Mobile Servicing System to User (Generic) Interface Control Document Part 2

International Space Station Program

Revision A,

May 22, 1997

Type 1
Approved by NASA

Canadian Space Agency | Agence spatiale canadienne

National Aeronautics and Space Administration
International Space Station Program
Johnson Space Center
Houston, Texas

REVISION AND HISTORY PAGE

REV.	DESCRIPTION	PUB. DATE
	CHANGE	00–00

PREFACE

SSP 42004, Mobile Servicing System to User (Generic) Interface Control Document, Part 2, shall be implemented on all new Program contractural and internal activity and shall be included in any existing contracts through contract changes. This document is under the control of the Space Station Control Board (SSCB) with the concurrence of the respective International Partners, any changes or revisions will be approved by the SSCB and the respective International Partners.

Program Manager, International Space Station Alpha	Date

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MOBILE SERVICING SYSTEM TO USER (GENERIC)
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INTERNATIONAL SPACE STATION PROGRAM

MOBILE SERVICING SYSTEM TO USER (GENERIC) INTERFACE CONTROL DOCUMENT PART 2

LIST OF CHANGES

MAY 22, 1997

All changes to paragraphs, tables, and figures in this document are shown below:

SSCBD	ENTRY DATE	CHANGE	PARAGRAPH(S)
			TABLE(S)
			FIGURE(S)
			APPENDIX(ES)
			ADDENDA

TABLE OF CONTENTS

APPENDIX

FIGURES

TABLES

1.0 INTRODUCTION

1.1 PURPOSE AND SCOPE

This Interface Control Document (ICD) Part 2 defines and controls the physical and functional interfaces between the Canadian Mobile Servicing System (MSS) and Users. For purposes of this ICD, the term “user” shall be defined as any payload, pallet, or Orbit–Replaceable Unit (ORU) that interfaces with the Space Station Remote Manipulator System (SSRMS) Latching End Effector (LEE), the Special Purpose Dexterous Manipulator (SPDM) LEE, the Payload/ORU Accommodation (POA), the Mobile Base System (MBS) Common Attach System (CAS), or the SPDM manipulators.

1.2 PRECEDENCE

In the event of conflict between SSP 41000, Space Station System Specification, and the contents of this ICD, the requirements of SSP 41000 shall take precedence.

1.3 RESPONSIBILITY AND CHANGE

This document is prepared and maintained in accordance with SSP 30459, International Space Station Interface Control Plan. The National Aeronautics and Space Administration (NASA) shall delegate the responsibility for preparation and maintenance of this ICD Part 2.

2.0 APPLICABLE DOCUMENTS

The following documents of the date and issue shown include specifications, models, standards, and form a part of this document to the extent specified herein.

DOCUMENT NO.	TITLE
SSP 30482 Rev A, CN–001 1 Jan 1994	Electrical Power Specification and Standards: Vol I, Electrical Performance Specifications
SSP 30482 Rev A, CN–001 1 Jan 1994	Electrical Power Specification and Standards: Vol II, Consumer Constraints
SSP 41000 Rev E 28 Jan 1997	System Specification for Space Station
SSQ 21635	Electrical Connector Specifications
NSTS–21000–IDD–ISS	Shuttle Orbiter/International Space Station Interface Definition Document
SSP 30459	International Space Station Interface Control Plan
SSP 42003, Part 2	Space Station Manned Base to Mobile Servicing System Interface Control Document, Part 2
SSP 42004, Part 1	Mobile Servicing System (MSS) to User (Generic) Interface Control Document, Part 1

SECTION A3 PDGF TO USER INTERFACES

A3 INTERFACE DEFINITION

A3.1 GENERAL

A3.1.1 INTERFACE DESCRIPTION

The physical interface (mechanical, structural, thermal and environmental) plane is defined at the Power and Data Grapple Fixture (PDGF) mounting ring surface to the User. The utility interface plane (power, data and video) is defined between the PDGF harness and the User connectors at the User end of the harness.

A3.1.2 ENGINEERING UNITS AND TOLERANCES

Unless otherwise noted herein, all dimensions are shown in the English system of inch pound (IP) units.

A3.2 STRUCTURAL/MECHANICAL INTERFACES

The PDGF attaches to the User via eight fasteners. The bolt hole pattern and related mechanical installation details are defined in Figures A3.2–1 through A3.2–3.

A3.3 ENVIRONMENTS

The PDGF to User electromagnetic, grounding and bonding interface implementation will be as defined in Figures A3.2–1 through A3.2–3.

A3.4 ELECTRICAL INTERFACES

The SSRMS Tip LEE will provide power, data and Pulse Frequency Modulation (PFM) sync and control, and PFM video interfaces to the User via the User PDGF as defined in Figure A3.4–1.

The MBS POA will provide power, data and PFM sync and control, and PFM video interfaces to the User via the User PDGF as defined in Figure A3.4–2.

The SPDM LEE will provide power interfaces to the User via the User PDGF as defined in Figure A3.4–3 (TBD#1).

The SSRMS will provide Keep–Alive power to the JEM–PM via the PDGF as defined in Figure A3.4–4.

The SSRMS will provide Keep–Alive power to the APM via the PDGF as defined in Figure A3.4–5.

A3.4.1 POWER, RETURN AND GROUNDING INTERFACES

The SSRMS LEE and MBS POA will provide power, return and grounding interfaces to the User via the PDGF as shown in Figures A3.4–1 and A3.4–2.

The PDGF external harness design for a User will be unique for each application. An example of a PDGF external harness design is shown in SSP 42003, Part 2, Section D.

A3.4.2 PDGF POWER CONNECTORS AND PIN ASSIGNMENTS

The PDGF power connectors and pin assignments for the User (power via the SSRMS Tip LEE) will be as defined in Tables A3.4.2.–1 through A3.4.2.–2.

The PDGF power connectors and pin assignments for the User (power via the MBS POA) will be as defined in Tables A3.4.2.–3 through A3.4.2.–4.

The PDGF power connectors and pin assignments for the User (power via the SPDM LEE) will be as defined in Tables A3.4.2.–5 through A3.4.2.–6 (TBD#2).

A3.4.3 PDGF DATA AND PFM VIDEO INTERFACES

The C & DH subsystem will support data interfaces between the User and the SSRMS LEE.

The C & DH subsystem will support data interfaces between the User and the MBS POA.

PFM sync and control and PFM video will be carried by copper lines between the User PDGF and the SSRMS LEE, and User PDGF and the MBS POA.

A3.4.3.1 PDGF DATA AND VIDEO CONNECTORS AND PIN ASSIGNMENTS

The PDGF data and PFM video connectors and pin assignments for the User (via the SSRMS Tip LEE) will be as defined in Tables A3.4.3.1–1 through A3.4.3.1–2.

The PDGF data and PFM video connectors and pin assignments for the User (via the MBS POA) will be as defined in Tables A3.4.3.1–3 through A3.4.3.1–4.

A3.4.4 VIDEO PROVISIONS FOR USERS

During SSRMS or MBS POA operations, the MSS will provide video capability as defined in Table A3.4.4–1.

A3.5 THERMAL INTERFACES

The PDGF to User thermal interface implementation will be as defined in Figures A3.2–1 through A3.2–3.

A3.6 SOFTWARE INTERFACES

There are no software interfaces between the User PDGF and the SSRMS LEE or MBS POA.

A3.7 PDGF TARGET

The PDGF grapple target will have features as defined in Figures A3.2–1 through A3.2–3.

NOTES:

1 INTERPRET DRAWING PER DOD-STD-100.

2 SEE SHEET 3 FOR CONNECTOR CONTACTS ASSIGNMENT.

3 CONNECTOR IDENTIFIERS FOR THE PURPOSE OF THIS DRAWING ONLY.

4 FOR INTERFACE REQUIREMENTS SEE SPAR-SS-ICD-0462.

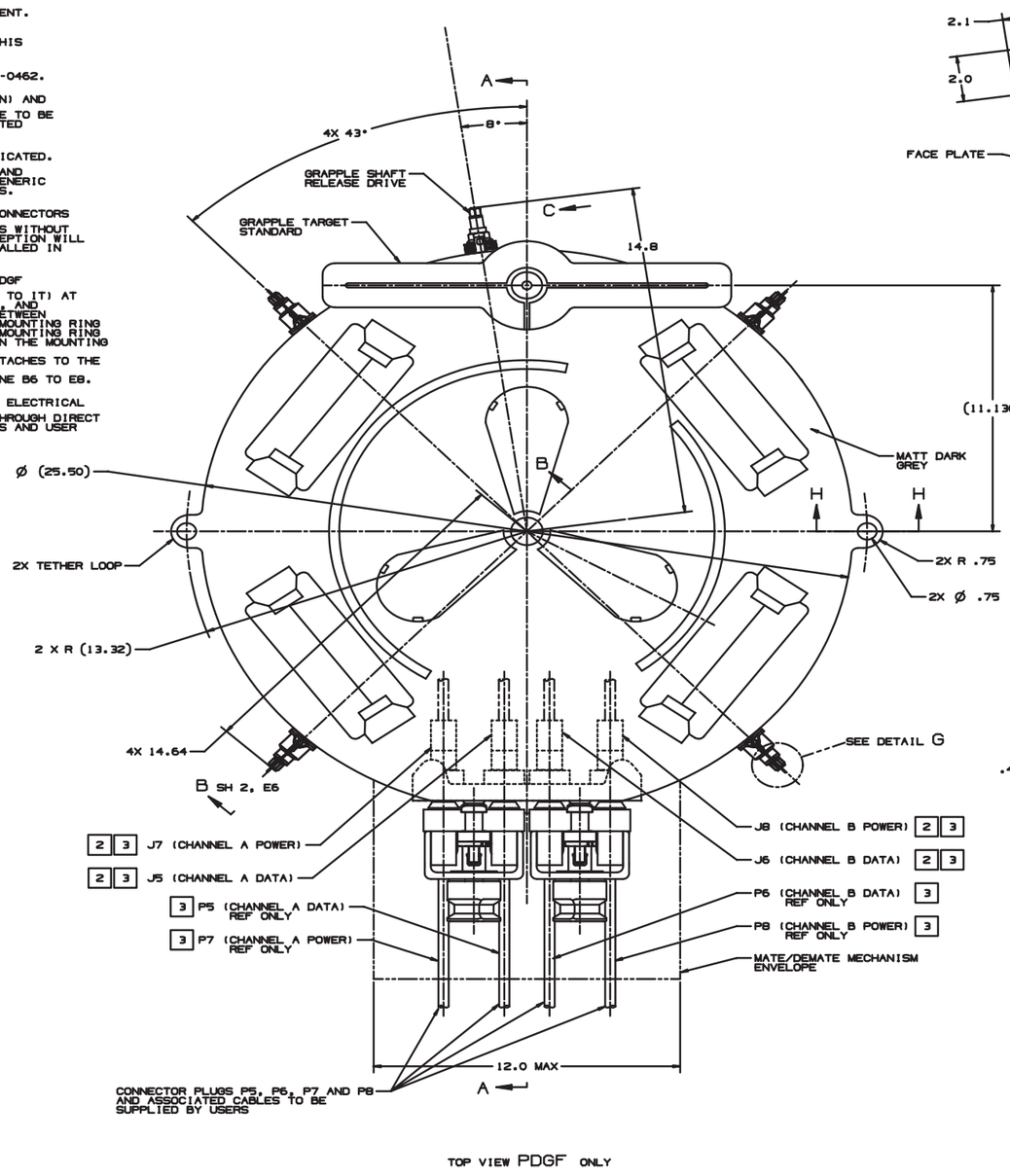
5 HOLES THROUGH THE THERMAL BUSHING (DETAIL N) AND THE USER MOUNTING SURFACE (SECTION F-F) ARE TO BE DRILLED AT ASSEMBLY TO THE DIAMETER INDICATED WHILE ENSURING THE RADIAL FLOAT SHOWN.

6 THE "MBS" DOES NOT REQUIRE THE B/U BUS INDICATED. HOWEVER ALL PDGF'S WILL HAVE CABLES, PINS AND SOCKETS FOR THE B/U BUS SO PDGF'S REMAIN GENERIC AND APPLICABLE TO ALL INTENDED APPLICATIONS.

7 WHEN CONTACTS ARE NOT USED IN ELECTRICAL CONNECTORS THE CONNECTOR WILL HAVE THE PINS OR SOCKETS WITHOUT WIRES IN THE APPROPRIATE LOCATION. THE EXCEPTION WILL BE COAXIAL CONTACTS WHICH WILL NOT BE INSTALLED IN UNUSED LOCATIONS.

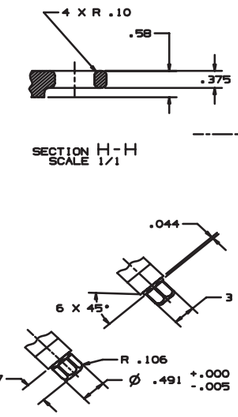
8 TO ENSURE THE CORRECT ORIENTATION OF THE PDGF MOUNTING RING (AND THE PDGF WHICH ATTACHES TO IT) AT INSTALLATION; USERS, MANUFACTURING, DESIGN, AND ASSEMBLY SHALL MAINTAIN THE RELATIONSHIP BETWEEN
A) SMALL COARSE ALIGNMENT BRACKETS ON THE MOUNTING RING
B) LARGE COARSE ALIGNMENT BRACKETS ON THE MOUNTING RING
C) SERIALIZATION AND PART NUMBER MARKING ON THE MOUNTING RING
D) TARGET ROD LOCATION ON THE PDGF THAT ATTACHES TO THE MOUNTING RING
AS INDICATED ON SHEET 2 OF THIS DRAWING ZONE B6 TO E8.

9 USER STRUCTURE SHALL PROVIDE FOR CLASS 'R' ELECTRICAL BONDING AS PER SSP 30245, TO BE ACHIEVED THROUGH DIRECT PRE LOADED CONTACT BETWEEN "H" CONTACT PADS AND USER MOUNTING SURFACE.

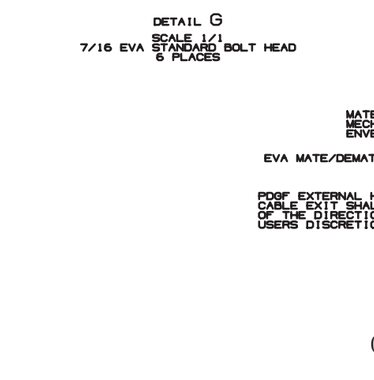


TOP VIEW PDGF ONLY

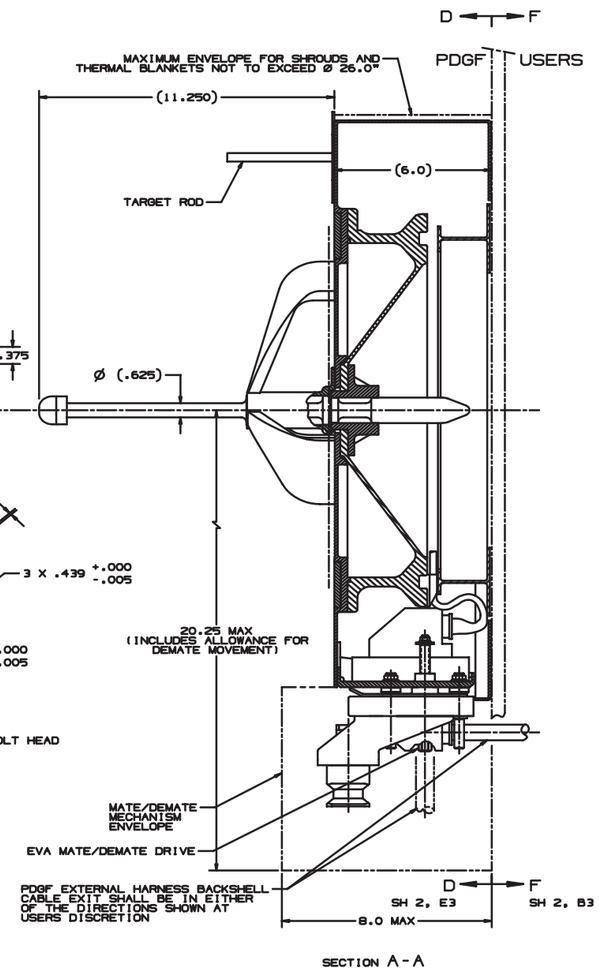
VIEW C
GRAPPLE SHAFT ORU RELEASE DRIVE



SECTION H-H
SCALE 1/1



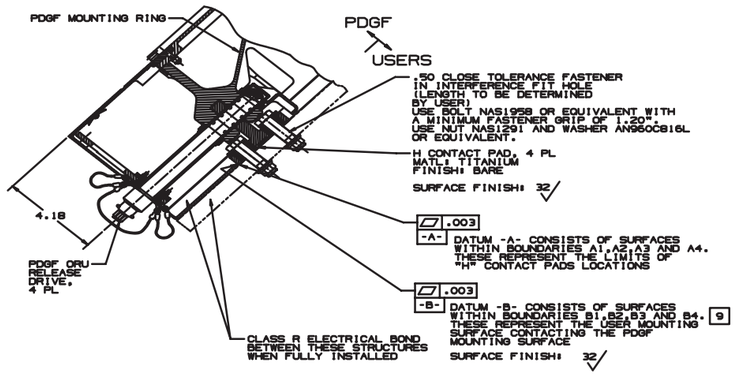
DETAIL G
SCALE 1/1
7/16 EVA STANDARD BOLT HEAD 6 PLACES



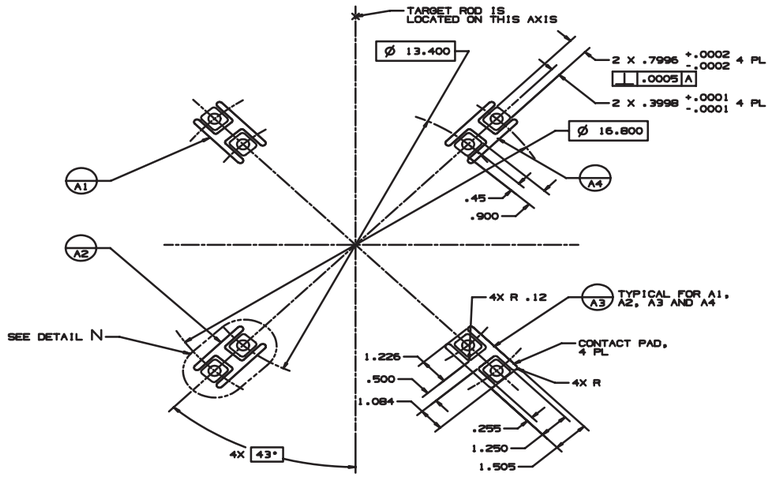
SECTION A-A

(Reference SPAR drawing 51618–0012, sheet 1 of 3)

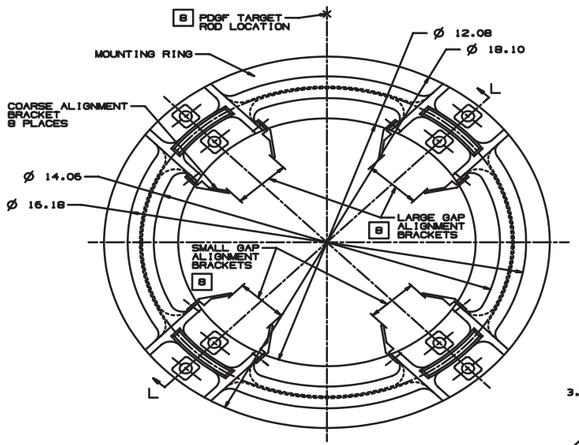
FIGURE A3.2–1 PDGF INTERFACE TO USERS



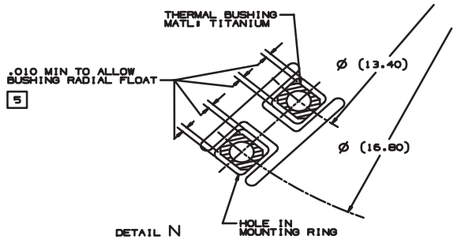
SECTION B-B
SH1,C7



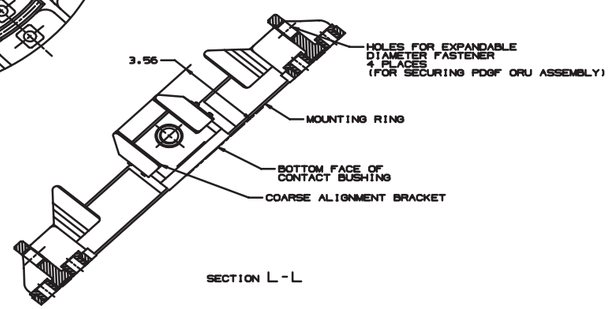
SECTION D-D SH 1, B2
PDGF MOUNTING RING MOUNTING SURFACE AND BOLT HOLE PATTERNS



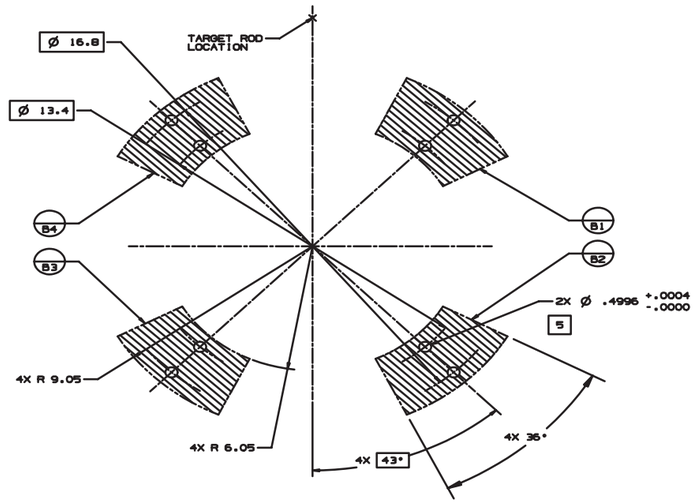
MOUNTING RING
TOP VIEW



DETAIL N
4 PL
SCALE 1/1



SECTION L-L



SECTION F-F SH1,B2
USER MOUNTING SURFACE AND BOLT HOLE PATTERNS

(Reference SPAR drawing 51618–0012, sheet 2 of 3)

FIGURE A3.2–2 PDGF INTERFACE TO USERS

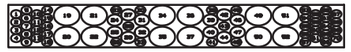
LEGEND FOR CABLE DESCRIPTION

N S/T N
- CABLE NUMBER
- S=SHIELDED - T=TWISTED - B=BRAID
- NUMBER OF WIRES IN CABLE

CONNECTOR J7 (CHANNEL A POWER)
CONTACTS ASSIGNMENT

CONTACT ID	CONTACT SIZE	WIRE SIZE	CABLE DESC	SHIELD DISP	FUNCTION
19	12	12	2T1		MSS LOCAL POWER BUS 1
20	12	12	2T1		MSS LOCAL POWER BUS 1 RETURN
21	12	12	2T2		MSS LOCAL POWER BUS 2
22	12	12	2T2		MSS LOCAL POWER BUS 2 RETURN
49	12	12	2T3		PAYLOAD POWER BUS 1
50	12	12	2T3		PAYLOAD POWER BUS 1 RETURN
51	12	12	2T4		PAYLOAD POWER BUS 2
52	12	12	2T4		PAYLOAD POWER BUS 2 RETURN
35	12	12	1 COND		MSS LOCAL GROUND

7 THE FOLLOWING CONTACTS ARE NOT USED:
1 TO 18
33 TO 34
36 TO 48
53 TO 70

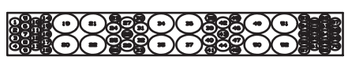


J7 CONN. RECEPTACLE PART NO PS239557-07
PIN NO PS239556-03,PS239556-02,PS239556-01
REF ONLY - P7 CONN. PLUG PART NO PS239557-02
SOCKET NO PS239556-07,PS239556-06,PS239556-05
BACKSHELL #PS239558-01

CONNECTOR J8 (CHANNEL B POWER)
CONTACTS ASSIGNMENTS

CONTACT ID	CONTACT SIZE	WIRE SIZE	CABLE DESC	SHIELD DISP	FUNCTION
19	12	12	2T1		MSS LOCAL POWER BUS 1
20	12	12	2T1		MSS LOCAL POWER BUS 1 RETURN
21	12	12	2T2		MSS LOCAL POWER BUS 2
22	12	12	2T2		MSS LOCAL POWER BUS 2 RETURN
49	12	12	2T3		PAYLOAD POWER BUS 1
50	12	12	2T3		PAYLOAD POWER BUS 1 RETURN
51	12	12	2T4		PAYLOAD POWER BUS 2
52	12	12	2T4		PAYLOAD POWER BUS 2 RETURN
35	12	12	1 COND		MSS LOCAL GROUND
39	20	20	2T5		BACKUP POWER BUS
40	20	20	2T5		BACKUP POWER BUS RETURN } 6

7 THE FOLLOWING CONTACTS ARE NOT USED:
1 TO 18
33 TO 34
36 TO 38
41 TO 48
53 TO 70



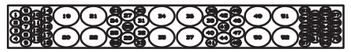
J8 CONN. RECEPTACLE PART NO PS239557-07
PIN NO PS239556-03,PS239556-02,PS239556-01
REF ONLY - P8 CONN. PLUG PART NO PS239557-02
SOCKET NO PS239556-07,PS239556-06,PS239556-05
BACKSHELL #PS239558-01

CONNECTOR J5 (CHANNEL A DATA)
CONTACTS ASSIGNMENTS

CONTACT ID	CONTACT SIZE	WIRE SIZE	CABLE DESC	SHIELD DISP	FUNCTION
34	COAX	RD316	COAX	••	VIDEO CHANNEL 1
36	COAX	RD316	COAX	••	VIDEO CHANNEL 2
35	COAX	RD316	COAX	••	VIDEO COMPOSITE SYNC 1
47	20	22	2ST3		MSS LOCAL BUS A (HI)
44	20	22	2ST3		MSS LOCAL BUS A (LO)
				• 2ST3	SHIELD

7 THE FOLLOWING CONTACTS ARE NOT USED:
1 TO 33
37 TO 43
45,46
48 TO 70

• SHIELDS ARE CONNECTED TO THE BACKSHELLS
•• COAX SHIELDS ARE CONNECTED TO THE BACKSHELLS AND THE COAX CONTACT SHIELD.



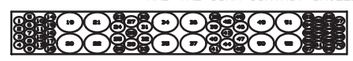
J5 CONN. RECEPTACLE PART NO PS239557-15
PIN NO PS239556-03,PS239556-02,PS239556-01,PS239556-04
REF ONLY - P5 CONN. PLUG PART NO PS239557-13
SOCKET NO PS239556-07,PS239556-06,PS239556-05,PS239556-08
BACKSHELL #PS239558-01

CONNECTOR J6 (CHANNEL B DATA)
CONTACTS ASSIGNMENT

CONTACT ID	CONTACT SIZE	WIRE SIZE	CABLE DESC	SHIELD DISP	FUNCTION
34	COAX	RD316	COAX	••	VIDEO CHANNEL 3
36	COAX	RD316	COAX	••	VIDEO COMPOSITE SYNC 2
42	20	22	2ST4		B/U 1553 BUS (HI) } 6
46	20	22	2ST4		B/U 1553 BUS (LO) } 6
				• 2S1	SHIELD
47	20	22	2ST3		MSS LOCAL BUS B (HI)
44	20	22	2ST3		MSS LOCAL BUS B (LO)
				• 2ST3	SHIELD

7 THE FOLLOWING CONTACTS ARE NOT USED:
1 TO 33
35,37 TO 41
43,45
48 TO 70

• SHIELDS ARE CONNECTED TO THE BACKSHELLS
•• COAX SHIELDS ARE CONNECTED TO THE BACKSHELL AND THE COAX CONTACT SHIELD.



J6 CONN. RECEPTACLE PART NO PS239557-15
PIN NO PS239556-03,PS239556-02,PS239556-01,PS239556-04
REF ONLY - P6 CONN. PLUG PART NO PS239557-13
SOCKET NO PS239556-07,PS239556-06,PS239556-05,PS239556-08
BACKSHELL #PS239558-01

(Reference SPAR drawing 51618–0012, sheet 3 of 3)

FIGURE A3.2–3 PDGF INTERFACE TO USERS

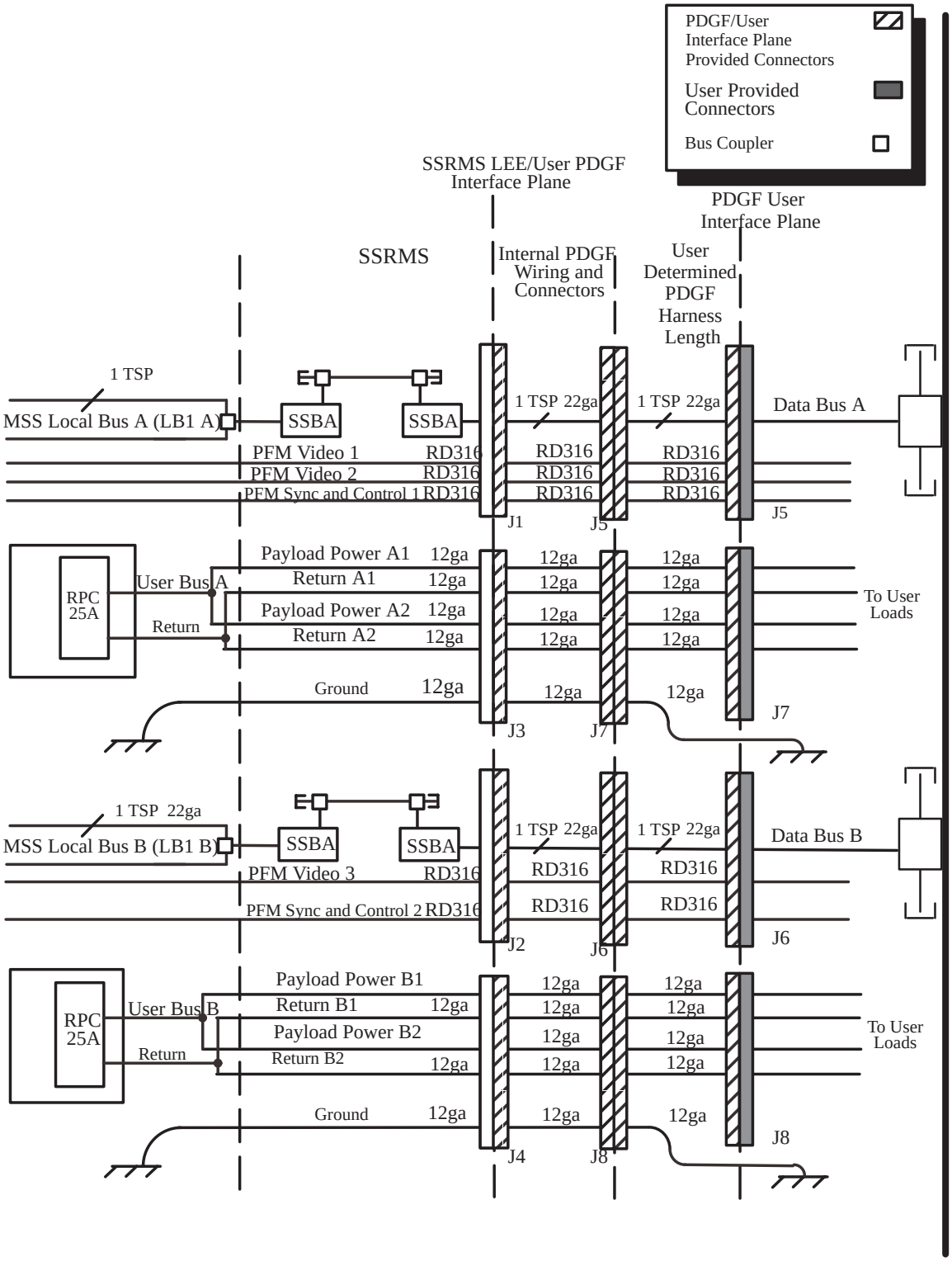


FIGURE A3.4–1 PDGF TO USER (VIA SSRMS) ELECTRICAL INTERFACE AND CURRENT PROTECTION DIAGRAM

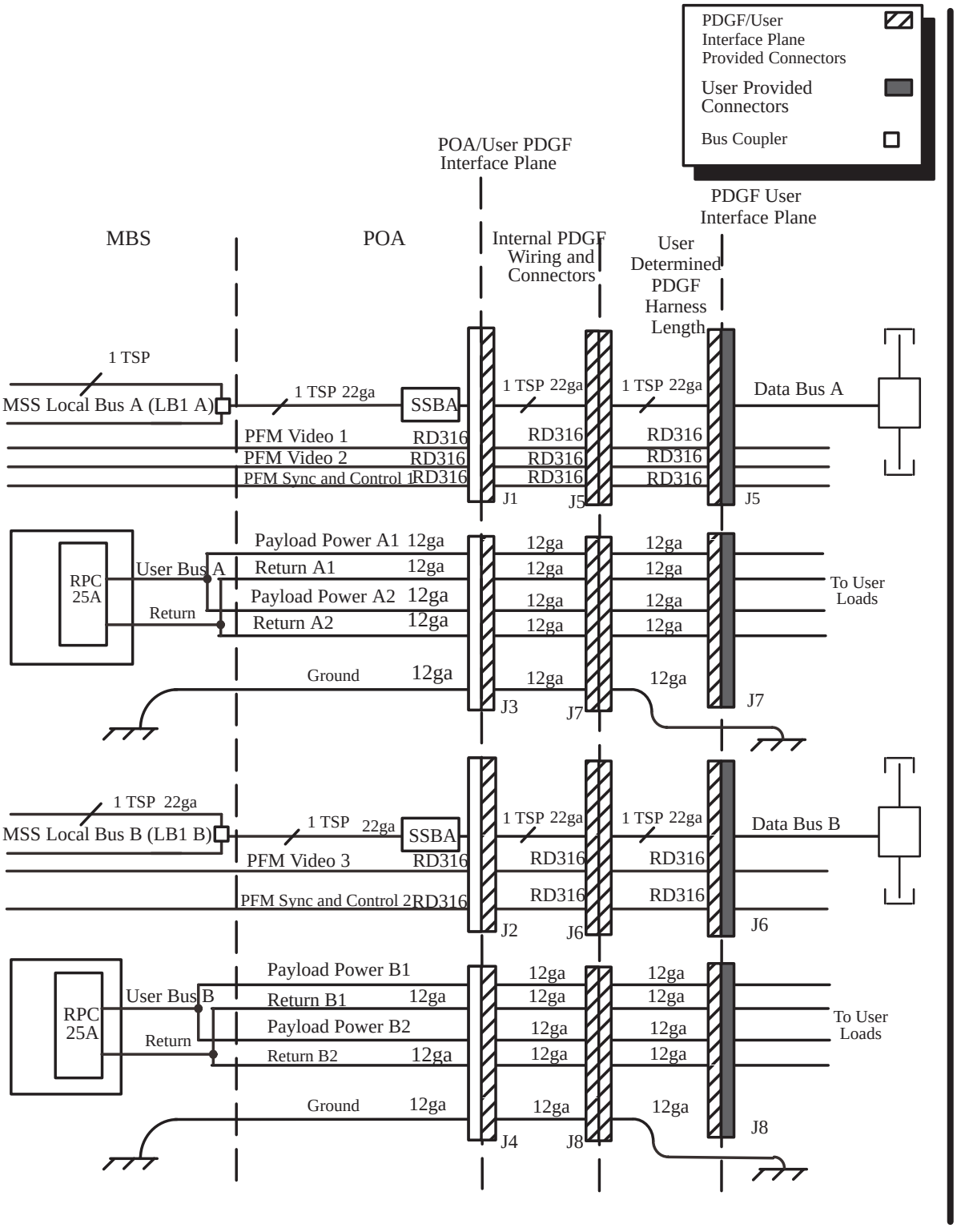
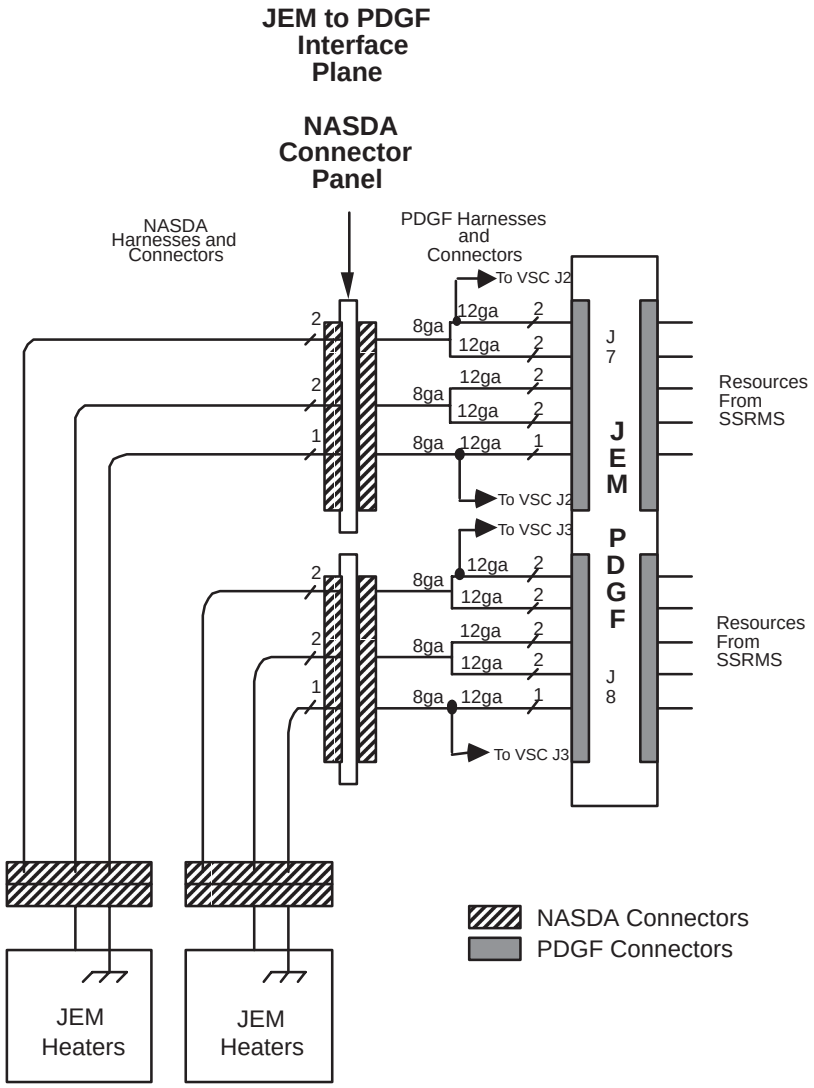


FIGURE A3.4–2 PDGF TO USER (VIA POA) ELECTRICAL INTERFACE AND CURRENT PROTECTION DIAGRAM

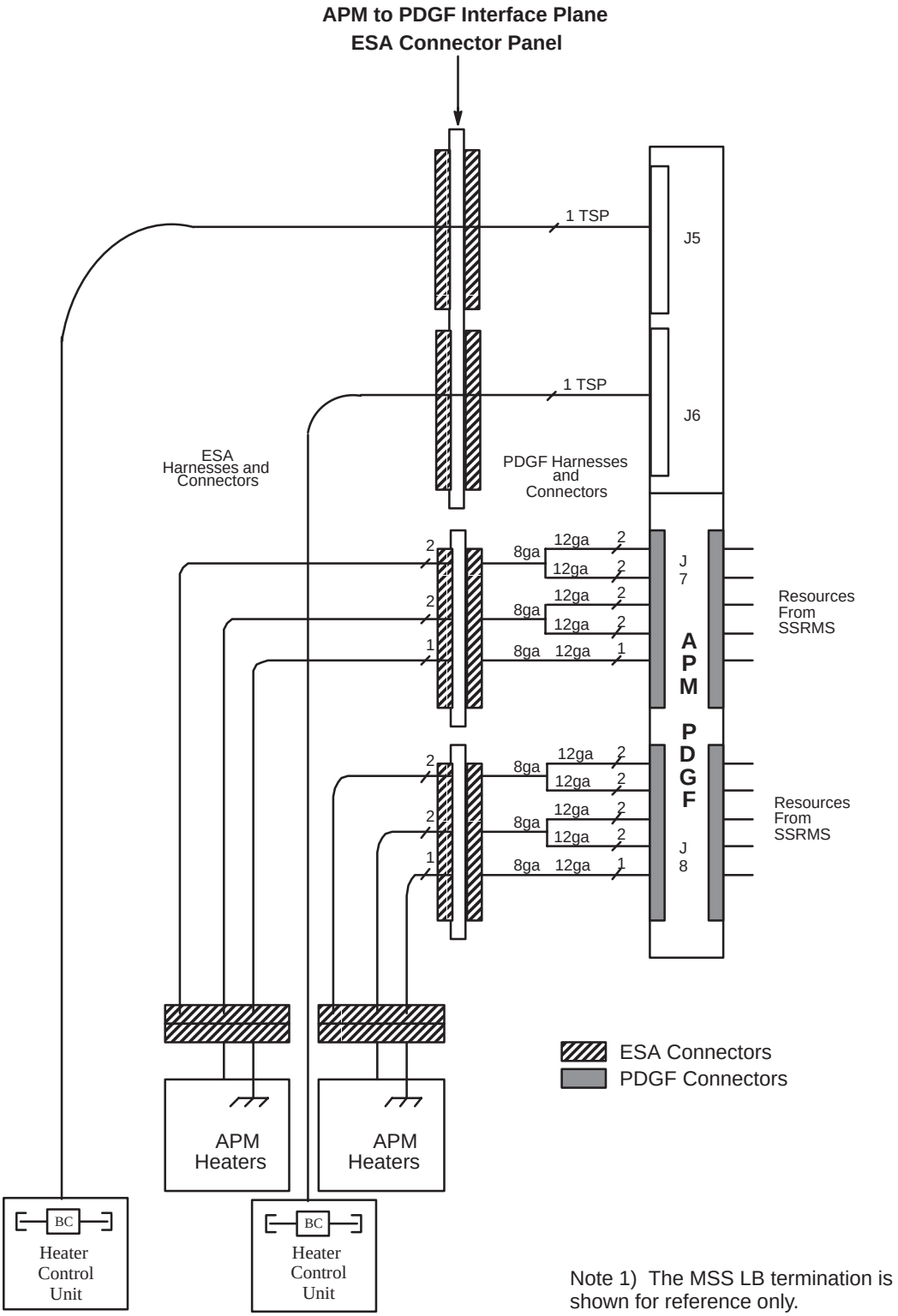
TBD #1

FIGURE A3.4–3 PDGF TO USER (VIA SPDM) ELECTRICAL INTERFACE AND CURRENT PROTECTION DIAGRAM



Notes:
1) VSC not shown.
2) Total keep–alive power drawn will include VSC keep–alive power as defined in SSP 42003, Section H.

FIGURE A3.4–4 JEM–PM TO PDGF KEEP–ALIVE ELECTRICAL SYSTEM DIAGRAM



Note 1) The MSS LB termination is shown for reference only.

FIGURE A3.4–5 APM TO PDGF KEEP–ALIVE ELECTRICAL SYSTEM DIAGRAM

TABLE A3.4.2–1 PDGF POWER FROM SSRMS (PRIME) CHARACTERISTICS, CONNECTORS, AND PIN ASSIGNMENTS (J7)

POWER SPECIFICATIONS							
Contact ID	Signal Function	Peak [2] Power (kW)	Minimum Voltage (VDC)	Maximum Current [3] [A]	EMC Class	Power [1] Quality Type	Wire Gauge (ga)
35	Ground	1.8	0	25	EO	C	12
49	Payload Power Bus 1	1.8	108.5	25	EO	C	12
50	Return 1	1.8	108.5	25	EO	C	12
51	Payload Power Bus 2	1.8	108.5	25	EO	C	12
52	Return 2	1.8	108.5	25	EO	N/A	12

Notes:

1) Power quality characteristics at this interface shall meet the interface “C” power quality requirements in SSP 30482 except for minimum voltage.

2) Table reflects design to peak power requirements and the associated minimum voltage at the LEE/PDGF interface plane.

3) Nominal rating of CRPCM output port, as defined in SSP 42004, Section A, Part 1.

4) Connector specifications are as per SSQ 21635.

5) For connector part numbers, refer to Figure A3.2–3.

TABLE A3.4.2–2 PDGF POWER FROM SSRMS (REDUNDANT) CHARACTERISTICS, CONNECTORS, AND PIN ASSIGNMENTS (J8)

POWER SPECIFICATIONS							
Contact ID	Signal Function	Peak [2] Power (kW)	Minimum Voltage (VDC)	Maximum Current [3] [A]	EMC Class	Power 1 Quality Type	Wire Gauge (ga)
35	Ground	1.8	0	25	EO	C	12
49	Payload Power Bus 1	1.8	108.5	25	EO	C	12
50	Return 1	1.8	108.5	25	EO	C	12
51	Payload Power Bus 2	1.8	108.5	25	EO	C	12
52	Return 2	1.8	108.5	25	EO	N/A	12

Notes:

1) Power quality characteristics at this interface shall meet the interface ”C” power quality requirements in SSP 30482, except for minimum voltage.

2) Table reflects design to peak power requirements and the associated minimum voltage at the LEE/PDGF interface plane.

3) Nominal rating of CRPCM output port, as defined in SSP 42004, Section A, Part 1.

4) Connector specifications are as per SSQ 21635.

5) For connector part numbers, refer to Figure A3.2–3.

TABLE A3.4.2–3 PDGF POWER FROM POA (PRIME) CHARACTERISTICS, CONNECTORS, AND PIN ASSIGNMENTS (J7)

POWER SPECIFICATIONS							
Contact ID	Signal Function	Peak Power [2] (kW)	Minimum Voltage (VDC)	Maximum Current [3] [A]	EMC Class	Power [1] Quality Type	Wire Gauge (ga)
35	Ground	1.8	0	25	EO	C	12
49	Payload Power Bus 1	1.8	113	25	EO	C	12
50	Return 1	1.8	113	25	EO	C	12
51	Payload Power Bus 2	1.8	113	25	EO	C	12
52	Return 2	1.8	113	25	EO	N/A	12

Notes:
1) The Transient Voltage Limits & Time Duration are as defined in SSP 30482.
2) Table reflects design to peak power requirements and the associated minimum voltage at the POA/PDGF interface plane.

3) Nominal rating of CRPCM output port, as defined in SSP 42004, Section A, Part 1.

4)Connector specifications are as per SSQ 21635.

5) For connector part numbers, refer to Figure A3.2–3.

TABLE A3.4.2–4 PDGF POWER FROM POA (REDUNDANT) CHARACTERISTICS, CONNECTORS, AND PIN ASSIGNMENTS (J8)

POWER SPECIFICATIONS							
Contact ID	Signal Function	Peak [2] Power (kW)	Minimum Voltage (VDC)	Maximum Current [3] [A]	EMC Class	Power [1] Quality Type	Wire Gauge (ga)
35	Ground	1.8	0	25	EO	C	12
49	Payload Power Bus 1	1.8	113	25	EO	C	12
50	Return 1	1.8	113	25	EO	C	12
51	Payload Power Bus 2	1.8	113	25	EO	C	12
52	Return 2	1.8	113	25	EO	N/A	12

Notes:

1) The Transient Voltage Limits & Time Duration are as defined in SSP 30482.

2) Table reflects design to peak power requirement and the associated minimum voltage at the POA/PDGF interface plane.

3) Nominal rating of CRPCM output port, as defined in SSP 42004, Section A, Part 1.

4) Connector specifications are as per SSQ 21635.

5) For connector part numbers, refer to Figure A3.2–3.

TABLE A3.4.3.1–1 PDGF DATA AND VIDEO FROM SSRMS (PRIME) CONNECTORS AND PIN ASSIGNMENTS (J5)

CONNECTOR SPECIFICATIONS			
Contact ID	Signal Function	EMC Type	Remarks
47	MSS LB1 A Hi	RF	1)
44	MSS LB1 A Lo	RF	1)
34	Video Channel 1	RF	
35	Video Channel 2	RF	
36	Sync and Control 1	RF	

Notes:
1) Specific local bus that supports payloads depends on location of SSRMS.

2) Connector specifications are as per SSQ 21635.

TABLE A3.4.3.1–2 PDGF DATA AND VIDEO FROM SSRMS (REDUNDANT) CONNECTORS AND PIN ASSIGNMENTS (J6)

CONNECTOR SPECIFICATIONS			
Contact ID	Signal Function	EMC Type	Remarks
47	MSS LB1 B Hi	RF	1)
44	MSS LB1 B Lo	RF	1)
34	Video Channel 3	RF	
36	Sync and Control 2	RF	

Notes:
1) Specific local bus that supports payloads depends on location of SSRMS.

2) Connector specifications are as per SSQ 21635.

TABLE A3.4.3.1–3 PDGF DATA AND VIDEO FROM POA (PRIME) CONNECTORS AND PIN ASSIGNMENTS (J5)

CONNECTOR SPECIFICATIONS			
Contact ID	Signal Function	EMC Type	Remarks
47	MSS LB1 A Hi	RF	
44	MSS LB1 A Lo	RF	
34	Video Channel 1	RF	
35	Video Channel 2	RF	
36	Sync and Control 1	RF	

Notes:
1) Connector specifications are as per SSQ 21635.

TABLE A3.4.3.1–4 PDGF DATA AND VIDEO FROM POA (REDUNDANT) CONNECTORS AND PIN ASSIGNMENTS (J6)

CONNECTOR SPECIFICATIONS			
Contact ID	Signal Function	EMC Type	Remarks
47	MSS LB1 B Hi	RF	
44	MSS LB1 B Lo	RF	
34	Video Channel 3	RF	
36	Sync and Control 2	RF	

Notes:
1) Connector specifications are as per SSQ 21635.

TABLE A3.4.4–1 VIDEO PROVISIONS FOR USERS

Link	Communication Type	# of Channels
Payload at SSRMS LEE	Video Sync Channels to Payload	2
	Video Channels From Payload	3
Payload at MBS POA	Video Sync Channels To Payload	2
	Video Channels From Payload	3

TABLE A3.4.4–2 DELETED

SECTION B3 MCAS TO USER INTERFACE

B3 INTERFACE DEFINITION

B3.1 GENERAL

B3.1.1 INTERFACE DESCRIPTION

The physical interface (mechanical, structural, thermal and environmental) plane is defined between the active half of the MBS CAS (MCAS) and the passive half of the User. The utility interface plane (power and data) is defined between the MCAS Umbilical Mechanism Assembly (UMA) connector and User connector.

There are no video interfaces between the MCAS and the User.

B3.1.2 DELETED

B3.1.3 ENGINEERING UNITS AND TOLERANCES

Unless otherwise noted herein, all dimensions are shown in the English system of inch pound (IP) units.

B3.2 STRUCTURAL/MECHANICAL INTERFACES

The MCAS provides the active half of the interface consisting of three V–guides, one latch, and one UMA for interfacing with the User. The User provides the passive half consisting of three guide pins, a capture bar, and passive UMA electrical connectors. The MCAS mechanical and structural details are defined in Figures B3.2–1 through B3.2–3.

B3.3 DELETED

B3.4 ELECTRICAL INTERFACES

The MCAS to User power and data interfaces will be as defined in Figure B3.4–1.

B3.4.1 POWER, RETURN AND GROUNDING INTERFACES

The MCAS to User power, return and grounding interfaces will be as defined in Figure B3.4–1.

B3.4.2 POWER CONNECTORS AND PIN ASSIGNMENTS

The power connectors and pin assignments between the MCAS and the User will be as defined in Table B3.4.2–1.

B3.4.3 DATA INTERFACES

The C & DH subsystem will support data interfaces between the MCAS and the User as defined in Figure B3.4–1.

B3.4.3.1 DATA CONNECTORS AND PIN ASSIGNMENTS

The data connectors and pin assignments between the MCAS and the User will be as defined in Table B3.4.2–1.

B3.5 ENVIRONMENTS

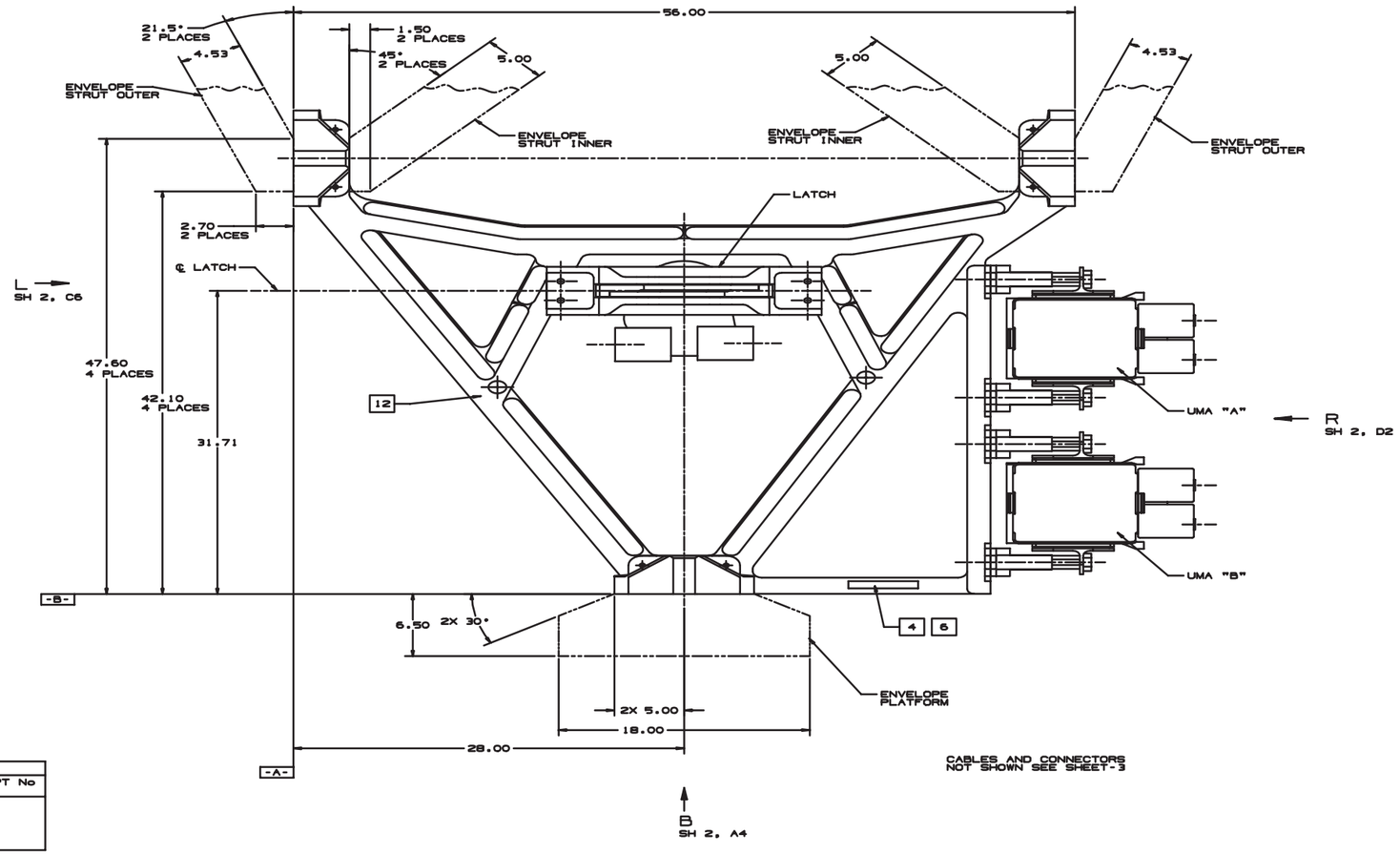
The MCAS to User electromagnetic, grounding and bonding interface implementation will be as defined in Figures B3.2–1 through B3.2–3.

B3.6 SOFTWARE INTERFACES

There are no software interfaces between the MCAS and the User.

NOTES:

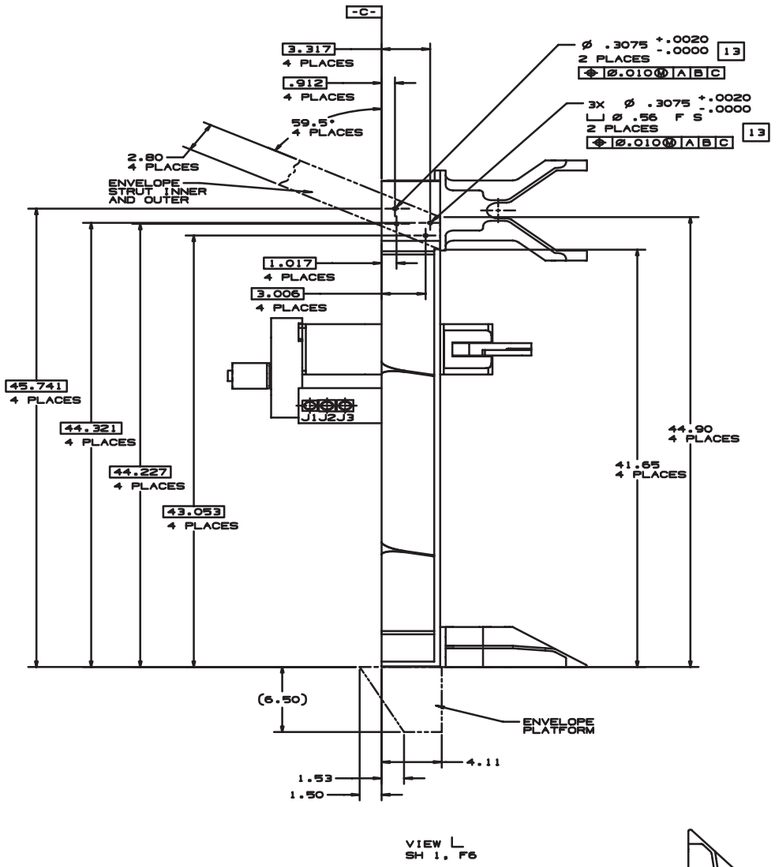
1. INTERPRET DRAWING PER DOD-STD-100.
2. IDENTIFICATION OF THE APPROVED SOURCE HEREON IS NOT TO BE CONSTRUED AS A GUARANTEE OF PRESENT OR CONTINUED AVAILABILITY AS A SOURCE OF SUPPLY FOR THE ITEMS DESCRIBED ON THE DRAWING.
3. ONLY THE ITEM DESCRIBED ON THIS DRAWING WHEN PROCURED FROM THE SUPPLIER LISTED HEREON IS APPROVED BY SPAR AEROSPACE LIMITED FOR USE IN THE APPLICATION SPECIFIED HEREON. A SUBSTITUTE ITEM SHALL NOT BE USED WITHOUT PRIOR TESTING AND APPROVAL BY SPAR AEROSPACE LIMITED.
4. IDENTIFY WITH CAGE CODE AND PIN 38309-51800-0025-1. MARKING PER PCR 05:01, METHOD B.
5. CLEANING, HANDLING AND TEMPORARY STORAGE PER PCR 10:01, TYPE II.
6. SERIALIZE PER QAN-SS-1.005. MARKING PER PCR 05:01, METHOD B.
7. THE ITEM DESCRIBED ON THIS DRAWING MUST MEET THE REQUIREMENTS OF SPAR-SS-SG-1777.
8. P1 AND P2 OF CABLE HARNESS W1,W2,W3,W4,W5,W6 TO BE SUPPLIED WITH STRAIGHT BACKSHELLS.
9. P3 AND P4 OF CABLE HARNESS W1,W2,W3,W4,W5,W6 TO BE SUPPLIED WITH 90° BACKSHELLS.
10. MATING CONNECTORS AND BACKSHELLS TO BE SUPPLIED IN ACCORDANCE WITH TABLE 1.
11. CABLE DIMENSIONS IN ACCORDANCE WITH TABLE 2.
12. ANODIZE PER MIL-A-8625, TYPE II, CLASS 1.
13. MACHINE AT ASSEMBLY.
14. ALL EXTERNAL CORNERS AND EDGES TO MEET REQUIREMENTS OF NASA-STD-3000.



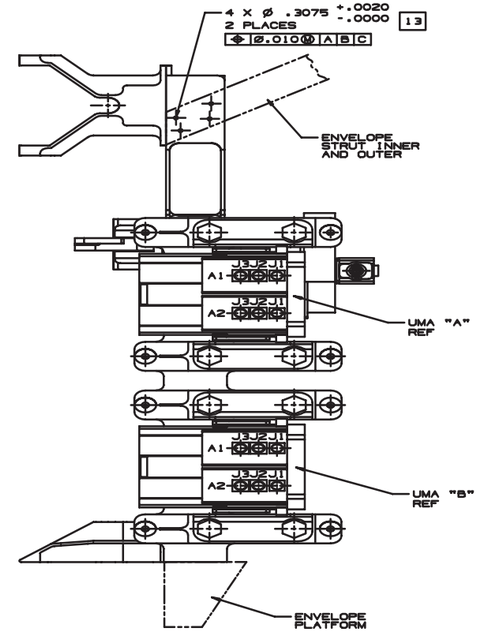
APPROVED SOURCE OF SUPPLY			
PART No	VENDOR ADDRESS	CAGE CODE	VENDOR PT No
-1	MCDONNELL DOUGLAS CORPORATION SPACE SYSTEMS COMPANY 5301 BOLSA AVE HUNTINGTON BEACH CA 92647-2099	18355	

(Reference SPAR Drawing 51800–0025, Sheet 1 of 3)

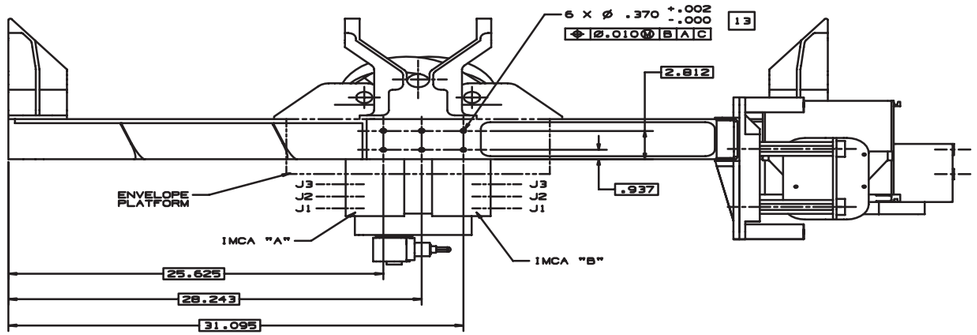
FIGURE B3.2–1 MCAS TO USER MECHANICAL INTERFACE



VIEW L
SH 1, F6



VIEW R
SH 1, E2



VIEW B
SH 1, B4

(Reference SPAR Drawing 51800–0025, Sheet 2 of 3)

FIGURE B3.2–2 MCAS TO USER MECHANICAL INTERFACE

CONNECTOR W1 P1
CONN TYPE NZGL06G1717N26PD

PIN	GAGE	SIG FUNCTION
A	20	GROUND
B	20	120VDCRTN
T	20	120VDC
K	22	ADD4RTN
J	22	ADD3RTN
H	22	ADD2RTN
G	22	ADD1RTN
F	22	ADD0RTN
E	22	ADDPYRTN
Z	22	ADD7RTN
N	22	ADD6RTN
P	22	ADD5RTN
D	22	ADDPARITY
•C	22	ADDBIT7
M	22	ADDBIT6
•A	22	ADDBIT5
L	22	ADDBIT4
Y	22	ADDBIT3
X	22	ADDBIT2
W	22	ADDBIT1
V	22	ADDBIT0

CONNECTOR W1 P2
CONN TYPE NZGL06G1511N35PE

PIN	GAGE	SIG FUNCTION
7	22	1553(H)
6	22	1553(L)

CONNECTOR W2 P1
CONN TYPE NZGL06G1717N26PC

PIN	GAGE	SIG FUNCTION
A	20	GROUND
B	20	120VDCRTN
T	20	120VDC
K	22	ADD4RTN
J	22	ADD3RTN
H	22	ADD2RTN
G	22	ADD1RTN
F	22	ADD0RTN
E	22	ADDPYRTN
Z	22	ADD7RTN
N	22	ADD6RTN
P	22	ADD5RTN
D	22	ADDPARITY
•C	22	ADDBIT7
M	22	ADDBIT6
•A	22	ADDBIT5
L	22	ADDBIT4
Y	22	ADDBIT3
X	22	ADDBIT2
W	22	ADDBIT1
V	22	ADDBIT0

CONNECTOR W2 P2
CONN TYPE NZGL06G1511N35PF

PIN	GAGE	SIG FUNCTION
7	22	1553(H)
6	22	1553(L)

CONNECTOR W3 P1
CONN TYPE NZGL06G2525N61PN

PIN	GAGE	SIG FUNCTION
A	20	GROUND
B	20	120VDCRTN
•C	20	120VDC
Z	22	ADD4RTN
Y	22	ADD3RTN
X	22	ADD2RTN
W	22	ADD1RTN
FF	22	ADD0RTN
NN	22	ADDPYRTN
V	22	ADD7RTN
EE	22	ADD6RTN
DD	22	ADD5RTN
HH	22	ADDPARITY
•R	22	ADDBIT7
MM	22	ADDBIT6
CC	22	ADDBIT5
•A	22	ADDBIT4
•U	22	ADDBIT3
•T	22	ADDBIT2
•S	22	ADDBIT1
GG	22	ADDBIT0
•K	22	ADDBIT0
•M	22	ADDBIT1
•N	22	ADDBIT2
•P	22	ADDBIT3
•Q	22	ADDBIT4
U	22	ADDPARITY
•Z	20	POWER1
•Y	20	PWR1RTN
M	22	ADD0RTN
N	22	ADD1RTN
P	22	ADD2RTN
•X	20	GROUND
R	22	ADD3RTN
S	22	ADD4RTN
T	22	ADDPYRTN
•W	20	POWER6
•D	20	POWER6
•H	20	POWER2
H	20	PWR2RTN
•E	20	POWER4
D	20	POWER4
K	20	POWER3
•I	20	PWR3RTN
•F	20	POWER5
F	20	POWER5

CONNECTOR W3 P2
CONN TYPE NZGL06G1511N35PE

PIN	GAGE	SIG FUNCTION
7	22	1553(H)
6	22	1553(L)
11	22	1553(H)
2	22	1553(L)
12	22	1553(H)
4	22	1553(L)

CONNECTOR W6 P1
CONN TYPE NZGL06G2525N61PN

PIN	GAGE	SIG FUNCTION
A	20	GROUND
B	20	120VDCRTN
•C	20	120VDC
Z	22	ADD4RTN
Y	22	ADD3RTN
X	22	ADD2RTN
W	22	ADD1RTN
FF	22	ADD0RTN
NN	22	ADDPYRTN
V	22	ADD7RTN
EE	22	ADD6RTN
DD	22	ADD5RTN
HH	22	ADDPARITY
•R	22	ADDBIT7
MM	22	ADDBIT6
CC	22	ADDBIT5
•A	22	ADDBIT4
•U	22	ADDBIT3
•T	22	ADDBIT2
•S	22	ADDBIT1
GG	22	ADDBIT0
•K	22	ADDBIT0
•M	22	ADDBIT1
•N	22	ADDBIT2
•P	22	ADDBIT3
•Q	22	ADDBIT4
U	22	ADDPARITY
•Z	20	POWER1
•Y	20	PWR1RTN
M	22	ADD0RTN
N	22	ADD1RTN
P	22	ADD2RTN
•X	20	GROUND
R	22	ADD3RTN
S	22	ADD4RTN
T	22	ADDPYRTN
•W	20	POWER6
•D	20	POWER6
•H	20	POWER2
H	20	PWR2RTN
•E	20	POWER4
D	20	POWER4
K	20	POWER3
•I	20	PWR3RTN
•F	20	POWER5
F	20	POWER5

CONNECTOR W6 P2
CONN TYPE NZGL06G1511N35PE

PIN	GAGE	SIG FUNCTION
7	22	1553(H)
6	22	1553(L)
11	22	1553(H)
2	22	1553(L)
12	22	1553(H)
4	22	1553(L)

CONNECTOR W4 P1
CONN TYPE NZGL06G1717N26PD

PIN	GAGE	SIG FUNCTION
A	20	GROUND
B	20	120VDCRTN
T	20	120VDC
K	22	ADD4RTN
J	22	ADD3RTN
H	22	ADD2RTN
G	22	ADD1RTN
F	22	ADD0RTN
E	22	ADDPYRTN
Z	22	ADD7RTN
N	22	ADD6RTN
P	22	ADD5RTN
D	22	ADDPARITY
•C	22	ADDBIT7
M	22	ADDBIT6
•A	22	ADDBIT5
L	22	ADDBIT4
Y	22	ADDBIT3
X	22	ADDBIT2
W	22	ADDBIT1
V	22	ADDBIT0

CONNECTOR W4 P2
CONN TYPE NZGL06G1511N35PE

PIN	GAGE	SIG FUNCTION
7	22	1553(H)
6	22	1553(L)

CONNECTOR W5 P1
CONN TYPE NZGL06G1717N26PD

PIN	GAGE	SIG FUNCTION
A	20	GROUND
B	20	120VDCRTN
T	20	120VDC
K	22	ADD4RTN
J	22	ADD3RTN
H	22	ADD2RTN
G	22	ADD1RTN
F	22	ADD0RTN
E	22	ADDPYRTN
Z	22	ADD7RTN
N	22	ADD6RTN
P	22	ADD5RTN
D	22	ADDPARITY
•C	22	ADDBIT7
M	22	ADDBIT6
•A	22	ADDBIT5
L	22	ADDBIT4
Y	22	ADDBIT3
X	22	ADDBIT2
W	22	ADDBIT1
V	22	ADDBIT0

CONNECTOR W5 P2
CONN TYPE NZGL06G1511N35PE

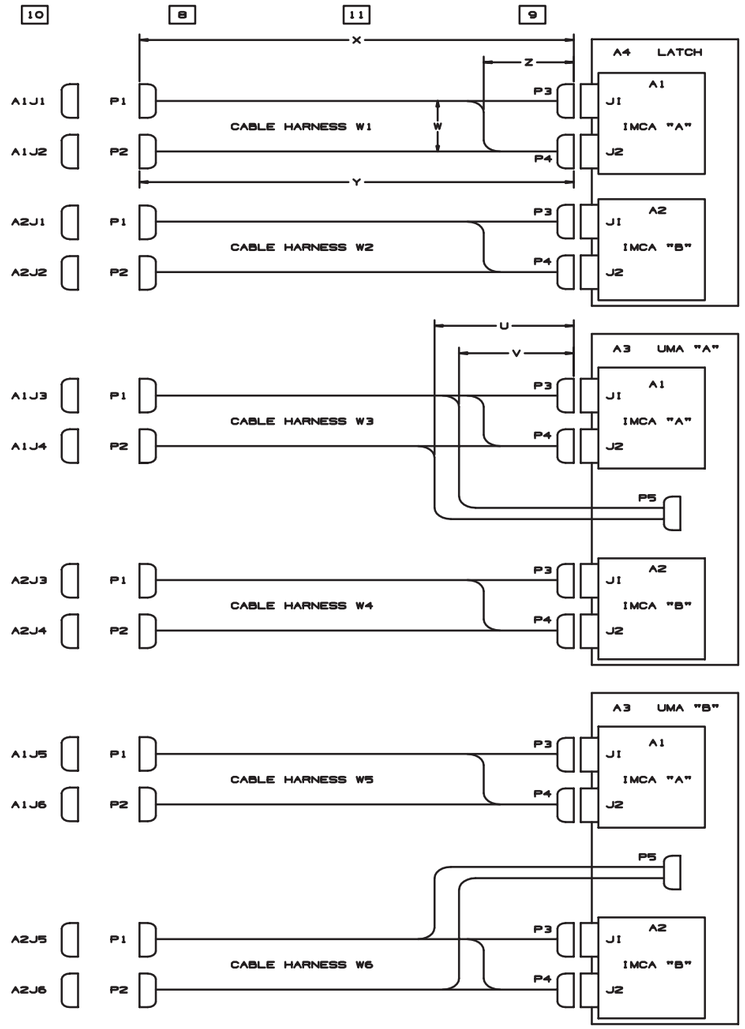
PIN	GAGE	SIG FUNCTION
7	22	1553(H)
6	22	1553(L)

TABLE 2

CABLE HARNESS	U	V	W	X	Y	Z
W1	-	-	TBD	90.6	90.2	TBD
W2	-	-	TBD	79.4	77.4	TBD
W3	TBD	TBD	TBD	89.8	90.8	TBD
W4	-	-	TBD	90.0	80.8	TBD
W5	-	-	TBD	108.2	109.7	TBD
W6	TBD	TBD	TBD	100.8	97.0	TBD

TABLE 1

	CONNECTOR TYPE	BACKSHELL TYPE
A1J1	NZGLOOT1717N26SD	NZGA-J0-17-N-08
A1J2	NZGLOOT1511N35SE	NZGA-J0-11-N-08
A2J1	NZGLOOT2525N61SN	NZGA-J0-25-N-12
A2J2	NZGLOOT1511N35SE	NZGA-J0-11-N-08
A1J3	NZGLOOT1717N26SD	NZGA-J0-17-N-08
A1J4	NZGLOOT1511N35SE	NZGA-J0-11-N-08
A2J3	NZGLOOT1717N26SC	NZGA-J0-17-N-08
A2J4	NZGLOOT1511N35SE	NZGA-J0-11-N-08
A1J5	NZGLOOT1717N26SD	NZGA-J0-17-N-08
A1J6	NZGLOOT1511N35SE	NZGA-J0-11-N-08
A2J5	NZGLOOT2525N61SN	NZGA-J0-25-N-12
A2J6	NZGLOOT1511N35SE	NZGA-J0-11-N-08



(Reference SPAR Drawing 51800–0025, Sheet 3 of 3)

FIGURE B3.2–3 MCAS TO USER MECHANICAL INTERFACE

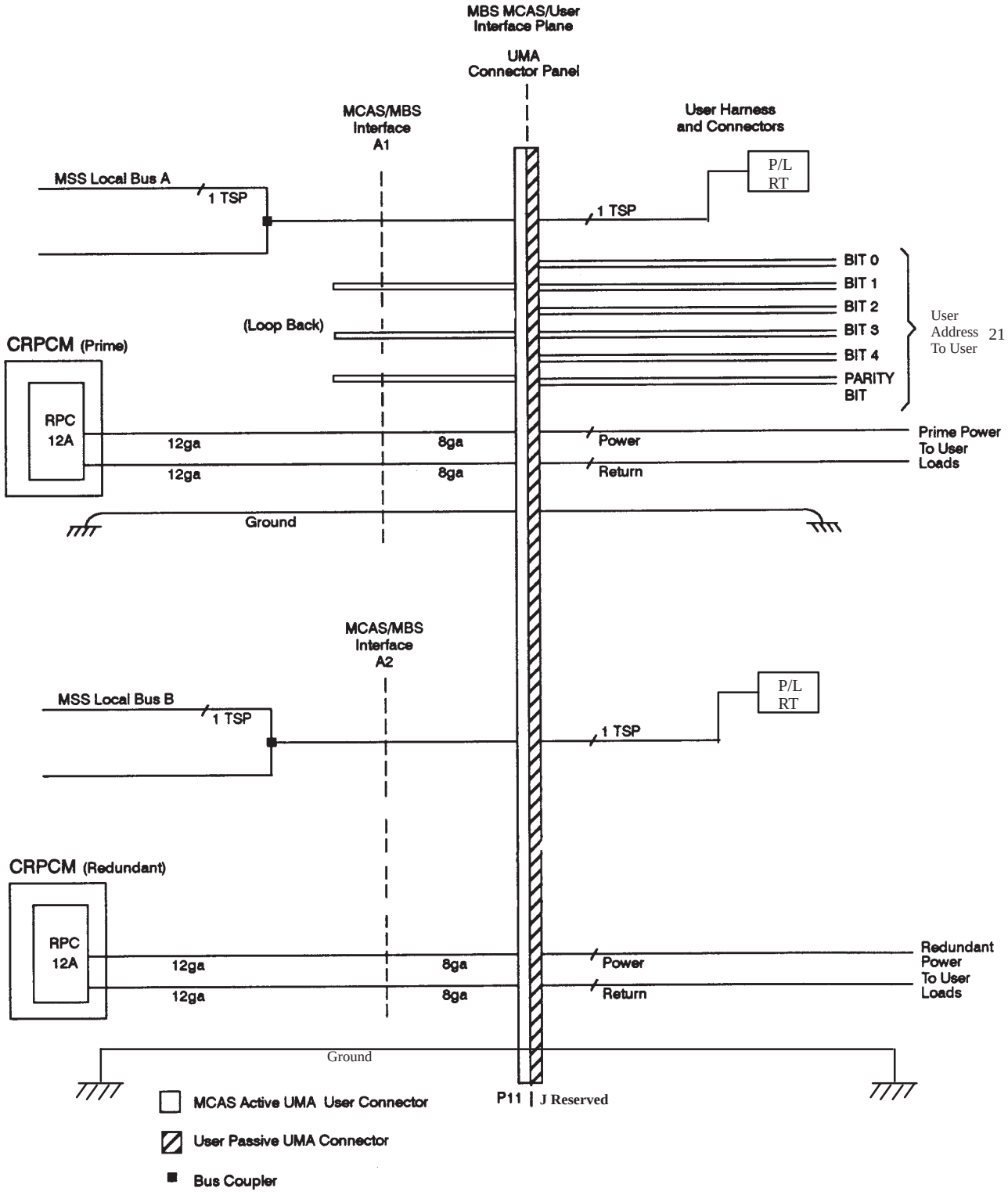


FIGURE B3.4–1 MCAS TO USER ELECTRICAL INTERFACE AND CURRENT PROTECTION DIAGRAM

TABLE B3.4.2–1 MCAS TO USER PRIME AND REDUNDANT POWER AND DATA CHARACTERISTICS, CONNECTORS, AND PIN ASSIGNMENTS

CONNECTOR ID	
MCAS Ref. Des: P11	Part Number: NUP1–005
User Ref. Des: J Reserved	Part Number: Reserved

POWER AND DATA SPECIFICATIONS

ContactID	Signal Function	Peak Power2 (W)	Minimum Voltage (VDC)	Current3 [A]	EMC Class	Power1) Quality Type	Wire Gauge (ga)	Remarks
TBD#12	LB A Hi	NA	NA	NA	RF	NA	22	RT AD-DRESS 21
TBD#13	LB B Hi	NA	NA	NA	RF	NA	22	
TBD#12	LB A Lo	NA	NA	NA	RF	NA	22	
TBD#13	LB B Lo	NA	NA	NA	RF	NA	22	
TBD#12	User Power Bus 1	1350	112.5	12	EO	C	8	
TBD#13	User Power Bus 2	1350	112.5	12	EO	C	8	
TBD#12	Return 1	1350	112.5	12	EO	C	8	
TBD#13	Return 2	1350	112.5	12	EO	C	8	
TBD#12	Ground	1350	112.5	12	EO	N/A	8	
TBD#13	Ground	1350	112.5	12	EO	N/A	8	

Notes:
1) The Transient Voltage Limits & Time Duration are as defined in SSP 30482, except for minimum voltage.

2) Table reflects design to peak power requirement and the associated minimum voltage defined at the MCAS UMA to User UMA interface plane.

3) Nominal rating of the MBS CRPCM output port.

4) Refer to SSQ 21635 for connector detailed specifications

SECTION C3 RESERVED

RESERVED

SECTION D3 RESERVED

RESERVED

SECTION E3 RESERVED

RESERVED

SECTION F3 RESERVED

RESERVED

SECTION G3 RESERVED

RESERVED

SECTION H3 RESERVED

RESERVED

SECTION I3 FRGF TO USER INTERFACES

I3 INTERFACE DEFINITION

The FRGF to user interface design details are documented in NSTS–21000–IDD–ISS, Shuttle Orbiter/International Cargo Standard Interfaces, Section 14.0.

APPENDIX A: ABBREVIATIONS AND ACRONYMS

AVF	Artificial Vision Function
AVU	Artificial Vision Unit
CAS	Common Attach Structure
CCTV	Closed Circuit Television
CSA	Canadian Space Agency
DHT	Dexterous Handling Target
EFGF	Electrical Flight Grapple Fixture
EMI	Electromagnetic Interference
EVA	Extravehicular Activity
FRGF	Flight Releasable Grapple Fixture
ft	feet
Hz	Hertz
ICD	Interface Control Document
in	inch
IP	International Partner
kbps	kilo bits per second
kg	kilograms
kN–m	kiloNewton–meter
kW	kilowatt
lbs	pounds
LEE	Latching End Effector
m	meter
mA	milliamps
MBS	MRS Base System

MC	Micro Conical
MCAS	MBS CAS
MCE	MSS Control Equipment
MCF	Micro Conical Fitting
MRS	Mobile Remote Servicer
MSC	Mobile Servicing Center
MSS	Mobile Servicing System
MT	Mobile Transporter
NASA	National Aeronautics and Space Administration
N	Newton
NSTS	National Space Transportation System
ORU	Orbit–Replaceable Unit
OTCM	ORU/Tool Changeout Mechanism
OTP	ORU/Tool Platform
PDGF	Power and Data Grapple Fixture
PFM	Pulse Frequency Modulation
POA	Payload/ORU Accommodation
PSA	Payload/ORU Support Assembly
PWP	Portable Workplatform
rad	Radian
RSGF	Rigidize Sensing Grapple Fixture
RT	Remote Terminal
SDGF	Standard Dexterous Grasp Fixture
SEE	Standard End Effector
SI	Systems International
SPDA	Secondary Power Distribution Assembly

SPDM	Special Purpose Dexterous Manipulator
SPEE	Special Purpose End Effector
SSCB	Space Station Control Board
SSRMS	Space Station Remote Manipulator System
TBD	To Be Determined
TBR	To Be Reviewed
TUS	Trailing Umbilical System
UMA	Umbilical Mechanism Assembly
Vdc	Volts, direct current
W	Watts

APPENDIX B: ISSUE SHEETS

ISSUE FORM, SPACE STATION

Issue No. 42004–02–TC–01

Issue Title: Drawing Impact due to Change on Bonding Specification

Initiator Name:	Tom Craig	**Date:**	7/3/97
Org/Company:	Boeing/Huntsville	**Initiator's Issue No:**	
Phone:	205–461–6029	**Problem Category:**	
Mailcode:			(Mandatory only)

Document ID:	SSP 42004, Revision A	**Page #:**	A3–4
Title:	MSS to User ICD, Part 2	**Sec. #:**	A
Date:	5/22/97	**Para. #:**	
		Fig. #:	A3.2–1

Description of Issue:

Previous versions of these documents have only required a Class H and R bond, which PG–3 implemented in their interface design. Note 9, added to this page since the February draft, imposes a specific implementation of the Class R bond which is different from the one used in our released drawings. Although the change to he drawing is minor in nature, we need authorization to make the change.

Recommendation:

Impact if Recommendation Not Implemented:

APPENDIX C: TBD LIST

1	A3.4 ELECTRICAL INTERFACES (SPDM)	A3–2	
2	A3.4.2 POWER CONNECTORS AND PIN ASSIGNMENTS (SPDM)	A3–2	
3	A3.7 PDGF STANDARD GRAPPLE TARGET AND AVF TARGET	A3–3	2–21–97
4	TABLE A3.4.2–1 PDGF TO USER POWER FROM SSRMS (PRIME) CHARACTERISTICS, CONNECTORS, AND PIN ASSIGNMENTS	A3–13	2–21–97
5	TABLE A3.4.2–2 PDGF TO USER POWER FROM SSRMS (REDUNDANT) CHARACTERISTICS, CONNECTORS, AND PIN ASSIGNMENTS	A3–14	2–21–97
6	TABLE A3.4.2–3 PDGF TO USER POWER FROM POA (PRIME) CHARACTERISTICS, CONNECTORS, AND PIN ASSIGNMENTS	A3–15	2–21–97
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