——— Cable U12 ———>**						**SSH P211S**	**SSH P212S**	
J728S	**<— Box-Mounted Receptacles —>**						**J211P**	**J212P**	
PIN	SIGNAL NAME	TYPE	V_{max} V	I_{max} mA[1]	GROUP	WIRE SPEC.		PIN	FUNCTION
1	Blank								Blank
2	SSH_SUNSB1_SEN	Analog	10	1.0	TS4-2B	****		17	SSH Sun Sensor B1 Sense
3	SSH_SUNSB2_SEN	Analog	10	1.0	TS4-2C	****		2	SSH Sun Sensor B2 Sense
4	SSH_SUNSA1_SEN	Analog	10	1.0	TS4-1B	****		19	SSH Sun Sensor A1 Sense
5	SSH_SUNSA2_SEN	Analog	10	1.0	TS4-1C	****		4	SSH Sun Sensor A2 Sense
6	SSH_HWATMPA_DRV	Vdc	15	0.5	TS8-A	****		5	SSH HWA Temperature A Drive
7	SSH_MOTTMPB_DRV	Vdc	15	0.5	TS8-G	****		21	SSH Motor Temperature B Drive
8	SSH_MOTTMPB_SEN	Analog	10	0.5	TS8-H	****		22	SSH Motor Temperature B Sense
9	SSH_DRPOS_DRV	Vdc	15	0.5	TS3-1A	***		24	SSH Door Position Pot Drive
10	Blank								Blank
11	SSH_LATDIS_NC	Bilevel	5	0.5	TS12-A	****		11	SSH Latch Fully Disengaged µSw N.C.
12	SSH_DRCLOS_NC	Bilevel	5	0.5	TS12-D	****		12	SSH Door Fully Closed µSw N.C.
13	SSH_LATENG_NC	Bilevel	5	0.5	TS12-G	****		13	SSH Latch Fully Engaged µSw N.C.
14	SSH_DROPEN_NC	Bilevel	5	0.5	TS12-K	****		14	SSH Door Fully Open µSw N.C.
15	Blank								Blank
16	SSH_HWAHTRA_DRV	Vdc	30	0.5 A	TS4-3A	*	1		SSH HWA Heater A Drive
17	SSH_HWAHTRB_DRV	Vdc	30	0.5 A	TS4-3C	*	2		SSH HWA Heater B Drive
18	SSH_MOTAPH2_DRV	Pulse	30	0.5 A	TS3-2B	**	12		SSH Motor A Phase 2 Drive (Red)
19	Blank								Blank
20	SSH_MOTBPH2_DRV	Pulse	30	0.5 A	TS3-3B	**	14		SSH Motor B Phase 2 Drive (Red-Wht)
21	Blank								Blank
22	Blank								Blank
23	SSH_SUNSB3_SEN	Analog	5	1.0	TS4-2D	****		32	SSH Sun Sensor B3 Sense
24	Blank								Blank
25	SSH_SUNSA3_SEN	Analog	5	1.0	TS4-1D	****		34	SSH Sun Sensor A3 Sense
26	Blank								Blank
27	SSH_HWATMPA_SEN	Analog	10	0.5	TS8-B	****		6	SSH HWA Temperature A Sense
28	SSH_HWATMPB_DRV	Vdc	15	0.5	TS8-C	****		7	SSH HWA Temperature B Drive

IPU							SSH	SSH	
P728P	**<——— Cable U12 ———>**						**P211S**	**P212S**	
J728S	**<— Box-Mounted Receptacles —>**						**J211P**	**J212P**	
PIN	SIGNAL NAME	TYPE	V_{max} V	I_{max} mA[1]	GROUP	WIRE SPEC.		PIN	FUNCTION
29	SSH_MOTTMPA_DRV	Vdc	15	0.5	TS8-E	****		35	SSH Motor Temperature A Drive
30	SSH_DRPOS_W	Analog	15	0.5	TS3-1B	***		39	SSH Door Position Pot Wiper
31	SSH_DRPOS_RTN	Vdc	0	0.5	TS3-1C	***		25	SSH Door Position Pot Return
32	Blank								Blank
33	SSH_LATDIS_COM	Vdc	0	0.5	TS12-B	****		27	SSH Latch Fully Disengaged µSw Com
34	SSH_DRCLOS_COM	Vdc	0	0.5	TS12-E	****		28	SSH Door Fully Closed µSw Com
35	SSH_LATENG_COM	Vdc	0	0.5	TS12-H	****		29	SSH Latch Fully Engaged µSw Com
36	SSH_DROPEN_COM	Vdc	0	0.5	TS12-L	****		30	SSH Door Fully Open µSw Com
37	SSH_HWAHTRA_RTN	Vdc	0	0.5 A	TS4-3B	*	11		SSH HWA Heater A Return
38	SSH_HWAHTRB_RTN	Vdc	0	0.5 A	TS4-3D	*	6		SSH HWA Heater B Return
39	SSH_MOTAPH1_DRV	Pulse	30	0.5 A	TS3-2A	**	7		SSH Motor A Phase 1 Drive (Yel)
40	SSH_MOTAPH3_DRV	Pulse	30	0.5 A	TS3-2C	**	13		SSH Motor A Phase 3 Drive (Wht)
41	SSH_MOTBPH1_DRV	Pulse	30	0.5 A	TS3-3A	**	9		SSH Motor B Phase 1 Drive (Yel-Wht)
42	SSH_MOTBPH3_DRV	Pulse	30	0.5 A	TS3-3C	**	15		SSH Motor B Phase 3 Drive (Wht-Blk)
43	Blank								Blank
44	SSH_SUNSB_SHD	Shield			TS4-2			1	SSH Sun Sensors B Cable Shield
45	SSH_SUNSB_COM	Vdc	0	4.0	TS4-2A	****		31	SSH Sun Sensors B Common
46	SSH_SUNSA_SHD	Shield			TS4-1			3	SSH Sun Sensors A Cable Shield
47	SSH_SUNSA_COM	Vdc	0	4.0	TS4-1A	****		33	SSH Sun Sensors A Common
48	SSH_HWATMPB_SEN	Analog	10	0.5	TS8-D	****		8	SSH HWA Temperature B Sense
49	SSH_MOTTMPA_SEN	Analog	10	0.5	TS8-B	****		36	SSH Motor Temperature A Sense
50	SSH_TMP_SHD	Shield			TS8				SSH Temperature Sensor Cable Shield
51	SSH_DRPOS_SHD	Shield			TS3-1			9	SSH Door Position Pot Cable Shield
52	SSH_USW_SHD	Shield			TS12				SSH µSwitch Shield
53	Blank								Blank
54	SSH_LATDIS_NO	Bilevel	5	0.5	TS12-C	****		41	SSH Latch Fully Disengaged µSw N.O.
55	SSH_DRCLOS_NO	Bilevel	5	0.5	TS12-F	****		42	SSH Door Fully Closed µSw N.O.
56	SSH_LATENG_NO	Bilevel	5	0.5	TS12-J	****		43	SSH Latch Fully Engaged µSw N.O.
57	SSH_DROPEN_NO	Bilevel	5	0.5	TS12-M	****		44	SSH Door Fully Open µSw N.O.
58	SSH_HWA_SHD	Shield			TS4-3		3		SSH HWA Shield
59	Blank								Blank

IPU							SSH	SSH	
P728P	**<——— Cable U12 ———>**						**P211S**	**P212S**	
J728S	**<— Box-Mounted Receptacles —>**						**J211P**	**J212P**	
PIN	SIGNAL NAME	TYPE	V_{max} V	I_{max} mA[1]	GROUP	WIRE SPEC.		PIN	FUNCTION
60	SSH_MOTA_SHD	Shield			TS3-2		8		SSH Drive Motor A Shield
61	Blank								Blank
62	SSH_MOTB_SHD	Shield			TS3-3		10		SSH Motor B Shield
shell	SSH_CHASS_GND						shell	shell	Overall Shield to Chassis
	Blank						4		
	Blank						5		
	Blank							10	
	Blank							15	
	Blank							16	
	Blank							18	
	Blank							20	
	Blank							23	
	Blank							26	
	Blank							37	
	Blank							38	
	Blank							40	
*	M27500-22SC4S23								
**	M27500-24SC3S23								
***	M27500-26SC3S23								
****	M22759/33-26-9								

Notes: 1. Unless otherwise specified.

3.2.5.2.2 Cable U13 Configuration and Connector Pinouts

The cable configuration and connector pinout definitions for Cable U13 (IPU to SVA Control and Monitor) are shown in Table 3.2.5.2.2-1.

Table 3.2.5.2.2-1 Cable U13 Configuration and Pinout

IPU							**SVA**	
P729P	**<——— Cable U13 ———>**						**P221S**	
J729S	**<— Box-Mounted Receptacles —>**						**J221P**	
PIN	SIGNAL NAME	TYPE	V_{max} V	I_{max} mA[1]	GROUP	WIRE SPEC.	PIN	FUNCTION
1	Blank							
2	SVA_MOTTMPA_DRV	Vdc	10	0.5	TS4-1A	**	1	SVA Motor Temperature A Drive
3	SVA_MOTTMPB_DRV	Vdc	10	0.5	TS4-1C	**	7	SVA Motor Temperature B Drive
4	SVA_DROPEN_NC	Bilevel	5	0.5	TS6-D	***	2	SVA Door Fully Open µSw N.C.
5	SVA_DRCLOS_NC	Bilevel	5	0.5	TS6-A	***	15	SVA Door Fully Closed µSw N.C.
6	Blank							
7	SVA_MOTA_DRV	Drive	30	2.0A	TS4-2A	*	3	SVA Motor Motor A Drive
8	SVA_MOTB_DRV	Drive	30	2.0A	TS4-2C	*	4	SVA Motor Motor B Drive
9	Blank							
10	Blank							
11	SVA_MOTTMPA_SEN	Analog	5	0.5	TS4-1B	**	6	SVA Motor Temperature A Sense
12	SVA_MOTTMPB_SEN	Analog	5	0.5	TS4-1D	**	12	SVA Motor Temperature B Sense
13	SVA_DROPEN_COM	Bilevel	0	0.5	TS6-E	***	13	SVA Door Fully Open µSw Com
14	SVA_DRCLOS_COM	Bilevel	0	0.5	TS6-B	***	10	SVA Door Fully Closed µSw Com
15	Blank							
16	SVA_MOTA_RTN	Drive	0	2.0A	TS4-2B	*	14	SVA Motor Motor A Return
17	SVA_MOTB_RTN	Drive	0	2.0A	TS4-2D	*	9	SVA Motor Motor B Return
18	Blank							
19	Blank							
20	SVA_TMP_SHD	Shield						SVA Motor Temperature Shield
21	SVA_SW_SHD	Shield						SVA Micro Switch Shield
22	SVA_DROPEN_NO	Bilevel	5	0.5	TS6-F	***	8	SVA Door Fully Open µSw N.O.
23	SVA_DRCLOS_NO	Bilevel	5	0.5	TS6-C	***	5	SVA Door Fully Closed µSw N.O.
24	Blank							

IPU							SVA	
P729P	<——— Cable U13 ———>						P221S	
J729S	<— Box-Mounted Receptacles —>						J221P	
PIN	SIGNAL NAME	TYPE	V_{max} V	I_{max} mA[1]	GROUP	WIRE SPEC.	PIN	FUNCTION
25	SVA_MOT_SHD	Shield					11	SVA Motor Drive Shield
26	Blank							
shell	SVA_CHASS_GND						shell	Overall cable shield to chassis
*	M27500-24SC4S23							
**	M27500-26SC4S23							
***	M22759/33-26-9							
Notes: 1. Unless otherwise specified.								

3.3 Functional Interface

Refer to SP-HIR-103 Command & Telemetry Handbook (C&TH).

3.4 Mechanical Interface

N/A

3.5 Thermal Interface

N/A

3.6 Optical Interface

N/A

3.7 Electrical Bonding

N/A

3.8 Other Interfaces

N/A

4 ABBREVIATIONS & ACRONYMS

ADC	Analog to Digital Converter
C&TH	Command and Telemetry Handbook
HRM	Hold-down Release Mechanism
HWA	Hot Wax Actuator
IC	Integrated Circuit
ICD	Interface Control Document
IICD	Internal Interface Control Document
IPS	Instrument Processor Subsystem
IPU	Instrument Processor Unit
ITS	Instrument Technical Specification
PCU	Power Converter Unit
SPDT	Single Pole Double Throw
SSH	Sunshield Subsystem
SVA	Space View Aperture
TBD	To Be Determined
TBV	To Be Verified

END