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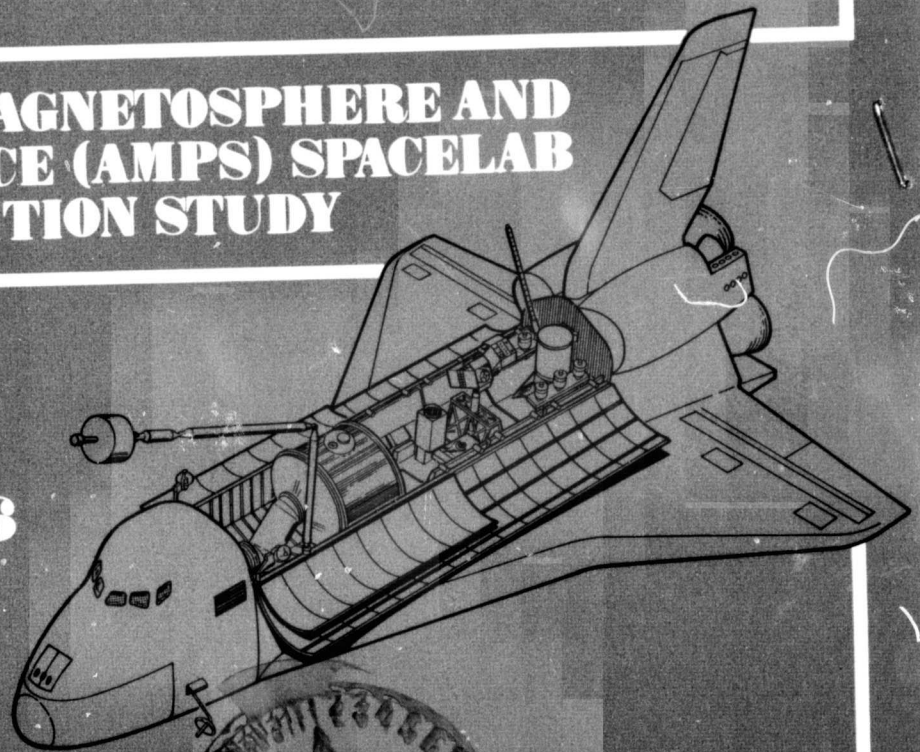
INTERFACE CONTROL DOCUMENTS (ICD)

BOOK 1 - AMPS EQUIPMENT TO ORBITER ICD

(NASA-CR-152566) ATMOSPHERE, MAGNETOSPHERE AND PLASMAS IN SPACE (AMPS). SPACELAB PAYLOAD DEFINITION STUDY. VOLUME 3; BOOK 1: AMPS EQUIPMENT TO ORBITER ICD Final Report (TRW Defense and Space Systems Group)	N77-28169 HC A02/MF A01 Unclas 39998
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ATMOSPHERE, MAGNETOSPHERE AND PLASMAS IN SPACE (AMPS) SPACELAB PAYLOAD DEFINITION STUDY

**Final Report
November 1976**



Prepared for
National Aeronautics
and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland 20771



TRW
DEFENSE AND SPACE SYSTEMS GROUP

ATMOSPHERE, MAGNETOSPHERE AND PLASMAS IN SPACE (AMPS)
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FINAL REPORT

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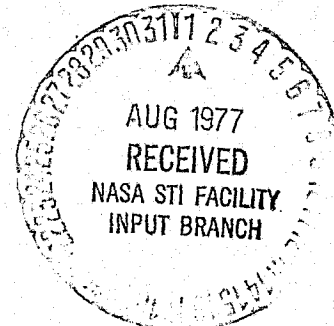
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1. SCOPE

This document defines the physical, thermal, and electrical interfaces that exist between Spacelab-AMPS Payload No.(TBD) and the Orbiter. The characteristics specified herein are based on the definition of Spacelab and Orbiter as of the date of issue of this document. Subsequent changes in the Spacelab or Orbiter which affect the AMPS payload may require revision of this document.

2. APPLICABLE DOCUMENTS

The following documents are applicable to the extent noted.

2.1 OVERRIDING DOCUMENTS. In case of conflict, the following documents supersede any requirements stated herein:

- (a) JSC 07700 Volume XIV, Revision D, change 16, entitled: "Space Shuttle Payload Accommodation.
- (b) NASA/ESA Shuttle Vehicle/Spacelab Interface Control Documents:
 - (1) ICD-2-05301 Avionics Interfaces
 - (2) ICD-2-05101 Structural/Mechanical Interfaces
 - (3) Others (TBD).

2.2 APPLICABLE DOCUMENTS. The following documents of the exact issue noted are applicable to the extent specified herein:

- (a) NASA/ESA SLP/2104, dated PDR-B 1976, entitled: Spacelab Payload Accommodation Handbook.

3. INTERFACES

3.1 PHYSICAL INTERFACES. This section covers the physical interfaces in the payload bay, on the Orbiter flight deck, and elsewhere on the Orbiter.

3.1.1 Payload bay installation. Figure 3.1-1 shows the payload installed in the payload bay, the hard-points used, the clearances between the payload and Orbiter, the c.g. location, and other details of the physical interfaces in the payload bay.

3.1.1.1 Payload manifest. Table III.I-1 is a summary manifest of payload equipment by category including mass properties and c.g. locations.

3.1.1.2 Orbiter optional equipment. Table III.I-2 identifies the optional Orbiter equipment required to support the payload and further identifies those items which are expendable.

3.1.2 Aft flight deck installation. Figure 3.1-2 shows the physical location and installation details for all payload equipment mounted on the aft flight deck. Also included are tabulated data on the mass properties of all payload hardware.

3.1.3 Cable and utility lines. Table III.I-3 shows the routing, tiedown, and other physical details related to cabling and utility lines which interface with the Orbiter.

3.2 ELECTRICAL INTERFACES

3.2.1 Electrical power. Figure 3.2-1 shows the wiring interfaces, loads, grounding, and other details of the interface between the payload and Orbiter. This figure also shows emergency loads and fault protection provided by the payload.

3.2.2 Communications. Table III.II-1 shows the type, format, bit rate, signal level and other details of data streams which interface with the Orbiter uplink/forward link.

3.2.3 Data interfaces. Table III.II-2 identifies payload interfaces with the Orbiter avionics including the intercom, CCTV, GN&C, MTU, PDI, PSP, MDM, payload interrogator, the MSS PCM recorder, and the payload wideband recorder.

3.3 THERMAL INTERFACES. Figure 3.3-1 contains a description of the thermal model used in analysis of the payload when installed in the Orbiter; shows temperature predictions for typical operating modes; shows the location of temperature sensors; and illustrates other features of the thermal interface. This figure includes specific details of the thermal interface between payload equipment on the Orbiter flight deck and the Orbiter itself, and identifies any special thermal requirements which might impact the Orbiter configuration.

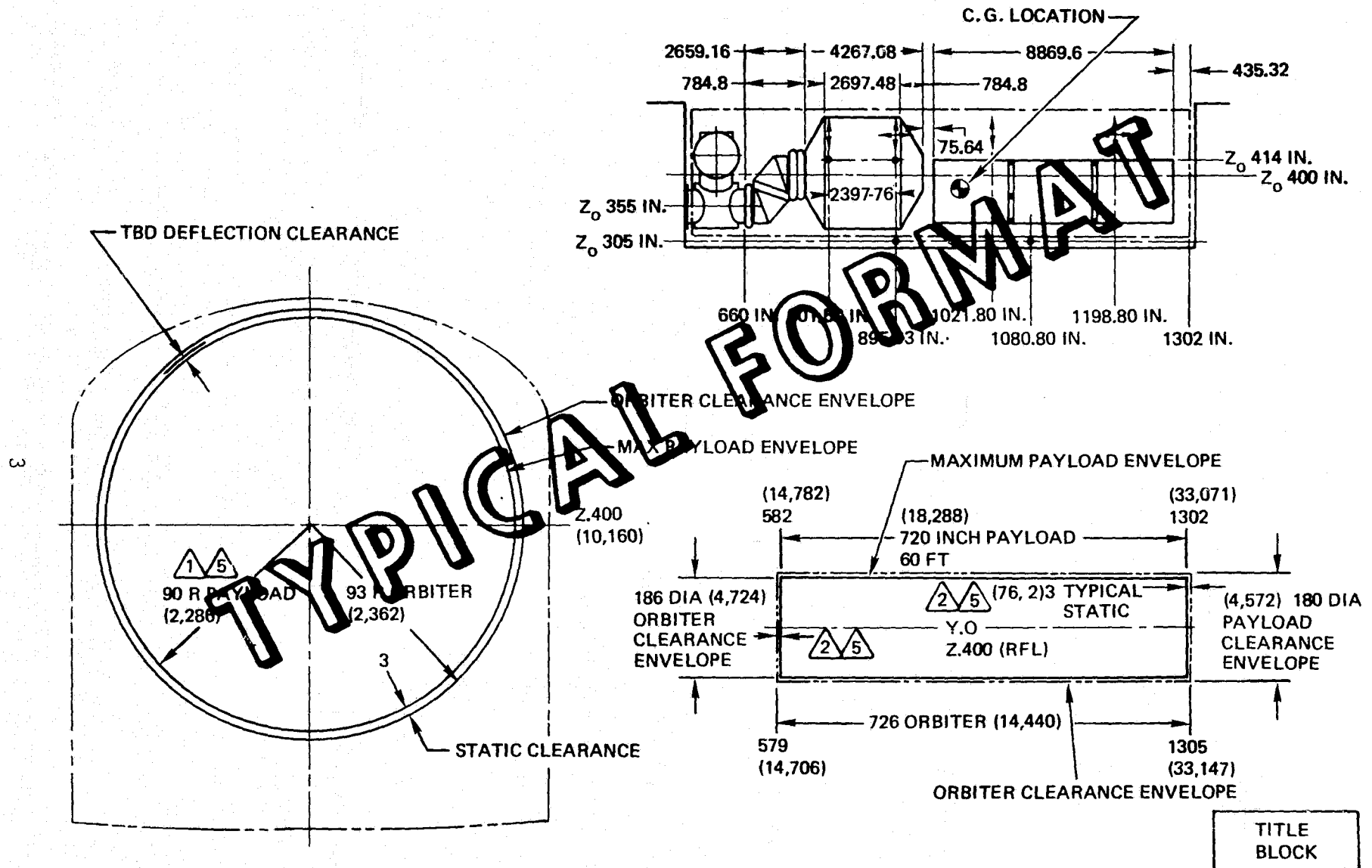


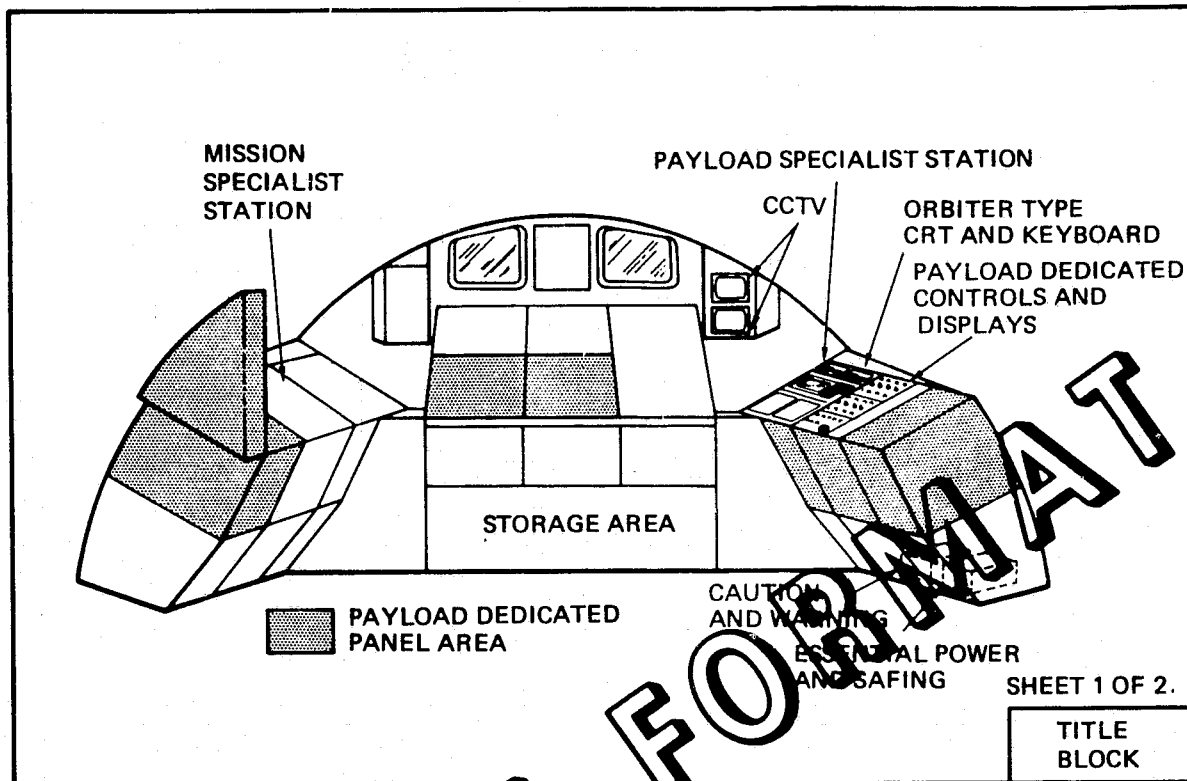
Figure 3.1-1. Payload Installation

Table III.I-1. Payload Manifest

EQUIPMENT CATEGORY	EQUIP. DESC	LAUNCH WEIGHT (KG)	LANDING WEIGHT (KG)	CG LOCATION			NOTES
				X _o	Y _o	Z _o	
SPACELAB MIE							
SPACELAB MDE							
LABCRAFT							
INSTRUMENT							
MMSE							
OPTIONAL ORBITER							
OTHER							
TOTALS							

Table III.I-2. Optional Orbiter Equipment

EQUIP. DESC	QUANTITY	WEIGHT (KG)	CG LOCATION			NOTES
			X _o	Y _o	Z _o	
RMS	—	—	—	—	—	NOT PAYLOAD CHARGEABLE
ERS KIT, (S)						
OMS KIT						
TUNNEL ADAPTER						
DOCKING MODULE						
2ND RMS						
ATS RAD KIT						
CREW						
MSS RECORDER						
ETC						



OAFD PAYLOAD EQUIPMENT

EQUIP DESC	WEIGHT	CG LOCATION			NOTES
		X ₀	Y ₀	Z ₀	
TOTAL					

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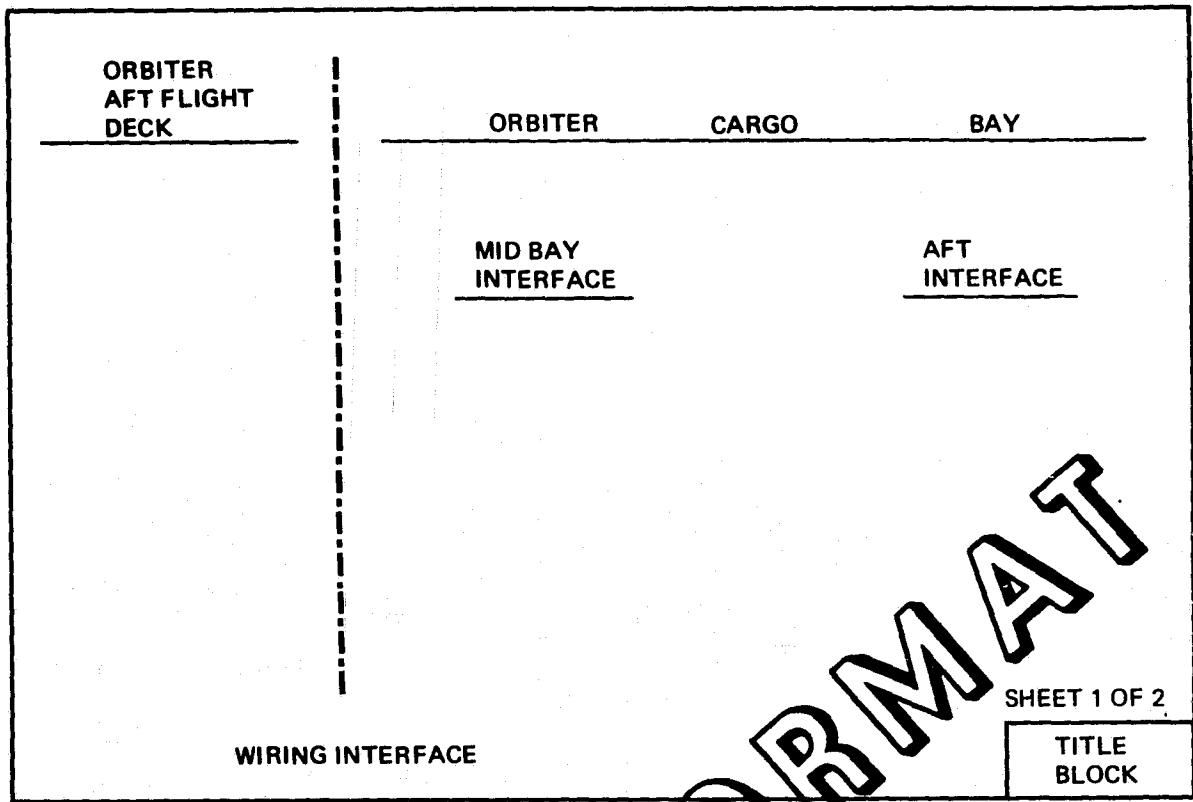
Figure 3.1-2. OAFD Payload Equipment Installation

Table III.I-3. Cable and Utility Line Routing

FLIGHT___CABLE AND UTILITY LINE ROUTING									
CABLE (ID)	CABLE LENGTH	CONNECTOR ROUTING		PHYSICAL ROUTING					
		FROM	TO	FROM	TO	BEND	TIEDOWN	THERMAL COVERING	REMARKS
CL-01	20.16M	JM-1	JP-1	X ₁ Y ₁ Z ₁	X ₂ Y ₁ Z ₂	90° AT X ₂	2' INTERVALS	NONE	

SIZE	CODE IDENT NO.	ICD-XXX	REV
SCALE	DATE	DRAWN BY	

TYPICAL FORMAT



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LOAD TABLE

LOAD DESCR	AVE POWER (WATTS)	PEAK POWER (WATTS)	EMERGENCY POWER (WATTS)	FAULT PROTECTION	REMARKS
TOTALS					

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Figure 3.2-1. Electrical Power Interfaces

Table III.II-1. Payload Communications Formats

DATA ID	DATE TYPE	DATA FORMAT	DATA RATE	DATA ROUTING		SIGNAL LEVEL	NOTES
				FROM	TO		
	ANALOG (0-5 VAC)	SUBCOM ON 1 MHz SUBCARRIER	5-1500 MHz				
	DIGITAL	NRZ	4 MBPS				

Table III.II-2. Data Interfaces

DATA TYPE	DATA TYPE	DATA FORMAT	DATA RATE	DATA ROUTING		SIGNAL LEVEL	NOTES
				FROM	TO		
C&W GN&C							

PHYSICAL DESCRIPTION OF
THERMAL INTERFACES
(TBD)

TITLE
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FLIGHT _____ THERMAL MODEL

OPERATING MODE	COOLING AIR	SUN ANGLE (β)	MODEL ELEMENT NAME	ELEMENT DESCRIPTION	NODE ID	T _{MAX} OR T _{MIN}	NOTES
PRE-LAUNCH							
ASCENT							
ASCENT							
ASCENT							
ON-ORBIT							
ON-ORBIT							
ON-ORBIT							
POST-LANDING							

Figure 3.3-1. Thermal Interfaces