
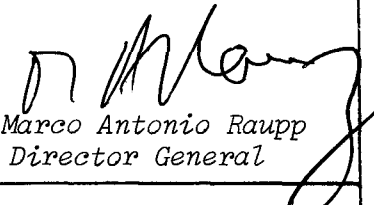


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14. Abstract/Notes <i>This document presents the formats of the Telecommand (TC) and Telemetry (TM) messages to be handled by the On Board Computer of the first Brazilian Complete Space Mission Satellite.</i> <i>It also describes the structure Operation Process Packet and Execution Data Packtes that are data fields of the TM and TC messages.</i>			
15. Remarks			

CONTENTS

	<u>Page</u>
LIST OF FIGURES.....	<i>iii</i>
1 - <u>TC FORMAT</u>	1
2 - <u>STORAGE TM FORMAT</u>	2
3 - <u>THE PPO STRUCTURE</u>	3

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LIST OF FIGURES

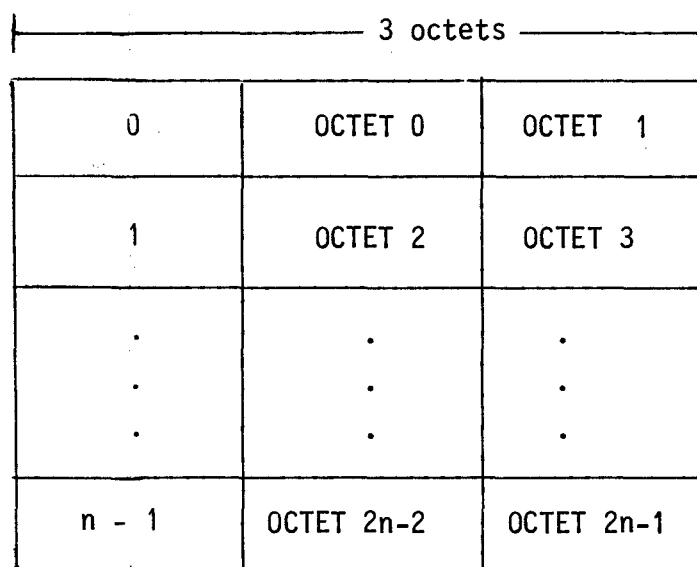
	<u>Page</u>
1 - TC format	1
2 - Storage TM format.....	2
3 - PPO structure.....	3
4 - PPO Primary Header.....	3
5 - PPO Primary Header.....	4
6 - PPO Ancillary Data Header.....	4
7 - PDE structure.....	4
8 - Package Identification Field.....	5
9 - Execution Control Field.....	5
10- PDE Presentation Header.....	5
11- PDE File Header.....	6

ON BOARD COMPUTER TELECOMMAND AND STORAGE TELEMETRY FORMATS

This document presents the formats of the TC and TM messages to be handled by the On Board Computer of the On Board Supervision Subsystem (OBS).

1 - TC FORMAT

The TC message to be received by the On Board Computer consists of a string up to 254 24-bit serial load commands, as presented in figure 1.



where $11 \leq n \leq 253$

Fig. 1 - TC format

The first octet of the 24-bit serial load commands specifies the sequence of the message. The message sequence number begins with zero, increases sequentially up to n-1 and always finishes with 255.

The second and third octets of the i^{th} 24-bit serial load commands contain the $(2i)^{\text{th}}$ and $(2i + 1)^{\text{th}}$ octet of Operation's Process Packet (PPO). For this space mission, the PPO to be addressed to the On-Board Computer Subsystem has a variable size which is to be limited between 24 to 508 octets. The PPO format is presented in Section 3.

2 - STORAGE TM FORMAT

The Storage TM Format consists of 128 octets telemetry frames, as presented in Figure 2, according to the ESA (Ref. PPS-46 ESA PCM) Telemetry Standard (April 78).

The first frame contains Real Time Telemetry specified in the Applicable Document - B (AD-B), while from frame 1 to 5 the field between octet n° 5 to octet n° 112 is reserved to segments of PPO's. For this space mission, the size of the telemetry PPO will be limited to 540 octets. When the size of the PPO is less than 540 octets, the remaining octets of the reserved area are filled with a bit string of an alternating binary, zeros and ones, beginning by a zero.

SYNC (1 oct)	SYNC (1 oct)	FRAME # AND MODE (1 oct)	FORMAT #	REAL TIME TELEMETRY (108 oct)	SPARE (14 oct)	CRC (1 oct)	CRC (1 oct)
"	"	1	"	RESERVED FOR PPO'S (540 OCTETS)	"	"	"
"	"	2	"		"	"	"
"	"	3	"		"	"	"
"	"	4	"		"	"	"
"	"	5	"		"	"	"

128 octets

Fig. 2 - Storage TM format

3 - THE PPO STRUCTURE

The PPO structure is presented in Figure 3.

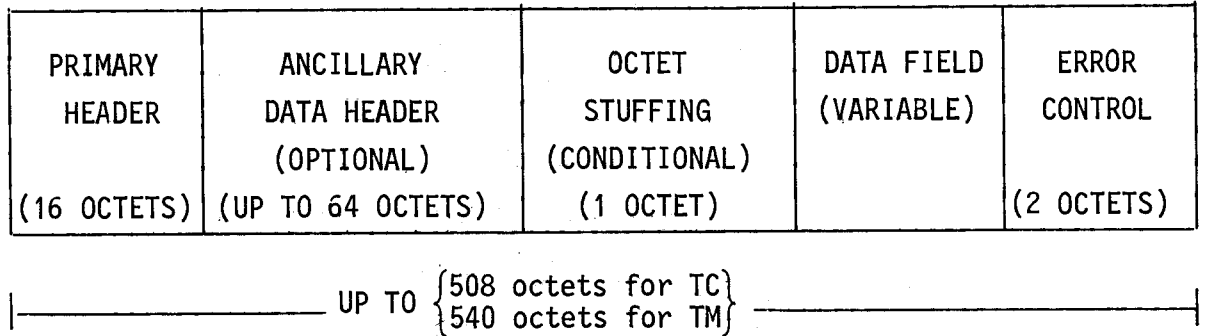
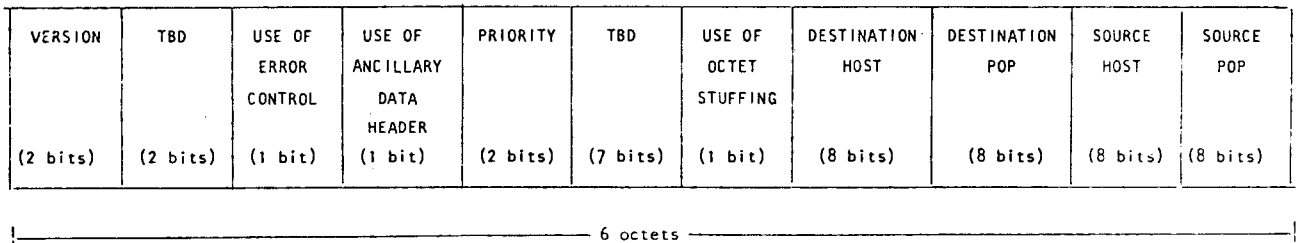


Fig. 3 - PPO structure

The PPO Primary Header consists of an Identification Field (6 octets) and an Operational Control Field (10 octets). They are described, in detail, in Figure 4 and 5.

IDENTIFICATION FIELD



* POP means Operational Process

Fig. 4 - PPO Primary Header

OPERATIONAL CONTROL FIELD

MISSION ID (8 Bits)	ROUTE ID (8 Bits)	OPERATION ID (8 Bits)	OPERATIONAL OBJECTIVE ID (8 Bits)	OPERATIONAL STAGE ID (8 Bits)	PACKET SERIAL NUMBER (8 Bits)	PPO TOTAL SIZE (16 Bits)	NUMBER OF PDES IN THE SEQUENCE (8 Bits)	CHECKSUM OF THE PPO PRIMARY HEADER (8 Bits)
10 octets								

* PDE means Execution Data Packet

Fig. 5 - PPO Primary Header.

The Ancillary Data Header is described in Figure 6.

VERSION (2 bits)	ANCILLARY DATA HEADER SIZE (6 bits)	TYPE (8 bits)	REAL-TIME DATA INSERTION (up to 62 octets)
Up to 64 octets			

Fig. 6 - PPO Ancillary Data Header.

The data filled contains one or more Execution Data Packets (PDE's), whose structure is presented in Figure 7.

EXECUTION MODE HEADER (6 octets)	PRESENTATION HEADER (OPTIONAL) (3 octets)	FILE HEADER (OPTIONAL) (2 octets)	ANCILLARY DATA HEADER (OPTIONAL) (up to 64 octets)	OCTET STUFFING (CONDITIONAL) (1 octet)	DATA FIELD (variable)
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Fig. 7 - PDE structure.

The Execution Mode Header consists of a Packet Identification Field (1 octet) and an Execution Control Field (5 octets), which are described in Figure 8 and 9, respectively.

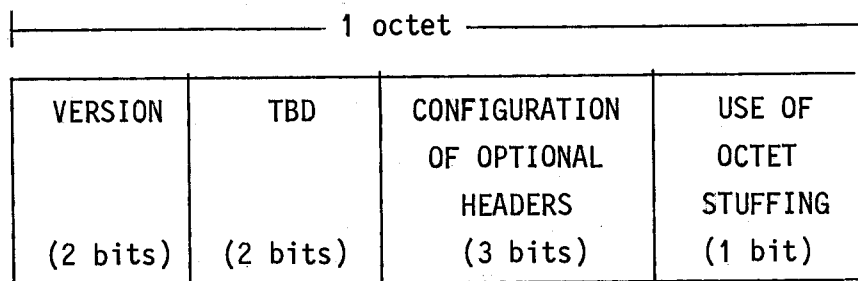


Fig. 8 - Package Identification Field.

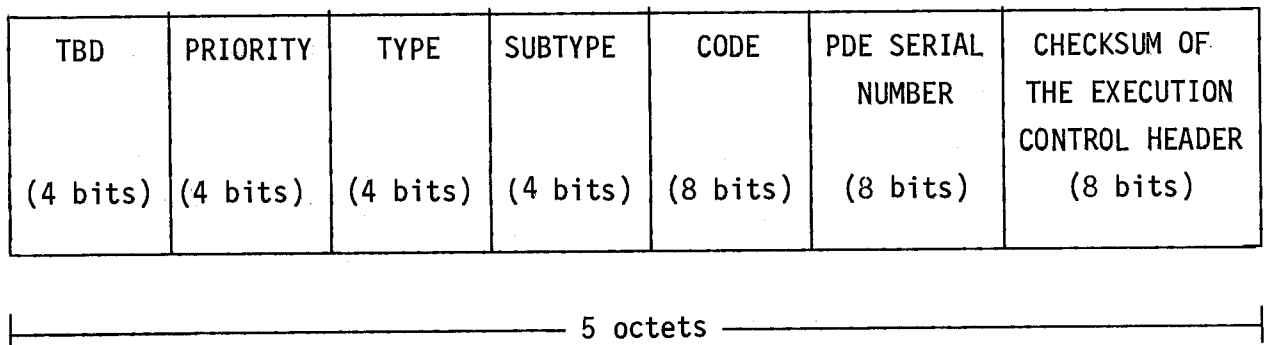


Fig. 9 - Execution Control Field.

The Presentation Header describes how the Data Field is structured and it is presented in Figure 10.

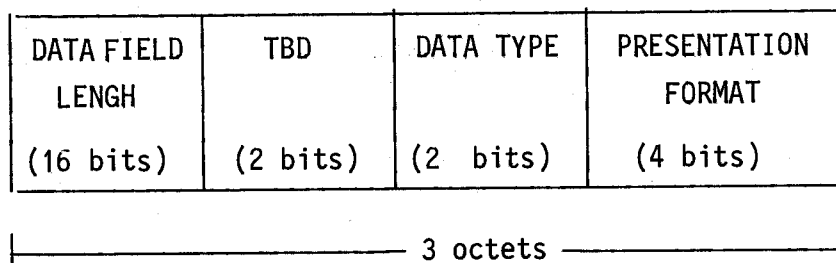


Fig. 10 - PDE Presentation Header.

The File Header provides information to store to or retrieve from the associated file system and the header structure is presented in Figure 11.

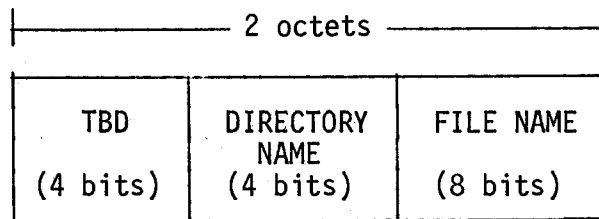


Fig. 11 - PDE File Header.

The PDE Ancillary Data Header is similar to that of the PPO, which is described in Figure 6.



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