NASA CR- 170540

SVS-10123

E83-10275

"Made available under NASA sponsorship In the interest of early and wide dissemination of Earth Resources Survey Program information and without liability for any use made thereof."

LANDSAT D

DATA FORMAT CONTROL BOOK

(E83-10275) LANDSAT-D DATA FORMAT CONTROL BOOK. VOLUME 2: TELEMETRY (General Electric Co.) 378 p HC A17/MF A01 CSCL 09F

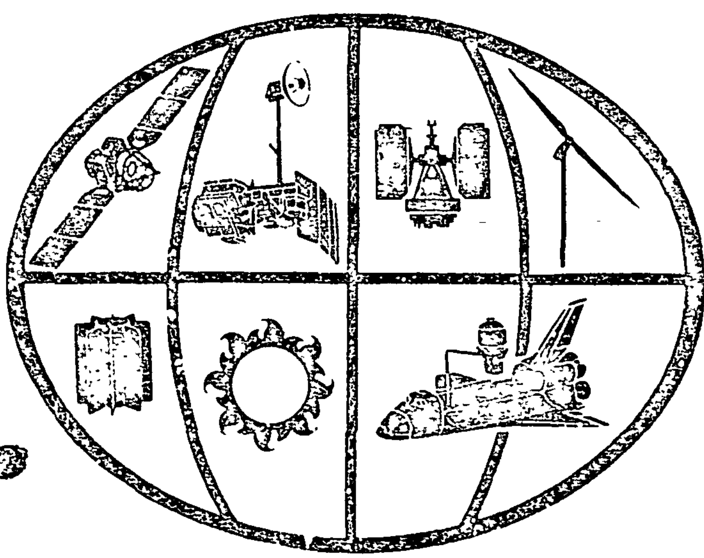
N83-26142

Unclas

G3/43 00275

VOLUME II

(TELEMETRY)



space systems division

CONTRACT NO.
NAS 5-25300

GENERAL ELECTRIC

BEST AVAILABLE COPY

SVS-10123A
Volume II
October 1982

ORIGINAL PAGE IS
OF POOR QUALITY

LANDSAT-D
DATA FORMAT CONTROL BOOK
VOLUME II (TELEMETRY)

PREPARED BY: R Talipsky DATE: 7/28/81
R. Talipsky, Systems Engineer

APPROVED BY: T. Aepli DATE: 7/28/81
T. Aepli, Manager
Landsat-D Systems Engineering

APPROVED BY: S. Capodici DATE: 7-2[illegible]

S. Capodici
Landsat-D Program Manager

ISSUED BY: Donna Johnston DATE: 7/29/81
Print Control & Reproduction

Rev. A 12/21/82

ORIGINAL PAGE IS
OF POOR QUALITY

REVISION LOG

This log identifies those portions of this specification which have been revised since original issue. Revised portions of each page, for the current revision only, are identified by marginal striping.

Revision	Paragraph Number(s) Affected	Rev. Date
A	2.1.1.5	Oct 1982
	2.1.3.1	
	2.1.3.3	
	2.2.1	
	2.2.5	
	2.2.6.2.4	
	2.2.6.2.6	
	2.2.6.2.7	
	Figure 2-9	
	Table 2-6	
	2.2.7	
	2.3.2.4	
	2.3.3.4.2	
	Tables 2-15 thru 2-41	
	2.5	
	Tables 2-42 thru 2-69	
	Table 3-1	
	Table 3-3	
	2.1.1.2	
	Figure 2-6	
	2.2.6.2.3	
A	Table 2-7 INC AN'S 1 Thru 4	Oct 1982

PC62/98 12/21/82

ORIGINAL PAGE IS
OF POOR QUALITY

TABLE OF CONTENTS

TABLE OF CONTENTS

LIST OF FIGURES

ORIGINAL PAGE IS
OF POOR QUALITY

LIST OF TABLES

LIST OF TABLES

SVS-10123A
Volume II
October 1982

NOTE

Data from portions of the Landsat-D Ground Segment Data Base, Version 113, are contained in this volume. In the event of conflict between that data and the latest revision of the Landsat-D Ground Segment Data Base, the Landsat-D Ground Segment Data Base takes precedence.

SECTION 1

INTRODUCTION

1.0 INTRODUCTION

This volume defines the formats used for the transmission of Landsat-D and Landsat-D Prime spacecraft telemetry data through either the TDRS/GSTDN via the NASCOM Network to the CSF.

The volume contains a description of the Landsat-D and Landsat-D Prime spacecraft's telemetry flow from the Command and Data Handling Subsystem, a telemetry list and telemetry matrix assignment for the mission and engineering formats. The OBC controlled format and the dwell format are also discussed. The OBCs contribution to telemetry, and the format of the reports, are covered. The high rate data channel includes the payload correction data format, the narrowband Tape Recorder and the OBC dump formats.

1.1 TELEMETRY OVERVIEW

The Landsat-D spacecraft downlink consists of an S-Band frequency capable of being received at various Ground Spaceflight Tracking Data Network (GSTDN) stations and through the Tracking and Data Relay Satellite (TDRS) to the TDRS Ground Station at White Sands, New Mexico as shown on Figure 1-1. The S-Band downlink telemetry data is transmitted on 2287.5 MHz via the Landsat-D omni antenna or high gain antenna. The omni antenna S-Band telemetry is received by the GSTDN, foreign ground stations, the TDRS, and the transportable ground station. There are two data bit streams: the S-Band Realtime spacecraft telemetry which contains spacecraft subsystem health and status (housekeeping) data, Global Positioning System (Receiver/Processor Assembly) data; the High Rate Channel telemetry which contains OBC dump or Payload Correction Data (PCD) or Narrowband Tape Recorder (NBTR) Playback (Reproducer) data.

Also, a ranging code is transmitted to the Landsat-D spacecraft either via the TDRS or from a GSTDN ground station and returned coherently with the forward link via a PN range code or ranging tone respectively. Tracking data is relayed over NASCOM lines to the Orbital Computations Group (OCG). Tracking by the TDRS requires establishment of a forward and return link with the Landsat-D spacecraft via TDRS S-Band Multiaccess (MA) or single access (SSA) channel. Ranging is accomplished by the Landsat-D high gain antenna initially program tracking the TDRS. The Landsat-D spacecraft then switches to Ku-band autotracking once the Ku-band received signal level indicates lock. The OBC controls the Ku/S-band high gain antenna during program tracking of the TDRS.

1.2 REALTIME SPACECRAFT TELEMETRY

The realtime telemetry data flow is from the Landsat-D spacecraft via the TDRS to the White Sands Ground Station, hence via NASCOM to the GSFC Landsat-D OCC. Additional support is provided by the GSTDN sites and hence via NASCOM to GSFC Landsat-D OCC. There is a Landsat-D Spacecraft onboard recording capability of the realtime spacecraft narrow band telemetry data. A housekeeping telemetry rate of 8 Kbps is used for normal operations via the TDRS high gain antenna to the TDRS satellite operating in the MA or SSA mode and to the GSTDN/Foreign Ground Stations via the omni antenna. Housekeeping telemetry rate of 1 Kbps is available for use when transmitting via the omni to the TDRS while is operating in the SSA mode for Landsat-D orbit adjusts.

There are two telemetry formats controlled by ROM's: Format I (Engineering Format) is for Landsat-D subsystem data with emphasis on attitude control data during transmission supporting launch operational, orbit adjust maneuvers, or for safehold) at 8 Kbps rate. Format II (Mission Format) is for Landsat-D subsystem and sensor housekeeping at 8 Kbps (normal mode). A third format is possible but not planned for usage and is controlled by the On-Board Computer. Telemetry rates are independent of the formats.

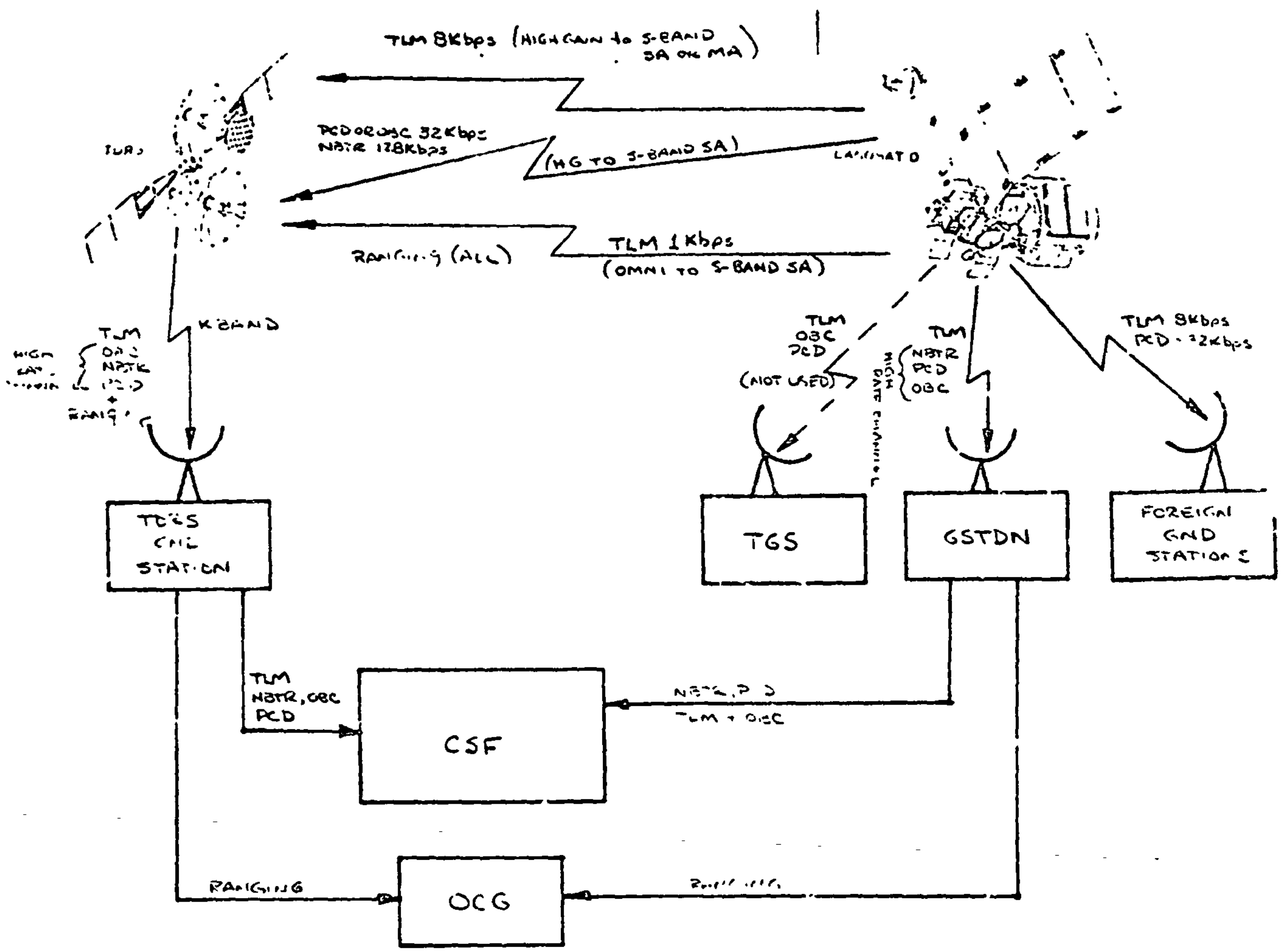


Figure 1-1. Landsat-D Telemetry Flow

1.3 HIGH RATE TELEMETRY CHANNEL

The high rate telemetry channel is transmitted simultaneously with the realtime spacecraft telemetry and received and relayed by the TDRSS and/or the GSTDN to the Landsat-D OCC in a similiar fashion as described above. The high rate telemetry channel contains several different kinds of data with different formats and data rates as a function of the data routing. Only one type of data whether Payload Correction Data (PCD), OBC Dump, or Narrowband Tape Recorder (NBTR) Playback data can be transmitted at a time via the high rate channel telemetry stream. PCD is also contained in the TM Telemetry stream. The PCD is transmitted on the high rate channel at 32 Kbps with a unique format. The OBC Dump is transmitted at 32 Kbps (1 Kbps is available if needed). The NBTR playback is transmitted at 128 Kbps via TDRS or 256 Kbps to the GSTDN and normally replayed at 128 Kbps to the CSF. The playback telemetry format is the reverse of the realtime spacecraft telemetry. Playback of a full Tape at 128 Kbps takes an operating time of 14.9 minutes and 256 Kbps takes 7.45 minutes. The formats are described later.

In addition to the GSTDN's, a Transportable Ground Station (TGS) located at GSFC can receive S-band downlink telemetry although the TGS is not planned to be used in this manner. Also, TGS receives TM & MSS wideband data and forwards them to the Data Receive Record and Transmit System (DRRTS). The TM and MSS data description formats are not part of this DFCB volume. They are included in SVS-10125, Data Format Control Book, Volume V, (Payload).

SECTION 2

TELEMETRY DOWNLINK DESCRIPTION

2.1 GENERAL DESCRIPTION

The realtime spacecraft telemetry (housekeeping and GPS data) and the high rate channel (PCD, NBTR or OBC) data are downlinked via the S-Band Transponder, Figure 2-1. The TDRS System, the GSTDN, foreign ground stations and the Transportable Ground Station (TGS) are capable of receiving this downlinked data/dump. The telemetry rate and format are changeable based upon the spacecraft commanded mode of operation.

The configuration of the S-band downlink provides the capability for both realtime spacecraft telemetry and the high rate channel telemetry through the TDRS and the GSTDN simultaneously, if required. Telemetry data to the GSTDN is via two bit streams, biphase modulated and summed in a linear network and transmitted as residual-carrier phase modulation on S-Band. The two TDRS data bit streams are modulo-2 added to internally-generated PN codes and transmitted independently on the In-phase (I) channel and the Quadrature (Q) channel as staggered-Quadrature-Phase-Shift-Keyed (SQPSK) modulation of the S-band return link.

The use of transmitter A or B is commandable as is the use of either the OMNI or high gain antenna's via settings of RF Switches 1 and 2 for TDRS and/or GSTDN operations.

ORIGINAL PAGE IS OF POOR QUALITY

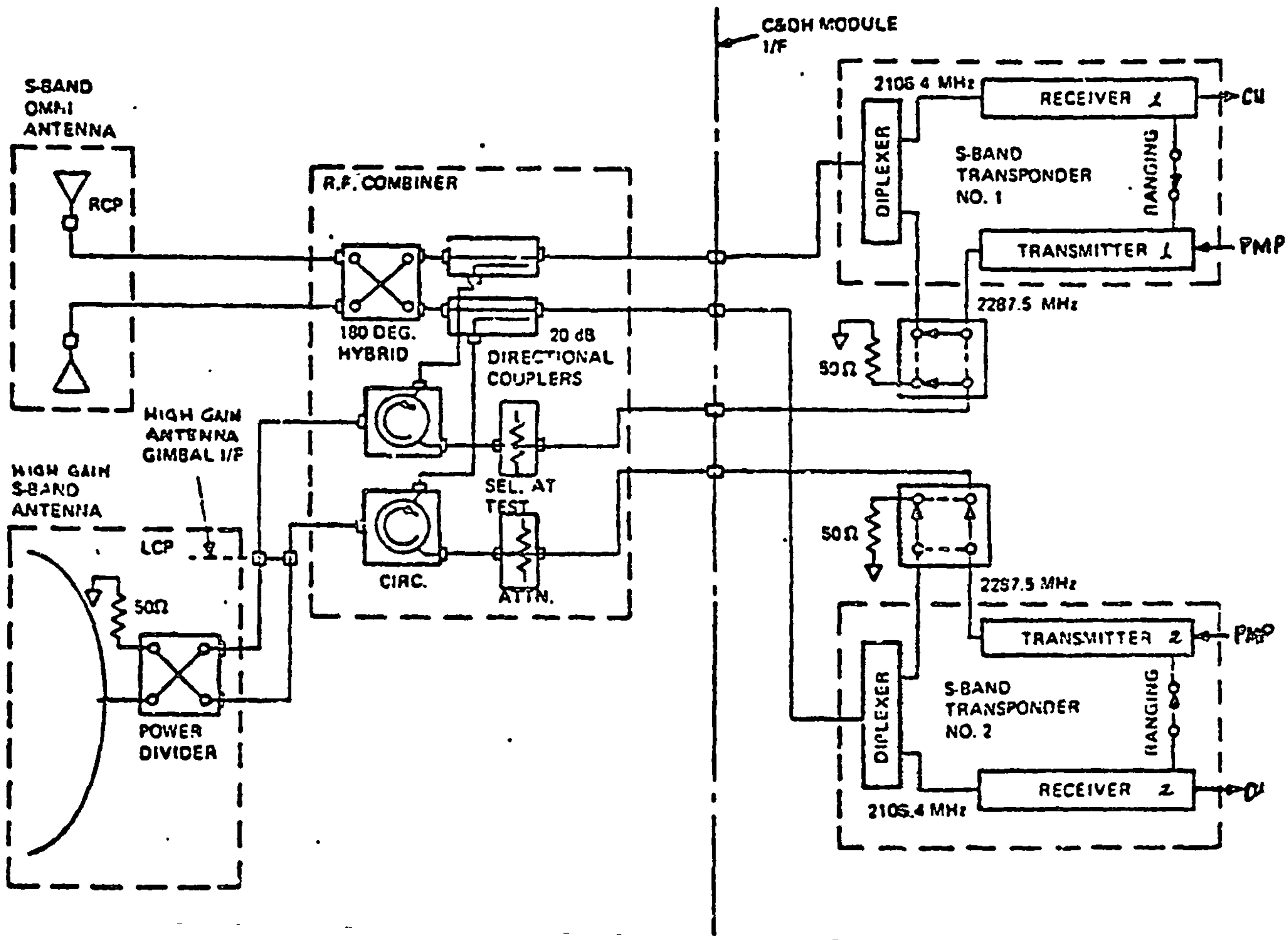


Figure 2-1. S-Band Transponder and Antenna

Telemetry is sampled in the subsystems by the Remote Interface Units (RIU) and passed to the Format Generator and/or computer over the Multiplex Data Bus, Figure 2-2. From the C&DH formatter, the telemetry data is routed to the Pre-Modulation Processor (PMP), and in turn to the transponder. If requested, telemetry is channeled to the OBC via the STACC Interface Unit (STINT). The OBC requests and stores these inputs at the appropriate time. All telemetry is supplied to the transponder through a PMP. The PMP may be commanded to supply realtime spacecraft telemetry to the Narrowband Tape Recorder (NBTR) for subsequent playback on the high rate channel. Also, when commanded, the payload correction data is supplied to the PMP from the PCD formatter in the PDU. Both PMP's can be turned ON simultaneously with an associated transponder and telemetry routed to both the TDRS and GSTDN/TGS/Foreign Stations simultaneously.

Flight Spacecraft time (GMT) is included in the realtime spacecraft telemetry stream from the DPU which supplies a 52 bit time code in BCD. Also, the CU supplies the OBC with a 24 bit (binary count) time code via the realtime spacecraft telemetry stream. The OBC uses least significant 18 of these bits for Stored Commands and Time Tags for Absolute and Relative Time Commands Processing with LSB equal to 1.024 seconds. The DPU supplies both the TM and MSS with the BCD time code as discussed in SVS-10126, Data Format Control Book, Volume V, (Payload).

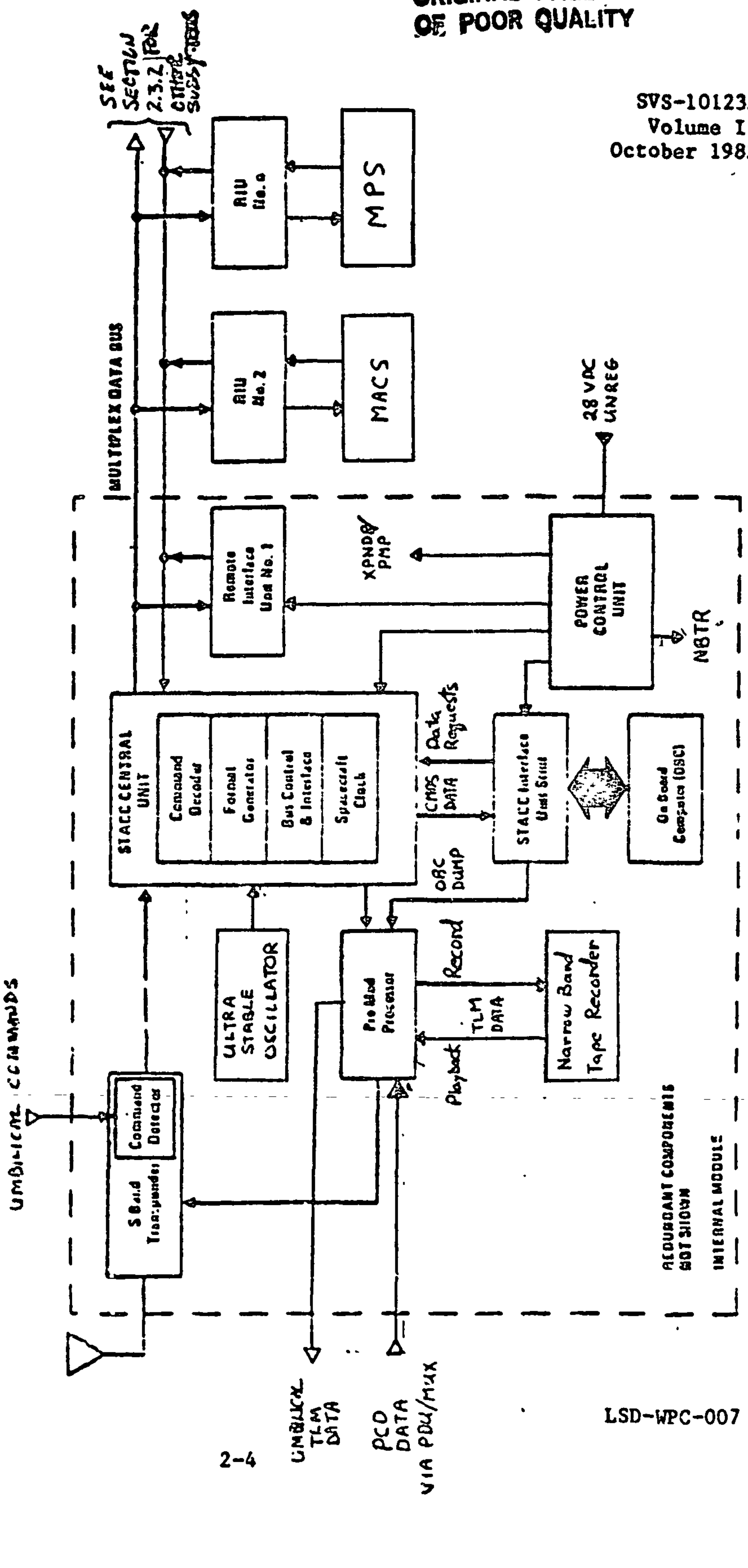


Figure 2-2. Simplified Block Diagram of the C&DH Subsystem

The S-Band OMNI downlink characteristics are as follows:

1. Frequency - 2287.5 MHz
2. Polarization - Right Hand Circular (RCP)
3. Transmitter Power - 5 watts ±1 dB
4. Beamwidth (Coverage) - ±63.8 Deg fr. NADIR (100%) - GSTDN
   - ±116.2 Deg fr. Zenith (84%) - TDRSS (return)
   - OMNI - Total Sphere (85%) Requirement
5. Bandwidth - 3 MHz
6. Antenna Gain - -6 dBi (minimum over 80% of sphere)

The S-Band TDRS High Gain link characteristics are as follows:

1. Frequency - 2287.5 MHz
2. Polarization - Left Hand Circular (LCP)
3. Transmitter Power - 5 watts ±1 dB (+6.9 dBw)
4. Beamwidth - half power, 5 degrees
5. Bandwidth - 6 MHz
6. Antenna Gain - +28 dB

2.1.1 TELEMETRY DATA CHARACATERISTICS

2.1.1.1 Modulation

The modulation techniques are different for GSTDN and TDRS as summarized in Table 2-1 and described below:

1. GSTDN

   a. The realtime spacecraft telemetry data is biphase-S, phase shift keyed, phase modulated (Bi0-S/PSK/PM) on a 1.024 MHz subcarrier via the OMNI antenna. Twenty percent of the power is in the residual carrier. Realtime spacecraft telemetry is transmitted simultaneously with ranging data if desired.

   b. The high rate channel telemetry is Bi0-S/PM modulated directly on the baseband.

   c. The GSTDN ranging is PM modulated.

2. TDRS

   a. The realtime spacecraft telemetry data is NRZ-M convolutionally coded (length-7), pseudo-noise code (PN) and transmitted independently on the "I" and "Q" channel as Staggered-Quadrature-Phase-Shift-Keyed (SQPSK) on the S-Band Return Link.

   b. The high rate channel telemetry is NRZ-M convolutionally coded (length-7), PN coded and transmitted on the "Q" channel only while realtime spacecraft telemetry is transmitted on the "I" channel simultaneously.

Bi-phase-S and Nonreturn-to-Zero data formats are described and shown in Table 2-2.

ORIGINAL PAGE IS
OF POOR QUALITY

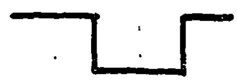
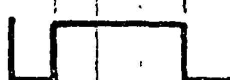
TABLE 2-1 OPERATIONAL MODES, C&DH SUBSYSTEM (TELEMETRY)

		LANDSAT ANT.		TDRSS	CHANNEL (2) I	CHANNEL (2) Q
1. TDRSS MODE						
	A. NORMAL	HIGH GAIN	to	MA	8 kbps (TLM)[1]	8 kbps (TLM)[1]
	B. DEPLOYMENT, ORBIT ADJUST OR BACKUP SAFEHOLD	OMNI	to	SSA	1 kbps (TLM[1]	1 kbps (TLM)[1]
	C. HIGH RATE	HIGH GAIN	to	SSA	8 kbps (TLM)[1]	32 kbps (OBC, PCD)[1]
					8 kbps (TLM)[1]	128 kbps (NBTR)[1]
2. GSTDN/TGS/FOREIGN MODE					BASEBAND	SUBCARRIER[3]
	A. NORMAL	OMNI	to	GROUND STATIONS	32 kbps[4]	8 kbps[5]
					256 kbps[4]	8 kbps[5]

NOTES:
(1) NRZ-M/CONVOLUTIONAL CODE, RATE 1/2 (LENGHT-7) PN/SQPSK
(2) RELATIVE POWER RATIO IS 4:1 IN Q AND I CHANNELS, RESPECTIVELY
(3) SUBCARRIER IS 1.024 MHz
(4) BI Ø - S/PM
(5) BI Ø - S/PSK/PM

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-2. Data Bit Stream Formats

Data Format	1 1 0 0 1	Description
NRZ-L		NRZ-L level (or NRZ change): "ONE" is represented by one level. "ZERO" is represented by the other level.
NRZ-M		NRZ-Mark (Differential encoding): "ONE" is represented by a change in level. "ZERO" is represented by no change in level.
Biθ-M		Bi-Phase-Mark, A transition occurs at the beginning of every time (T) period: "ONE" is represented by a second transition one-half time period later. "ZERO" is represented by no second transition.
Biθ-S		Bi-Phase-Space, A transition occurs at the beginning of every time (T) period: "ZERO" is represented by a second transition one-half time period later "ONE" is represented by no second transition.

The TDRSS Ground Station generally demodulates the "Q" channel. The "Q" to "I" channel power ratio is 4:1. The "I" channel is demodulated for telemetry when either the OBC data/dump, PCD formatter data or the NBTR playback data is transmitted on the "Q" channel.

2.1.1.2 Bit Rate

The output bit rate via the Pre-Modulation Processor to the transponder is a function of the selected data source, data bit stream used, spacecraft mission phase, and receiving site as shown in Table 2-3.

Table 2-3. Telemetry Bit Rate and Type

Telemetry Type	Data Source	Bit Rate	Receiving Site
Realtime Spacecraft	CU	1 Kbps 8 Kbps	TDRSS TDRSS, GSTDN or Foreign Stations
On-Board Computer Data/Dump	OBC/STINT	1 or 32 Kbps	TDRSS or GSTDN
Payload Correction Data	PCD Formatter	32 Kbps	TDRSS, GSTDN or Foreign Stations
Narrowband Tape Recorder Playback	NBTR	128 Kbps 256 Kbps	TDRSS GSTDN

All signal inputs to each PMP include NRZ-L data and required clocks. The PMP receives OBC data dump and required clocks from either of two STACC STINT's with rates command selectable either at 1 or 32 Kbps (Landsat-D uses 32 Kbps); the PMP receives realtime spacecraft telemetry which consists of NRZ-L data and clock from either STACC/CU with rates command selectable at 1 or 8 Kbps; the PMP receives PCD Formatter data in a similiar fashion except the source is from the power distribution unit (PDU) which contains the PCD Formatter; lastly, the PMP receives realtime spacecraft telemetry playback data from the NBTR with data rates at 128 Kbps or 256 Kbps with the appropriate clock signal. The C&DH subsystem can be commanded to select bit rates of 1, 2, 4, 8, 16, 32 or 64 Kbps for realtime spacecraft telemetry, however, telemetry rates must be 8 Kbps only for OBC timing purposes. Telemetry rate of 1 Kbps can be used for emergency operations but the OBC timing may not be valid.

2.1.1.3 Word Length

The word length is eight bits assembled into analog, passive analog, bi-level (discrete) or serial digital words.

2.1.1.4 Telemetry Matrix Capacity

The telemetry subsystem provides 64 channels for data inputs per RIU and an additional 64 channels per Telemetry Multiplexer/Expander Unit (EU) and used as follows:

1. 64 available for analog or

2. 64 available for bilevel or

3. 16 available for serial digital or

4. 16 available for conditioned passive analog or

5. Combination of the above. (See Table 2-10)

There are nine RIU's (some have EU's) on Landsat-D which acquire data from the subsystems and route it to the CU via the Multiplex Data Bus (MDB). The C&DH formatter retrieves the appropriate RIU channel data at the correct time for insertion into the realtime spacecraft telemetry stream (matrix) by using one of the CU's two programmable read-only-memories (PROM) which contains an RIU and channel number for each telemetry word.

2.1.1.5 Format Selection

Two PROM devices are used in the CU for Engineering and Mission formats. Mission and engineering formats are nearly identical except that the mission format contains more TM Sensor and GPS housekeeping data whereas the engineering format contains more modular attitude control subsystem (MACS) and propulsion module (PM) data. The mission format is intended for use while the spacecraft is in the normal on-orbit imaging configuration during payload activity using the 8 Kbps telemetry rate. The engineering format is intended for use when the spacecraft is being launched, in an orbit adjust or safe hold activity. A third way to control the realtime spacecraft telemetry stream is by the OBC generated format which is variable and based upon a memory upload used by the OBC to control the format in lieu of the PROM's. A fourth type of format available is an accelerated multiplex dwell format for a selected telemetry word repeated in all non-fixed columns continuously. The latter two formats are not planned for Landsat-D normal operations.

2.1.2 TELEMETRY MATRIX CONSTRUCTION

2.1.2.1 Telemetry Data Format

The telemetry format for the C&DH Subsystem is a 128 x 128 row/column matrix. A minor frame (row) contains 128 eight bit words (columns) and is illustrated in Figure 2-3. A major frame is comprised of 128 minor frames. The format starts in row 0, column 0 and proceeds sequentially through the matrix until the final word in row 127, column 127 is transmitted. This completes a major frame. The most significant bit (MSB) is transmitted first in a minor frame word.

2.1.2.2 Minor Frame

Each minor frame contains 128 words. The first three words are used for the minor frame synchronization. The minor frame counter is located in relative word location 65 (Frame Counter) (Figure 2-4). These words are located in fixed word locations as shown in Table 2-4. At the 8 Kbps rate, a word period is 1 millisecond. At the 1 Kbps rate, a word period is 8 milliseconds.

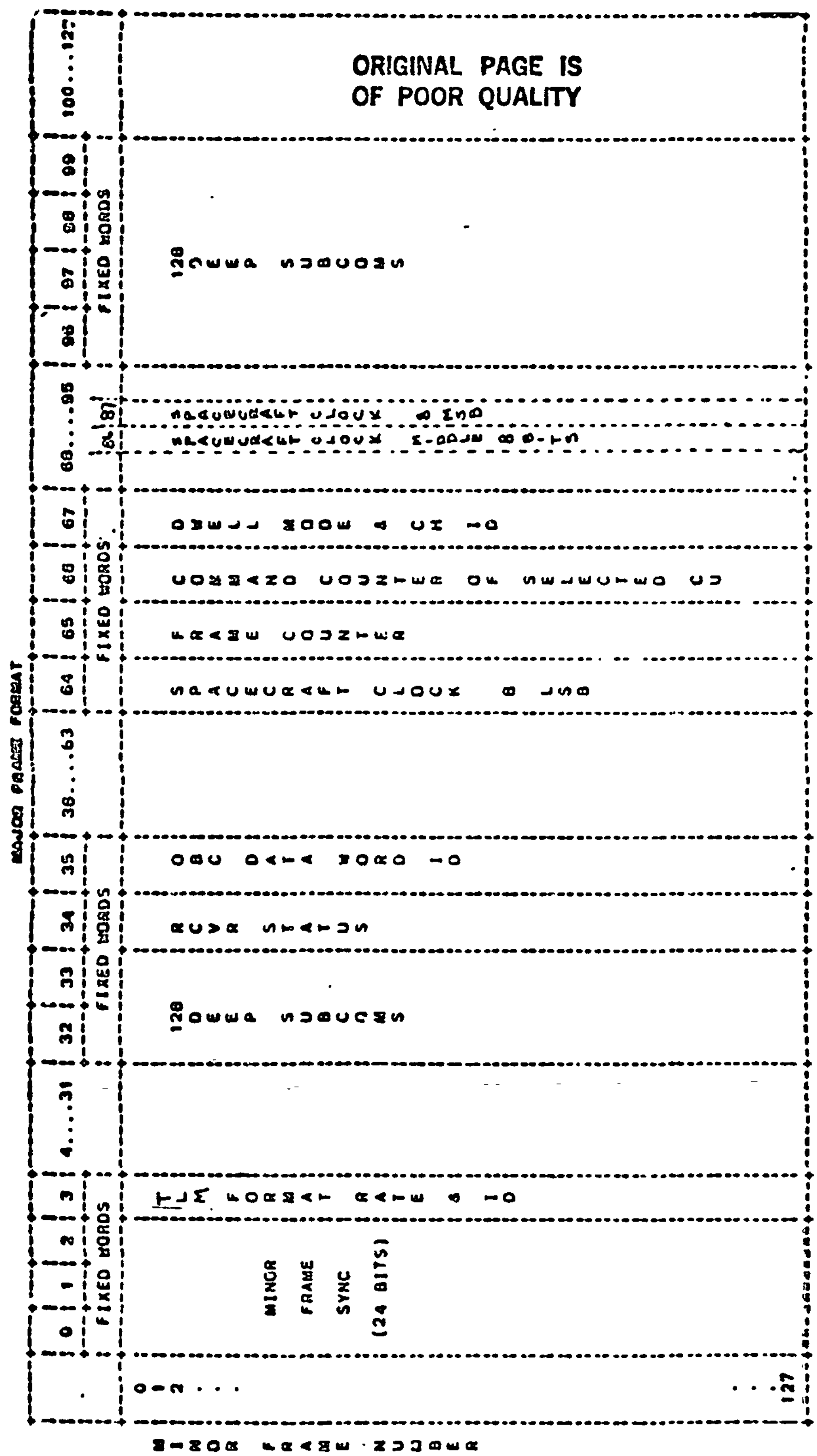


Figure 2-3. Telemetry Matrix Construction

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-4. Fixed Column Assignments

Word No.	Bit No.	Function
0-2		Sync Word (FAF320 in HEXADECIMAL)
3	0, 1, 2	Bit Rate
	3, 4	Format ID
	5	Central Unit A/B
	6	Real Time/Computer Dump Data
	7	CU Signal Presence
32		Subcom
33		Subcom
34	0	Receiver (Rcvr)-A Lock Status
	1	Rcvr-A TDRSS/STDN Mode
	2	Rcvr-B Lock Status
	3	Rcvr-B TDRSS/STDN Mode
	4, 5	Det. A Inlock, Det. B Inlocks
	6, 7	CU-A Command Reject, CU-B Command Reject
35		Computer Data Word (Report Identifier)
64		Spacecraft Clock (8 LSB from selected CU, 16 MSB in Subcom)
65		Frame Counter (Figure 2-4)
66		Command Counter (Selected CU)
67	0	Dwell Mode
	1 to 7	Dwell ID
96-99		Subcom

2.1.2.3 Major Frame

The major frame contains 128 minor frames. The major frame duration is 16.384 seconds at 8 Kbps and 131.072 seconds at the 1 Kbps rate.

2.1.2.4 Fixed Columns

There are 16 fixed columns, six of which can be used for subcommutated words in minor frame words 32, 33, 96, 97, 98 and 99. The remaining 10 fixed columns are described below and in the following paragraphs:

1. Word #3 - Bit rate (bits 0,1 and 2):

   000 = 1 Kbps
   001 = 2 Kbps
   010 = 4 Kbps
   011 = 8 Kbps
   100 = 16 Kbps
   101 = 32 Kbps
   110 = 64 Kbps
   111 = 128 Kbps

   - Format ID (bits 3 and 4):

   00 = CU Flexible (not used on Landsat-D).
   01 = Format I (Engineering)
   10 = Format II (Mission)
   11 = On-Board Computer Controlled

   - Central Unit A/B (bit 5):

   0 = A
   1 = B

   - Realtime Time/Computer Dump Data (bit 6):

   0 = On Board Computer Dump
   1 = Realtime Spacecraft via MDB (always 1 for Landsat-D)

- CU Signal Presence (bit 7):

  0 = Not rejected
  1 = Rejected if both CU A and B reject the command

2. Word #34 - Receiver A Lock Status (bit 0):

   1 = locked
   0 = not locked

 - Receiver A TDRSS/GSTDN Mode (bit 1):

   0 = GSTDN
   1 = TDRSS

 - Receiver B Lock Status (bit 2):

   1 = locked
   0 = not locked

 - Receiver B TDRSS/GSTDN Mode (bit 3):

   0 = GSTDN
   1 = TDRSS

 - Detector A Inlock, Det. B Inlock Status (bit 4,5)

   0 = locked
   1 = not locked

 - CU-A Command Reject, CU-B Command Reject (bit 6,7):

   0 = Accept
   1 = Reject

3. Word #35 - Computer Data Word ID (8 bits):

   Identifies the OBC Telemetry Report number for this minor frames 25 word OBC Report (See Section 2.5)

4. Word #67 - Dwell Mode (bit 0):

   0 = Dwell mode OFF
   1 = Dwell mode ON

 - Dwell ID (bits 1-7) which is the minor frame word number (4-127) to be repeated in the dwell mode. This is not normally planned for use in Landsat-D.

2.1.2.5 Non-Fixed Columns

There are 112 non-fixed columns for the assignment of subsystem telemetry data. The matrix allocation of Columns/Subcom words are described in Section 2.4, Telemetry Matrix Assignments. The On-Board Computers contribution to the 25 minor frame words (columns) is described in OBC Reports, Section 2.5.

Certain types of OBC contribution to telemetry data are not available directly from the subsystems (e.g., Flight Segment attitude errors). These are derived within OBC and data accessed in the subsystem(s) by the OBC via "Computer Address" words through the RIU. Since direct telemetry acquisition of data via "Computer Addressed" gates can compromise an OBC computational cycle, requests for these data are made through the OBC. See reference item number 3 in Section 5.

2.1.2.6 Subcommutation

There are a total of six subcommutated words in a minor frame. The cycle length of the subcommutation is one major frame. The 8-bit (0-255) minor frame counter is used to identify the subcom words. When using Format I or II, the format of the subcom words is controlled by the memory device identical to that used for minor frame format control. Subcom formats are the same for both memory controlled minor frame formats. When operating in the computer generated minor frame, the subcom formats are controlled by the OBC. See Section 2.4, Telemetry Matrix Assignments.

2.1.3 TELEMETRY CONTROL WORDS

2.1.3.1 Synchronization

The first three words in each minor frame are used for minor frame synchronization. These 24 sync bits are described as follows:

```
              MINOR FRAME SYNC
WORD:     0          1          2
          MSB                   LSB
        __________________________
        11111010 11110011 00100000
        _____    _________________
```

Since the telemetry bit stream is transmitted MSB first, this sync pattern is received as illustrated. In hexadecimal, the sync pattern is $FAF320_{16}$.

2.1.3.2 Frame Counter

Word 65 of the minor frame is the frame counter. At the end of each minor frame the counter is incremented by one, and the new value (n+1) is placed in word 65 in the subsequent minor frame. This process is continued until a maximum count of 255 is reached and the process repeated. Only the last seven bits are needed to determine the frame counter contents for subcom word ID (0-127). The bit pattern sequence is shown in Figure 2-4.

2.1.3.3 Time Code

The STACC/CU spacecraft clock counter is 24 bits (binary count) in length. The eight least significant bits (LSB) are located in the fixed telemetry column in word location 64 of the telemetry matrix. The 16 most significant bits (MSB) are located in two additional telemetry words (86 and 87). The output of the CU spacecraft oscillator (4.096 MHz) is counted down to provide a 24-bit spacecraft time code with LSB resolution of 1.024 seconds. Each CU has its own oscillator. Additionally, an ultra stable external oscillator is command selectable. This external oscillator is primarily used due to the Digital Processing Unit (DPU) stability requirements for generation of TM (52 bits) and MSS (48 bits) time codes discussed in SVS-10126, Data Format Control Book, Volume V, (Payload). Also, the Digital Processing Unit (DPU) generates a 52 bit time code which is put in the realtime telemetry stream in word location 32 in minor frame numbers 0-7 each major frame as shown in Table 2-36. This DPU time code is also put in the PCD data stream as shown in Figure 2-9 and described in 2.2.6.2.9 as it appears in PCD format word 72. In either case, the DPU time code is referenced to the major frame sync pulse which marks the beginning of the major frame (minor frame zero, word zero-MSB).

The CU (24 bit counter) clock is incremented at the beginning of the major frame and every Yth minor frame as a function of telemetry rate. At a telemetry rate of XKbps, the spacecraft clock increments by 1 every Xth minor frame. In the 1 Kbps mode the spacecraft clock will increment by 1 every minor frame and in the 8 Kbps mode it will increment every 8th minor frame.

ORIGINAL PAGE IS
OF POOR QUALITY

Major Frame	Minor Frame								
Nth Major Frame	1st Minor Frame	0	0	0	0	0	0	0	0
	2nd Minor Frame	0	0	0	0	0	0	0	1
	3rd Minor Frame	0	0	0	0	0	0	1	0
	⋮				⋮				
	128th Minor Frame	0	1	1	1	1	1	1	1
N+1 Major Frame	1st Minor Frame	1	0	0	0	0	0	0	0
	2nd Minor Frame	1	0	0	0	0	0	0	1
	⋮				⋮				
	128th Minor Frame	1	1	1	1	1	1	1	1
N+2 Major Frame	1st Minor Frame	0	0	0	0	0	0	0	0
	2nd Minor Frame	0	0	0	0	0	0	0	1
	⋮				⋮				
	128th Minor Frame	0	1	1	1	1	1	1	1

Frame ID (0-127)

Figure 2-4. Frame Counter ID Bit Pattern

2.2 TELEMETRY FORMATS

2.2.1 CU PROM ENGINEERING FORMAT

The Engineering format, designated Format I, is for initial spacecraft operations subsequent to a delta launch during deployment, Safe-Hold mode or when an orbit adjust operation is conducted. Engineering format contains subsystem data as shown in Section 2.4, Telemetry Matrix Assignments.

2.2.2 CU PROM MISSION FORMAT

The normal on-orbit mission telemetry format is defined as format II and both formats are independent of telemetry rate. Although other bit rates are possible, the 8 Kbps rate is used since it is consistent with the quantity of spacecraft telemetered data, the link margins achieveable at 8 Kbps rate and the restrictions of power flux density when the flight segment is transmitting to the TDRS and the earth is near the line of sight of the TDRS high gain antenna beam. Mission format contains subsystem data as shown in Section 2.4, Telemetry Matrix Assignments.

2.2.3 ON-BOARD COMPUTER TELEMETRY FORMAT

The CBC provides a capability for a third flexible format, but not planned for use, based upon a computer memory load. When operating in the computer generated minor frame format, the subcom formats are controlled by the computer instead of the CU PROM.

2.2.4 ACCELERATED MULTIPLEX (DWELL) FORMAT

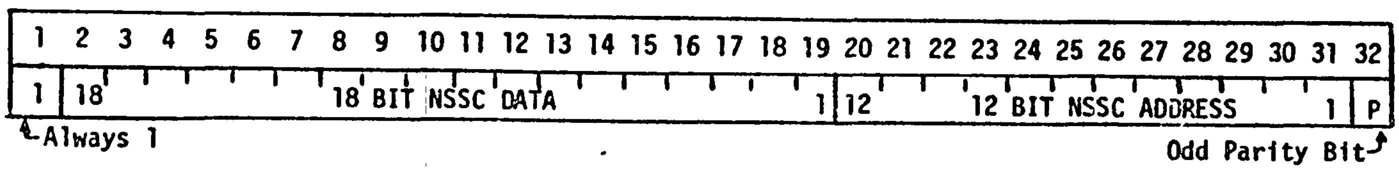
The accelerated multiplex format can insert any single non-fixed telemetry point from the telemetry matrix column (excluding 0 through 3, 32 through 35, 64 through 67 and 96 through 99 - fixed columns) into all of the 112 non-fixed columns. This mode provides an operational analysis tool since it can be initiated through a single serial magnitude command to the CU. It is also referred to as the "Dwell" mode.

2.2.5 OBC DUMP FORMAT

The OBC can dump any 4,096 words of memory in units called memory banks. Less than 4,096 words can also be dumped or loaded. Each dump is repeated at least four (4) times. The memory dump goes to the PMP via the STINT. Each NSSC memory word dumped requires 32 bits, as shown in Figure 2-5. Thirty-two, 32-bit words make up a minor frame (1024 bits), within which there are four groups, each having eight 32-bit words (256 bits). The first word of each group has a special function, as shown in Figure 2-6. This special function means that only 28 memory dump words can be put in each minor frame. Therefore, a copy of one complete fixed bank dump cannot be completed in an integral number of minor frames. Each suceeding dump of the fixed bank begins with the first word (of the second copy of the dump) following immediately after the last word of the preceding dump, and this continues with succeeding dumps until all four dumps have been completed. Figure 2-6 shows the end of the first dump and begining of the second for a hardware dump of a fixed bank. For a dump of less than 4096, X5 and X6 (Figure 2-6) would appear in a different frame position. The minimum number of words that can be dumped is 1024. Therefore, dumps of less than 8 words will be increased to 8 words then repeated until 1024 total words are dumped, dumps of 8 to 256 words will be repeated until 1024 total words are dumped, dumps of greater than 256 will be repeated 4 times.

The OBC dump can be controlled by the hardware or software and is described in Paragraph 2.3.3.4.

ORIGINAL PAGE IS
OF POOR QUALITY



The format of dump data is listed below:

Bits	Description
1	Always 1
2-19	Eighteen bit NSSC data word.
20-31	Twelve LSBs of the 16 bit NSSC address of the data word in bits 2-19
32	This bit is adjusted so that the number of 1 bits in the word is always odd.

FIGURE 2-5 STINT Dump Word Format

MINOR FRAME 1

X1	___	___	___	___	___	___	___	1-8 (32 bit words)
X2	___	___	___	___	___	___	___	9-16
X3	___	___	___	___	___	___	___	17-24
X4	___	___	___	___	___	___	___	25-32

MINOR FRAME 147

X1	___	___	___	___	___	___	___	4673 - 4680
X2	X5	X6	___	___	___	___	___	4681 - 4688
X3	___	___	___	___	___	___	___	4689 - 4696
X4	___	___	___	___	___	___	___	4697 - 4704

X1 MF SYNC Contains a 32 bit sync code (FAF320$_{Hex}$ + 8 zeros)

X2 BANK ID (of the fixed bank) Contains the bank identifier of the NSSC word dumped in the preceding 32 bit word

Format

1 2 ... 23 24 25 26 ... 29 30 31 32
| 1 | 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 | 0 | 1 | X X X X | 1 | 1 | P |

always 1   Hardware dump ⟶ Bank ID   parity
Software dump ⟶ 0000

X3	Subcom Counter	All ones parity bit zero
X4	Subcom Counter	All ones parity bit zero
X5	End of first dump	The 4096th word of the first copy of the dumped bank appears here (position shown-hardware dump)
X6	Start of second dump	The first word of the second copy of the dumped bank appears here. (position shown-hardware dump)

X5 & X6 may be in another position for software dump of less than 4096 words

Figure 2-6 NSSC Dump Format

2.2.6 PAYLOAD CORRECTION DATA (PCD) FORMAT

The PCD telemetry matrix consists of 128 words (minor frame) as shown in Figure 2-7 by 128 rows (major frame). The words in the minor frame contain Angle Displacement Sensor (ADS) and Gyro data whereas the subcom (word 72 only) contains attitude, gyro drift, ephemeris, time code, ADS temperature, PCD multiplexer status as well as TM housekeeping Telemetry data. The PCD Formatter telemetry data is transmitted over the high rate channel (32 Kbps) to GSTDN or TDRS. The PCD Formatter output is also sent to the DPU for insertion into the TM multiplexer payload data stream as described in SVS-10126, Data Format Control Book, Volume V, (Payload). A minor frame is 32 Msec as shown in Figure 2-8 and a major frame is 4.096 seconds. Only one word is subcommutated (word 72) as shown in Figure 2-9.

32 MSEC

DATA	WORD
SYNC	0,1,2
ADS 1	3,4
ADS 2	5,6
ADS 3	7,8
	9
	10
ADS 1	11,12
ADS 2	13,14
ADS 3	15,16
GYRO (Fig 2-8)	17
	18
ADS 1	19,20
ADS 2	21,22
ADS 3	23,24
	25,26
ADS 1	27,28
ADS 2	29,30
ADS 3	31,32
GYRO (Fig 2-8)	33
	34
ADS 1	35,36
ADS 2	37,38
ADS 3	39,40
	41,42
ADS 1	43,44
ADS 2	45,46
ADS 3	47,48
GYRO (Fig 2-8)	49
	50
ADS 1	51,52
ADS 2	53,54
ADS 3	55,56
	57,58
ADS 1	59,60
ADS 2	61,62
ADS 3	63,64

DATA	WORD
MFID	65
ADS 1	66,67
ADS 2	68,69
ADS 3	70,71
SUB COMM (Fig 2-9)	72
	73
ADS 1	74,75
ADS 2	76,77
ADS 3	78,79
	80
GYRO (Fig 2-8)	81
ADS 1	82,83
ADS 2	84,85
ADS 3	86,87
	88,89
ADS 1	90,91
ADS 2	92,93
ADS 3	94,95
	96
GYRO (Fig 2-8)	97
ADS 1	98,99
ADS 2	100,101
ADS 3	102,103
	104,105
ADS 1	106,107
ADS 2	108,109
ADS 3	110,111
	112
GYRO (Fig 2-8)	113
ADS 1	114,115
ADS 2	116,117
ADS 3	118,119
	120,121
ADS 1	122,123
ADS 2	124,125
ADS 3	126,127

= NO DATA - ZERO FILL

Figure 2-7. PCD Minor Frame (32 Msec)

2.2.6.1 Data Sources

The format contains the following types of data from several sources:

1. Angle Displacement Sensor (from ADS)
2. ADS Temperature (from ADS)
3. Gyro Data (from OBC)
4. Gyro Drift Data (from OBC)
5. Attitude Estimate (from OBC)
6. Ephemeris (from OBC)
7. TM Housekeeping Telemetry Data (from OBC)
8. Spare Telemetry Data (From OBC)
9. S/C Time Code (from DPU)
10. Formatter Status (generated in the Formatter)
11. Sync (generated in the Formatter)
12. MFID (generated in the Formatter)
13. Telemetry Frame Correlation (generated in the Formatter)

The location of the data types is further shown in Figure 2-8 and Figure 2-9.

Minor Frame	WORD IN MINOR FRAME											
		17		33		49		81		97		113
0		☒		☒		☒		1_1		1_2		2_1
1		1_3		2_2		2_3		3_1		3_2		3_3
2		☒		☒		☒		1_1		1_2		2_1
3		1_3		2_2		2_3		3_1		3_2		3_3
⋮		⋮		⋮		⋮		⋮		⋮		⋮

☒ - No Data

$$\left.\begin{array}{lll} 1_N & - & \text{X Axis} \\ 2_N & - & \text{Y Axis} \\ 3_N & - & \text{Z Axis} \end{array}\right\}$$ 3- 8 bit bytes; MSB first

Figure 2-8. Gyro Data

2.2.6.2 Data & Timing

2.2.6.2.1 Angle Displacement Sensor - Each axis of the ADS will be sampled every 2 msec (8 words). The sample will be converted to a 12 bit word and inserted in 2 consecutive words of the format, with the 4 MSB's of the first word set to zero. The format and range of the ADS DATA is as follows:

```
MSB              LSB
|                  |
0000 XXXX XXXX XXXX

1ST WORD   2ND WORD    IN MINOR FRAME
```

VOLTAGE	ANGLE (MICRORADIANS) PITCH, ROLL & YAW	BIT PATTERN
+5.0000	+250	0000 0000 0000 0000
0.0000		0000 1000 0000 0000
-4.9976	-250	0000 1111 1111 1111

The data will be sampled during the odd numbered word time preceding the first of the two data words. For example; ADS axis #1 will be sampled during the following word times of each PCD Minor Frame.

1	33	65	97
9	41	73	105
17	49	81	113
25	57	89	121

2.2.6.2.2 ADS Temperature - Up to four ADS related temperatures will be sampled once a PCD Major Frame (4.096 sec). Each sample will be converted to a 12 bit word and inserted in 2 consecutive words of format, with the 4 MSB's of the first word set to zero, as shown below. As above, the data will be sampled in the word time preceding the data word. That is, ADS Temperature #1 is placed in Word 72 minor frame 108 and 109 and sampling time is word 71. The formatting and range of ADS temp data is shown below:

```
MSB            LSB
0000XXXXXXXXXXXX     X = DATA BIT
```

Data	Minor Frame	Word 72
ADS Temp #1	108	MSB 0000XXXX
	109	LSB XXXXXXXX
ADS Temp #2	110	
	111	Same Format
ADS Temp #3	112	
	113	As Above
ADS Temp #4	114	
	115	

Temp	MSB LSB
+50°	0000000000000000
0°C	0000111111111111

2.2.6.2.3 Gyro Data - Each axis of both DRIRU's is sampled, by the OBC, every 64 msec. The OBC will send the data from the DRIRU it is using, to the Formatter. The data will consist of a 24 bit word for each axis (a total of 72 bits). The timing of the data sampling, transfer, and read out in the PCD format, is shown in Figure 2-10.

The word format of the Gyro data for each axis is: (2's complement word)

```
             81   |  97   |   17          X
  WORD      113   |  33   |   49          Y AXIS
             81   |  97   |  113          Z AXIS
            MSB   |       |  LSB          (See Fig. 2-8)
           2^22   |       |  2^0
            SXXXXXXXXXXXXXXXXXXXXXXX      (0.05 ARC-SEC/COUNT)(LOW RATE)
           7 MSB  | MIDDLE.  8 LSB        (0.8 ARC-SEC/COUNT)(HIGH RATE)
```

Each 1 msec data sampling period is initiated by that 16 msec interrupt to the OBC which occurs 36 msec after the start of an even numbered PCD minor frame. (That is, 4 msec after the start of each odd numbered PCD minor frame.) (Figure 2-10.) The start of every fourth PCD major frame is coincident with the start of the TLM major frame, and this time is contained in subcom word 72, minor frame 96 through 103, thus the time of the start of every gyro data sampling period can be determined. Normal imaging in operations uses the lower rate data.

In addition, the relationship between the sampling period, transfer, and read out is also fixed. (See Figure 2-17).

That is, with reference to Figure 2-8, the data present in:

WORD	MINOR FRAME	AXIS
81 & 97	2	X
17	3	X
113	2	Y
33 & 49	3	Y
81, 97 & 113	3	Z

was sampled by the OBC in the period starting at word 16 of minor frame 1.

The data is transferred to the Formatter in the period starting 4 msec after the start of the next PCD minor frame.

2.2.6.2.4 Gyro Drift Data - The drift calculation is performed by the OBC approximately once a minute. The data consists of 3 x 32 bit words. The data will be transferred to the Formatter during the 4th transfer period (see Figure 2-11), between the Attitude data and the TLM spares data.

The format and frame position of the gyro drift data is: (2's complement word)

		MSB 7 2^{-17} SXXXXXXX	XXXXXXXX	XXXXXXXX	LSB 7 2^{-47} XXXXXXXX	(Scale -16)
	ROLL	16	17	18	19	THETBX*
MINOR	PITCH	20	21	22	23	THETBY
FRAME	YAW	24	25	26	27	THETBZ

* OBC TLM Report #10

The data will appear in word 72 of minor frames 16 through 27 of the PCD major frame that starts at the TLM Major Frame Pulse (see Figure 2-9). Since the data will be sampled every 16.384 seconds, it will repeat 4 times between each calculation.

2.2.6.2.5 Attitude Estimate - The OBC calculates a FS Attitude Estimate every 512 msec. The OBC will send 1 out of 8 of these sets of data to the Formatter, starting with that one calculated 52 msec after the TLM Major Frame Pulse and every 4.096 sec after that (once a PCD major frame) (See Figure 2-11).

Attitude is Euler parameters (EPA1, EPA2, EPA3, EPA4) that specify vehicle attitude relative to ECI frame (non-dimensional). OBC double precision word (36 bits) is compressed to 32 bits and has the following format: (2's complement word)

```
                          32-BITS
       MSB                                  LSB
       2^0                                  2^-30   (Scale 1)
EPA1   SXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX  WORD 72
           0        1        2        3     Minor Frame
```

Repeated for EPA2,3,4 in Minor Frames 4 through 15.

The data will appear in word 72 of minor frames 0 through 15 of each PCD major frame (see Figure 2-9).

2.2.6.2.6 Ephemeris - This calculation is made by the OBC when the Attitude calculation is made. In this case, only 1 out of 16 sets of data will be sent to the Formatter (that is, every other PCD major frame - 8.192 sec).

The data consists of 192 bits transferred to the Formatter after the Attitude data in transfer periods 1 and 3 (see Figure 2-11).

Ephemeris is 32 bit binary words defining $X,Y,Z,\dot{X},\dot{Y},\dot{Z}$ (meters and kilometers/sec respectively) in ECITOD coordinates. The data are 36 bit OBC double precision words compressed to 32 bits by dropping the second sign bit and the 3 least significant bits. The scale factor is 23 for position and 3 for velocity. The format of this data is as follows: (2's complement words)

	MSB			LSB	
WORD 72	2^{22}			2^{-8}	
	SXXXXXXX	XXXXXXXX	XXXXXXXX	XXXXXXXX	SCALE = 23

POSITION

X	16	17	18	19	MINOR	EOGBRF (1)*
Y	20	21	22	23	FRAME	EOGBRF (2)
Z	24	25	26	27		EOGBRF (3)

* OBC TLM Report #13 EPH01

	MSB			LSB	
WORD 72	2^{2}			2^{-28}	
	SXXXXXXX	XXXXXXXX	XXXXXXXX	XXXXXXXX	SCALE = 3

VELOCITY

X	28	29	30	31	MINOR	EOGBVF (1)*
Y	32	33	34	35	FRAME	EOGBVF (2)
Z	36	37	38	39		EOGBVF (3)

* OBC TLM Report #13 EPH01

The data will appear in word 72 of minor frames 16 through 39 of every other PCD major frame (see Figure 2-9). These major frames will carry the "1" and "3" identifier in place of Time Code.

2.2.6.2.7 TM Housekeeping Telemetry - Up to 248 bits of TM Housekeeping Telemetry data may be stripped out of the realtime telemetry format by the OBC and sent to the Formatter. The data will be buffered at the fifth 16 msec interrupt after the start of a telemetry major frame, and transferred to the Formatter following the Attitude data in transfer period 2 (see Figure 2-11).

The data will appear in word 72 of minor frames 16 through 45 of the third PCD major frame after the TLM Major Frame Pulse (see Figure 2-9). This major frame will carry the identifier "2" in place of Time Code. For time correlation, it should be noted that the data will be from the previous TLM major frame.

ORIGINAL PAGE IS
OF POOR QUALITY

The TM Telemetry will consist of:

WORD #	USER ID	DESCRIPTION
1	TM-59	Blackbody Temp
2	TM-60	SI FPA Temp
3	TM-61	Calibration Shutter Temp.
4	TM-62	Backup Shutter Temp
5	TM-69	Baffle Temp
6	TM-70	Cold FPA Temp.
7	TM-67	CFPA Control Temp
8	TM-95	CAL Lamp Filter Temp
9	TM-94	SLC Temp.
10	TM-86	CAL Shutter Temp.
11	TM-83	Ambient Preamp Temp (Even)
12	TM-75	Band 6 Post Amp Temp
13	TM-73	Relay Optics Temps
14	TM-72	Cold Preamp Temp
15	TM-71	Ambient Preamp Temp (Odd)
16	TM-101	Serial Word A
17	TM-102	Serial Word B
18	TM-103	Serial Word C
19	TM-104	Serial Word D
20	TM-105	Serial Word E
21	TM-106	Serial Word F
22	TM-107	Serial Word G
23	TM-108	Serial Word H
24	TM-112	Serial Word L
25	TM-79	Primary Mirror Temp
26	TM-80	Primary Mirror Mask Temp
27	TM-81	Secondary Mirror Temp
28	TM-82	Secondary Mirror Mask Temp
29	TM-84	Telescope Housing Temp
30	TM-85	Telescope Baseplate Temp
31	TM-68	CFPA HTR Current

2.2.6.2.8 Spare Telemetry - Up to 176 bits of data may be stripped out of the realtime telemetry format or computed data by the OBC and sent to the Formatter in the same manner as the TM Housekeeping Data, except the 4th transfer period is used (see Figure 2-11).

The data will appear in word 72 of minor frames 28 through 49 of the first PCD major frame after the TLM Major Frame Pulse (see Figure 2-9). This major frame carries the S/C Time Code. The spare telemetry contains the following:

MINOR FRAME	FUNCTIONS (Number in HEX)
28	EPHEMERIS SOURCE ID 00 = GPS; 01 = UPLINK
29	ROLL GYRO ID 00 = GYRO 1; 01 = GYRO 2
30	PITCH GYRO ID 00 = GYRO 1; 01 = GYRO 2
31	YAW GYRO ID 00 = GYRO 1; 01 = GYRO 2

IRU Channel

	Gyro 1	Gyro 2
Roll	B	A
Pitch	B	C
Yaw	A	C

The data will be from the TLM major frame that started 32.768 sec before the time given in the PCD major frame. If no spare telemetry data is sent to the formatter the field will be zero filled.

2.2.6.2.9 S/C Time Code - Time Code will be transferred directly from the DPU to the Formatter at the same time as it is transferred to the RIU for the TLM format. This transfer will occur during the first 1.024 sec after a TLM Major Frame Pulse.

The data consists of the full 64 bits (4 - Spacecraft ID, 52 - T/C, 8 - DPU Status) defining the time at which the TLM Major Frame Pulse occurred. The data will appear in word 72 of minor frames 96 through 103 of the first PCD major frame after the TLM Major Frame Pulse (see Figure 2-9). The time code appears as shown in Table 2-36. Though the PCD time code format is the same as the realtime format, word location is different. Realtime Telemetry location is word 32.

2.2.6.2.10 Formatter Status - 16 bits of Formatter status can be accommodated and will appear in word 72 of minor frames 116 and 117 of each PCD major frame.

The data consists of a frame error bit and ADS ground reference. The ADS ground reference voltage has the same scale and range as ADS data (-4.9976 to +5.000 volts). The format is as follows:

MINOR FRAME	WORD 72				
116	*	0	0	0	MSB ←
117		ADS	GND	REFERENCE → LSB	

* FRAME ERROR BIT

1 = Expected TLM Major Frame Pulse either did not occur or did not line up with start of PCD Major Frame 1.

2.2.6.2.11 Sync - The same sync pattern used for the TLM data will appear in words 0 through 2 of each PCD minor frame. (FAF320 HEX)

2.2.6.2.12 MFID - A 0 to 127 count of minor frames will appear in word 65 of each PCD minor frame.

2.2.6.2.13 Telemetry Frame Correlation - Word 72 of minor frames 96 through 103 of the 2nd, 3rd and 4th PCD major frames of a four frame set (see Figure 2-8) will contain a unique identifier (1, 2 or 3).

2.2.6.3 PCD Data in Realtime Telemetry Stream

Data types, item numbers 2 through 9 in paragraph 2.2.6.1, are also contained in the realtime spacecraft telemetry stream for the purpose of MSS processing by foreign stations. The high rate channel PCD telemetry is essentially used to process Thematic Mapper payload data.

ORIGINAL PAGE IS
OF POOR QUALITY

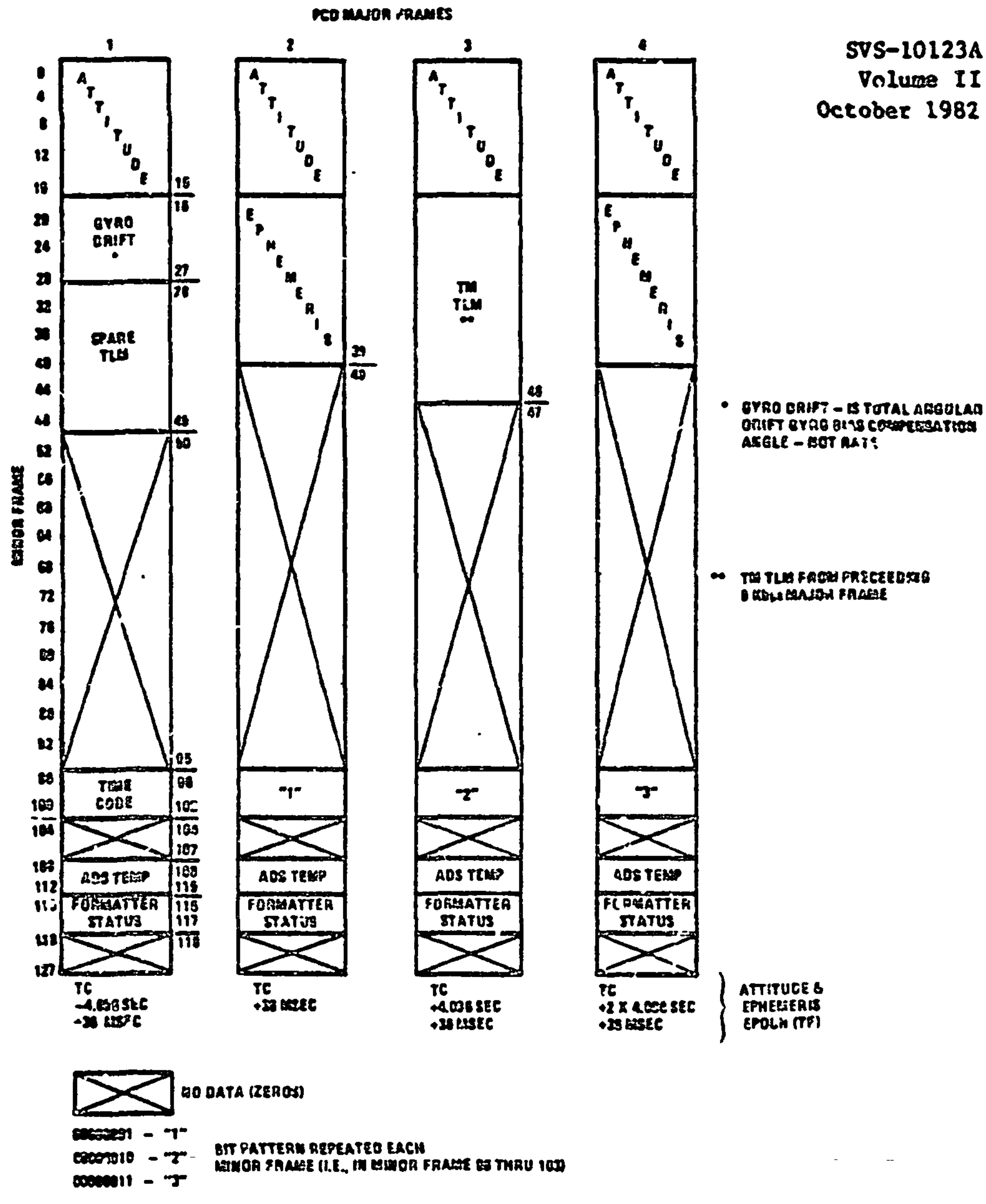


Figure 2-9. Sub Comm Data (Word 72)

ORIGINAL PAGE IS
OF POOR QUALITY

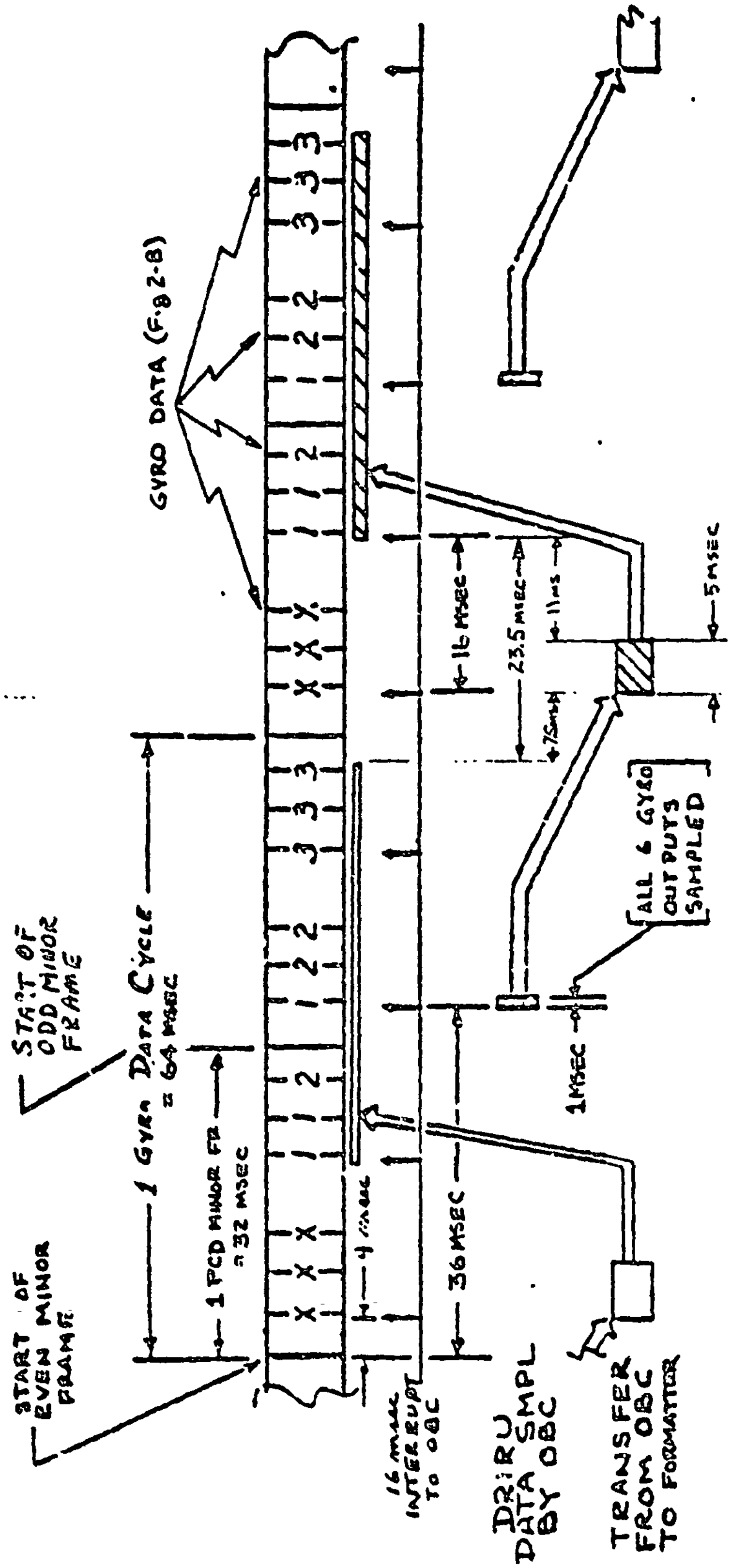
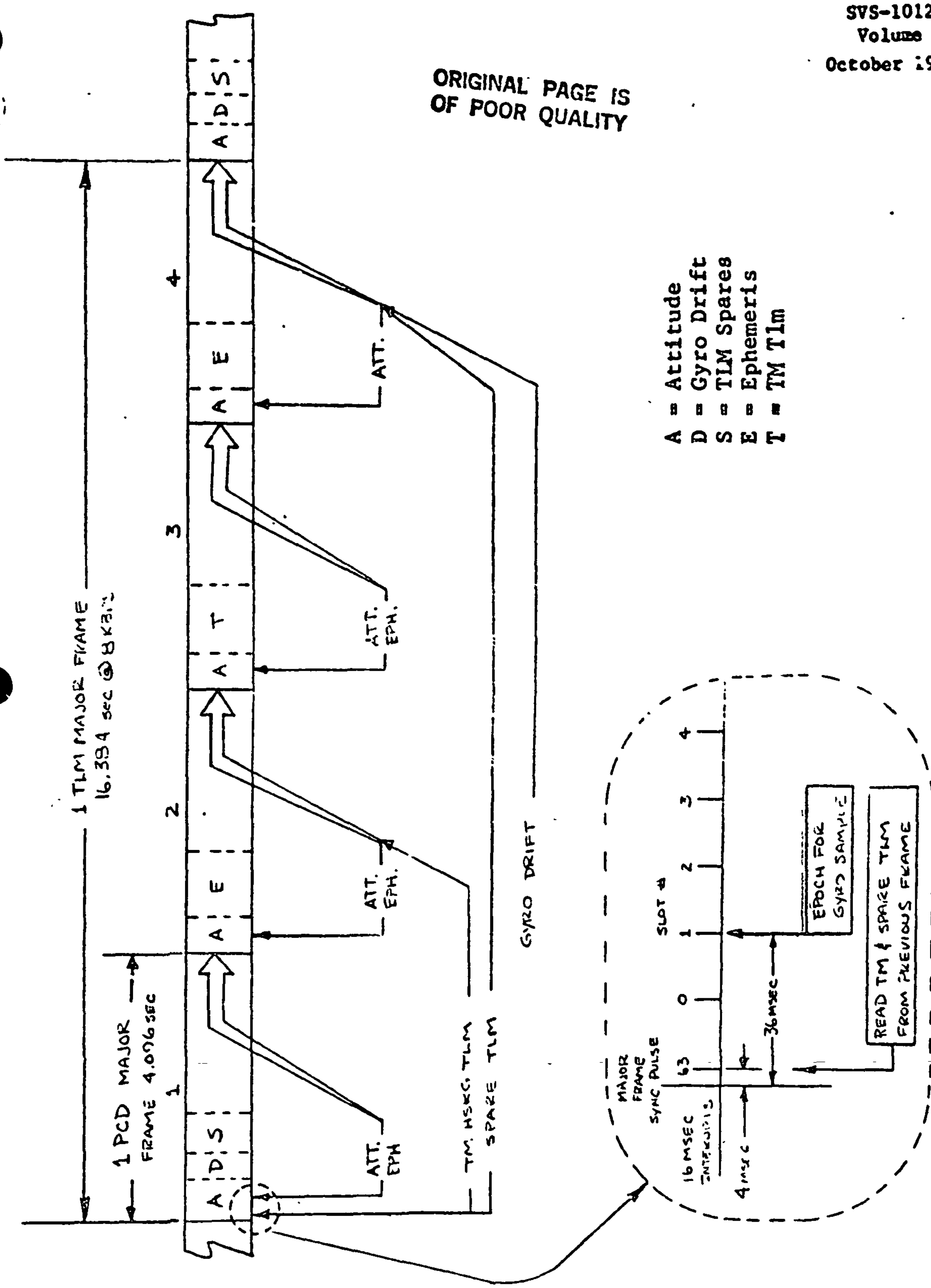


Figure 2-10. Gyro Data Timing

ORIGINAL PAGE IS
OF POOR QUALITY



A = Attitude
D = Gyro Drift
S = TLM Spares
E = Ephemeris
T = TM Tlm

Figure 2-11. Sub Comm Data Timing

2.2.7 NARROWBAND TAPE RECORDER (NBTR) FORMAT

The NBTR records on 4 pairs of channels for redundancy. Playback is via one of the 4 pairs into a single output by command. The recording is in a forward direction (no reverse direction recording possible) and playback is in the reverse direction only. The format of the NBTR telemetry stream is identical to that shown in Figure 2-3 except that the last word of the matrix is transmitted first. Also, the LSB of a word is transmitted first. Therefore, the data output from the tape recorder during playback is reversed in time, (i.e., data bit stream recorded as 110 is played back as 011). The recorder will only record 8 Kbps telemetry data. The tape recorder transmits the data bit stream to the PMP at a command selectable rate of either 128 Kbps or 256 Kbps in NRZ-L format and is converted to NRZ-M by the PMP before downlink.

2.3 COMMAND AND DATA HANDLING (C&DH) SUBSYSTEM

The C&DH subsystem contains the STACC Central Unit (CU), the STACC Interface Units (STINT), the Central Processor Units (CPU), Memories, transponders, receivers, the RF switching and the Pre-Modulator Processors (PMP) as shown in Figure 2-12. The C&DH Subsystem is responsible for acquiring and transmitting two data bit streams:

1. Realtime Spacecraft Telemetry:

   a. Housekeeping (Subsystem and Sensor) Telemetry and

   b. Global Positioning System data (selected Data Files) and

c. Flight Spacecraft Time (DPU, CU/OBC, GPS) and

d. Payload Correction Data (2 through 9 of 2.2.6.1)

2. High Rate Channel Telemetry:

a. Playback of Recorded Realtime Spacecraft Telemetry above or

b. Payload Correction Data or

c. On-Board Computer Memory Dump

2.3.1 TRANSPONDER

The transponders are capable of transmitting in the frequency range of 2200 to 2300 MHz. For the Landsat D mission, the transmit frequency is 2287.5 MHz. The receiver frequency is 2106.4 MHz.

The spreading code for the TDRS Return Link is obtained from the transponder internal digital subsystem. Modulation mode control permits reconfiguration of the phase modulator network to deliver to the S-Band power amplifier stage one of the following:

1. Residual carrier, linearly phase modulated (GSTDN)

2. Suppressed carrier SQPSK, PN internally supplied (TDRSS)

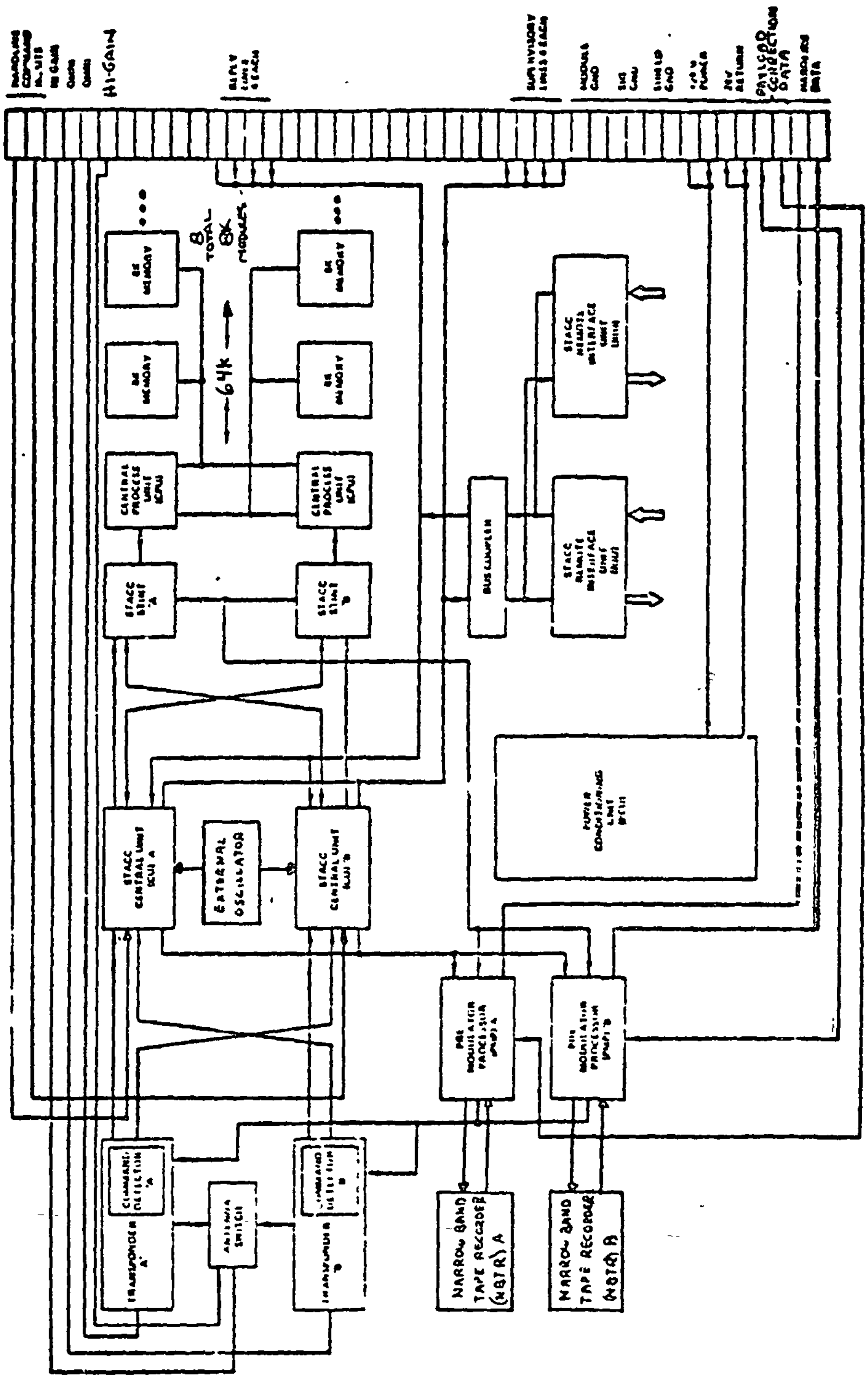


Figure 2-12 C&DH Subsystem Block Diagram

The configuration of the transmitter and the selection of modulation sources and levels for TDRSS or GSTDN operation is automatically accomplished by the transponder's digital subsystem, based on the Forward Link mode being received by the transponder and external commands. See SVS-10124, Data Format Control Book, Volume III (Command). Following modulation, the S-Band signal is amplified to the desired RF output level.

The initial power-up configuration, assumed by the transponder automatically when power is temporary interrupted to the receiver (prime power), is shown in Table 2-5.

2.3.1.1 Transmitter

The nominal RF output of the transponder is 5 watts ± 1dB at the diplexer output port. The Modulator in the TDRS transponder, Figure 2-13, has inputs for two digital telemetry data bit streams for the TDRSS Mode and two analog telemetry inputs for the GSTDN mode.

The two TDRS data bit streams (Realtime Telemetry and High Rate Channel) are modulo-2 added to internally-generated PN codes and transmited independently on the In-phase (I) channel and the Quadrature (Q) channel as Staggered - Quadrature - Phase-Shift-Keyed (SQPSK) modulation on the S-Band Return Link. The relative distribution of modulation energy is set at 4:1 ratio (Q:I).

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-5. Power-up (RESET) RF Parameter Configuration

Parameter	Initial Value
Receiver Mode	Dual
TDRS Receive Command Rate	Low (125 bps)
Transmit:	Initially OFF
(After "Override" Turn-ON)	Auto turn on inhibited
Frequency	AUX OSC until receiver acquires: then Receiver VCO
Mode	STDN
STDN Modulation Index	Low
STDN Telemetry Channels	Both OFF
STDN Ranging Channel	Disabled

ORIGINAL PAGE IS
OF POOR QUALITY

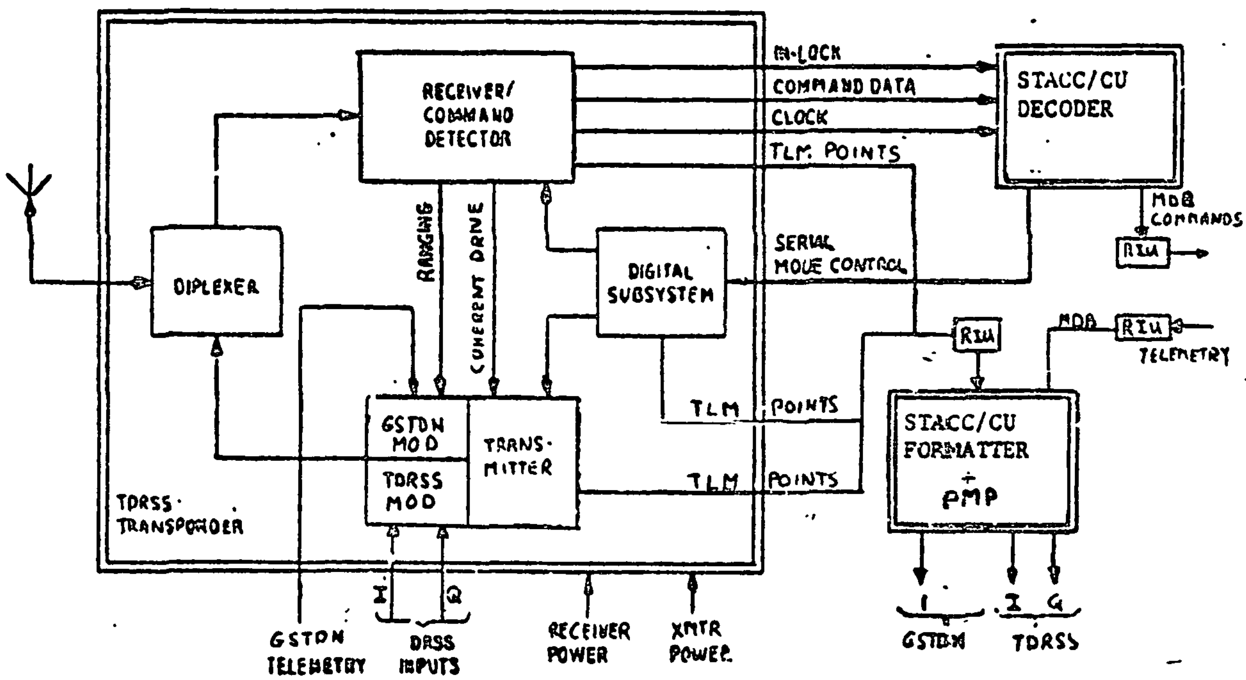


Figure 2-13. System Level Functional Interface

From the PMP, the GSTDN analog signal #1 is summed in a linear network in the transmitter and transmitted as a residual - carrier phase modulation on the S-Band Link. The transmitter GSTDN #2 signal input port is not used. The GSTDN phase modulation index is commandable LOW or HIGH. Both the TDRSS and the GSTDN telemetry channels can be turned ON/OFF by external command. The ranging turnaround function is command selectable and internal to the transponder. The GSTDN tone ranging channel is linearly summed with the telemetry inputs from the PMP. Coherent frequency turnaround ratio is 240/221.

2.3.1.2 Receiver

The receiver simultaneously tries to lock on to either the TDRS or GSTDN signal based upon received signal strength. The received signal strength of -50 to -95 dBm selects the GSTDN mode whereas the range -110 to -135 dBm causes the receiver to select the TDRS mode for processing incoming command signals. See SVS-10124, Data Format Control Book, Volume III, (Command) for commanding description and formats.

2.3.1.3 Antennas

The transponder transmits via the OMNI or the high gain antenna on the S-Band frequency of 2287.5 MHz. The transponder to antenna configuration is command selectable and set by two RF switches. The two RF switch states are independently commanded, therefore, transponder No. 1 or No. 2 can be independently configured to transmit telemetry through the OMNI or high gain antenna.

2.3.1.4 Ranging

A turnaround of the received S-Band ranging code is command selectable and is coherent (240/221). The turn-around ranging function in the transponder is available only when the receiver is locked to a Forward Link signal. In the TDRSS mode of the transponder, turn-around ranging is obtained by synchronizing the "all 1's" state in the locally generated Return Link PN code with the "all 1's" state in the received Forward Link PN code. The code itself is not turned around.

The GSTDN ground Tone Ranging Subsystem relies on the Landsat-D spacecraft transponder to detect sinewave tones in the range of 4 KHz to 500 KHz which have been phase-modulated on the Forward Link carrier by the GSTDN site and to re-modulate them at a predetermined phase modulation index. In the phaselock receiver, a separate intermediate frequency amplifier/phase detector channel is provided for the range tone signals. The amplitude of the output tones are maintained constant by an automatic gain control system. The modulation Index controls are provided in both the transponder and the Pre-Modulator Processor and must be configured as shown in Table 2-6, to obtain the correct modulation index for GSTDN operation.

Table 2-6. Modulation Index Settings

Mod. Index Settings		Resultant Modulation Index		
XPDR	PMP	RANGE(2)	BASEBAND(2)	TELEMETRY (RT)
LOW	LOW(1)	0.6	1.0	0.8
LOW	LOW	OFF	OFF	0.8
HIGH	LOW	OFF	OFF	1.6

NOTE: (1) Baseband ON
(2) Mutually Exclusive Operation
(3) Mode B,C,D

A commandable switch is provided in the ranging channel so that it can be commanded ON/OFF. The ranging tones to the GSTDN may be transmitted alone or may be summed with the Return Link subcarrier (RT S/C telemetry) prior to applying the signals to the transmitter phase modulator. If the receiver is not locked to a forward link signal an RF switch in the transmitter automatically selects the transmitter drive frequency from a quartz crystal oscillator. This is called the "non-coherent" mode.

Some combinations of realtime spacecraft telemetry (RT), range (RNG), Range Rate (RR), On-Board Computer (OBC), Narrowband Tape Recorder (NBTR) Playback and Payload Correction Data (PCD) can be transmitted simultaneously to either GSTDN or TDRS under certain configurations of the C&DH. These are summarized in Table 2-7.

Table 2-7. TDRS/GSTDN Data Type Selection vs. Mod. Index

	GSTDN						MOD	TDRS					
	RT	RNG	RR	OBC	NBTR	PCD	INDEX	RT	RNG	RR	OBC	NBTR	PCD
A.	X		C				H	X	C	C			
B.	X	C	C				L	X	C	C			
C.	X		C	X			H	X	C	C	X		
D.	X		C		X		H	X	C	C		X	
E.	X		C			X	H	X	C	C			X

NOTES: X = Turned ON

C = Coherent Turn-around mode

L = Low Modulation Index

H = High Modulation Index

RT = Realtime Telemetry

RNG= Range

RR = Range Rate

2.3.2 STACC CENTRAL UNIT (CU)

The CU includes the command decoder, format generator, bus control interface and spacecraft clock, as shown in Figure 2-14. The CU controls the telemetry matrix via the format generator. The telemetry data is retrieved from various subsystems via a Multiplex Data Bus. The CU can address up to 31 RIU's (62 redundantly). RIU address '0' is reserved for internal CU special commands. There are nine RIU's on Landsat-D addressed as follows for the various spacecraft subsystems for both commands and telemetry:

RIU #	Subsystem(s) Addressed
1	C&DH, OBC and NBTR
2	MACS
3	MPS
4	SC&CU, ESAM and PM
5	PM
6	PDU, DPU, TM and TH
7	GPS, MSS, TM, S-Band XMTR, and TH
8	MSS, DPU, TM, TH and TCS
9	WBCS

ORIGINAL PAGE IS
OF POOR QUALITY

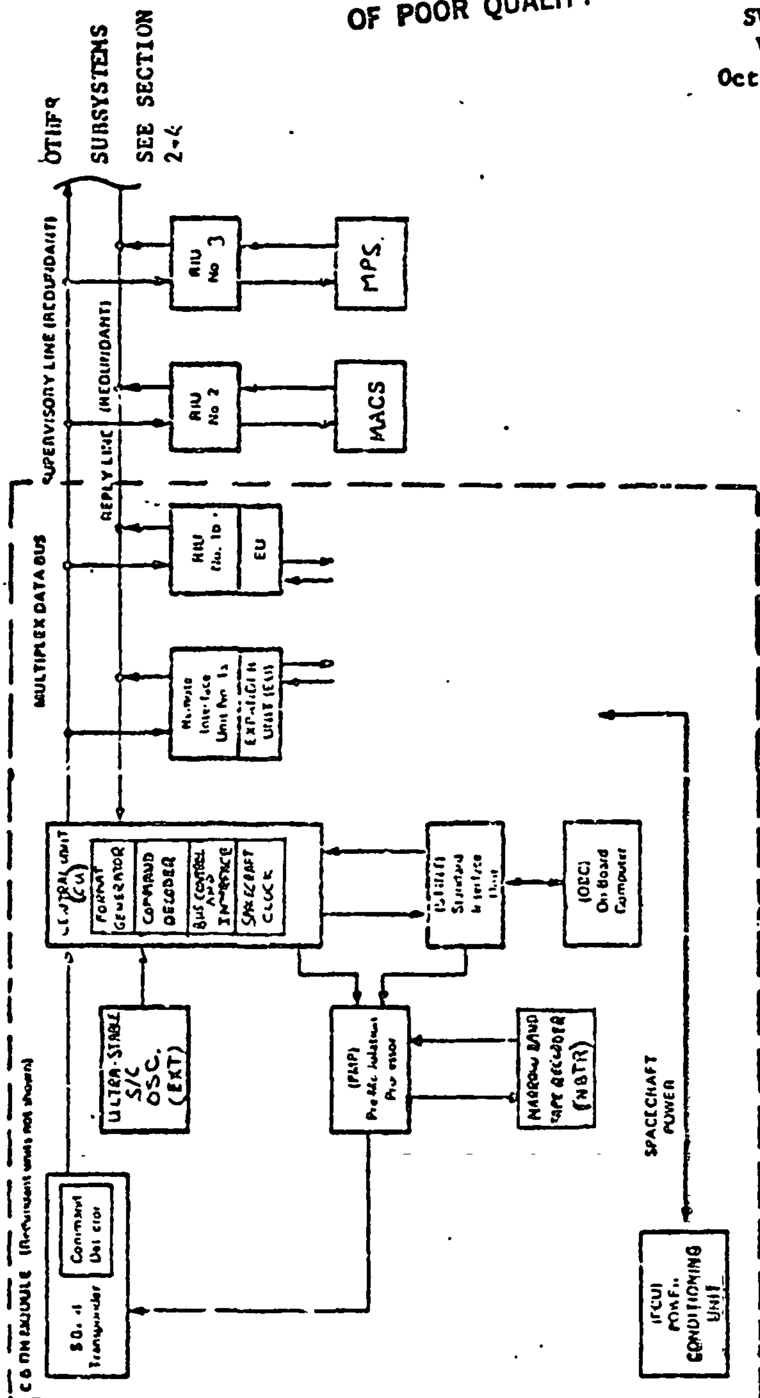


Figure 2-14. STACC in C&DH.

2.3.2.1 Multiplex Data Bus

The STACC CU multiplex data bus consists of the Bus Control Interface, Bus Control Units and Remote Interface Units (RIU) including Expander Unit(s). The multiplex data bus has redundant sets of "party lines". Each set contains two 2-wire circuits, one for the transmission of commands and addresses from the CU to remote units and the second for the transmission of data from the remote units back to the CU. These circuits are referred to as the Supervisory Line and the Reply Line respectively. The Multiplex Data Bus characteristics are described in Table 2-8. The 32 bit Supervisory Line Word Format is shown in Figure 2-15 and the 9 bit Reply Line Word Format is shown in Figure 2-16.

2.3.2.1.1 Supervisor Line

There are four types of supervisory line messages that are sent to the RIU's via the Multiplex Data Bus: Real-time (ground) command, RIU channel address for telemetry data, computer command, and RIU channel address for computer data. These four message segments, each containing 32 bits, comprise a 125 microsecond timing cycle on the Supervisory Line that is repeated continuously, Figure 2-17. The Supervisory Line remains active when not transmitting messages, permitting RIU's to continue deriving clock and to maintain synchronization. The Multiplex Data Bus activity is described later.

Table 2-8. Multiplex Data Bus Characteristics

Bit rate:	1.024 mbps
Bit sync:	Biphase-L per preliminary MSDADS
Word sync:	3 bits illegal code followed by Logical "1"
Word size:	32 bits on Supervisory Line
	9 bits on Reply Line, 8 bits data plus leading 0
Word rate:	32 kwps maximum on Supervisory Line 16 kwps maximum on Reply Line
*Response time:	N-bit times to be specified by contractor where $N \leq 64$.
Clock on Supervisory Line is continuous.	
Data on Reply Line are phased relative to Supervisory Line Clock.	
Up to 62 Remote Units may be tied on bus.	

* Response Time is defined as the time from the end of the message parity bit to the start of the return data sync word.

ORIGINAL PAGE IS
OF POOR QUALITY

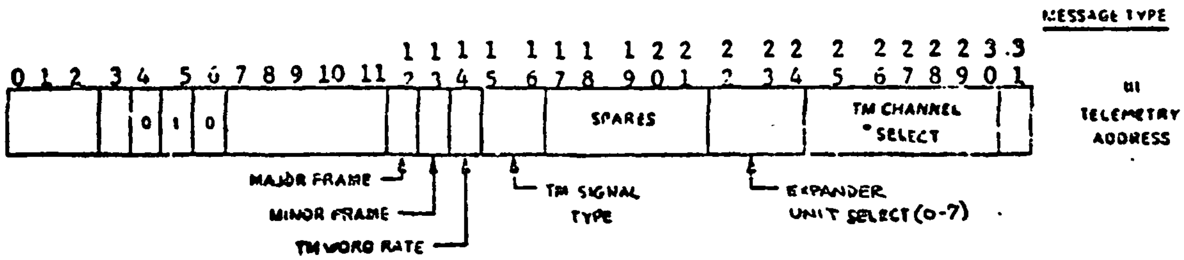


Figure 2-15. Supervisory Line Word Format

The telemetry signal type is determined by bits 15 and 16 of the telemetry message, as shown in the above diagram. The meanings of bits 15 and 16 are as follows:

- 00 Passive Analog
- 01 Active Analog
- 10 Serial digital
- 11 Bilevel

Format on the reply line consists of nine bits. The first is a sync bit, logical "0" which is followed by eight bits of telemetry information, as shown below.

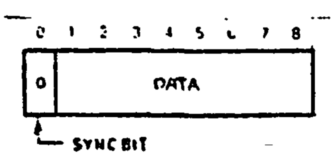


Figure 2-16. Reply Line Word Format

Segment #0	Segment #1	Segment #2	Segment #3
o One Ground CMD message slot #0 only Row #13 only o One ground CMD every 16 ms	o STACC Request for telemetry o Inserted once every message slot o 16 fixed words plus 112 TLM addresses o 128 Telemetry requests every 16 ms.	o CMDs from OBC in message Slot #6 only o Discrete CMD in message Slot #6 and Row #4 only o 16 serial magnitude CMDs every 16 ms o 1 discrete CMD every 16 ms.	o OBC requests for telemetry o 128 requests every 16 ms.

(See Figure 2-24)

Figure 2-17. Supervisory Line Message Format

2.3.2.1.2 Reply Line

For a given message, the addressed RIU must respond in a maximum of 31.25 microseconds following the message cycle to become active and start execution. The transmission of the acquired data is accomplished on the reply line. Signals only appear on the reply line during the response period. The reply activity message format is 9 bits long and occupies appropriate time slots containing 8 bits of data and a leading logical zero (as sync). The maximum word rate is 16 K words (9 bits) per second. The Reply line is quiescent when not in use.

2.3.2.2 Bus Control Unit

The bus controller interfaces the Central Unit to the multiplex data bus. It receives data source addressing from the format generator, adds the standard header and immediately transmits the data onto the supervisory line as Manchester encoded data. Bit 31, even parity bit, is generated on the fly as data is shifted out. The controller uses the 1.024 and 2.048 MHz clocks from the spacecraft clock for encoding. The beginning of each 32 bit data word is denoted by an approximately 1 microsecond party line pulse generated by the format generator. The controller transmits Manchester logical "ones" when real data words are not being sent.

The controller receives Manchester encoded data on the reply line. The data consists a sync bit (0) and 8 bits of data (Figure 2-16) transmitted at the

1.024 MHz rate. The controller generates an eight pulse clock from the data, a data ready envelope, and transfers the eight data bits to the format generator. The format generator returns a data received pulse during the eighth clock time to complete the data transfer.

The controller responds to four critical commands which establish the configuration of the redundant party lines. The commands determine which supervisory line is driven and which line receiver data will be accepted. See Volume III (Command) of the DFCB for description and format of Special commands.

2.3.2.3 Remote Interface Unit (RIU)

The RIU is the standard interface between the STACC CU and the subsystems. The RIU performs the command decoding and the telemetry multiplexing as shown in Figure 2-18. The RIU performs the following functions:

1. Distributes eight (8) serial magnitude and sixty-three (63) pulse commands. (Refer to SVS-10124, Data Format Control Book, Volume III (Command).
2. Selects and distributes clock signals from the STACC CU and forwards them to the subsystem equipment.
3. Selects, conditions and, where indicated, converts sixty-four (64) channels of telemetry data and relays them to the STACC CU.

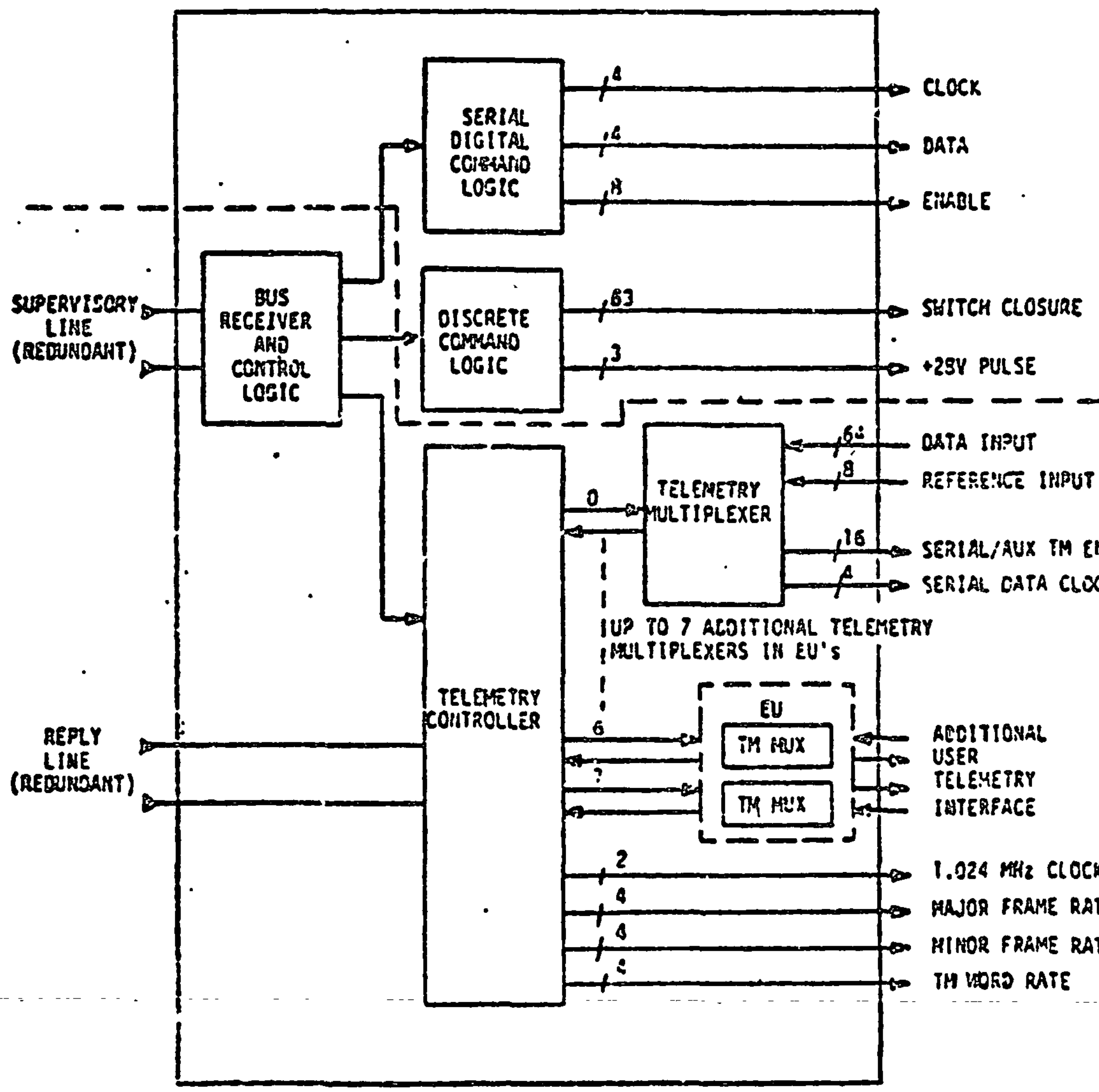


Figure 2-18. RIU Simplified Block Diagram

All RIU's on Landsat-D are connected as redundant pairs, e.g., RIU 1A and 1B. In normal operation one of the pairs is OFF and the mate of the pair is ON in the standby 2 mode. Turning one of a pair OFF can only be accomplished by turning the other on in the standby 2 mode.

2.3.2.3.1 Telemetry Controller

The Telemetry Controller is an independently timed and power strobed section used to provide all timing and control signals necessary for telemetry multiplexer and bus transmitter operation, processing of the four types of analog and digital input signals, and temporary storage of acquired data to be transmitted on both reply lines to the CU. At the end of a data acquisition process, acquired data resides in the eight bit output data register. The telemetry controller sends the contents of this register along with a one-bit sync (Figure 2-16), and the necessary power and timing signals to the reply bus transmitter which sends the 9-bit word to the CU. Nine bits of NRZ-L data including a one-bit sync are converted to biphase data and transmitted on both reply lines simultaneously.

2.3.2.3.2 Telemetry Multiplexer Expander Units

Each RIU contains a single telemetry multiplexer capable of retrieving four types of signals from a total of 64 inputs. A total of eight multiplexers may be used with any given RIU providing a maximum input capability of 512 channels. The additional telemetry multiplexers are housed in pairs in Expander Units.

2.3.2.3.3 RIU Operational Modes

The RIU "ON" is divided into 2 separate subgroups called Standby 1 and Standby 2. Table 2-9 defines the RIU operational modes.

2.3.2.3.4 Subsystem Telemetry Interface

The RIU retrieves four types of data from up to 512 input channels (fully expanded). The types of data which are acquired are analog, passive analog, bilevel and serial digital. Retrieval data is sent to the CU hence to the OBC or ground at a selected bit rate and format via the CU/PMP/Transponder. The STACC CU controls the acquisition of data, via messages sent over the Supervisory Line. The telemetry controller in the RIU selects the input to be sampled, power strobes the correct telemetry multiplexer and routes the acquired sample to the appropriate input circuit for processing, formatting and transmission to the CU over the Reply Line of the MDB. The telemetry type, bits 15 and 16 of the Telemetry message (Figure 2-15), indicates to the telemetry controller whether the input is active or passive and whether it is analog or digital. Following data acquisition and processing the telemetry controller stores the 8 bit data word prior to transmission. A 1-bit sync is added forming the 9-bit reply word which is sent over the reply lines.

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-9. RIU Operational Mode Definition

Function	Mode			
	Power Fail	Off	Standby 1	Standby 2
Telemetry	-	-	-	X
+5.3 Volts (Stby 2)	-	-	-	X
Frame & Word Rate Sync	-	-	-	X
1.024 MHz Clock	-	-	-	X
Serial Command	-	-	-	X
+5.3 Volts (Stby 1)	-	-	X	X
Discrete Commands 1-63	-	-	X	X
Discrete Command 0	-	X	X	X
Supervisory Bus Rcvr.	-	X	X	X
Power Converter	-	X	X	X
Mux Pinchoff	X*	X	X	X

X - Functionally Powered
* - From external -15V source

NOTES:

1. The difference between "OFF" and "STANDBY 1" and between "STANDBY 1" and "STANDBY 2" is determined by separate dedicated relays and will therefore remain the same after a power failure.

2. "STANDBY 1" is activated by command to RIU Channel "0", SELF ON.

3. "STANDBY 2" is activated by command to RIU Channel "63", MATE OFF.

2.3.2.3.5 Telemetry Input Quantities

Each Telemetry Multiplexer (Figure 2-18) has 64 input channels which may acquire data of four types, mentioned above. Sixteen specific channels may be used for passive analog inputs and sixteen for serial digital. Any of the 64 may be used for bilevel (preferably in groups of 8) or analog. The restrictions related to the assignment of telemetry inputs are outlined in Table 2-10.

2.3.2.3.6 Analog Telemetry Inputs

The analog signal (0 to +5.12 VDC) is converted to an 8-bit digital word. The total error of any given reading is ±25 mv:

1. Quantitization: ± 1/2 bit
2. Linearity: ± 1/2 bit
3. Accuracy: ± 1/4 bit
4. TOTAL: ± 1 1/4 bits (25 mv)

The Anglog to Digital Converter is set up so that:

0 to 10 mv = 0 counts

10 mv to 30 mv = 1 count (nominal 20 mv)

30 mv to 50 mv = 2 counts (nominal 40 mv)

•

•

•

5.09V to 5.11V = 255 counts (nominally 5.1V)

Table 2-10. Telemetry Channel Assignments
(per Telemetry Multiplexer)

TELEMETRY INPUT CHANNEL	CHANNEL ASSIGNMENT BY SIGNAL TYPE		
0 . . 7	Bilevel Group 0	Only these channels can be used for serial digital data	These channels may be used for analog data. An enable is available at the time of sampling.
8 . . 15	Bilevel Group 1	Only these channels can be used for serial digital data	These channels may be used for analog data. An enable is available at the time of sampling.
16 . . 23	Bilevel Group 2	Only these channels cana be used for conditioned passive transducer data.	These channels may be used for analog data not requiring an enable at the time of sampling.
24 . . 31	Bilevel Group 3	Only these channels cana be used for conditioned passive transducer data.	These channels may be used for analog data not requiring an enable at the time of sampling.
32 . . 39	Bilevel Group 4		These channels may be used for analog data not requiring an enable at the time of sampling.
40 . . 47	Bilevel Group 5		These channels may be used for analog data not requiring an enable at the time of sampling.
48 . . 55	Bilevel Group 6		These channels may be used for analog data not requiring an enable at the time of sampling.
56 . . 63	Bilevel Group 7		These channels may be used for analog data not requiring an enable at the time of sampling.

Therefore, 5.1V to 5.12 = all ones.

The A to D Converter input of -1V to 0V = all zeroes, 5.12V to 7V = all ones.

The analog telemetry timing characteristics for transmission over the reply lines of the multiplexer data bus are shown in Figure 2-19.

2.3.2.3.7 Passive Analog Telemetry Inputs

The passive analog signal is different from the active in that a standard 1 mA current drive is supplied. The resulting analog signal is routed to the same analog-to-digital converter, as the active analog telemetry input. The passive analog telemetry timing for data transmission over the MDB is shown in Figure 2-20.

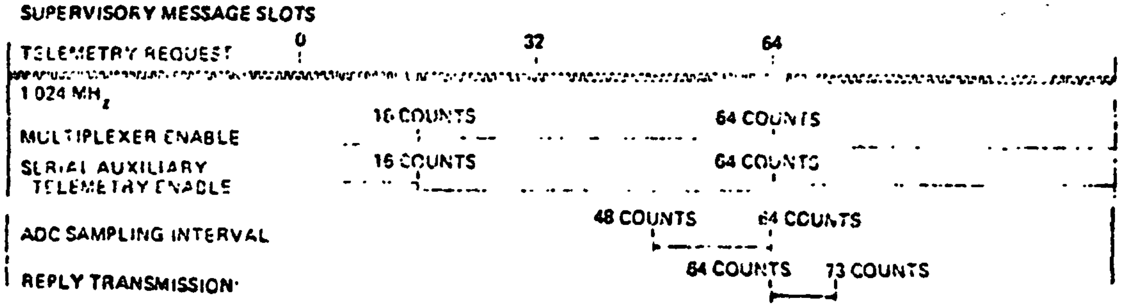


Figure 2-19. Analog Telemetry Timing

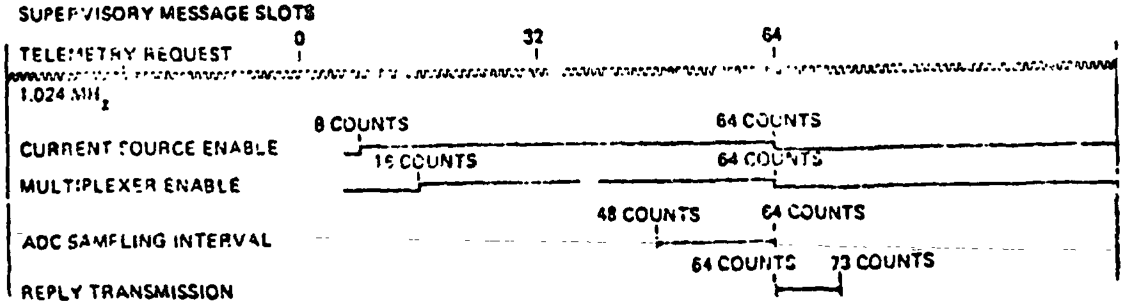


Figure 2-20. Passive Analog Telemetry Timing

2.3.2.3.8 Bilevel Telemetry Inputs

In response to the bilevel telemetry request message (via Supervisory Line), a specific block of eight telemetry inputs is routed to form a sequence to a voltage sampler which makes a "0" or "1" decision. The resultant eight bits are formated and transmitted with a one-bit sync over the reply lines just as in the analog types, Figure 2-21.

The Bilevel conversion characteristics are as follows:

1. Logical "1" = +3.5 to +15 VDC
2. Logical "0" = -1.0 to +1.5 VDC

2.3.2.3.9 Serial Digital Telemetry Inputs

The serial digital telemetry signal is such that the 8-bit subsystem output shift register contents are shifted to an 8-bit internal shift register for storage and a 1-bit sync is added before being transmitted over the MDB reply line to the CU, Figure 2-22.

The serial digital input characteristics are described as follows:

1. Word Length: 8-bits
2. Logical "1" +2.4 to +15 VDC
3. Logical "0" -1.0 to +1.5 VDC

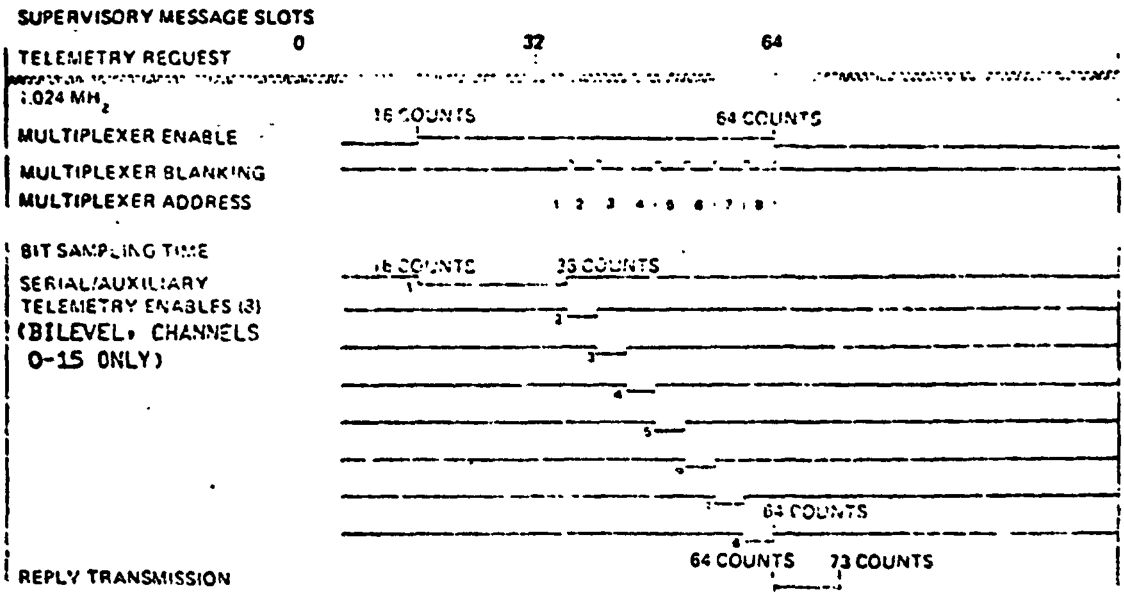


Figure 2-21. Bilevel Telemetry Timing

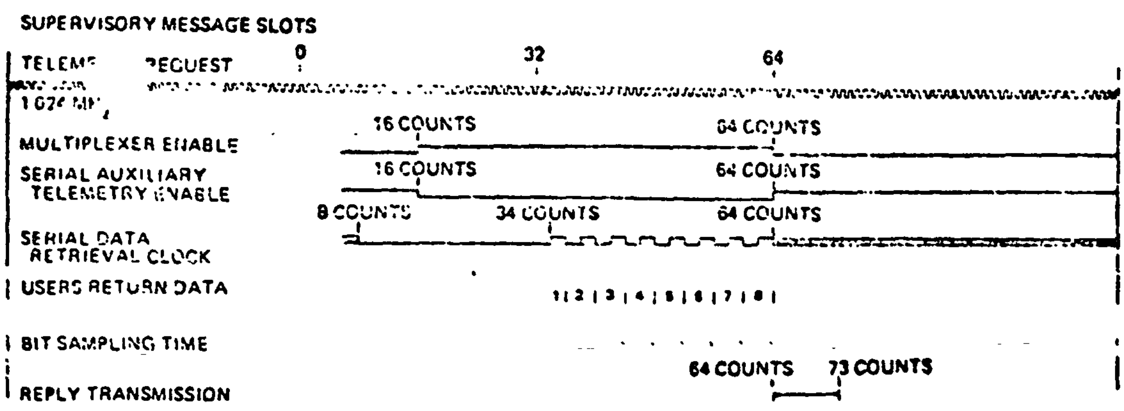


Figure 2-22. Serial Digital Telemetry Timing

2.3.2.4 C&DH Clock

There is a S/C oscillator in both of the two CU's. Also an external ultra-stable S/C oscillator is command selectable for CU use. Either oscillator contains the frequency source for timing the STACC and other subsystem functions - the basic oscillator frequency output is 4.096 MHz. The CU long-term oscillator stability requirement is equal to or better than 2 parts in 10^8 per day and ± 2 parts in 10^6 per year. The external oscillator long term stability requirements over 3 years is $\leq 2 \times 10^{-7}$. The output of either oscillator is counted down to provide a 24 bit counter spacecraft clock time code with Least Significant Bit resolution of 1.024 seconds. The 24 bit counter is put into the realtime spacecraft telemetry stream and four clock signals are transferred to the RIU's for distribution. These are:

1. 1.024 MHz Clock signal
2. Major frame sync signal (every 128 minor frames)
3. Minor frame sync signal (every 128 telemetry minor frame words)
4. Telemetry word rate sync signal; Ground selectable, 125 or 1000 words per second which is equal to 1 Kbps and 8 Kbps respectively.

Within the RIU, the 1.024 MHz clock is derived from the continuous biphase signal on the multiplex data bus Supervisory Line as shown in Figure 2-23 The sync pulses have a duration of 48 clock cycles, approximately 46.9 usec, and begin 16 counts after parity verification.

ORIGINAL PAGE IS
OF POOR QUALITY

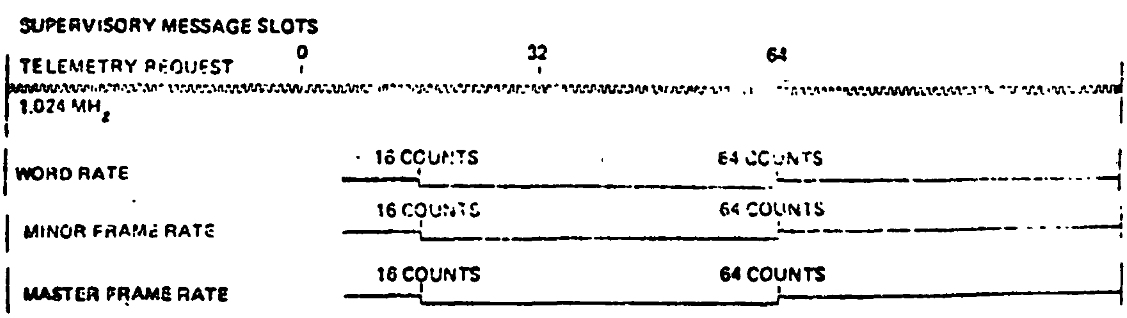


Figure 2-23. Telemetry Sync Signals

Telemetry word rate, minor frame rate, and major frame rate is extracted from a type III message on the Supervisory Line. The three rates are produced by decoding of logical "1s" in the three bit positions assigned to the function (Figure 2-15). The logical "1s" are generated at the word, minor frame, and major frame transition times and appear in the next type III message, (Table 2-11) following the transition. These three functions are decoded by all RIUs, independent of address. The "Telemetry Address" is placed on the supervisory line in specific slots as indicated in Figure 2-24.

The C&DH clock can actually provide the following telemetry bit rate frequencies: 1, 2, 4, 8, 16, 32 and 64 Kbps. The rate is set by a serial magnitude command sent to the STACC/CU as defined in SVS-10124, Data Format Control Book, Volume III, (Command). Landsat-D uses 1 or 8 Kbps.

Additionally, the clock generates a synchronizing interrupt to be sent to the OBC; denoted the 16 millisec interrupt, it is a 1 us pulse whose trailing edge occurs 1 us prior to the trailing edge of minor frame clock, and always at 16 ms intervals.

The 24 bit spacecraft counter (clock) clock provides three words to telemetry. The least significant eight bits of time code are connected to the fixed word multiplexer in the format generator. The other 16 bits of time code are provided as two 8 bit serial data words to remote interface unit #1 for non-fixed minor words (86 and 87) in the telemetry matrix.

2.3.2.5 Format Generator

The format generator (Figure 2-14) provides all necessary timing and control to address data sources and format real-time data into a fixed telemetry format.

2.3.2.5.1 Timing Slots

The format generator establishes the timing segments which regulate the transmission of data on the supervisory line. Each of the continuous timing segments is 31.25 us in duration. Specific segments are assigned for telemetry addresses, computer addresses, ground commands, and computer commands. With the exception of those assigned to telemetry addresses, segments remain fixed regardless of the telemetry output rate. Telemetry segments slide appropriately to maintain the telemetry output rate.

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-11. Summary of Format Definitions

Bit Position	Bit Quantity		Function
0-2	3	MESSAGE	1 - 1/2 bits (+), 1 - 1/2 bits (-)
3	1	HEADER	Fixed logical "1"
4-6	3		Specifies 1 of 3 message types:
		(000)	MESSAGE TYPE I (SER. MAG. CMD)
7-11	5		Specifies one of 32 Remote Units
12-14	3		Specifies one of eight command lines to user
15-30	16		Specifies magnitude command value
31	1		Parity
		(001)	MESSAGE TYPE II (PULSE CMD)
7-11	5		Specifies one of 32 remote units
12	1		Specifies remote unit A or B
13-24	12		Not Used
25-30	6		Selects one of 64 outputs
31	1		Parity
		(010)	MESSAGE TYPE III (TM ADDRESS)
7-11	5		Specifies one of 32 remote units
12	1		Major frame rate
13	1		Minor frame rate
14	1		TM word rate
15-16	2		Specifies one of four signal types
17-21	5		Not used
22-24	3		Allows expansion to 256 inputs
25-30	6		Selects one of 64 inputs
31	1		Even parity

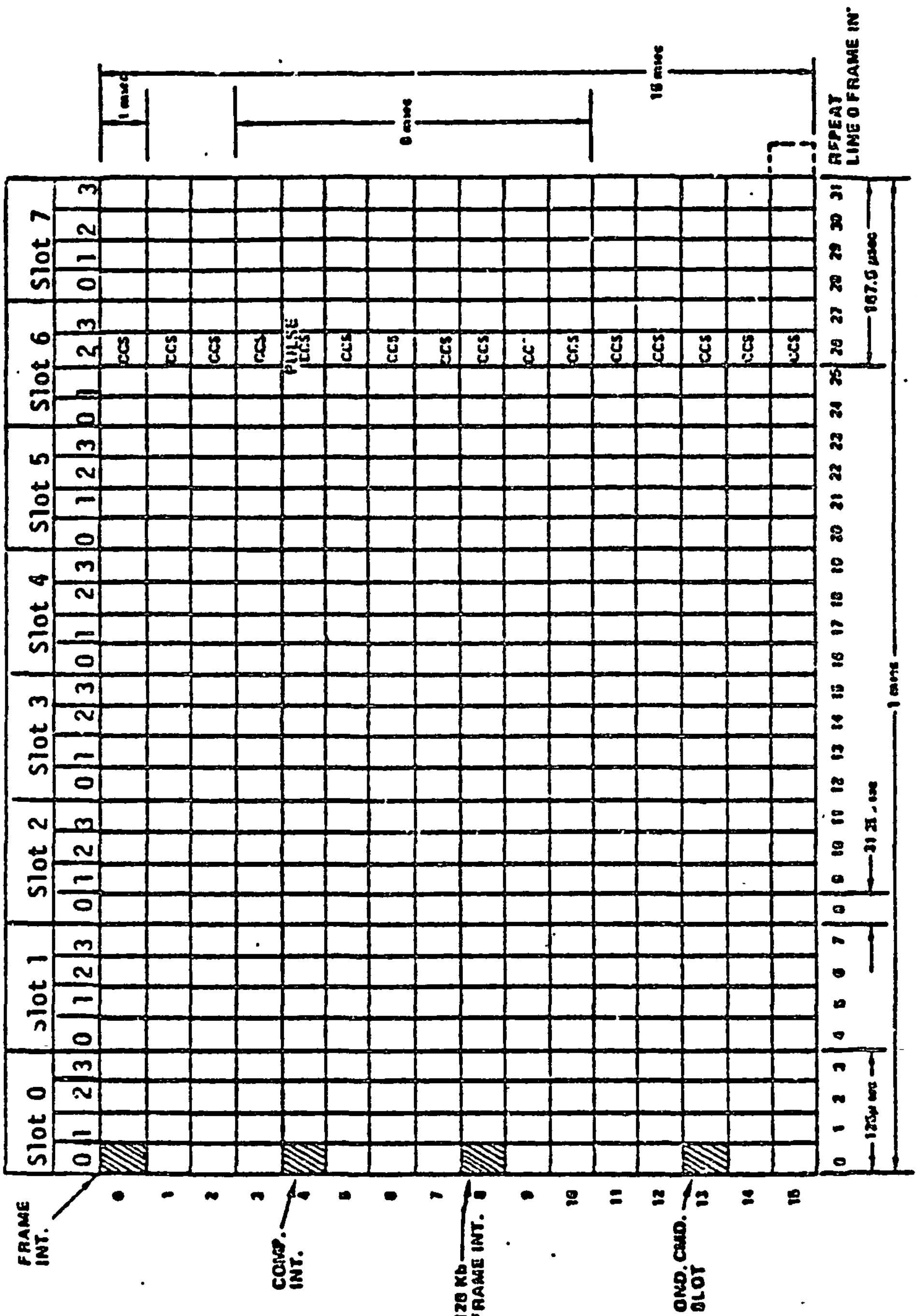


Figure 2-24. Multiplex Data Bus Activity

LSD-WPC-007

2.3.2.5.2 Ground Command Slot

The ground command slot is the first full slot which occurs 8 ms after the OBC 16 ms interrupt (which is generated by the spacecraft clock). See SVS-10124, Data Format Control Book, Volume III, (Command).

2.3.2.5.3 Telemetry Format

The format generator provides a fixed telemetry format using 8 bit words assembled into a 128 word by 128 frame major frame. The unit establishes 4 fixed groups of 4 words each in positions 0-3, 32-35, 64-67, and 96-99. Words 32-33, 35 and 96-99 are reserved for subcom channels. Words 0-3, 34 and 64-67 are obtained from a fixed word multiplexer in the format generator and inserted in the telemetry frame during all modes of operation. The bit assignments of the fixed words are as specified earlier.

2.3.2.5.4 Modes of Operation

The format generator provides data source addressing sequences dependent upon the mode of operation. There are four possible modes. Each ROM memory (2) in the format generator is capable of storing two unique sets of minor frame data source addresses. The format generator processes one set during ROM mode 1, and the second set during ROM mode 2. During the computer mode, data source addressing is provided by the on-board computer: the format generator sends a telemetry address and a 1.024 MHz gated clock to the computer which responds with 16 bits of serial address data. The format generator stores and formats the data and transmits it serially through the party line controller onto the supervisory line during the next telemetry address slot. Non-telemetry data source addressing by the computer is handled in the same manner using a computer addresss and 1.024 MHz gated clock from the unit, and 16 bits of address data from the computer. This address is transmitted on the supervisory line during the computer address slot.

A fourth mode of operation is the dwell mode. Dwell mode, like the above 3 modes, may be selected by a serial magnitude command from RIU #1 and will control the data source addressing. During word periods other than 0-3, 32-35, 64-67, and 96 through 99 the format generator generates the address programmed into the ROM memory location corresponding to the dwell word identified. See SVS-10124, Data Format Control Book, Volume III, (Command) for dwell command description and format.

2.3.2.5.5 Reply Data

Data is returned on the Reply Line in the specified response time of 64 to 73 microseconds. The format generator receives 8 bits of data and derived clock from the party line controller. It loads telemetry data into a telemetry buffer and a computer register. Computer requested data is loaded into the computer register only. The buffer is loaded into the telemetry output register for transmission in bi-phase at the current telemetry rate. The computer register contents are transferred serially to the computer using the 1.024 MHz clock and either telemetry data or computer data.

2.3.2.5.6 Dwell Telemetry

The format generator provides word 67, dwell ID (minor frame word number), to telemetry. In response to the dwell command the format generator transfers an 8 bit serial word, with dwell indicator and ID to the PMP.

2.3.3 ON-BOARD COMPUTER (OBC)

The OBC is a general purpose computer, the NASA Standard Space Computer (NSSC-1), and is included as part of the C&DH Subsystem. The OBC communicates with satellite subsystems via the STINT to the STACC CU and hence the Multiplex Data Bus. The general characteristico of the OBC are listed in Table 2-12. Interface with the computer is provided to accommodate a number of functions. Those underlined below are covered in this volume and the remainder in SVS-10124, Data Format Control Book, Volume III, (Command):

1. Delayed Computer Storage
2. Program Loading
3. Command Output
4. Telemetry data input (Telemetry Addresses)
5. Telemetry format control (Flexible Format)
6. Data output to real-time telemetry (Computer Words)
7. Data Dump direct to the PMP (Memory Dump)
8. Direct access to any data point via Multiplex Data Bus (Computer Data)

Table 2-12. On-Board Computer Characteristics

Word length:	18 bits, 5 bits instruction ID, 1-bit index, 12 bits operand fetch.
Execution speed:	2 us cycle time, 4 us add, 32 us multiply, and 60 us divide.
Memory capacity:	Eight 8192 word modules for total of 65,536 words. (8 modules contain two 4 K banks each.)
Processor interrupts:	16 levels of priority interrupt.
Direct memory access:	16-cycle steal channels, maximum I/O rate of 100 K words/second.
Memory write protection:	Allowable storage areas are assigned in segments of 128 words.
Input/output:	I/O is achieved through time multiplexing of existing telemetry and command hardware.
Program load and dump:	Any 4 K memory bank can be loaded and dumped via command and telemetry without software bootstrap
Power:	45-watts maximum (computing with full memory complement).
Instructions:	55
Accumulator:	One - 36 bits
Index register:	One
Direct addressing:	All 4 K words in any bank.

2.3.3.1 Telemetry Data Input

Telemetry data is provided to the OBC as a result of the OBC supplying a Computer or Telemetry Address via the STACC Interface Unit (STINT), Figure 2-17. The format generator acquires the telemetry data and non-telemetry data (if needed) and makes it available to the OBC via the STINT.

2.3.3.1.1 Addresses

The format generator provides control signals for the serial transfer of 16-bit data acquisition addresses from the OBC for both flexible format telemetry and computer data. In the flexible format mode, there are two limitations of OBC controlled format: the OBC does not supply telemetry address transfer signals for words - 0 through 3 and 64 through 67; and all data items which OBC processors have been getting from main telemetry (not subcom) must be included in main telemetry in the new format, unless execution of processors can be discontinued. See Reference 3 in Section 5, "MMS Flight Executive User's Guide."

2.3.3.1.2 Return data

The format generator provides control signals for the serial transfer of all telemetry data and all computer data to the OBC via the STINT. The data transfer of telemetry data is independent of the computer data transfer. Each data type is eight bits sent to the CU (format generator) hence to the STINT and OBC. Both telemetry and computer data are transferred over the same circuitry.

2.3.3.2 Telemetry Format Control

The OBC supplies the addresses via the STINT for data acquisition in the OBC flexible telemetry format mode. The OBC sends a block of addresses to the CU for data acquisition during the flexible telemetry format mode.

2.3.3.3 Data Output to RT Telemetry (Computer Words)

Certain types of required data are not available directly from the subsystem RIU's via the MDB (e.g., FS attitude errors). These data are derived within the OBC and accessed via "Computer word" through the RIU as serial telemetry words. Twenty-five columns have been assigned for this type of data. The format of the OBC reports is described in Section 2.5.

2.3.3.4 OBC Memory Dump

An OBC memory dump is initiated by either hardware or software commands through the STINT. Hardware dumps are accomplished in command selectable 4096 memory word banks. Sixteen banks are used on Landsat D. Dump rate is command selectable at 1 Kbps or 32 Kbps. The dump rate is selected by a special command to the CU.

2.3.3.4.1 Hardware Controlled Dump

The NSSC contains a hardware controlled channel that allows any bank to be dumped independently of processor operation. The memory bank (4096 words) to be dumped is selected by command. Only that selected fixed bank of NSSC memory is dumped, and the dump is repeated four times. The format of the dump was described earlier in Section 2.2.5. A hardware memory dump requires clearing the computer before the dump and reinitializing the system afterwards. The reason for this is that only the fixed bank can be dumped under hardware control. See Data Format Control Book, SVS-10124, Volume III (Command) for command details.

2.3.3.4.2 Software Controlled Dump

An executive request command to initiate a software controlled dump is accomplished by ground command. The Executive Request Command is decoded in the STINT and the low order 18 bits of the command word (27 bits) are made available to the NSSC. Two commands are required: The first command includes the number of words to be dumped and the second command includes the starting absolute address of the dump. The length should be limited to 4096 and start address and length limited as not to cross a bank boundary (i.e.; bank boundary = 4096, a dump of 150 words starting at 3996 would not be permitted because the bank boundary is exceeded). The minimum dump is 1024 words. Dumps of less than 8 words will be increased to 8 words and repeated until a total of 1024 words are dumped. Dumps of less than 256 words are repeated until total dump is 1024 words. Dumps of greater than or equal to 256 words will be repeated 4 times. Software Dumps are useful for getting reports from the OBC which are too lengthy to be included in telemetry. The Dump is controlled by the STINT in the same way as a hardware dump, and over the same output lines and using the same format as the hardware dump. A software dump is repeated four times as in a hardware dump.

C-2

2.3.4 STACC INTERFACE UNIT (STINT)

The STINT is the interface unit for the OBC and the STACC CU. The STINT interfaces with the PMP during the OBC Memory Dump period at 1 or 32 Kbps telemetry rate. The STINT interfaces with the C&DH RIU for discrete and serial magnitude commands as well as STINT status for telemetry. Whenever bits are designated by number convention as to most significant bit (MSB) and least significant bit (LSB), the MSB is transmitted first between the STINT - Central Unit and between the STINT-Remote Interface Unit.

When a word is to be transferred from the STINT to the memory, the STINT receives an acknowledgement of the transfer request from the NSSC and uses it to gate the word onto the memory input bus (MIB). When a word is to be transferred from memory to the STINT, the NSSC acknowledgement signal is used to gate the word from the memory output bus (MOB) into a register located in the STINT. The STINT function and number of data bits transferred are shown in Table 2-13.

2.3.4.1 Input and Output

I/O operations between the STINT and OBC are carried out through 16 direct memory access (DMA) devices. All 16 DMA devices share a single channel. Simultaneous requests for memory access are resolved by hardware priorities. I/O can be performed one word at a time under program control or by means of cycle-steal operations independent of OBC instruction processing. The DMA devices are listed in Table 2-13. Where word sizes are less than 16 bits, the operation reads from or stores into the least significant bits of the computer word. No packing or unpacking takes place. In storing, unused bits are set to 1's. To avoid halting program execution when multiple DMA requests occur, 1 CPU memory cycle is allowed between 10 cycle DMA accesses. Program execution is not likely to be slowed even briefly by more than 40 percent, and the average over a period of a second will rarely exceed 20 percent.

Device 0 reads telemetry data into memory simultaneously with its transmission to ground control. Device 1 reads in spacecraft data specially requested by the OBC. Device 2 is used when the OBC has been given control of telemetry format. It sends out the addresses for data which must be obtained and included in the telemetry stream. Device 3 has a similar function, except that data obtained will come back through device 1 and will not be included in telemetry.

Devices 4 and 5 bring in 27-bit commands transmitted from ground control. The 9 most significant bits come in through device 4 and the 18 least significant on device 5. Similiarly, devices 6 and 7 send commands from the OBC to other parts of the spacecraft via the Standard Computer Interface (STINT) and Central Unit.

Device 8 allows the computer to receive 16-bit serial magnitude commands through an RIU in the same was as any other piece of spacecraft hardware. Since the 16 bits could be derived from a 27-bit command sent out from the OBC the OBC can send commands to itself.

Device 10 is used to set and reset bits in the Activation Status Register (ASR). The ASR is used in starting cycle-steal I/O operations. See Reference Item 14 in Section 5. Device 11 is used to place data into the telemetry stream from the OBC memory (OBC Contribution to Telemetry).

Table 2-13. DMA Device Assignment

Device Number	Function	Word Size (Bits)
0	TELEMETRY DATA IN	8
1	COMPUTER DATA IN	8
2	TELEMETRY ADDRESS OUT	16
3	COMPUTER ADDRESS OUT	16
4	COMMAND INPUT	9
	(GROUND)	
5	COMMAND INPUT	18
6	COMPUTER COMMAND OUT	9
	(OBC)	
7	COMPUTER COMMAND OUT	18
8	INPUT FROM REMOTE DECODER (RIU)	16
9	-----	--
10	ASR CONTROL	18
11	OUTPUT TO REMOTE MUX (RIU)	8
12	-----	--
13	-----	--
14	WIDEBAND DUMP OUT	32
	(OBC DUMP)	
15	STINT CONTROL	18

Devices 14 and 15 are used in connection with software dumps. The dump is started by sending device 15 a word with a 1 in bit 18 and ended by sending it a word with a 0 in bit 18. The dump is sent through device 14 as a normal cycle-steal operation. Cycle-steal operations allow a block of data to be sent out or read in while program execution continues. Each memory access (to read or store one I/O word) takes 10 machine cycles (5 memory cycles), during which memory references by the OBC are locked out.

2.3.5 PRE-MODULATOR PROCESSOR (PMP)

The PMP receives 1 Kbps or 8 Kbps telemetry data, NRZ-L, and required clock from the STACC CU and 1 Kbps or 32 Kbps OBC Memory Dump data, NRZ-L, and clock from the STINT. It also receives NBTR playback data from the NBTR and Payload Correction data from the PCD Formatter. The data rate and content of output are command selectable. PMP output data is NRZ-M for TDRSS and Biphase-S for the Ground Stations. Additionally, the PMP provides hardline telemetry data direct to the umbilical.

The PMP is redundant and each one can be powered and providing data for either the TDRS or GSTDN telemetry streams simultaneously.

2.3.6 NARROWBAND TAPE RECORDER (NBTR)

The Landsat-D spacecraft has two identical tape recorders which can either record or playback data, but not both simultaneously. Each recorder has 238 minutes of recording capacity. Playback time is 14.9 or 7.45 minutes depending upon tape speed and assuming a full tape. A tape winding capability in the forward or reverse direction at high speed exists without erasure of previously recorded data. In this mode, the tape can be moved end-to-end in 3.1 minutes. A summary of tape modes is given in Table 2-14. The NBTRs are dedicated units and are not cross-strapped to the PMPs. NBTR 1 is dedicated to PMP A and NBTR 2 dedicated to PMP B.

Table 2-14. Recorder Operating Modes

Operating Mode	Data Rate (Kbps)	Level of MUX	Tape Speed (ips)	Min. Total Oper. Time (Minutes)
Record	8	2	0.42	238
Playback (TDRS)	128	2	6.7	14.9
Playback (GSTDN)	256	2	13.4	7.45
Winding	---	-	33	3.1

The Landsat-D recorder is a slightly modified version of the 4.5×10^8 Bit Standard Tape Recorder (see Figure 2-25). Digital data recording is accomplished by demultiplexing the input data onto 2 channels that are recorded in parallel and 4 times redundantly on the magnetic tape. Upon playback, one of the 4 pairs of redundant signal channels, selected by serial magnitude command, is deskewed and dejittered and finally combined into a single output.

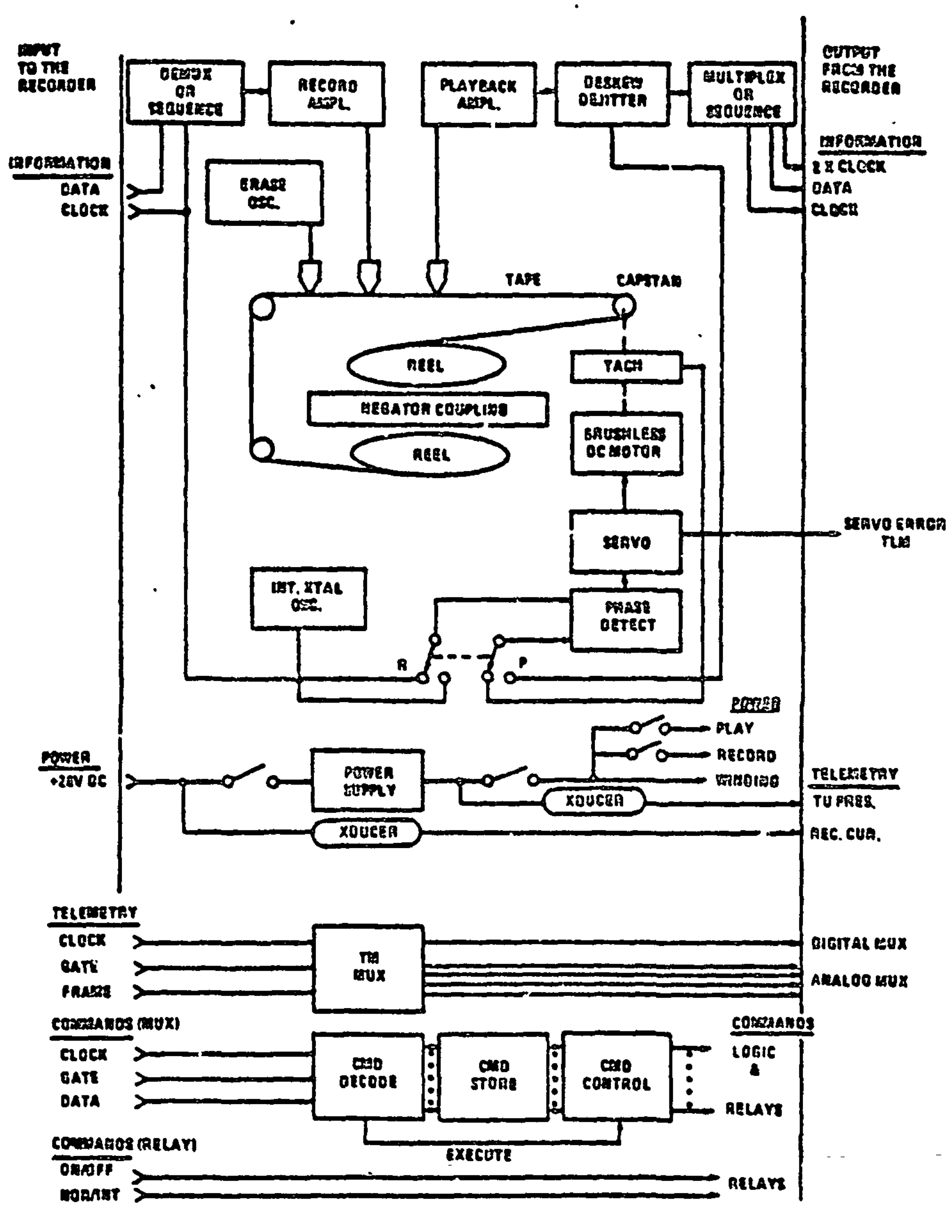


Figure 2-25. Narrowband Tape Recorder Simplified Block Diagram

During recording, the tape speed is controlled by the externally supplied data input clock. During playback, the timing reference is derived from a crystal oscillator located within the recorder. Tape motion is achieved by using a brushless dc motor whose speed is controlled by a tachometer sensor. During recording this sensor compares motor speed with the external data timing reference. During playback, the tachometer sensor is replaced by the off-tape playback signal which is compared to the internal crystal oscillator.

The recorder is provided with a multiplexed (binary logic) command system. As such, it does not have any memory during periods when the recorder is turned off. Thus, a full set of commands is generally required to establish the desired recorder operating mode. The commands are stored while the recorder is in the standby mode.

The commanded operating mode, the actual operating mode, and various other vital recorder functions and conditions are monitored via the telemetry system. The majority of these signals are made available to the spacecraft in multiplexed format, their timing being controlled by externally generated signals. Temperature, pressure, and total recorder current are available in a non-multiplexed format.

One ground-isolating power supply generates the internally required voltages. The command and control circuitry is operative whenever the recorder is in the Power On mode. The majority of the telemetry circuitry is powered whenever the recorder is in the Power On mode; however, the recorder current TM is on at all the time that the +28 Volt S/C bus is powered. The erase circuitry is powered whenever the recorder is in a Power On mode; the control of the erase function is controlled by a logic level. Circuitry required for tape winding, recording, or playback is powered selectively.

2.4 TELEMETRY MATRIX ASSIGNMENTS

A summary of the telemetry data to be formatted on the Landsat D spacecraft is presented in Figure 2-26, which contains the following information for each user:

1. Number of minor frame words (columns) required for the mission and engineering formats.
2. Number of telemetry words appearing in each of the six columns dedicated to subcommutation.

2.4.1 TELEMETRY FRAME FORMAT

Table 2-15 presents the minor frame word (column) allocations for the Mission format and Table 2-16 presents the allocations for the Engineering format. Each minor frame word is sampled every 128 milliseconds at 8 Kbps and every 1.024 seconds at 1 Kbps.

In both formats, sixteen minor frame words (columns 0, 1, 2, 3, 32, 33, 34, 35, 64, 65, 66, 67, 96, 97, 98, 99) are reserved for specific spacecraft data and are designated as fixed words. Note that Tables 2-15 and 2-16 both contain the fixed words as indicated in Figure 2-3.

Six of the fixed words have been allocated for subcommutated data such that data are sampled at least once every major frame. Words may be sampled in these columns (32, 33, 96, 97, 98, 99) more than once per major frame. Tables 2-17 through 2-22 list the telemetry word assignments in each of the subcomms.

A telemetry word assigned a sample rate of once per major frame will be sampled approximately once every 16 seconds at 8 Kbps and approximately once every 2 minutes at 1 Kbps.

Those words which require sampling faster than once per major frame have been equally spaced in subcomm columns. As an example, a word requiring 4 samples per major frame is sampled first in minor frame N, second in minor frame N+32, third in N+64, fourth in N+96, in the same column.

	Minor Frame words (columns)		Subcommutated Words (samples per major frame)					
User	Mission Format	Eng'g Format	Col. 32	Col. 33	Col. 96	Col. 97	Col. 98	Col. 99
C/DH	17	17	-	-	19	21	23	1
NBTR	10	6	-	-	-	-	-	-
MACS	0	41	-	-	58	56	47	1
MPS	12	7	-	-	22	19	21	-
SC/CU	0	0	-	-	11	6	7	-
PM	8	10	3	1	8	16	19	-
WBCS	0	0	-	-	8	8	9	81
TM	11	0	105	-	-	-	-	16
MSS	0	0	-	41	1	1	1	1
S-Band	0	0	-	9	-	-	-	-
DPU	0	0	9	-	-	-	-	-
PDU	1	4	-	9	1	1	1	1
GPS	1-	6	-	12	-	-	-	4
THERMAL	0	0	9	32	-	-	-	-
OBC	26	26	-	-	-	-	-	-
TM RIU	0	0	-	1	-	-	-	3
ESAM	10	10	-	4	-	-	-	8
TOTAL USED	109	127	126	109	128	128	128	116
SPARES	19	1	2	19	0	0	0	12

Figure 2-26. Landsat D Telemetry Summary

2.4.2 TELEMETRY ASSIGNMENTS BY USER

Tables 2-23 through 2-41 list telemetry points by user. The user identification numbers have been arbitrarily assigned to facilitate cross referencing to the telemetry matrix assignments (Tables 2-15 through 2-22).

Each listing gives a User ID, telemetry function description, type of signal, telemetry matrix location, sample rate, mode and RIU channel assignment as explained in Table 2-23. Explanations of bit structure of digital words are also included in each listing.

RIU channels are numbered 0 through 63. Where an expander unit is associated with a RIU, the EU channels 0 through 63 are identified as RIU channels 64 through 127. Thus a designation of 01-80 indicates channel 16 of the EU associated with RIU 01 (C/DH). If a second expander unit is associated with a RIU, channels 0 through 63 of that EU are identified as RIU channels 128 through 191. RIU channel designations for bilevel digital words in the listings refer to the first (MSB) of the eight bits in a RIU group. Thus a bilevel word with a designation of 06-32 indicates a bilevel word in RIU 06 where bit 0 is assigned to channel 32, bit 1 to channel 33, 2 to 34, 3 to 35, etc.

Tables 2-15 thru 2-41 represent drawing number 47J249440AR up to alteration notice 12. To keep updated use alteration notices from print control.

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-15. Mission Telemetry Frame Format

Minor Frame Word	User ID	Description	Minor Frame Word	User ID	Description
00	C/DH-01	MINOR FRAME SYNC WORD 00	32	C/DH-56	SUBCOM 01 (SEE TABLE 2-17)
01	C/DH-01	MINOR FRAME SYNC WORD 01	33	C/DH-57	SUBCOM 02 (SEE TABLE 2-18)
02	C/DH-01	MINOR FRAME SYNC WORD 02	34	C/DH-16	BILEVEL WORD 010 (RCVR STATUS)
03	C/DH-08	TLM RATE, FORMAT, ID	35	OBC-01	OBC DATA IDENTIFIER
04	PM-41	REM A ATT CNTRL THRUSTERS ON/OFF	36	PM-42	REM C ATT CNTRL THRUSTERS ON/OFF
05	PM-43	REM B ATT CNTRL THRUSTERS ON/OFF	37	PM-44	REM D ATT CNTRL THRUSTERS ON/OFF
06			38	ESAM-09	ESA-1 SIGNAL STATUS
07	MPS-40	TOTAL LOAD CURRENT	39	MPS-40	TOTAL LOAD CURRENT
08	ESAM-01	ESA-1 PITCH FINE ERROR	40	ESAM-02	ESA-1 PITCH COARSE ERROR
09	ESAM-05	ESA-2 PITCH FINE ERROR	41	[illegible]	ESA-2 PITCH COARSE ERROR
10	GPS-02	BILEVEL WORD 701	42		
11	NBTR-01	RECORDER 1 DIGITAL MUX	43		
12	NBTR-02	RECORDER 2 DIGITAL MUX	44	TM-50	CALIBRATION LAMP 1 CURRENT
13			45	TM-51	CALIBRATION LAMP 2 CURRENT
14	MPS-49	BATTERY 3 HIGH CURRENT	46	TM-52	CALIBRATION LAMP 3 CURRENT
15	MPS-30	BATTERY 2 HIGH CURRENT	47	TM-59	BLACKBODY TEMPERATURE
16	MPS-29	BATTERY 1 HIGH CURRENT	48	TM-60	SI FPA TEMPERATURE
17	GPS-01	GPS DATA WORD	49	TM-61	CALIBRATION SHUTTER TEMPERATURE
18	GPS-01	GPS DATA WORD	50	TM-62	BACKUP SHUTTER TEMPERATURE
19	GPS-01	GPS DATA WORD	51	TM-70	COLD STAGE FPA TEMPERATURE
20	GPS-01	GPS DATA WORD	52	TM-94	SLC TEMPERATURE
21	GPS-01	GPS DATA WORD	53	TM-69	BAFFLE TEMPERATURE
22	GPS-01	GPS DATA WORD	54		
23	GPS-01	GPS DATA WORD	55		
24	GPS-01	GPS DATA WORD	56		
25	GPS-01	GPS DATA WORD	57		
26	GPS-01	GPS DATA WORD	58		
27	GPS-01	GPS DATA WORD	59	MPS-35	INSTRUMENTS LOW CURRENT
28	GPS-01	GPS DATA WORD	60	MPS-36	INSTRUMENTS HIGH CURRENT
29			61	MPS-38	C/DH CURRENT
30			62	MPS-39	SC/CU, MPS CURRENT
31			63	MPS-37	MACS, PM CURRENT

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-15. Mission Telemetry Frame Format

Minor Frame Word	User ID	Description	Minor Frame Word	User ID	Description
64	C/DH-04	SPACECRAFT CLOCK (8 LSB)	96	C/DH-58	SUBCOM 03 (SEE TABLE 2-19)
65	C/DH-05	MINOR FRAME COUNTER	97	C/DH-59	SUBCOM 04 (SEE TABLE 2-20)
66	C/DH-06	COMMAND COUNTER, SELECTED CU	98	C/DH-60	SUBCOM 05 (SEE TABLE 2-21)
67	C/DH-07	DWELL MODE ID, CHANNEL	99	C/DH-61	SUBCOM 06 (SEE TABLE 2-22)
68	PM-41	REM A ATT CNTRL THRUSTERS ON/OFF	100	PM-42	REM C ATT CNTRL THRUSTERS ON/OFF
69	PM-43	REM B ATT CNTRL THRUSTERS ON/OFF	101	PM-44	REM D ATT CNTRL THRUSTERS ON/OFF
70			102	ESAM-10	ESA-2 SIGNAL STATUS
71	MPS-40	TOTAL LOAD CURRENT	103	MPS-40	TOTAL LOAD CURRENT
72	ESAM-03	ESA-1 ROLL FINE ERROR	104	ESAM-04	ESA-1 ROLL COARSE ERROR
73	ESAM-07	ESA-2 ROLL FINE ERROR	105	ESAM-08	ESA-2 ROLL COARSE ERROR
74	GPS-02	BILEVEL WORD 701	106		
75	TM-111	SERIAL WORD K	107		
76			108	OBC-02	OBC DATA WORD 6
77			109	OBC-02	OBC DATA WORD 7
78	PDU-04	BILEVEL WORD 603	110	OBC-02	OBC DATA WORD 8
79	NBTR-05	RECORDER 1 ANALOG MUX NO. 2	111	OBC-02	OBC DATA WORD 9
80	NBTR-06	RECORDER 2 ANALOG MUX NO. 2	112	OBC-02	OBC DATA WORD 10
81	NBTR-09	RECORDER 1 TOTAL CURRENT	113	OBC-02	OBC DATA WORD 11
82	NBTR-10	RECORDER 2 TOTAL CURRENT	114	OBC-02	OBC DATA WORD 12
83			115	OBC-02	OBC DATA WORD 13
84	NBTR-03	RECORDER 1 ANALOG MUX NO. 1	116	OBC-02	OBC DATA WORD 14
85	NBTR-04	RECORDER 2 ANALOG MUX NO. 1	117	OBC-02	OBC DATA WORD 15
86	C/DH-03	SPACECRAFT CLOCK (8 MIDDLE BITS)	118	OBC-02	OBC DATA WORD 16
87	C/DH-02	SPACECRAFT CLOCK (8 MSB)	119	OBC-02	OBC DATA WORD 17
88			120	OBC-02	OBC DATA WORD 18
89	NBTR-07	RECORDER 1 SERVO ERROR	121	OBC-02	OBC DATA WORD 19
90	NBTR-08	RECORDER 2 SERVO ERROR	122	OBC-02	OBC DATA WORD 20
91	OBC-02	OBC DATA WORD 1	123	OBC-02	OBC DATA WORD 21
92	OBC-02	OBC DATA WORD 2	124	OBC-02	OBC DATA WORD 22
93	OBC-02	OBC DATA WORD 3	125	OBC-02	OBC DATA WORD 23
94	OBC-02	OBC DATA WORD 4	126	OBC-02	OBC DATA WORD 24
95	OBC-02	OBC DATA WORD 5	127	OBC-02	OBC DATA WORD 25

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-16. Engineering Telemetry Frame Format

Minor Frame Word	User ID	Description	Minor Frame Word	User ID	Description
00	C/DH-01	MINOR FRAME SYNC WORD 00	32	C/DH-56	SUBCOM 01 (SEE TABLE 2-17)
01	C/DH-01	MINOR FRAME SYNC WORD 01	33	C/DH-57	SUBCOM 02 (SEE TABLE 2-18)
02	C/DH-01	MINOR FRAME SYNC WORD 02	34	C/DH-16	BILEVEL WORD 010 (RCVR STATUS)
03	C/DH-08	[illegible] ATE, FORMAT, ID	35	OBC-01	OBC DATA IDENTIFIER
04	PM-41	REM A ATT CNTRL THRUSTERS ON/OFF	36	PM-42	REM C ATT CNTRL THRUSTERS ON/OFF
05	PM-43	REM B ATT CNTRL THRUSTERS ON/OFF	37	PM-44	REM D ATT CNTRL THRUSTERS ON/OFF
06	PM-39	REM A/C TRANS CNTRL THRUST ON/OFF	38	ESAM-09	ESA-1 SIGNAL STATUS
07	MPS-40	TOTAL LOAD CURRENT	39	MPS-40	TOTAL LOAD CURRENT
08	ESAM-01	ESA-1 PTICH FINE ERROR	40	ESAM-02	ESA-1 PITCH COARSE ERROR
09	ESAM-05	ESA-2 PITCH FINE ERROR	41	ESAM-06	ESA-2 PITCH COARSE ERROR
10	GPS-02	BILEVEL WORD 701	42	MACS-97	ACE A IRU PITCH POSITION
11	NBTR-01	RECORDER 1 DIGITAL MUX	43	MACS-98	ACE A IRU YAW POSITION
12	NBTR-02	RECORDER 2 DIGITAL MUX	44	MACS-76	ROLL SRW TACH A
13	PDU-01	SERIAL DATA WORDS	45	MACS-80	ROLL SRW TACH B
14	MPS-49	BATTERY 3 HIGH CURRENT	46	MACS-77	PITCH SRW TACH A
15	MPS-30	BATTERY 2 HIGH CURRENT	47	MACS-81	PITCH SRW TACH B
16	MPS-29	BATTERY 1 HIGH CURRENT	48	MACS-78	YAW SRW TACH A
17	GPS-01	GPS DATA WORD	49	MACS-82	YAW SRW TACH B
18	GPS-01	GPS DATA WORD	50	MACS-79	SKEW SRW TACH A
19	GPS-01	GPS DATA WORD	51	MACS-83	SKEW SRW TACH B
20	GPS-01	GPS DATA WORD	52	MACS-72	ROLL SRW MOTOR VOLTS
21	GPS-01	GPS DATA WORD	53	MACS-73	PITCH SRW MOTOR VOLTS
22	MACS-65	IRU ROLL RATE 2	54	MACS-74	YAW SRW MOTOR VOLTS
23	MACS-41	IRU CHAN A MOTOR CURRENT	55	MACS-75	SKEW SRW MOTOR VOLTS
24	MACS-42	IRU CHAN B MOTOR CURRENT	56	MACS-68	ROLL SRW DRIVE CONTROL
25	MACS-43	IRU CHAN C MOTOR CURRENT	57	MACS-69	PITCH SRW DRIVE CONTROL
26	MACS-56	ROLL MAGNETIC TORQUER DRIVE A	58	MACS-70	YAW SRW DRIVE CONTROL
27	MACS-57	ROLL MAGNETIC TORQUER DRIVE B	59	MACS-71	SKEW SRW DRIVE CONTROL
28	MACS-58	PITCH MAGNETIC TORQUER DRIVE A	60	MACS-46	CSS1 PITCH POSITION ERROR
29	MACS-59	PITCH MAGNETIC TORQUER DRIVE B	61	MACS-48	CSS2 PITCH POSITION ERROR
30	MACS-60	YAW MAGNETIC TORQUER DRIVE A	62	MACS-47	CSS1 YAW POSITION ERROR
31	MACS-61	YAW MAGNETIC TORQUER DRIVE B	63	MACS-49	CSS2 YAW POSITION ERROR
64	C/DH-04	SPACECRAFT CLOCK (8 LSB)	96	C/DH-58	SUBCOM 03 (SEE TABLE 2-19)
65	C/DH-05	MINOR FRAME COUNTER	97	C/DH-59	SUBCOM 04 (SEE TABLE 2-20)
66	C/DH-06	COMMAND COUNTER, SELECTED CU	98	C/DH-60	SUBCOM 05 (SEE TABLE 2-21)
67	C/DH-07	DWELL MODE ID, CHANNEL	99	C/DH-61	SUBCOM 06 (SEE TABLE 2-22)
68	PM-41	REM A ATT CNTRL THRUSTERS ON/OFF	100	PM-42	REM C ATT CNTRL THRUSTERS ON/OFF
69	PM-43	REM B ATT CNTRL THRUSTERS ON/OFF	101	PM-44	REM D ATT CNTRL THRUSTERS ON/OFF
70	PM-40	REM B/D TRANS CNTRL THRUST ON/OFF	102	ESAM-10	ESA-2 SIGNAL STATUS

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-16. Engineering Telemetry Frame Format

Minor Frame Word	User ID	Description	Minor Frame Word	User ID	Description
71	MPS-40	TOTAL LOAD CURRENT	103	MPS-40	TOTAL LOAD CURRENT
72	ESAM-03	ESA-1 ROLL FINE ERROR	104	ESAM-04	ESA-1 ROLL COARSE ERROR
73	ESAM-07	ESA-2 ROLL FINE ERROR	105	ESAM-08	ESA-2 ROLL COARSE ERROR
74	MACS-99	ACS B IRU ROLL POSITION	106	MACS-100	ACE B IRU PITCH POSITION
75	MACS-96	ACE A IRU ROLL POSITION	107	MACS-101	ACE B IRU YAW POSITION
76			108	OBC-02	OBC DATA WORD 6
77	MACS-62	IRU ROLL RATE 1	109	OBC-02	OBC DATA WORD 7
78	PDU-04	BILEVEL WORD 603	110	OBC-02	OBC DATA WORD 8
79	MACS-63	IRU PITCH RATE 1	111	OBC-02	OBC DATA WORD 9
80	MACS-66	IRU PITCH RATE 2	112	OBC-02	OBC DATA WORD 10
81	MACS-64	IRU YAW RATE 1	113	OBC-02	OBC DATA WORD 11
82	MACS-67	IRU YAW RATE 2	114	OBC-02	OBC DATA WORD 12
83	PDU-11	SOLAR ARRAY POSITION NO. 1	115	OBC-02	OBC DATA WORD 13
84	NBTR-03	RECORDER 1 ANALOG MUX NO. 1	116	OBC-02	OBC DATA WORD 14
85	NBTR-04	RECORDER 2 ANALOG MUX NO. 1	117	OBC-02	OBC DATA WORD 15
86	C/DH-03	SPACECRAFT CLOCK (8 MIDDLE BITS)	118	OBC-02	OBC DATA WORD 16
87	C/DH-02	SPACECRAFT CLOCK (8 MSB)	119	OBC-02	OBC DATA WORD 17
88	PDU-12	SOLAR ARRAY POSITION NO. 2	120	OBC-02	OBC DATA WORD 18
89	NBTR-07	RECORDER 1 SERVO ERROR	121	OBC-02	OBC DATA WORD 19
90	NBTR-08	RECORDER 2 SERVO ERROR	122	OBC-02	OBC DATA WORD 20
91	OBC-02	OBC DATA WORD 1	123	OBC-02	OBC DATA WORD 21
92	OBC-02	OBC DATA WORD 2	124	OBC-02	OBC DATA WORD 22
93	OBC-02	OBC DATA WORD 3	125	OBC-02	OBC DATA WORD 23
94	OBC-02	OBC DATA WORD 4	126	OBC-02	OBC DATA WORD 24
95	OBC-02	OBC DATA WORD 5	127	OBC-02	OBC DATA WORD 25

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-17. Subcommutator 1 - Minor Frame Word 32

Minor Frame Number	User ID	Description	Minor Frame Number	User ID	Description
00	DPU-01	TIME CODE WORD 1	32	TM-09	BAND 1 +19V
01	DPU-01	TIME CODE WORD 2	33	TM-10	BAND 1 -19V
02	DPU-01	TIME CODE WORD 3	34	TM-11	BAND 2 +19V
03	DPU-01	TIME CODE WORD 4	35	TM-12	BAND 2 -19V
04	DPU-01	TIME CODE WORD 5	36	TM-13	BAND 3 +19V
05	DPU-01	TIME CODE WORD 6	37	TM-14	BAND 3 -19V
06	DPU-01	TIME CODE WORD 7	38	TM-15	BAND 4 +19V
07	DPU-02	DPU STATUS	39	TM-16	BAND 4 -19V
08	TM-44	SLC 1 DRIVE CURRENT	40	TM-17	BAND 5/7 +19V
09	TM-45	SLC 2 DRIVE CURRENT	41	TM-18	BAND 5/7 -19V
10	TM-46	SLC 1 ±15V	42	TM-19	BAND 6 +19V
11	TM-48	SLC 2 ∓15V	43	TM-20	BAND 6 -19V
12	TM-50	CAL LAMP 1 CURRENT	44	TM-21	ISO +19V
13	TM-47	SLC 1 +5V	45	TM-22	ISO -19V
14	TM-49	SLC 2 +5V	46	TM-31	MUX INPUT CURRENT
15	TM-03	+19V	47	TM-32	MUX BIT DENSITY
16	TM-04	-19V	48	TM-30	MUX +30V
17	TM-08	ALL CAL LAMPS ON	49	TM-33	MUX +5V
18	TM-07	+28 SHUTTER DRIVE VOLTAGE	50	TM-52	CAL LAMP 3 CURRENT
19	TM-06	+80 HEATER VOLTAGE	51	TM-34	MUX +18V
20	TM-101	SERIAL WORD A	52	TM-35	MUX -3V
21	TM-102	SERIAL WORD B	53	TM-36	MUX -5V
22	TM-103	SERIAL WORD C	54	TM-37	MUX -15V
23	TM-104	SERIAL WORD D	55	TM-24	P/S 1 SMA +6.8V
24	TM-105	SERIAL WORD E	56	TM-25	P/S 1 SMA +27V
25	TM-106	SERIAL WORD F	57	TM-26	P/S 1 SMA -27V
26	TM-107	SERIAL WORD G	58	TM-27	P/S 2 SMA +6.8V
27	TM-108	SERIAL WORD H	59	TM-28	P/S 2 SMA +27V
28	TM-109	SERIAL WORD I	60	TM-29	P/S 2 SMA -17V
29	TM-110	SERIAL WORD J	61	TM-38	BAND 1 A/D REF
30	TM-112	SERIAL WORD L	62	TM-39	BAND 2 A/D REF
31	TM-51	CAL LAMP 2 CURRENT	63	TM-01	TM ATTACH FITTING NO. 1 TEMP

Table 2-17. Subcommutator 1 - Minor Frame Word 32

Minor Frame Number	User ID	Description	Minor Frame Number	User ID	Description
64	PM-45	PM-1A HEATERS 1-4 STATUS	96	TM-76	MUX ELECTRONICS TEMP
65	TM-40	BAND 3 A/D REF	97	TM-77	MUX PWR SUPPLY TEMP
66	TM-41	BAND 4 A/D REF	98	TM-79	PRI MIRROR TEMP
67	TH-02	*TH ATTACH FITTING NO. 2 TEMP*	99	TM-80	PRI MIRROR MASK TEMP
68	TM-42	BAND 5 A/D REF	100	TM-81	SEC MIRROR TEMP
69	TM-53	BLACKBODY CURRENT	101	TM-82	SEC MIRROR MASK TEMP
70	TM-43	BAND 7 A/D REF	102	TM-83	AMBIENT PREAMP TEMP (EVEN)
71	TM-56	INCHWORM 1 POSITION	103	TM-84	TELESCOPE HOUSING TEMP
72	TM-57	INCHWORD 2 POSITION	104	TM-85	TELESCOPE BASEPLATE TEMP
73	TM-58	INCHWORM 3 POSITION	105	TM-87	SMA +Z HOUSING TEMP
74	TM-59	BLACKBODY TEMP	106	TM-88	SMA -Z HOUSING TEMP
75	TM-60	SI FPA TEMP	107	TM-55	COLD STAGE HEATER CURRENT
76	DPU-03	DPU TEMP A	108	TM-90	SMA ELECTRONICS TEMP
77	PM-46	PM-1A LATCH VALVE STATUS WORD	109	TM-91	SMA FLEX PIVOT +X TEMP
78	TM-61	CAL SHUTTER TEMP (ACTIVE)	110	TM-92	SMA FLEX PIVOT -X TEMP
79	TM-86	CAL SHUTTER TEMP (PASSIVE)	111	TM-89	SCAN ANGLE MONITOR TEMP
80	TM-62	BACKUP SHUTTER TEMP	112	TM-94	SLC TEMP
81	TM-63	COLD STAGE TEMP A (COLD)	113	TM-93	SUNSHIELD TEMP
82	TM-64	COLD STAGE TEMP B (HOT)	114	TM-95	CAL LAMP FILTERS TEMP
83	TM-65	INTER STAGE TEMP A (COLD)	115	TM-96	COOLER AMBIENT STAGE TEMP
84	TM-66	INTER STAGE TEMP B (HOT)	116	TM-97	COOLER DOOR TEMP
85	PM-51	PM-1A LATCH VALVE STATUS	117	TM-54	BAFFLE HEATER CURRENT
86			118	TM-67	CFPA CONTROL TEMP
87	TM-69	BAFFLE TEMP	119	TM-100	+Y RADIATOR FIN TEMP
88	TM-68	CFPA HEATER CURRENT	120	TH-03	TM ATTACH FITTING NO. 3 TEMP
89	TM-70	COLD STAGE FPA TEMP	121	TH-04	TM ATTACH FITTING NO. 4 TEMP
90	TM-71	AMBIENT PREAMP TEMP (ODD)	122	TH-05	APEX FITTING NO. 1 TEMP
91	TM-72	COLD PREAMP TEMP	123	TH-06	APEX FITTING NO. 2 TEMP
92	TM-73	RELAY OPTICS TEMP	124	TH-07	APEX FITTING NO. 3 TEMP
93	TM-74	POWER SUPPLY TEMP	125	TH-08	PDU MTG PNL (INBOARD) TEMP
94	TM-75	BAND 6 POST AMP TEMP	126	TH-37	BOOM JETTISON PYRO BRACKET TEMP
95	TM-78	CAL LAMP DRIVE TEMP	127		

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-18. Subcommutator 2 - Minor Frame Word 33

Minor Frame Number	User ID	Description	Minor Frame Number	User ID	Description
00	PM-47	PM-1A TANK PRESSURE	32	MSS-61	+15V TELEMETRY REG
01	MSS-63	SHUTTER CONTROL INTEGRATOR	33	MSS-32	-24.5V PRIMARY POWER SUPPLY 1
02	MSS-64	SCAN MIRROR DRIVE	34	MSS-33	-24.5V PRIMARY POWER SUPPLY 2
03	MSS-65	SCAN MIRROR REGULATOR	35	MSS-34	+5V RADIOMETER PWR SUPPLY
04			36	MSS-62	CAL LAMP CURRENT
05	MSS-31	AVERAGE DATA DENSITY	37	MSS-59	OPT SWITCH LAMP I-1
06	MSS-05	SCAN MIRROR REG TEMP	38	MSS-60	OPT SWITCH LAMP I-2
07	MSS-06	SCAN MIRROR ELECTRONICS TEMP	39	MSS-36	BAND 1 CHANNEL A VIDEO
08	MSS-07	SCAN MIRROR COIL TEMP	40		
09	MSS-08	SCAN MIRROR HOUSING TEMP	41		
10	MSS-09	MULTIPLEXER TEMP	42		
11	MSS-10	RADIOMETER PWR SUPPLY TEMP	43		
12	MSS-11	RADIOMETER ELECTRONICS COVER TEMP	44	ESAM-13	ESA-1 TEMP
13	MSS-12	PRIMARY PWR SUPPLY 1 TEMP	45	MSS-41	BAND 2 CHANNEL A VIDEO
14	MSS-13	PRIMARY PWR SUPPLY 2 TEMP	46	ESAM-14	ESA-2 TEMP
15	MSS-14	FIBER OPTICS TEMP 1	47	ESAM-15	ESA-1 BOLOMETER TEMP
16	MSS-15	FIBER OPTICS TEMP 2	48	ESAM-16	ESA-2 BOLOMETER TEMP
17	MSS-16	HV MONITOR BAND 1A	49		
18	MSS-17	HV MONITOR BAND 1B	50		
19	MSS-18	HV MONITOR BAND 2A	51	MSS-47	BAND 3 CHANNEL A VIDEO
20	MSS-19	HV MONITOR BAND 2B	52		
21	MSS-20	HV MONTIOR BAND 3A	53		
22	MSS-21	HV MONITOR BAND 3B	54		
23	MSS-22	BAND 1 ± 15V REG	55		
24	MSS-23	BAND 2 ∓ 15V REG	56		
25	MSS-24	BAND 3 ∓ 15V REG	57	MSS-53	BAND 4 CHANNEL A VIDEO
26	MSS-25	BAND 4 ∓ 15V REG	58		
27	MSS-26	+12/-6V REG	59		
28	MSS-28	RADIOMETER +19V	60		
29	MSS-27	RADIOMETER +19V	61		
30	MSS-29	MUX +5V LOGIC MONITOR	62		
31	MSS-30	MUX A/D REFERENCE	63	PDU-09	+5V POWER SUPPLY

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-18. Subcommutator 2 - Minor Frame Word 33

Minor Frame Number	User ID	Description	Minor Frame Number	User ID	Description
64	GPS-11	R/PA P/S +5V (STANDBY)	96	TH-12	RF COMBINER MTG PNL (OUTBOARD) TEMP
65	GPS-12	R/PA P/S +12V (STANDBY)	97	TH-13	EQUIP MTG PANEL NO. 1 TEMP (+Y)
66	GPS-13	R/PA P/S +5V	98	TH-14	EQUIP MTG PANEL NO. 2 TEMP (+Y)
67	GPS-14	R/PA P/S +12V (ANALOG)	99	TH-15	EQUIP MTG PANEL NO. 3 TEMP (+Y)
68	GPS-15	R/PA P/S INPUT CURRENT	100	TH-16	EQUIP MTG PANEL NO. 4 TEMP (-Y)
69	GPS-16	R/PA P/S TEMP	101	TH-17	EQUIP MTG PANEL NO. 5 TEMP (-Y)
70	GPS-17	R/PA ANALOG MODULE TEMP	102	TH-18	EQUIP MTG PANEL NO. 6 TEMP (-Y)
71	GPS-08	DSC OVEN VOLTAGE	103	TH-19	S-BAND XMTR PANEL TEMP NO. 1
72	GPS-07	OSC OVEN TEMP	104	TH-21	-Y BULKHEAD (STATION 55) TEMP
73	GPS-09	EXT OSC REG VOLT	105	TH-23	CLOSING WEB, WB MOD NO. 1 TEMP
74	GPS-10	EXT OSC CASE TEMP	106	TH-24	CLOSING WEB, WB MOD NO. 2 TEMP
75	GPS-18	EXT PREAMP TEMP	107	TH-25	MSS MOUNT TEMP
76	DASB-01	BILEVEL WORD 707	108	TH-26	CLOSING WEB, MSS SENSOR TEMP NO. 1
77	DASB-02	XMTR A PWR SUPPLY MON	109	TH-27	CLOSING WEB, MSS SENSOR TEMP NO. 2
78	DASB-03	XMTR B PWR SUPPLY MON	110	TH-29	UPPER BOOM POWER HINGE TEMP
79	DASB-04	XMTR A PWR AMP TEMP	111	TH-31	UPPER HINGE CABLE TEMP
80	DASB-05	XMTR B PWR AMP TEMP	112	TH-32	GPS PREAMPLIFIER TEMP
81	DASB-08	XMTR A REFLECTED RF PWR	113	TH-33	+Y KEEL STRUCTURE TEMP
82	DASB-09	XMTR B REFLECTED RF PWR	114	TH-34	-Y KEEL STRUCTURE TEMP
83	DASB-06	XMTR A FORWARD RF PWR	115	TH-35	BOOM LATCHDOWN FITTING TEMP NO. 1
84	DASB-07	XMTR B FORWARD RF PWR	116	TH-28	LOWER BOOM POWER HINGE TEMP
85	PDU-02	BILEVEL WORD 601	117	TH-30	UPPER BOOM TEMP
86	PDU-03	BILEVEL WROD 602	118	TH-38	ARRAY TEMP NO. 1
87			119	TH-39	ARRAY TEMP NO. 2
88	PDU-05	BILEVEL WORD 604	120	TH-40	ARRAY TEMP NO. 3
89	PDU-06	PDU POWER SUPPLY TEMP	121	TH-41	ARRAY TEMP NO. 4
90	PDU-07	PDU LOGIC TEMP	122	TH-20	S-BAND XMTR PANEL TEMP NO. 2
91	ADS-01	ADS TEMP	123	TH-36	BOOM LATCHDOWN FITTING TEMP NO. 2
92	PDU-10	TH +19V	124	TH-22	SAD MOUNTING PANEL TEMP
93	TH-09	PDU MTG PNL (TOP OUTBOARD) TEMP	125	PDU-11	SOLAR ARRAY POSITION NO. 1
94	TH-10	RIU 6 MTG PNL (INBOARD) TEMP	126	PDU-12	SOLAR ARRAY POSITION NO. 2
95	TH-11	RIU 6 MTG PNL (OUTBOARD) TEMP	127		

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-19. Subcommutator 3 - Minor Frame Word 96

Minor Frame Number	User ID	Description	Minor Frame Number	User ID	Description
00	MSS-01	BILEVEL WORD 706	32	MACS-77	PITCH SRW TACH A
01	WB-01	GDE PRI SERIAL OUTPUT (WORD 1)	33	WB-01	GDE PRI SERIAL OUTPUT (WORD 1)
02	MACS-01	FSS 32-BIT DATA (MSB)	34	MACS-79	SKEW SRW TACH A
03	WB-02	GDE REDUND SERIAL OUTPUT (WORD 1)	35	WB-02	GDE REDUND SERIAL OUTPUT (WORD 1)
04	SC/CU-01	PAYLOAD HEATERS 1 AND 2 STATUS	36	MACS-73	PITCH SRW MOTOR VOLTS
05	MACS-04	ACE A 16-BIT COMP STATUS (MSB)	37	MACS-74	YAW SRW MOTOR VOLTS
06	MACS-56	ROLL MAG TORQ DRIVE A	38	MACS-75	SKEW SRW MOTOR VOLTS
07	MACS-27	RIU 2 TEMP	39	MACS-62	IRU ROLL RATE 1
08	MACS-90	ACE A TAM ROLL COMPENSATED SIG	40	MACS-65	IRU ROLL RATE 2
09	MACS-91	ACE A TAM PITCH COMPENSATED SIG	41	MACS-20	ROLL SRW TEMP
10	MACS-92	ACE A TAM YAW COMPENSATED SIG	42	MACS-21	PITCH SRW TEMP
11	PDU-01	SERIAL DATA (WORD 1)	43	MACS-50	TAM 1 ROLL ERROR SIGNAL
12	SC/CU-12	SC/CU TEMPERATURE	44	MACS-53	TAM 2 ROLL ERROR SIGNAL
13	MACS-19	BILEVEL WORD 04	45	MACS-38	IRU CHAN A REG VOLT
14	MPS-31	BATTERY 1 LOW CURRENT	46	MACS-72	ROLL SRW MOTOR VOLTS
15	MACS-96	ACE A IRU ROLL POSITION	47	MACS-96	ACE A IRU ROLL POSITION
16	C/DH-45	EXT OSC CASE TEMP	48	SC/CU-13	SPACECRAFT STRUCTURE TEMP 1
17	SC/CU-10	BILEVEL WORD 01	49	SC/CU-16	SPACECRAFT STRUCTURE TEMP 4
18	SC/CU-11	BILEVEL WORD 02	50	MPS-01	STATUS WORD 1
19	MPS-10	PCU TEMP 1	51	MPS-04	STATUS WORD 4
20	MPS-08	BATTERY 1 TEMP (PRIMARY)	52	MPS-41	SOLAR ARRAY BUS VOLTAGE
21	MPS-35	INSTRUMENTS LOW CURRENT	53	MPS-35	INSTRUMENTS LOW CURRENT
22	MPS-38	C/DH CURRENT	54	MPS-38	C/DH CURRENT
23	C/DH-51	XPNDR A RF FORWARD PWR	55	C/DH-51	XPNDR A RF FORWARD PWR
24	C/DH-52	XPNDR A RF REFLECTED PWR	56	C/DH-52	XPNDR A RF REFLECTED PWR
25	MPS-16	MODULE TEMP 1	57	MACS-06	FHST 1 WORD 1 16-BIT DATA (MSB)
26	MPS-19	MODULE TEMP 4	58	MACS-07	FHST 1 WORD 2 16-BIT DATA (MSB)
27	MPS-13	BPA TEMP	59	MACS-08	FHST 2 WORD 1 16-BIT DATA (MSB)
28	MPS-20	BATTERY 1 VOLTAGE	60	MACS-09	FHST 2 WORD 2 16-BIT DATA (MSB)
29	MPS-21	BATTERY 2 VOLTAGE	61	MACS-05	ACE A 24-BIT SHE STATUS (WORD 1)
30	MPS-46	BATTERY 3 VOLTAGE	62	MACS-13	ACE B 24-BIT SHE STATUS (WORD 1)
31	MPS-76	ROLL SRW TACH A	63	MACS-78	YAW SRW TACH A

LSD-WPC-007

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-19. Subcommutator 3 - Minor Frame Word 96

Minor Frame Number	User ID	Description	Minor Frame Number	User ID	Description
64	PM-48	PM-1A TANK TEMP	96	MACS-77	PITCH SRW TACH A
65	WB-01	GDE PRI SERIAL OUTPUT (WORD 1)	97	WB-01	GDE PRI SERIAL OUTPUT (WORD 1)
66	MACS-57	ROLL MAG TORQ DRIVE B	98	MACS-79	SKEW SRW TACH A
67	WB-02	GDE REDUND SERIAL OUTPUT (WORD 1)	99	WB-02	GDE REDUND SERIAL OUTPUT (WORD 1)
68	MACS-12	ACE B 16-BIT COMP STATUS (MSB)	100	MACS-73	PITCH SRW MOTOR VOLTS
69	C/DH-42	XPNDR A PWR AMP TEMP	101	MACS-74	YAW SRW MOTOR VOLTS
70	C/DH-41	XPNDR A TCXO TEMP	102	MACS-75	SKEW SRW MOTOR VOLTS
71	SC/CU-04	PAYLOAD HEATERS 7 AND 8 STATUS	103	MACS-62	IRU ROLL RATE 1
72	MACS-16	BILEVEL WORD 01	104	MACS-65	IRU ROLL RATE 2
73	MACS-32	IRU CHAN A TEMP	105	PM-24	PME A/B ATT CNTRL ENA/DISA
74	MACS-33	IRU CHAN B TEMP	106	C/DH-24	BILEVEL WORD 140
75	MACS-34	IRU CHAN C TEMP	107	C/DH-21	BILEVEL WORD 070
76	MACS-14	ACE A 24-BIT COMPUTER/PAYS WORD 1	108	C/DH-18	BILEVEL WORD 040
77	MACS-15	ACE B 24-BIT COMPUTER/DAYS WORD 1	109	PM-27	ACS DIR CONT INPUTS ENA/DISA
78	C/DH-14	PMP A STATUS	110	MACS-72	ROLL SRW MOTOR VOLTS
79	MACS-96	ACE A IRU ROLL POSITION	111	MACS-96	ACE A IRU ROLL POSITION
80	C/DH-34	RIU 1 A/B INTERSPACE TEMP	112	PM-32	PME A POS AC TORQ PULSE GEN
81	C/DH-34	STACC RIU B TEMP	113	PM-33	PME B POS AC TORQ PULSE GEN
82	C/DH-11	STANDBY CU CMD COUNTER	114	PM-37	PME A TR CONT REM A,C/B,D ENA/DISA
83	C/DH-32	STACC RIU A TEMP	115	PM-38	PME B TR CONT REM A,C/B,D ENA/DISA
84	MPS-42	BATTERY 1 TEMP (REDUNDANT)	116	MPS-41	SOLAR ARRAY BUS VOLTAGE
85	MPS-35	INSTRUMENTS LOW CURRENT	117	MPS-35	INSTRUMENTS LOW CURRENT
86	MPS-38	C/DH CURRENT	118	MPS-38	C/DH CURRENT
87	C/DH-51	XPNDR A RF FORWARD PWR	119	C/DH-51	XPNDR A RF FORWARD PWR
88	C/DH-52	XPNDR A RF REFLECTED PWR	120	C/DH-52	XPNDR A RF REFLECTED PWR
89	SC/CU-19	RIU 4A TEMP	121	MACS-06	FHST 1 WORD 1 16-BIT DATA (MSB)
90	SC/CU-20	RIU 4B TEMP	122	MACS-07	FHST 1 WORD 2 16-BIT DATA (MSB)
91	MACS-84	ACE A/B +5V REG V	123	MACS-08	FHST 2 WORD 1 16-BIT DATA (MSB)
92	MACS-86	ACE A/B -15V REG V	124	MACS-09	FHST 2 WORD 2 16-BIT DATA (MSB)
93	MACS-87	ACE A/B +28V REG V	125	SC/CU-07	ANT. DEPLOY PYRO STATUS
94	SC/CU-24	SC/CU +25V B POWER	126	PM-21	PME A/B LTCH VALVE DRVR ENA/DISA
95	MACS-76	ROLL SRW TACH A	127	MACS-78	YAW SRW TACH A

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-20. Subcommutator 4 - Minor Frame Word 97

Minor Frame Number	User ID	Description	Minor Frame Number	User ID	Description
00	MSS-02	BILEVEL WORD 801	32	MACS-81	PITCH SRW TACH B
01	WB-01	GDE PRI SERIAL OUTPUT (WORD 2)	33	WB-01	GDE PRI SERIAL OUTPUT (WORD 2)
02	MACS-01	FSS 32-BIT DATA	34	MACS-83	SKEW SRW TACH B
03	WB-02	GDE REDUND SERIAL OUTPUT (WORD 2)	35	WB-02	GDE REDUND SERIAL OUTPUT (WORD 2)
04	SC/CU-02	PAYLOAD HEATERS 3 AND 4 STATUS	36	C/DH-43	XPNDR B TCXO TEMP
05	MACS-04	ACE A 16-BIT COMP STATUS (LSB)	37	PM-03	REM A TEMP 1 (PME-A), TEMP 3 (PME-B)
06	MACS-58	PITCH MAG TORQ DRIVE A	38	PM-04	REM A TEMP 2 (PME-A), TEMP 4 (PME-B)
07	MACS-26	FSS TEMP	39	MACS-63	IRU PITCH RATE 1
08	MACS-93	ACE B TAM ROLL COMPENSATED SIG	40	MACS-66	IRU PITCH RATE 2
09	MACS-94	ACE B TAM PITCH COMPENSATED SIG	41	MACS-22	YAW SRW TEMP
10	MACS-95	ACE B TAM YAW COMPENSATED SIG	42	MACS-23	SKEW SRW TEMP
11	PDU-01	SERIAL DATA (WORD 2)	43	MACS-51	TAM 1 PITCH ERROR SIGNAL
12	MACS-44	FHST 1 STAR INTENSITY	44	MACS-54	TAM 2 PITCH ERROR SIGNAL
13	MACS-46	CSS 1 PITCH POSITION ERROR	45	MACS-39	IRU CHAN B REG VOLT
14	HPS-32	BATTERY 2 LOW CURRENT	46	SC/CU-23	SC/CU +5V B POWER
15	MACS-99	ACE B IRU ROLL POSITION	47	MACS-99	ACE B IRU ROLL POSITION
16	C/DH-46	EXT OSC OVEN TEMP	48	SC/CU-14	SPACECRAFT STRUCTURE TEMP 2
17	PM-01	BILEVEL WORD 01	59	SC/CU-17	SPACECRAFT STRUCTURE TEMP 5
18	MPS-27	SCA DC/DC CONV A VOLTAGE	50	MPS-02	STATUS WORD 2
19	MPS-11	PCU TEMP 2	51	MPS-05	STATUS WORD 5
20	MPS-09	BATTERY 2 TEMP (PRIMARY)	52	MPS-33	CS 1 ARRAY/GND PWR CURRENT
21	C/DH-37	TEMP BETWEEN XPNDRS A AND B	53	MACS-24	OPTIC BENCH TEMP (FHST)
22	MPS-39	SC/CU, MPS CURRENT	54	MPS-39	SC/CU, MPS CURRENT
23	C/DH-54	XPNDR B RF FORWARD PWR	55	C/DH-54	XPNDR B RF FORWARD PWR
24	C/DH-55	XPNDR B RF REFLECTED PWR	56	C/DH-55	XPNDR B RF REFLECTED PWR
25	MPS-17	MODULE TEMP 2	57	MACS-06	FHST 1 WORD 1 16-BIT DATA (LSB)
26	MPS-22	LOAD BUS VOLTAGE	58	MACS-07	FHST 1 WORD 2 16-BIT DATA (LSB)
27	MPS-15	SCA TEMP	59	MACS-08	FHST 2 WORD 1 16-BIT DATA (LSB)
28	MPS-23	BATTERY 1 3RD ELECTRODE VOLTAGE	60	MACS-09	FHST 2 WORD 2 16-BIT DATA (LSB)
29	MPS-24	BATTERY 2 3RD ELECTRODE VOLTAGE	61	MACS-05	ACE A 24-BIT SHE STATUS (WORD 2)
30	MPS-47	BATTERY 3 3RD ELECTRODE VOLTAGE	62	MACS-13	ACE B 24-BIT SHE STATUS (WORD 2)
31	MPS-80	ROLL SRW TACH B	63	MACS-82	YAW SRW TACH B

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-20. Subcommutator 4 - Minor Frame Word 97

Minor Frame Number	User ID	Description	Minor Frame Number	User ID	Description
64	PM-49	PM-1A FUEL TEMP	96	MACS-81	PITCH SEW TACH B
65	WB-01	GDC PRI SERIAL OUTPUT (WORD 2)	97	WB-01	GDE PRI SERIAL OUTPUT (WORD 2)
66	MACS-59	PITCH MAG TORQ DRIVE B	98	MACS-83	SKEW SEW TACH B
67	WB-02	GDE REDUND SERIAL OUTPUT (WORD 2)	99	WB-02	GDE REDUND SERIAL OUTPUT (WORD 2)
68	MACS-12	ACE B 16-BIT COMP STATUS (LSB)	100	MACS-47	CSS 1 YAW POSITION ERROR
69	C/DH-44	XPNDR B PWR AMP TEMP	101	MACS-48	CSS 2 PITCH POSITION ERROR
70	C/DH-40	MEM 0,3 INTERSPACE TEMP	102	MACS-49	CSS 2 YAW POSITION ERROR
71	SC/CU-05	SPACECRAFT HEATERS 1,2,3 STATUS	103	MACS-63	IRU PITCH RATE 1
72	MACS-17	BILEVEL WORD 02	104	MACS-66	IRU PITCH RATE 2
73	MACS-41	IRU CHAN A MOTOR CURRENT	105	C/DH-25	BILEVEL WORD 150
74	MACS-42	IRU CHAN B MOTOR CURRENT	106	C/DH-17	BILEVEL WORD 020
75	MACS-43	IRU CHAN C MOTOR CURRENT	107	C/DH-22	BILEVEL WORD 110
76	MACS-14	ACE A 24-BIT COMPUTER/PAYS WORD 2	108	C/DH-23	BILEVEL WORD 130
77	MACS-15	ACE B 24-BIT COMPUTER/PAYS WORD 2	109	PM-28	PME A POS AC REM A/C ENA/DISA
78	C/DH-15	PMP B STATUS	110	PM-30	PME B POS AC REM A/C ENA/DISA
79	MACS-99	ACE B IRU ROLL POSITION	111	MACS-99	ACE B IRU ROLL POSITION
80	MACS-35	OPTIC BENCH TEMP (IRU)	112	PM-33	PME A NEG AC TORQ PULSE GEN
81	C/DH-36	STACC STINT B TEMP	113	PM-35	PME B NEG AC TORQ PULSE GEN
82	C/DH-09	CU A FLEX FORMAT LOAD/VERIFY	114	PM-39	REM A/C TRANSL CONT THRUST ON/OFF
83	C/DH-35	STACC STINT A TEMP	115	PM-40	REM B/D TRANSL CONT THRUST ON/OFF
84	MPS-43	BATTERY 2 TEMP (REDUNDANT)	116	MPS-33	CS1 ARRAY/GND PWR CURRENT
85	PM-11	TANK 1 TEMP	117	PM-20	PRI/REDUND HEATER BUS ENA/DIS
86	MPS-39	SC/CU, MPS CURRENT	118	MPS-39	SC/CU, MPS CURRENT
87	C/DH-54	XPNDR B RF FORWARD PWR	119	C/DH-54	XPNDR B RF FORWARD PWR
88	C/DH-55	XPNDR B RF REFLECTED PWR	120	C/DH-55	XPNDR B RF REFLECTED PWR
89	PM-09	REM D TEMP 1 (PME-A), TEMP 3 (PME-B)	121	MACS-06	FHST 1 WORD 1 16-BIT DATA (LSB)
90	PM-10	REM D TEMP 2 (PME-A), TEMP 4 (PME-B)	122	MACS-07	FHST 1 WORD 2 16-BIT DATA (LSB)
91	MACS-85	ACE A/B +5V REG V	123	MACS-08	FHST 2 WORD 1 16-BIT DATA (LSB)
92	MACS-88	ACE A -18V REG V	124	MACS-09	FHST 2 WORD 2 16-BIT DATA (LSB)
93	MACS-89	ACE B +18V REG V	125	SC/CU-08	ARRAY DEPLOY PYRO STATUS
94	PM-12	TANK 2 TEMP	126	PM-22	LATCH VALVES 1,2,3 OPEN/CLOSED
95	MACS-80	ROLL SEW TACH B	127	MACS-82	YAW SEW TACH B

LSD-WPC-007

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-21. Subcommutator 5 - Minor Frame Word 98

Minor Frame Number	User ID	Description	Minor Frame Number	User ID	Description
00	MSS-03	BILEVEL WORD 802	32	MACS-69	PITCH SRW DRIVE CONTROL
01	WB-01	GDE PRI SERIAL OUTPUT (WORD 3)	33	WB-01	GDE PRI SERIAL OUTPUT (WORD 3)
02	MACS-01	FSS 32-BIT DATA	34	MACS-71	SKEW SRW DRIVE CONTROL
03	WB-02	GDE REDUND SERIAL OUTPUT (WORD 3)	35	WB-02	GDE REDUND SERIAL OUTPUT (WORD 2)
04	SC/CU-03	PAYLOAD HEATERS 5 AND 6 STATUS	36	C/DH-31	PCU TEMP
05	MPS-37	MACS, PM CURRENT	37	MPS-37	MACS, PM CURRENT
06	MACS-60	YAW MAG TORQ DRIVE A	38	MPS-44	BATTERY 3 TEMP (PRIMARY)
07	C/DH-27	BILEVEL WORD 170	39	MACS-64	IRU YAW RATE 1
08	MACS-30	SRW DRIVE ELECTRONICS TEMP	40	MACS-67	IRU YAW RATE 2
09	C/DH-50	XPNDR A AGC LEVEL	41	C/DH-50	XPNDR A AGC LEVEL
10	C/DH-53	XPNDR B AGC LEVEL	42	C/DH-53	XPNDR B AGC LEVEL
11	PDU-01	SERIAL DATA (WORD 3)	43	MACS-52	TAM 1 YAW ERROR SIGNAL
12	MACS-45	FHST 2 STAR INTENSITY	44	MACS-55	TAM 2 YAW ERROR SIGNAL
13	WB-03	DSU PRIMARY STATUS WORD	45	MACS-40	IRU CHAN C REG VOLTS
14	MPS-50	BATTERY 3 LOW CURRENT	46	C/DH-28	PMP TEMP
15	SC/CU-21	SC/CU +5V A POWER	47	PM-19	FUEL TANK PRESSURE
16	C/DH-47	EXT OSC OVEN VOLTAGE	48	SC/CU-15	SPACECRAFT STRUCTURE TEMP 3
17	PM-02	BILEVEL WORD 02	49	SC/CU-17	SPACECRAFT STRUCTURE TEMP 6
18	MPS-28	SCA DC/DC CONV B VOLTAGE	50	MPS-03	STATUS WORD 3
19	MPS-12	PCU TEMP 3	51	MPS-06	STATUS WORD 6
20	C/DH-38	TEMP NEAR HTR A610 THERMOSTAT	52	MPS-34	CS 2 ARRAY/GND PWR CURRENT
21	C/DH-97	ACE A IRU PITCH POSITION	53	MACS-97	ACE A IRU PITCH POSITION
22	MACS-100	ACE B IRU PITCH POSITION	54	MACS-100	ACE B IRU PITCH POSITION
23	PM-13	TANK 3 TEMP	55	MPS-18	MODULE TEMP 3
24	PM-14	LTCH VLV 1 (PMZ-A), L/V 4 (PMZ-B)	56	MPS-07	RIU 3 STATUS
25	MACS-98	ACE A IRU YAW POSITION	57	MACS-98	ACE A IRU YAW POSITION
26	MACS-101	ACE B IRU YAW POSITION	58	MACS-101	ACE B IRU YAW POSITION
27	MPS-14	PRU TEMP	59	C/DH-39	TEMP NEAR HTR A611 THERMOSTAT
28	MPS-25	BATTERY 1 DIFFERENTIAL VOLTAGE	60	MACS-31	TORQ DRIVE ELECTRONICS TEMP
29	MPS-26	BATTERY 2 DIFFERENTIAL VOLTAGE	61	MACS-05	ACE A 24-BIT SHE STATUS (WORD 3)
30	MPS-48	BATTERY 3 DIFFERENTIAL VOLTAGE	62	MACS-13	ACE B 24-BIT SHE STATUS (WORD 3)
31	MACS-68	ROLL SRW DRIVE CONTROL	63	MACS-70	YAW SRW DRIVE CONTROL

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-21. Subcommutator 5 - Minor Frame Word 98

Minor Frame Number	User ID	Description	Minor Frame Number	User ID	Description
64	MPS-36	INSTRUMENTS HIGH CURRENT	96	MACS-69	PITCH SRW DIRVE CONTROL
65	WB-01	GDE PRI SERIAL OUTPUT (WORD 3)	97	WB-01	GDE PRI SERIAL OUTPUT (WORD 3)
66	MACS-61	YAW MAG TORQ DRIVE B	98	MACS-71	SKEW SRW DRIVE CONTROL
67	WB-02	GDE REDUND SERIAL OUTPUT (WORD 3)	99	WB-02	GDE REDUND SERIAL OUTPUT (WORD 3)
68	MACS-25	PSU TEMP	100	MACS-37	FHST 2 TEMP
69	MPS-37	MACS, PM CURRENT	101	MPS-37	MACS, FM CURRENT
70	PM-50	PM-1A LINE TEMPERATURE	102	MPS-45	BATTERY 3 TEMP (REDUNDANT)
71	SC/CU-06	SPACECRAFT HEATERS 4,5,6 STATUS	103	MACS-64	IRU YAW RATE 1
72	MACS-18	BILEVEL WORD 03	104	MACS-67	IRU YAW RATE 2
73	C/DH-50	XPNDR A AGC LEVEL	105	C/DH-50	XPNDR A AGC LEVEL
74	C/DH-53	XPNDR B AGC LEVEL	106	C/DH-53	XPNDR B AGC LEVEL
75	MACS-28	ACE A PWR COND TEMP	107	C/DH-49	+28V UNREGULATED BUS
76	MACS-14	ACE A 24-BIT COMPUTER/PAYS WORD 3	108	C/DH-26	BILEVEL WORD 160
77	MACS-15	ACE B 24-BIT COMPUTER/PAYS WORD 3	109	PM-29	PME A NEG AC REM A/C ENA/DISA
78	MACS-29	ACE B PWR COND TEMP	110	PM-31	PME B NEG AC REM A/C ENA/DISA
79	SC/CU-22	SC/CU +25V A POWER	111	MACS-36	FHST 1 TEMP
80	C/DH-29	STACC CU A TEMP	112	PM-25	PME A 40/100/280 MS PULSE SELECT
81	C/DH-30	STACC CU B TEMP	113	PM-26	PME B 40/100/280 MS PULSE SELECT
82	C/DH-10	CU B FLEX FORMAT LOAD/VERIFY	114	MPS-03	STATUS WORD 3
83	C/DH-12	STINT A STATUS	115	PM-36	PME A/B TRANSL CONT ENA/DISA
84	C/DH-13	STINT B STATUS	116	MPS-34	CS2 ARRAY/GND PWR CURRENT
85	MACS-97	ACE A IRU PITCH POSITION	117	MACS-97	ACE A IRU PITCH POSITION
86	MACS-100	ACE B IRU PITCH POSITION	118	MACS-100	ACE B IRU PITCH POSITION
87	PM-07	REM C TEMP 1 (PME-A), TEMP 3 (PME-B)	119	C/DH-20	BILEVEL WORD 060
88	PM-08	REM C TEMP 2 (PME-A), TEMP 4 (PME-B)	120	C/DH-19	BILEVEL WORD 050
89	MACS-98	ACE A IRU YAW POSITION	121	MACS-98	ACE A IRU YAW POSITION
90	MACS-101	ACE B IRU YAW POSITION	122	MACS-101	ACE B IRU YAW POSITION
91	PM-15	TEMP LTCH VLV 2 (PME-A), LTCH VLV 5 (PME-B)	123	PM-05	REM B TEMP 1 (PME-A), TEMP 3 (PME-B)
92	PM-16	TEMP LTCH VLV 3 (PME-A), LTCH VLV 6 (PME-B)	124	PM-06	REM B TEMP 2 (PME-A), TEMP 4 (PME-B)
93	PM-17	BEAM TEMP, CENTER (PME-A), PME (PME-B)	125	SC/CU-09	JETTISON PYRO STATUS
94	PM-18	BEAM TEMP REM A (PME-A), REM B (PME-B)	126	PM-23	LATCH VALVES 4,5,6 OPEN/CLOSED
95	MACS-68	ROLL SRW DRIVE CONTROL	127	MACS-70	YAW SRW DRIVE CONTROL

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-22. Subcommutator 6 - Minor Frame Word 99

Minor Frame Number	User ID	Description	Minor Frame Number	User ID	Description
00	MCS-04	BILEVEL WORD 803	32	WB-27	WBM AUTOTRACK RCVR TEMP
01	WB-01	CDE PRI SERIAL OUTPUT (WORD 4)	33	WB-01	CDE PRI SERIAL OUTPUT (WORD 4)
02	KACS-01	FSS 32-BIT DATA (LSB)	34	WB-28	WBM +Y PANEL (PSU) TEMP
03	WB-02	CDE REDUND SERIAL OUTPUT (WORD 4)	35	WB-02	CDE REDUND SERIAL OUTPUT (WORD 4)
04	WB-40	RIU 9A TEMP	36	WB-35	WBM X TWTA BASEPLATE TEMP
05	WB-05	BILEVEL WORD 01	37	WB-26	WBM XTWTA SIDE TEMP
06	ESAM-11	ESA-1 SENSOR STATUS	38	ESAM-11	ESA-1 SENSOR STATUS
07	WB-46	KU TWTA PRI BUS CURRENT	39	GPS-03	BILEVEL WORD 702
08	WB-47	KU TWTA REDUND BUS CURRENT	40	GPS-04	BILEVEL WORD 703
09	WB-44	KU TWTA PRI HELIX CURRENT	41		
10	WB-45	KU TWTA REDUND HELIX CURRENT	42		
11	PDU-01	SERIAL DATA (WORD 4)	43	WD-08	BILEVEL WORD 04
12	WB-06	BILEVEL WORD 02	44	WB-30	WBM +Z PANEL TEMP
13	WB-04	DSU REDUNDANT STATUS WORD	45	WB-36	WBM UQPSK MODULATOR TEMP
14			46		
15	WB-42	PWR CONV PRI VOLT MONITOR	47	WB-31	WBM KU FREQ SOURCE TEMP
16	C/DH-48	EXT OSC REG VOLT	48	WB-17	RFC KU-TWTA BASEPLATE TEMP PRI
17	IM RIU6	RIU 06 TEMP	49	WB-58	BILEVEL WORD 08
18	TM-01	PWR SUPPLY 1 CURRENT	50	TM-01	PWR SUPPLY 1 CURRENT
19	TM-02	PWR SUPPLY 2 CURRENT	51	TM-02	PWR SUPPLY 2 CURRENT
20	TM-05	+8V	52	TM-05	+8V
21	TM-23	CDVU +8V	53	TM-23	CDVU +8V
22	ESAM-12	ESA-2 SENSOR STATUS	54	ESAM-12	ESA-2 SENSOR STATUS
23	WB-54	AT RCVR PRI AZIM ERROR	55	WB-54	AT RCVR PRI AZIM ERROR
24	WB-55	AT RCVR RED AZIM ERROR	56	WB-55	AT RCVR RED AZIM ERROR
25	WB-56	AT RCVR PRI ELEV ERROR	57	WB-56	AT RCVR PRI ELEV ERROR
26	WB-57	AT RCVR RED ELEV ERROR	58	WB-57	AT RCVR RED ELEV ERROR
27	WB-52	AT RCVR PRI SIG STRENGTH	59	WB-52	AT RCVR PRI SIG STRENGTH
28	WB-53	AT RCVR RED SIG STRENGTH	60	WB-53	AT RCVR RED SIG STRENGTH
29	WB-07	BILEVEL WORD 03	61	WB-09	BILEVEL WORD 05
30			62		
31	WB-38	CDA ELEV MOTOR TEMP PRIME	63	WB-33	WBM-X PANEL (PSU/DSU) TEMP

LSD-WPC-007

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-22. Subcommutator 6 - Minor Frame Word 99

Minor Frame Number	User ID	Description	Minor Frame Number	User ID	Description
64	WB-13	GDA AZIM MOTOR TEMP PRIME	96	WB-16	RFC SPARE TEMP 1
65	WB-01	GDE PRI SERIAL OUTPUT (WORD 4)	97	WB-01	GDE PRI SERIAL OUTPUT (WORD 4)
66	WB-20	RFC KU UPCONVERTER TEMP	98	WB-17	RFC KU TWTA BASEPLATE TEMP RED
67	WB-02	GDE REDUND SERIAL OUTPUT (WORD 4)	99	WB-02	GDE REDUND SERIAL OUTPUT (WORD 4)
68	WB-15	RFC KU DIPLEXER TEMP	100	WB-18	RFC AUTOTRACK FREQ SOURCE TEMP
69	WB-21	RFC AUTOTRACK COMBINER ASSY TEMP	101	WB-29	WBM K-TWTA BASEPLATE TEMP PRI
70	ESAM-11	ESA-1 SENSOR STATUS	102	ESAM-11	ESA-1 SENSOR STATUS
71	WB-50	X TWTA PRI BUS CURRENT	103	GPS-05	BILEVEL WORD 704
72	WB-51	X TWTA REDUND BUS CURRENT	104	GPS-06	BILEVEL WORD 705
73	WB-48	X TWTA PRI HELIX CURRENT	105		
74	WB-49	X TWTA REDUND HELIX CURRENT	106		
75	WB-10	BILEVEL WORD 06	107	WB-19	RFC PANEL (GDA MOUNT)TEMP
76	WB-14	RFC PANEL (NEAR FEED) TEMP	108	WB-25	RFC AT DOWNCONVERTER TEMP
77	WB-34	WBM GDE TEMP	109	WB-22	RFC SPARE TEMP 2
78			110		
79	WB-43	PWR CONV REDUND VOLT MONITOR	111	WB-26	WBM +X COVER TEMP
80	WB-11	BILEVEL WORD 07	112	WB-32	WBM X FREQ SOURCE TEMP
81	IM RIU7	RIU 07 TEMP	113	IM RIU8	RIU 08 TEMP
82	TM-01	PWR SUPPLY 1 CURRENT	114	TM-01	PWR SUPPLY 1 CURRENT
83	TM-02	PWR SUPPLY 2 CURRENT	115	TM-02	PWR SUPPLY 2 CURRENT
84	TM-05	+8V	116	TM-05	+8V
85	TM-23	CDVU +8V	117	TM-23	CDVU +8V
86	ESAM-12	ESA-2 SENSOR STATUS	118	ESAM-12	ESA-2 SENSOR STATUS
87	WB-54	AT RCVR PRI AZIM ERROR	119	WB-54	AT RCVR PRI AZIM ERROR
88	WB-55	AT RCVR RED AZIM ERROR	120	WB-55	AT RCVR RED AZIM ERROR
89	WB-56	AT RCVR PRI ELEV ERROR	121	WB-56	AT RCVR PRI ELEV ERROR
90	WB-57	AT RCVR RED ELEV ERROR	122	WB-57	AT RCVR RED ELEV ERROR
91	WB-52	AT RCVR PRI SIG STRENGTH	123	WB-52	AT RCVR PRI SIG STRENGTH
92	WB-53	AT RCVR RED SIG STRENGTH	124	WB-53	AT RCVR RED SIG STRENGTH
93	WB-12	GDA ELEV MOTOR TEMP REDUND	125	WB-37	RFC KU TWTA SIDE TEMP
94			126		
95	WB-39	GDA AZIM MOTOR TEMP REDUND	127	WB-41	RIU 98 TEMP

Table 2-23. Telemetry List Notes

NOTES:

1. SGNL TYPE

   B--0 through B--7 indicate bit definition for each bit of a bilevel digital Word (Bit 0 is MSB).

   S--0 through S--7 indicate bit definition for each bit of a serial digital Word (Bit 0 is MSB).

   SER or S0-7 indicate serial digital words where bit definition is unknown or not required.

   PASS indicates a passive analog function requiring a 1 mA current source from a RIU.

   ALOG indicates an active analog function not requiring a 1 mA source.

2. MTX LOC = Matrix Location

   00 through 127 columns by 00 through 127 rows. N/A indicates not assigned in telemetry matrix.

3. SMPL RATE indicates the number of samples per major frame. Only the first MTX LOC is given for functions sampled more than once per major frame. Subsequent samples are in evenly spaced (128/SMPL RATE) rows in the column from the location given.

4. M = MODE

   8 indicates MISSION mode format only
   1 indicates ENGINEERING mode format only
   Blank indicates both MISSION and ENGINEERING mode formats

5. ADDRESS

   Channels are identified 00 through 63 for RIU telemetry gates, 64 through 127 for gates 00 through 63 of the first EU associated with a RIU, and 128 through 191 for gates 00 through 63 of the second EU associated with a RIU.

6. Tables 2-15 through 2-41 are derived from drawing number 47J249400AR including Alteration Notices 1 through 12. Refer to future Alteration Notices from Print Control to update these tables.

7. Bilevel digital word; 1 is first meaning; 0 is second meaning.

   Example:

   C/DH-25 Xpndr B Xmtr ON/OFF
   1=Xpndr B Xmtr ON
   0=Xpndr B Xmtr OFF

Table 2-24

C&DH

COMMUNICATIONS AND DATA HANDLING SUBSYSTEM

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-24. C&DH Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SGNL TYPE	MTX LOC COL,ROW	SMPL RATE	M	ADDRESS RIU-CH
C/DH-01	CMFSYNC	FRAME SYNC WORD 00 (11111010)	S0-7	00,0	[illegible]		CU
		FRAME SYNC WORD 01 (11110011)	S0-7	01,0	[illegible]		CU
		FRAME SYNC WORD 02 (00100000)	S0-7	02,0	[illegible]		CU
C/DH-02	CCLKMSB	S/C CLOCK (8 MSB)	S0-7	87,0	128		01-06
C/DH-03	CCLKISB	S/C CLOCK (8 MIDDLE BITS)	S0-7	86,0	128		01-07
C/DH-04	CCLKLSB	S/C CLOCK (8 LSB), 1 BIT=1.024 SECONDS	S0-7	64,0	128		CU
C/DH-05	CFRMCNT	MINOR FRAME COUNTER (0-255)	S0-7	65,0	128		CU
C/DH-06	CCMDCNT	CMD COUNTER, SELECTED CU (0-255)	S0-7	66,0	128		CU
C/DH-07	CDWLMOD	DWELL MODE ON/OFF	S--0	67,0	128		CU
	CDWLCHN	DWELL MODE CHANNEL (0-127)	S1-7	67,0	128		CU
C/DH-08	CBITRAT	TELEMETRY BIT RATE	S0-2	03,0	128		CU
		000 1 KBPS					
		001 2 KBPS					
		010 4 KBPS					
		011 8 KBPS					
		100 16 KBPS					
		101 32 KBPS					
		110 64 KBPS					
		111 128 KBPS					
	CFORMAT	FORMAT SELECT	S3-4	03,0	128		CU
		00 CU FLEX FORMAT					
		01 ENG'G ROM FORMAT					
		10 MISSION ROM FORMAT					
		11 OBC FLEX FORMAT					
	CONCUID	CU B/CU A	S--5	03,0	128		CU
	CRTCDMP	DATA REAL TIME/OBC DUMP	S--6	03,0	128		CU
	CCHAREJ	CU DCDR CH A REJECT/NO REJECT	S--7	03,0	128		CU
C/DH-09	CCUAFLX	CU A FLEX FORMAT LOAD/VERIFY	S0-7	97,82	1		CU
C/DH-10	CCUBFLX	CU B FLEX FORMAT LOAD/VERIFY	S0-7	98,82	1		CU
C/DH-11	CSCMDCT	STANDBY CU COMMAND COUNTER (0-255)	S0-7	96,82	1		01-02
C/DH-12	CADMPID	OBC DUMP MEMORY BANK ID, STINT A	S0-3	98,83	1		01-03
		0000 MEM BANK 15					
		0001 MEM BANK 14					
		0010 MEM BANK 13					
		0011 MEM BANK 12					
		0100 MEM BANK 11					
		0101 MEM BANK 10					
		0110 MEM BANK 9					
		0111 MEM BANK 8					
		1000 MEM BANK 7					
		1001 MEM BANK 6					
		1010 MEM BANK 5					

LSD-WPC-007

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-24. C&DH Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SCHL TYPE	MTX LOC COL,ROW	SMPL RATE	M	ADDRESS RIU-CH
		1011 MEM BANK 4					
		1100 MEM BANK 3					
		1101 MEM BANK 2					
		1110 MEM BANK 1					
		1111 MEM BANK 0					
	CADMPHS	TYPE DUMP, STINT A	S4-5	98,83	1		
		00 SOFTWARE DUMP					
		01 HARDWARE DUMP					
		10 NOT USED					
		11 NO DUMP					
		NOT USED	S6-7	98,83	1		
C/DH-13	CBDMPID	OBC DUMP MEMORY BANK ID, STINT B	S0-3	98,84	1		01-04
		0000 MEM BANK 15					
		0001 MEM BANK 14					
		0010 MEM BANK 13					
		0011 MEM BANK 12					
		0100 MEM BANK 11					
		0101 MEM BANK 10					
		0110 MEM BANK 9					
		0111 MEM BANK 8					
		1000 MEM BANK 7					
		1001 MEM BANK 6					
		1010 MEM BANK 5					
		1011 MEM BANK 4					
		1100 MEM BANK 3					
		1101 MEM BANK 2					
		1110 MEM BANK 1					
		1111 MEM BANK 0					
	CBDMPHS	TYPE DUMP, STINT B	S4-5	98,84	1		
		00 SOFTWARE DUMP					
		01 HARDWARE DUMP					
		10 NOT USED					
		11 NO DUMP					
		NOT USED	S6-7	98,84	1		
C/DH-14	CPAMODE	PMP A OPERATING MODE STATUS	S0-3	96,78	1		01-00
		0000 MODE SELECT OUTPUTS OFF					
		1000 MODE A - R/T TO STDN					
		0100 MODE B - R/T AND OBC TO STDN					
		1100 MODE C - R/T AND T/R TO STDN					
		0010 MODE D - R/T AND EXT TO STDN					
		1010 MODE E - EXT TO STDN					
		0110 MODE F - R/T TO TDRSS					

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-24. C&DH Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SCNL TYPE	MTX LOC COL,ROW	SMPL RATE	M	ADDRESS RIU-CH
		1110 MODE G - R/T AND OBC TO TDRSS					
		0001 MODE H - R/T AND T/R TO TDRSS					
		1001 MODE I - R/T AND EXT TO TDRSS					
	CPARTTR	PMP A R/T DATA TO TAPE STATUS	S4-5	96,78	1		
		00 OFF					
		01 NOT USED					
		10 ON					
		11 NOT USED					
	CPAHDLN	PMP A HARDLINE OUTPUT STATUS	S6-7	96,78	1		
		00 HARDLINE OUTPUTS OFF					
		01 OBC MEM TO HARDLINE					
		10 R/T TO HARDLINE					
		11 T/R TO HARDLINE					
C/DH-15	CPBMODE	PMP B OPERATING MODE STATUS	S0-3	97,78	1		01-01
		0000 MODE SELECT OUTPUTS OFF					
		1000 MODE A - R/T TO STDN					
		0100 MODE B - R/T AND OBC TO STDN					
		1100 MODE C - R/T AND T/R TO STDN					
		0010 MODE D - R/T AND EXT TO STDN					
		1010 MODE E - EXT TO STDN					
		0110 MODE F - R/T TO TDRSS					
		1110 MODE G - R/T AND OBC TO TDRSS					
		0001 MODE H - R/T AND T/R TO TDRSS					
		1001 MODE I - R/T AND EXT TO TDRSS					
	CPBRTTR	PMP B R/T DATA TO TAPE STATUS	S4-5	97,78	1		
		00 OFF					
		01 NOT USED					
		10 ON					
		11 NOT USED					
	CPBHDLN	PMP B HARDLINE OUTPUT STATUS	S6-7	97,78	1		
		00 HARDLINE OUTPUTS OFF					
		01 OBC MEM TO HARDLINE					
		10 R/T TO HARDLINE					
		11 T/R TO HARDLINE					
C/DH-16	CSTAT010	BILEVEL WORD 010:		34,0		01-08	
	CXPARLK	XPNDR A RCVR LOCKED/UNLOCKED	B—0	34,0	128		01-08
	CXPARMD	XPNDR A REC MODE TDRS/STDN	B—1	34,0	128		01-09
	CXPBRLK	XPNDR B RCVR LOCKED/UNLOCKED	B—2	34,0	128		01-10
	CXPBRMD	XPNDR B REC MODE TDRS/STDN	B—3	34,0	128		01-11
	CXPACLK	XPNDR A CMD DET UNLOCKED/LOCKED	B—4	34,0	128		01-12
	CXPBCLK	XPNDR B CMD DET UNLOCKED/LOCKED	B—5	34,0	128		01-13
	CCUAREJ	CU A COMMAND REJECT/ACCEPT	B—6	34,0	128		01-14

LSD-WPC-007

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-24. C&DH Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SGNL TYPE	MTX LOC COL,ROW	SMPL RATE	M	ADDRESS RIU-CH
	CCUBREJ	CU B COMMAND REJECT/ACCEPT	B--7	34,0	128		01-15
C/DH-17		BILEVEL WORD 020:					01-16
	CXPASTD	XPNDR A REC MODE STDN/DUAL	B--6	97,106	1		01-22
C/DH-18	CSTAT040	BILEVEL WORD 040:		96,103			01-32
	CCUANF	CU A ON/OFF	B--0	96,108	1		01-32
	CCUAHFN	CU A HARDLINE OFF/ON	B--1	96,108	1		01-33
	CCUBNF	CU B ON/OFF	B--2	96,108	1		01-34
	CCUBHFN	CU B HARDLINE OFF/ON	B--3	96,108	1		01-35
	CRPLYBA	REPLY LINE B/A	B--4	96,108	1		01-36
	CSUPVBA	SUPERVISORY LINE B/A	B--5	96,108	1		01-37
	COSCINX	CU OSCILLATOR INTERNAL/EXTERNAL	B--6	96,108	1		01-38
	CRIUSBA	RIU 01 B ON/A ON	B--7	96,108	1		01-39
C/DH-19	CSTAT050	BILEVEL WORD 050:		98,120			01-40
	CPMPANF	PMP A ON/OFF	B--0	98,120	1		01-40
	CPACUBA	PMP A SELECT CU B/CU A	B--1	98,120	1		01-41
	CPRTENC	PMP A R/T CONV ENC IN/OUT	B--2	98,120	1		01-42
	SPASTBA	PMP A SELECT STINT B/STINT A	B--3	98,120	1		01-43
	SPASTENC	PMP A STINT/TAPE CONV ENC IN/OUT	B--4	98,120	1		01-44
	CPAN1MX	PMP A SELECT RECORDER A/PCD	B--5	98,120	1		01-45
	CPAMXAB	PMP A SELECT PCD B/A	B--6	98,120	1		01-46
		B5-6					
		00 SELECT PCD A					
		01 SELECT PCD B					
		10 SELECT NBTR NO. 1					
		11 SELECT NBTR NO. 1					
	CMATENF	RIU 01 MATE STANDBY 1/OFF	B--7	98,120	1		01-47
C/DH-20		BILEVEL WORD 060:		98,119			01-48
	CPMPBNF	PMP B ON/OFF	B--0	98,119	1		01-48
	CPBCUBA	PMP B SELECT CU B/CU A	B--1	98,119	1		01-49
	CPBSTENC	PMP B R/T CONV ENC IN/OUT	B--2	98,119	1		01-50
	CPBSTBA	PMP B SELECT STINT B/STINT A	B--3	98,119	1		01-51
	CPBSTENC	PMP B STINT/TAPE CONV ENC IN/OUT	B--4	98,119	1		01-52
	CPBN2MX	PMP B SELECT RECORDER B/PCD	B--5	98,119	1		01-53
	CPBMXAB	PMP B SELECT PCD B/A	B--6	98,119	1		01-54
		B5-6					
		00 SELECT PCD A					
		01 SELECT PCD B					
		10 SELECT NBTR NO. 2					
		11 SELECT NBTR NO. 2					
	CPABXP	PMP A/B TO XPNDR B/A (XSTRAP)/A/B(NOR)	B--7	98,119	1		01-55
C/DH-21		BILEVEL WORD 070:					01-56
	CXPAMOD	XPNDR A MOD INDEX HIGH/LOW	B--7	96,107	1		01-63

LSD-WPC-007

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-24. C&DH Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SCHL TYPE	MTX LOC COL,ROW	SMPL RATE	N	ADDRESS RIU-CH
C/DH-22	CSTAT110	BILEVEL WORD 110:		97,107			01-72
	CXMTAED	XPNDR A XMTR PRI PWR ENA/DISA	B—0	97,107	1		01-72
	CXMTBED	XPNDR B XMTR PRI PWR ENA/DISA	B—1	97,107	1		01-73
	CHTR1ED	HEATER 1 ENA/DISA	B—2	97,107	1		01-74
	CHTR2ED	HEATER 2 ENA/DISA	B—3	97,107	1		01-75
	CXAMPTH	XPNDR A TDRS MULTIPATH/NO MULTIPATH	B—4	97,107	1		01-76
	CXBMPTH	XPNDR B TDRS MULTIPATH/NO MULTIPATH	B—5	97,107	1		01-77
	CXPAXMT	XPNDR A XMIT MODE STDN/TDRS	B—6	97,107	1		01-78
	CXPBDET	XPNDR A DETECTOR 1 KBPS/125 BPS	B—7	97,107	1		01-79
C/DH-23	CSTAT130	BILEVEL WORD 130:		97,108			01-88
	CCUADMP	STACC CU A OBC DUMP 32 KBPS/1 KBPS	B—3	97,108	1		01-91
	CXPARAS	XPNDR A RCVR ACQUISITION STATE (MSB)	B—4	97,108	1		01-92
		XPNDR A RAS	B—5	97,108	1		01-93
		XPNDR A RAS	B—6	97,108	1		01-94
		XPNDR A RAS (LSB)	B—7	97,108	1		01-95
		B4-7					
		0000 NOT USED					
		0001 SHORT CODE AND CW SEARCH					
		0020 SIDE LOBE SEARCH NO. 1					
		0011 PN LOOP ACQUISITION					
		0100 CARRIER LOOP ACQUISITION					
		1010 SIDE LOBE SEARCH NO. 2					
		0110 LONG CODE SEARCH					
		0111 MULTIPATH SEARCH					
		1000 TDRSS TRACKING MODE					
		1001 NOT USED					
		1010 NOT USED					
		1011 STDN MODE ACQUISITION					
		1100 STDN TRACKING MODE					
C/DH-24	CSTAT140	BILEVEL WORD 140:		96,106			01-96
	CXPARNG	XPNDR A STDN RANGING ON/OFF	B—0	96,106	1		01-96
	CXMTANF	XPNDR A XMTR ON/OFF	B—1	96,106	1		01-97
	CXPAOSC	XPNDR A OSC AUTO TRANSFER DISA/ENA	B—2	96,106	1		01-98
	CXPBXMT	XPNDR B XMIT MODE STDN/TDRS	B—3	96,106	1		01-99
	CAUTAXMA	XPNDR A XMTR AUTO ON ENA/DISA	B—4	96,106	1		01-100
	CAUTAXMB	XPNDR B XMTR AUTO ON ENA/DISA	B—5	96,106	1		01-101
	CXPBPNI	XPNDR B PN CODE I CHAN OFF/ON	B—6	96,106	1		01-102
	CXPBPNQ	XPNDR B PN CODE Q CHAN OFF/ON	B—7	96,106	1		01-103
C/DH-25	CSTAT150	BILEVEL WORD 150:		97,105			01-104
	CXPBDET	XPNDR B DETECTOR 1 KBPS/125 BPS	B—0	97,105	1		01-104
	CXPAPNI	XPNDR A PN CODE I CHAN OFF/ON	B—1	97,105	1		01-105
	CXPAPNQ	XPNDR A PN CODE Q CHAN OFF/ON	B—2	97,105	1		01-106

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-24. C&DH Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SGNL TYPE	HTT LOC COL,ROW	SMPL RATE	M	ADDRESS RIU-CH
	CXPBRNG	XPNDR B STDN RANGING ON/OFF	B--3	97,105	1		01-107
	CXMTBNF	XPNDR B XMTR ON/OFF	B--4	97,105	1		01-108
	CXPBOSC	XPNDR B OSC AUTO TRANSFER DISA/ENA	B--5	97,105	1		01-109
	CXPBSTD	XPNDR B REC MODE STDN/DUAL	B--6	97,105	1		01-110
	CXPBMOD	XPNDR B MOD INDEX HIGH/LOW	B--7	97,105	1		01-111
C/DH-26	CSTAT160	BILEVEL WORD 160:		98,108			01-112
	CSTOBCA	STACC STINT A, NSSC A ON/OFF	B--0	98,108	1		01-112
	CCFDAED	COMPUTER FAILURE DET A ENA/DISA	B--1	98,108	1		01-113
	CSTOBCB	STACC STINT B, NSSC B ON/OFF	B--3	98,108	1		01-115
	CCFDBED	COMPUTER FAILURE DET B ENA/DISA	B--4	98,108	1		01-116
	CPWRM13	PWR SUPPLY FOR MEM 1,3,5,7 B/A	B--6	98,108	1		01-118
	CPWRM02	PWR SUPPLY FOR MEM 0,2,4,6 B/A	B--7	98,108	1		01-119
C/DH-27	CSTAT170	BILEVEL WORD 170:		98,07			01-120
	CKEM1ED	MEM 1,5 ENA/DISA	B--0	98,07	1		01-120
	CKEM2ED	MEM 2,6 ENA/DISA	B--1	98,07	1		01-121
	CKEM3ED	MEM 3,7 ENA/DISA	B--2	98,07	1		01-122
	CKEMOED	MEM 0,4 ENA/DISA	B--3	98,07	1		01-123
	C28VRFS	28V BUS B/A FOR RF SWITCH	B--4	98,07	1		01-124
	CRFSWC	RF SW CONFIGURATION BIT	B--5	98,07	1		01-125
		RF SW CONFIGURATION BIT	B--6	98,07	1		01-126
		B5-6					
		00 NOT USED					
		01 CONFIGURATION 2					
		10 CONFIGURATION 1					
		11 CONFIGURATION 3					
	CCUBDMP	STACC CU B OSC DUMP 32 KBPS/1 KBPS	B--7	98,07	1		01-127
	CSAGCXPA	XPNDR A AGC-STDN MODE		98,09			
	CTAGCXPA	XPNDR A AGC-TDRSS MODE		98,09			
	CSAGCXPB	XPNDR B AGC-STDN MODE		98,10			
	CTAGCXPB	XPNDR B AGC-TDRSS MODE		98,10			
	CPMPAIM	PMP A SELECT MUX/RCDR A		98,120			
	CPMPBIM	PMP B SELECT MUX/RCDR B		98,119			
C/DH-28	CPMPTMP	PMP TEMP	PASS	98,46	1		01-21
C/DH-29	CCUATMP	STACC CU A TEMP	PASS	98,80	1		01-16
C/DH-30	CCUBTMP	STACC CU B TEMP	PASS	98,81	1		01-17
C/DH-31	CPCUTMP	PCU TEMP	PASS	96,36	1		01-20
C/DH-32	CTRIUA	RIU 01 A TEMP	PASS	96,83	1		01-27
C/DH-33	CTRIUB	RIU 01 B TEMP	PASS	96,81	1		01-28
C/DH-34	CTRIUAB	RIU 01 A/B INTERSPACE TEMP	PASS	96,80	1		01-30
C/DH-35	CTSTNTA	STINT A TEMP	PASS	97,83	1		01-18
C/DH-36	CTSTNTB	STINT B TEMP	PASS	97,81	1		01-19
C/DH-37	CTXPAB	MODULE TEMP BETWEEN XPNDRS A&B	PASS	97,21	1		01-31

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-24. C&DH Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SGNL TYPE	MTX LOC COL,ROW	SMPL RATE	M	ADDRESS RIU-CH
C/DH-38	CTA610	MODULE TEMP NEAR HTR A610 THMSTAT	PASS	98,20	1		01-80
C/DH-39	CTA611	MODULE TEMP NEAR HTR A611 THMSTAT	PASS	98,59	1		01-81
C/DH-40	CTMEM03	MEM 0,3 INTERSPACE TEMP	PASS	97,70	1		01-29
C/DH-41	CTXPAXO	XPNDR A TCXO TEMP	PASS	96,70	1		01-23
C/DH-42	CTXPAPA	XPNDR A POWER AMP TEMP	PASS	96,69	1		01-24
C/DH-43	CTXPBXO	XPNDR B TCXO TEMP	PASS	97,36	1		01-26
C/DH-44	CTXPBPA	XPNDR B POWER AMP TEMP	PASS	97,69	1		01-25
C/DH-45	CTEXOSC	EXT OSCILLATOR CASE TEMP	PASS	96,16	1		01-89
C/DH-46	CTXOVEN	EXT OSC OVEN TEMP	PASS	97,16	1		01-88
C/DH-47	CVXOVEN	EXT OSC OVEN VOLTAGE	ALOG	98,16	1		01-83
C/DH-48	CVEXOSC	EXT OSC REG VOLTAGE	ALOG	99,16	1		01-82
C/DH-49	CUNRG28	+28 V UNREG BUS	ALOG	98,107	1		01-62
C/DH-50	CAGCXPA	XPNDR A AGC LEVEL	ALOG	98,09	4		01-56
C/DH-51	CXPAFWD	XPNDR A RF FORWARD POWER	ALOG	96,23	4		01-57
C/DH-52	CXPAREV	XPNDR A RF REFLECTED POWER	ALOG	96,24	4		01-58
C/DH-53	CAGCXPB	XPNDR B AGC LEVEL	ALOG	98,10	4		01-59
C/DH-54	CXPBFWD	XPNDR B RF FORWARD POWER	ALOG	97,23	4		01-60
C/DH-55	CXPBREV	XPNDR B RF REFLECTED POWER	ALOG	97,24	4		01-61
	CCLOCK	S/C CLOCK	ALOG	87,0			
			ALOG	86,0			
			ALOG	64,0			

Table 2-25

NBTR

NARROWBAND TAPE RECORDER

(STANDARD TAPE RECORDER)

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-25. NBTR Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SGNL TYPE	MTX LOC COL,ROW	SMPL RATE	M	ADDRESS RIU-CH
NBTR-01		RECORDER NO. 1 DIGITAL MUX:					01-64
	N1PWRON	MSB=PWR ON/OFF	S0-7	11,00	16		
		WORD 2					
	N1IPSCMD	TAPE SPEED COMMAND STATUS	S0-4	11,01	16		
		00011 20.916 IPS					
		10011 10.458 IPS					
		01011 6.229 IPS					
		11011 2.614 IPS					
		00111 1.307 IPS					
		10111 0.654 IPS					
		01111 0.327 IPS					
		00000 33.465 IPS					
		10000 16.733 IPS					
		01000 8.366 IPS					
		11000 4.183 IPS					
		00100 2.092 IPS					
		10100 1.046 IPS					
		01100 0.523 IPS					
		00010 26.772 IPS					
		10010 13.386 IPS					
		01010 6.693 IPS					
		11010 3.347 IPS					
		00110 1.673 IPS					
		10110 0.837 IPS					
		01110 0.418 IPS					
	N1DIRCMD	TAPE DIRECTION CMD STATUS REV/FWD	S--5	11,01	16		
		NOT USED (DIGITAL 0)	S--6	11,01	16		
		NOT USED (DIGITAL 0)	S--7	11,01	16		
		WORD 3					
	N1ENCOD	SERVO ENCODER CMD STATUS SEC/PRI	S--0	11,02	16		
		NOT USED (DIGITAL 0)	S--1	11,02	16		
		NOT USED (DIGITAL 0)	S--2	11,02	16		
		NOT USED (DIGITAL 0)	S--3	11,02	16		
	N1PBGRP	P/B DATA GROUP SELECTED	S4-5	11,02	16		
		00 GROUP A					
		01 GROUP C					
		10 GROUP B					
		11 GROUP D					
		NOT USED (DIGITAL 0)	S--6	11,02	16		
		NOT USED (DIGITAL 0)	S--7	11,02	16		
		WORD 4					
		NOT USED (DIGITAL 0)	S--0	11,03	16		

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-25. NBTR Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SGNL TYPE	MTX LOC COL,ROW	SMPL RATE	M	ADDRESS RIU-CH
		NOT USED (DIGITAL 0)	S--1	11,03	16		
		NOT USED (DIGITAL 0)	S--2	11,03	16		
		NOT USED (DIGITAL 0)	S--3	11,03	16		
		NOT USED (DIGITAL 0)	S--4	11,03	16		
		NOT USED (DIGITAL 0)	S--5	11,03	16		
		NOT USED (DIGITAL 0)	S--6	11,03	16		
		NOT USED (DIGITAL 0)	S--7	11,03	16		
		WORD 5					
	N1MODE	OPERATING MODE	SO-2	11,04	16		
		000 STOP					
		100 NOT USED					
		010 NOT USED					
		110 RECORD					
		001 PLAYBACK					
		101 WIND					
	N1TPDIR	TAPE DIRECTION REVERSE/FORWARD	S--2	11,04	16		
	N1OPGRP	OPERATING GROUP	S4-5	11,04	16		
		00 GROUP A					
		01 GROUP C					
		10 GROUP B					
		11 GROUP D					
		NOT USED (DIGITAL 0)	S--6	11,04	16		
		NOT USED (DIGITAL 0)	S--7	11,04	16		
		WORD 6					
	N1TBOTS	TERTIARY BOT SWITCH ON/OFF	S--0	11,05	16		
	N1TEOTS	TERTIARY EOT SWITCH ON/OFF	S--1	11,05	16		
	N1SLOCK	SERVO LOCKED/NOT LOCKED	S--2	11,05	16		
		NOT USED (DIGITAL 1)	S--3	11,05	15		
	N1SBOTS	SECONDARY BOT SENSOR LIT/NOT LIT	S--4	11,05	16		
	N1SEOTS	SECONDARY EOT SENSOR LIT/NOT LIT	S--5	11,05	16		
	N1PBOT	PRIMARY BOT YES/NO	S--6	11,05	16		
	N1PEOT	PRIMARY EOT YES/NO	S--7	11,05	16		
		WORD 7					
	N1SYNC2	SYNC WORD 8		11,07			
		NOT USED (DIGITAL 0)	S--0	11,07	16		
		NOT USED (DIGITAL 1)	S--1	11,07	16		
		NOT USED (DIGITAL 0)	S--2	11,07	16		
		NOT USED (DIGITAL 1)	S--3	11,07	16		
		NOT USED (DIGITAL 0)	S--4	11,07	16		
		NOT USED (DIGITAL 1)	S--5	11,07	16		
		SYNC MARK (DIGITAL 0)	S--6	11,07	16		
		SYNC MARK (DIGITAL 0)	S--7	11,07	16		

LSD-WPC-007

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-25. HDTR Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SCHL TYPE	MTX LOC COL,ROW	SMPL RATE	M	ADDRESS RIU-CH
HDTR-02		RECORDER NO. 2 DIGITAL MUX:					01-65
		WORD 1					
	H2PWRON	HSB-PWR ON/OFF	SO-7	12,00	16		
		WORD 2					
	H2IPSCMD	TAPE SPEED COMMAND STATUS	SO-4	12,01	16		
		00011 20.916 IPS					
		10011 10.458 IPS					
		01011 6.229 IPS					
		11011 2.614 IPS					
		00111 1.307 IPS					
		10111 0.654 IPS					
		01111 0.327 IPS					
		00000 33.465 IPS					
		10000 16.733 IPS					
		01000 8.366 IPS					
		11000 4.183 IPS					
		00100 2.092 IPS					
		10100 1.046 IPS					
		01100 0.523 IPS					
		00010 26.772 IPS					
		10010 13.386 IPS					
		01010 6.693 IPS					
		11010 3.347 IPS					
		00110 1.673 IPS					
		10110 0.837 IPS					
		01110 0.418 IPS					
	H2DIRCMD	TAPE DIRECTION CMD STATUS REV/FWD	S--?	12,01	16		
		NOT USED (DIGITAL 0)	S--6	12,01	16		
		NOT USED (DIGITAL 0)	S--7	12,01	16		
		WORD 3					
	H2ENCOD	SERVO ENCODER CMD STATUS SEC/PRI	S--0	12,02	16		
		NOT USED (DIGITAL 0)	S--1	12,02	16		
		NOT USED (DIGITAL 0)	S--2	12,02	16		
		NOT USED (DIGITAL 0)	S--3	12,02	16		
	H2PBGRP	P/B DATA GROUP SELECTED	S4-5	12,02	16		
		00 GROUP A					
		01 GROUP C					
		10 GROUP B					
		11 GROUP D					
		NOT USED (DIGITAL 0)	S--6	12,02	16		
		NOT USED (DIGITAL 0)	S--7	12,02	16		
		WORD 4					

LSD-UPC-007

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-25. HBTR Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SGNL TYPE	MTX LOC COL,ROW	SMPL RATE	M	ADDRESS RIU-CH
		NOT USED (DIGITAL 0)	S--0	12,03	16		
		NOT USED (DIGITAL 0)	S--1	12,03	16		
		NOT USED (DIGITAL 0)	S--2	12,03	16		
		NOT USED (DIGITAL 0)	S--3	12,03	16		
		NOT USED (DIGITAL 0)	S--4	12,03	16		
		NOT USED (DIGITAL 0)	S--5	12,03	16		
		NOT USED (DIGITAL 0)	S--6	12,03	16		
		NOT USED (DIGITAL 0)	S--7	12,03	16		
		WORD 5					
	N2MODE	OPERATING MODE	S--2	12,04	16		
		000 STOP					
		100 NOT USED					
		010 NOT USED					
		110 RECORD					
		001 PLAYBACK					
		101 WIND					
	N2TPDIR	TAPE DIRECTION REVERSE/FORWARD	S--3	12,04	16		
	N2OPGRP	OPERATING GROUP	S4-5	12,04	16		
		00 GROUP A					
		01 GROUP B					
		10 GROUP C					
		11 GROUP D					
		NOT USED (DIGITAL 0)	S--6	12,04	16		
		NOT USED (DIGITAL 0)	S--7	12,04	16		
		WORD 6					
	N2TBOTS	TERTIARY BOT SWITCH ON/OFF	S--0	12,05	16		
	N2TEOTS	TERTIARY EOT SWITCH ON/OFF	S--1	12,05	16		
	N2SLOCK	SERVO LOCKED/NOT LOCKED	S--2	12,05	16		
		NOT USED (DIGITAL 1)	S--3	12,05	16		
	N2SBOTS	SECONDARY BOT SENSOR LIT/NOT LIT	S--4	12,05	16		
	N2SEOTS	SECONDARY EOT SENSOR LIT/NOT LIT	S--5	12,05	16		
	N2PBOT	PRIMARY BOT YES/NO	S--6	12,05	16		
	N2PEOT	PRIMARY EOT YES/NO	S--7	12,05	16		
		WORD 7					
	N2SYNC2	SYNC WORD 8		12,07			
		NOT USED (DIGITAL 0)	S--0	12,07	16		
		NOT USED (DIGITAL 1)	S--1	12,07	16		
		NOT USED (DIGITAL 0)	S--2	12,07	16		
		NOT USED (DIGITAL 1)	S--3	12,07	16		
		NOT USED (DIGITAL 0)	S--4	12,07	16		
		NOT USED (DIGITAL 1)	S--5	12,07	16		
		SYNCH MARK (DIGITAL 0)	S--6	12,07	16		

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-25. NBTR Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SGNL TYPE	MTX LOC COL,ROW	SMPL RATE	M	ADDRESS RIU-CH
		SYNCH MARK (DIGITAL 0)	S—7	12,07	16		
NBTR-03		RECORDER NO. 1 ANALOG MUX NO. 1:					01-69
	N1TUPSI	TU PRESSURE	ALOG	84,00	8		
	N1SPEED	MOTOR SPEED	ALOG	84,01	8		
	N1MTRI	MOTOR CURRENT	ALOG	84,02	8		
	N1PTACH	TACHOMETER SENSOR-PRIMARY	ALOG	84,03	8		
	N1PWR5V	+5V POWER	ALOG	84,04	8		
	N1ASEOT	SECONDARY EOT SENSOR	ALOG	84,05	8		
	N1PREEL	REEL PRIMARY SENSOR	ALOG	84,06	8		
	N1P1ENC	ENCODER SENSOR PRIMARY NO. 1	ALOG	84,07	8		
	N1SREEL	REEL REDUNDANT SENSOR	ALOG	84,08	8		
	N1ASBOT	SECONDARY BOT SENSOR	ALOG	84,09	8		
	N1STACH	TACHOMETER SENSOR-SECONDARY	ALOG	84,10	8		
	N1P2ENC	ENCODER SENSOR PRIMARY NO. 2	ALOG	84,11	8		
	N1P3ENC	ENCODER SENSOR PRIMARY NO. 3	ALOG	84,12	8		
	N1S1ENC	ENCODER SENSOR SECONDARY NO. 1	ALOG	84,13	8		
	N1S2ENC	ENCODER SENSOR SECONDARY NO. 2	ALOG	84,14	8		
	N1S3ENC	ENCODER SENSOR SECONDARY NO. 3	ALOG	84,15	8		
NBTR-04		RECORDER NO. 2 ANALOG MUX NO. 1:					01-70
	N2TUPSI	TU PRESSURE	ALOG	85,00	8		
	N2SPEED	MOTOR SPEED	ALOG	85,01	8		
	N2MTRI	MOTOR CURRENT	ALOG	85,02	8		
	N2PTACH	TACHOMETER SENSOR-PRIMARY	ALOG	85,03	8		
	N2PWR5V	+5V POWER	ALOG	85,04	8		
	N2ASEOT	SECONDARY EOT SENSOR	ALOG	85,05	8		
	N2PREEL	REEL PRIMARY SENSOR	ALOG	85,06	8		
	N2P1ENC	ENCODER SENSOR PRIMARY NO. 1	ALOG	85,07	8		
	N2SREEL	REEL REDUNDANT SENSOR	ALOG	85,08	8		
	N2ASBOT	SECONDARY BOT SENSOR	ALOG	85,09	8		
	N2STACH	TACHOMETER SENSOR-SECONDARY	ALOG	85,10	8		
	N2P2ENC	ENCODER SENSOR PRIMARY NO. 2	ALOG	85,11	8		
	N2P3ENC	ENCODER SENSOR PRIMARY NO. 3	ALOG	85,12	8		
	N2S1ENC	ENCODER SENSOR SECONDARY NO. 1	ALOG	85,13	8		
	N2S2ENC	ENCODER SENSOR SECONDARY NO. 2	ALOG	85,14	8		
	N2S3ENC	ENCODER SENSOR SECONDARY NO. 3	ALOG	85,15	8		
NBTR-05		RECORDER NO. 1 ANALOG MUX NO 2:					01-114
	N1PBV8	CHANNEL 8 P/B VOLTAGE	ALOG	79,00	8	8	
	N1PBV2	CHANNEL 2 P/B VOLTAGE	ALOG	79,01	8	8	
	N1PBV7	CHANNEL 7 P/B VOLTAGE	ALOG	79,02	8	8	

LSD-WPC-007

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-25. NBTR Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SGNL TYPE	MTX LOC COL,ROW	SMPL RATE	M	ADDRESS RIU-CH
	N1PBV1	CHANNEL 1 P/B VOLTAGE	ALOG	79,03	8	8	
	N1PBV5	CHANNEL 5 P/B VOLTAGE	ALOG	79,04	8	8	
	N1PBV6	CHANNEL 6 P/B VOLTAGE	ALOG	79,05	8	8	
	N1PBV4	CHANNEL 4 P/B VOLTAGE	ALOG	79,06	8	8	
	N1PBV3	CHANNEL 3 P/B VOLTAGE	ALOG	79,07	8	8	
	N1PSP5	+5V POWER SUPPLY VOLTAGE	ALOG	79,08	8	8	
	N1EUTMP	EU TEMPERATURE	ALOG	79,09	8	8	
	N1TUTMP	TU TEMPERATURE	ALOG	79,10	8	8	
	N1GND	GROUND	ALOG	79,11	8	8	
	N1PSN6	-6V POWER SUPPLY VOLTAGE	ALOG	79,12	8	8	
	N1PSN12	-12V POWER SUPPLY VOLTAGE	ALOG	79,13	8	8	
	N1PSP15	+15V POWER SUPPLY VOLTAGE	ALOG	79,14	8	8	
	N1PSP12	+12V POWER SUPPLY VOLTAGE	ALOG	79,15	8	8	
NBTR-06		RECORDER NO. 2 ANALOG MUX NO. 2:					01-117
	N2PBV8	CHANNEL 8 P/B VOLTAGE	ALOG	80,00	8	8	
	N2PBV2	CHANNEL 2 P/B VOLTAGE	ALOG	80,01	8	8	
	N2PBV7	CHANNEL 7 P/B VOLTAGE	ALOG	80,02	8	8	
	N2PBV1	CHANNEL 1 P/B VOLTAGE	ALOG	80,03	8	8	
	N2PBV5	CHANNEL 5 P/B VOLTAGE	ALOG	80,04	8	8	
	N2PBV6	CHANNEL 6 P/B VOLTAGE	ALOG	80,05	8	8	
	N2PBV4	CHANNEL 4 P/B VOLTAGE	ALOG	80,06	8	8	
	N2PBV3	CHANNEL 3 P/B VOLTAGE	ALOG	80,07	8	8	
	N2PSP5	+5V POWER SUPPLY VOLTAGE	ALOG	80,08	8	8	
	N2EUTMP	EU TEMPERATURE	ALOG	80,09	8	8	
	N2TUTMP	TU TEMPERATURE	ALOG	80,10	8	8	
	N2GND	GROUND	ALOG	80,11	8	8	
	N2PSN6	-6V POWER SUPPLY VOLTAGE	ALOG	80,12	8	8	
	N2PSN12	-12V POWER SUPPLY VOLTAGE	ALOG	80,13	8	8	
	N2PSP15	+15V POWER SUPPLY VOLTAGE	ALOG	80,14	8	8	
	N2PSP12	+12V POWER SUPPLY VOLTAGE	ALOG	80,15	8	8	
NBTR-07	N1SVERR	RECORDER NO. 1 SERVO ERROR	ALOG	89,00	128		01-90
NBTR-08	N2SVERR	RECORDER NO. 2 SERVO ERROR	ALOG	90,00	128		01-67
	N1SYNC	NBTR 1 SYNC WORD		11,0			
	N1STAT02	STATUS WORD NO. 2		11,01			
	N1STAT03	STATUS WORD NO. 3		11,02			
	N1STAT04	STATUS WORD NO. 4		11,03			
	N1STAT05	STATUS WORD NO. 5		11,04			
	N1STAT06	STATUS WORD NO. 6		11,05			

ORIGINAL PAGE IS
OF POOR QUALITY

LSD-WPC-007

Table 2-25. NBTR Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SCHL TYPE	MTX LOC COL,ROW	SMPL RATE	N	ADDRESS RIU-CH
	N1STAT07	STATUS WORD NO. 7		11,06			
	N1STAT08	STATUS WORD NO. 8		11,07			
	N2SYNC	NBTR2 SYNC WORD		12,00			
	N2STAT02	STATUS WORD NO. 2		12,01			
	N2STAT03	STATUS WORD NO. 3		12,02			
	N2STAT04	STATUS WORD NO. 4		12,03			
	N2STAT05	STATUS WORD NO. 5		12,04			
	N2STAT06	STATUS WORD NO. 6		12,05			
	N2STAT07	STATUS WORD NO. 7		12,06			
	N2STAT08	STATUS WORD NO. 8		12,07			
	N1POSN	NBTR 1 TAPE POSITION INDICATOR		11,06			
	N2POSN	NBTR 2 TAPE POSITION INDICATOR		12,06			

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-26

MACS

MODULAR ATTITUDE CONTROL SUBSYSTEM

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-26. MACS Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SCHL TYPE	MTX LOC COL,ROW	SMPL RATE	M	ADDRESS RIU-CH
MACS-01		FSS 32-BIT DATA:					02-00
	AFSSOUTY	OPT AXIS ROT ABOUT FSS Y AXIS (MSB)	S0-7	96,01	1		
		OPT AXIS ROT ABUOT FSS Y AXIS (LSB)	S0-5	97,02	1		
		SUN ACQUIRED YES/NO	S--6	97,02	1		
		UNUSED BIT	S--7	97,02	1		
	AFSSOUTX	OPT AXIS ROT ABOUT FSS X AXIS (MSB)	S0-7	98,02	1		
		OPT AXIS ROT ABOUT FSS X AXIS (LSB)	S0-5	99,02	1		
	AFSSPWR	POWER STATUS	S6-7	99,02	1		
		10 = ON					
		11 = OFF					
MACS-02		ACE A 144-BIT IRU DATA	SER	N/A			02-01
MACS-10		ACE B 144-BIT IRU DATA	SER	N/A			02-12
MACS-03		ACE A 64-BIT TACH DATA	SER	N/A			02-02
MACS-11		ACE B 64-BIT TACH DATA	SER	N/A			02-13
MACS-04		ACE A COMPONENT STATUS:					02-03
	A4HZCLAA	ACE A 4HZ CLOCK ON/OFF	S--0	96,05	1		
	A4HZCLBA	ACE B 4 Hz CLOCK ON/OFF	S--1	96,05	1		
	ATR1HTA	ACE A FHST 1 HEATER PWR OFF/ON	S--2	96,05	1		
	ATR2HTA	ACE A FHST 2 HEATER PWR OFF/ON	S--3	96,05	1		
	AHTRA1A	ACE A HEATER 1A POWER OFF/ON	S--4	96,05	1		
	AHTRA1B	ACE A HEATER 1B POWER OFF/ON	S--5	96,05	1		
	AHTRA2A	ACE A HEATER 2A POWER OFF/ON	S--6	96,05	1		
	AHTRA2B	ACE A HEATER 2B POWER OFF/ON	S--7	96,05	1		
	AHTRA3A	ACE A HEATER 3A POWER OFF/ON	S--0	97,05	1		
	AHTRA3B	ACE A HEATER 3B POWER OFF/ON	S--1	97,05	1		
	AAZTRQB	ACE A YAW MAG TORQUER B ON/OFF	S--2	97,05	1		
	AAZTRQA	ACE A YAW MAG TORQUER A ON/OFF	S--3	97,05	1		
	AAYTRQB	ACE A PITCH MAG TORQUER B ON/OFF	S--4	97,05	1		
	AAYTRQA	ACE A PITCH MAG TORQUER A ON/OFF	S--5	97,05	1		
	AAXTRQB	ACE A ROLL MAG TORQUER B ON/OFF	S--6	97,05	1		
	AAXTRQA	ACE A ROLL MAG TORQUER A ON/OFF	S--7	97,05	1		
MACS-12		ACE B COMPONENT STATUS:					02-14
	A4HZCLAB	ACE A 4Hz CLOCK ON/OFF	S--0	96,68	1		
	A4HZCLBB	ACE B 4Hz CLOCK ON/OFF	S--1	96,68	1		
	ATR1HTB	ACE B FHST 1 HEATER POWER OFF/ON	S--2	96,68	1		
	ATR2HTB	ACE B FHST 2 HEATER POWER OFF/ON	S--3	96,68	1		
	AHTRB1A	ACE B HEATER 1A POWER OFF/ON	S--4	96,68	1		
	AHTRB1B	ACE B HEATER 1B POWER OFF/ON	S--5	96,68	1		
	AHTRB2A	ACE B HEATER 2A POWER OFF/ON	S--6	96,68	1		
	AHTRB2B	ACE B HEATER 2B POWER OFF/ON	S--7	96,68	1		
	AHTRB3A	ACE B HEATER 3A POWER OFF/ON	S--0	97,68	1		
	AHTRB3B	ACE B HEATER 3B POWER OFF/ON	S--1	97,68	1		

LSD-UPC-007

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-26. MACS Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SGNL TYPE	MTX LOC COL,ROW	SMPL RATE	M	ADDRESS RIU-CH
	ABZTRQB	ACE B YAW MAG TORQUER B ON/OFF	S--2	97,68	1		
	ABZTRQA	ACE B YAW MAG TORQUER A ON/OFF	S--3	97,68	1		
	ABYTRQB	ACE B PITCH MAG TORQUER B ON/OFF	S--4	97,68	1		
	ABYTRQA	ACE B PITCH MAG TORQUER A ON/OFF	S--5	97,68	1		
	ABXTRQB	ACE B ROLL MAG TORQUER B ON/OFF	S--6	97,68	1		
	ABXTRQA	ACE B ROLL MAG TORQUER A ON/OFF	S--7	97,68	1		
MACS-05		ACE A SHE STATUS:					02-04
	AAXCSS1	ACE A ROLL CSS 1 ON/OFF	S--0	96,61	1		
	AAXCSS2	ACE A ROLL CSS 2 ON/OFF	S--1	96,61	1		
	AAXESGYC	ACE A ROLL ES ON/OFF	S--2	96,61	1		
	AAXIRU1	ACE A ROLL IRU 1 POSITION ON/OFF	S--3	96,61	1		
	AAXIRU2	ACE A ROLL IRU 2 POSITION ON/OFF	S--4	96,[illegible]	1		
	AAXRATE	ACE A ROLL IRU 1/2 RATE ON	S--5	96,6[illegible]	1		
		ACE A NOT USED	S--6	96,61	1		
	AATHRST	ACE A THRUSTER CONTROL ON/OFF	S--7	96,61	1		
	AAZCSS1	ACE A YAW CSS 1 ON/OFF	S--0	97,61	1		
	AAZCSS2	ACE A YAW CSS 2 ON/OFF	S--1	97,61	1		
	AAZESGYC	ACE A YAW GYC ON/OFF	S--2	97,61	1		
	AAZIRU1	ACE A YAW IRU 1 POSITION ON/OFF	S--3	97,61	1		
	AAZIRU2	ACE A YAW IRU 2 POSITION ON/OFF	S--4	97,61	1		
	AAYRATE	ACE A PITCH IRU 1/2 RATE ON	S--5	97,61	1		
	AATAM	ACE A TAM 2/1 SELECTED	S--6	97,61	1		
	AATHRUN	ACE A THRUSTER UNLOAD ON/OFF	S--7	97,61	1		
	AAYCSS1	ACE A PITCH CSS 1 ON/OFF	S--0	98,61	1		
	AACSS2	ACE A PITCH CSS 2 ON/OFF	S--1	98,61	1		
	AAYESGYC	ACE A PITCH ES ON/OFF	S--2	98,61	1		
	AAIRU1	ACE A PITCH IRU 1 POSITION ON/OFF	S--3	98,61	1		
	AAIRU2	ACE A PITCH IRU 2 POSITION ON/OFF	S--4	98,61	1		
	AAZRATE	ACE A YAW IRU 1/2 RATE ON	S--5	98,61	1		
	AASFHLD	ACE A SAFE-HOLD ON/OFF	S--6	98,61	1		
	AASHLRT	ACE A SHUTTLE RETRIEVAL ON/OFF	S--7	98,61	1		
MACS-13		ACE B SHE STATUS:					02-15
	ABXCSS1	ACE B ROLL CSS 1 ON/OFF	S--0	96,62	1		
	ABXCSS2	ACE B ROLL CSS 2 ON/OFF	S--1	96,62			
	ABXESGYC	ACE B ROLL ES ON/OFF	S--2	96,62	1		
	ABXIRU1	ACE B ROLL IRU 1 POSITION ON/OFF	S--3	96,62	1		
	ABXIRU2	ACE B ROLL IRU 2 POSITION ON/OFF	S--4	96,62	1		
	ABXRATE	ACE B ROLL IRU 1/2 RATE ON	S--5	96,62	1		
		ACE B NOT USED	S--6	96,62	1		
	ABTHRST	ACE B THRUSTER CONTROL ON/OFF	S--7	96,62	1		
	ABZCSS1	ACE B YAW CSS 1 ON/OFF	S--0	97,62	1		
	ABZCSS2	ACE B YAW CSS 2 ON/OFF	S--1	97,62	1		

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-26. MACS Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SGNL TYPE	MTX LOC COL,ROW	SMPL RATE	N	ADDRESS RIU-CH
	ABZESGYC	ACE B YAW GYC ON/OFF	S--2	97,62	1		
	ABZIRU1	ACE B YAW IRU 1 POSITION ON/OFF	S--3	97,62	1		
	ABZIRU2	ACE B YAW IRU 2 POSITION ON/OFF	S--4	97,62	1		
	ABYRATE	ACE B PITCH IRU 1/2 RATE ON	S--5	97,62	1		
	ABTAM	ACE B TAM 2/1 SELECTED	S--6	97,62	1		
	ABTHRUN	ACE B THRUSTER UNLOAD ON/OFF	S--7	97,62	1		
	ABYCSS1	ACE B PITCH CSS 1 ON/OFF	S--0	98,62	1		
	ABYCSS2	ACE B PITCH CSS 2 ON/OFF	S--1	98,62	1		
	ABXESGYC	ACE B PITCH ES ON/OFF	S--2	98,62	1		
	ABXIRU1	ACE B PITCH IRU 1 POSITION ON/OFF	S--3	98,62	1		
	ABXIRU2	ACE B PITCH IRU 2 POSITION ON/OFF	S--4	98,62	1		
	ABZRATE	ACE B YAW IRU 1/2 RATE ON	S--5	98,62	1		
	ABSFHLD	ACE B SAFE-HOLD ON/OFF	S--6	98,62	1		
	ABSHLRT	ACE B SHUTTLE RETRIEVAL ON/OFF	S--7	98,62	1		
MACS-06		FHST 1 WORD 1 16-BIT DATA:					02-08
	AST1HOR2	HOR STAR POSITION	S0-3	97,57	2		
		UNUSED BIT	S--4	97,57	2		
	AST1SHBO	OPTICS SHTR CLOSED BY BOA YES/NO	S--5	97,57	2		
	AST1STAR	STAR PRESENT YES/NO	S--6	97,57	2		
	AST1SHTS	OPTICS SHTR CLOSED BY TS YES/NO	S--7	97,57	2		
MACS-07		FHST 1 WORD 2 16-BIT DATA:					02-09
	AST1VRT2	VERT STAR POSITION	S0-3	97,58	2		
		UNUSED BIT	S--4	97,58	2		
	AST1TOL	PWR SUPPLY OUT OF TOLERANCE NO/YES	S--5	97,58	2		
		UNUSED BIT	S6-7	97,58	2		
MACS-08	FHST 2 WORD 1 16-BIT DATA						02-10
	AST2HORZ	HOR STAR POSITION	S0-3	97,59	2		
		UNUSED BIT	2-4	97,59	2		
	AST2SHBO	OPTICS SHTR CLOSED BY BOA YES/NO	S-5	97,59	2		
	AST2STAR	STAR PRESENT YES/NO	S-6	97,59	2		
	AST2SHTS	OPTICS SHTR CLOSED BY TS YES/NO	S-7	97,59	2		
MACS-09	FHST 2 WORD 2 16-BIT DATA						02-11
	AST2VRT2	VERT STAR POSITION	S0-3	97,60	2		
		UNUSED BIT	S-4	97,60	2		
	AST2TOL	PWR SUPPLY OUT OF TOL YES/NO	S-5	97,60	2		
		UNUSED BITS	S6-7	97,60	2		
MACS-14		ACE A 24-BIT COMPUTER/PAYS WORD 1:					02-06
	AAXWHEN	ROLL SRW PAYS/OBC ENABLE	S--0	96,76	1		
	AAYWHEN	PITCH SRW PAYS/OBC ENABLE	S--1	96,76	1		
	AAZWHEN	YAW SRW PAYS/OBC ENABLE	S--2	96,76	1		
	AASWHEN	SKEW SRW PAYS/OBC ENABLE	S--3	96,76	1		
	AASPSWA	SEPARATION SW A CLOSED/OPEN	S--4	96,76	1		

LSD-WPC-007

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-26. MACS Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SGNL TYPE	MTX LOC COL,ROW	SMPL RATE	M	ADDRESS RIU-CH
	AASPSWB	SEPARATION SW B CLOSED/OPEN	S--5	96,76	1		
		NOT USED	S6-7	96,76	1		
	AACOMPW2	ACE A 24-BIT COMPUTER/PAYS WORD 2	S0-7	97,76	1		
	AACOMPW3	ACE A 24-BIT COMPUTER/PAYS WORD 3	S0-7	98,76	1		
MACS-15		ACE B 24-BIT COMPUTER/PAYS WORD 1:					02-07
	ABXWHEN	ROLL SRW PAYS/OBC ENABLE	S--0	96,77	1		
	ABYWHEN	PITCH SRW PAYS/OBC ENABLE	S--1	96,77	1		
	ABZWHEN	YAW SRW PAYS/OBC ENABLE	S--2	96,77	1		
	ABSWHEN	SKEW SRW PAYS/OBC ENABLE	S--3	96,77	1		
	ABSPSWA	SEPARATION SW A CLOSED/OPEN	S--4	96,77	1		
	ABSPSWB	SEPARATION SW B CLOSED/OPEN	S--5	96,77	1		
		NOT USED	S6-7	96,77	1		
MACS-16		BILEVEL WORD 01:					02-32
	AIRUARNG	IRU CHANNEL A RANGE LOW/HIGH	B--0	96,72	1		02-32
	AIRUBRNG	IRU CHANNEL B RANGE LOW/HIGH	B--1	96,72	1		02-33
	AIRUCRNG	IRU CHANNEL C RANGE LOW/HIGH	B--2	96,72	1		02-34
	AIRUAPWR	IRU CHANNEL A POWER ON/OFF	B--3	96,72	1		02-35
	AIRUBPWR	IRU CHANNEL B POWER ON/OFF	B--4	96,72	1		02-36
	AIRUCPWR	IRU CHANNEL C POWER ON/OFF	B--5	96,72	1		02-37
	AST1PWR	FHST 1 POWER ON/OFF	B--6	96,72	1		02-38
	AST2PWR	FHST 2 POWER ON/OFF	B--7	96,72	1		02-39
MACS-17		BILEVEL WORD 02:					02-64
	ATAM1PWR	TAM 1 POWER ON/OFF	B--0	97,72	1		02-64
	ATAM2PWR	TAM 2 POWER ON/OFF	B--1	97,72	1		02-65
	AAONBOFF	ACE A POWER ON/ACE B POWER ON	B--2	97,72	1		02-66
	ALMA	LAUNCH MODE A YES/NO	B--3	97,72	1		02-67
	SAIND1	S/A INDEX 1 STATUS	B--4	97,72	1		02-68
	SAIND2	S/A INDEX 2 STATUS	B--5	97,72	1		02-69
	ACSHATM	CSM A TIMER TIMEOUT/NO TIMEOUT	B--6	97,72	1		02-70
	ACSMBTM	CSM B TIMER TIMEOUT/NO TIMEOUT	B--7	97,72	1		02-71
MACS-18		BILEVEL WORD 03:					02-96
	ACSHA[illegible]	CSM A INHIBITED/ENABLED	B--0	98,72	1		02-96
	ACSMBED	CSM B INHIBITED/ENABLED	B--1	98,72	1		02-97
	AXWHED	ROLL WHEEL ENABLED/DISABLED	B--2	98,72	1		02-98
	AYWHED	PITCH WHEEL ENABLED/DISABLED	B--3	98,72	1		02-99
	AZWHED	YAW WHEEL ENABLED/DISABLED	B--4	98,72	1		02-100
	ASWHED	SKEW WHEEL ENABLED/DISABLED	B--5	98,72	1		02-101
	ALMB	LAUNCH MODE B YES/NO	B--6	98,72	1		02-102
MACS-19		BILEVEL WORD 04:					02-40
	ARIUMATE	RIU 02 MATE STANDBY 1/OFF	B--6	96,13	1		02-46
	ARIUID	RIU 02 B/A	B--7	96,13	1		02-47
	ABCOMPW2	ACE B 24 BIT COMP/PAYS WORD 2	S0-7	97,77			

LSD-WPC-007

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-26. MACS Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SCHL TYPE	MTX LOC COL,ROW	SMPL RATE	M	ADDRESS RIU-CH
	ADCOMPW3	ACE B 24 BIT COMP/PAYS WORD 3	SO-7	98,77			
MACS-20	AXWHLTMP	ROLL SRW TEMP	PASS	96,41	1		02-16
MACS-21	AYWHLTMP	PITCH SRW TEMP	PASS	96,42	1		02-17
MACS-22	AZWHLTMP	YAW SRW TEMP	PASS	97,41	1		02-18
MACS-23	ASWHLTMP	SKEW SRW TEMP	PASS	97,42	1		02-19
MACS-24	ASTOBTMP	OPTICAL BENCH TEMP (FHST)	PASS	97,53	1		02-20
MACS-25	APSUTMP	PSU TEMP	PASS	98,68	1		02-21
MACS-26	AFSSTMP	FSS TEMP	PASS	97,07	1		02-22
MACS-27	ARIUTMP	RIU 02 TEMP	PASS	96,07	1		02-23
MACS-28	AAPWRCDT	ACE A POWER CONDITIONER TEMP	PASS	98,75	1		02-24
MACS-29	ABPWRCDT	ACE B POWER CONDITIONER TEMP	PASS	98,78	1		02-25
MACS-30	AWHDRELT	SRW DRIVE ELECTRONICS TEMP	PASS	98,08	1		02-26
MACS-31	ATQDRELT	TORQ DRIVE ELECTRONICS TEMP	PASS	98,60	1		02-27
MACS-32	AIRUATMP	IRU CHANNEL A TEMP	PASS	96,73	1		02-28
MACS-33	AIRUBTMP	IRU CHANNEL B TEMP	PASS	96,75	1		02-29
MACS-34	AIRUCTMP	IRU CHANNEL C TEMP	PASS	96,75	1		02-30
MACS-35	AIRUO3TP	OPTICAL BENCH TEMP (IRU)	PASS	97,80	1		02-31
MACS-36	AST1TEMP	FHST 1 TEMP	ALOG	98,111	1		02-54
MACS-37	AST2TEMP	FHST 2 TEMP	ALOG	98,100	1		02-55
MACS-38	AIRUAVLT	IRU CHANNEL A REG VOLTAGE	ALOG	96,45	1		02-40
MACS-39	AIRUBVLT	IRU CHANNEL B REG VOLTAGE	ALOG	97,45	1		02-41
MACS-40	AIRUCVLT	IRU CHANNEL C REG VOLTAGE	ALOG	98,45	1		02-42
MACS-41	AIRUAMTI	IRU CHANNEL A MOTOR CURRENT	ALOG	97,73	1		02-43
				23	128	1	
MACS-42	AIRUBMTI	IRU CHANNEL B MOTOR CURRENT	ALOG	97,74	1		02-44
				24	128	1	
MACS-43	AIRUCMTI	IRU CHANNEL C MOTOR CURRENT	ALOG	97,75	1		02-45
				25	128	1	
MACS-44	AST1MAG	FHST 1 STAR INTENSITY	ALOG	97,12	1		02-52
MACS-45	AST2MAG	FHST 2 STAR INTENSITY	ALOG	98,12	1		02-53
MACS-46	ACSS1Y	CSS 1 PITCH POSITION ERROR	ALOG	97,13	1		02-48
				60	128	1	
MACS-47	ACSS1Z	CSS 1 YAW POSITION ERROR	ALOG	97,100	1		02-49
				62	128	1	
MACS-48	ACSS2Y	CSS 2 PITCH POSITION ERROR	ALOG	97,101	1		02-50
				61	128	1	
MACS-49	ACSS2Z	CSS 2 YAW POSITION ERROR	ALOG	97,102	1		02-51
				63	128	1	
MACS-50	ATAM1X	TAM 1 ROLL ERROR SIGNAL	ALOG	96,43	1		02-56
MACS-51	ATAM1Y	TAM 1 PITCH ERROR SIGNAL	ALOG	97,43	1		02-57
MACS-52	ATAM1Z	TAM 1 YAW ERROR SIGNAL	ALOG	98,43	1		02-58
MACS-53	ATAM2X	TAM 2 ROLL ERROR SIGNAL	ALOG	96,44	1		02-59

LSD-WPC-007

Table 2-26. MACS Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SGNL TYPE	MTX LOC COL,ROW	SMPL RATE	M	ADDRESS RIU-CH
MACS-54	ATAM2Y	TAM 2 PITCH ERROR SIGNAL	ALOG	97,44	1		02-60
MACS-55	ATAM2Z	TAM 2 YAW ERROR SIGNAL	ALOG	98,44	1		02-61
MACS-56	AXMAGDRA	ROLL MAG TORQ DRIVE A	ALOG	96,06	1		02-72
				26	128	1	
MACS-57	AXMAGDRB	ROLL MAG TORQ DRIVE B	ALOG	96,66	1		02-73
				27	128	1	
MACS-58	AYMAGDRA	PITCH MAG TORQ DRIVE A	ALOG	97,06	1		02-74
				28	128	1	
MACS-59	AYMAGDRB	PITCH MAG TORQ DRIVE B	ALOG	97,66	1		02-75
				29	128	1	
MACS-60	AZMAGDRA	YAW MAG TORQ DRIVE A	ALOG	98,06	1		02-76
				30	128	1	
MACS-61	AZMAGDRB	YAW MAG TORQ DRIVE B	ALOG	98,65	1		02-77
				31	128	1	
MACS-62	AXRATE1	IRU ROLL RATE 1	ALOG	96,39	2		02-82
				77	128	1	
MACS-63	AYRATE1	IRU PITCH RATE 1	ALOG	97,39	2		02-83
				79	128	1	
MACS-64	AZRATE1	IRU YAW RATE 1	ALOG	98,39	2		02-84
				81	128	1	
MACS-65	AXRATE2	IRU ROLL RATE 2	ALOG	96,40	2		02-85
				22	128	1	
MACS-66	AYRATE2	IRU PITCH RATE 2	ALOG	97,40	2		02-86
				80	128	1	
MACS-67	AZRATE2	IRU YAW RATE 2	ALOG	98,40	2		02-87
				82	128	1	
MACS-68	AXWHDRVA	ROLL SRW DRIVE CONTROL	ALOG	98,31	2		02-104
				56	128	1	
MACS-69	AYWHDRVA	PITCH SRW DRIVE CONTROL	ALOG	98,32	1		02-105
				57	128	1	
MACS-70	AZWHDRVA	YAW SRW DRIVE CONTROL	ALOG	98,63	2		02-106
				58	128	1	
MACS-71	ASWHDRVA	SKEW SRW DRIVE CONTROL	ALOG	98,34	2		02-107
				59	128	1	
MACS-72	AXWHDRVB	ROLL SRW MOTOR VOLTS	ALOG	96,46	2		02-108
				52	128	1	
MACS-73	AYWHDRVB	PITCH SRW MOTOR VOLTS	ALOG	96,36	2		02-109
				53	128	1	
MACS-74	AZWHDRVB	YAW SRW MOTOR VOLTS	ALOG	96,37	2		02-110
				54	128	1	
MACS-75	ASWHDRVB	SKEW SRW MOTOR VOLTS	ALOG	96,38	2		02-111
				55	128	1	

LSD-WPC-007

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-26. MACS Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SGNL TYPE	MTX LOC COL,ROW	SMPL RATE	M	ADDRESS RIU-CH
MACS-76	AXTACHA	ROLL SRW TACH A	ALOG	96,31 44	2 128	 1	02-112
MACS-77	AYTACHA	PITCH SRW TACH A	ALOG	96,32 46	2 128	 1	02-113
MACS-78	AZTACHA	YAW SRW TACH A	ALOG	96,63 48	2 128	 1	02-114
MACS-79	ASTACHA	SKEW SRW TACH A	ALOG	96,34 50	2 128	 1	02-115
MACS-80	AXTACHB	ROLL SRW TACH B	ALOG	97,31 45	2 128	 1	02-116
MACS-81	AYTACHB	PITCH SRW TACH B	ALOG	97,32 47	2 128	 1	02-117
MACS-82	AZTACHB	YAW SRW TACH B	ALOG	97,63 49	2 128	 1	02-118
MACS-83	ASTACHB	SKEW SRW TACH B	ALOG	97,34 51	2 128	 1	02-119
MACS-84	AP5VOLT	ACE A/B +5V REG VOLTAGE	ALOG	96,91	1		02-123
MACS-85	AP15VOLT	ACE A/B +15V REG VOLTAGE	ALOG	97,91	1		02-124
MACS-86	AN15VOLT	ACE A/B -15V REG VOLTAGE	ALOG	96,92	1		02-125
MACS-87	AP28VOLT	ACE A/B +28V REG VOLTAGE	ALOG	96,93	1		02-127
MACS-88	AAN18VLT	ACE A -18V REG VOLTAGE	ALOG	97,92	1		02-122
MACS-89	ABN18VLT	ACE B -18V REG VOLTAGE	ALOG	97,93	1		02-126
MACS-90	AAXTAMCP	ACE A TAM ROLL COMPENSATED SIGNAL	ALOG	96,08	1		02-78
MACS-91	AAYTAMCP	ACE A TAM PITCH COMPENSATED SIGNAL	ALOG	96,09	1		02-79
MACS-92	AAZTAMCP	ACE A TAM YAW COMPENSATED SIGNAL	ALOG	96,10	1		02-88
MACS-93	ABXTAMCP	ACE B TAM ROLL COMPENSATED SIGNAL	ALOG	97,08	1		02-89
MACS-94	ABYTAMCP	ACE B TAM PITCH COMPENSATED SIGNAL	ALOG	97,09	1		02-120
MACS-95	ABZTAMCP	ACE B TAM YAW COMPENSATED SIGNAL	ALOG	97,10	1		02-121
MACS-96	AAIRUXPN	ACE A IRU ROLL POSITION	ALOG	96,15 75	4 128	 1	02-90
MACS-97	AAIRUYPN	ACE A IRU PITCH POSITION	ALOG	98,21 42	4 128	 1	02-91
MACS-98	AAIRUZPN	ACE A IRU YAW POSITION	ALOG	98,25 43	4 128	 1	02-92
MACS-99	ABIRUXPN	ACE B IRU ROLL POSITION	ALOG	97,15 74	4 128	 1	02-93
MACS-100	ABIRUYPN	ACE B IRU PITCH POSITION	ALOG	98,22 106	4 128	 1	02-94
MACS-101	ABIRUZPN	ACE B IRU YAW POSITION	ALOG	98,26 107	4 128	 1	02-95

Table 2-27

MPS

MODULAR POWER SUBSYSTEM

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-27. MPS Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SGML TYPE	MTX LOC COL,ROW	SMPL RATE	M	ADDRESS RIU-CH
MPS-01		STATUS WORD 1:					03-00
	PB1TSWA	BATT 1 TH SW E/D STATUS A RSET/SET	S--0	96,50	1		
	PTH2BPB	HTR B THMST BYPASS STAT B RSET/SET	S--1	96,50	1		
	PTH1BPB	HTR A THMST BYPASS STAT B RSET/SET	S--2	96,50	1		
	PAUHTRB	AUTO HTR ON/OFF STATUS B RSET/SET	S--3	96,50	1		
	PBMODE	PRU "M" RESET/SET	S--4	96,50	1		
	PBVLC	PRU "VC" RSET/SET	S--5	96,50	1		
	PBVLB	PRU "VB" RSET/SET	S--6	96,50	1		
	PBVLA	PRU "VA RSET/SET	S--7	96,50	1		
MPS-02		STATUS WORD 2:					03-01
	PB2TSWA	BATT 2 TH SW E/D STATUS A RSET/SET	S--0	97,50	1		
		NOT USED	S--1	97,50	1		
	PSCARMA	BATT CHG RLY DVR RIU A DISARMED/ARMED	S--2	97,50	1		
	PB3CHG	BATT 3 OFF CHARGE/ON CHARGE	S--3	97,50	1		
	PB2CHG	BATT 2 OFF CHARGE/ON CHARGE	S--4	97,50	1		
	PB1CHG	BATT 1 OFF CHARGE/ON CHARGE	S--5	97,50	1		
	PPRUIB	PRU "IB" RSET/SET	S--6	97,50	1		
	PPRUIA	PRU "IA" RSET/SET	S--7	97,50	1		
MPS-03		STATUS WORD 3:					03-02
	PSA2PD	PD RELAY ARRAY 2 CLOSED/OPEN	S--0	98,50	2		
	PSA1PD	PD RELAY ARRAY 1 CLOSED/OPEN	S--1	98,50	2		
	PB3PD	PD RELAY BATT 3 CLOSED/OPEN	S--2	98,50	2		
	PB2PD	PD RELAY BATT 2 CLOSED/OPEN	S--3	98,50	2		
	PB1PD	PD RELAY BATT 1 CLOSED/OPEN	S--4	98,50	2		
	PB3OT	BATT 3 TEMP NORMAL/OVER LIMIT	S--5	98,50	2		
	PB2OT	BATT 2 TEMP NORMAL/OVER LIMIT	S--6	98,50	2		
	PB1OT	BATT 1 TEMP NORMAL/OVER LIMIT	S--7	98,50	2		
MPS-04		STATUS WORD 4:					03-03
	PB3TSWA	BATT 3 THML SW E/D STATUS A RSET/SET	S--0	96,51	1		
	PIMBUSB	INSTRUMENT MODULE BUS B DISAB/ENAB	S--1	96,51	1		
	PSHMCMD	SAFE MODE COMMAND SENT/NORMAL	S--2	96,51	1		
	PCMONA	COMPUTER MON E/D STATUS A RSET/SET	S--3	96,51	1		
	POBCTIM	COMPUTER TIMER FAILURE/NORMAL	S--4	96,51	1		
	PPDARMA	INSTR FUSE/PD R-D RIU A DISARMED/ARMED	S--5	96,51	1		
	P4TARMA	HTR RLY DVR RIU A DISARMED/ARMED	S--6	96,51	1		
		NOT USED	S--7	96,51	1		
MPS-05		STATUS WORD 5:					03-04
	PB3TSWB	BATT 3 THML SW E/D STATUS B RSET/SET	S--0	97,51	1		
	PB2TSWB	BATT 2 THML SW E/D STATUS B RSET/SET	S--1	97,51	1		
	PB1TSWB	BATT 1 THML SW E/D STATUS B RSET/SET	S--2	97,51	1		
	PTH2BPA	HTR B THMST BYPASS STATUS A RSET/SET	S--3	97,51	1		
	PTH1BPA	HTR A THMST BYPASS STATUS A RSET/SET	S--4	97,51	1		

LSD-WPC-007

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-27. MPS Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SCHL TYPE	MTX LOC COL,ROW	SMPL RATE	M	ADDRESS RIU-CH
	PAUHTRA	AUTO HTR ON/OFF STATUS A RSET/SET	S—5	97,51	1		
	PLD2PD	PD RELAY LOAD 2 CLOSED/OPEN	S—6	97,51	1		
	PLD1PD	PD RELAY LOAD 1 CLOSED/OPEN	S—7	97,51	1		
MPS-06		STATUS WORD 6:					03-05
	PCMONB	COMPUTER MON E/D STATUS B RSET/SET	S—0	98,51	1		
	PBCARMB	BATT CHG RLY DVR RIU B DISARMED/ARMED	S—1	98,51	1		
	PPDARMB	INSTR FUSE/PD R-D RIU B DISARMED/ARMED	S—2	98,51	1		
	PHTARMB	HTR RLY DVR RIU B DISARMED/ARMED	S—3	98,51	1		
		NOT USED	S4-7	98,51	1		
MPS-08	PTBAT1P	BATT 1 TEMP (PRIMARY)	PASS	96,20	1		03-29
MPS-09	PTBAT2P	BATT 2 TEMP (PRIMARY)	PASS	97,20	1		03-30
MPS-42	PTBAT1R	BATT 1 TEMP (REDUNDANT)	PASS	96,84	1		03-21
MPS-43	PTBAT2R	BATT 2 TEMP (REDUNDANT)	PASS	97,84	1		03-22
MPS-10	PTBCU1	PCU TEMP 1	PASS	96,19	1		03-25
MPS-11	PTBCU2	PCU TEMP 2	PASS	97,19	1		03-24
MPS-12	PTPCU3	PCU TEMP 3	PASS	98,19	1		03-20
MPS-13	PTBPA	BPA TEMP	PASS	96,27	1		03-26
MPS-14	PTSPRU	PRU TEMP	PASS	98,27	1		03-28
MPS-15	PTSCA	SCA TEMP	PASS	97,27	1		03-27
MPS-16	PTMPS1	MODULE TEMP 1	PASS	96,25	1		03-19
MPS-17	PTMPS2	MODULE TEMP 2	PASS	97,25	1		03-10
MPS-18	PTMPS3	MODULE TEMP 3	PASS	98,55	1		03-17
MPS-19	PTMPS4	MODULE TEMP 4	PASS	96,26	1		03-16
MPS-20	PVBAT1	BATT 1 VOLTAGE	ALOG	96,28	1		03-32
MPS-21	PVBAT2	BATT 2 VOLTAGE	ALOG	96,29	1		03-33
MPS-22	PVLB	LOAD BUS VOLTAGE	ALOG	97,26	1		03-35
MPS-23	PV3RDE1	BATT 1 3RD ELECTRODE VOLTAGE	ALOG	97,28	1		03-45
MPS-24	PV3RDE2	BATT 2 3RD ELECTRODE VOLTAGE	ALOG	97,29	1		03-44
MPS-25	PVDIFB1	BATT 1 DIFFERENTIAL VOLTAGE	ALOG	98,28	1		03-42
MPS-26	PVDIFB2	BATT 2 DIFFERENTIAL VOLTAGE	ALOG	98,29	1		03-41
MPS-27	PVSCACA	SCA DC/DC CONV A VOLTAGE	ALOG	97,18	1		03-56
MPS-28	PVSCACB	SCA DC/DC CONV B VOLTAGE	ALOG	98,18	1		03-48
MPS-29	PIB1HI	BATT 1 HIGH CURRENT	ALOG	16,0	128		03-52
MPS-31	PIB1LO	BATT 1 LOW CURRENT	ALOG	96,14	1		03-55
MPS-30	PIB2HI	BATT 2 HIGH CURRENT	ALOG	15,0	128		03-51
MPS-32	PIB2LO	BATT 2 LOW CURRENT	ALOG	97,14	1		03-54
MPS-33	PISA1	CS 1 ARRAY/GND PWR CURRENT	ALOG	97,52	2		03-57
MPS-34	PISA2	CS 2 ARRAY/GND PWR CURRENT	ALOG	98,52	2		03-63
MPS-41	PVSA	SOLAR ARRAY BUS VOLTAGE	ALOG	96,52	2		03-36
MPS-35	PIIMLO	INSTRUMENTS LOW CURRENT	ALOG	96,21	4		C3-61
				59	128	8	
MPS-36	PIIMHI	INSTRUMENTS HIGH CURRENT	ALOG	98,64	1		03-62

LSD-WPC-007

ORIGINAL PAGE IS
OF POOR QUALITY

LSD-WPC-007

Table 2-27. MPS Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SGNL TYPE	MTX LOC COL,ROW	SMPL RATE	M	ADDRESS RIU-CH
				60	128	8	
	PBIMSB1	RIU 03 MATE STANDBY 1/OFF	B--1	98,56	1		03-09
MPS-37	PIACS	MACS, PM CURRENT	ALOG	98,05	4		03-58
				63	128	8	
	PRIBAON	RIU 03 B ON/A ON	B--0	98,56	1		03-08
MPS-38	PICDH	C&DH CURRENT	ALOG	96,22	4		03-59
				61	128	8	
MPS-39	PISCCU	SC&CU, MPS CURRENT	ALOG	97,22	4		03-60
				62	128	8	
MPS-40	PITL1	TOTAL LOAD CURRENT	ALOG	7	128		03-49
	PITL2	TOTAL LOAD CURRENT 2		39	128		
	PITL3	TOTAL LOAD CURRENT 3		71	128		
	PITL4	TOTAL LOAD CURRENT 4		103	128		
MPS-44	PTBAT3P	BATT 3 TEMP (PRIMARY)	PASS	98,38	1		03-31
MPS-45	PTBAT3R	BATT 3 TEMP (REDUNDANT)	PASS	98,102	1		03-23
MPS-46	PVBAT3	BATT 3 VOLTAGE	ALOG	96,30	1		03-34
MPS-47	PV3RDE3	BATT 3 3RD ELECTRODE VOLTAGE	ALOG	97,30	1		03-43
MPS-48	PVDIFB3	BATT 3 DIFFERENTIAL VOLTAGE	ALOG	98,30	1		03-40
MPS-49	PIB3HI	BATT 3 HIGH CURRENT	ALOG	14	128		03-50
MPS-50	PIB3LO	BATT 3 LOW CURRENT	ALOG	98,14	1		03-53
	PSTAT01	MPS STATUS WORD 1	ALOG	96,50			
	PSTAT02	MPS STATUS WORD 2	ALOG	97,50			
	PSTAT03	MPS STATUS WORD 3	ALOG	98,50			
	PSTAT04	MPS STATUS WORD 4	ALOG	96,51			
	PSTAT05	MPS STATUS WORD 5	ALOG	97,51			
	PSTAT06	MPS STATUS WORD 6	ALOG	98,51			

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-28

SC&CU

SIGNAL CONDITIONING AND CONTROL UNIT

ORIGINAL PAGE IS
OF POOR QUALITY

LSD-WPC-007

Table 2-28. SC/CU Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SGNL TYPE	MTX LOC COL,ROW	SMPL RATE	M	ADDRESS RIU-CH
		PAYLOAD HEATER STATUS:					
SC/CU-01		NOT USED (DIGITAL 1)	SO-1	96,04	1		04-00
	USS1AHTR	USS HEATER 1 A ENA/DISA	S--2	96,04	1		
	USS1BHTR	USS HEATER 1 B ENA/DISA	S--3	96,04	1		
	USS1THT	USS HEATER 1 THERMOSTAT BYPASS/ENA	S--4	95,04	1		
	USPHTRA	DASB RAD PRIMARY HTR ENA/DISA	S--5	96,04	1		
	[illegible]HTRB	DASB RAD REDUNDANT HTR ENA/DISA	S--6	96,04	1		
	USBTHT	DASB RAD HTR THERMOSTAT BYPASS/ENA	S--7	96,04	1		
SC/CU-02		NOT USED (DIGITAL 1)	SO-1	97,04	1		04-01
	UTMMAHA	TM/MA PRIMARY HTR ENA/DISA	S--2	97,04	1		
	UTMMAHB	TM/MA REDUNDANT HTR ENA/DISA	S--3	97,04	1		
	UTMMATH	TM/MA HTR THERMOSTAT BYPASS/ENA	S--4	97,04	1		
	UMSAHTA	MSS I/F A PRIMARY HTR ENA/DISA	S--5	97,04	1		
	UMSAHTB	MSS I/F A REDUNDANT HTR ENA/DISA	S--6	97,04	1		
	UMSATHT	MSS I/F A HTR THERMOSTAT BYPASS/ENA	S--7	97,04	1		
SC/CU-03		NOT USED (DIGITAL 1)	SO-1	98,04	1		04-02
	UWBHTRA	WB MOD I/F PRIMARY HTR ENA/DISA	S--2	98,04	1		
	UWBHTRB	WB MOD I/F REDUNDANT HTR ENA/DISA	S--3	98,04	1		
	UWBTHT	WB MOD I/F HTR THERMOSTAT BYPASS/ENA	S--4	98,04	1		
	USS2AHTR	USS HEATER 2 A ENA/DISA	S--5	98,04	1		
	USS2BHTR	USS HEATER 2 B ENA/DISA	S--6	98,04	1		
	USS2THT	USS HEATER 2 THERMOSTAT BYPASS/ENA	S--7	98,04	1		
SC/CU-04		NOT USED (DIGITAL 1)	SO-1	96,71	1		04-04
	UTMHTR1	TM SAFEHOLD HTR 1 ENA/DISA	S--2	96,71	1		
	UTMHTR2	TM SAFEHOLD HTR 2 ENA/DISA	S--3	96,71	1		
	UTMTHT	TM S/H HTR THERMOSTAT BYPASS/ENA	S--4	96,71	1		
	UPL8AHTR	PAYLOAD HTR 8 PRIMARY ENA/DISA	S--5	96,71	1		
	UPL8BHTR	PAYLOAD HTR 8 REDUNDANT ENA/DISA	S--6	96,71	1		
	UPL8THT	PAYLOAD HTR 8 THERMOSTAT BYPASS/ENA	S--7	96,71	1		
		S/C HEATER STATUS:					
SC/CU-05		NOT USED (DIGITAL 1)	SO-1	97,71	1		04-05
	USCHTR1	S/C HEATER 1 ENA/DISA	S--2	97,71	1		
	USC1THT	S/C HEATER 1 THERMOSTAT BYPASS/ENA	S--3	97,71	1		
	USCHTR2	S/C HEATER 2 ENA/DISA	S--4	97,71	1		
	USC2THT	S/C HEATER 2 THERMOSTAT BYPASS/ENA	S--5	97,71	1		
	USCHTR3	S/C HEATER 3 ENA/DISA	S--6	97,71	1		
	USC3THT	S/C HEATER 3 THERMOSTAT BYPASS/ENA	S--7	97,71	1		
SC/CU-06		NOT USED (DIGITAL 1)	SO-1	98,71	1		04-06
	USCHTR4	S/C HEATER 4 ENA/DISA	S--2	98,71	1		
	USC4THT	S/C HEATER 4 THERMOSTAT BYPASS/ENA	S--3	98,71	1		
	USCHTR5	S/C HEATER 5 ENA/DISA	S--4	98,71	1		
	USC5THT	S/C HEATER 5 THERMOSTAT BYPASS/ENA	S--5	98,71	1		

ORIGINAL PAGE IS
OF POOR QUALITY

LSD-WPC-007

Table 2-28. SC/CU Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SGNL TYPE	MTX LOC COL,ROW	SMPL RATE	M	ADDRESS RIU-CH
	USCHTR6	S/C HEATER 6 ENA/DISA	S--6	98,71	1		
	USC6THT	S/C HEATER 6 THERMOSTAT BYPASS/ENA	S--7	98,71	1		
SC/CU-07		ANTENNA DEPLOY PYRO STATUS:					04-08
		NOT USED (DIGITAL 1)	S--0	96,125	1		
	UBDUMAS	UNPOWERED SIDE MASTER ARM-ARM/SAFE	S--1	96,125	1		
	UBDPMAS	POWERED SIDE MASTER ARM-ARM/SAFE	S--2	96,125	1		
	UBDBUNL	ANTENNA BOOM UNLATCH PYRO ARM/SAFE	S--3	96,125	1		
	UBDGIM1	GIMBAL LOCK RELEASE PYRO 1 ARM/SAFE*	S--4	96,125	1		
	UBDGIM2	GIMBAL LOCK RELEASE PYRO 2 ARM/SAFE*	S--5	96,125	1		
	UGIMLOK	GIMBAL LOCK RELEASE PYROS 1 & 2 ARM/SAFE (Landsat D Prime)	S--7	96,125	1		
	UBDPLUG	ARM PLUG CONTINUITY NO/YES	S--7	96,125	1		
SC/CU-08		ARRAY DEPLOY PYRO STATUS:					04-09
		NOT USED (DIGITAL 1)	S--0	97,125	1		
	UADUMAS	UNPOWERED SIDE MASTER ARM-ARM/SAFE	S--1	97,125	1		
	UADPMAS	POWERED SIDE MASTER ARM-ARM/SAFE	S--2	97,125	1		
	UADST1A	SET 1 PYROS 1A & 2B ARM/SAFE	S--3	97,125	1		
	UADST1B	SET 1 PYROS 2A & 1B ARM/SAFE	S--4	97,125	1		
	UADST2A	SET 2 PYROS 3A & 4B ARM/SAFE	S--5	97,125	1		
	UADST2B	SET 2 PYROS 4A & 3B ARM/SAFE	S--6	97,125	1		
	UADPLUG	ARM PLUG CONTINUITY NO/YES	S--7	97,125	1		
SC/CU-09		COMMANDABLE JETTISON PYRO STATUS:					04-10
		NOT USED (DIGITAL 1)	S--0	98,125	1		
	UBJUMAS	UNPOWERED SIDE MASTER ARM-ARM/SAFE	S--1	98,125	1		
	UBJPMAS	POWERED SIDE MASTER ARM-ARM/SAFE	S--2	98,125	1		
	UBJCCUT	GDA CABLE CUTTER PYRO ARM/SAFE	S--3	98,125	1		
	UBJPYRO	BOOM JETTISON PYRO ARM/SAFE	S--4	98,125	1		
	UBJSPR1	SPARE PYRO ARM/SAFE	S--5	98,125	1		
	UBJSPR2	SPARE PYRO ARM/SAFE	S--6	98,126	1		
	UBJPLUG	ARM PLUG CONTINUITY NO/YES	S--7	98,125	1		
SC/CU-10		BILEVEL WORD 01:					04-32
	UBOFFAON	SC&CU A ON/OFF	B--0	96,17	1		04-32
	UAOFFBON	SC&CU B ON/ OFF	B--1	96,17	1		04-33
	UASPYRED	A SIDE PYROS ENABLED/DISABLED	B--2	96,17	1		04-34
	UBSPYRED	B SIDE PYROS ENABLED/DISABLED	B--3	96,17	1		04-35
	UHTRAED	SC&CU HEATER A ENABLED/DISABLED	B--4	96,17	1		04-36
	UTHTABE	SC&CU THERMOSTAT A BYPASSED/ENABLED	B--5	96,17	1		04-37
	UHTRBED	SC&CU HEATER B ENABLED/DISABLED	B--6	96,17	1		04-38
	UTHTBBE	SC&CU THERMOSTAT B BYPASSED/ENABLED	B--7	96,17	1		04-39

*Landsat D Only

ORIGINAL PAGE IS
OF POOR QUALITY

LSD-WPC-007

Table 2-28. SC/CU Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SGNL TYPE	MTX LOC COL,ROW	SMPL RATE	M	ADDRESS RIU-CH
SC/CU-11		BILEVEL WORD 02:					04-40
	URIUSBA	RIU 04 B ON/A ON	B—0	96,18	1		04-40
	UMATENF	RIU 04 MATE STANDBY 1/OFF	B—1	96,18	1		04-41
SC/CU-12	UTSCCU	SC&CU TEMPERATURE	PASS	96,12	1		04-22
SC/CU-13	UT1HMS	SPACECRAFT STRUCTURE TEMP 1	PASS	96,48	1		04-16
SC/CU-14	UT2HMS	SPACECRAFT STRUCTURE TEMP 2	PASS	97,48	1		04-17
SC/CU-15	UT3HMS	SPACECRAFT STRUCTURE TEMP 3	PASS	98,48	1		04-18
SC/CU-16	UT4HMS	SPACECRAFT STRUCTURE TEMP 4	PASS	96,49	1		04-19
SC/CU-17	UT5HMS	SPACECRAFT STRUCTURE TEMP 5	PASS	97,49	1		04-20
SC/CU-18	UT6HMS	SPACECRAFT STRUCTURE TEMP 6	PASS	98,49	1		04-21
SC/CU-19	UTRIUA	RIU 04A TEMPERATURE	PASS	96,89	1		04-24
SC/CU-20	UTRIUB	RIU 04B TEMPERATURE	PASS	96,90	1		04-25
SC/CU-21	U5VAPWR	SC&CU +5 V A POWER	ALOG	98,15	1		04-42
SC/CU-22	U25VAPW	SC&CU +25 V A POWER	ALOG	98,79	1		04-43
SC/CU-23	U5VBPWR	SC&CU +5V B POWER	ALOG	97,46	1		04-44
SC/CU-24	U25VBPW	SC&CU +25 V B POWER	ALOG	96,94	1		04-45
	USTAT01	SC&CU STATUS WORD NO. 1	ALOG	96,4			
	USTAT02	SC&CU STATUS WORD NO. 2	ALOG	97,4			
	USTAT03	SC&CU STATUS WORD NO. 3	ALOG	98,4			
	USTAT04	SC&CU STATUS WORD NO. 4	ALOG	96,71			
	USTAT05	SC&CU STATUS WORD NO. 5	ALOG	97,71			
	USTAT06	SC&CU STATUS WORD NO. 6	ALOG	98,71			
	USTAT07	SC&CU STATUS WORD NO. 7	ALOG	96,125			
	USTAT08	SC&CU STATUS WORD NO. 8	ALOG	97,125			
	USTAT09	SC&CU STATUS WORD NO. 9	ALOG	98,125			
	USTAT10	SC&CU STATUS WORD NO. 10	ALOG	96,17			
	USTAT11	SC&CU STATUS WORD NO. 11	ALOG	96,18			

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-29

ESAM

EARTH SENSOR ASSEMBLY MODULE

ORIGINAL PAGE IS
OF POOR QUALITY

LSD-WPC-007

Table 2-29. ESAM Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SGNL TYPE	MTX LOC COL,ROW	SMPL RATE	M	ADDRESS RIU-CH
ESAM-01	EES1YF	ESA-1 PITCH FINE ERROR	ALOG	8	128		04-48
ESAM-05	EES2YF	ESA-2 PITCH FINE ERROR	ALOG	9	128		04-52
ESAM-02	EES1YC	ESA-1 PITCH COARSE ERROR	ALOG	40	128		04-49
ESAM-06	EES2YC	ESA-2 PITCH COARSE ERROR	ALOG	41	128		04-53
ESAM-03	EES1XF	ESA-1 ROLL FINE ERROR	ALOG	72	128		04-50
ESAM-07	EES2XF	ESA-2 ROLL FINE ERROR	ALOG	73	128		04-54
ESAM-04	EES1XC	ESA-1 ROLL COARSE ERROR	ALOG	104	128		04-51
ESAM-08	EES2XC	ESA-2 ROLL COARSE ERROR	ALOG	105	128		04-55
ESAM-09	EES1SIG	ESA-1 SIGNAL STATUS	ALOG	38	128		04-59
ESAM-10	EES2SIG	ESA-2 SIGNAL STATUS	ALOG	102	128		04-62
ESAM-11	EES1SEN	ESA-1 SENSOR STATUS	ALOG	99,06	4		04-57
ESAM-12	EES2SEN	ESA-2 SENSOR STATUS	ALOG	99,22	4		04-58
ESAM-13	EES1TMP	ESA-1 TEMPERATURE	ALOG	33,44	1		04-56
ESAM-14	EES2TMP	ESA-2 TEMPERATURE	ALOG	33,46	1		04-63
ESAM-15	EES1BTMP	ESA-1 BOLOMETER TEMPERATURE	ALOG	33,47	1		04-60
ESAM-16	EES2BTMP	ESA-2 BOLOMETER TEMPERATURE	ALOG	33,48	1		04-61

Table 2-30

PM

PROPULSION MODULE

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-30. PM Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SGNL TYPE	MTX LOC COL,ROW	SMPL RATE	M	ADDRESS RIU-CH
PM-01		BILEVEL WORD 01:					05-32
	ZMATENF	RIU 05 MATE STANDBY I/OFF	B—0	97,17	1		05-32
	ZRIUSBA	RIU 05 B ON/A ON	B—1	97,17	1		05-33
	ZRMAPRHT	REM A PRIMARY HEATER ON/OFF	B—3	97,17	1		05-35
	ZRMBPRHT	REM B PRIMARY HEATER ON/OFF	B—4	97,17	1		05-36
	ZRMCPRHT	REM C PRIMARY HEATER ON/OFF	B—5	97,17	1		05-37
	ZRMDPRHT	REM D PRIMARY HEATER ON/OFF	B—6	97,17	1		05-38
	ZSHFPRHT	SHELF PRIMARY HEATERS ON/OFF	B—7	97,17	1		05-39
PM-02		BILEVEL WORD 02:					05-40
	ZRMABUHT	REM A REDUNDANT HEATER ON/OFF	B—0	98,17	1		05-40
	ZRMBBUHT	REM B REDUNDANT HEATER ON/OFF	B—1	98,17	1		05-41
	ZRMCBUHT	REM C REDUNDANT HEATER ON/OFF	B—2	98,17	1		05-42
	ZRMDBUHT	REM D REDUNDANT HEATER ON/OFF	B—3	98,17	1		05-43
	ZSHFBUHT	SHELF REDUNDANT HEATERS ON/OFF	B—4	98,17	1		05-44
PM-03	ZTRMA1A3	REM A TEMP 1(PME-A),TEMP3(PME-B)	PASS	97,37	1		05-16
PM-04	ZTRMA2A4	REM A TEMP 2(PME-A),TEMP4(PME-B)	PASS	97,38	1		05-17
PM-05	ZTRMB1B3	REM B TEMP 1(PME-A),TEMP3(PME-B)	PASS	98,123	1		05-18
PM-06	ZTRMB2B4	REM B TEMP 2(PME-A),TEMP4(PME-B)	PASS	98,124	1		05-19
PM-07	ZTRMC1C3	REM C TEMP 1(PME-A),TEMP3(PME-B)	PASS	98,87	1		05-20
PM-08	ZTRMC2C4	REM C TEMP 2(PME-A),TEMP4(PME-B)	PASS	98,88	1		05-21
PM-09	ZTRMD1D3	REM D TEMP 1(PME-A),TEMP3(PME-B)	PASS	97,89	1		05-22
PM-10	ZTRMD2D4	REM D TEMP 2(PME-A),TEMP4(PME-B)	PASS	97,90	1		05-23
PM-11	ZTTANK1	TANK 1 TEMP	PASS	97,85	1		05-24
PM-12	ZTTANK2	TANK 2 TEMP	PASS	97,94	1		05-25
PM-13	ZTTANK3	TANK 3 TEMP	PASS	98,23	1		05-26
PM-14	ZTLV1LV4	L/V 1 TEMP (PME-A),L/V4 TEMP(PME-B)	PASS	98,24	1		05-27
PM-15	ZTLV2LV5	L/V 2 TEMP (PME-A),L/V5 TEMP(PME-B)	PASS	98,91	1		05-28
PM-16	ZTLV3LV6	L/V 3 TEMP (PME-A),L/V6 TEMP(PME-B)	PASS	98,92	1		05-29
PM-17	ZTBMCTR	BEAM TEMP CENTER(PME-A),PME(PME-B)	PASS	98,93	1		05-30
PM-18	ZTBMRMAB	BEAM TEMP REM A(PME-A),REM B(PME-B)	PASS	98,94	1		05-31
PM-19	ZFULPSI	FUEL TANK PRESSURE	ALOG	98,47	1		05-14
PM-20	ZHTRBUS	PRI/REDUND HTR BUS ENA/DISA	ALOG	97,117	1		05-34
PM-21	ZLVDVRS	PME A/B LATCH VALVE DRIVER ENA/DISA	ALOG	96,126	1		05-45
PM-22	ZLV123	LATCH VALVES 1,2,3 OPEN/CLOSED	ALOG	97,126	1		05-46
PM-23	ZLV456	LATCH VALVES 4,5,6 OPEN/CLOSED	ALOG	98,126	1		05-47
PM-24	ZEABATC	PME A/B ATT CONTROL ENA/DISA	ALOG	96,105	1		05-48
PM-25	ZEAPULS	PME A 40/100/280 MS PULSE SELECT	ALOG	98,112	1		05-49
PM-26	ZEBPULS	PME B 40/100/280 MS PULSE SELECT	ALOG	98,113	1		05-50
PM-27	ZACSDIR	ACS DIRECT CONTROL INPUTS ENA/DISA	ALOG	96,109	1		05-51
PM-28	ZEAPATC	PME A POS ATT CONT REM A/C ENA/DISA	ALOG	97,109	1		05-56
PM-29	ZEANATC	PME A NEG ATT CONT REM A/C ENA/DISA	ALOG	98,109	1		05-57
PM-30	ZEBPATC	PME B POS ATT CONT REM A/C ENA/DISA	ALOG	97,110	1		05-58

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-30. PM Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SGNL TYPE	MTX LOC COL,ROW	SMPL RATE	M	ADDRESS RIU-CH
PM-31	ZEBNATC	PME B NEG ATT CONT REM A/C ENA/DISA	ALOG	98,110	1		05-59
PM-32	ZEAPGEN	PME A POS ATT CONT TORQ PULSE GEN	ALOG	96,112	1		05-52
PM-33	ZEANGEN	PME A NEG ATT CONT TORQ PULSE GEN	ALOG	97,112	1		05-53
PM-34	ZEBPGEN	PME B POS ATT CONT TORQ PULSE GEN	ALOG	96,113	1		05-54
PM-35	ZEBNGEN	PME B NEG ATT CONT TORQ PULSE GEN	ALOG	97,113	1		05-55
PM-36	ZEABTRS	PME A/B TRANSLATION CONTROL ENA/DISA	ALOG	98,115	1		05-60
PM-37	ZEARMTC	PME A TR CONT REM A,C/B,D ENA/DISA	ALOG	96,114	1		05-61
PM-38	ZEBRMTC	PME B TR CONT REM A,C/B,D ENA/DISA	ALOG	>6,115	1		05-62
PM-39	ZRMACTA	REM A/C TRANSL CONT THRUSTERS ON/OFF	ALOG	97,114	1		05-12
				06	128	1	
PM-40	ZRMBD.C	REM B/D TRANSL CONT THRUSTERS ON/OFF	ALOG	97,115	1		05-13
				70	128	1	
PM-41	ZRMAATC	REM A ATT CONTROL THRUSTERS ON/OFF	ALOG	04	128		05-00
				68	128		
PM-42	ZRMCATC	REM C ATT CONTROL THRUSTERS ON/OFF	ALOG	36	128		05-01
				100	128		
PM-43	ZRMBATC	REM B ATT CONTROL THRUSTERS ON/OFF	ALOG	05	128		05-02
				69	128		
PM-44	ZRMDATC	REM D ATT CONTROL THRUSTERS ON/OFF	ALOG	37	128		05-03
				101	128		
PM-47	ZFULPSI	PM-1A TANK PRESSURE	ALOG	33,00	1		04-46 (Not used on LSD)
PM-45		PM-1A HEATER 1-4 STATUS:					04-03
		NOT USED (DIGITAL 1)	S--0	32,64	1		
		NOT USED (DIGITAL 1)	S--1	32,64	1		
	ZPRTKHT	PM-1A PRI TANK HTR ENA/DISA	S--2	32,64	1		
	ZPRLNHT	PM-1A PRI LINE HTR ENA/DISA	S--3	32,64	1		
	ZPRLNTH	PM-1A LINE HTR THMSTAT BYP/ENA	S--4	32,64	1		
	ZBUTKHT	PM-1A RED TANK HTR ENA/DISA	S--5	32,64	1		
	ZBULNHT	PM-1A RED LINE HTR ENA/DISA	S--6	32,64	1		
	ZBUTKTH	PM-1A TANK HTR THMSTAT BYP/ENA	S--7	32,64	1		
PM-46	Z1ALVCH	PM-1A LATCH VALVE G,H STATUS:					04-07 (Not used on LSD)
		NOT USED (DIGITAL 1)	S--0	32,77	1		
		UNPOWERED SIDE MASTER ARM-ARM/SAFE	S--1	32,77	1		
		POWERED SIDE MASTER ARM-ARM/SAFE	S--2	32,77	1		
	ZVLGOPN	PM-1A LTCH VALVE G OPEN ENA/DISA	S--3	32,77	1		
	ZLVGCLS	PM-1A LTCH VALVE G CLOSE ENA/DISA	S--4	32,77	1		
	ZLVHCLS	PM-1A LTCH VALVE H CLOSE ENA/DISA	S--5	32,77	1		
	ZLVHOPN	PM-1A LTCH VALVE H OPEN ENA/DISA	S--6	32,77	1		
	ZLVPLUG	ARM PLUG CONTINUITY NO/YES	S--7	32,77	1		
PM-48	ZT1ATNK	PM-1A TANK TEMPERATURE	PASS	96,64	1		04-26
PM-49	ZT1AFUL	PM-1A FUEL TEMPERATURE	PASS	97,64	1		04-27
PM-50	ZT1ALIN	PM-1A LINE TEMPERATURE	PASS	98,70	1		04-28

LSD-WPC-007

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-30. PM Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SGNL TYPE	MTX LOC COL,ROW	SMPL RATE	M	ADDRESS RIU-CH
PM-51		PM-1A LATCH VALVE STATUS	PASS	32,85	1		04-29 (Not used on LSD)
	ZSTAT01	PM BILEVEL WORD 1					
	ZSTAT02	PM BILEVEL WORD 2					
	Z1ASTAT1	PM-1A STATUS WORD 1					

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-31

WBCS

WIDELAND COMMUNICATIONS SUBSYSTEM

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-31. WBCS Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SGNL TYPE	MTX LOC COL,ROW	SMPL RATE	M	ADDRESS RIU-CH
WB-01		GDE PRIMARY SERIAL OUTPUT:					09-09
		WORD 1					
	WANTAZ01	GDA AZIM POS'N, DEGREED 0.0/0.0	S--0	96,01	4		
	WANTAZ02	GDA AZIM POS'N, DEGREES 0.0220/0.0	S--1	96,01	4		
	WANTAZ03	GDA AZIM POS'N, DEGREES 0.0439/0.0	S--2	96,01	4		
	WANTAZ04	GDA AZIM POS'N, DEGREES 0.0879/0.0	S--3	96,01	4		
	WANTAZ05	GDA AZIM POS'N, DEGREES 0.1758/0.0	S--4	96,01	4		
	WANTAZ06	GDA AZIM POS'N, DEGREES 0.3516/0.0	S--5	96,01	4		
	WANTAZ07	GDA AZIM POS'N, DEGREES 0.7031/0.0	S--6	96,01	4		
	WANTAZ08	GDA AZIM POS'N, DEGREES 1.4060/0.0	S--7	96,01	4		
		WORD 2					
	WANTAZ09	GDA AZIM POS'N, DEGREES 2.8130/0.0	S--0	97,01	4		
	WANTAZ10	GDA AZIM POS'N, DEGREES 5.6250/0.0	S--1	97,01	4		
	WANTAZ11	GDA AZIM POS'N, DEGREES 11.250/0.0	S--2	97,01	4		
	WANTAZ12	GDA AZIM POS'N, DEGREES 22.500/0.0	S--3	97,01	4		
	WANTAZ13	GDA AZIM POS'N, DEGREES 45.000/0.0	S--4	97,01	4		
	WANTAZ14	GDA AZIM POS'N, DEGREES 90.000/0.0	S--5	97,01	4		
	WANTAZ15	GDA AZIM POS'N, DEGREES 180.00/0.0	S--6	97,01	4		
	WANTAZ16	GDA AZIM POS'N, DEGREES 360/0.0	S--7	97,01	4		
		WORD 3					
	WANTEL01	GDA ELEV POS'N, DEGREES 0.0/0.0	S--0	98,01	4		
	WANTEL02	GDA ELEV POS'N, DEGREES 0.0/0.0	S--1	98,01	4		
	WANTEL03	GDA ELEV POS'N, DEGREES 0.0220/0.0	S--2	98,01	4		
	WANTEL04	GDA ELEV POS'N, DEGREES 0.0439/0.0	S--3	98,01	4		
	WANTEL05	GDA ELEV POS'N, DEGREES 0.0879/0.0	S--4	98,01	4		
	WANTEL06	GDA ELEV POS'N, DEGREES 0.1758/0.0	S--5	98,01	4		
	WANTEL07	GDA ELEV POS'N, DEGREES 0.3516/0.0	S--6	98,01	4		
	WANTEL08	GDA ELEV POS'N, DEGREES 0.7031/0.0	S--7	98,01	4		
		WORD 4					
	WANTEL09	GDA ELEV POS'N, DEGREES 1.4060/0.0	S--0	99,01	4		
	WANTEL10	GDA ELEV POS'N, DEGREES 2.8130/0.0	S--1	99,01	4		
	WANTEL11	GDA ELEV POS'N, DEGREES 5.6250/0.0	S--2	99,01	4		
	WANTEL12	GDA ELEV POS'N, DEGREES 11.250/0.0	S--3	99,01	4		
	WANTEL13	GDA ELEV POS'N, DEGREES 22.500/0.0	S--4	99,01	4		
	WANTEL14	GDA ELEV POS'N, DEGREES 45.000/0.0	S--5	99,01	4		
	WANTEL15	GDA ELEV POS'N, DEGREES 90.000/0.0	S--6	99,01	4		
	WANTEL16	GDA ELEV POS'N, DEGREES 180.00/0.0	S--7	99,01	4		
WB-02	WANTAZA	GDE REDUND SERIAL OUTPUT (WORD 1)	SO-7	96,03	4		09-73
	WANTAZB	GDE REDUND SERIAL OUTPUT (WORD 2)	SO-7	97,03	4		
	WANTELA	GDE REDUND SERIAL OUTPUT (WORD 3)	SO-7	98,03	4		
	WANTELB	GDE REDUND SERIAL OUTPUT (WORD 4)	SO-7	99,03	4		
WB-03		DSU PRIMARY STATUS:					09-08

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-31. WBCS Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SCNL TYPE	MTX LOC COL,ROW	SMPL RATE	M	ADDRESS RIU-CH
	WPKQTMMS	KU-BAND Q CHANNEL TM/MSS	S--0	98,13	1		
	WPKIPNTM	KU-BAND I CHANNEL 84PN/TM	S--1	98,13	1		
	WPKOFF	KU-BAND OFF/ON	S--2	98,13	1		
	WPXOFF	X-BAND OFF/ON	S--3	98,13	1		
	WPXQTMMS	X-BAND Q CHANNEL TM/MSS	S--4	98,13	1		
	WPXIPNTM	X-BAND I CHANNEL 84PN/TM	S--5	98,13	1		
	WPCMDENA	COMMAND ENA/DISA STATUS (11=ENABLE)	S6-7	98,13	1		
WB-04		DSU REDUNDANT STATUS:					09-72
	WRKQTMMS	KU-BAND Q CHANNEL TM/MSS	S--0	99,13	1		
	WRKIPNTM	KU-BAND I CHANNEL 84PN/TM	S--1	99,13	1		
	WRKOFF	KU-BAND OFF/ON	S--2	99,13	1		
	WRXOFF	X-BAND OFF/ON	S--3	99,13	1		
	WRXQTMMS	X-BAND Q CHANNEL TM/MSS	S--4	99,13	1		
	WRXIPNTM	X-BAND I CHANNEL 84PN/TM	S--5	99,13	1		
	WRCMDENA	COMMAND ENA/DIS STATUS (11=ENABLE)	S6-7	99,13	1		
WB-05		BILEVEL WORD 01:					09-32
	WPKUPCON	KU UP CONV PRIMARY ON/OFF	B--0	99,05	1		09-32
	WPKTWTA	KU TWTA PRIMARY ON/OFF	B--1	99,05	1		09-33
	WPATFRQ	AUTOTRACK FREQ SOURCE PRIMARY ON/OFF	B--2	99,05	1		09-34
	WPATDCON	AT DOWN CONV PRIMARY ON/OFF	B--3	99,05	1		09-35
	WPATCMB	AUTOTRACK COMBINER PRIMARY ON/OFF	B--4	99,05	1		09-36
	WPRFGDH	HEATERS PRIMARY RPC/GDA ON/OFF	B--5	99,05	1		09-37
	WPXTWTAH	HEATERS PRIMARY X-BAND TWTA ON/OFF	B--6	99,05	1		09-38
	WPWBMH	HEATERS PRIMARY WDM (PSU&GDE) ON/OFF	B--7	99,05	1		09-39
WB-06		BILEVEL WORD 02:					09-40
	WPLDCNAB	PSU PRIMARY LOADS TO PWR CONV A/B	B--0	99,12	1		09-40
	WPXTWTA	X BAND TWTA PRIMARY ON/OFF	B--1	99,12	1		09-41
	WRXMOD	X-BAND UQPSK MOD PRIMARY ON/OFF	B--2	99,12	1		09-42
	WPXFRQ	X-BAND FREQ SOURCE AMP PRI ON/OFF	B--3	99,12	1		09-43
	WPKFRQ	KU-BAND FREQ SOURCE AMP PRI ON/OFF	B--4	99,12	1		09-44
	WPKMOD	KU-BAND UQPSK MOD PRIMARY ON/OFF	B--5	99,12	1		09-45
	WPDSU	DSU PRIMARY ON/OFF	B--6	99,12	1		09-46
	WPATRCR	AUTOTRACK RCVR PRIMARY ON/OFF	B--7	99,12	1		09-47
WB-07		BILEVEL WORD 03:					09-48
	WPGRPE	GDE/RPE PRIMARY ON/OFF	B--0	99,29	1		09-48
	WPMOTBUS	GDE MOTOR DRIVE PRIME BUS PWR ON/OFF	B--1	99,29	1		09-49
	WPCMDPRC	PSU PRIMARY CMD PROC ON/OFF	B--2	99,29	1		09-50
	WPSAFEEN	PSU PRIMARY SAFEHOLD ENA/DISAB	B--3	99,29	1		09-51
	WKDATS3N	CX SW3 AT-DNCNV/ATR CABLE NORM/CROSS	B--4	99,29	1		09-52
	WFSKUS5N	CX SW5 FS/KU-UPCNV CABLE NORM/CROSS	B--5	99,29	1		09-53
	WKMKUS6N	CX SW6 UQPSK/KU-UPCN CABLE NORM/CROSS	B--6	99,29	1		09-54
	WPXWSEN	X WAVEGUIDE SWITCH PRIMARY ENA/DISAB	B--7	99,29	1		09-55

LSD-WPC-007

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-31. WBCS Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SGNL TYPE	MTX LOC COL,ROW	SMPL RATE	M	ADDRESS RIU-CH
WB-08		BILEVEL WORD 04:					09-56
	WKTWSPR	WG SWITCH 2 KU-TWTA PRIME/REDUNDANT	B--0	99,43	1		09-56
	WRIU9	RIU 09 B ON/A ON	B--1	99,43	1		09-57
	WPKFRQOV	KU FREQ SOURCE OSC/OVEN PRIMARY ON/OFF	B--2	99,43	1		09-58
	WCXWGXOR	COAX/WG SWITCH POSITION NORM/CROSS	B--3	99,43	1		09-59
	WPXFRQOV	X-FREQ SOURCE OSC/OVEN PRIMARY ON/OFF	B--4	99,43	1		09-60
	WXUFSS8N	CX SW8 X-UPCNV/X-TWTA CROSSED/NORM	B--5	9,43	1		09-61
	WPGMDE	GDE/MDE PRIMARY ON/OFF	B--6	99,43	1		09-62
WB-09		BILEVEL WORD 05:					09-96
	WRKUPCON	AT UP CONV REDUNDANT ON/OFF	B--0	99,61	1		09-96
	WRKTWTA	AT TWTA REDUNDANT ON/OFF	B--1	99,61	1		09-97
	WRATFRQ	AUTOTRACK FREQ SOURCE REDUNDANT ON/OFF	B--2	99,61	1		09-98
	WRKDNCON	AT DOWN CONV REDUNDANT ON/OFF	B--3	99,61	1		09-99
	WRATCMB	AUTOTRACK COMBINER REDUNDANT ON/OFF	B--4	99,61	1		09-100
	WRRFGDH	HEATERS REDUNDANT RFC/GDA ON/OFF	B--5	99,61	1		09-101
	WRXTWTAH	HEATERS REDUNDANT X-BAND TWTA ON/OFF	B--6	99,61	1		09-102
	WRWBMH	HEATERS REDUNDANT WBM (PSU&GDE) ON/OFF	B--7	99,61	1		09-103
WB-10		BILEVEL WORD 06:					09-104
	WRLDCNAB	PSU REDUND LOADS TO PWR CONV A/B	B--0	99,75	1		09-104
	WRXTWTA	X-BAND TWTA REDUNDANT ON/OFF	B--1	99,75	1		09-105
	WRXMOD	X-BAND UQPSK MOD REDUNDANT ON/OFF	B--2	99,75	1		09-106
	WRXFRQ	X-BAND FREQ SOURCE AMP RED ON/OFF	B--3	99,75	1		09-107
	WRKFRQ	KU-BAND FREQ SOURCE AMP RED ON/OFF	B--4	99,75	1		09-108
	WRKMOD	KU-BAND UQPSK MOD REDUNDANT ON/OFF	B--5	99,75	1		09-109
	WRDSU	DSU REDUNDANT ON/OFF	B--6	99,75	1		09-110
	WRATRCR	AUTOTRACK RCVR REDUNDANT ON/OFF	B--7	99,75	1		09-111
WB-11		BILEVEL WORD 07:					09-112
	WRGRPE	GDE/RPE REDUNDANT ON/OFF	B--0	99,80	1		09-112
	WRMOTBUS	GDE MOTOR DRIVE RED. BUS PWR ON/OFF	B--1	99,80	1		09-113
	WRCMDPRC	PSU REDUNDANT CMD PROC ON/OFF	B--2	99,80	1		09-114
	WRSAFEEN	PSU REDUNDANT SAFEHOLD ENABLE/DISAB	B--3	99,80	1		09-115
	WATKD34N	CX SW4 ATR/AT-DNCNV CABLE CROSS/NORM	B--4	99,80	1		09-116
	WKUFSS1N	CX SW1 KU-UPCNV/FS CABLE CROSS/NORM	B--5	99,80	1		09-117
	WKUKMS2N	CX SW2 KU-UPCV/UQPSK CABLE CROSS/NORM	B--6	99,80	1		09-118
	WRXWSEN	X WAVEGUIDE SWITCH REDUND ENABLE/DISAB	B--7	99,80	1		09-119
WB-58		BILEVEL WORD 08:					09-120
	WKDWSPR	WG SWITCH 1 KU-DNCNV PRIME/REDUNDANT	B--0	99,49	1		09-120
	WRIUMATE	RIU 09 MATE STANDBY 1/OFF	B--1	99,49	1		09-121
	WRKFRQOV	KU-FREQ SOURCE OSC/OVEN REDUNDANT ON/OFF	B--2	99,49	1		09-122
	WRXFRQOV	X-FREQ SOURCE OSC/OVEN REDUNDANT ON/OFF	B--4	99,49	1		09-124
	WFSXUS7N	CX SW7 X-FS/X-UPCNV LO CROSSED/NORM	B--5	99,49	1		09-125
	WRGMDE	GDE/MDE REDUNDANT ON/OFF	B--6	99,49	1		09-126

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-31. WBCS Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SCNL TYPE	MTX LOC COL,ROW	SMPL RATE	M	ADDRESS RIU-CH
WB-12	WRELMOTT	GDA ELEVATION MOTOR TEMP REDUNDANT	PASS	99,93	1		09-92
WB-13	WPAZMOTT	GDA AZIMUTH MOTOR TEMP PRIME	PASS	99,64	1		09-17
WB-14	WNRFEEDT	RFC PANEL(NEAR FEED) TEMP	PASS	99,76	1		09-29
WB-15	WKUDIPT	RFC KU DIPLEXER TEMP	PASS	99,68	1		09-30
WB-16	WSPARE1T	RFC SPARE TEMP 1	PASS	99,96	1		09-31
WB-17	WPKTWTBT	RFC KU-TWTA BASEPLATE TEMP PRIME	PASS	99,48	1		09-91
WB-18	WATFST	RFC AUTOTRACK FREQ SOURCE TEMP (+Y PANEL)	PASS	99,100	1		09-20
WB-19	WGDAMTT	RFC PANEL (GDA MOUNT) TEMP	PASS	99,107	1		09-21
WB-20	WKUPCONT	RFC KU UPCONVERTER TEMP	PASS	99,66	1		09-93
WB-21	WATCHBT	RFC KU AUTOTRACK FEED ASSY TEMP	PASS	99,69	1		09-94
WB-22	WSPARE2T	RFC SPARE TEMP 2	PASS	99,109	1		09-95
WB-23	WRKTWTBT	RFC KU-TWTA BASEPLATE TEMP RED.	PASS	99,98	1		09-19
WB-24	WTWTSIDT	WBM X-TWTA SIDE TEMP (-Y PANEL)	PASS	99,37	1		09-89
WB-25	WATDNCNT	RFC AT DOWNCONVERTER TEMP (+Y PANEL)	PASS	99,108	1		09-85
WB-26	WPXCOVT	WBM +X COVER TEMP	PASS	99,111	1		09-22
WB-27	WATRCVRT	WBM AUTOTRACK RCVR TEMP (-X PANEL)	PASS	99,32	1		09-23
WB-28	WPSUPYT	WBM PSU TEMP (+Y PANEL)	PASS	99,34	1		09-24
WB-29	WPXTWTAT	WBM X-TWTA BASEPLATE TEMP PRIME	PASS	99,101	1		09-84
WB-30	WPZPNLT	WBM +Z PANEL TEMP	PASS	99,44	1		09-26
WB-31	WKFST	WBM KU FREQ SOURCE TEMP (DSU;-X PANEL)	PASS	99,47	1		09-27
WB-32	WXFST	WBM X-BAND FREQ SOURCE TEMP (-X PANEL)	PASS	99,112	1		09-86
WB-33	WDSUMXT	WBM PCU/DSU TEMP (-X PANEL)	PASS	99,63	1		09-87
WB-34	WGDET	WBM GIMBAL DRIVE ELECTRONICS TEMP (+Y PNL)	PASS	99,77	1		09-88
WB-35	WRXTWTAT	WBM X-TWTA BASEPLATE TEMP RED.	PASS	99,36	1		09-25
WB-36	WPSKMODT	WBM UQPSK MODULATOR TEMP (-X PANEL)	PASS	99,45	1		09-90
WB-37	WKTWTAT	RFC KU-TWTA SIDE TEMP (-Y PANEL)	PASS	99,125	1		09-91
WB-38	WPELMOTT	GDA ELEVATION MOTOR TEMP PRIME	PASS	99,31	1		09-28
WB-39	WRAZMOTT	GDA AZIMUTH MOTOR TEMP REDUNDANT	PASS	99,95	1		09-81
WB-40	WRIU9AT	RIU 09A TEMP	PASS	99,04	1		09-18
WB-41	WRIU9BT	RIU 09B TEMP	PASS	99,127	1		09-82
WB-42	WPPWCONV	PWR CONV SEC VOLT MON, PRIMARY	ALOG	99,15	1		09-07
WB-43	WRPWCONV	PWR CONV SEC VOLT MON, REDUNDANT	ALOG	99,79	1		09-71
WB-44	WPKHELI	KU TWTA PRIMARY HELIX CURRENT	ALOG	99,09	1		09-00
WB-45	WRKHELI	KU TWTA REDUNDANT HELIX CURRENT	ALOG	99,10	1		09-64
WB-46	WPKBUSI	KU TWTA PRIMARY BUS CURRENT	ALOG	99,07	1		09-01
WB-47	WRKBUSI	KU TWTA REDUNDANT BUS CURRENT	ALOG	99,08	1		09-65
WB-48	WPXHELI	X TWTA PRIMARY HELIX CURRENT	ALOG	99,73	1		09-05
WB-49	WRXHELI	X TWTA REDUNDANT HELIX CURRENT	ALOG	99,74	1		09-69
WB-50	WPXBUSI	X TWTA PRIMARY BUS CURRENT	ALOG	99,71	1		09-06
WB-51	WRXBUSI	X TWTA REDUNDANT BUS CURRENT	ALOG	99,72	1		09-70
WB-52	WPATRSS	AUTOTRACK RCVR PRI SIGNAL STRENGTH	ALOG	99,27	4		09-04
WB-53	WRATRSS	AUTOTRACK RCVR RED SIGNAL STRENGTH	ALOG	99,28	4		09-68

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-31. WBCS Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SGNL TYPE	MTX LOC COL,ROW	SMPL RATE	M	ADDRESS RIU-CH
WB-54	WPATELER	AUTOTRACK RCVR PRIMARY ELEV ERROR	ALOG	99,23	4		09-02
WB-55	WRATELER	AUTOTRACK RCVR REDUNDANT ELEV ERROR	ALOG	99,24	4		09-66
WB-56	WPATAZER	AUTOTRACK RCVR PRIMARY AZIM ERROR	ALOG	99,25	4		09-03
WB-57	WRATAZER	AUTOTRACK RCVR REDUNDANT AZIM ERROR	ALOG	99,26	4		09-67

LSD-WPC-007

Table 2-32

TM

THEMATIC MAPPER

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-32. TM Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SGNL TYPE	MTX LOC COL,ROW	SMPL RATE	M	ADDRESS RIU-CH
TM-101	TWORDA	SERIAL WORD A:					
		NOT USED (DIGITAL 1 WHEN TM ON)	S--0	32,20	1		08-00
	TTHSDWN	THERMAL SHUTDOWN ENABLED/DISABLED	S--1	32,20	1		
	TSMA+ZST	SMA +Z HEATER CONTROLLER ON/OFF	S--2	32,20	1		
	TSMA-ZST	SMA -Z HEATER CONTROLLER ON/OFF	S--3	32,20	1		
	TSCRSTAT	SERIAL COMMAND RECEIVER 1 ON/OFF	S--4	32,20	1		
	TSHFZLKA	SHUTTER FUSIBLE LINK SWA CLOSED/OPEN	S--5	32,20	1		
	TSHFZLKB	SHUTTER FUSIBLE LINK SWB CLOSED/OPEN	S--6	32,20	1		
	TSHFZLKC	SHUTTER FUSIBLE LINK SWC CLOSED/OPEN	S--7	32,20	1		
TM-102	TWORDB	SERIAL WORD B:					
	TBDSTAT1	BAND 1 ON/OFF	S--0	32,21	1		08-01
	TBDSTAT2	BAND 2 ON/OFF	S--1	32,21	1		
	TBDSTAT3	BAND 3 ON/OFF	S--2	32,21	1		
	TBDSTAT4	BAND 4 ON/OFF	S--3	32,21	1		
	TBDSTAT5	BAND 5 ON/OFF	S--4	32,21	1		
	TBDSTAT6	BAND 6 ON/OFF	S--5	32,21	1		
	TBDSTAT7	BAND 7 ON/OFF	S--6	32,21	1		
	TCSTLMNF	COLD STAGE TELEMETRY ON/OFF	S--7	32,21	1		
TM-103	TWORDC	SERIAL WORD C:					
	TDOORCLS	COOLER DOOR CLOSED/OPEN	S--0	32,22	1		08-02
	TDOORGAS	COOLER DOOR POS'N OUTGAS/NOT OUTGAS	S--1	32,22	1		
	TDOOROPN	COOLER DOOR FULL OPEN/NOT FULL OPEN	S--2	32,22	1		
	TDOOREM	COOLER DOOR MAGNET ON/OFF	S--3	32,22	1		
	TDOORMTR	COOLER DOOR MOTOR ON/OFF	S--4	32,22	1		
	TDRFZLKA	COOLER DOOR FUS LINK SWA CLOSED/OPEN	S--5	32,22	1		
	TDRFZLKB	COOLER DOOR FUS LINK SWB CLOSED/OPEN	S--6	32,22	1		
	TDRFZLKC	COOLER DOOR FUS LINK SWC CLOSED/OPEN	S--7	32,22	1		
TM-104	TWORDD	SERIAL WORD D:					
	TLMPST1	CAL LAMP 1 ON/OFF	S--0	32,23	1		08-03
	TLMPST2	CAL LAMP 2 ON/OFF	S--1	32,23	1		
	TLMPST3	CAL LAMP 3 ON/OFF	S--2	32,23	1		
	TLMPOR1	CAL LAMP 1 OVERRIDE ON/OFF	S--3	32,23	1		
	TLMPOR2	CAL LAMP 2 OVERRIDE ON/OFF	S--4	32,23	1		
	TLMPOR3	CAL LAMP 3 OVERRIDE ON/OFF	S--5	32,23	1		
	TLMPSEQ	CAL SEQUENCER ON/OFF	S--6	32,23	1		
	TMUXMID	MULTIPLEXER ON/OFF (BACKUP)	S--7	32,23	1		
TM-105	TWORDE	SERIAL WORD E:					
	TIWSTAT	INCHWORM POWER ON/OFF	S--0	32,24	1		08-04
	TLVDTST	LVDT ON/OFF	S--1	32,24	1		
	TBBSET	BLACKBODY ON/OFF	S--2	32,24	1		
	TBBSET2	BLACKBODY T2 ON/OFF	S--3	32,24	1		
	TBBSET3	BLACKBODY T3 ON/OFF	S--4	32,24	1		

LSD-WPC-007

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-32. TM Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SCTL TYPE	MTX LOC COL,ROW	SMPL RATE	M	ADDRESS RIU-CH
	TBBBU	BLACKBODY BACKUP ON/OFF	S—5	32,24	1		
	TSME1NF	SME 1 ON/OFF	S—6	32,24	1		
	TSME2NF	SME 2 ON/OFF	S—7	32,24	1		
TM-106	TWORDF	SERIAL WORD F:					
	TBAFHTRC	BAFFLE HEATER CONTROLLER ON/OFF	S—0	32,25	1		08-05
	TBAFHTRB	BAFFLE HEATER BACKUP ON/OFF	S—1	32,25	1		
	TMCGASLP	MACRODISCRETE CMD GEN A PRI ON/OFF	S—2	32,25	1		
	TMCGASLR	MACRODISCRETE CMD GEN A RED ON/OFF	S—3	32,25	1		
	TMCGBSLP	MACRODISCRETE CMD GEN B PRI ON/OFF	S—4	32,25	1		
	TMCGBSLR	MACRODISCRETE CMD GEN B RED ON/OFF	S—5	32,25	1		
	TMUXPWR	MULTIPLEXER ON/OFF	S—6	32,25	1		
	WMSCAENA	MIDSCAN PULSE ON/OFF (PRIMARY)	S—7	32,25	1		
TM-107	TWORDG	SERIAL WORD G:					
	TSLCSEL1	SCAN LINE CORRECTOR 1 ON/OFF	S—0	32,26	1		08-06
	TSLCSEL2	SCAN LINE CORRECTOR 2 ON/OFF	S—1	32,26	1		
	TCALSHTR	CAL SHUTTER ON/OFF	S—2	32,26	1		
	TCALPHER	CAL SHUTTER PHASE ERROR YES/NO	S—3	32,26	1		
	TCALAMPER	CAL SHUTTER AMPLITUDE ERROR YES/NO	S—4	32,26	1		
	TBUSHTR	BACKUP SHUTTER ON/OFF	S—5	32,26	1		
	TBUPHERR	BACKUP SHUTTER PHASE ERROR YES/NO	S—6	32,26	1		
	TBUAMPER	BACKUP SHTR AMPLITUDE ERROR YES/NO	S—7	32,26	1		
TM-108	TWORDH	SERIAL WORD H:					
	TCSCNTLR	COLD STAGE HEATER CONTROLLER ON/OFF	S—0	32,27	1		08-07
	TCSOGPWR	COLD STAGE OUTGAS PWR ENABLED/DISAB	S—1	32,27	1		
	TISCNTLR	INTER STAGE HEATER CONTROL ON/OFF	S—2	32,27	1		
	TISCNTRL	INTER STAGE HEATER ENABLED/DISABLED	S—3	32,27	1		
	TCFPA	COLD FPA HEATER CONTROLLER ON/OFF	S—4	32,27	1		
	TCFPA2	COLD FPA T2 ON/OFF	S—5	32,27	1		
	TCFPA3	COLD FPA T3 ON/OFF	S—6	32,27	1		
	TCFPATLM	COLD FPA TELEMETRY ON/OFF	S—7	32,27	1		
TM-109	TWORDI	SERIAL WORD I:					
	TIWEXT	INCHWORM EXTEND ENABLED/DISABLED	S—0	32,28	1		08-08
	TIWENA3	INCHWORM 3 ENABLE/DISABLE	S—1	32,28	1		
	TIWENA2	INCHWORM 2 ENABLE/DISABLE	S—2	32,28	1		
	TIWENA1	INCHWORM 1 ENABLE/DISABLE	S—3	32,28	1		
	TCOOLDRM	COOLER DOOR MOVE/INHIBIT	S—4	32,28	1		
	TCOOLDRO	COOLER DOOR OPEN/CLOSE	S—5	32,28	1		
	TMSCBENA	MIDSCAN PULSE B ENABLE/DISABLE	S—6	32,28	1		
	TMSCAENA	MIDSCAN PULSE A ENABLE/DISABLE	S—7	32.28	1		
TM-110	TWORDJ	SERIAL WORD J:					
		NOT USED	S0-5	32,29	1		08-09
	TIWMOVE	INCHWORM MOVE/INHIBIT	S—6	32,29	1		

LSD-HPC-007

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-32. TM Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SGNL TYPE	MTX LOC COL,ROW	SMPL RATE	M	ADDRESS MIU-CH
	TIWCONT	INCHWORM CONTRACT ENABLED/DISABLED	S--7	32,29	1		
TM-112	TWORDL	SERIAL WORD L:					
	TDCRSTAT	DC RESTORE NORMAL/NOT NORMAL	S--0	32,30	1		08-11
	TDCRSEL	FRAME DC RESTORE SELECTED YES/NO	S--1	32,30	1		
	TTLMSCAL	TELEMETRY SCALING ON/OFF	S--2	32,30	1		
	TSMA+ZEN	SMA +Z HEATER ENABLED/DISABLED	S--3	32,30	1		
	TSMA-ZEN	SMA -Z HEATER ENABLED/DISABLED	S--4	32,30	1		
	TMIDSCNR	MIDSCAN PULSE ON (REDUNDANT)	S--5	32,30	1		
	TSAMSEL	SME 1/2 SELECT SAM OR MAGNETIC PICKUP	S--6	32,30	1		
		NOT USED (DIGITAL 1 WHEN TM ON)	S--7	32,30	1		
TM-111	TMSYNCK1	SERIAL WORD K:					
		SYNC NUMBER 1	SO-7	75,00	1	8	08-10
		PO-P1 ISB	SO-7	75,01	1	8	
		PO-P1 LSB	SO-7	75,02	1	8	
		P1-P2 ISB	SO-7	75,03	1	8	
		P1-P2 LSB	SO-7	75,04	1	8	
		A TQR ISB	SO-7	75,05	1	8	
		A TQR LSB	SO-7	75,06	1	8	
		FWD INTGR MSB	SO-7	75,07	1	8	
		FWD INTGR ISB	SO-7	75,08	1	8	
		FWD INTGR LSB	SO-7	75,09	1	8	
		P2-P3 ISB	SO-7	75,10	1	8	
		P2-P3 LSB	SO-7	75,11	1	8	
		PREV P3-P5 MSB	SO-7	75,12	1	8	
		PREV P3-P5 ISB	SO-7	75,13	1	8	
		PREV P3-P5 LSB	SO-7	75,14	1	8	
		STATUS	SO-7	75,15	1	8	
		SYNC NUMBER 2	SO-7	75,16	1	8	
		P3-P4 ISB	SO-7	75,17	1	8	
		P3-P4 LSB	SO-7	75,18	1	8	
		P4-P5 ISB	SO-7	75,19	1	8	
		P4-P5 LSB	SO-7	75,20	1	8	
		B TQR ISB	SO-7	75,21	1	8	
		B TQR LSB	SO-7	75,22	1	8	
		REV INTGR MSB	SO-7	75,23	1	8	
		REV INTGR ISB	SO-7	75,24	1	8	
		REV INTGR LSB	SO-7	75,25	1	8	
		P5-PO ISB	SO-7	75,26	1	8	
		P5-PO LSB	SO-7	75,27	1	8	
		PREV PO-P2 MSB	SO-7	75,28	1	8	
		PREV PO-P2 ISB	SO-7	75,29	1	8	
		PREV PO-P2 LSB	SO-7	75,30	1	8	

LSD-WPC-007

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-32. TM Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SGNL TYPE	MTX LOC COL,ROW	SMPL RATE	M	ADDRESS RIU-CH
		1/2 SCN COUNT	SO-7	75,31	1	8	
TM-71	TAOPAT	AMBIENT PREAMP TEMP (ODD)	PASS	32,90	1		07-80
TM-72	TCPAT	COLD PREAMP TEMP	PASS	32,91	1		07-88
TM-73	TROT	RELAY OPTICS TEMP	PASS	32,92	1		07-81
TM-74	TPST	POWER SUPPLY TEMP	PASS	32,83	1		06-90
TM-75	TB6PAT	BAND 6 POST AMP TEMP	PASS	32,94	1		06-91
TM-76	TMUXET	MUX ELECTRONICS TEMP	PASS	32,96	1		06-88
TM-77	TMUXPST	MUX POWER SUPPLY TEMP	PASS	32,97	1		06-89
TM-78	TLMPDRT	CAL LAMP DRIVE TEMP	PASS	32,95	1		06-92
TM-79	TPMT	PRIMARY MIRROR TEMP	PASS	32,98	1		07-89
TM-82	TSMMT	SECONDARY MIRROR MASK TEMP	PASS	32,99	1		06-90
TM-81	TSMT	SECONDARY MIRROR TEMP	PASS	32,100	1		06-93
TM-80	TPMMT	PRIMARY MIRROR MASK TEMP	PASS	32,101	1		07-94
TM-83	TAEPAT	AMBIENT PREAMP TEMP (EVEN)	PASS	32,102	1		07-82
TM-84	TTHT	TELESCOPE HOUSING TEMP	PASS	32,103	1		07-91
TM-85	TTBPT	TELESCOPE BASEPLATE TEMP	PASS	32,104	1		07-92
TM-86	TCALST	CAL SHUTTER TEMP	PASS	32,79	1		07-83
TM-87	TDWNSMT	SMA +Z HOUSING TEMP	PASS	32,105	1		06-80
TM-88	TUPSMT	SMA -Z HOUSING TEMP	PASS	32,106	1		06-81
TM-89	TSAMT	SCAN ANGLE MONITOR TEMP	PASS	32,111	1		06-82
TM-90	TSMAET	SMA ELECTRONICS TEMP	PASS	32,108	1		06-83
TM-91	TFWDSMT	SMA FLEX PIVOT +X TEMP	PASS	32,109	1		06-84
TM-92	TAFTSMT	SMA FLEX PIVOT -X TEMP	PASS	32,110	1		06-85
TM-93	TSST	SUNSHIELD TEMP	PASS	32,113	1		06-86
TM-94	TSLCT	SLC TEMP	PASS	32,112	1		07-84
				52	128	8	
TM-95	TLMPFT	CAL LAMP FILTERS TEMP	PASS	32,114	1		07-85
TM-96	TCAST	COOLER AMBIENT STAGE TEMP	PASS	32,115	1		07-93
TM-97	TCDT	COOLER DOOR TEMP	PASS	32,116	1		07-94
TM-100	TRFINT	+Y RADIATOR FIN TEMP	PASS	32,119	1		07-9[illegible]
TM-67	TCFPACT	CFPA CONTROL TEMP	ALOG	32,118	1		06-100
TM-59	TBBT	BLACKBODY TEMP	ALOG	32,74	1		06-72
				47	128	8	
TM-60	TSIFPT	SI FPA TEMP	ALOG	32,75	1		06-73
				48	128	8	
TM-61	TCALST	CALIBRATION SHUTTER TEMP	ALOG	32,78	1		06-74
				49	128	8	
TM-62	TBUST	BACKUP SHUTTER TEMP	ALOG	32,80	1		06-75
				50	128	8	
TM-63	TCSCT	COLD STAGE TEMP A (COLD)	ALOG	32,81	1		06-79
TM-64	TCSHT	COLD STAGE TEMP B (HOT)	ALOG	32,82	1		06-96
TM-65	TISCT	INTERMEDIATE STAGE TEMP A (COLD)	ALOG	32,83	1		06-97

LSD-WPC-007

ORIGINAL PAGE IS
OF POOR QUALITY

LSD-WPC-007

Table 2-32. TM Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SGNL TYPE	MTX LOC COL,ROW	SMPL RATE	M	ADDRESS RIU-CH
TM-66	TISHT	INTERMEDIATE STAGE TEMP B (HOT)	ALOG	32,84	1		06-98
TM-69	TBAFFT	BAFFLE TEMP	ALOG	32,87	1		06-76
				53	128	8	
TM-70	TCFPACT	COLD STAGE FPA TEMP	ALOG	32,89	1		06-99
				51	128	8	
TM-03	TM19VP	+19V	ALOG	32,15	1		06-66
TM-04	TM19VN	-19V	ALOG	32,16	1		06-67
TM-05	TM8V	+8V	ALOG	99,20	4		06-68
TM-08	TMLMPS	ALL CAL LAMPS ON	ALOG	32,17	1		06-102
TM-07	TM33V	+28 SHUTTER DRIVE VOLTAGE	ALOG	32,18	1		06-70
TM-06	TM80V	+80 HEATER VOLTAGE	ALOG	32,19	1		06-71
TM-09	TM119VP	BAND 1 +19V	ALOG	32,32	1		07-120
TM-10	TM119VN	BAND 1 -19V	ALOG	32,33	1		07-121
TM-11	TM219VP	BAND 2 +19V	ALOG	32,34	1		07-122
TM-12	TM219VN	BAND 2 -19V	ALOG	32,35	1		07-123
TM-13	TM319VP	BAND 3 +19V	ALOG	32,36	1		07-124
TM-14	TM319VN	BAND 3 -19V	ALOG	32,37	1		07-125
TM-15	TM419VP	BAND 4 +19V	ALOG	32,38	1		07-126
TM-16	TM419VN	BAND 4 -19V	ALOG	32,39	1		07-127
TM-17	TM519VP	BAND 5/7 +19V	ALOG	32,40	1		07-104
TM-18	TM519VN	BAND 5/7 -19V	ALOG	32,41	1		07-105
TM-19	TM619VP	BAND 6 +19V	ALOG	32,42	1		07-106
TM-20	TM619VN	BAND 6 -19V	ALOG	32,43	1		07-107
TM-21	TMIS19VP	ISO +19V	ALOG	32,44	1		07-108
TM-22	TMIS19VN	ISO -19V	ALOG	32,45	1		07-109
TM-23	TMUV9V	CDVU +8V	ALOG	99,21	4		07-110
TM-24	TM17V	PWR SUPPLY 1 SMA +6.8V	ALOG	32,55	1		06-104
TM-25	TM127VP	PWR SUPPLY 1 SMA +27V	ALOG	32,56	1		06-105
TM-26	TM127VN	PWR SUPPLY 1 SMA -27V	ALOG	32,57	1		06-106
TM-27	TM27V	PWR SUPPLY 2 SMA +6.8V	ALOG	32,58	1		06-107
TM-28	TM227VP	PWR SUPPLY 2 SMA +27V	ALOG	32,59	1		06-108
TM-29	TM227VN	PWR SUPPLY 2 SMA -27V	ALOG	32,60	1		06-109
TM-30	TMUX30V	MULTIPLEXER +30V	ALOG	32,48	1		06-110
TM-31	TMUXI	MULTIPLEXER INPUT CURRENT	ALOG	32,46	1		06-126
TM-32	TBITDEN	MULTIPLEXER BIT DENSITY	ALOG	32,47	1		06-120
TM-33	TMUX5VP	MULTIPLEXER +5V	ALOG	32,49	1		06-121
TM-34	TMUX18VP	MULTIPLEXER +18V	ALOG	32,51	1		06-122
TM-35	TMUX3VN	MULTIPLEXER -3V	ALOG	32,52	1		06-123
TM-36	TMUX5VN	MULTIPLEXER -5V	ALOG	32,53	1		06-124
TM-37	TMUX13VN	MULTIPLEXER -13V	ALOG	32,54	1		06-125
TM-38	TM1ADVR	BAND 1 A/D REFERENCE	ALOG	32,61	1		06-112
TM-39	TM2ADVR	BAND 2 A/D REFERENCE	ALOG	32,62	1		06-113

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-32. TM Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SGNL TYPE	MTX LOC COL,ROW	SMPL RATE	N	ADDRESS RIU-CH
TM-40	TM3ADVR	BAND 3 A/D REFERENCE	ALOG	32,65	1		06-114
TM-41	TM4ADVR	BAND 4 A/D REFERENCE	ALOG	32,66	1		06-115
TM-42	TM5ADVR	BAND 5 A/D REFERENCE	ALOG	32,68	1		06-116
TM-43	TM7ADVR	BAND 7 A/D REFERENCE	ALOG	32,70	1		06-117
TM-44	TMSLC1I	SLC 1 DRIVE CURRENT	ALOG	32,08	1		07-112
TM-45	TMSLC2I	SLC 2 DRIVE CURRENT	ALOG	32,09	1		07-113
TM-46	TSL115V	SLC 1 +/- 15V	ALOG	32,10	1		07-114
TM-48	TSL215V	SLC 2 +/- 15V	ALOG	32,11	1		07-116
TM-47	TSL15VP	SLC 1 +5V	ALOG	32,13	1		07-115
TM-49	TSL25VP	SLC 2 +5V	ALOG	32,14	1		07-117
TM-50	TMLMP1I	CALIBRATION LAMP 1 CURRENT	ALOG	32,12	1		08-12
				46	128	8	
TM-51	TMLMP2I	CALIBRATION LAMP 2 CURRENT	ALOG	32,31	1		08-13
				45	128	8	
TM-52	TMLMP3I	CALIBRATION LAMP 3 CURRENT	ALOG	32,50	1		08-14
				46	128	8	
TM-53	TBBHTRI	BLACKBODY CURRENT	ALOG	32,69	1		07-118
TM-54	TBFHTRI	BAFFLE HEATER CURRENT	ALOG	32,117	1		07-111
TM-68	TCFPAHI	CFPA HEATER CURRENT	ALOG	32,88	1		06-101
TM-55	TCSHTRI	COLD STAGE HEATER CURRENT	ALOG	32,107	1		08-15
TM-56	TIW1POS	INCHWORM 1 POSITION	ALOG	32,71	1		07-119
TM-57	TIW2POS	INCHWORM 2 POSITION	ALOG	32,72	1		07-86
TM-58	TIW3POS	INCHWORM 3 POSITION	ALOG	32,73	1		07-87
TM-01	TMPS1I	POWER SUPPLY 1 CURRENT	ALOG	99,18	4		06-64
TM-02	TMPS2I	POWER SUPPLY 2 CURRENT	ALOG	99,19	4		06-65

Table 2-33

MSS

MULTISPECTRAL SCANNER

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-33. MSS Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SGNL TYPE	MTX LOC COL,ROW	SMPL RATE	N	ADDRESS RIU-CH
MSS-01	MSSTAT01	BILEVEL WORD 706:					07-64
	MPSYSA	SYSTEM POWER A ON/OFF	B--1	96,00	1		07-65
	MPSYSB	SYSTEM POWER B ON/OFF	B--2	96,00	1		07-66
	MPROTSHD	ROTATING SHUTTER DRIVER ON/OFF	B--3	96,00	1		07-67
	MPCALLP	CAL LAMP (A OR B) ON/OFF	B--4	96,00	1		07-68
	MSCALLP	CAL LAMP A ON, B OFF/B ON, A OFF	B--5	96,00	1		07-69
	MSSHRMON	SHUTTER MONITOR A ON, B OFF/B ON, A OFF	B--6	96,00	1		07-70
	MSSCNMON	SCAN MONITOR A ON, B OFF/B ON, A OFF	B--7	96,00	1		07-71
MSS-02	MSSTAT02	BILEVEL WORD 801:					08-32
	MXSCMRIN	SCAN MIRROR INHIBIT/NORMAL	B--0	97,00	1		08-32
	MPSCNMON	SCAN MONITOR ON/OFF	B--1	97,00	1		08-33
	MPMUX	MUX ON/OFF	B--2	97,00	1		08-34
	MPSCMRL1	SCAN MIRROR POWER LINE 1 OFF/ON	B--3	97,00	1		08-35
	MPSCMRL2	SCAN MIRROR POWER LINE 2 OFF/ON	B--4	97,00	1		08-36
	MPSCMR	SCAN MIRROR POWER OFF/ON	B--5	97,00	1		08-37
	MSMUXCL	MUX COMPRESSED/LINEAR	B--6	97,00	1		08-38
	MSMSCODE	MIDSCAN CODE OFF/ON	B--7	97,00	1		08-39
MSS-03	MSSTAT03	BILEVEL WORD 802:					08-48
	MSBD1GHL	BAND 1 GAIN HIGH/LOW	B--0	98,00	1		08-48
	MSBD2GHL	BAND 2 GAIN HIGH/LOW	B--1	98,00	1		08-49
	MPBD1LV	BAND 1 LOW VOLTAGE ON/OFF	B--2	98,00	1		08-50
	MPBD2LV	BAND 2 LOW VOLTAGE ON/OFF	B--3	98,00	1		08-51
	MPBD3LV	BAND 3 LOW VOLTAGE ON/OFF	B--4	98,00	1		08-52
	MPBD4LV	BAND 4 LOW VOLTAGE ON/OFF	B--5	98,00	1		08-53
MSS-04	MSSTAT04	BILEVEL WORD 803:					08-120
	MPSYSHV	HIGH VOLTAGE ON/OFF	B--0	99,00	1		08-120
	MPBD1HVA	BAND 1 HIGH VOLTAGE A ON/OFF	B--1	99,00	1		08-121
	MPBD1HVB	BAND 1 HIGH VOLTAGE B ON/OFF	B--2	99,00	1		08-122
	MPBD2HVA	BAND 2 HIGH VOLTAGE A ON/OFF	B--3	99,00	1		08-123
	MPBD2HVB	BAND 2 HIGH VOLTAGE B ON/OFF	B--4	99,00	1		08-124
	MPBD3HVA	BAND 3 HIGH VOLTAGE A ON/OFF	B--5	99,00	1		08-125
	MPBD3HVB	BAND 3 HIGH VOLTAGE B ON/OFF	B--6	99,00	1		08-126
	MXSHRROT	SHUTTER ROTATING YES/NO	B--7	99,00	1		08-127
MSS-05	MTSCMRRG	SCAN MIRROR REGULATOR TEMP	PASS	33,06	1		08-17
MSS-06	MTSCMREL	SCAN MIRROR ELECTRONICS TEMP	PASS	33,07	1		08-18
MSS-07	MTSCMRCL	SCAN MIRROR COIL TEMP	PASS	33,08	1		08-19
MSS-08	MTSCMRHG	SCAN MIRROR HOUSING TEMP	PASS	33,09	1		08-20
MSS-09	MTMUX	MUX TEMP	PASS	33,10	1		08-21
MSS-10	MTRADPS	PWR SUPPLY TEMP (RADIOMETER)	PASS	33,11	1		08-22
MSS-11	MTELCVR	ELECTRONICS COVER TEMP (RADIOMETER)	PASS	33,12	1		08-23
MSS-12	MTPPS1	PRIMARY POWER SUPPLY 1 TEMP	PASS	33,13	1		08-80
MSS-13	MTPPS2	PRIMARY POWER SUPPLY 2 TEMP	PASS	33,14	1		08-81

LSD-WPC-007

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-33. MSS Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SCHL TYPE	MTX LOC COL,ROW	SMPL RATE	M	ADDRESS RIU-CH
MSS-14	MTFIBOP1	FIBER OPTICS TEMP 1	PASS	33,15	1		08-82
MSS-15	MTFIBOP2	FIBER OPTICS TEMP 2	PASS	33,16	1		08-83
MSS-16	MVBD1HVA	HV MONITOR BAND 1A	ALOG	33,17	1		08-112
MSS-17	MVBD1HVB	HV MONITOR BAND 1B	ALOG	33,18	1		08-113
MSS-18	MVBD2HVA	HV MONITOR BAND 2A	ALOG	33,19	1		08-114
MSS-19	MVBD2HVB	HV MONITOR BAND 2B	ALOG	33,20	1		08-115
MSS-20	MVBD3HVA	HV MONITOR BAND 3A	ALOG	33,21	1		08-116
MSS-21	MVBD3HVB	HV MONITOR BAND 3B	ALOG	33,22	1		08-117
MSS-22	MVBD1B15	BAND 1 +/- 15V REGULATOR	ALOG	33,23	1		08-40
MSS-23	MVBD2B15	BAND 2 +/- 15V REGULATOR	ALOG	33,24	1		08-41
MSS-24	MVBD3B15	BAND 3 +/- 15V REGULATOR	ALOG	33,25	1		08-42
MSS-25	MVBD4B15	BAND 4 +/- 15V REGULATOR	ALOG	33,26	1		08-43
MSS-26	MVP12N06	+12V/-6V REGULATOR	ALOG	33,27	1		08-45
MSS-27	MVRADB19	RADIOMETER +/- 19V	ALOG	33,29	1		08-47
MSS-28	MVRADP19	RADIOMETER +19V	ALOG	33,28	1		08-46
MSS-29	MVMUXP05	MUX +5V LOGIC MONITOR	ALOG	33,30	1		08-56
MSS-30	MVMUXAD	MUX A/D REFERENCE	ALOG	33,31	1		08-57
MSS-31	MXAVDATA	AVERAGE DATA DENSITY	ALOG	33,05	1		08-58
MSS-32	MVPS1N24	-24.5V PRIMARY POWER SUPPLY 1	ALOG	33,33	1		08-104
MSS-33	MVPS2N24	-24.5V PRIMARY POWER SUPPLY 2	ALOG	33,34	1		08-105
MSS-34	MVRADP05	+5V RADIOMETER POWER SUPPLY	ALOG	33,35	1		08-108
MSS-35	MXBD1CHA	BAND 1 CHANNEL A VIDEO	ALOG	33,39	1		08-96
MSS-41	MXBD2CHA	BAND 2 CHANNEL A VIDEO	ALOG	33,45	1		08-97
MSS-47	MXBD3CHA	BAND 3 CHANNEL A VIDEO	ALOG	33,51	1		08-98
MSS-53	MXBD4CHA	BAND 4 CHANNEL A VIDEO	ALOG	33,57	1		08-99
MSS-59	MIOPSWL1	OPTICAL SWITCH LAMP 1 CURRENT MON	ALOG	33,37	1		08-106
MSS-60	MIOPSWL2	OPTICAL SWITCH LAMP 2 CURRENT MON	ALOG	33,38	1		08-107
MSS-61	MVTLMP15	+15V TELEMETRY REGULATOR	ALOG	33,32	1		08-109
MSS-62	MICALLMP	CAL LAMP CURRENT	ALOG	33,36	1		08-110
MSS-63	MVSHRCTL	SHUTTER CONTROL INTEGRATOR	ALOG	33,01	1		08-111
MSS-64	MVSCMRDR	SCAN MIRROR DRIVE	ALOG	33,02	1		08-118
MSS-65	MVSCMRRG	SCAN MIRROR REGULATOR	ALOG	33,03	1		08-119

LSD-WPC-007

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-34

GPS

GLOBAL POSITIONING SYSTEM

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-34. GPS Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SGNL TYPE	MTX LOC COL,ROW	SMPL RATE	M	ADDRESS RIU-CH
RECEIVER/PROCESSOR ASSEMBLY							
GPS-01		GPS SERIAL DATA OUTPUT	SER	17	128		07-00
				18	128		
				19	128		
				20	128		
				21	128		
				22	128	8	
				23	128	8	
				24	128	8	
				25	128	8	
				26	128	8	
				27	128	8	
				28	128	8	
GPS-02	GPSTAT1	BILEVEL WORD 701:					07-08
	GDATRDY	DATA READY/NOT READY	B--0	10	128		07-08
				74	128	8	
	GCPRTLM	MODE STATUS COMPUTER/TELEMETRY	B--1	10	128		07-09
				74	128	8	
	GOVRFLO	OVERRUN (O/P BUFFER OVERFLOW YES/NO)	B--2	10	128		07-10
				74	128	8	
	GCMDPASS	COMMAND PASS FLAG	B--3	10	128		07-11
				74	128	8	
	GCMDFAIL	COMMAND FAIL FLAG	B--4	10	128		07-12
				74	128	8	
GPS-03	GPSSTAT2	BILEVEL WORD 702:					07-32
	GTIMERUN	TIME CODE GENERATOR RUN/SET	B--0	99,39	1		07-32
	GRPAON	R/PA POWER ON/OFF	B--1	99,39	1		07-33
	GMAPWRON	MAIN POWER ON/OFF	B--2	99,39	1		07-34
	GOSC1ON	OSCILLATOR 1 SELECT ON/OFF	B--3	99,39	1		07-35
	GOSC2ON	OSCILLATOR 2 SELECT ON/OFF	B--4	99,39	1		07-36
	GNAVCMD	R/PA MODE NAVIGATE/COMMAND	B--5	99,39	1		07-37
	GRECCMD	DMA READY/NOT READY TO RECEIVE SM CMD	B--6	99,39	1		07-38
	GXMTDA	DMA READY/NOT READY TO XMIT SER DATA	B--7	99,39	1		07-39
GPS-04	GPSSTAT3	BILEVEL WORD 703:					07-40
	GINIT	INITIALIZATION YES/NO	B--0	99,40	1		07-40
	GPROP	PROPAGATE YES/NO	B--1	99,40	1		07-41
	GCOLL	COLLECT ALMANAC MODE YES/NO	B--2	99,40	1		07-42
	GINVTR	INVALID TRANSITION/NORMAL OPERATION	B--3	99,40	1		07-43
	GDIAGERR	DIAGNOSTIC ERROR/NORMAL OPERATION	B--4	99,40	1		07-44
	GTSTERR	BUILT IN TEST ERROR/NORMAL OPERATION	B--5	99,40	1		07-45
	GNORFAIL	SET FAILURE/NORMAL OPERATION	B--6	99,40	1		07-46
GPS-05	GPSSTAT4	BILEVEL WORD 704:					07-48

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-34. GPS Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SGNL TYPE	MTX LOC COL,ROW	SMPL RATE	M	ADDRESS RIU-CH
	GMDEBIT1	R/PA MODE BIT 1	B--0	99,103	1		07-48
	GMDEBIT2	R/PA MODE BIT 2	B--1	99,103	1		07-49
	GMDEBIT3	R/PA MODE BIT 3	B--2	99,103	1		07-50
	GMDEBIT4	R/PA MODE BIT 4	B--3	99,103	1		07-51
	GRPAOP	R/PA OPERATIONAL MODE	B0-3				
		STANDBY	0000				
		SPARE	0001				
		LOAD	0010				
		PROPAGATE	0011				
		COMMAND	0100				
		GROUND	0101				
		CAL	0110				
		RECEIVER TEST	0111				
		SPACE (ST, P, ND)	1000				
		SPACE (ST,P,D)	1001				
		SPACE (ST,C/A,ND)	1010				
		SPACE (ST,C/A,D)	1011				
		SPACE (TTFF,P,ND)	1100				
		SPACE (TTFF,P,D)	1101				
		SPACE (TTFF,C/A,ND)	1110				
		SPACE (TTFF,C/A,D)	1111				
		(ST=SEQUENTIAL TRACK STATE)					
		(TTFF=TIME-TO-FIRST-FIX STATE)					
		(P=TRACKING P CODE)					
		(C/A=TRACKING C/A CODE)					
		(D=DATA DEMODULATION DWELL)					
		(ND=NON DATA DEMODULATION DWELL)					
	GSATBIT1	SATELLITE BIT 1	B--4	99,103	1		07-52
	GSATBIT2	SATELLITE BIT 2	B--5	99,103	1		07-53
		SATELLITES BEING TRACKED	B4-5				
		NONE OR 4	00				
		1	01				
		2	10				
		3	11				
GPS-06	GPSSTAT5	BILEVEL WORD 705:					07-56
	GRECCHA	RECEIVER CHANNEL A POWER ON/OFF	B--0	99,104	1		07-56
	GRECCHB	RECEIVER CHANNEL B POWER ON/OFF	B--1	99,104	1		07-57
	GRAM5V	RAM +5V STBY PWR BELOW 2.5V/NORMAL	B--2	99,104	1		07-58
	GCOSLKA	COSTAS LOCK CHAN A YES/NO	B--3	99,104	1		07-59
	GCOSLKB	COSTAS LOCK CHAN B YES/NO	B--4	99,104	1		07-60
	GCDSELA	CODER SELECT CHAN A P/CA	B--5	99,104	1		07-61
	GCDSELB	CODER SELECT CHAN B P/CA	B--6	99,104	1		07-62

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-34. GPS Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SGNL TYPE	MTX LOC COL,ROW	SMPL RATE	M	ADDRESS RIU-CH
GPS-07	GOSCOVNT	OSCILLATOR OVEN TEMP	PASS	33,72	1		07-17-03
GPS-08	GOSCOVNV	OSCILLATOR OVEN VOLTAGE	ALOG	33,71	1		07-64
GPS-09	GOSCREGV	EXTERNAL OSCILLATOR REG VOLTAGE	ALOG	33,73	1		07-15
GPS-10	GOSCCAST	EXTERNAL OSCILLATOR CASE TEMP	ALOG	33,74	1		07-14
GPS-11	GSTBY5V	R/PA POWER SUPPLY +5V (STANDBY)	ALOG	33,64	1		07-01
GPS-12	GSTBY12V	R/PA POWER SUPPLY +12V (STANDBY)	ALOG	33,65	1		07-02
GPS-13	GMPWR5V	R/PA POWER SUPPLY +5V	ALOG	33,66	1		07-03
GPS-14	GMPWR12V	R/PA POWER SUPPLY +12V (ANALOG)	ALOG	33,67	1		07-04
GPS-15	GCURRIN	R/PA POWER SUPPLY INPUT CURRENT	ALOG	33,68	1		07-05
GPS-16	GPWRSUPT	R/PA POWER SUPPLY TEMP	ALOG	33,69	1		07-06
GPS-17	GALOGMDT	R/PA ANALOG MODULE TEMP	ALOG	33,70	1		07-07
GPS-18	GPREAMPT	EXTERNAL PREAMP TEMP	ALOG	33,75	1		07-13

LSD-WPC-007

Table 2-35

PDU

POWER DISTRIBUTION UNIT

ORIGINAL PAGE IS
OF POOR QUALITY

LSD-WPC-007

Table 2-35. PDU Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SGNL TYPE	MTX LOC COL,ROW	SMPL RATE	M	ADDRESS RIU-CH
PDU-01		PDU SERIAL DATA:					
	YSADRT	SOLAR ARRAY DRIVE RATE	S0-1	96,11	1		06-01
				13,00	32	1	
		00 1H(0)					
		01 2H(0)					
		10 STOP					
		11 3H(0)					
	YLSDMOD	SAD MODE ORBIT/SAFEHOLD	S—2	96,11	1		
				13,00	32	1	
	YSADINH	SAD INHIBIT LOGIC ENABLED/DISABLED	S—3	96,11	1		
				13,00	32	1	
	YSAPOS	SOLAR ARRAY DEPLOYED/NOT DEPLOYED	S—4	96,11	1		
				13,00	32	1	
	YDPLINH	DEPLOY INHIBIT LOGIC ENABLED/DISABLED	S—5	96,11	1		
				13,00	32	1	
	YDPLRET	SA/LH RETRACT ALLOW/DISALLOW	S—6	96,11	1		
				13,00	32	1	
	YSADCTL	SAD RATES NOT CONTROLLING/CONTROLLING	S—7	96,11	1		
				13,00	32	1	
	YDPLDIR	DEPLOY MODE FORWARD/RETRACT	S—0	97,11	1		
				13,01	32	1	
	YDPLSTA	DEPLOY DRIVING/NOT DRIVING	S—1	97,11	1		
				13,01	32	1	
	YUHSEL	UPPER HINGE SELECTED/NOT SELECTED	S—2	97,11	1		
				13,01	32	1	
	YLHSEL	LOWER HINGE SELECTED/NOT SELECTED	S—3	97,11	1		
				13,01	32	1	
	YSAHSEL	ARRAY HINGE SELECTED/NOT SELECTED	S—4	97,11	1		
				13,01	32	1	
	YUHPOS	UPPER HINGE DEPLOYED/NOT DEPLOYED	S—5	97,11	1		
				13,01	32	1	
	YLHPOS	LOWER HINGE DEPLOYED/NOT DEPLOYED	S—6	97,11	1		
				13,01	32	1	
		DIGITAL 1 (FIXED)	S—7	97,11	1		
				13,01	32	1	
	YSHASTA	SAFEHOLD A DISABLED/ENABLED	S—0	98,11	1		
				13,02	32	1	
	YSHAACT	SAFEHOLD A ACTIVATE DISABLED/ENABLED	S—1	98,11	1		
				13,02	32	1	
	YSHACL	SAFEHOLD A CONTROLLING NO/YES	S—2	98,11	1		
				13,02	32	1	
	YACSAIN	SAFEHOLD A MACS SAFEHOLD SGNL YES/NO	S—3	98,11	1		

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-35. PDU Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SGNL TYPE	MTX LOC COL,ROW	SMPL RATE	N	ADDRESS RIU-CH
				13,02	32	1	
	YCSSART	SAFEHOLD A CSS SAD RATE CONTROL	S4-5	98,11	1		
				13,02	32	1	
		00 1W(0)					
		01 2W(0)					
		10 STOP					
		11 3W(0)					
	YSHAMOD	SAFEHOLD A EARTH SNSR/INERTIAL MODE	S--6	98,11	1		
				13,02	32	1	
	YIDXSGA	SAFEHOLD A AT INDEX POSITION NO/YES	S--7	98,11	1		
				13,02	32	1	
	YSHBSTA	SAFEHOLD B DISABLED/ENABLED	S--0	99,11	1		
				13,03	32	1	
	YSHBACT	SAFEHOLD B ACTIVATE DISABLED/ENABLED	S--1	99,11	1		
				13,03	32	1	
	YSHBCTL	SAFEHOLD B CONTROLLING NO/YES	S--2	99,11	1		
				13,03	32	1	
	YACSBIN	SAFEHOLD B MACS SAFEHOLD SGNL YES/NO	S--3	99,11	1		
				13,03	32	1	
	YCSSBRT	SAFEHOLD B CSS SAD RATE CONTROL	S4-5	99,11	1		
				13,03	32	1	
		00 1W(0)					
		01 2W(0)					
		10 STOP					
		11 3W(0)					
	YSHBMOD	SAFEHOLD B EARTH SNSR/INERTIAL MODE	S--6	99,11	1		
				13,03	32	1	
	YIDXSGB	SAFEHOLD B AT INDEX POSITION NO/YES	S--7	99,11	1		
				13,03	32	1	
PDU-02	YSTAT01	BILEVEL WORD 601:					06-08
	YTMAPWR	TM POWER A ENABLED/DISABLED	B--2	33,85	1		06-10
	YTMBPWR	TM POWER B ENABLED/DISABLED	B--3	33,85	1		06-11
	YMSAPWR	MSS POWER A ENABLED/DISABLED	B--4	33,85	1		06-12
	YMSBPWR	MSS POWER B ENABLED/DISABLED	B--5	33,85	1		06-13
	YSBAPWR	DASB POWER A ENABLED/DISABLED	B--6	33,85	1		06-14
	YSBBPWR	DASB POWER B ENABLED/DISABLED	B--7	33,85	1		06-15
PDU-03	YSTAT02	BILEVEL WORD 602:					06-32
	YGPSPWR	GPS POWER ENABLED/DISABLED	B--0	33,86	1		06-32
	YSMAHTR	TM SMA HEATER PWR ENABLED/DISABLED	B--1	33,86	1		06-33
	YFSBLNK	TM FSBL LINKS PWR ENABLED/DISABLED	B--2	33,86	1		06-34
	YMSHTB	MSS I/F B HEATER ENABLED/DISABLED	B--3	33,86	1		06-35
	YXSBYHT	TM EXT STANDBY HTR ENABLED/DISABLED	B--4	33,86	1		06-36

LSD-WPC-007

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-35. PDU Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SGNL TYPE	MTX LOC COL,ROW	SMPL RATE	M	ADDRESS RIU-CH
	YU3AHTR	USS HEATER 3A ENABLED/DISABLED	B--5	[illegible],86	1		06-37
	YU3BHTR	USS HEATER 3B ENABLED/DISABLED	B--6	33,86	1		06-38
	YHNGHTR	HINGE HEATERS ON/OFF	B--7	33,86	1		06-39
PDU-04		BILEVEL WORD 603:					06-40
	YPDUELE	PDU ELECTRONICS A/B SELECTED	B--0	78	128		06-40
	YSDAPWR	FORMATTER/ADSA POWER ON/OFF	B--1	78	128		06-41
	YDPUPWR	DPU FULL ON/STANDBY	B--2	78	128		06-42
	YSR2BUS	SPARE RELAY 2 BUS A/BUS B	B--3	78	128		06-43
	YTICTOC	SPARE RELAY 1 ON/OFF (TICK/TOCK)	B--4	78	128		06-44
	YSR2PWR	SPARE RELAY 2 ON/OFF	B--5	78	128		06-45
	YU3CBUS	USS HEATER 3C BUS A/BUS B	B--6	78	128		06-46
	YU3CHTR	USS HEATER 3C ENABLED/DISABLED	B--7	78	128		06-47
PDU-05	YSTAT04	BILEVEL WORD 604:					06-48
	YMDASTA	MOTOR DRIVE A (SAD/BOOM) ENAB/DISAB	B--0	33,88	1		06-48
	YMDBSTA	MOTOR DRIVE B (SAD/BOOM) ENAB/DISAB	B--1	33,88	1		06-49
	YSEGSW1	SEG SWITCH 1 GT 180/LT 180 DEGREES	B--2	33,88	1		06-50
	YSEGSW2	SEG SWITCH 2 GT 180/LT 180 DEGREES	B--3	33,88	1		06-51
	YELARIU	PDU A RIU A ON/OFF	B--4	33,88	1		06-52
	YELBRIU	PDU B RIU A ON/OFF	B--5	33,88	1		06-53
PDU-09	YVOLT5	+5V SUPPLY VOLTAGE	ALOG	33,63	1		06-05
PDU-10	YTM19V	TM 18V/20V MONITOR	ALOG	33,92	1		06-69
PDU-11	YSALOC1	SOLAR ARRAY POSITION NUMBER 1	ALOG	33,125	1		06,06
				83	128	1	
PSU-12	YSALOC2	SOLAR ARRAY POSITION NUMBER 2	ALOG	33,126	1		06-07
				88	128	1	
PDU-07	YTLOGIC	PDU LOGIC TEMPERATURE	PASS	33,90	1		06-17
PDU-06	YTPS	PDU PWR SUPPLY TEMPERATURE	PASS	33,89	1		06-19

LSD-WPC-007

Table 2-36

DPU

DIGITAL PROCESSING UNIT

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-36. DPU Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SGNL TYPE	MTX LOC COL,ROW	SMPL RATE	N	ADDRESS RIU-CH
DPU-01		TIME CODE DATA: (BCD EXCEPT TIME SOURCE)					
		TIME SOURCE (1110-LSD,1101-NOT LSD)	S0-3	32,00	1		06-00
	DTCDAYH	DAYS HUNDREDS	S4-7	32,00	1		
	DTCDAYT	DAYS TENS	S0-3	32,01	1		
	DTCDAYU	DAYS UNITS	S4-7	32,01	1		
	DTCHRT	HOURS TENS	S0-3	32,02	1		
	DTCHRU	HOURS UNITS	S4-7	32,02	1		
	DTCMINT	MINUTES TENS	S0-3	32,03	1		
	DTCMINU	MINUTES UNITS	S4-7	32,03	1		
	DTCSECT	SECONDS TENS	S0-3	32,04	1		
	DTCSECU	SECONDS UNITS	S4-7	32,04	1		
	DTCMSECH	MILLISECONDS HUNDREDS	S0-3	32,05	1		
	DTCMSECT	MILLISECONDS TENS	S4-7	32,05	1		
	DTCMSECU	MILLISECONDS UNITS	S0-3	32,06	1		
	DTCMSECF	MILLISECOND FRACTIONS (LSB-1/16 MS)	S4-7	32,06	1		
DPU-02		DPU STATUS:					
	DRIUSEL	RIU A/B SELECTED	S--0	32,07	1		
	DMSSTCR	MSS TIME CODE REQUEST YES/NO	S--1	32,07	1		
	DTMTCR	TM TIME CODE REQUEST YES/NO	S--2	32,07	1		
	DCDHTMT	C/DH-TM DATA TRANSFER YES/NO	S--3	32,07	1		
	DLDGTC	DPU LOADING TIME CODE YES/NO	S--4	32,07	1		
	DTCRGUP	TIME CODE REGISTER UPDATE YES/NO	S--5	32,07	1		
		NOT USED	S--6	32,07	1		
	DPUSEL	DPU A/B SELECTED	S--7	32,07	1		
DPU-03	DPUTEMP	PASS		32,76	1		08-24
DPU-05		BILEVEL WORD 604:					06-48
	DARIUA	DPU A RIU A ON/OFF	B--6	33,88	1		06-54
	DBRIUA	DPU B RIU A ON/OFF	B--7	33,88	1		06-55

Table 2-37

DASB (S-B)

DIRECT ACCESS S-BAND TRANSMITTERS

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-37. DASB Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SGNL TYPE	MTX LOC COL,ROW	SMPL RATE	M	ADDRESS RIU-CH
DASB-01	SBSTAT01	BILEVEL WORD 707:					07-72
	SXMTRAON	XMTR A POWER ON/OFF	B—0	33,76	1		07-72
	SXMTRBON	XMTR B POWER ON/OFF	B—1	33,76	1		07-73
	SANTAORB	S-B ANTENNA SELECT XMTRA/XMTR B	B—4	33,76	1		07-76
DASB-02	SAPWRSUP	XMTR A POWER SUPPLY MONITOR	ALOG	33,77	1		07-96
DASB-03	SBPWRSUP	XMTR B POWER SUPPLY MONITOR	ALOG	33,78	1		07-97
DASB-06	SAFWDPWR	XMTR A FORWARD RF POWER	ALOG	33,83	1		07-100
DASB-07	SBFWDPWR	XMTR B FORWARD RF POWER	ALOG	33,84	1		07-101
DASB-08	SAREFPWR	XMTR A REFLECTED RF POWER	ALOG	33,81	1		07-98
DASB-09	SBREFPWR	XMTR B REFLECTED RF POWER	ALOG	33,82	1		07-99
DASB-04	SAPAT	XMTR A POWER AMP TEMP	PASS	33,79	1		07-18
DASB-05	SABAT	XMTR B POWER AMP TEMP	PASS	33,80	1		07-19

LSD-WPC-007

Table 2-38
THERMAL
SUBSYSTEM

ORIGINAL PAGE IS
OF POOR QUALITY

LSD-WPC-007

Table 2-38. Thermal Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SGNL TYPE	MTX LOC COL,ROW	SMPL RATE	M	ADDRESS RIU-CH
TH-01	QTTMAF1	TM ATTACH FITTING NUMBER 1 TEMP	PASS	32,63	1		06-20
TH-02	QTTMAF2	TM ATTACH FITTING NUMBER 2 TEMP	PASS	32,67	1		06-21
TH-03	QTTMAF3	TM ATTACH FITTING NUMBER 3 TEMP	PASS	32,120	1		06-22
TH-04	QTTMAF4	TM ATTACH FITTING NUMBER 4 TEMP	PASS	32,121	1		06-23
TH-05	QTAPXF1	APEX FITTING NUMBER 1 TEMP	PASS	32,122	1		06-24
TH-06	QTAPXF2	APEX FITTING NUMBER 2 TEMP	PASS	32,123	1		06-25
TH-07	QTAPXF3	APEX FITTING NUMBER 3 TEMP	PASS	32,124	1		06-26
TH-08	QTPDUIB	PDU MOUNTING PANEL (INBOARD) TEMP	PASS	32,125	1		06-28
TH-09	QTPDUOB	PDU MOUNTING PANEL (TOP OUTBOARD) TEMP	PASS	33,93	1		06-29
TH-10	QTRIU6I	RIU 06 MOUNTING PANEL (INBOARD) TEMP	PASS	33,94	1		06-30
TH-11	QTRIU6O	RIU 06 MOUNTING PANEL (OUTBOARD) TEMP	PASS	33,95	1		06-31
TH-12	QTRFCPO	RF COMBINER MTG PANEL (OUTBOARD) TEMP	PASS	33,96	1		06-27
TH-13	QTEQPP1	EQUIPMENT MTG PANEL NUMBER 1 TEMP (+Y)	PASS	33,97	1		08-26
TH-14	QTEQPP2	EQUIPMENT MTG PANEL NUMBER 2 TEMP (+Y)	PASS	33,98	1		08-27
TH-15	QTEQPP3	EQUIPMENT MTG PANEL NUMBER 3 TEMP (+Y)	PASS	33,99	1		08-28
TH-16	QTEQPP4	EQUIPMENT MTG PANEL NUMBER 4 TEMP (-Y)	PASS	33,100	1		08-29
TH-17	QTEQPP5	EQUIPMENT MTG PANEL NUMBER 5 TEMP (-Y)	PASS	33,101	1		08-30
TH-18	OTEQPP6	EQUIPMENT MTG PANEL NUMBER 6 TEMP (-Y)	PASS	33,102	1		08-31
TH-19	QTSBXP1	S-BAND TRANSMITTER PANEL TEMP NO. 1	PASS	33,103	1		07-20
TH-20	QTSBXP2	S-BAND TRANSMITTER PANEL TEMP NO 2	PASS	33,122	1		08-84
TH-21	QTYBKHD	-Y BULKHEAD (STATION 55) TEMP	PASS	33,104	1		07-23
TH-23	QTCWWB1	CLOSING WEB, WB MODULE NUMBER 1 TEMP	PASS	33,105	1		07-21
TH-24	QTCWWB2	CLOSING WEB, WB MODULE NUMBER 2 TEMP	PASS	33,106	1		07-22
TH-22	QTSADPL	SAD MOUNTING PANEL TEMP	PASS	33,124	1		07-31
TH-37	QTBJPYO	BOOM JETTISON PYRO BRACKET TEMP	PASS	32,126	1		08-100
TH-25	QTMSSMT	MSS MOUNT TEMP	PASS	33,107	1		08-85
TH-26	QTMSSW1	CLOSING WEB, MSS SENSOR TEMP NO 1	PASS	33,108	1		08-86
TH-27	QTMSSW2	CLOSING WEB,MSS SENSOR TEMP NO 2	PASS	33,109	1		08-87
TH-29	QTUBPWH	UPPER BOOM POWER HINGE TEMP	PASS	33,110	1		08-93
TH-31	WTLBPWHI	INNER LOWER BOOM POWER HINGE TEMP	PASS	33,111	1		08-94
TH-32	QTGPSAP	GPS PREAMPLIFIER TEMP	PASS	33,112	1		08-95
TH-33	QTPOSYK	+Y KEEL STRUCTURE TEMP	PASS	33,113	1		07-28
TH-34	QTNEGYK	-Y KEEL STRUCTURE TEMP	PASS	33,114	1		08-90
TH-35	QTBLF1	BOOM LATCHDOWN FITTING TEMP NO 1	PASS	33,115	1		07-30
TH-36	QTBLF2	BOOM LATCHDOWN FITTING TEMP NO 2	PASS	33,123	1		07-29
TH-28	QTLBPWHO	OUTER LOWER BOOM PWR HINGE TEMP	PASS	33,116	1		08-91
TH-30	QTUBIF	UPPER BOOM TEMP	PASS	33,117	1		08-92
TH-38	QTARRY1	ARRAY TEMP NUMBER 1	PASS	33,118	1		07-24
TH-39	QTARRY2	ARRAY TEMP NUMBER 2	PASS	33,119	1		07-25
TH-40	QTARRY3	ARRAY TEMP NUMBER 3	PASS	33,120	1		07-26
TH-41	QTARRY4	ARRAY TEMP NUMBER 4	PASS	33,121	1		07-27

C-3

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-39

OBC

ON BOARD COMPUTER

Table 2-39. OBC Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SCHL TYPE	MTX LOC COL,ROW	SMPL RATE	M	ADDRESS RIU-CH
OBC-01	OBCID	OBC DATA I.D. (REPORT NUMBER) COUNTER	SO-7	35,0	128		01-05
OBC-02		OBC DATA WORD 1	SER	91	128		
		OBC DATA WORD 2	SER	92	128		
		OBC DATA WORD 3	SER	93	128		
		OBC DATA WORD 4	SER	94	128		
		OBC DATA WORD 5	SER	95	128		
		OBC DATA WORD 6	SER	108	128		
		OBC DATA WORD 7	SER	109	128		
		OBC DATA WORD 8	SER	110	128		
		OBC DATA WORD 9	SER	111	128		
		OBC DATA WORD 10	SER	112	128		
		OBC DATA WORD 11	SER	113	128		
		OBC DATA WORD 12	SER	114	128		
		OBC DATA WORD 13	SER	115	128		
		OBC DATA WORD 14	SER	116	128		
		OBC DATA WORD 15	SER	117	128		
		OBC DATA WORD 16	SER	118	128		
		OBC DATA WORD 17	SER	119	128		
		OBC DATA WORD 18	SER	120	128		
		OBC DATA WORD 19	SER	121	128		
		OBC DATA WORD 20	SER	122	128		
		OBC DATA WORD 21	SER	123	128		
		OBC DATA WORD 22	SER	124	128		
		OBC DATA WORD 23	SER	125	128		
		OBC DATA WORD 24	SER	126	128		
		OBC DATA WORD 25	SER	127	128		

See Section 2.5 for an explanation of OBC telemetry reports.

See following pages for definition of the OBC data words.

* "Column" is shown here without reference to "row" because the data appears in <u>every</u> row.

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-39. OBC Telemetry List (Continued)

MINOR FRAME	ID OBC-01	OBC-02 (DATA WORDS 1 THROUGH 25) MNEMONIC	REPORT NAME	SMPL RATE	MINOR FRAME	ID OBC-01	OBC-02 (DATA WORDS 1 THROUGH 25) MNEMONIC	REPORT NAME	SMPL RATE
00	35	POT 01	SOLAR ARRAY POSITION REPORT	1	32	47	TMON 01	TELEMETRY MONITOR REPORT #1	1
01	36	SDP 01	SOLAR ARRAY DEPLOY REPORT	1	33	48	TMON 02	TELEMETRY MONITOR REPORT #2	1
02	45	SCPRPRT	STORED CMD PROCESSOR REPORT	1	34	49	TMON 03	TELEMETRY MONITOR REPORT #3	1
03					35	26	UFL 03	UPDATE FILTER REPORT #3	1
04					36	27	UFL 04	UPDATE FILTER REPORT #4	1
05					37				
06	38	ACS 13	ATTITUDE CONTROL REPORT #13	4	38	38	ACS 13	ATTITUDE CONTROL REPORT #13	4
07	39	EXECRPT1	FLIGHT EXECUTIVE REPORT	4	39	39	EXECRPT1	FLIGHT EXECUTIVE REPORT	4
08	1	ACS 01	ATTITUDE CONTROL REPORT #1	4	40	1	ACS 01	ATTITUDE CONTROL REPORT #1	4
09	2	ACS 02	ATTITUDE CONTROL REPORT #2	4	41	2	ACS 02	ATTITUDE CONTROL REPORT #2	4
10	3	ACS 03	ATTITUDE CONTROL REPORT #3	4	42	3	ACS 03	ATTITUDE CONTROL REPORT #3	4
11	4	ACS 04	ATTITUDE CONTROL REPORT #4	4	43	4	ACS 04	ATTITUDE CONTROL REPORT #4	4
12	5	ACS 05	ATTITUDE CONTROL REPORT #5	4	44	5	ACS 05	ATTITUDE CONTROL REPORT #5	4
13	6	ACS 06	ATTITUDE CONTROL REPORT #6	4	45	6	ACS 06	ATTITUDE CONTROL REPORT #6	4
14	7	ACS 07	ATTITUDE CONTROL REPORT #7	4	46	7	ACS 07	ATTITUDE CONTROL REPORT #7	4
15	12	ACS 12	ATTITUDE CONTROL REPORT #12	8	47	12	ACS 12	ATTITUDE CONTROL REPORT #12	8
16	13	EPH 01	EPHEMERIS REPORT #1	4	48	13	EPH 01	EPHEMERIS REPORT #1	4
17	14	EPH 02	EPHEMERIS REPORT #2	4	49	14	EPH 02	EPHEMERIS REPORT #2	4
18	15	EPH 03	EPHEMERIS REPORT #3	4	50	15	EPH 03	EPHEMERIS REPORT #3	4
19	20	ANT 01	TDRS ANT POINTING REPORT #1	4	51	20	ANT 01	TDRS ANT POINTING REPORT #1	4
20	21	ANT 02	TDRS ANT POINTING REPORT #2	4	52	21	ANT 02	TDRS ANT POINTING REPORT #2	4
21	22	ANT 03	TDRS ANT POINTING REPORT #3	4	53	22	ANT 03	TDRS ANT POINTING REPORT #3	4
22	23	ANT 04	TDRS ANT POINTING REPORT #4	4	54	23	ANT 04	TDRS ANT POINTING REPORT #4	4
23	8	ACS 08	ATTITUDE CONTROL REPORT #8	1	55	28	UFL 05	UPDATE FILTER REPORT #5	1
24	44	ANT 05	TDRS ANT POINTING REPORT #5	4	56	44	ANT 05	TDRS ANT POINTING REPORT #5	4
25					57				
26	9	ACS 09	ATTITUDE CONTROL REPORT #9	1	58	16	EPH 04	EPHEMERIS REPORT #4	1
27	10	ACS 10	ATTITUDE CONTROL REPORT #10	1	59	17	EPH 05	EPHEMERIS REPORT #5	1
28	24	UFL 01	UPDATE FILTER REPORT #1	1	60	18	EPH 06	EPHEMERIS REPORT #6	1
29	25	UFL 02	UPDATE FILTER REPORT #2	1	61	19	EPH 07	EPHEMERIS REPORT #7	1
30	11	ACS 11	ATTITUDE CONTROL REPORT #11	4	62	11	ACS 11	ATTITUDE CONTROL REPORT #11	4
31	12	ACS 12	ATTITUDE CONTROL REPORT #12	8	63	12	ACS 12	ATTITUDE CONTROL REPORT #12	8

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-39. OBC Telemetry List (Continued)

MINOR FRAME	ID OBC-01	OBC-02 (DATA WORDS 1 THROUGH 25) MNEMONIC	REPORT NAME	SMPL RATE	MINOR FRAME	ID OBC-01	OBC-02 (DATA WORDS 1 THROUGH 25) MNEMONIC	REPORT NAME	SMPL RATE
64	43	SEP 01	SOLAR EPHEMERIS REPORT	1	96	34	UFL 11	UPDATE FILTER REPORT #11	1
65	40	MMON 01	MEMORY MONITOR REPORT #1	1	97	37	GMT 01	GMT UPDATE REPORT	1
66	41	MMON 02	MEMORY MONITOR REPORT #2	1	98				
67	42	MMON 03	MEMORY MONITOR REPORT #3	1	99				
68	29	UFL 06	UPDATE FILTER REPORT #6	1	100				
69					101				
70	38	ACS 13	ATTITUDE CONTROL REPORT #13	4	102	38	ACS 13	ATTITUDE CONTROL REPORT #13	4
71	39	EXECRPT1	FLIGHT EXECUTIVE REPORT	4	103	39	EXECRPT1	FLIGHT EXECUTIVE REPORT	4
72	1	ACS 01	ATTITUDE CONTROL REPORT #1	4	104	1	ACS 01	ATTITUDE CONTROL REPORT #1	4
73	2	ACS 02	ATTITUDE CONTROL REPORT #2	4	105	2	ACS 02	ATTITUDE CONTROL REPORT #2	4
74	3	ACS 03	ATTITUDE CONTROL REPORT #3	4	106	3	ACS 03	ATTITUDE CONTROL REPORT #3	4
75	4	ACS 04	ATTITUDE CONTROL REPORT #4	4	107	4	ACS 04	ATTITUDE CONTROL REPORT #4	4
76	5	ACS 05	ATTITUDE CONTROL REPORT #5	4	108	5	ACS 05	ATTITUDE CONTROL REPORT #5	4
77	6	ACS 06	ATTITUDE CONTROL REPORT #6	4	109	6	ACS 06	ATTITUDE CONTROL REPORT #6	4
78	7	ACS 07	ATTITUDE CONTROL REPORT #7	4	110	7	ACS 07	ATTITUDE CONTROL REPORT #7	4
79	12	ACS 12	ATTITUDE CONTROL REPORT #12	8	111	12	ACS 12	ATTITUDE CONTROL REPORT #12	8
80	13	EPH 01	EPHEMERIS REPORT #1	4	112	13	EPH 01	EPHEMERIS REPORT #1	4
81	14	EPH 02	EPHEMERIS REPORT #2	4	113	14	EPH 02	EPHEMERIS REPORT #2	4
82	15	EPH 03	EPHEMERIS REPORT #3	4	154	15	EPH 03	EPHEMERIS REPORT #3	4
83	20	ANT 01	TDRS ANT POINTING REPORT #1	4	115	20	ANT 01	TDRS ANT POINTING REPORT #1	4
84	21	ANT 02	TDRS ANT POINTING REPORT #2	4	116	21	ANT 02	TDRS ANT POINTING REPORT #2	4
85	22	ANT 03	TDRS ANT POINTING REPORT #3	4	117	22	ANT 03	TDRS ANT POINTING REPORT #3	4
86	23	ANT 04	TDRS ANT POINTING REPORT #4	4	118	23	ANT 04	TDRS ANT POINTING REPORT #4	4
87					119				
88	44	ANT 05	TDRS ANT POINTING REPORT #5	4	120	44	ANT 05	TDRS ANT POINTING REPORT #5	4
89					121				
90	30	UFL 07	UPDATE FILTER REPORT #7	1	122				
91	31	UFL 08	UPDATE FILTER REPORT #8	1	123				
92	32	UFL 09	UPDATE FILTER REPORT #9	1	124				
93	33	UFL 10	UPDATE FILTER REPORT #10	1	125				
94	11	ACS 11	ATTITUDE CONTROL REPORT #11	4	126	11	ACS 11	ATTITUDE CONTROL REPORT #11	4
95	12	ACS 12	ATTITUDE CONTROL REPORT #12	8	127	'2	ACS 12	ATTITUDE CONTROL REPORT #12	8

LSD-WPC-007

Table 2-40

MISCELLANEOUS FUNCTIONS

ORIGINAL PAGE IS
OF POOR QUALITY

LSD-WPC-007

Table 2-40. Miscellaneous Functions Telemetry List

USER ID	ACRONYM	TLM FUNCTION DESCRIPTION	SGNL TYPE	MTX LOC COL,ROW	SMPL RATE	M	ADDRESS RIU-CU
PDU-02	YSTAT01	BILEVEL WORD 601:					06-08
	RIU6STAT	RIU 06 B ON/A ON	B—0	33,85	1		06-08
		RIU 06 MATE STANDBY 1/OFF	B—1	33,85	1		06-09
DASB-01	SBSTAT01	BILEVEL WORD 707:					07-72
	RIU7STAT	RIU 07 B ON/A ON	B—2	33,76	1		07-74
		RIU 07 MATE STANDBY 1/OFF	B—3	33,76	1		07-75
		SPACECRAFT ID BIT 2 (1)	B—6	33,76	1		07-78
		SPACECRAFT ID BIT 2 (0)	B—7	33,76	1		07-79
		B6-7 SPACECRAFT ID					
		00 NOT USED					
		01 LANDSAT D					
		10 LANDSAT D PRIME					
		11 NOT ASSIGNED					
MSS-03	MSSTAT03	BILEVEL WORD 802:					08-48
	RIU8STAT	RIU 08 B ON/A ON	B—6	98,00	1		08-54
		RIU 08 MATE STANDBY 1/OFF	B—7	98,00	1		08-55
IM RIU 6	RTRIU6	RIU 06 TEMP	PASS	99,17	1		06-16
IM RIU 7	RTRIU7	RIU 07 TEMP	PASS	99,81	1		07-16
IM RIU 8	RTRIU8	RIU 08 TEMP	PASS	99,113	1		08-16
ADS-01	XTADSA	ADS TEMP	PASS	33,91	1		06-18

Table 2-4

RIU 06, 07, 08

SPARE

TELEMETRY CHANNELS

ORIGINAL PAGE IS
OF POOR QUALITY

LSD-WPC-007

Table 2-41. Spare Telemetry Channels

USER ID	TLM FUNCTION DESCRIPTION	SGNL TYPE	MTX LOC COL,ROW	SMPL RATE	M	ADDRESS RIU-CH
	SPARE PDU OR DPU	SER				06-02
		ALOG				
	SPARE PDU OR DPU	SER				06-03
		ALOG				
	SPARE PDU OR DPU	SER				06-04
		ALOG				
	UNASSIGNED	PASS				06-19
	UNASSIGNED	ANY				06-56
	UNASSIGNED	ANY				06-57
	UNASSIGNED	ANY				06-58
	UNASSIGNED	ANY				06-59
	UNASSIGNED	ANY				06-60
	UNASSIGNED	ANY				06-61
	UNASSIGNED	ANY				06-62
	UNASSIGNED	ANY				06-63
	SPARE TM	ALOG*				06-77
	SPARE TM	ALOG*				06-78
	SPARE TM	PASS				06-87
	SPARE TM	PASS				06-95
	SPARE TM	ALOG*				06-103
	SPARE TM	ALOG*				06-111
	SPARE TM	ALOG*				06-118
	SPARE TM	ALOG*				06-119
	SPARE TM	ALOG*				06-127
GPS-04	SPARE GPS	B--7	99,40	1		07-47
GPS-05	SPARE GPS	B--6	99,103	1		07-54
GPS-05	SPARE GPS	B--7	99,103	1		07-55
GPS-06	SPARE GPS	B--7	99,104	1		07-63
DASB-01	UNASSIGNED	B--5	33,76	1		07-77
	SPARE DASB	ALOG*				07-102
	SPARE DASB	ALOG*				07-103
	SPARE MSS	ALOG*				08-44
	SPARE MSS	ALOG*				08-59
	SPARE MSS	ALOG*				08-60
	SPARE MSS	ALOG*				08-61
	SPARE MSS	ALOG*				08-62
	SPARE MSS	ALOG*				08-63
	UNASSIGNED	ANY				08-64
	UNASSIGNED	ANY				08-65
	UNASSIGNED	ANY				08-66
	UNASSIGNED	ANY				08-67
	UNASSIGNED	ANY				08-68

ORIGINAL PAGE IS
OF POOR QUALITY

LSD-WPC-007

Table 2-41. Spare Telemetry Channels

USER ID	TLM FUNCTION DESCRIPTION	SGNL TYPE	MTX LOC COL,ROW	SMPL RATE	M	ADDRESS RIU-CH
	UNASSIGNED	ANY				08-69
	UNASSIGNED	ANY				08-70
	UNASSIGNED	ANY				08-71
	UNASSIGNED	ANY				08-72
	UNASSIGNED	ANY				08-73
	UNASSIGNED	ANY				08-74
	UNASSIGNED	ANY				08-75
	UNASSIGNED	ANY				08-76
	UNASSIGNED	ANY				08-77
	UNASSIGNED	ANY				08-78
	UNASSIGNED	ANY				08-79
	SPARE (RESTRICTED TO BOOM TEMP)	PASS				08-88
	SPARE MSS	ALOG*				08-100
	SPARE MSS	ALOG*				08-101
	SPARE MSS	ALOG*				08-102
	SPARE MSS	ALOG*				08-103
	UNASSIGNED	PASS				08-25

2.5 OBC REPORTS

The Landsat-D telemetry is structured to allow the flight software to contribute a telemetry report in each minor frame. The Landsat D flight software will contribute 111 reports to each major frame of telemetry. This leaves 17 reports as a reserve for growth in the number of items contributed to telemetry by the OBC. Each report is 26 words long. The first word is output in column 35 of the telemetry matrix and gives the report number. The remaining words (words 0-24) are output in column 91-95 and 108-127. Table 2-42 provides minor frame number, report number (which will appear in column 35) and a functional identification of all of the OBC-TLM reports.

2.5.1 OBC TELEMETRY REPORT DESCRIPTION

Tables 2-43 to 2-66 show and define in detail the location and meaning or value of all the telemetered parameters. Following each group of OBC TLM Reports is that part of the flight software data dictionary defining those parameters. These tables are extracted from the Landsat-D Flight Software Design Document SVS-10130 and should be referred to for updates. The information provided is:

1. NAME: Symbolic Name of Parameter
2. DPROC: Defining Processor
3. TYPE: C = Constant, V = Variable, P = Parameter
4. UPROC/DUNITS: Processors using parameter/Display Units
5. TABLE: OBC-TLM Report Number
   Drop Leading 8 for Number

6.	ENTRY:	Word number in report where parameter starts
7.	LENGTH:	Precision in OBC Computation S = Single Precision D = Double Precision T = Triple Precision W = Word (8bit Flag/Counter)
8.	SCALE:	Scale of Parameter
9.	UNITS:	Units of OBC Computation
10.	VALUE:	Nominal Value of Parameter
11.	DEFINITION:	Explanation of parameter along with flag states if Flag

NOTE: The symbolic name of the parameter is preceeded by the letter "O" in the Ground Segment Data Base.

Glossary of Units

Name	Description
(R/S)2	(Radians/Seconds) ** 2
0/1	Binary Zero or Binary One
1/MS	1/Milliseconds
1/R*GA	1/(Radians * Gauss)
1/Rad	1/Radians
1/V*RD	1/(Volts * Radians)
1/VLT	1/Volts
CIR	Circles
CIR/CT	Circles/Count
CNT*-1	1/Count
CNT/RA	Counts/Radians
Counts	Counts
Cycles	Cycles
DE/CNT	Degrees/Count
DEG/FS	Degrees/Fullscale
Degree	Degree
GA/CNT	Gauss/Count
GAU*-1	1/Gauss
Gauss	Gauss
Gyrcts	Gyrocounts
KGM**1	Kilograms
KGM**2	Kilograms ** 2
KM/SEC	Kilometers/Second
M/MSEC	Meters/Millisecond
Meters	Meters
MG/CNT	Milligauss/Count
MSEC	Milliseconds
MTR**2	Meters ** 2
N.A.	Not Applicable
N.D.	Non Dimensioned
NMS*-1	1/(Newtons * Meters * Seconds)
NMS/CT	(Newtons * Meters * Seconds)/Counts
NMSEC	Newtons * Meters * Seconds
R*2/SE	(Radians ** 2)/Seconds
R/G*-2	Radians/(Gauss ** -2)
R/G*2	Radians/(Gauss ** 2)
R/S**2	Radians/(Seconds ** 2)
R/S/R	Radians/(Seconds/Radian)
R/V*-2	Radians/Radian
RAD**2	Radians ** 2
RAD*-1	1/Radians
RAD*-2	Radians ** -2
RAD*SE	Radians * Seconds

RAD/CT	Radians/Count
RAD/GA	Radians/Gauss
RAD/MS	Radians/Millisecond
PAD/SE	Radians/Second
PAD/V	Radians/Volt
RAD/V2	Radians/(Volt ** 2)
Radian	Radian
REV	Revolutions
REV/MS	Revolutions/Millisecond
RSEC*2	(Radians/Second) ** 2
Second	Secoud
US/M	Microseconds/Meter
VLT*-1	1/Volts
VLT*-2	Volts ** -2
Volts	Volts
Yes/No	Binary 0 or Binary 1

Knowing the scale and the number of bits telemetered the maximum range and least significant bit weight can be obtained by using the following equations:

Max Range = $(2^{N}-1)/(2^{N-S})$

LSB = $1/(2^{N-S})$

N = one less than number of bits telemetered

(i.e., 1 byte = 8 bits, N = 7)

S = binary scale of OBC data

As an example THETAX, the first two words of ACS Telemetry Report #1 has a scale of -5 and 2 bytes (16 bits) are present in telemetry. This provides S = -5 and N = 15 (2 bytes x 8 bits/byte - 1). Applying these to the equations above provides LSB weight of 9.54E-7 radians and a maximum range of ± 0.03125 radians. The format would be:

ORIGINAL PAGE IS
OF POOR QUALITY

	MSB 2^{-6} LSB 2^{-20}	SCALE -5
THETAX	SXXXXXXXXXXXXXXX	S = Sign Bit
		X = Data Bit
ACS TLM REP #1	WORD1 WORD 2	
LSB	S000000000000001	= 9.54 E-7 Rad
MAX RANGE	S111111111111111	= .03125 Rad

MS BYTE/MSB

Used in this section to mean Most Significant Byte. Parameters are calculated as single precision (18 bit), in double precision (36 bit) or triple precision (54 bit) words in the OBC. Telemetry words are one byte (8 bits) each, therefore, only the 1/2/3 Most Significant (MS) Byte(s) of the parameter may be inserted in telemetry.

LS BYTE/LSB

Used to mean Least Significant Byte. Unless otherwise noted the LS Byte is used as telemetry word.

Software Version

These OBC Telemetry Reports reflect version 19 (5/18/82) of the Landsat-D Flight Segment Software.

2.5.1.1 <u>OBC Telemetry Zero Reports</u>

Upon ground command OBC Telemetry reports may be reset to zero. An executive request code 13 command will zero the report designated in the operand. If the operand is 256 or greater the entire OBC contribution to telemetry will be set to zero.

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-42. OBC-TLM Report Sequence

Report # (Word 35)	Minor Frame Number	Mnemonic	Name
1	8, 40, 72, 104	ACS 01	Attitude Control Report #1
2	9, 41, 73, 105	ACS 02	Attitude Control Report #2
3	10, 42, 74, 106	ACS 03	Attitude Control Report #3
4	11, 43, 75, 107	ACS 04	Attitude Control Report #4
5	12, 44, 76, 108	ACS 05	Attitude Control Report #5
6	13, 45, 77, 109	ACS 06	Attitude Control Report #6
7	14, 46, 78, 110	ACS 07	Attitude Control Report #7
8	23	ACS 08	Attitude Control Report #8
9	26	ACS 09	Attitude Control Report #9
10	27	ACS 10	Attitude Control Report #10
11	30, 62, 94, 126	ACS 11	Attitude Control Report #11
12	15, 31, 47, 63 79, 95, 111, 127	ACS 12	Attitude Control Report #12
13	16, 48, 80, 112	EPH 01	Ephemeris Report #1
14	17, 49, 81, 113	EPH 02	Ephemeris Report #2
15	18, 50, 82, 114	EPH 03	Ephemeris Report #3
16	58	EPH 04	Ephemeris Report #4
17	59	EPH 05	Ephemeris Report #5
18	60	EPH 06	Ephemeris Report #6
19	61	EPH 07	Ephemeris Report #7
20	19, 51, 83, 115	ANT 01	TDRS Ant Pointing Report #1
21	20, 52, 84, 116	ANT 02	TDRS Ant Pointing Report #2
22	21, 53, 85, 117	ANT 03	TDRS Ant Pointing Report #3
23	22, 54, 86, 118	ANT 04	TDRS Ant Pointing Report #4
24	28	UFL 01	Update Filter Report #1
25	29	UFL 02	Update Filter Report #2
26	35	UFL 03	Update Filter Report #3
27	36	UFL 04	Update Filter Report #4
28	55	UFL 05	Update Filter Report #5
29	68	UFL 06	Update Filter Report #6
30	90	UFL 07	Update Filter Report #7
31	91	UFL 08	Update Filter Report #8
32	92	UFL 09	Update Filter Report #9
33	93	UFL 10	Update Filter Report #10
34	96	UFL 11	Update Filter Report #11

Table 2-42. OBC-TLM Report Sequence

Report # (Word 35)	Minor Frame Number	Mnemonic	Name
35	00	POT 01	SA Potentiometer Data Report #1
36	01	SDP 01	Solar Array Deploy Report
37	97	GMT 01	GMT Update Report
38	06, 38, 70, 102	ACS 13	Attitude Control Report #13
39	07, 39, 71, 103	EXECRPT 1	Flight Executive Report
40	65	MMON 01	Memory Monitor Report #1
41	66	MMON 02	Memory Monitor Report #2
42	67	MMON 03	Memory Monitor Report #3
43	64	SEP 01	Solar Ephermeris Report #1
44	24, 56, 88, 120	ANT 05	TDRS Ant Pointing Report #5
45	2	SCPRPRT	Stored Cmd Pointer Report
46	124	STBF 01	Status Buffer Report #1
47	32	TMO 01	Telemetry Monitor Report #1
48	33	TMO 02	Telemetry Monitor Report #2
49	34	TMO 03	Telemetry Monitor Report #3
50	125	STBF 02	Status Buffer Report #2

LSD-WPC-007

ORIGINAL PAGE IS
OF POOR QUALITY

TABLE 2-43

ACS OBC TELEMETRY REPORTS

ORIGINAL PAGE IS
OF POOR QUALITY

ACS TELEMETRY REPORT #1

Minor Frame Number: 8,40,72,104 **OBC Telemetry Report Number:** #1

Minor Frame word	91	92	93	94	95
ENTRY	0	1	2	3	4
Data	THETAX 2 MS BYTES*		THETAY 2 MS BYTES		THETAZ 2 MS BYTES

108	109	110	111	112
5	6	7	8	9
	NGX 3 MS BYTES			

113	114	115	116	117
10	11	12	13	14
NGY 3 MS BYTES		NGZ 3 MS BYTES		

118	119	120	121	122
15	16	17	18	19
NGXF 3 MS BYTES			NGYF 3 MS BYTES	

123	124	125	126	127
20	21	22	23	24
	NGZF 3 MS BYTES			NACS3

* 2 MOST SIGNIFICANT BYTES - CALCULATED IN OBC AS DOUBLE PRECISION (36 BIT) WORD - ONLY 2 MS BYTES TELEMETERED

ACS TELEMETRY REPORT #2

Minor Frame Number: 9,41,73,105 **OBC Telemetry Report Number:** 2

Minor Frame word	91	92	93	94	95
ENTRY	0	1	2	3	4
Data	WGX MSB	WGY MSB	WGZ MSB	WX MSB	WY MSB

Minor Frame word	108	109	110	111	112
ENTRY	5	6	7	8	9
Data	WZ MSB	EX 2 MS BYTES		EY 2 MS BYTES	

Minor Frame word	113	114	115	116	117
ENTRY	10	11	12	13	14
Data	EZ 2 MS BYTES		EPA 1 3 MS BYTES		

Minor Frame word	118	119	120	121	122
ENTRY	15	16	17	18	19
Data	EPA 2 3 MS BYTES			EPA 3 3 MS BYTES	

Minor Frame word	123	124	125	126	127
ENTRY	20	21	22	23	24
Data		EPA 4 3 MS BYTES			NHT

Epoch for EPA1,2,3,4 is TF

ORIGINAL PAGE IS
OF POOR QUALITY

ACS TELEMETRY REPORT #3

Minor Frame Number: 10,42,74,106 **OBC Telemetry Report Number:** 3

Minor Frame word	91	92	93	94	95
ENTRY	0	1	2	3	4
Data	EPD1 2 MS BYTES		EPD2 2 MS BYTES		EPD3 2 MS BYTES

Minor Frame word	108	109	110	111	112
ENTRY	5	6	7	8	9
Data		EPD4 2 MS BYTES		EPC1 3 MS BYTES	

Minor Frame word	113	114	115	116	117
ENTRY	10	11	12	13	14
Data		EPC2 3 MS BYTES			

Minor Frame word	118	119	120	121	122
ENTRY	15	16	17	18	19
Data	EPC3 3 MS BYTES		EPC4 3 MS BYTES		

Minor Frame word	123	124	125	126	127
ENTRY	20	21	22	23	24
Data	EIX 2 MS BYTES		EIY 2 MS BYTES		IACCMD

ORIGINAL PAGE IS
OF POOR QUALITY

ACS TELEMETRY REPORT #4

Minor Frame Number: 11,43,73,105 OBC Telemetry Report Number: 4

Minor Frame word	91	92	93	94	95
ENTRY	0	1	2	3	4
Data	EIZ 2 MS BYTES		EDIX 2 MS BYTES		EDIY 2 MS BYTES

108	109	110	111	112
5	6	7	8	9
	EDIZ 2 MS BYTES		TWX 2 MS BYTES	

113	114	115	116	117
10	11	12	13	14
TWY 2 MS BYTES		TWZ 2 MS BYTES		WEX MSB

118	119	120	121	122
15	16	17	18	19
WEY MSB	WEZ MSB	TTX MSB	TTY MSB	TTZ MSB

123	124	125	126	127
20	21	22	23	24
BIAS Y 2 MS BYTES		BIAS Z 2 MS BYTES		SKEW LSB

MSB = MOST SIGNIFICANT BYTE

ORIGINAL PAGE IS
OF POOR QUALITY

ACS TELEMETRY REPORT #5

Minor Frame Number: 12,44,76,108 **OBC Telemetry Report Number:** 5

Minor Frame word	91	92	93	94	95
ENTRY	0	1	2	3	4
Data	← SFEHLD →		EX1C MSB	EY1C MSB	EX2C MSB

108	109	110	111	112
5	6	7	8	9
EY2C MSB	EX1F MSB	EY1F MSB	EX2F MSB	EY2F MSB

113	114	115	116	117
10	11	12	13	14
NACS4	DELTNA MSB	DELTNE MSB	ITHUNLX MSB	ITHUNLY MSB

118	119	120	121	122
15	16	17	18	19
ITHUNLZ MSB	← XPC 2 MS BYTES →		← YPC 2 MS BYTES →	

123	124	125	126	127
20	21	22	23	24
← TWS 2 MS BYTES →		NACS5	TAMSTA	MTRAFLG

ACS TELEMETRY REPORT #6

Minor Frame Number: 13,45,77,109   OBC Telemetry Report Number: 6

Minor Frame word	91	92	93	94	95
ENTRY	0	1	2	3	4
Data	SYSMOX MSB	SYSPL MSB	SYSMOZ MSB	← NOMS1 →	

108	109	110	111	112
5	6	7	8	9
ELXIL MSB	TWXC MSB	ELYIL MSB	TWYC MSB	ELZIL MSB

113	114	115	116	117
10	11	12	13	14
TWZC MSB	FDC1PR LSB	FDC1Y LSB	FDC1PRF LSB	FDC1YF LSB

118	119	120	121	122
15	16	17	18	19
FDC2PR	FDC2Y	FDC2PRF	FDC2YF	XRATDIL

123	124	125	126	127
20	21	22	23	24
XRATDIL	ZRATDIL	FSTATE(1) PITCH LSB	FSTATE(2) ROLL LSB	SAFE1ST

ORIGINAL PAGE IS
OF POOR QUALITY

ACS TELEMETRY REPORT #7

Minor Frame Number: 14,46,78,110   OBC Telemetry Report Number: 7

Minor Frame word	91	92	93	94	95
ENTRY	0	1	2	3	4
Data	P1 MSB	P2 MSB	P3 MSB	WXC MSB	WYC MSB

Minor Frame word	108	109	110	111	112
ENTRY	5	6	7	8	9
Data	WZC MSB	PX MSB	PY MSB	PZ MSB	←NOMS2→

Minor Frame word	113	114	115	116	117
ENTRY	10	11	12	13	14
Data	→	← TACS 2 MS BYTES →		← WGDX1 2 MS BYTES →	

Minor Frame word	118	119	120	121	122
ENTRY	15	16	17	18	19
Data	← WGDX2 2 MS BYTES →		← WGDY1 2 MS BYTES →		←

Minor Frame word	123	124	125	126	127
ENTRY	20	21	22	23	24
Data	WGDY2 2 MS BYTES	← WGDZ1 2 MS BYTES →		← WGDZ2 2 MS BYTES →	

ORIGINAL PAGE IS
OF POOR QUALITY

ACS TELEMETRY REPORT #8

Minor Frame Number: 23 OBC Telemetry Report Number: 8

Minor Frame word	91	92	93	94	95
ENTRY	0	1	2	3	4
Data	MODE	XPOSDIL	XPOSDIL	SMODE 3	SMODE 4

Minor Frame word	108	109	110	111	112
ENTRY	5	6	7	8	9
Data	ESACNT	MAGULD	FLTROFF	ESASTA	MODE 41

Minor Frame word	113	114	115	116	117
ENTRY	10	11	12	13	14
Data	TIMUNLX	TIMUNLY	MODE 31	ECIATT	MODE 11

Minor Frame word	118	119	120	121	122
ENTRY	15	16	17	18	19
Data	EPHEMFL	FAILW	ICAL	NGXOVFL	NGYOVFL

Minor Frame word	123	124	125	126	127
ENTRY	20	21	22	23	24
Data	TIMUNLZ	SUNPRS	IRUSTA	JTHSW	NACS6

ORIGINAL PAGE IS
OF POOR QUALITY

ACS TELEMETRY REPORT #9

Minor Frame Number: 26

OBC Telemetry Report Number: 9

Minor Frame word	91	92	93	94	95
ENTRY	0	1	2	3	4
Data	IENUNL	INIUNL	ITHSW	MODE 2C	IHTBMD

108	109	110	111	112
5	6	7	8	9
DISPAS	ENAPAS	IHTY	IHTZ	SPARE

113	114	115	116	117
10	11	12	13	14
IGYX	IGYY	IGYZ	SENSTA	OFFSET

118	119	120	121	122
15	16	17	18	19
NGZOVFL	ESASEL	ELX MSB	ELY MSB	ELZ MSB

123	124	125	126	127
20	21	22	23	24
← NOMS3 →		NACS1	IMOMUN	MAGREF

ACS TELEMETRY REPORT #10

Minor Frame Number: 27 OBC Telemetry Report Number: 10

Minor Frame word	91	92	93	94	95
ENTRY	0	1	2	3	4
Data	THETBX 2 MS BYTES		THETBY 2 MS BYTES		THETBZ 2 MS BYTES

108	109	110	111	112
5	6	7	8	9
	HWX MSB	HWY MSB	HWZ MSB	HWS MSB

113	114	115	116	117
10	11	12	13	14
MX MSB	MY MSB	MZ MSB	BEX MSB	BEY MSB

118	119	120	121	122
15	16	17	18	19
BEZ MSB	SELMAG	DHUNLDX	DHUNLDY	DHUNLDZ

123	124	125	126	127
20	21	22	23	24
EXG MSB	EYG MSB	EZG MSB	EXM MSB	EYM MSB

ORIGINAL PAGE IS
OF POOR QUALITY

ACS TELEMETRY REPORT #11

Minor Frame Number: 30,62,94,126 **OBC Telemetry Report Number:** 11

Minor Frame word	91	92	93	94	95
ENTRY	0	1	2	3	4
Data	SX (MS BIT, SIGN BIT) — TF — FLIGHT SOFTWARE TIME				

Minor Frame word	108		109	110	111	112
ENTRY	5		6	7	8	9
Data	X LS BIT	XXXXX	SX (MS BIT, SIGN BIT) TDELTA			

Minor Frame word	113	114	115	116	117
ENTRY	10	11	12	13	14
Data	X LS BIT	XXXXX	DPUDCER	FSDPUST	TFRESET

Minor Frame word	118	119	120	121	122
ENTRY	15	16	17	18	19
Data	SWTCH1	SWTCHY	SWTCHZ	SYSMOY	ITPFAIL

Minor Frame word	123	124	125	126	127
ENTRY	20	21	22	23	24
Data	SHFAIL	ITP1ST	NOMS4		NACS2

Flight Software Time (TF)
@8kbps TF = TDPU + 36msec + $(4096*2^{-3})$ + (N*4096msec)
@1kbps TF = TDPU + 36msec + $(4096*2^{0})$ + (N*32768msec)**

@ 1 January,0000hrs TF = 86,400,000msec

*N = 0.1.2,3 each succeeding TF update interval
**1kbps timing is unreliable

ORIGINAL PAGE IS
OF POOR QUALITY

ACS TELEMETRY REPORT #12

Minor Frame Number: 15, 31, 47, 63, 79, 95, 111, 127

OBC Telemetry Report Number: 12

Minor Frame word	91	92	93	94	95
ENTRY	0	1	2	3	4
Data	← CNGX → (SX … X)		← CNGY →		← CNGZ —

SX: SIGN BIT; 2^{14} COUNTS; X: 2^{0} COUNTS

108	109	110	111	112
5	6	7	8	9
→	← CNGX1 →		← CNGY1 —	

113	114	115	116	117
10	11	12	13	14
← CNGZ1 →		← CNGX2 →		← CNGY2 —

118	119	120	121	122
15	16	17	18	19
→	← CNGZ2 →		← CNGX3 →	

123	124	125	126	127
20	21	22	23	24
← CNGY3 →		← CNGZ3 →		00000000 ZERO BYTE

ACS TELEMETRY REPORT #13

Minor Frame Number: 06, 38, 70, 102 OBC Telemetry Report Number: 38

Minor Frame word	91	92	93	94	95
ENTRY	0	1	2	3	4
Data	TACSSP	SDSEPFL	SDFUNCT	ACQ1ST	FDCEP

108	109	110	111	112
5	6	7	8	9
EPCNT	ACQRIU	PFDCEP	FPITCH	FPCNT

113	114	115	116	117
10	11	12	13	14
PFPITCH	FROLL	FRCNT	PFROLL	ACQFD1

118	119	120	121	122
15	16	17	18	19
WGXK1	WGZK1	SWTCH1M	MODE2CM	FDCNT1

123	124	125	126	127
20	21	22	23	24
FDCNT2	PFSTAT1	PFSTAT2	CTR120	SKOUT

TABLE 2-44

ACS OBC TELEMETRY DEFINITIONS

ORIGINAL PAGE IS
OF POOR QUALITY

INPUT = DRO·[RICH MAST]TELEMETRY.MAS;18 / 29-APR-1982 14:05:04.03 29-APR-82 15:24:42 PAGE 1

FLIGHT SOFTWARE DICTIONARY V1 0-5

NAME	DPROC	TYPE	UPROC /	DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
THETAX	ACS	V		DEGREE	801	0000	D	-5	RADIAN		ANGULAR INCREMENTS X
THETAY	ACS	V		DEGREE	801	0002	D	-5	RADIAN		ANGULAR INCREMENTS Y
THETAZ	ACS	V		DEGREE	801	0004	D	-5	RADIAN		ANGULAR INCREMENTS Z
NGX	UNDEF	V	ACS	COUNTS	801	0006	D	24	COUNTS		ROLL GYRO RAW ANGULAR DATA
NGY	UNDEF	V		COUNTS	801	0009	D	24	COUNTS		PITCH GYRO RAW ANGULAR DATA
NGZ	UNDEF	V		COUNTS	801	0012	D	24	COUNTS		YAW GYRO RAW ANGULAR DATA
NGXF	UNDEF	V	ACS	COUNTS	801	0015	D	24	COUNTS		ROLL GYRO FILTERED ANGULAR DATA
NGYF	UNDEF	V	ACS	COUNTS	801	0018	D	24	COUNTS		PITCH GYRO FILTERED ANGULAR DATA
NGZF	UNDEF	V	ACS	COUNTS	801	0021	D	24	COUNTS		YAW GYRO FILTERED ANGULAR DATA
NACS3	ACS	V		COUNTS	801	0024	W	7	COUNTS		NUMBER OF ACS THRUSTER FIRINGS +PITCH (V14)

ORIGINAL PAGE IS
OF POOR QUALITY

INPUT = DBO [RICH MAST]TELEMETRY.MAS;18 / 29-APR-1982 14:05:04.03 29-APR-82 15:24:42 PAGE 2

FLIGHT SOFTWARE DICTIONARY V1.0-5

NAME	DPROC	TYPE	UPROC /	DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
WGX	ACS	V		DEG/CY	802	0000	S	-5	RAD/CY		ROLL GYRO ANGULAR RATE
WGY	ACS	V		DEG/CY	802	0001	S	-5	RAD/CY		PITCH GYRO ANGULAR RATE
WGZ	ACS	V		DEG/CY	802	0002	S	-5	RAD/CY		YAW GYRO ANGULAR RATE
WX	ACS	V	SCP	DEG/SE	802	0003	S	-5	RAD/SE		RATE (X)
WY	ACS	V		DEG/SE	802	0004	S	-5	RAD/SE		RATE (Y)
WZ	ACS	V		DEG/SE	802	0005	S	-5	RAD/SE		RATE (Z)
EX	ACS	V		DEGREE	802	0006	D	2	RADIAN		ROLL ATTITUDE ERROR
EY	ACS	V		DEGREE	802	0008	D	2	RADIAN		PITCH ATTITUDE ERROR
EZ	ACS	V		DEGREE	802	0010	D	2	RADIAN		YAW ATTITUDE ERROR
EPA1	ACS	V	SCP	N.D.	802	0012	D	1	N.D.		EULER PARMS THAT SPECIFY VEHICLE ORIENTATION RELATIVE TO ECI FRAME
EPA2	ACS	V		N.D.	802	0015	D	1	N.D.		EULER PARMS THAT SPECIFY VEHICLE ORIENTATION RELATIVE TO ECI FRAME
EPA3	ACS	V		N.D.	802	0018	D	1	N.D.		EULER PARMS THAT SPECIFY VEHICLE ORIENTATION RELATIVE TO ECI FRAME
EPA4	ACS	V		N.D.	802	0021	D	1	N.D.		EULER PARMS THAT SPECIFY VEHICLE ORIENTATION RELATIVE TO ECI FRAME
NII	ACS	V		COUNTS	802	0024	W	7	COUNTS		OPEN LOOP THRUSTER FIRING ARRAY INDEX

ORIGINAL PAGE IS
OF POOR QUALITY

INPUT - DUO [RICH.MAST]TELEMETRY.MAS;18 / 29-APR-1982 14 05:04 03 29-APR-82 15:20:42 PAGE 3
FLIGHT SOFTWARE DICTIONARY V1.0-5

NAME	UPROC	TYPE	UPROC / DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
EPD1	ACS	V	N.D	803	0000	D	1	N.D.		EULER PARAMETERS RELATING MISSION FRAME & ECI FRAME
EPD2	ACS	V	N.D.	803	0002	D	1	N.D.		EULER PARAMETERS RELATING MISSION FRAME & ECI FRAME
EPD3	ACS	V	N.D.	803	0004	D	1	N.D.		EULER PARAMETERS RELATING MISSION FRAME & ECI FRAME
EPD4	ACS	V	N.D.	803	0006	D	1	N.D.		EULER PARAMETERS RELATING MISSION FRAME & ECI FRAME
EPC1	ACS	V	N.D.	803	0008	D	1	N.D.		EULER PARAMETERS SPECIFYING VEHICLE ORIENTATION REL TO DESIRED ORIENTATION
EPC2	ACS	V	N.D.	803	0011	D	1	N.D.		EULER PARAMETERS SPECIFYING VEHICLE ORIENTATION REL TO DESIRED ORIENTATION
EPC3	ACS	V	N.D.	803	0014	D	1	N.D.		EULER PARAMETERS SPECIFYING VEHICLE ORIENTATION REL TO DESIRED ORIENTATION
EPC4	ACS	V	N.D.	803	0017	D	1	N.D.		EULER PARAMETERS SPECIFYING VEHICLE ORIENTATION REL TO DESIRED ORIENTATION
EIX	ACS	V	RAD*SE	803	0020	S	4	RAD*SE		ROLL ATTITUDE ERROR INTEGRAL
EIY	ACS	V	RAD*SE	803	0022	S	4	RAD*SE		PITCH ATTITUDE ERROR INTEGRAL
TACCMD	ACS	V	N.D.	803	0024	W	7	N.D.		THRUSTER ON/OFF CMD WORD. BIT 1= +ROLL, 2= -ROLL, 3= +PITCH, 4= -PITCH, 5= +YAW, 6= -YAW. 1=ON, 0=OFF.

ORIGINAL PAGE IS
OF POOR QUALITY

INPUT = DBO:[RICH.MAST]TELEMETRY.MAS;18 / 29-APR-1982 14:05.04.03   29-APR-82   15:24:43   PAGE   4

FLIGHT SOFTWARE DICTIONARY V1.0-5

NAME	DPROC	TYPE	UPROC /	DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
EIZ	ACS	V		RAD*SE	804	0000	S	4	RAD*SE		YAW ATTITUDE ERROR INTEGRAL
EDIX	ACS	V		RSEC*2	804	0002	S	9	RSEC*2		ROLL ATTITUDE ERROR DOUBLE INTGRAL
EDIY	ACS	V		RSEC*2	804	0004	S	9	RSEC*2		PITCH ATTITUDE ERROR DOUBLE INTEGRAL
EDIZ	ACS	V		RSEC*2	804	0006	S	9	RSEC*2		YAW ATTITUDE ERROR DOUBLE INTEGRAL
IWX	ACS	V		N.D.	804	0008	S	1	N.D.		ROLL WHEEL CMD
IWY	ACS	V		N.D.	804	0010	S	1	N.D.		PITCH WHEEL COMMAND
IWZ	ACS	V		N.D.	804	0012	S	1	N.D.		YAW WHEEL COMMAND
WEX	ACS	V		DEG/SE	804	0014	S	-4	RAD/SE		ROLL ATTITUDE RATE ERROR
WEY	ACS	V		DEG/SE	804	0015	S	-4	RAD/SE		PITCH ATTITUDE RATE ERROR
WEZ	ACS	V		DEG/SE	804	0016	S	-4	RAD/SE		YAW ATTITUDE RATE ERROR
TTX	ACS	V		DEGREE	804	0017	S	1	RADIAN		ROLL ORBIT ADJUST THRUSTER CMD COMPUTATION SIGNAL
TTY	ACS	V		DEGREE	804	0018	S	1	RADIAN		PITCH ORBIT ADJUST THRUSTER COMMAND COMPUTATION SIGNAL
TTZ	ACS	V		DEGREE	804	0019	S	1	RADIAN		YAW ORBIT ADJUST THRUSTER COMMAND COMPUTATION SIGNAL
BIASY	ACS	P		DEGREE	804	0020	S	-4	RADIAN	0	PITCH POSITION ERROR BIAS
BIASZ	ACS	P		DEGREE	804	0022	S	-4	RADIAN	-0.148E-01	YAW POSITION ERROR BIAS
SKEW	ACS	V		N.D.	804	0024	W	7	N.D.		SKEW WHEEL OUT OF LIMITS FLAG. 0:IN LIMITS, 1:OUT OF LIMITS

ORIGINAL PAGE IS
OF POOR QUALITY

FLIGHT SOFTWARE DICTIONARY V1 0-5

NAME	DPROC	TYPE	UPROC /	DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
SFEHOLD	ACS	V		N.D.	805	0000	W	15	N.D.		O: SAFEHOLD NOT ENTERED BY OBC <>O: RELATIVE LOC SAFEHOLD CALLED FROM. (V15A) \O20982V16D0
EX1C	ACS	V		DEGREE	805	0002	S	1	RADIAN		ROLL EARTH SENSOR 1 COARSE ATTITUDE ERROR (CORRECTED V15A)
EY1C	ACS	V		DEGREE	805	0003	S	1	RADIAN		PITCH EARTH SENSOR 1 COARSE ATTITUDE ERROR
EX2C	ACS	V		DEGREE	805	0004	S	1	RADIAN		ROLL EARTH SENSOR 2 COARSE ATTITUDE ERROR
EY2C	ACS	V		DEGREE	805	0005	S	1	RADIAN		PITCH EARTH SENSOR 2 COARSE ATTITUDE ERROR
EX1F	ACS	V		DEGREE	805	0006	S	-3	RADIAN		ROLL EARTH SENSOR 1 FINE ATTITUDE ERROR
EY1F	ACS	V		DEGREE	805	0007	S	-3	RADIAN		PITCH EARTH SENSOR 1 FINE ATTITUDE ERROR
EX2F	ACS	V		DEGREE	805	0008	S	-3	RADIAN		ROLL EARTH SENSOR 2 FINE ATTITUDE ERROR
EY2F	ACS	V		DEGREE	805	0009	S	-3	RADIAN		PITCH EARTH SENSOR 2 FINE ATTITUDE ERROR
NACS4	ACS	V		COUNTS	805	0010	W	7	COUNTS		NUMBER OF ACS THRUSTER FIRINGS -PITCH (V14)
DELTHA	ACS	V		DEG/S*2	805	0011	S	-6	R/S*2		TDRS ANTENNA AZIMUTH ANGULAR ACCELERATION
DELTHE	ACS	V		DEG/S*2	805	0012	S	-6	R/S*2		TDRS ANTENNA ELEVATION ANGULAR ACCELERATION
THUNLX	ACS	V		COUNTS	805	0013	W	7	COUNTS		ROLL WHEEL THRUSTER UNLOADING PULSE COUNTER
THUNLY	ACS	V		COUNTS	805	0014	W	7	COUNTS		PITCH WHEEL THRUSTER UNLOADING PULSE COUNTER
THUNLZ	ACS	V		COUNTS	805	0015	W	7	COUNTS		YAW WHEEL THRUSTER UNLOADING PULSE COUNTER
XPC	ACS	V	SCP	N.D.	805	0016	S	0	N.D.		CALIBRATED FSS X AXIS DATA ---(NOTE ACS REFERS TO THIS ITEM AS XP)
YPC	ACS	V	SCP	N.D.	805	0018	S	0	N.D.		CALIBRATED FSS Y AXIS DATA ---(NOTE ACS REFERS TO THIS ITEM AS YP)
TWS	ACS	V		N.D.	805	0020	S	1	N.D.		SKEW WHEEL COMMAND
NACS5	ACS	V		COUNTS	805	0022	W	7	COUNTS		NUMBER OF ACS THRUSTER FIRINGS +YAW (V14)

ORIGINAL PAGE IS
OF POOR QUALITY

INPUT = DBO [RICH MAS]TELEMETRY MAS;18 / 29-APR-1982 14:05:04.03 29-APR-82 15:24:43 PAGE 6

FLIGHT SOFTWARE DICTIONARY V1.0-5

NAME	DPROC	TYPE	UPROC / DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
TAMSIA	ACS	V	N.D.	805	0023	W	7	N.D.		MAGNETIC ACQN. 1:ON, 0:OFF
MIRAFIG	ACS	V	YES/NO	805	0024	W	7	YES/NO		CHANNEL A MOTOR CURRENT FAILED FLAG

ORIGINAL PAGE IS
OF POOR QUALITY

INPUT = DBO:[RICH.MAST]TELEMETRY.MAS;18 / 29-APR-1982 14:05:04.03 29-APR-82 15:24:43 PAGE 7

FLIGHT SOFTWARE DICTIONARY V1.0-5

NAME	DPROC	TYPE UPROC /	DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
SYSMOX	ACS	V	NMSEC	806	0000	S	8	NMSEC		ROLL SYSTEM MOMENTUM
SY3PL	ACS	V	NMSEC	806	0001	S	8	NMSEC		PITCH SYSTEM MOMENTUM
SYSMOZ	ACS	V	NMSEC	806	0002	S	8	NMSEC		YAW SYSTEM MOMENTUM
NOMS1	ACS	V	MSEC	806	0003	S	20	MSEC		NUMBER OF MS OA THRUSTERS FIRED +PITCH (V14)
FLX1L	ACS	V	NMSEC	806	0005	S	4	NMSEC		LIMITED ROLL WHEEL CONTROL SIGNAL FILTERED ONCE
TWXC	ACS	V	NMSEC	806	0006	S	1	NMSEC		LIMITED ROLL WHEEL CONTROL SIGNAL FILTERED TWICE
FLY1L	ACS	V	NMSEC	806	0007	S	4	NMSEC		LIMITED PITCH WHEEL CONTROL SIGNAL FILTERED ONCE
TWYC	ACS	V	NMSEC	806	0008	S	1	NMSEC		LIMITED PITCH WHEEL CONTROL SIGNAL FILTERED TWICE
FLZ1L	ACS	V	NMSEC	806	0009	S	4	NMSEC		LIMITED YAW WHEEL CONTROL SIGNAL FILTERED ONCE
TWZC	ACS	V	NMSEC	806	0010	S	1	NMSEC		LIMITED YAW WHEEL CONTROL SIGNAL FILTERED TWICE
FDC1PR	ACS	V	N.A.	806	0011	W	7	N.A.		ENABLE PITCH/ROLL SYSTEM FAILURE DETECTION. 0:DISABLED. 1:ENABLED. (V14)
FDC1Y	ACS	V	N.A.	806	0012	W	7	N.A.		ENABLE YAW SYSTEM FAILURE DETECTION. 0:DISABLED. 1:ENABLED. (V14)
FDC1PRF	ACS	V	N.A.	806	0013	W	7	N.A.		PITCH/ROLL SYSTEM FAILURE DETECTION FLAG. 0:NO FAILURE. 1:FAILURE (V14)
FDC1YF	ACS	V	N.A.	806	0014	W	7	N.A.		YAW SYSTEM FAILURE DETECTION FLAG. 0:NO FAILURE. 1:FAILURE. (V14)
FDC2PR	ACS	V	N.A.	806	0015	W	7	N.A.		ENABLE PITCH/ROLL GYRO FAILURE DETECTION. 0:DIABLED. 1:ENABLED. (V14)
FDC2Y	ACS	V	N.A.	806	0016	W	7	N.A.		ENABLE YAW GYRO FAILURE DETECTION. 0:DISABLED. 1:ENABLED. (V14)
FDC2PRF	ACS	V	N.A.	806	0017	W	7	N.A.		PITCH/ROLL GYRO FAILURE DETECTION FLAG. 0:NO FAILURE 1:FAILURE. (V14)
FDC2YF	ACS	V	N.A.	806	0018	W	7	N.A.		YAW GYRO FAILURE DETECTION FLAG 0:NO FAILURE 1:FAILURE. (V14)
XRATDIL	ACS	V	N.A.	806	0019	W	7	N.A.		ROLL RATE DILEMMA FLAG

ORIGINAL PAGE IS
OF POOR QUALITY

INPUT = DBO [RICH MAS] TELEMETRY.MAS;18 / 29-APR-1982 14:05:04.03 29-APR-82 15:24:43 PAGE 8

FLIGHT SOFTWARE DICTIONARY V1 0-5

NAME	UPROC	TYPE UPROC /	UNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
YRATDIL	ACS	V	N.A.	806	0020	W	7	N.A.		PITCH RATE DILEMMA FLAG
ZRATDIL	ACS	V	N.A.	806	0021	W	7	N.A.		YAW RATE DILEMMA FLAG
FSTATE1	ACS	V	N.A.	806	0022	W	7	N.A.		NORM/OA FDC PITCH FAILURE STATE. 0=ALL OK. 1=EY OUT. 2=EY1C OUT. 3=EY&EY1C OUT. 4=EY2C OUT. 5=EY&EY2C OUT. 6=EY1C&EY2C OUT. 7=ALL OUT. \042782V16RS
FSTATE2	ACS	V	N.A.	806	0023	W	7	N.A.		NORM/OA FDC ROLL FAILURE STATE. 0=ALL OK. 1=EX OUT. 2=EX1C OUT. 3=EX&EX1C OUT. 4=EX2C OUT. 5=EX&EX2C OUT. 6=EX1C&EX2C OUT. 7=ALL OUT. \042782V16RS
SAFE1ST	ACS	V	N.A.	806	0024	W	7	N.A.		1ST PASS FLAG FOR SAFEHOLD INTERLOCK

NAME	UPROC	TYPE	UPROC /	DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
P1	ACS	V		N D	807	0000	S	2	N D.		TDRS ANTENNA TORQUE IN S/C AXIS ROLL
P2	ACS	V		N D	807	0001	S	2	N.D.		TDRS ANTENNA TORQUE IN S/C AXIS PITCH
P3	ACS	V		N.D.	807	0002	S	2	N D.		TDRS ANTENNA TORQUE IN S/C AXIS YAW
WXC	ACS	V	SCP	DEG/SE	807	0003	S	-5	RAD/SE		COMMANDED VEHICLE RATES - ROLL
WYC	ACS	V		DEG/SE	807	0004	S	-5	RAD/SE		COMMANDED PITCH RATE
WZC	ACS	V		DEG/SE	807	0005	S	-5	RAD/SE		COMMANDED YAW RATE
PX	ACS	V		NMSEC	807	0006	S	8	NMSEC		ROLL THRUSTER UNLOADING CONTROL SIGNAL \032782V17DO
PY	ACS	V		NMSEC	807	0007	S	8	NMSEC		PITCH THRUSTER UNLOADING CONTROL SIGNAL \032782V17DO
PZ	ACS	V		NMSEC	807	0008	S	8	NMSEC		YAW THRUSTER UNLOADING CONTROL SIGNAL \032782V17DO
NOMS2	ACS	V		MSEC	807	0009	S	20	MSEC		NUMBER OF MS OA THRUSTERS FIRED -PITCH (V14)
TACS	ACS	V		N.A.	807	0011	S	17	N.A.		ACS CYCLE COUNTER
WGXD1	ACS	V		COUNTS	807	0013	D	17	COUNTS		ROLL GYRO DIFFERENCES CHANNEL 1. COUNTS ARE EQUIVALENT HIGH RATE COUNTS; OBC NORMALIZES THIS DATA BASED UPON GYRO HI/ /LO RATE STATUS \C32982V17DO
WGXD2	ACS	V		COUNTS	807	0015	D	17	COUNTS		ROLL GYRO DIFFERENCES CHANNEL 2. COUNTS ARE EQUIVALENT HIGH RATE COUNTS; OBC NORMALIZES THIS DATA BASED UPON GYRO HI/ /LO RATE STATUS \032982V17DO
WGYD1	ACS	V		COUNTS	807	0017	D	17	COUNTS		PITCH GYRO DIFFERENCES CHANNEL 1. COUNTS ARE EQUIVALENT HIGH RATE COUNTS; OBC NORMALIZES THIS DATA BASED UPON GYRO HI/LO RATE STATUS \032982V17DO
WGYD2	ACS	V		COUNTS	807	0019	D	17	COUNTS		PITCH GYRO DIFFERENCES CHANNEL 2. COUNTS ARE EQUIVALENT HIGH RATE COUNTS; OBC NORMALIZES THIS DATA BASED UPON GYRO HI/LO RATE STATUS \032982V17DO
WGZD1	ACS	V		COUNTS	807	0021	D	17	COUNTS		YAW GYRO DIFFERENCES CHANNEL 1. COUNTS ARE EQUIVALENT HIGH RATE COUNTS; OBC NORMALIZES THIS DATA BASED UPON GYRO HI/ /LO RATE STATUS \032982V17DO

ORIGINAL PAGE IS
OF POOR QUALITY

ORIGINAL PAGE IS
OF POOR QUALITY

INPUT - DBO [HIGH MAST]TELEMETRY MAS:18 / 29-APR-1982 14:05:04 03 29-APR-82 15:24:43 PAGE 10

FLIGHT SOFTWARE DICTIONARY V1 0-5

NAME	UPROC	TYPE UPROC /	DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
WGYD2	ACS	V	COUNTS	807	0023	D	17	COUNTS		YAW GYRO DIFFERENCES CHANNEL 2. COUNTS ARE EQUIVALENT HIGH RATE COUNTS; OBC NORMALIZES THIS DATA BASED UPON GYRO HI/ /LO RATE STATUS \032982V17DQ

ORIGINAL PAGE IS
OF POOR QUALITY

INPUT = DRO:[RICH.MAST]TELEMETRY MAS;18 / 29-APR-1982 14:05:04.03 29-APR-82 15:24:43 PAGE 11

FLIGHT SOFTWARE DICTIONARY V1.0-5

NAME	DPROC	TYPE UPROC /	DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
MODE	ACS	P	COUNTS	808	0000	W	7	COUNTS	1	MODE FLAG 1: LOCAL VERT ACQ 2: YAW AXIS ACQ 3: STELLAR ACQUISITION 4: EARTH POINTING MODE 7: ORBIT ADJUST
XPOSDIL	ACS	V	N.D.	808	0001	W	7	N.D.		ROLL POSITION DILEMNA FLAG
YPOSDIL	ACS	V	N.D.	808	0002	W	7	N.D.		PITCH POSITION DILEMNA FLAG
SMODE3	ACS	V	COUNTS	808	0003	W	7	COUNTS		STELLAR ACQ. SUBMODE 0: ECI ATT. INITIALIZE 1: ECI ATTITUDE UPDATE 2: ECI ATT. UPDATE DONE
SMODE4	ACS	V	COUNTS	808	0004	W	7	COUNTS		EARTH POINTING SUBMODE 1: EARTH POINTING MODE 2: STELLAR POINTING MODE
ESACNT	ACS	V	N.D.	808	0005	W	7	N.D.		NUMBER OF ESA FAILURES
MAGULD	ACS	P	N.D.	808	0006	W	7	N.D.	0	MAGNETIC TORQUER ENABLE FLAG (1:ENA, <>1:DIS)
FLTROFF	ACS	P	YES/NO	808	0007	W	7	YES/NO	0	GYRO PREFILTERS ENABLE FLAG 1:ON, 0:OFF
ESASTA	ACS	V	N.D.	808	0008	W	7	N.D.		ESA IN USE
MODE41	ACS	P	YES/NO	808	0009	W	7	YES/NO	0	EARTH POINTING INITIALIZE FLAG (0:DIS, 1:ENA)
TIMUNLX	ACS	-	SECOND	808	0010	S	7	SECOND		WHEEL UNLOADING TIMER FOR ROLL
TIMUNLY	ACS	-	SECOND	808	0011	S	7	SECOND		WHEEL UNLOADING TIMER FOR PITCH
MODE31	ACS	P	YES/NO	808	0012	W	7	YES/NO	0	STELLAR ACQUISITION INITIALIZE FLAG (0:DIS, 1:ENA)
ECIATT	ACS	V	COUNTS	808	0013	W	7	COUNTS		ECI ATTITUDE STATE FLAG 0: ECI NOT INITIALIZED 1: ECI NOT YET UPDATED 2: UPDATED ECI AVAILABLE 3: STELLAR ACQ. CO OMPLETE
MODE11	ACS	P	YES/NO	808	0014	W	7	YES/NO	0	EARTH ACQUISITION INITIALIZE FLAG (0:DIS, 1:ENA)
EPHEMFL	ACS	V	YES/NO	808	0015	W	7	YES/NO	1	EPHEMERIS SOURCE SELECTION FLAG (0:GPS, <>0:UPLINK)
FAILW	ACS	P	N.D.	808	0016	W	7	N.D.	0	BAD REACTION WHEEL FLAG: 1: ROLL WHEEL FAILED 2: PITCH WHEEL FAILED 3: YAW WHEEL FAILED 4: ALL WHLS OK
ICAL	ACS	P	YES/NO	808	0017	W	7	YES/NO	0	ACQUISITION/EARTH POINTING FLAG (0-2:ACQ, 3:EP)
NGXOVFL	ACS	V	N.D.	808	0018	W	7	N.D.		X-AXIS GYRO OVERFLOW CTR

ORIGINAL PAGE IS
OF POOR QUALITY

INPUT - DBO (RICH MAST)TELEMETRY MAS;18 / 29-APR-1982 14:05:04 03   29-APR-82 15:24:44   PAGE 12

FLIGHT SOFTWARE DICTIONARY V1.0-5

NAME	DPROC	TYPE	UPROC /	DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
NGYOVFL	ACS	V		N.D.	808	0019	W	7	N.D.		Y-AXIS GYRO OVERFLOW CTR
TIMUNLZ	ACS	V		SECOND	808	0020	S	7	SECOND		WHEEL UNLOADING TIMER FOR YAW
SUNPRS	ACS	V	SCP	N.D.	808	0021	W	7	N.D.		SUN PRESENCE FLAG 0: NO SUN IN FSS FOV 1: SUN IN FSS FOV
SPARE	ACS	-		-	808	0022	-	-	-		***** S P A R E ***** \042782V17DQ
JTTISW	ACS	V		N.D.	808	0023	W	7	N.D.		THRUSTER SWITCH TIMER INITIALIZATION FLAG
NACSG	ACS	V		COUNTS	808	0024	W	7	COUNTS		NUMBER OF ACS THRUSTER FIRINGS -YAW (V14)

ORIGINAL PAGE IS
OF POOR QUALITY

INPUT = DBO [RICH MAST]TELEMETRY.MAS;18 / 29-APR-1982 14:05 04 03 29-APR-82 15.24.44 PAGE 13

FLIGHT SOFTWARE DICTIONARY V1.0-5

NAME	DPROC	TYPE	UPROC /	DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
TENAUN	ACS	P		YES/NO	809	0000	W	7	YES/NO	0	THRUSTER UNLOAD ENABLE FLAG (1:ENA, <>1:DIS)
THIUN	ACS	P		YES/NO	809	0001	W	7	YES/NO	0	THRUSTER UNLOAD INIT FLAG (1:INIT, <>1.NO INIT)
ETHSW	ACS	V		N.D.	809	0002	W	7	N.D.		EARTH ACON. THRUSTER CTLR. SWITCH
MODE2C	ACS	V		YES/NO	809	0003	W	7	YES/NO		EARTH/YAW ORBIT PLANE ACQUISITION COMPLETION FLAG
THBKMD	ACS	P		YES/NO	809	0004	W	7	YES/NO	0	BACKUP O/A FLAG (0:NORMAL OA, 1.BACKUP OA)
DISPAS	ACS	V		N.D.	809	0005	W	7	N.D.		1 ST PASS FLAG FOR ORBIT ADJUST THRUSTERS OFF. 1=FIRST THRUSTER OFF PASS, 0=NOT FIRST PASS
ENAPAS	ACS	V		N.D.	809	0006	W	7	N.D.		1ST PASS FLAG FOR ORBIT ADJUST THRUSTERS ON. 1=FIRST THRUSTER ON PASS, 0=NOT FIRST PASS (TO BE DELETED)
THEY	ACS	V		N.D	809	0007	W	7	N.D.		COMPUTED HYSTERESIS FLAG FOR PITCH
THEZ	ACS	V		N.D.	809	0008	W	7	N.D.		COMPUTED HYSTERESIS FLAG FOR YAW
SPARE	ACS	-		-	809	0009	-	-	-		***** S P A R E ***** (V14)
IGYX	UNDEF	V	ACS	N.D.	809	0010	W	7	N.D.	1	GYRO REDUNDANCY SELECTION FLAG FOR ROLL
IGYY	UNDEF	V	ACS	N.D.	809	0011	W	7	N.D.	1	GYRO REDUNDANCY SELECTION FLAG FOR PITCH
IGYZ	UNDEF	V	ACS	N.D.	809	0012	W	7	N.D.	1	GYRO REDUNDACCY SELECTION FLAG FOR YAW
SENSTA	ACS	V		N.D.	809	0013	W	7	N.D.		GYRO HI/LO RATE MODE FLAG. USE BITS 8,7,6
OFFSET	ACS	P		N.A.	809	0014	W	7	N.A.	0	OFFSET POINTING FLAG (1:OFFSET, <>1:NO OFFSET)
NGZOVFL	ACS	V		N.D.	809	0015	W	7	N.D.		Z-AXIS GYRO OVERFLOW COUNTER
ESASEL	ACS	P		YES/NO	809	0016	W	7	YES/NO	0	ESA SELECTION FLAG (1:UNIT 1, <>1: UNIT2)
ELX	ACS	-		N.D.	809	0017	S	2	N.D.		ACON WHEEL CTR.X ERROR SIGNAL
ELY	ACS	-		N.D.	809	0018	S	2	N.D.		ACON WHEEL CTR.Y ERROR SIGNAL
ELZ	ACS	-		N.D.	809	0019	S	2	N.D.		ACON WHEEL CTR.Z ERROR SIGNAL
NOMS?	ACS	P		MSEC	809	0020	S	20	MSEC		NUMBER OF MS OA THRUSTER FIRED +YAW (V14)

ORIGINAL PAGE IS
OF POOR QUALITY

INPUT = DRO:[RICH.MAST]TELEMETRY MAS;18 / 29-APR-1982 14:05 04 03 29-APR-82 15:24:44 PAGE 14

FLIGHT SOFTWARE DICTIONARY V1.0-5

NAME	UPROC	TYPE UPROC /	DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
NACS1	ACS	V	COUNTS	809	0022	W	7	COUNTS		NUMBER OF ACS THRUSTER FIRINGS +ROLL (V14)
IMOMUN	ACS	P	YES/NO	809	0023	W	7	YES/NO	0	MOMENTUM SELECT FLAG (1:SYS MOMS, <>1:WHL MOMS)
MAGREF	ACS	V	N.D.	809	0024	W	7	N.D.		O:NOT AT MAGENTIC REFERENCE. 1:S/C AT OR PAST MAG REFERENCE

ORIGINAL PAGE IS
OF POOR QUALITY

INPUT = DBO:[RICH.MAST]TELEMETRY.MAS;18 / 29-APR-1982 14:05:04.03 29-APR-82 15:24:44 PAGE 15

FLIGHT SOFTWARE DICTIONARY V1.0-5

NAME	UPROC	TYPE	UPROC / DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
THETBX	ACS	P	ARCS/CY	810	0000	D	-16	RAD/CY	0	ROLL GYRO RATE BIAS (RAD / SEC)
THETBY	ACS	P	ARCS/CY	810	0002	D	-16	RAD/CY	0	PITCH GYRO RATE BIAS (RAD / SEC)
THETBZ	ACS	P	ARCS/CY	810	0004	D	-16	RAD/CY	0	YAW GYRO RATE BIAS (RAD / SEC)
HWX	ACS	V	NMSEC	810	0006	S	5	NMSEC		ROLL WHEEL MOMENTUM
HWY	ACS	V	NMSEC	810	0007	S	5	NMSEC		PITCH WHEEL MOMENTUM
HWZ	ACS	V	NMSEC	810	0008	S	5	NMSEC		YAW WHEEL MOMENTUM
HWS	ACS	V	NMSEC	810	0009	S	5	NMSEC		SKEW WHEEL MOMENTUM
MX	ACS	V	POLE.CM	810	0010	S	7	CNTSX		ROLL AXIS TORQUER BAR CMD
MY	ACS	V	POLE.CM	810	0011	S	7	CNTSY		PITCH AXIS TORQUER BAR CMD
MZ	ACS	V	POLE.CM	810	0012	S	7	CNTSZ		YAW AXIS TORQUER BAR CMD
BEX	ACS	V	GAUSS	810	0013	S	1	GAUSS		EARTH'S MAGNETIC FIELD VEHICLE FRAME COMPONENTS
BEY	ACS	V	GAUSS	810	0014	S	1	GAUSS		PITCH COMPONENT OF EARTH MAGNETIC FIELD
BEZ	ACS	V	GAUSS	810	0015	S	1	GAUSS		YAW COMPONENT OF EARTH MAGNETIC FIELD
SELMAG	ACS	P	N.D.	810	0016	W	7	N.D.		MAGNETOMETER SELECT FLAG (1 IS MAG 1, <> 1 IS MAG 2) \030882V17RS
DHUNLDX	ACS	-	NMSEC	810	0017	-	8	NMSEC		ROLL MOMENTUM TO BE REMOVED BY THRUSTERS
DHUNLDY	ACS	-	NMSEC	810	0018	-	8	NMSEC		PITCH MOMENTUM TO BE REMOVED BY THRUSTERS
DHUNLDZ	ACS	-	NMSEC	810	0019	-	8	NMSEC		YAW MOMENTUM TO BE REMOVED BY THRUSTERS
EXG	ACS	-	DEGREE	810	0020	-	1	RADIAN		ROLL IRU POSITION (GYROS & MAGNETOMETERS)
EYG	ACS	-	DEGREE	810	0021	-	1	RADIAN		PITCH IRU POSITION (GYROS & MAGNETOMETERS)
EZG	ACS	-	DEGREE	810	0022	-	1	RADIAN		YAW IRU POSITION (GYROS & MAGNETOMETERS)-(NOT USED)
EXM	ACS	-	DEGREE	810	0023	-	1	RADIAN		ROLL TAM POSITION
EYM	ACS	-	DEGREE	810	0024	-	1	RADIAN		PITCH TAM POSITION

ORIGINAL PAGE IS
OF POOR QUALITY

FLIGHT SOFTWARE DICTIONARY V1.0-5

NAME	OPROC	TYPE	UPROC /	DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
TF	SCP	V	ACS	SEC	811	0000	T	38	MSEC		FLIGHT SOFTWARE TIME
TDELTA	SCP	V	ACS	SEC	811	0006	T	38	MSEC		DPU TIME-FLIGHT SW TIME
DPUDCER	SCP	V	ACS	N.D.	811	0012	W	7	N.D.		COUNT OF THE NUMBER OF DPU TIME DECODING ERRORS
FSDPUST	SCP	V	ACS	N.D.	811	0013	W	7	N.D.		FSW TIME STATUS. BIT1:DECODE ERRORS. BIT2:ABS(TDELTA) > TFOX. 0=NO, 1=YES. BIT3:TF RESET BIT4:DPU<=TF BIT5:RESET INH BY DPU H/W STATUS. 042782V17DQ
TFRESET	UNDEF	V	ACS	N.D.	811	0014	W	7	N.D.		COUNTER OF THE NUMBER OF FLIGHT SOFTWARE TIME RESETS
SWICHI	ACS	V		N.D.	811	0015	W	7	N.D.		1:+MAG 2:-MAG 3:IRU 4:ESA ACQN CTL. INPUT
SWICHY	ACS	V		N.D.	811	0016	W	7	N.D.		1:PITCH ORB RATE BIAS ENABLED 2:DISABLED
SWICHZ	ACS	V		N.D.	811	0017	W	7	N.D.		1:YAW RATE STABILIZATION 2:YAW GYRO-COMPASS
SYSMOY	ACS	V		NMSEC	811	0018	S	8	NMSEC		PITCH SYSTEM MOMENTUM
ITPFAIL	ACS	V		N.D.	811	0019	W	7	N.D.		# OF CONSECUTIVE TIMES GYROS + TACHS READ ZERO
SHFAIL	ACS	V		N.D.	811	0020	W	7	N.D.		# CONSECUTIVE CYCLES S/H STATUS SET
ITP1ST	ACS	V		N D.	811	0021	W	7	N.D.		ITP LOCKUP INITIALIZATION FLAG
NOMS4	ACS	V		MSEC	811	0022	S	20	MSEC		NUMBER OF MS OA THRUSTERS FIRED -YAW (V14)
NACS2	ACS	V		COUNTS	811	0024	W	7	COUNTS		NUMBER OF ACS THRUSTER FIRINGS -ROLL (V14)

ORIGINAL PAGE IS
OF POOR QUALITY

INPUT - DRO:[RICH MAST]TELEMETRY MAS;18 / 29-APR-1982 14:05:04.03   29-APR-82 15:24:44   PAGE 17

FLIGHT SOFTWARE DICTIONARY V1.0-5

NAME	DPROC	TYPE	UPROC / DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
CNGX	ACS	V	COUNTS	812	0000	D	14	COUNTS		GYRO RATE COUNT X AT TO
CNGY	ACS	V	COUNTS	812	0002	D	14	COUNTS		GYRO RATE COUNT Y AT TO
CNGZ	ACS	V	COUNTS	812	0004	D	14	COUNTS		GYRO RATE COUNT Z AT TO
CNGX1	ACS	V	COUNTS	812	0006	D	14	COUNTS		GYRO RATE COUNT X AT TO+.512
CNGY1	ACS	V	COUNTS	812	0008	D	14	COUNTS		GYRO RATE COUNT Y AT TO+.512
CNGZ1	ACS	V	COUNTS	812	0010	D	14	COUNTS		GYRO RATE COUNT Z AT TO+.512
CNGX2	ACS	V	COUNTS	812	0012	D	14	COUNTS		GYRO RATE COUNT X AT TO+1.024
CNGY2	ACS	V	COUNTS	812	0014	D	14	COUNTS		GYRO RATE COUNT Y AT TO+1.024
CNGZ2	ACS	V	COUNTS	812	0016	D	14	COUNTS		GYRO RATE COUNT Z AT TO+1.024
CNGX3	ACS	V	COUNTS	812	0018	D	14	COUNTS		GYRO RATE COUNT X AT TO+1.536
CNGY3	ACS	V	COUNTS	812	0020	D	14	COUNTS		GYRO RATE COUNT Y AT TO+1.536
CNGZ3	ACS	V	COUNTS	812	0022	D	14	COUNTS		GYRO RATE COUNT Z AT TO+1.536
SPARE	ACS	-	-	812	0024	-	-	-		ZERO BYTE (FSRB #028)

ORIGINAL PAGE IS
OF POOR QUALITY

INPUT = DBO [RICH.MAST]TELEMETRY MAS:18 / 29-APR-1982 14 05:04 03 29-APR-82 15:24:48 PAGE 45

FLIGHT SOFTWARE DICTIONARY V1.0-5

NAME	DPROC	TYPE	UPROC /	DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
TACSSP	ACS	V		CYCLES	838	0000	W	7	CYCLES		2 SEPARATION SWITCH TIMER
SDSEPFL	ACS	V		N.D.	838	0001	W	7	N.D.		2 SEPARATION SWITCH OPEN FLAG
SDFUNCT	ACS	V		N.D.	838	0002	W	7	N.D.		SOLAR ARRAY DEPLOY FUNCTION
ACQ1ST	ACS	V		N.D.	838	0003	W	7	N.D.	0	FIRST TIME THRU CODE FLAG
FDCEP	ACS	V		N.D.	838	0004	W	7	N.D.		ESA EP. BIT1:ESA1 BIT2:ESA2 1::EP
EPCNT	ACS	V		N.D.	838	0005	W	7	N.D.	0	EARTH PRESENCE FAIL STATE COUNTER
ACORIU	ACS	V		N.D.	838	0006	W	7	N.D.	0	RIU 4A AND 4B COMMANDED ON FLAG. BIT1:4A BIT2:4B
PFDCEP	ACS	V		N.D.	838	0007	W	7	N.D.	0	PREVIOUS ESA EP STATE
FPITCH	ACS	V		N.D.	838	0008	W	7	N.D.	0	PITCH ESA > THR BIT1:ESA1 BIT2:ESA2
FPCNT	ACS	V		N.D.	838	0009	W	7	N.D.	0	PITCH CONSECUTIVE > THR COUNT
PFPITCH	ACS	V		N.D.	838	0010	W	7	N.D.	0	PREVIOUS PITCH > THR STATE
FROLL	ACS	V		N.D.	838	0011	W	7	N.D.		ROLL ESA > THR STATE BIT1:ESA1 BIT2:ESA2
FRCNT	ACS	V		N.D.	838	0012	W	7	N.D.	0	ROLL CONSECUTIVE > THR COUNT
PFROLL	ACS	V		N.D.	838	0013	W	7	N.D.	0	PREVIOUS ROLL > THR STATE
ACQFD1	ACS	V		N.D.	838	0014	W	7	N.D.	0	1ST TIME THROUGH YAW ACQN. FDC
WGXK1	ACS	V		N.D.	838	0015	W	7	N.D.	0	IRU 2 ROLL RATE OUT OF THRESHOLD COUNTER
WGZK1	ACS	V		N.D.	838	0016	W	7	N.D.	0	IRU 2 YAW RATE OUT OF THRESHOLD COUNTER
SWICHIM	ACS	V		N.D.	838	0017	W	7	N.D.	0	RECORD OF SWICH1
MODE2CM	ACS	V		N.D.	838	0018	W	7	N.D.	0	RECORD OF MODE2C
FDCNT1	ACS	V		N.D.	838	0019	W	7	N.D.		CONSECUTIVE ERROR COUNTS FOR PITCH NORMFD
FDCNT2	ACS	V		N.D.	838	0020	W	7	N.D.		CONSECUTIVE ERROR COUNTS FOR ROLL NORMFC
PFSTAT1	ACS	V		N.D.	838	0021	W	7	N.D.		PREVIOUS FAILURE STATE PITCH. 1:ATT DET OUT 2:ESA1 OUT 3:ESA2 OUT
PFSTAT2	ACS	V		N.D.	838	0022	W	7	N.D.		PREVIOUS FAILURE STATE ROLL. 1:ATT DET OUT 2:ESA1 OUT 3:ESA2 OUT

ORIGINAL PAGE IS
OF POOR QUALITY

INPUT = DBO-[RICH MAST]TELEMETRY MAS;18 / 29-APR-1982 14:05:04.03   29-APR-82 15:24:48   PAGE 46

FLIGHT SOFTWARE DICTIONARY V1.0-5

NAME	DPROC	TYPE UPROC /	DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
CTR120	ACS	V	MFRAME	838	0023	W	7	MFRAME	0	COUNTS 120 SECONDS SINCE SKEW WHEEL COMMANDED TO A CONSTANT SPEED. 8 CTS=>120 SECONDS
SKOUT	ACS	V	CYCLES	838	0024	W	7	CYCLES	0	# OF CONSECUTIVE CYCLES SKEW WHEEL SPEED OUT OF LIMITS

TABLE 2-45

UPDATE FILTER OBC TELEMETRY REPORTS

ORIGINAL PAGE IS
OF POOR QUALITY

UPDATE FILTER TELEMETRY REPORT #1

Minor Frame Number: 28 OBC Telemetry Report Number: 24

Minor Frame word	91	92	93	94	95
ENTRY	0	1	2	3	4
Data	S1 2 MS BYTES		S2 2 MS BYTES		S3 2 MS BYTES

Minor Frame word	108	109	110	111	112
ENTRY	5	6	7	8	9
Data		S4 2 MS BYTES		S5 2 MS BYTES	

Minor Frame word	113	114	115	116	117
ENTRY	10	11	12	13	14
Data	S6 2 MS BYTES		PM 11(1)		

Minor Frame word	118	119	120	121	122
ENTRY	15	16	17	18	19
Data		PM 11(2)			

Minor Frame word	123	124	125	126	127
ENTRY	20	21	22	23	24
Data	PM 11(3)				FHST

UPDATE FILTER TELEMETRY REPORT #2

Minor Frame Number: 29 OBC Telemetry Report Number: 25

Minor Frame word	91	92	93	94	95
ENTRY	0	1	2	3	4
Data	← PM 11(5) →				←

	108	109	110	111	112
	5	6	7	8	9
	PM 11(6) →			← PM 11(9)	

	113	114	115	116	117
	10	11	12	13	14
	→		← PM 22(1)		

	118	119	120	121	122
	15	16	17	18	19
	→	← PM 22(2) →			

	123	124	125	126	127
	20	21	22	23	24
	← PM 22(3) →				NFAIL 1

ORIGINAL PAGE IS
OF POOR QUALITY

UPDATE FILTER TELEMETRY REPORT #3

Minor Frame Number: 35 **OBC Telemetry Report Number:** 26

Minor Frame word	91	92	93	94	95
ENTRY	0	1	2	3	4
Data	PM 22(5)				

Minor Frame word	108	109	110	111	112
ENTRY	5	6	7	8	9
Data	PM 22(6)			PM 22(9)	

Minor Frame word	113	114	115	116	117
ENTRY	10	11	12	13	14
Data			PM 12(1)		

Minor Frame word	118	119	120	121	122
ENTRY	15	16	17	18	19
Data		PM 12(2)			

Minor Frame word	123	124	125	126	127
ENTRY	20	21	22	23	24
Data	PM 12(3)				NFAIL 2

ORIGINAL PAGE IS
OF POOR QUALITY

UPDATE FILTER TELEMETRY REPORT #4

Minor Frame Number: 36

OBC Telemetry Report Number: 27

Minor Frame word	91	92	93	94	95
ENTRY	0	1	2	3	4
Data	PM 12(4)				

Minor Frame word	108	109	110	111	112
ENTRY	5	6	7	8	9
Data	PM 12(5)			PM 12(6)	

Minor Frame word	113	114	115	116	117
ENTRY	10	11	12	13	14
Data			PM 12(7)		

Minor Frame word	118	119	120	121	122
ENTRY	15	16	17	18	19
Data		PM 12(8)			

Minor Frame word	123	124	125	126	127
ENTRY	20	21	22	23	24
Data	PM 12(9)				SPARE

UPDATE FILTER TELEMETRY REPORT #5

Minor Frame Number: 55 OBC Telemetry Report Number: 28

Minor Frame word	91	92	93	94	95
ENTRY	0	1	2	3	4
Data	K1(1) 2 MS BYTES		K1(2) 2 MS BYTES		K(1)(3) 2 MS BYTES

Minor Frame word	108	109	110	111	112
ENTRY	5	6	7	8	9
Data		K1(4) 2 MS BYTES		K1(5) 2 MS BYTES	

Minor Frame word	113	114	115	116	117
ENTRY	10	11	12	13	14
Data	K1(6) 2 MS BYTES		KI1(1) 2 MS BYTES		KI1(2) 2 MS BYTES

Minor Frame word	118	119	120	121	122
ENTRY	15	16	17	18	19
Data		KI1(3) 2 MS BYTES		KI1(4) 2 MS BYTES	

Minor Frame word	123	124	125	126	127
ENTRY	20	21	22	23	24
Data	KI1(5) 2 MS BYTES		KI1(6) 2 MS BYTES		SPARE

ORIGINAL PAGE IS
OF POOR QUALITY

UPDATE FILTER TELEMETRY REPORT #6

Minor Frame Number: 68 **OBC Telemetry Report Number:** 29

Minor Frame word	91	92	93	94	95
ENTRY	0	1	2	3	4
Data	XS 2 MS BYTES		YS 2 MS BYTES		SCP11 LSB

108	109	110	111	112
5	6	7	8	9
SCP 12 LSB	SCP 22 LSB	SCKL LSB	SCKH LSB	SCKIL LSB

113	114	115	116	117
10	11	12	13	14
SCKIH LSB	STRST01	STRST02	STRST03	STRST04

118	119	120	121	122
15	16	17	18	19
STRST05	STRST06	STRST07	STRST08	STRST09

123	124	125	126	127
20	21	22	23	24
STRST10	STRST11	STRST12	STRST13	STRST14

UPDATE FILTER TELEMETRY REPORT #7

Minor Frame Number: 90 OBC Telemetry Report Number: 30

Minor Frame word	91	92	93	94	95
ENTRY	0	1	2	3	4
Data	TP MS BYTE	← Z1 2 MS BYTES	→	← Z2 2 MS BYTES	→

Minor Frame word	108	109	110	111	112
ENTRY	5	6	7	8	9
Data	← H1(1) 2 MS BYTES	→	← H1(2) 2 MS BYTES	→	← H1(3) 2 MS BYTES

Minor Frame word	113	114	115	116	117
ENTRY	10	11	12	13	14
Data	→	← H2(1) 2 MS BYTES	→	← H2(2) 2 MS BYTES	→

Minor Frame word	118	119	120	121	122
ENTRY	15	16	17	18	19
Data	← H2(3) 2 MS BYTES	→	← VS1 2 MS BYTES	→	← VS2 2 MS BYTES

Minor Frame word	123	124	125	126	127
ENTRY	20	21	22	23	24
Data	→	RS MS BYTE			

ORIGINAL PAGE IS
OF POOR QUALITY

UPDATE FILTER TELEMETRY REPORT #8

Minor Frame Number: 91 | OBC Telemetry Report Number: 31

Minor Frame word	91	92	93	94	95
ENTRY	0	1	2	3	4
Data	THETAM 2 MS BYTES		PHIM 2 MS BYTES		XSC 2 MS BYTES

108	109	110	111	112
5	6	7	8	9
	SPARE	SPARE	ZSC 2 MS BYTES	

113	114	115	116	117
10	11	12	13	14
XP 2 MS BYTES		YP 2 MS BYTES		XPE 2 MS BYTES

118	119	120	121	122
15	16	17	18	19
	YPE 2 MS BYTES		P COUNT	K COUNT

123	124	125	126	127
20	21	22	23	24
LSX 2 MS BYTES		LSY 2 MS BYTES		SPARE

ORIGINAL PAGE IS
OF POOR QUALITY

UPDATE FILTER TELEMETRY REPORT #9

Minor Frame Number: 92 OBC Telemetry Report Number: 32

Minor Frame word	91	92	93	94	95
ENTRY	0	1	2	3	4
Data	LSZ 2 MS BYTES		SX 2 MS BYTES		SY 2 MS BYTES

108	109	110	111	112
5	6	7	8	9
	IS MS BYTE	TS MS BYTE	ISTR	LASTID1

113	114	115	116	117
10	11	12	13	14
LASTID2	TRY	ISC	NCA	NCAMAX

118	119	120	121	122
15	16	17	18	19
PASS	STRCAT	VSD	UFDTREQ	ST

123	124	125	126	127
20	21	22	23	24
SPARE				

ORIGINAL PAGE IS
OF POOR QUALITY

UPDATE FILTER TELEMETRY REPORT #10

Minor Frame Number: 93 OBC Telemetry Report Number: 33

Minor Frame word	91	92	93	94	95
ENTRY	0	1	2	3	4
Data	← U →				SPARE

108	109	110	111	112
5	6	7	8	9
← UI →				SPARE

113	114	115	116	117
10	11	12	13	14
← SCU →		XXXXXX	← SCUI →	

118	119	120	121	122
15	16	17	18	19
→ XXXXXX	← TUS →			

123	124	125	126	127
20	21	22	23	24
← SPARE →				

ORIGINAL PAGE IS
OF POOR QUALITY

UPDATE FILTER TELEMETRY REPORT #11

Minor Frame Number: 96 OBC Telemetry Report Number: 34

Minor Frame word	91	92	93	94	95
ENTRY	0	1	2	3	4
Data	← YSC → 2 MS BYTES		← H → 2 MS BYTES		TST 1 MSB

108	109	110	111	112
5	6	7	8	9
← V → 2 MS BYTES		TST 2 MSB	ST1T MSB	ST2T MSB

113	114	115	116	117
10	11	12	13	14
SPARE	STRST15	STRST16	STRST17	STRST18

118	119	120	121	122
15	16	17	18	19
STRST19	STRST20	STRST21	STRST22	STRST23

123	124	125	126	127
20	21	22	23	24
STRST24	STRST25	STRST26	STRST27	STRST28

TABLE 2-46

UPDATE FILTER OBC TELEMETRY DEFINITIONS

ORIGINAL PAGE IS
OF POOR QUALITY

INPUT = DRO [RICH.MAST]TELEMETRY MAS;18 / 29-APR-1982 14:05:04.03 29-APR-82 15:24:46 PAGE 30

FLIGHT SOFTWARE DICTIONARY V1.0-5

NAME	UPROC	TYPE UPROC /	DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
S1	UFLTR	V	ARCSEC	824	0000	D	-5	RADIAN		ESTIMATED ROLL ATTITUDE DETERMINATION ERROR
S2	UFLTR	V	ARCSEC	824	0002	D	-5	RADIAN		ESTIMATED PITCH ATTITUDE DETERMINATION ERROR
S3	UFLTR	V	ARCSEC	824	0004	D	-5	RADIAN		ESTIMATED YAW ATTITUDE DETERMINATION ERROR
S4	UFLTR	V	ARCS/S	824	0006	D	-17	RAD/SE		ESTIMATED ROLL GYRO BIAS COMPENSATION ERROR
S5	UFLTR	V	ARCS/S	824	0008	D	-17	RAD/SE		ESTIMATED PITCH GYRO BIAS COMPENSATION ERROR
S6	UFLTR	V	ARCS/S	824	0010	D	-17	RAD/SE		ESTIMATED YAW GYRO BIAS COMPENSATION ERROR
PM111	UFLTR	V	RAD**2	824	0012	D	-11	RAD**2		(1) ELEMENT OF ATTITUDE ERROR COVARIANCE MATRIX. SCALED BY SCP11
PM112	UFLTR	V	RAD**2	824	0016	D	-11	RAD**2		(2) ELEMENT OF ATTITUDE ERROR COVARIANCE MATRIX. SCALED BY SCP11
PM113	UFLTR	V	RAD**2	824	0020	D	-11	RAD**2		(3) ELEMENT OF ATTITUDE ERROR COVARIANCE MATRIX. SCALED BY SCP11
FIST	UFLTR	P	1/2	824	0024	W	7	1/2	2	STAR TRACKER SELECTION FIELD. 1=STAR TRACKER 1. 2=STAR TRACKER 2.

INPUT - DRO [RICH MAST]TELEMETRY.MAS;18 / 29-APR-1982 14:05:04.03 29-APR-82 15:24:46 PAGE 31

FLIGHT SOFTWARE DICTIONARY V1.0 5

NAME	UPROC	TYPE UPROC /	DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
PM115	UFLTR	V	RAD**2	825	0000	D	-11	RAD**2		(5) ELEMENT OF ATTITUDE ERROR COVARIANCE MATRIX. SCALED BY SCP11 (V14)
PM116	UFLTR	V	RAD**2	825	0004	D	-11	RAD**2		(6) ELEMENT OF ATTITUDE ERROR COVARIANCE MATRIX. SCALED BY SCP11 (V14)
PM119	UFLTR	V	RAD**2	825	0008	D	-11	RAD**2		(9) ELEMENT OF ATTITUDE.ERROR COVARIANCE MATRIX. SCALED BY SCP11 (V14)
PM221	UFLTR	V	(R/S)2	825	0012	D	-35	(R/S)2		(1) ELEMENT OF GYRO BIAS ERROR COVARIANCE MATRIX. SCALED BY SCP22 (V14)
PM222	UFLTR	V	(R/S)2	825	0016	D	-35	(R/S)2		(2) ELEMENT OF GYRO BIAS ERROR COVARIANCE MATRIX. SCALED BY SCP22 (V14)
PM223	UFLTR	V	(R/S)2	825	0020	D	-35	(R/S)2		(3) ELEMENT OF GYRO BIAS ERROR COVARIANCE MATRIX. SCALED BY SCP22 (V14)
NFAIL1	UFLTR	V	N.D.	825	0024	W	7	N.D.		STAR ID FAILURE COUNTER FOR STAR TRACKER #1

ORIGINAL PAGE IS
OF POOR QUALITY

ORIGINAL PAGE IS
OF POOR QUALITY

INPUT = DBO.[RICH MAST]TELEMETRY.MAS;18 / 29-APR-1982 14:05:04.03 29-APR-82 15:24:46 PAGE 32

FLIGHT SOFTWARE DICTIONARY V1.0-5

NAME	DPROC	TYPE	UPROC	/ DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
PM225	UFLTR	V		(R/S)2	826	0000	D	-35	(R/S)2		(5) ELEMENT OF GYRO BIAS ERROR COVARIANCE MATRIX. SCALED BY SCP22 (V14)
PM226	UFLTR	V		(R/S)2	826	0004	D	-35	(R/S)2		(6) ELEMENT OF GYRO BIAS ERROR COVARIANCE MATRIX. SCALED BY SCP22 (V14)
PM229	UFLTR	V		(R/S)2	826	0008	D	-35	(R/S)2		(9) ELEMENT OF GYRO BIAS ERROR COVARIANCE MATRIX. SCALED BY SCP22 (V14)
PM121	UFLTR	V		R*2/SE	826	0012	D	-26	R*2/SE		(1) ELEMENT OF ATTITUDE DETERMINATION AND GYRO BIAS COMPENSATION CROSS COVARIANCE MATRIX SCALED BY SCP12. (V14)
PM122	UFLTR	V		R*2/SE	826	0016	D	-26	R*2/SE		(2) ELEMENT OF ATTITUDE DETERMINATION AND GYRO BIAS COMPENSATION CROSS COVARIANCE MATRIX SCALED BY SCP12. (V14)
PM123	UFLTR	V		R*2/SE	826	0020	D	-26	R*2/SE		(3) ELEMENT OF ATTITUDE DETERMINATION AND GYRO BIAS COMPENSATION CROSS COVARIANCE MATRIX SCALED BY SCP12. (V14)
NFAIL2	UFLTR	V	UFLTR	N.A.	826	0024	W	7	N.A.	0	STAR ID FAILURE COUNTER FOR STAR TRACKER #2

NAME	DPROC	TYPE UPROC /	DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
PM124	UFLTR	V	R*2/SE	827	0000	D	-26	R*2/SE		(4) ELEMENT OF ATTITUDE DETERMINATION AND GYRO BIAS COMPENSATION CROSS COVARIANCE MATRIX SCALED BY SCP12. (V14)
PM125	UFLTR	V	R*2/SE	827	0004	D	-26	R*2/SE		(5) ELEMENT OF ATTITUDE DETERMINATION AND GYRO BIAS COMPENSATION CROSS COVARIANCE MATRIX SCALED BY SCP12. (V14)
PM126	UFLTR	V	R*2/SE	827	0008	D	-26	R*2/SE		(6) ELEMENT OF ATTITUDE DETERMINATION AND GYRO BIAS COMPENSATION CROSS COVARIANCE MATRIX SCALED BY SCP12. (V14)
PM127	UFLTR	V	R*2/SE	827	0012	D	-26	R*2/SE		(7) ELEMENT OF ATTITUDE DETERMINATION AND GYRO BIAS COMPENSATION CROSS COVARIANCE MATRIX SCALED BY SCP12. (V14)
PM128	UFLTR	V	R*2/SE	827	0016	D	-26	R*2/SE		(8) ELEMENT OF ATTITUDE DETERMINATION AND GYRO BIAS COMPENSATION CROSS COVARIANCE MATRIX SCALED BY SCP12. (V14)
PM129	UFLTR	V	R*2/SE	827	0020	D	-26	R*2/SE		(9) ELEMENT OF ATTITUDE DETERMINATION AND GYRO BIAS COMPENSATION CROSS COVARIANCE MATRIX SCALED BY SCP12. (V14)
SPARE	UFLTR	-	-	827	0024	-	-	-		***** S P A R E *****

ORIGINAL PAGE IS
OF POOR QUALITY

ORIGINAL PAGE IS
OF POOR QUALITY

INPUT - DBO:[RICH MAST]TELEMETRY.MAS;18 / 29-APR-1982 14:05:04.03 29-APR-82 15:24:46 PAGE 34
FLIGHT SOFTWARE DICTIONARY V1.0-5

NAME	UPROC	TYPE UPROC /	DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
K11	UFLTR	V	RA/RA	828	0000	D	VAR	RA/RA		(1) ELEMENT OF MEASUREMENT #1 GAIN MATRIX. SCALED BY SCKL AND SCKH.
K12	UFLTR	V	RA/RA	828	0002	D	VAR	RA/RA		(2) ELEMENT OF MEASUREMENT #1 GAIN MATRIX. SCALED BY SCKL AND SCKH.
K13	UFLTR	V	RA/RA	828	0004	D	VAR	RA/RA		(3) ELEMENT OF MEASUREMENT #1 GAIN MATRIX. SCALED BY SCKL AND SCKH.
K14	UFLTR	V	R/S/R	828	0006	D	VAR	R/S/R		(4) ELEMENT OF MEASUREMENT #1 GAIN MATRIX. SCALED BY SCKL AND SCKH.
K15	UFLTR	V	R/S/R	828	0008	D	VAR	R/S/R		(5) ELEMENT OF MEASUREMENT #1 GAIN MATRIX. SCALED BY SCKL AND SCKH.
K16	UFLTR	V	R/S/R	828	0010	D	VAR	R/S/R		(6) ELEMENT OF MEASUREMENT #1 GAIN MATRIX. SCALED BY SCKL AND SCKH.
K111	UFLTR	V	RA/RA	828	0012	D	VAR	RA/RA		(1) ELEMENT OF MEASUREMENT #2 GAIN MATRIX. SCALED BY SCKIL AND SCKIH.
K112	UFLTR	V	RA/RA	828	0014	D	VAR	RA/RA		(2) ELEMENT OF MEASUREMENT #2 GAIN MATRIX. SCALED BY SCKIL AND SCKIH.
K113	UFLTR	V	RA/RA	828	0016	D	VAR	RA/RA		(3) ELEMENT OF MEASUREMENT #2 GAIN MATRIX. SCALED BY SCKIL AND SCKIH.
K114	UFLTR	V	R/S/R	828	0018	D	VAR	R/S/R		(4) ELEMENT OF MEASUREMENT #2 GAIN MATRIX. SCALED BY SCKIL AND SCKIH.
K115	UFLTR	V	R/S/R	828	0020	D	VAR	R/S/R		(5) ELEMENT OF MEASUREMENT #2 GAIN MATRIX. SCALED BY SCKIL AND SCKIH.
K116	UFLTR	V	R/S/R	828	0022	D	VAR	R/S/R		(6) ELEMENT OF MEASUREMENT #2 GAIN MATRIX. SCALED BY SCKIL AND SCKIH.
SPARE	UFLTR	-	-	828	0024	-	-	-		***** S P A R E *****

ORIGINAL PAGE IS
OF POOR QUALITY

NAME	DPROC	TYPE	UPROC /	DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
XS	UFLTR	V		N.D.	829	0000	S	-3	N.D.		TRACKED STAR LOS VECTOR COMPONENTS ALONG TRACKER
YS	UFLTR	V		N.D.	829	0002	S	-3	N.D.		COMPENSATED STAR TRACKER MEASUREMENT ALONG Y AXIS
SCP11	UFLTR	V		N.D.	829	0004	S	7	N.D.		SCALE OF PM11 ELEMENTS
SCP12	UFLTR	V		N.D.	829	0005	S	7	N.D.		SCALE OF PM12 ELEMENTS
SCP22	UFLTR	V		N.D.	829	0006	S	7	N.D.		SCALE OF PM13 ELEMENTS
SCKI	UFLTR	V		N.D.	829	0007	S	7	N.D.		SCALE OF K1,2,3, FOR FIRST PASS THRU GAIN MATRIX COMPUTATION
SCKII	UFLTR	V		N.D.	829	0008	S	7	N.D.		SCALE OF K4,5,6, FOR FIRST PASS THRU GAIN MATRIX COMPUTATION
SCKII	UFLTR	V		N.D.	829	0009	S	7	N.D.		SCALE OF K11,2,3 FOR 2ND PASS THRU GAIN MATRIX COMPUTATION
SCKIII	UFLTR	V		N.D.	829	0010	S	7	N.D.		SCALE OF K14,5,6, FOR 2ND PASS THRU GAIN MATRIX COMPUTATION
STRSTO1	UFLTR	V		N.D.	829	0011	W	7	N.D.		STATUS WORD FOR STARS 1 & 2, V15. TWO ADJACENT 4 BIT GROUPS, WITH STAR (N) THE UPPER 4 BITS, STAR (N+1) THE LOWER FOUR.
STRSTO2	UFLTR	V		N.D.	829	0012	W	7	N.D.		STATUS WORD FOR STARS 3 & 4 (V15). BIT CODING: BIT 1=Y VARIANCE PASS Y/N. BIT 2=X VARIANCE PASS Y/N. BIT 3=INTENSITY PASS Y/N. BIT 4=ORBIT ANGLE P
STRSTO3	UFLTR	V		N.D.	829	0013	W	7	N.D.		STATUS WORD FOR STARS 5 & 6 (V15)
STRSTO4	UFLTR	V		N.D.	829	0014	W	7	N.D.		STATUS WORD FOR STARS 7 & 8 (V15)
STRSTO5	UFLTR	V		N.D.	829	0015	W	7	N.D.		STATUS WORD FOR STARS 9 & 10 (V15)
STRSTO6	UFLTR	V		N.D.	829	0016	W	7	N.D.		STATUS WORD FOR STARS 11 & 12 (V15)
STRSTO7	UFLTR	V		N.D.	829	0017	W	7	N.D.		STATUS WORD FOR STARS 13 & 14 (V15)
STRSTO8	UFLTR	V		N.D.	829	0018	W	7	N.D.		STATUS WORD FOR STARS 15 & 16 (V15)
STRSTO9	UFLTR	V		N.D.	829	0019	W	7	N.D.		STATUS WORD FOR STARS 17 & 18 (V15)
STRST10	UFLTR	V		N.D.	829	0020	W	7	N.D.		STATUS WORD FOR STARS 19 & 20 (V15)
STRST11	UFLTR	V		N.D.	829	0021	W	7	N.D.		STATUS WORD FOR STARS 21 & 22 (V15)
STRST12	UFLTR	V		N.D.	829	0022	W	7	N.D.		STATUS WORD FOR STARS 23 & 24 (V15)

ORIGINAL PAGE IS
OF POOR QUALITY

INPUT = DBO:[RICH MAST]TELEMETRY MAS;18 / 29-APR-1982 14:05:04.03 29-APR-82 15:24:47 PAGE 36
FLIGHT SOFTWARE DICTIONARY V1.0-5

NAME	DPROC	TYPE UPROC /	DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
STRST13	UFLIR	V	N.D.	829	0023	W	7	N.D.		STATUS WORD FOR STARS 25 & 26 (V15)
STRST14	UFLIR	V	N.D.	829	0024	W	7	N.D.		STATUS WORD FOR STARS 27 & 28 (V15)

ORIGINAL PAGE IS
OF POOR QUALITY

INPUT = DBO:[RICH MAST]TELEMETRY MAS;18 / 29-APR-1982 14:05:04.03 29-APR-82 15:24:47 PAGE 37

FLIGHT SOFTWARE DICTIONARY V1.0-5

NAME	DPROC	TYPE	UPROC / DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
TP	UFLTR	V	SECOND	830	0000	S	9	SECOND		PROPAGATION INTERVAL
Z1	UFLTR	V	ARCSEC	830	0001	S	-3	RADIAN		UPDATE SENSOR MEASUREMENT RESIDUALS. FOR STAR TRK ONLY MODE SC=-3. FOR STAR TRK+FSS MODE SC=-2.
Z2	UFLTR	V	ARCSEC	830	0003	S	-3	RADIAN		UPDATE SENSOR MEASUREMENT RESIDUALS. SAME SCALE NOTE APPLIES.
H11	UFLTR	V	N.D.	830	0005	S	0	N.D.		(1) ELEMENT OF UPDATE FILTER MEASUREMENT VECTOR
H12	UFLTR	V	N.D.	830	0007	S	0	N.D.		(2) ELEMENT OF UPDATE FILTER MEASUREMENT VECTOR
H13	UFLTR	V	N.D.	830	0009	S	0	N.D.		(3) ELEMENT OF UPDATE FILTER MEASUREMENT VECTOR
H21	UFLTR	V	N.D.	830	0011	S	0	N.D.		(1) ELEMENT OF UPDATE FILTER MEASUREMENT VECTOR
H22	UFLTR	V	N.D.	830	0013	S	0	N.D.		(2) ELEMENT OF UPDATE FILTER MEASUREMENT VECTOR
H23	UFLTR	V	N.D.	830	0015	S	0	N.D.		(3) ELEMENT OF UPDATE FILTER MEASUREMENT VECTOR
VS1	UFLTR	V	ARCSEC	830	0017	S	-2	RADIAN		MEASUR.RESIDUAL ACCEPTABL ACCURACY CRITERIA FOR THE X STAR TRACKER.
VS2	UFLTR	V	ARCSEC	830	0019	S	-2	RADIAN		MEASUR.RESIDUAL ACCEPTABL ACCURACY CRITERIA FOR THE Y STAR TRACKER.
R5	UFLTR	V	DEGREE	830	0021	S	3	RADIAN		VEH.ORBIT ROTATION ANGLE
SPARE	UFLTR	-	-	830	0022	-	-	-		***** S P A R E *****
SPARE	UFLTR	-	-	830	0023	-	-	-		***** S P A R E *****
SPARE	UFLTR	-	-	830	0024	-	-	-		***** S P A R E *****

INPUT = DBO [RICH.MAST]TELEMETRY MAS;18 / 29-APR-1982 14:05.04.03 29-APR-82 15:24:47 PAGE 38

FLIGHT SOFTWARE DICTIONARY V1.0-5

NAME	UPROC	TYPE	UPROC /	DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
THETAM	UFLTR	V		DEGREE	831	0000	S	-3	RADIAN		COMPENSATED STAR TRACKER MEASUREMENTS
PHIM	UFLTR	V		DEGREE	831	0002	S	-3	RADIAN		FULLY COMPENSATED STAR TRACKER.
XSC	UFLTR	V		N.D.	831	0004	S	-3	N.D.		TRACKED STAR LOS UNIT VECTOR ALONG STAR TRACKER X AXIS
SPARE	UFLTR	-		-	831	0006	-	-	-		***** S P A R E *****
ZSC	UFLTR	V		N.D.	831	0008	S	-3	N.D.		TRACKED STAR LOS UNIT VECTOR ALONG STAR TRACKER Z AXIS
XP	UFLTR	V		N.D.	831	0010	S	0	N.D.		COMPENSATED (FOR ABERRATION) FSS ROLL AXIS MEASUREMENT
YP	UFLTR	V		N.D.	831	0012	S	0	N.D.		COMPENSATED (FOR ABERRATION) FSS PITCH AXIS MEASUREMENT
XPE	UFLTR	V		N.D.	831	0014	S	0	N.D.		EXPECTED FSS MEASUREMENT FOR X AXIS
YPE	UFLTR	V		N.D.	831	0016	S	0	N.D.		EXPECTED FSS MEASUREMENT FOR Y AXIS
PCOUNT	UFLTR	V	UFLTR	COUNTS	831	0018	W	7	COUNTS	0	COUNT OF # OF TIMES THROUGH COVARIANCE MATRIX PROPAGATION
KCOUNT	UFLTR	V	UFLTR	COUNTS	831	0019	W	7	COUNTS	0	COUNT OF # OF TIMES THROUGH GAIN MATRIX COMPUTATION
LSX	UFLTR	V		N.D.	831	0020	S	0	N.D.		COMPONENTS OF MEASURED STAR LOS ALONG VEHICLE X AXIS
LSY	UFLTR	V		N.D.	831	0022	S	0	N.D.		SAME FOR Y AXIS
SPARE	UFLTR	-		-	831	0024	-	-	-		***** S P A R E *****

ORIGINAL PAGE IS OF POOR QUALITY

ORIGINAL PAGE IS
OF POOR QUALITY

INPUT - DBO:[RICH.MAST]TELEMETRY.MAS;18 / 29-APR-1982 14:05:04.03 29-APR-82 15:24:47 PAGE 39

FLIGHT SOFTWARE DICTIONARY V1.0-5

NAME	DPROC	TYPE	UPROC /	DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
LSZ	UFLTR	V		N.D	832	0000	S	0	N.D.		SAME FOR Z AXIS
SX	UFLTR	V		ARCSEC	832	0002	S	0	RADIAN		STAR TRACKER MEASUREMENT RESIDUALS USED IN STAR ID
SY	UFLTR	V		ARCSEC	832	0004	S	0	RADIAN		STAR TRACKER MEASUREMENT RESIDUALS
IS	UFLTR	V		VOLTS	832	0006	W	8	TMC		STAR TRACKER INTENSITY TELEMETRY (V15)
TS	UFLTR	V		VOLTS	832	0007	W	8	TMC		STAR TRACKER TEMPERATURE TELEMETRY (V15)
ISTR	UFLTR	V	UFLTR	N.D.	832	0008	W	7	N.D.	0	IDENTIFIED STAR INDEX
LSTID1	UFLTR	V	UFLTR	N.D.	832	0009	W	7	N.D.	0	LAST STAR IDENTIFIED BY STAR TRACKER #1
LSTID2	UFLTR	V		N.D.	832	0010	W	7	N.D.		LAST STAR IDENTIFIED BY STAR TRACKER #2
IRY	UFLTR	V	UFLTR	N.D.	832	0011	W	7	N.D.	0	UPDATE SENSOR SEQUENCE COUNTER. 1=DATA FROM THE FIRST UPDATE SENSOR HAS BEEN CHECKED. 2=BOTH CHECKED.
ISC	UFLTR	V	UFLTR	N.D.	832	0012	W	7	N.D.	0	# OF STARS IN CATALOG THAT PASS ID CRITERIA
NCA	UFLTR	V	UFLTR	N.A.	832	0013	W	7	N.A.	0	INDEX OF ACCEPTED STAR
NCAMAX	UFLTR	V	UFLTR	N.A.	832	0014	W	7	N.A.	0	# OF STARS IN CATALOG
PASS	UFLTR	V	UFLTR	N.D.	832	0015	W	7	N.D.	0	INDEX FOR GAIN MATRIX COMPUTATION
STRCAT	UFLTR	V		YES/NO	832	0016	W	7	YES/NO		FLAG USED TO INDICATE A NEW CATALOG. 0:NOT LOADED. 1:LOADED. (V14)
VSD	UFLTR	V	UFLTR	YES/NO	832	0017	W	7	YES/NO	0	VALID STAR DATA FLAG
UFDTREQ	UFLTR	V		N.D.	832	0018	S	7	N.D.		UPDATE FILTER DATA REQUEST FLAG (TO BE DELETED)
ST	UFLTR	P		YES/NO	832	0019	W	7	YES/NO	1	STAR TRACKER CONFIGURATION FLAG (0: 1 ST, 1 FSS ; 1: 2 ST)
SPARE	UFLTR	-		-	832	0020	-	-	-		***** S P A R E *****
SPARE	UFLTR	-		-	832	0021	-	-	-		***** S P A R E *****
SPARE	UFLTR	-		-	832	0022	-	-	-		***** S P A R E *****
SPARE	UFLTR	-		-	832	0023	-	-	-		***** S P A R E *****
SPARE	UFLTR	-		-	832	0024	-	-	-		***** S P A R E *****

INPUT = DBO:[RICH.MAST]TELEMETRY.MAS;18 / 29-APR-1982 14:05:04.03 29-APR-82 15:24:47 PAGE 40

FLIGHT SOFTWARE DICTIONARY V1.0-5

NAME	DPROC	TYPE	UPROC /	DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
U	UFLTR	V		RADIAN	833	0000	D	VAR	RADIAN		UF RESIDUAL VARIANCE
SPARE	UFLTR	-		-	833	0004	-	-	-		***** S P A R E *****
UI	UFLTR	V		1/RAD	833	0005	D	VAR	1/RAD		INVERSE OF U
SPARE	UFLTR	-		-	833	0009	-	-	-		***** S P A R E *****
SCU	UFLTR	V	UFLTR	N.A.	833	0010	S	17	N.A.	0	SCALE OF U
SCUI	UFLTR	V	UFLTR	N.A.	833	0013	S	17	N.A.	0	SCALE OF THE INVERSE OF U
TUS	UFLTR	V		MSEC	833	0016	T	38	MSEC		LAST CYCLE FLIGHT SOFTWARE TIME \O32482V17DB
SPARE	UFLTR	-		-	833	0022	-	-	-		***** S P A R E *****
SPARE	UFLTR	-		-	833	0023	-	-	-		***** S P A R E *****
SPARE	UFLTR	-		-	833	0024	-	-	-		***** S P A R E *****

ORIGINAL PAGE IS
OF POOR QUALITY

FLIGHT SOFTWARE DICTIONARY V1.0-5

NAME	DPROC	TYPE	UPROC /	DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
YSC	UFLTR	V		N.D.	834	0000	S	-3	N.D.		TRACKED STAR LOS UNIT VECTOR ALONG STAR TRACKER Y AXIS
H	UFLTR	V	UFLTR	DEGREE	834	0002	S	11	FHSTC	0	STAR TRACKER HORIZONTAL MEASUREMENT (CORRECTED V15)
IST1	UFLTR	V		COUNTS	834	0004	W	7	COUNTS		STAR INTENSITY DATA FROM STAR TRACKER #1 (CORRECTED V15). SEE DR #265.
V	UFLTR	V	UFLTR	DEGREE	834	0005	S	11	FHSTC	0	STAR TRACKER VERTICAL MEASUREMENT (CORRECTED V15)
IST2	UFLTR	V		COUNTS	834	0007	W	7	COUNTS		STAR INTENSITY DATA FROM STAR TRACKER #2 (CORRECTED V15). SEE DR #265.
ST1T	UFLTR	V		VOLTS	834	0008	W	7	COUNTS		TEMPERATURE DATA FROM STAR TRACKER #1 (CORRECTED V15). SEE DR #265.
ST2T	UFLTR	V		VOLTS	834	0009	W	7	COUNTS		TEMPERATURE DATA FROM STAR TRACKER #2 (CORRECTED V15) SEE DR #265.
SPARE	UFLTR	-		-	834	0010	-	-	-		***** S P A R E *****
STRST15	UFLTR	V		N.D.	834	0011	W	7	N.D.		STATUS WORD FOR STARS 29 & 30 (V15)
STRST16	UFLTR	V		N.D.	834	0012	W	7	N.D.		STATUS WORD FOR STARS 31 & 32 (V15)
STRST17	UFLTR	V		N.D.	834	0013	W	7	N.D.		STATUS WORD FOR STARS 33 & 34 (V15)
STRST18	UFLTR	V		N.D.	834	0014	W	7	N.D.		STATUS WORD FOR STARS 35 & 36 (V15)
STRST19	UFLTR	V		N.D.	834	0015	W	7	N.D.		STATUS WORD FOR STARS 37 & 38 (V15)
STRST20	UFLTR	V		N.D.	834	0016	W	7	N.D.		STATUS WORD FOR STARS 39 & 40 (V15)
STRST21	UFLTR	V		N.D.	834	0017	W	7	N.D.		STATUS WORD FOR STARS 41 & 42 (V15)
STRST22	UFLTR	V		N.D.	834	0018	W	7	N.D.		STATUS WORD FOR STARS 43 & 44 (V15)
STRST23	UFLTR	V		N.D.	834	0019	W	7	N.D.		STATUS WORD FOR STARS 45 & 46 (V15)
STRST24	UFLTR	V		N.D.	834	0020	W	7	N.D.		STATUS WORD FOR STARS 47 & 48 (V15)
STRST25	UFLTR	V		N.D.	834	0021	W	7	N.D.		STATUS WORD FOR STARS 49 & 50 (V15)
STRST26	UFLTR	V		N.D.	834	0022	W	7	N.D.		STATUS WORD FOR STARS 51 & 52 (V15)
STRST27	UFLTR	V		N.D.	834	0023	W	7	N.D.		STATUS WORD FOR STARS 53 & 54 (V15)
STRST28	UFLTR	V		N.D.	834	0024	W	7	N.D.		STATUS WORD FOR STAR 55 (V15)

TABLE 2-47

TDRS ANT

OBC TELEMETRY REPORTS

ORIGINAL PAGE IS
OF POOR QUALITY

TDRS ANT POINTING REPORT #1

Minor Frame Number: 19,51,83,115 OBC Telemetry Report Number: 20

Minor Frame word	91	92	93	94	95
ENTRY	0	1	2	3	4
Data	EANA MSB	EANE MSB	ESTS MSB	EABSC MSB	EEBSC MSB

Minor Frame word	108	109	110	111	112
ENTRY	5	6	7	8	9
Data	ESSBC MSB	THANA 2 MS BYTES		THANE 2 MS BYTES	

Minor Frame word	113	114	115	116	117
ENTRY	10	11	12	13	14
Data	THAZ 2 MS BYTES		THEL 2 MS BYTES		E2PANA 2 MS BYTES

Minor Frame word	118	119	120	121	122
ENTRY	15	16	17	18	19
Data		E2PANE 2 MS BYTES		DASCAN MSB	DESCAN MSB

Minor Frame word	123	124	125	126	127
ENTRY	20	21	22	23	24
Data	ZENANG 2 MS BYTES		NCSLEW 2 MS BYTES		INHPTRK

TDRS ANT POINTING REPORT #2

Minor Frame Number: 20,52,84,116 **OBC Telemetry Report Number:** 21

Minor Frame word	91	92	93	94	95
ENTRY	0	1	2	3	4
Data	NASTEP MSB	NESTEP MSB	ISX	IAD	IED

Minor Frame word	108	109	110	111	112
ENTRY	5	6	7	8	9
Data	ACPMODE	EXTRN	ADVTRN	INTDRS	CALENA

Minor Frame word	113	114	115	116	117
ENTRY	10	11	12	13	14
Data	AUTOSW	IERATR	IRESLV	SPARE	NRACMD MSB

Minor Frame word	118	119	120	121	122
ENTRY	15	16	17	18	19
Data	NRECMD MSB	NSTCMD 2 MS BYTES		FEANA	FEANE

Minor Frame word	123	124	125	126	127
ENTRY	20	21	22	23	24
Data	FESTS	LARGE	GANAE MSB	SPARE	ANTADV MSB

TDRS ANT POINTING REPORT #3

Minor Frame Number: 21,53,85,117 OBC Telemetry Report Number: 22

Minor Frame word	91	92	93	94	95
ENTRY	0	1	2	3	4
Data	EPAE1 2 MS BYTES		EPAE2 2 MS BYTES		EPAE3 2 MS BYTES

	108	109	110	111	112
	5	6	7	8	9
		EPAE4 2 MS BYTES		THACMD 2 MS BYTES	

	113	114	115	116	117
	10	11	12	13	14
	THECMD 2 MS BYTES		BANA 2 MS BYTES		BANE 2 MS BYTES

	118	119	120	121	122
	15	16	17	18	19
		YANA 2 MS BYTES		YANE 2 MS BYTES	

	123	124	125	126	127
	20	21	22	23	24
	OMEGA MSB	SPARE			

TDRS ANT POINTING REPORT #4

Minor Frame Number: 22,54,86,118 OBC Telemetry Report Number: 23

Minor Frame word	91	92	93	94	95
ENTRY	0	1	2	3	4
Data	ELBIAS	LAMA1	LAME1	LAMS1	LAMA2

108	109	110	111	112
5	6	7	8	9
LAME2	LAMS2	LAMS3	DMAX	DELTA

113	114	115	116	117
10	11	12	13	14
TABCMD 2 MS BYTES		TEBCMD 2 MS BYTES		STALIM MSB

118	119	120	121	122
15	16	17	18	19
STELIM	SCPENA	GPAE MSB	GIAE MSB	

123	124	125	126	127
20	21	22	23	24

TDRS ANT POINTING REPORT #5

Minor Frame Number: 24, 56, 88, 120 OBC Telemetry Report Number: 44

Minor Frame word	91	92	93	94	95
ENTRY	0	1	2	3	4
Data	FDCGDEE	FDCGDEA	ECOUNT	ACOUNT	TAZSI

108	109	110	111	112
5	6	7	8	9
→	← TELSI	→	← TAZSF	→

113	114	115	116	117
10	11	12	13	14
← TELSF	→	← TAZSD	→	← TELSD —

118	119	120	121	122
15	16	17	18	19
→	FDCNTE	FDCNTA	EFPASS	AFPASS

123	124	125	126	127
20	21	22	23	24
APSTAT	FDCAPFT	← SPARE		→

TABLE 2-48

TDRS ANT POINTING

OBC TELEMETRY DEFINITIONS

ORIGINAL PAGE IS
OF POOR QUALITY

INPUT = DBO:[RICH MAST]TELEMETRY.MAS;18 / 29-APR-1982 14:05:04.03 29-APR-82 15:24:45 PAGE 25
FLIGHT SOFTWARE DICTIONARY V1 0.5

NAME	DPROC	TYPE	UPROC /	DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
EAHA	APCM	V		VOLTS	820	0000	S	4	VOLTS		ATR AZIMUTH ERROR SIGNAL
EANE	APCM	V		VOLTS	820	0001	S	4	VOLTS		ATR ELEVATION ERROR SIGNAL
ESIS	APCM	V		VOLTS	820	0002	S	4	VOLTS		ATR SIGNAL STRENGTH
EABSC	APCM	V		VOLTS	820	0003	S	4	VOLTS		CALIBRATED ATR AZIMUTH SIGNAL BIAS
EEBSC	APCM	V		VOLTS	820	0004	S	4	VOLTS		CALIBRATED ATR ELEVATION SIGNAL BIAS
ESSBC	APCM	V		VOLTS	820	0005	S	4	VOLTS		CALIBRATED ATR SIGNAL STRENGTH BIAS
THANA	APCM	V	ACS	DEGREE	820	0006	S	8	DEGREE		TDRS ANTENNA AZIMUTH ANGLE
THANE	APCM	V	ACS	DEGREE	820	0008	S	8	DEGREE		TDRS ELEVATION ANGLE
THAZ	APCM	V		DEGREE	820	0010	S	8	DEGREE		DESIRED TDRS ANTENNA AZIMUTH
THEL	APCM	V		DEGREE	820	C012	S	8	DEGREE		DESIRED TDRS ANTENNA ELEVATION
E2PANA	APCM	V		DEGREE	820	0014	S	3	RADIAN		TDRS ANTENNA AZIMUTH TRACKING ERROR
E2PANE	APCM	V		DEGREE	820	0016	S	3	RADIAN		TDRS ANTENNA ELEVATION TRACKING ERROR
DASCAN	APCM	V		DEGREE	820	0018	S	8	DEGREE		TDRS ANTENNA AZIMUTH SCAN RANGE DELTA
DESCAN	APCM	V		DEGREE	820	0019	S	8	DEGREE		TDRS ANTENNA ELEVATION SCAN RANGE DELTA
ZENANG	APCM	V		DEGREE	820	0020	S	8	DEGREE		Zenith angLE
NCSLEW	APCM	V		N.D.	820	0022	S	17	N.D.		TDRS ANTENNA Slew timer
INHPTRK	APCM	V		N.D.	820	0024	W	7	N.D.		PROGRAM TRACK INHIBITOR FLAG. BIT 1: I/O DISCRETE TO OFF/DISCRETE TO NORMAL PT. BIT 2: I/O SLEW TO OFF/SLEW TO NORMAL PT. \032782V17DO

ORIGINAL PAGE IS
OF POOR QUALITY

INPUT - OBO (RICH MAST)TELEMETRY MAS:18 / 29-APR-1982 14:05.04.03 29-APR-82 15:24:45 PAGE 26

FLIGHT SOFTWARE DICTIONARY V1.0-5

NAME	OPROC	TYPE UPROC /	DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
NASTEP	APCM	V	STEPS	821	0000	S	7	STEPS		TDRS ANTENNA AZIMUTH GIMBAL DRIVE STEP CMD
NESTEP	APCM	V	STEPS	821	0001	S	7	STEPS		TDRS ANTENNA ELEVATION GIMBAL DRIVE STEP CMD
ISX	APCM	V	N.D.	821	0002	W	7	N.D.		Scan axis indicator: = 0, Azimuth scan = 1, Elevation scan
IAD	APCM	V	N.D.	821	0003	W	7	N.D.		AZIMUTH SCAN DIRECTION FLAG
IED	APCM	V	N.D.	821	0004	W	7	N.D.		ELEVATION SCAN DIRECTION FLAG
ACPMODE	APCM	V	N.D.	821	0005	W	7	N.D.		TDRS ANTENNA POINTING MODE FLAG
EXTRN	APCM	V	N.D.	821	0006	W	7	N.D.		Index for selecting the gimbal angles
ADVIRN	APCM	V	N.D.	821	0007	W	7	N.D.		ADVANCE ANTENNA TURNAROUND FLAG: ENABLED=1
INTDRS	APCM	V	N.D.	821	0008	W	7	N.D.		Index for selecting TDRS East or west: = 0, TDRS-East = 1, TDRS-West
CALENA	APCM	V	N.D.	821	0009	W	7	N.D.		ATR REFERENCE CALIBRATION FLAG: ENABLED=1
AUTOSW	APCM	V	N.D.	821	0010	W	7	N.D.		AUTOMATIC MODE SWITCHING FLAG: ENABLED=1
IEARIR	APCM	V	N.D.	821	0011	W	7	N.D.		INDEX FOR ATR RECEIVER SELECT 1:REDUNDANT(#2) 0:PRIME(#1)
IRESIV	APCM	P	N.D.	821	0012	W	7	N.D.	0	RESOLVER INDEX: = 0, USE PRIMARY = 1, USE REDUNDANT
SPARE	APCM	-	-	821	0013	-	-	-		***** S P A R E *****
NRACMD	APCM	V	STEPS	821	0014	S	7	STEPS		Azimuth SLEW RATE CMD
NRECMD	APCM	V	STEPS	821	0015	S	7	STEPS		ELEVATION slew rate CMD
NSTCMD	APCM	V	STEPS	821	0016	S	7	STEPS		Slew timer
FEANA	APCM	V	VOLTS	821	0018	S	4	VOLTS		FILTERED AZIMUTH ERROR SIGNAL
FEANE	APCM	V	VOLTS	821	0019	S	4	VOLTS		FILTERED ELEVATION ERROR SIGNAL
FESTS	APCM	V	VOLTS	821	0020	S	4	VOLTS		FILTERED SIGNAL STRENGTH ERROR SIGNAL
LARGE	APCM	V	N.D.	821	0021	W	7	N.D.		LARGE SLEW INDICATOR
GANAL	APCM	V	N.D.	821	0022	S	-12	N.D.		GAIN COMPENSATION CONSTANT
SPARE	APCM	-	-	821	0023	-	-	-		***** S P A R E ***** \042702V1GDO

INPUT = DRO [RICH.MAST]TELEMETRY.MAS;18 / 29-APR-1982 14:05 04.03 29-APR-82 15:24:45 PAGE 27

FLIGHT SOFTWARE DICTIONARY V1.0-5

NAME	DPROC	TYPE	UPROC / DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
ANTADV	APCM	V	DEGREE	821	0024	D	8	DEGREE		Antenna advance angle

ORIGINAL PAGE IS
OF POOR QUALITY

FLIGHT SOFTWARE DICTIONARY V1.0-5

NAME	DPROC	TYPE UPROC /	DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
EPAE1	APCM	V	N.D.	822	0000	D	1	N.D.		EULER PARMS TO CORRECT FOR ANTENNA ALIGNMENT ERRORS
EPAE2	APCM	V	N.D.	822	0002	D	1	N.D.		EULER PARMS TO CORRECT FOR ANTENNA ALIGNMENT ERRORS
EPAE3	APCM	V	N.D.	822	0004	D	1	N.D.		EULER PARMS TO CORRECT FOR ANTENNA ALIGNMENT ERRORS
EPAE4	APCM		N.D.	822	0006	D	1	N.D.		EULER PARMS TO CORRECT FOR ANTENNA ALIGNMENT ERRORS
THACMD	APCM	V	DEGREE	822	0008	D	8	DEGREE		Ext. commanded azimuth gimbal angle
THECMD	APCM	V	DEGREE	822	0010	D	8	DEGREE		Ext. commanded elevation gimbal angle
BANA	APCM	V	N.D.	822	0012	D	3	N.D.		LIMITED AZIMUTH ERROR SIGNAL INTEGRAL
BANE	APCM	V	N.D.	822	0014	D	3	N.D.		LIMITED ELEVATION ERROR SIGNAL INTEGRAL
YANA	APCM	V	N.D.	822	0016	D	6	N.D.		LIMITED AZIMUTH ERROR SIGNAL DOUBLE INTEGRAL
YANE	APCM	V	N.D.	822	0018	D	6	N.D.		LIMITED ELEVATION ERROR SIGNAL DOUBLE INTEGRAL
OMEGA	APCM	V	RADIAN	822	0020	D	-5	RADIAN		BACKUP SEARCH CONVERSION CRITERIA
SPARE	APCM	-	-	822	0022	-	-	-		***** S P A R E *****
SPARE	APCM	-	-	822	0023	-	-	-		***** S P A R E *****
SPARE	APCM	-	-	822	0024	-	-	-		***** S P A R E *****

ORIGINAL PAGE IS OF POOR QUALITY

INPUT = DBO:[RICH.MAST]TELEMETRY.MAS;18 / 29-APR-1982 14:05:04 03 29-APR-82 15:24:46 PAGE 29

FLIGHT SOFTWARE DICTIONARY V1.0-5

NAME	UPROC	TYPE	UPROC / DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
ELBIAS	APCM	V	DEGREE	823	0000	D	8	DEGREE		Turnaround initiation criterion
LAMA1	APCM	V	VOLTS	823	0001	S	4	VOLTS		Program track to autotrack MODE SWITCHING THRESHOLDS
LAME1	APCM	V	VOLTS	823	0002	S	4	VOLTS		PROGRAM TRACK TO AUTOTRACK MODE SWITCHING THRESHOLDS
LAMS1	APCM	V	VOLTS	823	0003	S	4	VOLTS		PROGRAM TRACK TO AUTOTRACK MODE SWITCHING THRESHOLDS
LAMA2	APCM	V	VOLTS	823	0004	S	4	VOLTS		Autotrack to program track SWITCHING THRESHOLDS
LAME2	APCM	V	VOLTS	823	0005	S	4	VOLTS		AUTOTRACK TO PROGRAM TRACK SWITCHING THRESHOLDS
LAMS2	APCM	V	VOLTS	823	0006	S	4	VOLTS		AUTOTRACK TO PROGRAM TRACK SWITCHING THRESHOLDS
LAMS3	APCM	V	VOLTS	823	0007	S	4	VOLTS		Backup search to autotrack mode switching threshold
DMAX	APCM	V	DEGREE	823	0008	D	8	DEGREE		Backup search maximum scan RADIUS
DELTA	APCM	V	DEGREE	823	0009	D	8	DEGREE		Backup search scan range increment
IABCMD	APCM	P	DEGREE	823	0010	S	8	DEGREE	0	AZIMUTH RESOLVER BIAS CMD
IEBCMD	APCM	P	DEGREE	823	0012	S	8	DEGREE	0	elevation RESOLVER bias CMD
STALIM	APCM	V	STEPS	823	0014	W	7	STEPS		Max. steps in a control CYCLE
STELIM	APCM	V	STEPS	823	0015	W	7	STEPS		MAX STEPS IN A CONTROL CYCLE
SCPENA	APCM	V	N.D.	823	0016	W	7	N.D.		STORED COMMAND PROCESSING ENABLE FLAG: ENABLED=1
GPAE	APCM	V	N.D.	823	0017	D	0	N.D.		RATE COMPUTATION CONSTANTS
GIAE	APCM	V	N.D.	823	0018	D	0	N.D.		RATE COMPUTATION CONSTANTS
GDAE	APCM	V	N.D.	823	0019	D	-6	N.D.		RATE COMPUTATION CONSTANTS
SPARE	APCM	-	-	823	0020	-	-	-		***** S P A R E *****
SPARE	APCM	-	-	823	0021	-	-	-		***** S P A R E *****
SPARE	APCM	-	-	823	0022	-	-	-		***** S P A R E *****
SPARE	APCM	-	-	823	0023	-	-	-		***** S P A R E *****
SPARE	APCM	-	-	823	0024	-	-	-		***** S P A R E *****

ORIGINAL PAGE IS
OF POOR QUALITY

INPUT = DBO.[RICH.MAST]TELEMETRY.MAS;18 / 29-APR-1982 14:05:04.03 29-APR-82 15:24:49 PAGE 53

FLIGHT SOFTWARE DICTIONARY V1 0-5

NAME	DPROC	TYPE	UPROC /	DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
FDCGDEE	APCM	V		YES/NO	844	0000	W	7	YES/NO		ELEVATION GDE-FDC ENABLED FLAG (O: DISABLED, 1: ENABLED)
FDCGDEA	APCM	V		YES/NO	844	0001	W	7	YES/NO		AZIMUTH GDE-FDC ENABLED FLAG (O: DISABLED, 1: ENABLED)
ECOUNT	APCM	V		N A.	844	0002	W	7	N A.		Counter for Elevation
ACOUNT	APCM	V		N.A.	844	0003	W	7	N A.		Counter for Azimuth
TAZSI	APCM	V		DEGREE	844	0004	D	10	DEGREE		Azimuth resolver output @ Acount=O
TELSI	APCM	V		DEGREE	844	0006	D	10	DEGREE		Elevation resolver output @ Ecount=O
TAZSF	APCM	V		DEGREE	844	0008	D	10	DEGREE		Azimuth resolver output @ Acount>Maxcnt
TELSF	APCM	V		DEGREE	844	0010	D	10	DEGREE		Elevation resolver output @ Ecount>Maxcnt
TAZSD	APCM	V		DEGREE	844	0012	D	10	DEGREE		ABS(TAZSF - TAZSI)
TELSD	APCM	V		DEGREE	844	0014	D	10	DEGREE		ABS(TELSF - TELSI)
FDCNTE	APCM	V		COUNTS	844	0016	W	7	COUNTS		Failure counter for Elevation (REFERRED TO AS FAILCNTE IN OBC)
FDCNTA	APCM	V		COUNTS	844	0017	W	7	COUNTS		Failure counter for Azimuth (REFERRED TO AS FAILCNTA IN OBC)
ELPASS	APCM	V		YES/NO	844	0018	W	7	YES/NO	O	1st Pass flag for Elevation (O: FIRST PASS, 1: NOT FIRST PASS)
ALPASS	APCM	V		YES/NO	844	0019	W	7	YES/NO	O	1st Pass flag for Azimuth (O: FIRST PASS, 1: NOT FIRST PASS)
APSTAT	APCM	V		N.D.	844	0020	W	7	N.D.		BIT1: AZIM AGAINST SOFT STOP; BIT2: ELEV AGAINST SOFT STOP; BIT3: SYNTAX ERR IN CMD; BIT4: INVAL OPERAND IN CMD; BIT5: UNDEF REQ CODE \031182V17RS
FDCAPET	APCM	V		SEC	844	0021	W	27	MSEC		CLOCK TB WHEN FDC SWITCHED APCM TO OFF MODE \042782V18DQ
SPARE	APCM	-		-	844	0024	-	-	-		***** S P A R E *****

TABLE 2-49

SOLAR ARRAY POTENTIOMETER

OBC TELEMETRY REPORTS

ORIGINAL PAGE IS
OF POOR QUALITY

SOLAR ARRAY POTENTIOMETER DATA REPORT #1

Minor Frame Number: 00   OBC Telemetry Report Number: 35

Minor Frame word	91	92	93	94	95
ENTRY	0	1	2	3	4
Data	← TSAI1 →		XXXXXX	← TSAI2 →	

Minor Frame word	108	109	110	111	112
ENTRY	5	6	7	8	9
Data	→ XXXXXX	SCFLAG MSB	DPUUSE LSB	FDCSADF LSB	SADFAIL LSB

Minor Frame word	113	114	115	116	117
ENTRY	10	11	12	13	14
Data	FSTIME LSB	← SADRATE → 2 MS BYTES		← POTDIF → 2 MS BYTES	

Minor Frame word	118	119	120	121	122
ENTRY	15	16	17	18	19
Data	← TIME 18 → 2 MS BYTES		ISAPI LSB	SADINT LSB	DLYFLG LSB

Minor Frame word	123	124	125	126	127
ENTRY	20	21	22	23	24
Data	INDEX LSB.	← SPARE →			

TABLE 2-50

SOLAR ARRAY POTENTIOMETER

OBC TELEMETRY DEFINITIONS

INPUT = DBO.[RICH MAS]TELEMETRY MAS;18 / 29-APR-1982 14:05:04.03 29-APR-82 15:24.47 PAGE 42

FLIGHT SOFTWARE DICTIONARY V1.0-5

NAME	DPROC	TYPE	UPROC /	DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
TSAI1	POTDAT	V		DEGREE	835	0000	S	9	DEGREE		SOLAR ARRAY ORIENTATION FROM POT#1
TSAI2	POTDAT	V		DEGREE	835	0003	S	9	DEGREE		SOLAR ARRAY ORIENTATION FROM POT#2
SCFLAG	POTDAT			N.D.	835	0006	W	7	N.D.		BIT1:POT#1 BAD BIT2:POT#2 BAD (V15A)
DPUUSE	SADFDC	V	SCP	N.D.	835	0007	W	7	N.D.		0:IGNORE DPU, 1:DPU OK SET=0 IF SAD FAILURE
FDCSADF	SADFDC	V		N.D.	835	0008	W	7	N.D.		1:FAILURE DETECTED, 0:NO FAILURE
SADFAIL	SADFDC	V		N.D.	835	0009	W	7	N.D.		# OF CONSECUTIVE TIMES SAD RATE OUT OF LIMITS
FSTIME	SADFDC	V		N.D.	835	0010	W	7	N.D.		1:FIRST TIME 18 POT VALUE BUFFER IS FULL
SADRATE	SADFDC	V		DEG/SE	835	0011	S	1	DEG/SE		COMPUTED SAD RATE
POTDIF	SADFDC	V		DEGREE	835	0013	S	9	DEGREE		DELTA POT RDG OVER LAST 262.144 SEC
TIME18	SADFDC	V		MSEC	835	0015	S	27	MSEC		CLOCK18 RDG WHEN SADFDC SWITCHED PDU
TSAPT	SADFDC	V		N.D.	835	0017	W	7	N.D.		POT SELECTION 1:USE POT#1, OTHERWISE USE #2
SADINI	SADFDC	V		N.D.	835	0018	W	7	N.D.		INITIALIZATION BITS FROM EXEC BIT1:INTERRUPT 0 BIT2:GRD REQUEST
DLYFLG	SADFDC	V		N.D.	835	0019	W	7	N.D.		1:WHILE SADFDC WAITING TO SEND 1X ORBIT RATE CMD
INDEX	SADFDC	V		N.D.	835	0020	W	7	N.D.		PTR TO MOST RECENTLY STORED POT DATA
SPARE	POTDAT	V		-	835	0021	-	-	-		***** S P A R E *****
SPARE	POTDAT	V		-	835	0022	-	-	-		***** S P A R E *****
SPARE	POTDAT	V		-	835	0023	-	-	-		***** S P A R E *****
SPARE	POTDAT	V		-	835	0024	-	-	-		***** S P A R E *****

ORIGINAL PAGE IS OF POOR QUALITY

TABLE 2-51

EPHEMERIS OBC TELEMETRY REPORTS

ORIGINAL PAGE IS
OF POOR QUALITY

EPHEMERIS COMPUTATION TELEMETRY REPORT #1

Minor Frame Number: 16,48,80,112 OBC Telemetry Report Number: 13

Minor Frame word	91	92	93	94	95
ENTRY	0	1	2	3	4
Data	← EOGBRF(1) →				←

	108	109	110	111	112
	5	6	7	8	9
	EOGBRF(2) →			← EOGBRF(3)	

	113	114	115	116	117
	10	11	12	13	14
	→		← EOGBVF(1)		

	118	119	120	121	122
	15	16	17	18	19
	→	← EOGBVF(2) →			

	123	124	125	126	127
	20	21	22	23	24
	← EOGBVF(3) →				$\underbrace{XXX}_{TUGFLGU}\ \underbrace{XXX}_{FUGFLGU}\ \underbrace{XX}_{GUGFLGU}$

TF is the time of the parameters in the above table

ORIGINAL PAGE IS OF POOR QUALITY

EPHEMERIS COMPUTATION TELEMETRY REPORT #2

Minor Frame Number: 17,49,81,113   OBC Telemetry Report Number: 14

Minor Frame word	91	92	93	94	95
ENTRY	0	1	2	3	4
Data	EOGBRG(1)				←

108	109	110	111	112
5	6	7	8	9
EOGBRG(2) →			EOGBRG(3)	

113	114	115	116	117
10	11	12	13	14
→		EOGBVG(1)		

118	119	120	121	122
15	16	17	18	19
→	EOGBVG(2)			

123	124	125	126	127
20	21	22	23	24
EOGBVG(3)				EPROC

TF is the time of the parameters in the above table

C-4

ORIGINAL PAGE IS
OF POOR QUALITY

EPHEMERIS COMPUTATION TELEMETRY REPORT #3

Minor Frame Number: 18,50,82,114 **OBC Telemetry Report Number:** 15

Minor Frame word	91	92	93	94	95
ENTRY	0	1	2	3	4
Data	EOGVCSEC			EOGVSHER	

108	109	110	111	112
5	6	7	8	9
	EOGVARER			

113	114	115	116	117
10	11	12	13	14
EOGVGTER		NEWDAT	NEWDATT	ECLNEW

118	119	120	121	122
15	16	17	18	19
EOGVF7DO			EOGVNFRE	

123	124	125	126	127
20	21	22	23	24
	EOGVLOST			SPARE

ORIGINAL PAGE IS
OF POOR QUALITY

EPHEMERIS COMPUTATION TELEMETRY REPORT #4

Minor Frame Number: 58 OBC Telemetry Report Number: 16

Minor Frame word	91	92	93	94	95
ENTRY	0	1	2	3	4
Data	EOGVFALM			EOGVTALM	

Minor Frame word	108	109	110	111	112
ENTRY	5	6	7	8	9
Data		EOGWPU			

Minor Frame word	113	114	115	116	117
ENTRY	10	11	12	13	14
Data	EOGWPC				

Minor Frame word	118	119	120	121	122
ENTRY	15	16	17	18	19
Data	EOGWPT				

Minor Frame word	123	124	125	126	127
ENTRY	20	21	22	23	24
Data					

ORIGINAL PAGE IS
OF POOR QUALITY

EPHEMERIS COMPUTATION TELEMETRY REPORT #5

Minor Frame Number: 59 OBC Telemetry Report Number: 17

Minor Frame word	91	92	93	94	95
ENTRY	0	1	2	3	4
Data	EOGBPTDE(1)				

108	109	110	111	112
5	6	7	8	9
EOGBPTDE(2)			EOGBPTDE(3)	

113	114	115	116	117
10	11	12	13	14
		WOGBPT1		

118	119	120	121	122
15	16	17	18	19
	WOGBPT2			

123	124	125	126	127
20	21	22	23	24
WOGBPT3				SPARE

ORIGINAL PAGE IS
OF POOR QUALITY

EPHEMERIS COMPUTATION TELEMETRY REPORT #6

Minor Frame Number: 18 OBC Telemetry Report Number: 18

Minor Frame word	91	92	93	94	95
ENTRY	0	1	2	3	4
Data	EOGWTE3				

108	109	110	111	112
5	6	7	9	9
EOGWTT3				

113	114	115	116	117
10	11	12	13	14
EOGWTTE				

118	119	120	121	122
15	16	17	18	19
EOGWTTW				

123	124	125	126	127
20	21	22	23	24
EOGVNT			SPARE	

ORIGINAL PAGE IS
OF POOR QUALITY

EPHEMERIS COMPUTATION TELEMETRY REPORT #7

Minor Frame Number: 61 OBC Telemetry Report Number: 19

Minor Frame word	91	92	93	94	95
ENTRY	0	1	2	3	4
Data	EOGWGT1				

Minor Frame word	108	109	110	111	112
ENTRY	5	7	7	8	9
Data	EOGWGT2				

Minor Frame word	113	114	115	116	117
ENTRY	10	11	12	13	14
Data	EOGWTDAT				

Minor Frame word	118	119	120	121	122
ENTRY	15	16	17	18	19
Data	EOGVINIT	SPARE			

Minor Frame word	123	124	125	126	127
ENTRY	20	21	22	23	24
Data					MXTM

TABLE 2-52

EPHEMERIS OBC TELEMETRY DEFINITIONS

ORIGINAL PAGE IS
OF POOR QUALITY

INPUT • DBO [RICH MAST]TELEMETRY MAS;18 / 29-APR-1982 14:05:04.03 29-APR-82 15:24:44 PAGE 18

FLIGHT SOFTWARE DICTIONARY V1.0-5

NAME	UPROC	TYPE	UPROC / DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
EOGBRF1	EPHEM	V	METERS	813	0000	D	23	METERS		ECI X AXIS COMPONENT OF FS POSITION COMPUTED USING UPLINKED DATA
EOGBRF2	EPHEM	V	METERS	813	0004	D	23	METERS		ECI Y AXIS COMPONENT OF FS POSITION COMPUTED USING UPLINKED DATA
EOGBRF3	EPHEM	V	METERS	813	0008	D	23	METERS		ECI Z AXIS COMPONENT OF FS POSITION COMPUTED USING UPLINKED DATA
EOGBVF1	EPHEM	V	KM/SEC	813	0012	D	3	KM/SEC		ECI X AXIS COMPONENT OF FS VELOCITY COMPUTED USING UPLINKED DATA
EOGBVF2	EPHEM	V	KM/SEC	813	0016	D	3	KM/SEC		ECI Y AXIS COMPONENT OF FS VELOCITY COMPUTED USING UPLINKED DATA
EOGBVF3	EPHEM	V	KM/SEC	813	0020	D	3	KM/SEC		ECI Z AXIS COMPONENT OF FS VELOCITY COMPUTED USING UPLINKED DATA
GUGFLGU	EPHEM	V	N.D.	813	0024	B002	1	N.D.		1=INITIALIZED 2=BKGD COEFFS READY 3=FORGROUND COPIED BKGD COEFFICIENTS \032982V17DB
FUGFLGU	EPHEM	V	N.D.	813	0024	B003	2	N.D.		1=INIT 2=FORGRD TELLS BGKD USE NEW DATA 3=SET BY BKGD WHEN NEW COEFF COMP BY BKGD 4=SET BY FORGRD WHEN NEW COEFF COMPUTED BY BKGD. \032982V17DB
TUGFLGU	EPHEM	V	N.D.	813	0024	B003	2	N.D.		SAME AS FUGFLGU FOR TDRS \032982V17DB

INPUT = DDO [RICH MAST]TELEMETRY.MAS;18 / 29-APR-1982 14:05:04.03 29-APR-82 15:24:45 PAGE 19

FLIGHT SOFTWARE DICTIONARY V1.0-5

NAME	DPROC	TYPE	UPROC /	DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
FOGBRG1	EPHEM	V		METERS	814	0000	D	23	METERS		ECI X AXIS COMPONENT OF FS POSITION COMPUTED USING GPS DATA
FOGBRG2	EPHEM	V		METERS	814	0004	D	23	METERS		ECI Y AXIS COMPONENT OF FS POSITION COMPUTED USING GPS DATA
FOGBRG3	EPHEM	V		METERS	814	0008	D	23	METERS		ECI Z AXIS COMPONENT OF FS POSITION COMPUTED USING GPS DATA
FOGBVG1	EPHEM	V		KM/SEC	814	0012	D	3	KM/SEC		ECI X AXIS COMPONENT OF FS VELOCITY COMPUTED USING GPS DATA
FOGBVG2	EPHEM	V		KM/SEC	814	0016	D	3	KM/SEC		ECI Y AXIS COMPONENT OF FS VELOCITY COMPUTED USING GPS DATA
FOGBVG3	EPHEM	V		KM/SEC	814	0020	D	3	KM/SEC		ECI Z AXIS COMPONENT OF FS VELOCITY COMPUTED USING GPS DATA
EPROC	GCUP	V		N.D.	814	0024	W	7	N.D.		BIT1:TDRS-W PERMITTED. BIT2:TDRS PERMITTED. BIT3:GPS PERMITTED. BIT4:UPLINK PERMITTED. BIT5:TDRS-E PERMITTED. \032982V17DB

ORIGINAL PAGE IS
OF POOR QUALITY

ORIGINAL PAGE IS
OF POOR QUALITY

INPUT = UBO:[RICH MAST]TELEMETRY.MAS;18 / 29-APR-1982 14:05:04.03 29-APR-82 15:24:45 PAGE 20

FLIGHT SOFTWARE DICTIONARY V1.0-5

NAME	DPROC	TYPE	UPROC /	DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
EOGVCSE	GCUP	V	EPHEM	N.D.	815	0000	S	17	N.D.		GPS running consecutive checksum error count initialized to 0
EOGVSIE	GCUP	V	EPHEM	N.D.	815	0003	S	17	N.D.		GPS running conversion error counter initialized to 0
EOGVARE	GCUP	V	EPHEM	N.D.	815	0006	S	17	N.D.		Running GPS variance error count initialized to 0
EOGVGIE	GCUP	V	EPHEM	N.D.	815	0009	S	17	N.D.		No new GPS time running counter
NEWDAT	UCUP	V		N.D.	815	0012	W	7	N.D.		UCUP SYSTEM TABLE NEW DATA FLAG \042982V17DQ
NEWDATT	TCUP	V		N.D.	815	0013	W	7	N.D.		TCUP SYSTEM TABLE NEW DATA FLAG \042982V17DQ
ECINEW	EPHEM	V		N.D.	815	0014	W	7	N.D.		FS NEW DATA FLAG \032482V17DB
EOGVF7D	IDA	V	EPHEM	N.D.	815	0015	S	17	N.D.		Count of GPS data lost because file 7 data not ready initialized to 0
EOGVNFR	IDA	V	EPHEM	N.D.	815	0018	S	17	N.D.		Count of GPS files lost due to buffer not free initialized to 0
EOGVLDS	EPHEM	V		N.D.	815	0021	S	17	N.D.		Count of number of times the E.C. module was executed since last good GPS
ECLINEW	EPHEM	V		N.D.	815	0024	W	7	N.D.		TDRS NEW DATA FLAG \032482V17DB

ORIGINAL PAGE IS
OF POOR QUALITY

INPUT = DRO:[RICH.MAST]TELEMETRY.MAS;18 / 29-APR-1982 14:05:04.03 29-APR-82 15:24:45 PAGE 21
FLIGHT SOFTWARE DICTIONARY V1.0-5

NAME	DPROC	TYPE	UPROC /	DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
FOGVFAL	UCUP	V	EPHEM	N.D.	816	0000	S	17	N.D.		Residual count exceeded counter for FS uplinked data Initialized to 0
EOGVTAL	TCUP	V	EPHEM	N.D.	816	0003	S	17	N.D.		TOTAL TDRS EPHEMERIDES FIT INTERVAL EXCEEDED COUNTER INITIALIZED TO 0
FOGWPU	EPHEM	V		N.D.	816	0006	D	2	N.D.		Uplinked FS ephemeris normalized time
FOGWPG	EPHEM	V		N.D.	816	0010	D	2	N.D.		GPS ephemeris normalized time
EOGWPT	EPHEM	V		N.D.	816	0014	D	2	N.D.		TDRS ephemerides normalized time
SPARE	EPHEM	-		-	816	0018	-	-	-		***** S P A R E *****
SPARE	EPHEM	-		-	816	0019	-	-	-		***** S P A R E *****
SPARE	EPHEM	-		-	816	0020	-	-	-		***** S P A R E *****
SPARE	EPHEM	-		-	816	0021	-	-	-		***** S P A R E *****
SPARE	EPHEM	-		-	816	0022	-	-	-		***** S P A R E *****
SPARE	EPHEM	-		-	816	0023	-	-	-		***** S P A R E *****
SPARE	EPHEM	-		-	816	0024	-	-	-		***** S P A R E ***** EPH%04

ORIGINAL PAGE IS
OF POOR QUALITY

INPUT = DBO·[RICH.MAST]TELEMETRY.MAS;18 / 29-APR-1982 14:05 04.03 29-APR-82 15:24:45 PAGE 22

FLIGHT SOFTWARE DICTIONARY V1.0-6

NAME	UPROC	TYPE	UPROC /	DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
EOGBPT1	EPHEM	V	APCM	METERS	817	0000	D	26	METERS		ECI X AXIS COMPONENT OF TDRS-E POSITION
EOGBPT2	EPHEM	V		METERS	817	0004	D	26	METERS		ECI Y AXIS COMPONENT OF TDRS-E POSITION
EOGBPT3	EPHEM	V		METERS	817	0008	D	26	METERS		ECI Z AXIS COMPONENT OF TDRS-E POSITITON
WOGBPT1	EPHEM	V		METERS	817	0012	D	26	METERS		ECI X AXIS COMPONENT OF TDRS-W POSITION
WOGBPT2	EPHEM	V		METERS	817	0016	D	26	METERS		ECI Y AXIS COMPONENT OF TDRS-W POSITION
WOGBPT3	EPHEM	V		METERS	817	0020	D	26	METERS		ECI Z AXIS COMPONENT OF TDRS-W POSITION
SPARE	EPHEM	-		-	817	0024	-	-	-		***** S P A R E ***** EPH%05

ORIGINAL PAGE IS
OF POOR QUALITY

INPUT = DBO.[RICH.MAST]TELEMETRY.MAS;18 / 29-APR-1982 14:05:04 03 29-APR-82 15:24:45 PAGE 23

FLIGHT SOFTWARE DICTIONARY V1.0-5

NAME	DPROC	TYPE	UPROC /	DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
FOGWIF3	EPHEM	V		MSEC	818	0000	T	38	MSEC		Upper time limit for uplinked FS ephemeris interpolator Initialized to 0
FOGWIT3	EPHEM	V		MSEC	818	0005	T	38	MSEC		TDRS interpolator coeffs. upper time limit Initialized to 0
EOGWITE	EPHEM	V		MSEC	818	0010	T	38	MSEC		TDRS East time of current data
FOGWITW	EPHEM	V		MSEC	818	0015	T	38	MSEC		TDRS West time of current data
EOGVNI	UCUP	V	EPHEM	N.D.	818	0020	W	17	N.D		UPLINKED FS EPHEMERIS RESIDUAL COUNTER
SPARE	EPHEM	-		-	818	0023	-	-	-		***** S P A R E *****
SPARE	EPHEM	-		-	818	0024	-	-	-		***** S P A R E ***** EPH%06

ORIGINAL PAGE IS
OF POOR QUALITY

INPUT = DBO:[RICH.MAST]TELEMETRY.MAS;18 / 29-APR-1982 14 05:04.03 29-APR-82 15:24:45 PAGE 24

FLIGHT SOFTWARE DICTIONARY V1.0-5

NAME	UPROC	TYPE	UPROC /	DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
EOGWGT1	GCUP	V	EPHEM	MSEC	819	0000	T	38	MSEC		TIME OF CURRENT FIRST GRID POINT FOR GPS INTERPOLATION
EOGWGT2	EPHEM	V		MSEC	819	0005	T	38	MSEC		Time of most recent GPS data (GUGWGTU2 for use in E.C.)
TDAT	UNDEF	V	EPHEM	MSEC	819	0010	T	38	MSEC		Converted GPS time to spacecraft time (NOTE REFERRED AS EOGWTDAT IN OBC)
EOGVINI	GCUP	V	EPHEM	N.D.	819	0015	W	7	N.D.		GPS coeff. update program initialization indicator (1,2,0) Initialized to 1
SPARE	EPHEM	-		-	819	0016	-	-	-		***** S P A R E *****
SPARE	EPHEM	-		-	819	0017	-	-	-		***** S P A R E *****
SPARE	EPHEM	-		-	819	0018	-	-	-		***** S P A R E *****
SPARE	EPHEM	-		-	819	0019	-	-	-		***** S P A R E *****
SPARE	EPHEM	-		-	819	0020	-	-	-		***** S P A R E *****
SPARE	EPHEM	-		-	819	0021	-	-	-		***** S P A R E *****
SPARE	EPHEM	-		-	819	0022	-	-	-		***** S P A R E *****
SPARE	EPHEM	-		-	819	0023	-	-	-		***** S P A R E *****
MXTM	EPHEM	V		YES/NO	819	0024	W	7	YES/NO		MAX TIME WITHOUT GPS DATA EXCEEDEC (NOTE REFERRED TO AS EOGWMXTM IN OBC)

TABLE 2-53

SOLAR ARRAY DEPLOY OBC TELEMETRY

REPORTS

SOLAR ARRAY DEPLOYMENT TELEMETRY REPORT

Minor Frame Number: 01 OBC Telemetry Report Number: 36

Minor Frame word	91	92	93	94	95
ENTRY	0	1	2	3	4
Data	← SDSEPTM		→	← SDTEMP	

108	109	110	111	112
5	6	7	8	9
→	SCSIDE1	PDSIDE2	ARMLOOP	PDLOOP2

113	114	115	116	117
10	11	12	13	14
DEPLOOP	PDXLOOP	SCCULOOP		

118	119	120	121	122
15	16	17	18	19

123	124	125	126	127
20	21	22	23	24

TABLE 2-54

SOLAR ARRAY DEPLOY OBC TELEMETRY DEFINITIONS

NAME	UPROC	TYPE	UPROC / DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
SDSEPTM	SOLECT	V	MSEC	836	0000	S	27	MSEC		TIME AT WHICH S/C SEPARATION WAS DETECTED FOR 3RD CONSECUTIVE TIME. NEXT SPARE DELETED V16. \020282V1600
SOLTEMP	SOLARD	V	MSEC	836	0003	S	27	MSEC		TEMPORARY STORAGE FOR SOLARD EXIT TIME. NEXT SPARE DELETED V16. \020282V1600
SCSIDE1	SOLARD	V	YES/NO	836	0006	W	7	YES/NO		Indicates which side SC/CU is on. 0 => SC/CU SIDE A On , 1 => SC/CU SIDE B On
PDSIDE2	SOLARD	V	YES/NO	836	0007	W	7	YES/NO		Indicates which side of the PDU is on. 0 => PDU SIDE A ON. 1 => PDU SIDE B ON
ARMLOOP	SOLARD	V	N.D.	836	0008	W	7	N.D.		# of unsuccessful attempts at arming the deploy circuitry and pyros
PDLOOP2	SOLARD	V	N.D.	836	0009	W	7	N.D.		# of unsuccessful attempts at configuring the PDU
DEPLOOP	SOLARD	V	N.D.	836	0010	W	7	N.D.		# of unsuccessful attempts at deploying the SA panel
PDRLOOP	SOLARD	V	N.D.	836	0011	W	7	N.D.		# of attempts at reconfiguring the PDU/RIU
SCCULOOP	SOLARD	V	N.D.	836	0012	W	7	N.D.		NUMBER OF UNSUCCESSFUL ATTEMPTS AT CONFIG THE SCCU \032482V170B
SPARE	SOLARD	-	-	836	0013	-	-	-		***** S P A R E *****
SPARE	SOLARD	-	-	836	0014	-	-	-		***** S P A R E *****
SPARE	SOLARD	-	-	836	0015	-	-	-		***** S P A R E *****
SPARE	SOLARD	-	-	836	0016	-	-	-		***** S P A R E *****
SPARE	SOLARD	-	-	836	0017	-	-	-		***** S P A R E *****
SPARE	SOLARD	-	-	836	0018	-	-	-		***** S P A R E *****
SPARE	SOLARD	-	-	836	0019	-	-	-		***** S P A R E *****
SPARE	SOLARD	-	-	836	0020	-	-	-		***** S P A R E *****
SPARE	SOLARD	-	-	836	0021	-	-	-		***** S P A R E *****
SPARE	SOLARD	-	-	836	0022	-	-	-		***** S P A R E *****
SPARE	SOLARD	-	-	836	0023	-	-	-		***** S P A R E *****
SPARE	SOLARD	-	-	836	0024	-	-	-		***** S P A R E *****

ORIGINAL PAGE IS
OF POOR QUALITY

TABLE 2-55

TLM MONITOR OBC TELEMETRY REPORTS

ORIGINAL PAGE IS
OF POOR QUALITY

TELEMETRY MONITOR REPORT #1

Minor Frame Number: 47

OBC Telemetry Report Number: 47

Minor Frame word	91	92	93	94	95
ENTRY	0	1	2	3	4
Data	TMSTAT 01	TMSTAT 02	---	---	---

108	109	110	111	112
5	6	7	8	9
---	---	---	---	---

113	114	115	116	117
10	11	12	13	14
---	---	---	---	---

118	119	120	121	122
15	16	17	18	19
---	---	---	---	---

123	124	125	126	127
20	21	22	23	24
---	---	---	TMSTAT 24	TMSTAT 25

ORIGINAL PAGE IS
OF POOR QUALITY

TELEMETRY MONITOR REPORT #2

Minor Frame Number: 48 OBC Telemetry Report Number: 48

Minor Frame word	91	92	93	94	95
ENTRY	0	1	2	3	4
Data	TMSTAT 26				

108	109	110	111	112
5	6	7	8	9

113	114	115	116	117
10	11	12	13	14

118	119	120	121	122
15	16	17	18	19

123	124	125	126	127
20	21	22	23	24
				TMSTAT 50

ORIGINAL PAGE IS OF POOR QUALITY

TELEMETRY MONITOR REPORT #3

Minor Frame Number: 49

OBC Telemetry Report Number: 49

Minor Frame word	91	92	93	94	95
ENTRY	0	1	2	3	4
Data	TMSTAT 51	----------	----------	----------	----------

108	109	110	111	112
5	6	7	8	9
----------	----------	----------	----------	----------

113	114	115	116	117
10	11	12	13	14
----------	----------	----------	----------	----------

118	119	120	121	122
15	16	17	18	19
----------	----------	----------	----------	----------

123	124	125	126	127
20	21	22	23	24
----------	----------	----------	----------	TMSTAT 75

TABLE 2-56

TELEMETRY MONITOR TELEMETRY

The telemetry monitor telemetry report contains the status words for the telemetry groups that are being monitored. Each group has one 8 bit status word associated with it. 75 total status words make up 3 reports. The reports are output once per major frame.

Let TMSTAT I J denote the status word for the IJ'th group. The contents of the status word are oefined as follows:

Bits 1 - 2		Number of times the group checked out of limits
Bit 3	= 1	Group out of limits
	= 0	Group in limits
Bit 4	= 1	Inhibited from sending commands
	= 0	Enabled for sending commands
bit 5	= 1	Inhibited from limit checking
	= 0	Enabled for limit checking
Bit 6		Undefined
Bit 7	= 1	Error in Group
Bit 8	= 1	Number of Groups Exceeded

ORIGINAL PAGE IS
OF POOR QUALITY

FLIGHT SOFTWARE DICTIONARY V1.0-5

NAME	UPROC	TYPE	UPROC /	DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
TMSTAT1	TMON	V	UNIS	N.D.	847	0000	W	7	N.D.		BITS 1&2:# OF TIMES CHECKED OUT OF LIMITS. BIT3: 1=OUT OF LIMITS. 0=IN LIMITS. BIT4:SEND COMMAND 0=ENABLED. 1=INHIBITED.
TMSTAT2	TMON	V		N.D.	847	0001	W	7	N.D		BIT5:LIMIT CHECKING 0=ENABLED. 1=INHIBITED. BIT6: UNDEFINED. BIT7:ERROR IN GROUP. BIT8:NUMBER OF GROUPS EXCEEDED (7&8=SYSTEM TABLE LOAD)
TMSTAT3	TMON	V		N.D.	847	0002	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTAT4	TMON	V		N.D.	847	0003	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTAT5	TMON	V		N.D.	847	0004	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTAT6	TMON	V		N.D.	847	0005	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTAT7	TMON	V		N.D.	847	0006	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTAT8	TMON	V		N.D.	847	0007	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTAT9	TMON	V		N.D.	847	0008	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA10	TMON	V		N.D.	847	0009	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA11	TMON	V		N.D.	847	0010	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA12	TMON	V		N.D.	847	0011	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA13	TMON	V		N.D.	847	0012	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA14	TMON	V		N.D.	847	0013	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA15	TMON	V		N.D.	847	0014	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA16	TMON	V		N.D.	847	0015	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA17	TMON	V		N.D.	847	0016	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA18	TMON	V		N.D.	847	0017	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA19	TMON	V		N.D.	847	0018	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA20	TMON	V		N.D.	847	0019	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA21	TMON	V		N.D.	847	0020	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA22	TMON	V		N.D.	847	0021	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA23	TMON	V		N.D.	847	0022	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA24	TMON	V		N.D.	847	0023	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2

ORIGINAL PAGE IS
OF POOR QUALITY

NAME	UPROC	TYPE UPROC / DUNITS		TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
TMSTA25	TMON	V	N.D.	847	0024	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2

ORIGINAL PAGE IS
OF POOR QUALITY

INPUT = DBO:[RICH.MAST]TELEMETRY.MAS;18 / 29-APR-1982 14:05:04.03 29-APR-82 15:24:49 PAGE 58

FLIGHT SOFTWARE DICTIONARY V1.0-5

NAME	DPROC	TYPE	UPROC /	DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
TMSTA26	TMON	V	UNIS	N.D.	848	0000	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA27	TMON	V		N.D.	848	0001	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA28	TMON	V		N.D.	848	0002	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA29	TMON	V		N.D.	848	0003	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA30	TMON	V		N.D.	848	0004	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA31	TMON	V		N.D.	848	0005	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA32	TMON	V		N.D.	848	0006	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA33	TMON	V		N.D.	848	0007	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA34	TMON	V		N.D.	848	0008	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA35	TMON	V		N.D.	848	0009	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA36	TMON	V		N.D.	848	0010	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA37	TMON	V		N.D.	848	0011	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA38	TMON	V		N.D.	848	0012	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA39	TMON	V		N.D.	848	0013	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA40	TMON	V		N.D.	848	0014	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA41	TMON	V		N.D.	848	0015	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA42	TMON	V		N.D.	848	0016	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA43	TMON	V		N.D.	848	0017	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA44	TMON	V		N.D.	848	0018	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA45	TMON	V		N.D.	848	0019	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA46	TMON	V		N.D.	848	0020	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA47	TMON	V		N.D.	848	0021	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA48	TMON	V		N.D.	848	0022	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA49	TMON	V		N.D.	848	0023	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA50	TMON	V		N.D.	848	0024	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2

ORIGINAL PAGE IS
OF POOR QUALITY

INPUT - DRO:[RICH.MAST]TELEMETRY.MAS;18 / 29-APR-1982 14:05:04.03 29-APR-82 15:24:49 PAGE 59

FLIGHT SOFTWARE DICTIONARY V1.0-5

NAME	UPROC	TYPE	UPROC / DUNITS	DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
TMSTA51	TMON	V	UNIS	N.D.	849	0000	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA52	TMON	V		N.D.	849	0001	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA53	TMON	V		N.D.	849	0002	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA54	TMON	V		N.D.	849	0003	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA55	TMON	V		N.D.	849	0004	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA56	TMON	V		N.D.	849	0005	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA57	TMON	V		N.D.	849	0006	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA58	TMON	V		N.D.	849	0007	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA59	TMON	V		N.D.	849	0008	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA60	TMON	V		N.D.	849	0009	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA61	TMON	V		N.D.	849	0010	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA62	TMON	V		N.D.	849	0011	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA63	TMON	V		N.D.	849	0012	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA64	TMON	V		N.D.	849	0013	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA65	TMON	V		N.D.	849	0014	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA66	TMON	V		N.D.	849	0015	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA67	TMON	V		N.D.	849	0016	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA68	TMON	V		N.D.	849	0017	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA69	TMON	V		N.D.	849	0018	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA70	TMON	V		N.D.	849	0019	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA71	TMON	V		N.D.	849	0020	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA72	TMON	V		N.D.	849	0021	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA73	TMON	V		N.D.	849	0022	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA74	TMON	V		N.D.	849	0023	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2
TMSTA75	TMON	V		N.D.	849	0024	W	7	N.D.		REFER TO TMSTAT1 & TMSTAT2

TABLE 2-57

FLIGHT EXECUTIVE OBC TELEMETRY REPORT

ORIGINAL PAGE IS
OF POOR QUALITY

FLIGHT EXECUTIVE TELEMETRY REPORT

Minor Frame Number: 07, 39, 71, 103 OBC Telemetry Report Number: 39

Minor Frame word	91	92	93	94	95
ENTRY	0	1	2	3	4
Data	FLTEX 01	FLTEX 02	-----------	-----------	-----------

Minor Frame word	108	109	110	111	112
ENTRY	5	6	7	8	9
Data	-----------	-----------	-----------	-----------	-----------

Minor Frame word	113	114	115	116	117
ENTRY	10	11	12	13	14
Data	-----------	-----------	-----------	-----------	-----------

Minor Frame word	118	119	120	121	122
ENTRY	15	16	17	18	19
Data	FLTEX 16	XX (130, 129)		← CKSUM	→

Minor Frame word	123	124	125	126	127
ENTRY	20	21	22	23	24
Data	→	← RTSCMDS	→	← CMDINH	→

TABLE 2-58

FLIGHT EXECUTIVE TELEMETRY REPORT DEFINITIONS

BITS 0-63 (Word 1-8) - 64 bits which indicate different situations and events within the executive which need prompt attention by the ground. MMS on board computer flight executive technical description (S-700-56 Rev B) Appendix D explains this field.

BITS 64-127 (Word 9-16) - Processor status, using two bits for each processor. The first bit is 1 if the processor is inhibited from sending commands, the second bit is 1 if the processor is inhibited from execution. The processors are arranged in numerical order, beginning with bits 64 and 65 for processor number 1.

BITS 129 and 130 - Have special meaning

BIT 129 - If 1, too many commands for the processor command storage area. Commands ignored.

BIT 130 - If 1, Critical processor inhibited

ORIGINAL PAGE IS
OF POOR QUALITY

INPUT = DRO:[RICH.MAST]TELEMETRY.MAS;18 / 29-APR-1982 14:05:04 03 29-APR-82 15:24:48 PAGE 47

FLIGHT SOFTWARE DICTIONARY V1.0-5

NAME	DPROC	TYPE	UPROC / DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
FLTEX01	FLTEXEC	V	N.D.	839	0000	W	7	N.D.		STATUS WHICH REQUIRES PROMPT ATTENTION - FLTEX 01
FLTEX02	FLTEXEC	V	N.D.	839	0001	W	7	N.D.		STATUS WHICH REQUIRES PROMPT ATTENTION - FLTEX 02
FLTEX03	FLTEXEC	V	N.D.	839	0002	W	7	N.D.		STATUS WHICH REQUIRES PROMPT ATTENTION - FLTEX 03
FLTEX04	FLTEXEC	V	N.D.	839	0003	W	7	N.D.		STATUS WHICH REQUIRES PROMPT ATTENTION - FLTEX 04
FLTEX05	FLTEXEC	V	N.D.	839	0004	W	7	N.D.		STATUS WHICH REQUIRES PROMPT ATTENTION - FLTEX 05
FLTEX06	FLTEXEC	V	N.D.	839	0005	W	7	N.D.		STATUS WHICH REQUIRES PROMPT ATTENTION - FLTEX 06
FLTEX07	FLTEXEC	V	N.D.	839	0006	W	7	N.D.		STATUS WHICH REQUIRES PROMPT ATTENTION - FLTEX 07
FLTEX08	FLTEXEC	V	N.D.	839	0007	W	7	N.D.		STATUS WHICH REQUIRES PROMPT ATTENTION - FLTEX 08
FLTEX09	FLTEXEC	V	N.D.	839	0008	W	7	N.D.		CURRENT STATUS OF PROC 1-4 - FLTEX 09 \042782V16DQ
FLTEX10	FLTEXEC	V	N.D.	839	0009	W	7	N.D.		CURRENT STATUS OF PROC 5-8 - FLTEX 10 \042782V16DQ
FLTEX11	FLTEXEC	V	N.D.	839	0010	W	7	N.D.		CURRENT STATUS OF PROC 9-12 - FLTEX 11 \042782V16DQ
FLTEX12	FLTEXEC	V	N.D.	839	0011	W	7	N.D.		CURRENT STATUS OF PROC 13-16 - FLTEX 12 \042782V16DQ
FLTEX13	FLTEXEC	V	N.D.	839	0012	W	7	N.D.		CURRENT STATUS OF PROC 17-20 - FLTEX 13 \042782V16DQ
FLTEX14	FLTEXEC	V	N.D.	839	0013	W	7	N.D.		CURRENT STATUS OF PROC 21-24 - FLTEX 14 \042782V16DQ
FLTEX15	FLTEXEC	V	N.D.	839	0014	W	7	N.D.		CURRENT STATUS OF PROC 25-28 - FLTEX 15 \042782V16DQ
FLTEX16	FLTEXEC	V	N.D.	839	0015	W	7	N.D.		CURRENT STATUS OF PROC 29-32 - FLTEX 16 \042782V16DQ
FLTEX17	FLTEXEC	V	N.D.	839	0016	W	7	N.D.		BIT 129 = SOFTWARE STORED COMMAND ERROR. BIT 130 = CRITICAL PROCESSOR WAS INHIBITTED
SPARE	FLTEXEC	-	-	839	0017	-	-	-		***** S P A R E *****

ORIGINAL PAGE IS
OF POOR QUALITY

INPUT - DBO.[RICH MAST]TELEMETRY.MAS;18 / 29-APR-1982 14.05:04.03 29-APR-82 15:24:48 PAGE 48

FLIGHT SOFTWARE DICTIONARY V1.0-5

NAME	UPROC	TYPE UPROC /	DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
CKSUM	FLTEXEC	V	N D.	839	0018	W	17	N.D.		OBC COMPUTED CHECKSUM \042782V18DQ
RTSCMDS	FLTEXEC	V	N D.	839	0021	W	15	N.D.		NUMBER OF WORDS REMAINING FOR RTS ALLOCATION \042782V18DQ
CMDINH	FLTEXEC	V	N.D.	839	0023	W	15	N.D.		MSB=INH #0 ; LSB=INH # 15. 1=INHIBITED, O=NOT INHIBITED. \042782V18DQ

TABLE 2-59

GMT UPDATE OBC TELEMETRY REPORT

GMT UPDATE REPORT

Minor Frame Number: 97 **OBC Telemetry Report Number:** 37

Minor Frame word	91	92	93	94	95
ENTRY	0	1	2	3	4
Data	GMTSTAT	MNSTRT	TDPUCUR		

Minor Frame word	108	109	110	111	112
ENTRY	5	6	7	8	9
Data				TUPDATE	

Minor Frame word	113	114	115	116	117
ENTRY	10	11	12	13	14
Data					

Minor Frame word	118	119	120	121	122
ENTRY	15	16	17	18	19
Data	SPARE				

Minor Frame word	123	124	125	126	127
ENTRY	20	21	22	23	24
Data	SPARE				

TABLE 2 - 60

GMT UPDATE TELEMETRY DEFINITIONS

ORIGINAL PAGE IS
OF POOR QUALITY

INPUT - DBO.[RICH.MAST]TELEMETRY MAS;18 / 29-APR 1982 14:05:04.03 29-APR-82 15:24:48 PAGE 44

FLIGHT SOFTWARE DICTIONARY V1.0-5

NAME	UPROC	TYPE	UPROC / DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
GMISTAT	GMICOR		N.D.	837	0000	W	7	N.D.		GMTCOR STATUS FLAG 1 => AWAITING MINOR FRAME # 8 2 => DPU TIME UPDATE COMPLETE 3 => ABORTED TIME UPDATE (BAD T)
MNFSTRT	GMICOR	V	N.D.	837	0001	W	7	N.D.		MINOR FRAME COUNT AT START OF GMTCOR EXECUTION \O32482V17DB
TDPUCUR	GMICOR	V	MSEC	837	0002	T	38	MSEC		CURRENT DPU TIME (EQUALS TDPU) \O32482V17DB
TUPDATE	GMICOR	V	MSEC	837	0008	T	38	MSEC		Updated DPU time \O31182V17RS
SPARE	GMICOR	-	-	837	0014	-	-	-		***** S P A R E *****
SPARE	GMICOR	-	-	837	0015	-	-	-		***** S P A R E *****
SPARE	GMICOR	-	-	837	0016	-	-	-		***** S P A R E *****
SPARE	GMICOR	-	-	837	0017	-	-	-		***** S P A R E *****
SPARE	GMICOR	-	-	837	0018	-	-	-		***** S P A R E *****
SPARE	GMICOR	-	-	837	0019	-	-	-		***** S P A R E *****
SPARE	GMICOR	-	-	837	0020	-	-	-		***** S P A R E *****
SPARE	GMICOR	-	-	837	0021	-	-	-		***** S P A R E *****
SPARE	GMICOR	-	-	837	0022	-	-	-		***** S P A R E *****
SPARE	GMICOR	-	-	837	0023	-	-	-		***** S P A R E *****
SPARE	GMICOR	-	-	837	0024	-	-	-		***** S P A R E *****

TABLE 2-61

MEMORY MONITOR OBC TELEMETRY REPORT

ORIGINAL PAGE IS
OF POOR QUALITY

MEMORY MONITOR REPORT #1

Minor Frame Number: 65 **OBC Telemetry Report Number:** 40

Minor Frame word	91	92	93	94	95
ENTRY	0	1	2	3	4
Data	XX18 — 13XX12 — 7XX6 — MEMORY WORD 1			SPARE	←

108	109	110	111	112
5	6	7	8	9
← MEMORY WORD 2 →		SPARE	← MEMORY WORD 3	

113	114	115	116	117
10	11	12	13	14
→	SPARE	← MEMORY WORD 4		→

118	119	120	121	122
15	16	17	18	19
SPARE	← MEMORY WORD 5		→	SPARE

123	124	125	126	127
20	21	22	23	24
← MEMORY WORD 6		→	SPARE	SPARE NOT USEABLE

ORIGINAL PAGE IS
OF POOR QUALITY

MEMORY MONITOR REPORT #2

Minor Frame Number: 66 OBC Telemetry Report Number: 41

Minor Frame word	91	92	93	94	95
ENTRY	0	1	2	3	4
Data	XX18 → 13 XX12 → 7 XX6 → MEMORY WORD 7			SPARE	

108	109	110	111	112
5	6	7	8	9
MEMORY WORD 8		SPARE	MEMORY WORD 9	

113	114	115	116	117
10	11	12	13	14
	SPARE	MEMORY WORD 10		

118	119	120	121	122
15	16	17	18	19
SPARE	MEMORY WORD 11			SPARE

123	124	125	126	127
20	21	22	23	24
MEMORY WORD 12			SPARE	SPARE NOT USEABLE

ORIGINAL PAGE IS
OF POOR QUALITY

MEMORY MONITOR REPORT #3

Minor Frame Number: 67 OBC Telemetry Report Number: 42

Minor Frame word	91	92	93	94	95
ENTRY	0	1	2	3	4
Data	XX18 → 13 XX12 → 7 XX6 → MEMORY WORD 13			SPARE	←

108	109	110	111	112
5	6	7	8	9
MEMORY WORD 14 →		SPARE	← MEMORY WORD 15	

113	114	115	116	117
10	11	12	13	14
→	SPARE	← MEMORY WORD 16 →		

118	119	120	121	122
15	16	17	18	19
SPARE	← MEMORY WORD 17 →			SPARE

123	124	125	126	127
20	21	22	23	24
← MEMORY WORD 18 →			SPARE	SPARE NOT USEABLE

TABLE 2-62

MEMORY MONITOR TLM DEFINITIONS

The three (3) Memory Monitor TLM Reports contain a maximum of 18 memory words who's addresses are found in System Table 15, QMONADDS. The first word of Table 15 contains the address of the memory location who's contents will be put in memory word 1 of Memory Monitor Report #1. The System Table contains 17 more addresses to specify location of the other 17 available words in the TLM Report. These are formated as shown in word 1 thru 4 or Report 1 with 18 bits of memory contents packed into words 1-3 followed by a fourth word with zero field. The two most significant bits of each of the first three words are fill bits.

ORIGINAL PAGE IS
OF POOR QUALITY

INPUT = DRO:[RICH MAST]TELEMETRY MAS;18 / 29-APR-1982 14:05:04.03 29-APR-82 15:24:48 PAGE 49

FLIGHT SOFTWARE DICTIONARY: V1.0-5

NAME	OPROC	TYPE	UPROC / DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
MEMMN1	FLTEXEC	V	N.D.	840	0000	M	17	N.D.		OMONADDS(1)
SPARE	FLTEXEC	-	-	840	0003	-	-	-		***** S P A R E *****
MEMMN2	FLTEXEC	V	N.D.	840	0004	M	17	N.D.		OMONADDS(2)
SPARE	FLTEXEC	-	-	840	0007	-	-	-		***** S P A R E *****
MEMMN3	FLTEXEC	V	N.D.	840	0008	M	17	N.D.		OMONADDS(3)
SPARE	FLTEXEC	-	-	840	0011	-	-	-		***** S P A R E *****
MEMMN4	FLTEXEC	V	N.D.	840	0012	M	17	N.D.		OMONADDS(4)
SPARE	FLTEXEC	-	-	840	0015	-	-	-		***** S P A R E *****
MEMMN5	FLTEXEC	V	N.D.	840	0016	M	17	N.D.		OMONADDS(5)
SPARE	FLTEXEC	-	-	840	0019	-	-	-		***** S P A R E *****
MEMMN6	FLTEXEC	V	N.D.	840	0020	M	17	N.D.		OMONADDS(6)
SPARE	FLTEXEC	-	-	840	0023	-	-	-		***** S P A R E *****
SPARE	FLTEXEC	-	-	840	0024	-	-	-		***** S P A R E ***** (NOT USABLE)

INPUT = DBO [RICH MAST]TELEMETRY.MAS;18 / 29-APR-1982 14.05:04 03 29-APR-82 15:24.48 PAGE 50

FLIGHT SOFTWARE DICTIONARY V1.0-5

NAME	DPROC	TYPE	UPROC /	DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
MEMMN7	FLTEXEC	V		N.D.	841	0000	M	17	N.D.		QMONADDS(7)
SPARE	FLTEXEC	-		-	841	0003	-	-	-		***** S P A R E *****
MEMMN8	FLTEXEC	V		N.D.	841	0004	M	17	N.D.		QMONADDS(8)
SPARE	FLTEXEC	-		-	841	0007	-	-	-		***** S P A R E *****
MEMMN9	FLTEXEC	V		N.D.	841	0008	M	17	N.D.		QMONADDS(9)
SPARE	FLTEXEC	-		-	841	0011	-	-	-		***** S P A R E *****
MEMMN10	FLTEXEC	V		N.D.	841	0012	M	17	N.D.		QMONADDS(10)
SPARE	FLTEXEC	-		-	841	0015	-	-	-		***** S P A R E *****
MEMMN11	FLTEXEC	V		N.D.	841	0016	M	17	N.D.		QMONADDS(11)
SPARE	FLTEXEC	-		-	841	0019	-	-	-		***** S P A R E *****
MEMMN12	FLTEXEC	V		N.D.	841	0020	M	17	N.D.		QMONADDS(12)
SPARE	FLTEXEC	-		-	841	0023	-	-	-		***** S P A R E *****
SPARE	FLTEXEC	-		-	841	0024	-	-	-		***** S P A R E ***** (NOT USABLE)

ORIGINAL PAGE IS
OF POOR QUALITY

INPUT = DRO:[RICH.MAST]TELEMETRY.MAS;18 / 29-APR-1982 14:05:04.03 29-APR-82 15:24:49 PAGE 51

FLIGHT SOFTWARE DICTIONARY V1.0-5

NAME	DPROC	TYPE	UPROC / DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
MEMMN13	FLTEXEC	V	N.D.	842	0000	M	17	N.D.		QMONADDS(13)
SPARE	FLTEXEC	-	-	842	0003	-	-	-		***** S P A R E *****
MEMMN14	FLTEXEC	V	N.D.	842	0004	M	17	N.D.		QMONADDS(14)
SPARE	FLTEXEC	-	-	842	0007	-	-	-		***** S P A R E *****
MEMMN15	FLTEXEC	V	N.D.	842	0008	M	17	N.D.		QMONADDS(15)
SPARE	FLTEXEC	-	-	842	0011	-	-	-		***** S P A R E *****
MEMMN16	FLTEXEC	V	N.D.	842	0012	M	17	N.D.		QMONADDS(16)
SPARE	FLTEXEC	-	-	842	0015	-	-	-		***** S P A R E *****
MEMMN17	FLTEXEC	V	N.D.	842	0016	M	17	N.D.		QMONADDS(17)
SPARE	FLTEXEC	-	-	842	0019	-	-	-		***** S P A R E *****
MEMMN18	FLTEXEC	V	N.D.	842	0020	M	17	N.D.		QMONADDS(18)
SPARE	FLTEXEC	-	-	842	0023	-	-	-		***** S P A R E *****
SPARE	FLTEXEC	-	-	842	0024	-	-	-		***** S P A R E ***** (NOT USABLE)

TABLE 2-63

SOLAR EPHEMERIS

OBC TELEMETRY REPORT

ORIGINAL PAGE IS
OF POOR QUALITY

SOLAR EPHEMERIS REPORT #1

Minor Frame Number: 64 **OBC Telemetry Report Number:** 43

Minor Frame word	91	92	93	94	95
ENTRY	0	1	2	3	4
Data	← TSOL			→	←

Minor Frame word	108	109	110	111	112
ENTRY	5	6	7	8	9
Data	L	→	← SIX		→

Minor Frame word	113	114	115	116	117
ENTRY	10	11	12	13	14
Data	→	← SIY			→

Minor Frame word	118	119	120	121	122
ENTRY	15	16	17	18	19
Data	← SIZ			→	← VEX

Minor Frame word	123	124	125	126	127
ENTRY	20	21	22	23	24
Data	→	← VEY	→	← VEZ	→

TABLE 2-64

SOLAR EPHEMERIS

OBC TELEMETRY DEFINITIONS

INPUT = DBO.[RICH.MAST]TELEMETRY.MAS;18 / 29-APR-1982 14:05:04.03 29-APR-82 15:24:49 PAGE . 52

FLIGHT SOFTWARE DICTIONARY V1.0-5

NAME	DPROC	TYPE UPROC /	DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
TSOL	SEPHEM	V	MSEC	843	0000	D	38	MSEC		SOLAR EPHEMERIS TIME
L	SEPHEM	V	CIRCLE	843	0004	D	-1	CIRCLE		SOLAR TRUE LONGITUDE
SIX	SEPHEM	V	N.D.	843	0007	D	0	N.D.		DIRECTION COSINE
SIY	SEPHEM	V	N.D.	843	0011	D	0	N.D.		DIRECTION COSINE
SIZ	SEPHEM	V	N.D.	843	0015	D	0	N.D.		DIRECTION COSINE
VEX	SEPHEM	V	KM/SEC	843	0019	S	5	KM/SEC		X-COMPONENT (ECI FRAME)
VEY	SEPHEM	V	KM/SEC	843	0021	S	5	KM/SEC		Y-COMPONENT (ECI FRAME)
VEZ	SEPHEM	V	KM/SEC	843	0023	S	5	KM/SEC		Z-COMPONENT (ECI FRAME)

TABLE 2-65

STORED COMMAND POINTER

OBC TELEMETRY REPORT

STORED CMD POINTER REPORT

Minor Frame Number: 2

OBC Telemetry Report Number: 45

Minor Frame word	91	92	93	94	95
ENTRY	0	1	2	3	4
Data	ATCPTR		SWVERNO	RTS1	

	108	109	110	111	112
	5	6	7	8	9
			RTS 2		

	113	114	115	116	117
	10	11	12	13	14
		RTS 3			

	118	119	120	121	122
	15	16	17	18	19
	RTS 4				

	123	124	125	126	127
	20	21	22	23	24
	RTS 5		ATCNXT		

TABLE 2-66

STORED COMMAND POINTER

OBC TELEMETRY DEFINITIONS

ORIGINAL PAGE IS
OF POOR QUALITY

INPUT = DBO:[RICH.MAST]TELEMETRY MAS;18 / 29-APR-1982 14:05:04.03   29-APR-82 15:24:49   PAGE 54

FLIGHT SOFTWARE DICTIONARY V1.0-5

NAME	DPROC	TYPE	UPROC / DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
AICPTR	FLTEXEC	V	N.A.	845	0000	W	15	N.A.		ABSOLUTE POINTER (STORED CMDS)
SWVERNO	FLTEXEC	V	N.A.	845	0002	W	7	N.A.		OBC VERSION NUMBER \042782V16DQ
RIS1	FLTEXEC	V	N.A.	845	0003	W	31	N.A.		INHIBIT ACTIVE STATUS 0-15
RIS2	FLTEXEC	V	N.A.	845	0007	W	31	N.A.		INHIBIT ACTIVE STATUS 16-31
RIS3	FLTEXEC	V	N.A.	845	0011	W	31	N.A.		INHIBIT ACTIVE STATUS 32-47
RIS4	FLTEXEC	V	N.A.	845	0015	W	31	N.A.		INHIBIT ACTIVE STATUS 48-63
RIS5	FLTEXEC	V	N.A.	845	0019	W	17	N.A.		INHIBIT ACTIVE STATUS 64-72. FOR ALL RIS WORDS: BIT 0: 1/0 INHIBITED/ENABLED. BIT 1: 1/0 ACTIVE/INACTIVE. \042882V18DQ
AICNXT	FLTEXEC	V	SEC	845	0022	W	27	MSEC		TIME OF NEXT STORED CMD \042882V18DQ

TABLE 2-67

STATUS BUFFER

TELEMETRY REPORT

ORIGINAL PAGE IS
OF POOR QUALITY

STATUS BUFFER TELEMETRY REPORT #1

(fixed section)

Minor Frame Number: 124 OBC Telemetry Report Number: 46

Minor Frame word	91	92	93	94	95
ENTRY	0	1	2	3	4
Data	← QSTATBUF	→	← QSTATPTR	→	QSTATEND –

Minor Frame word	108	109	110	111	112
ENTRY	5	6	7	8	9
Data	→	← QSTATOVF	→	← QSTATP1 (18bits)	

Minor Frame word	113	114	115	116	117
ENTRY	10	11	12	13	14
Data	→ XXXXXX	← QSTATP2 (18bits)	→	XXXXXX	←

Minor Frame word	118	119	120	121	122
ENTRY	15	16	17	18	19
Data	QSTATP3 → (18bits)	XXXXXX	← QSTATP4 (18bits)	→	XXXXXX

Minor Frame word	123	124	125	125	127
ENTRY	20	21	22	23	24
Data	← QSTATP5 (18bits)	→	XXXXXX	← SPARE	→

ORIGINAL PAGE IS
OF POOR QUALITY

STATUS BUFFER REPORT # 2

Minor Frame Number: 125 OBC Telemetry Report Number: 50

Minor Frame word	91	92	93	94	95
ENTRY	0	1	2	3	4
Data	SBPTR1 (9bits) / SBONF1 (1bit)	SBTIME1 (18bits)		SBPROC1 (9bits)	

Minor Frame word	108	109	110	111	112
ENTRY	5	6	7	8	9
Data	SBID1 (9bits) / SBPARA1 (18bits)			SBPTR2 (9bits)	SBONF2 (1bit)

Minor Frame word	113	114	115	116	117
ENTRY	10	11	12	13	14
Data	SBTIME2 (18bits)	SBPROC2 (9bits)	SBID2 (9bits)		SBPARA2 (18bits)

Minor Frame word	118	119	120	121	122
ENTRY	15	16	17	18	19
Data		SBPTR3 (9bits) / SBONF3 (1bit)	SBTIME3 (18bits)		

Minor Frame word	123	124	125	126	127
ENTRY	20	21	22	23	24
Data	SBPROC 3(9bit) / SBID3 (9bits)		SBPARA3 (18bits)		LOSTDATA

Table 2-68. Status Buffer TLM Definitions

Status Buffer information is available via OBC dump as described in Section 2.5.2 or via OBC TLM Reports 46 and 50.

Report 46 (Status Buffer Report Ø1) contains the information of the Fixed Format area of the Status Buffer (2.5.2.1).

Report 50 (Status Buffer Report Ø2) will sequence through the Variable Section of the Status Buffer presenting 3 Variable Section reports each time, completing the entire 60 word Variable Section in 320 seconds. If the Variable Section wraps around faster than it can be output by TLM the LSTDATA Flag (Report 50, word 25) will be set to 377 (octal).

FLIGHT SOFTWARE DICTIONARY V11.0-5

NAME	DPROC	TYPE	UPROC /	DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
OSTATBUF	SBMON	V		N.D.	846	0000	W	15	N.D.		ABS ADDRESS OF START OF VARIABLE SECTION OF STATUS BUFFER \O12982V16CA
/STATPTR	SBMON	V		N.D.	846	0002	W	15	N.D.		ABS ADDRESS OF THE WORD FOLLOWING THE LAST WORD OF THE LAST REPORT \O12982V16RA
OSTATEND	SBMON	V		N.D.	846	0004	W	15	N.D.		LAST ADDRESS OF STATUS BUFFER \O12982V16RA
OSTATOVF	SBMON	V		N.D.	846	0006	W	15	N.D.		NUMBER OF STATUS BUFFER WRITE WRAPAROUNDS \O12982V16RA
OSTATP1	SBMON	V		N.D.	846	0008	W	17	N.D.		ADDRESS OF THE LAST INSTRUCTION THAT TRIED TO STORE OUTSIDE ITS ASSIGNED AREA \O12982V16RA
OSTATP2	SBMON	V		N.D.	846	0011	W	17	N.D.		CONTENT OF THE X REGISTER WHEN INST WAS EXECUTED \O12982V16RA
OSTATP3	SBMON	V		N.D.	846	0014	W	17	N.D.		CONTENT OF THE PAGE AND MISC REGISTERS WHEN INST WAS EXECUTED \O12982V16RA
OSTATP4	SBMON	V		N.D.	846	0017	W	17	N.D.		CONTENT OF THE EFFECTIVE ADDRESS IF THE STORE OP WAS INDIRECT, O IF 'STA' \O12982V16RA
OSTATP5	SBMON	V		N.D.	846	0020	W	17	N.D.		COUNT OF STORAGE PROTECT ERRORS SINCE LAST STATUS BUFFER RESET \O12982V16RA
NOVR	SBMON	V		N.D.	846	0023	W	7	N.D.		NUM OF TIMES SBMON WRAPPED AROUND STATUS BUFFER (READING) \O32782V17DO
SPARE	SBMON	-		-	846	0024	-	-	-		***** S P A R E ***** \O12982V16RA

ORIGINAL PAGE IS
OF POOR QUALITY

NAME	DPROC	TYPE UPROC /	DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
SBPIR1	SBMON	V	N.D.	850	0000	B009	8	N.D.		OBC WORD LOCATION WITHIN THE STATUS BUFFER. INCREMENTS BY 3 FOR EACH TLM ENTRY. RANGES 0-59. \020282V160B
SBONF1	SBMON	V	N.D.	850	0001	B001	0	N.D.		IF DATA MSG HAS BEEN OUTPUT PRIOR TO THIS OUTPUT, THIS BIT=1 (OLD). IF NOT, THIS BIT=0 (NEW). \020282V160B
SBTIME1	SBMON	V	N.D.	850	0002	B018	17	N.D.		THE OBC CLOCK 18 VALUE AT THE TIME OF THE MESSAGE \020282V160B
SBPROC1	SBMON	V	N.D.	850	0003	B009	8	N.D.		PROCESSOR ID TO IDENTIFY THE OBC PROCESSOR INVOLVED. IF NO PROCESSOR INVOLVED, SET =0. \020282V160B
SBID1	SBMON	V	N.D.	850	0004	B009	8	N.D.		AN ID NUMBER CODE TO IDENTIFY THE MESSAGE MEANING \020282V160B
SBPARA1	SBMON	V	N.D.	850	0005	B018	17	N.D.		PARAMETER GIVES ADDITONAL MEANING TO REPORT ID CODE. SEE DOCUMENT S-700-56 REV B PG 3-12 FOR MORE INFORMATION \020282V160B
SBPIR2	SBMON	V	N.D.	850	0006	B009	8	N.D.		OBC WORD LOCATION WITHIN THE STATUS BUFFER. INCREMENTS BY 3 FOR EACH TLM ENTRY. RANGES 0-59. \020282V160B
SBONF2	SBMON	V	N.D.	850	0007	B001	0	N.D.		IF DATA MSG HAS BEEN OUTPUT PRIOR TO THIS OUTPUT, THIS BIT=1 (OLD). IF NOT, THIS BIT=0 (NEW). \020282V160B
SBTIME2	SBMON	V	N.D.	850	0008	B018	17	N.D.		THE OBC CLOCK 18 VALUE AT THE TIME OF THE MESSAGE \020282V160B
SBPROC2	SBMON	V	N.D.	850	0009	B009	8	N.D.		PROCESSOR ID TO IDENTIFY THE OBC PROCESSOR INVOLVED. IF NO PROCESSOR INVOLVED, SET =0. \020282V160B
SBID2	SBMON	V	N.D.	850	0010	B009	8	N.D.		AN ID NUMBER CODE TO IDENTIFY THE MESSAGE MEANING \020282V160B
SBPARA2	SBMON	V	N.D.	850	0011	B018	17	N.D.		PARAMETER GIVES ADDITONAL MEANING TO REPORT ID CODE. SEE DOCUMENT S-700-56 REV B PG 3-12 FOR MORE INFORMATION \020282V160B
SBPIR3	SBMON	V	N.D.	850	0012	B009	8	N.D.		OBC WORD LOCATION WITHIN THE STATUS BUFFER. INCREMENTS BY 3 FOR EACH TLM ENTRY. RANGES 0-59. \020282V160B
SBONF3	SBMON	V	N.D.	850	0013	B001	0	N.D.		IF DATA MSG HAS BEEN OUTPUT PRIOR TO THIS OUTPUT, THIS BIT=1 (OLD). IF NOT THIS BIT=0 (NEW). \020282V160B

ORIGINAL PAGE IS
OF POOR QUALITY

FLIGHT SOFTWARE DICTIONARY V1.0-5

NAME	DPROC	TYPE	UPROC / DUNITS	TABLE	ENTRY	LENGTH	SCALE	UNITS	VALUE	DEFINITION
SBTIME3	SBMON	V	N.D.	850	0014	B018	17	N.D.		THE OBC CLOCK 18 VALUE AT THE TIME OF THE MESSAGE \020282V16DB
SBPROC3	SBMON	V	N.D.	850	0015	B009	8	N.D.		PROCESSOR ID TO IDENTIFY THE OBC PROCESSOR INVOLVED. IF NO PROCESSOR INVOLVED, SET =0. \020282V16DB
SBID3	SBMON	V	N.D.	850	0016	B009	8	N.D.		AN ID NUMBER CODE TO IDENTIFY THE MESSAGE MEANING \020282V16DB
SBPARA3	SBMON	V	N.D.	850	0017	B018	17	N.D.		PARAMETER GIVES ADDITONAL MEANING TO REPORT ID CODE. SEE DOCUMENT S-700-56 REV B PG 3-12 FOR MORE INFORMATION \020282V16DB
LOSTDATA	SBMON	V	N.D.	850	0024	W	7	N.D.		FLAG INDICATING THAT THE ST BUFFER FILLED FASTER THAN TELEMETRY DATA COULD BE OUTPUT. NORMAL/OVERFLOW 0/377 \012982V16DB

ORIGINAL PAGE IS OF POOR QUALITY

SVS-10123A
Volume II
October 1982

2.5.2 OBC STATUS BUFFER

The OBC maintains a buffer which will keep a log of system and spacecraft activities, including reports of errors and anomalies detected by the Flight Executive or by processors and reports attempts by processors to send commands while they are inhibited from commanding. The Status Buffer contains two sections, a Fixed section and a Variable section. The Fixed area consists of a set of words reserved for specific uses. The Variable section contains three word reports packed into the buffer in the order in which they were reported. This buffer may be dumped and reset by ground command using an Executive Request code 14. If the operand of this request is 1, the buffer will be dumped. If the operand is 0 the buffer is reset. In resetting the buffer, words 0 and 2 of the fixed format section are left unchanged. Word 1 is set to the address of the first word of the variable section. The remainder of the buffer, both fixed and variable, is set to zero. The format of the dumped Status Buffer is the same as shown in Section 2.2.5.

2.5.2.1 Fixed-Format Area of the Status Buffer

The fixed-format area is at the beginning of the status buffer. Each word contains a single piece of information, and the position of the word indicates the nature of the information. The area consists of 8 words, which have been assigned the following uses:

- Words 0 through 3: Pointers and flags for the variable section.

  0 - QSTATBUF - absolute address of the start of the variable section.

  1 - QSTATPTR - absolute address of the word following the last word of the last report stored.

  2 - QSTATEND - absolute address of the last word of the variable section.

  3 - QSTATOVF - wraparound flag. This is a count of the number of times the variable section has overflowed and wrapped around since the status buffer was last reset. If no overflow has occurred, the word is zero.

- Words 4 through 8: Storage protection violation.

  4 address of the last instruction that tried to store outside its assigned area.

  5 contents of the X register when the instruction was executed.

  6 contents of the page and miscellaneous registers when the instruction was executed.

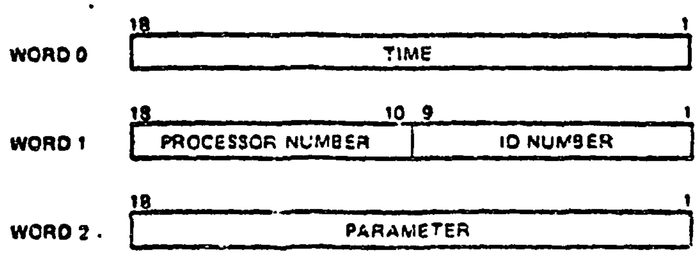
  7 contents of the effective address if the store operation was indirect, 0 if the instruction was store accumulator.

  8 count of the number of storage protect errors since the status buffer was last reset.

2.5.2.2 Variable Section of the Status Buffer

The variable section of the status buffer follows the fixed-format area. It contains three-word reports stored in chronological order. In case of buffer overflow, processing wraps around and new reports are stored over the oldest in the section. Sixty (60) reports may be stored before wraparound occurs. The error is reported in the Flight Executive Report (Report #39) in the OBC's contribution to telemetry, and a count of the number of times wraparound has occurred (which indicates the number of reports lost) is stored in the fixed-format area of the status buffer.

The format of reports is as follows:



The time is the 18-low-order bits of the OBC clock. The ID number gives the basic meaning of the report and the processor number identifies the processor involved. (Processors are numbered from 1 up to the order of their PCTs in memory. The processor number will be 0 if no processor is involved in the report.) Table 2-67 defines the meaning of various ID numbers.

The parameter word gives additional information. In many error reports from the Absolute Time Command Processor, the parameter will give the location in the stored command buffer of the erroneous command. In some reports, no information other than ID number and processor number is needed. In those cases, the content of the third word is meaningless and can be set to 0 by the processor. Table 2-67 identifies parameters (3rd word) associated with various ID numbers. See S-700-56 Rev B-MMS OBC Flight Executive Technical Description, Appendix B for further description of variable section reports.

Table 2-69. Status Buffer Variable Section Definitions

Report ID # Decimal	Hex	Meaning	Parameter (Word 3)
32	20	Overflow in requests to store reports	Interrupt handler relative location
33	21	Invalid status buffer report number	Source of request
34	22	Invalid jump pseudo-op	Location of jump pseudo op
37	25	Command stack overflow	Which stack overflowed 0 = low priority 1 = high priority
38	26	Invalid code in processor request for service	Absolute address of instruction
39	27	Block number too big in stored cmd to send predifined block	Command # of pseudo op
40	28	Illegal	Absolute address of interrupt interrupt in section error
41	29	Error in specifying functions for processor control	
42	2A	Error in command hardware	Neg # - number of cmds lost Pos # - number of spurious cmds received
43	2B	Invalid op code in pseudo-op stored cmd	Cmd number of invalid pseudo op
44	2C	Too much stacker overflow for ATCP	Command number of first cmd lost
46	2E	Error in specifying functions for RTS Control	

Table 2-69. Status Buffer Variable Section Definitions

Report ID # Decimal	Hex	Meaning	Parameter (Word 3)
47	2F	Error in sequence number for RTS Control	Invalid RTS number
48	30	Request to activate an active RTS	Number of RTS
49	31	Request to activate an inhibited RTS	RTS number
50	32	Invalid number in request to reserve space for RTS	Invalid number
51	33	Invalid number for loading RTS RTS commands	Invalid number
52	34	Invalid number for loading RTS times	Invalid number
53	35	Invalid length in request to reserve space for an RTS	Sequence number of RTS
54	36	RTS buffer overflow	Sequence number of RTS
55	37	Attempt to clear RTS buffer while a sequence is active	Sequence number lowest # active seq.
56	38	Invalid length in loading RTS commands	Sequence # of RTS
57	39	Invalid length in loading RTS times	Sequence # of RTS
58	3A	Attempt to load CMDS for an RTS before space reserved	Sequence # of RTS
59	3B	Attempt to load times for an RTS before space reserved	Sequence # of RTS

Table 2-69. Status Buffer Variable Section Definitions

Report ID # Decimal	Hex	Meaning	Parameter (Word 3)
60	3C	Error in requesting RTS dump	Erroneous sequence #
61	3D	Attempt to reserve larger space for active RTS	Sequence # of RTS
62	3E	Attempt to load commands for active RTS	Sequence # of RTS
63	3F	Attempt to load times for active RTS	Sequence # of RTS
256	100	Processor cut off too many times	
257	101	Processor requested while executing or waiting for execution	
258	102	Processor which is command inhibited has tried to send commands	Absolute address of high order of first CMD in the batch
259	103	Invalid op code in executive request	
260	104	Invalid entry in processor priority table	
261	105	Scheduler table processing started or stopped	1 = stopped 0 = started
262	106	Request for processor control specifies nonexistent processor	
263	107	Error in request to load or dump table	
264	108	Invalid PCT loc in scheduler table or table of long period processors	

Table 2-69. Status Buffer Variable Section Definitions

Report ID # Decimal	Hex	Meaning	Parameter (Word 3)
265	109	Invalid entry point for snap action	
266	10A	Failure in switching control of TLM format	
267	10B	Telemetry sync loss	
268	10C	Common error	
270	10E	Error in CMD count in processor request to stack a batch of CMDs	
271	110	Software dump timing error	
272	112	Stored command load would overflow buffer	
273	113	Error in loading TLM addresses	
274	114	The operand required by an executive request was never received	
275	115	Invalid block number in loading predefined block	
276	116	Invalid starting point for ATCP	
277	117	RTS control requested while RTCP waiting to initialize	
278	118	Request to clear RTS buffer while commands still stacked	
279	119	Telemetry went out of sync with clocks	

ORIGINAL PAGE IS
OF POOR QUALITY

Table 2-69. Status Buffer Variable Section Definitions

Report ID # Decimal	Hex	Meaning	Parameter (Word 3)
280	11A	Telemetry went back into sync with clock	
282	11C	Error in request to reset OBC contribution to TLM	
283	11D	Error in specifying buffer for stacking cmds	
284	11E	Bug in flight executive	
285	120	OBC clock was not incremented properly while telemetry was in dwell	
286	121	MEMTST found error	Address of bad word
287	122	Telemetry frame number error	Bad frame number
288	123	Error in changing TLM bit rate	Erroneous code
508	1FC	Critical Processor error	Processor # disabled
509	1FD	System table update incomplete out of stored commands	
510	1FE	Software stored command error	Pointer of CMD error
511	1FF	Telemetry monitor out of limit	TLM group out of limit

2.6 OPERATIONAL CONSIDERATIONS

The C&DH Subsystem transponder is capable of being operated in the TDRSS or G .DN mode of operation, i.e., one transponder can be operated in the TDRS mode and the second in the GSTDN mode. The data source and telemetry rates with appropriate antennas have to be command selected as shown and described earlier.

2.6.1 OBC DUMP

The OBC memory dump is command selectable at 1 or 32 kbps. At 32 kbps, a memory bank of 4096 words (times 32 bits per word) will take approximately 4.682 seconds for the first copy. Since the OBC Dump is transmitted four times, it takes 18.728 seconds to transmit. At 1 Kbps it takes approximately 9.988 minutes to transmit it four times 32 kbps will be used for Landsat-D. Since there are 16 memory banks for Landsat-D, it takes approximately 4.99 minutes to transmit the entire 64K memory at 32Kbps without considering the executive request and C&DH commands needed to change the fixed bank ID. This does not take into account the time required for commanding to change to other fixed memory banks.

2.6.2 GPS DATA

The GPS data files are transmitted as part of the telemetry at the 1 or 8 Kbps rate under the CU format control. Allocating approximately 12 columns to the GPS data files (944 bits or 112 words long) in the mission format and a reduced number of 5 columns during the engineering format. See SVS-10125, Data Format Control Book, Volume IV, (Global Positioning System) for the frequency of data file types and output rates.

2.6.3 RANGING

When either OBC Dump or NBTR playback or PCD data is transmitted over the high rate channel, range measurements in the GSTDN mode are not possible. Range rate is possible. TDRS range and range rate is possible regardless of high rate channel data output (Table 2-7).

2.6.4 HIGH RATE CHANNEL TELEMETRY

Only one type of data can be transmitted in either TDRS or GSTDN modes via the high rate channel at a time (See Table 2-7):

1. OBC Memory Dump
2. Narrowband Tape Recorder Playback
3. Payload Correction Data

SECTION 3

NASCOM MESSAGE FORMATS

3.1 GENERAL DESCRIPTION

The NASA Communications (NASCOM) Network is a global communications system consisting of diversely routed high speed data circuits with primary switching faclities at GSFC. Two distinct telemetry paths are possible for Landsat-D, namely, TDRS and GSTDN. The realtime telemetry stream between the GSTDN/TDRSS and the CSF is a computer compatible, digital format NRZ-L message, transmitted in standard 4800 bit message blocks. Each block is 300 16-bit words. All fields of the message block are transmitted with the Most Significant Bit (MSB) first.

3.2 TELEMETRY DATA (GSTDN)

The GSTDN message block begins with a 48-bit NASCOM network header, followed by a 48-bit User Message header, a 48 bit NASCOM Time Code, and ends with a 32-bit error control field. The 4624 bits between the header information and error control field are available for message data as shown in Figure 3-1. A description of each element of the format is provided in the following paragraphs:

1. Bits 1-48, NASCOM HEADER: The network header contains NASCOM sync, routing and statistics information.

    a. Bits 1-24, NASCOM Sync: This is a 24 bit synchronization field that is set to 30473047 octal used to determine the beginning of the 4800-bit block.

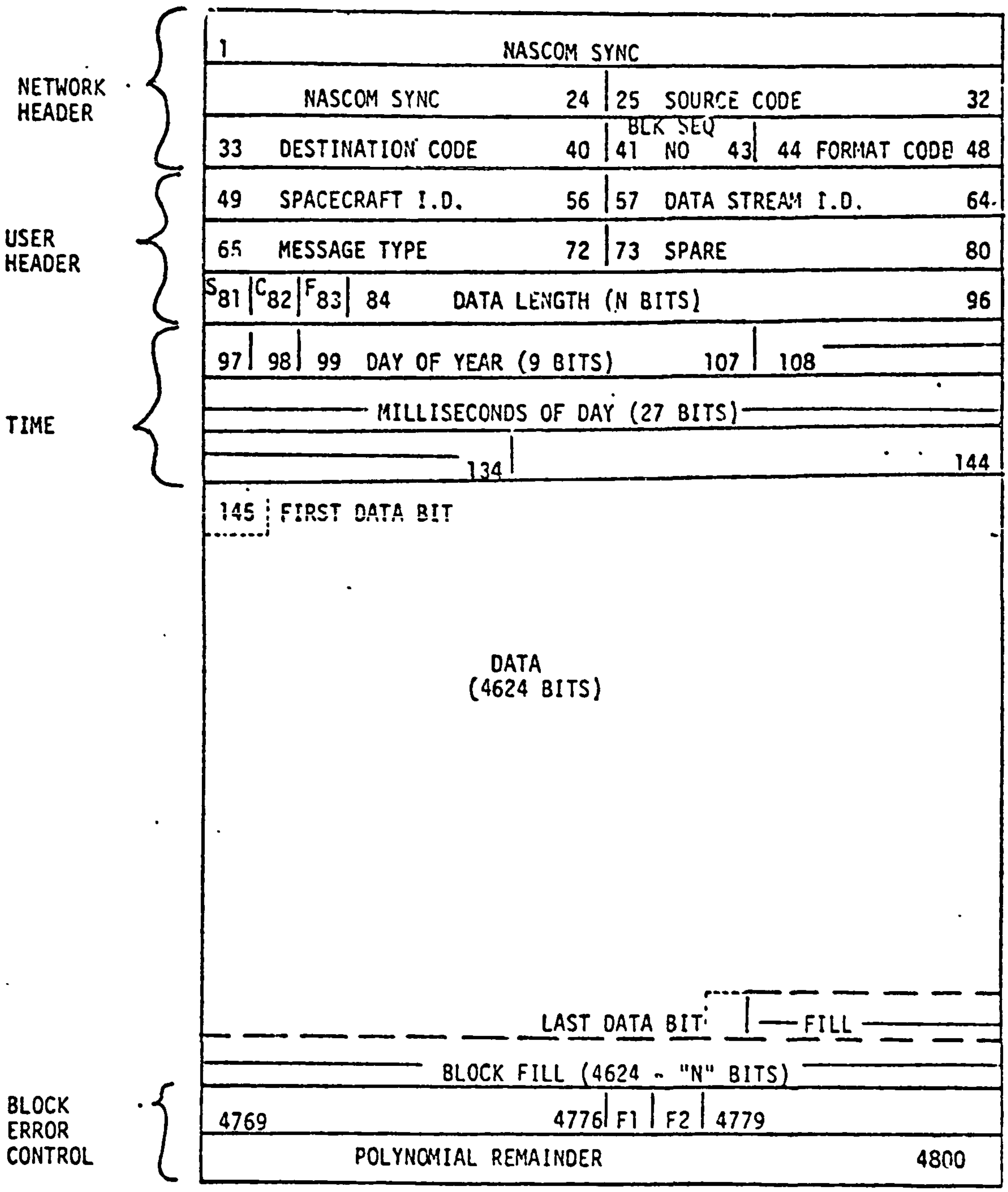


Figure 3-1. 4800 Bit GSTDN Telemetry Block LSD-WPC-007

Table 3-1. Source/Destination Codes

Source/Destination	Code (Octal)*
ALASKA (ULA)	023
GOLDSTONE (GDS)	016
MADRID (MAD)	011
GREENBELT (BLT)	030
HAWAII (HAW)	015
ORRORAL (ORR)	025
ASCONSION (ACN)	006
BERMUDA (BDA)	004
GUAM (GWM)	014
QUITO (QUI)	005
SANTIAGO (AGO)	010
MERRITT ISLAND (MIL)	001
LANDSAT-D CSF-1 8 Kbps RT TLM	106
LANDSAT-D CSF-2 32 Kbps OBC dump/PCD	306
LANDSAT-D CSF-3 128 Kbps STR Playback	046

*	MSB	LSB
MDM/TDRSS MSG	33	40
GSTDN MSG	25	32

b. Bits 25-32, Source Code: The 8-bit source code identifies the originator of the block by geographic locations. Source codes are assigned by Nascom and are listed in Table 3-1.

c. Bits 33-40, Destination Code: This 8-bit field identifies the geographic destinations. Codes are same as source codes. See Table 3-1.

d. Bits 41-43, Block Sequence Number: This 3-bit number identifies the sequence in which blocks are transmitted from the source.

e. Bits 44-48, Format Code: This 5 bit code identifies the general type of data contained in the block. This field will be 21 octal for telemetry blocks.

2. Bits 49-96, User Header: The 48-bit user header is reserved for information required by users to route and process the data contained in the block.

a. Bits 49-56, Spacecraft ID: This 8-bit field identifies the spacecraft being supported. For Landsat-D the code is 070 octal. See Table 3-2.

b. Bit 57-64, Data Stream ID: This 8-bit field identifies the type of telemetry contained in message. See Table 3-3.

c. Bit 65-72, Message Type: This field contains a code which identifies the type of data in the block. This code is 106 octal for telemetry. See Table 3-4.

d. Bits 73-80, Spare: Set to all ones.

e. Bit 81, Spare:

f. Bit 82, Spare: Set to "0" for telemetry.

g. Bit 83, Full Block Flag: This bit is reserved for a flag which indicates when the message field is full. "1" = 4624 bits of telemetry data.

h. Bits 84-96, Data Length: The last 13 bits of the user header contains a binary count of the number of bits of telemetry data, exclusive of fill, contained in the data field.

3. Bits 97-144, Time: This 48-bit field is reserved for a Parallel Binary Four (PB4) time code. The timecode represents the leading edge of the first data bit of the telemetry Data below.

   a. Bits 97-98: This 2-bit field is set to "00".

   b. Bits 99-107: This 9-bit field contains Day of Year.

   c. Bits 108-134: This 27 bit field contains milliseconds of day.

   d. Bits 135-144: This 10 bit field contains all zero's: Microseconds of milliseconds is not used.

4. Bits 145-4768, Telemtry Data: The 4624 bit data field is used to transmit the telemetry data. When the data does not fill this field, fill bits are added after the last data bit. This fill will be 311 octal. The telemetry data is transmitted asynchronously. This is referred to as the throughput format. The sync from the FS may appear anywhere within the block and may reside across block boundaries.

5. Bits 4769-4800, Block Error Control: The block error control field is 32 bits in length and is reserved for the polycode to be used to determine if bit errors have occurred during transmission of the block.

   a. Bits 4769-4776: This 8-bit field is not used and will be set to all ones.

   b. Bits 4777-4778: (F1, F2) These bits will be set to ones.

   c. Bits 4779-4800: Polynomial Remainder: The last 22 bits of the block are reserved for the polynomial remainder which results from encoding the block.

ORIGINAL PAGE IS
OF POOR QUALITY

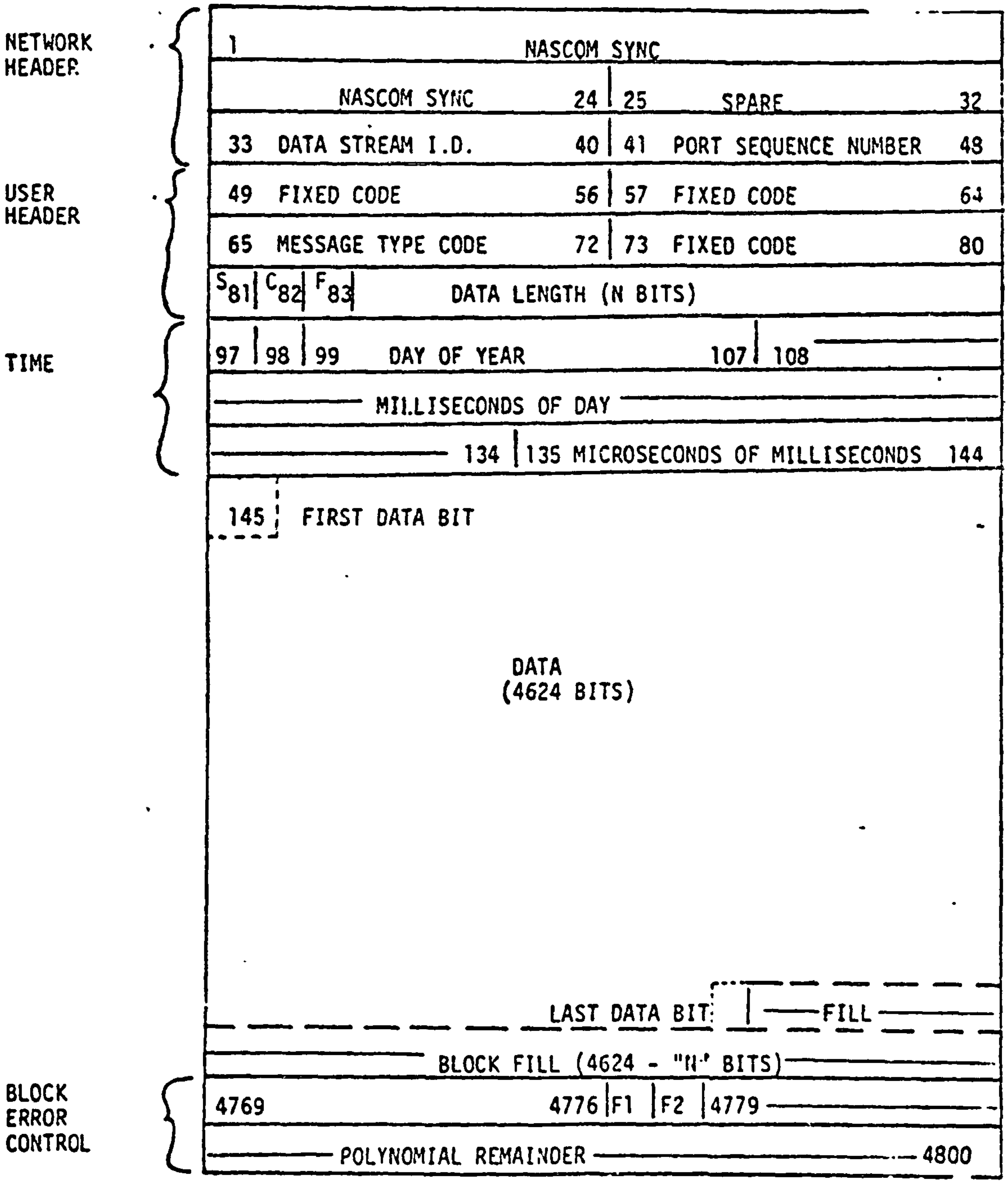


Figure 3-2. 4800 Bit MDM/TDRSS Telemetry Block LSD-WPC-007

Table 3-2. Spacecraft ID

SPACECRAFT	CODE (OCTAL)
Landsat-D	070
Landsat-D Prime	076

Table 3-3. Data Stream ID

DESCRIPTON	CODE (OCTAL)	
	Landsat-D	Landsat-D Prime
Realtime Telemetry	041	043
OBC Dump & PCD	052	—
NBTR Playback	042	044

Table 3-4. Mesage Type Codes (Bit 65-72)

DESCRIPTION	CODE (OCTAL)
WSGT MDM Block (Command ECHO)	025
GSTDN Telemetry	106

3.3 TELEMETRY DATA (TDRSS)

The TDRSS telemetry block, like the GSTDN, begins with 48 bits of Network Header, 48 bits of user header and 48 bits of time code. Subsequently, 4624 bits of telemtry data is followed by 32 bits of Block Error Control as shown in Figure 3-2. An element by element description follows:

1. Bits 1-48, Network Header: The network header is the 48 bits in the 4800-bit block format and contains the NASCOM sync code, routing and statistics information.

   a. Bits 1-24, NASCOM Sync: The 24-bit NASCOM sync code is a fixed code used to determine the beginning of the 4800-bit block. The code is 30473047 octal.

   b. Bits 25-32, Spare: Set to all ones (377 octal).

   c. Bits 33-40, Data Stream ID: 8-bit field used to differentiate between various spacaecraft sets. Table 3-3 gives Data Stream ID codes.

   d. Bits 41-48, Port Sequence Number: This is an 8-bit binary count used to identify the sequence in which blocks were transmitted to a specific port on the MDM.

2. Bits 49-96, User Header: The 48-bit user header is reserved for information required by users to route and process the data contained in the block.

   a. Bits 49-56, Fixed Code: This field is a fixed pattern of 00000001 binary (001 octal).

   b. Bits 57-64, Fixed Code: This field is a fixed pattern of 00000001 binary (001 octal).

   c. Bits 65-72, Message Type: This 8-bit field is used to designate the MDM which blocked the data. Table 3-4 gives Message Type codes.

   d. Bits 73-80, Fixed Code: This field is a fixed pattern of 00000001 binary (001 octal).

e. Bit 81, Spare: Always a logic zero.

f. Bit 82, Spare: Set to "0".

g. Bit 83, Full Block Flag. This bit is reserved for a flag which indicates when the data field is full. "1" indicates 4624 bits of telemetry data.

h. Bits 84-96, Data Length: The last 13 bits of the user header contain a binary count of the number of bits of telemetry data, exclusive of fill, contained in the data field.

3. Bits 97-144, Time: This 48-bit field is reserved for a Parallel Binary four (PB4) time code. The time code represents the leading edge of the first telemetry data bit described below.

   a. Bits 97-98: This 2-bit field is set to "00".

   b. Bits 99-107: This 9-bit field contains Day of Year.

   c. Bits 108-134: This 27 bit field contains milliseconds of day.

   d. Bits 135-144: This 10 bit field contains microseconds of milliseconds.

4. Bits 145-4768, Telemetry Data: The 4624 bit data field is used to transmit the telemetry data. When the data does not fill this field, fill bits are added after the last bit. This fill will be 311 octal. The telemetry data is asynchronous with the 4800-bit block therefore the minor frame sync may appear anywhere within the telemetry data field. In deed, it may be started in one block and end in the following block.

5. Bits 4769-4800, Block Error Control: The block error control field is 37 bits in length and is reserved for the polycode to be used to determine if bit errors have occurred during transmission of the block.

   a. Bits 4769-4776: This 8-bit field is not used and will be set to all ones.

   b. Bits 4777 F1 Set to logic zero by MDM:

   c. Bit 4778 F2: Receiving MDM (GSFC) sets this bit to zero if the polynomial remainder is good; set to one if polynomial remainder is bad.

   d. Bits 4779-4800, Polynomial Remainder: The last 22-bits of the block are reserved for the polynomial remainder which results from encoding the blocks.

SECTION 4

ACRONYMS AND ABBREVIATIONS

A	Analog (Telemetry)
ACS	Attitude Control System
A/D	Analog to Digital
B	Bilevel (Telemetry)
BBR	Band-to-Band Registration
BCU	Bus Coupling Unit
BCD	Binary Coded Decimal
BIL	Band-Interleaved-by-line
BIP	Band Interleaved-by-Pixel
BSQ	Band Sequential
CCSA	Computer Address
CC	Computer Command Slot
CCT	Computer Compatible Tape
C&DH	Command and Data Handling
CFPA	Cooled Focal Plane Assembly (Array)
CMD	Command
CSF	Control Simulation Facility
C/RS	Calibration/Restore Shutter
CU	Central Unit
Demux	Demultiplexer
Demod	Demodulator

DFCB	Data Format Control Book
DMS	Data Management System
DPU	Digital Processing Unit
DRRTS	Data Receive Record Transmit Subsystem
EDC	EROS Data Center
EDIPS	EDC Digital Image Processing System
ELC	End of Line Code
EROS	Earth Resources Observation System
ERTS	Earth Resources Technology Satellite
EU	Expander Unit (for RIU) or Electronics Unit (for NBTR)
FAIRS	Full Aperture Infrared Source
FM	Flight Model
FOV	Field-of-View
FPA	Focal Plane Array
FPDA	Focal Plane Detector Array
GDOP	Geometric-Dilution-of-Precision (the ratio of uncertainty in position of uncertainty in range measurements
GMT	Greenwich Mean Time
GPS	Global Positioning System
GSFC	Goddard Space Flight Center
GSTDN	Ground Spaceflight Tracking Data Network
HDT	High Density Magnetic Tape
HgCdTe	Mercury Cadmium Telluride
HOM	Horizontal Oblique Mercator

HRS	Horizontal Resampling
ICD	Interface Control Document or Drawing
IFOV	Instantaneous Field-of-View
IGFOV	Instantaneous Geometric FOV
IM	Instrument Module
InAs	Indium Arsenide
InSb	Indium Antimonide
IRG	Inter-Record Gap
IRIG-A	Inter-Range Instrumentation Group, standard time, format A
LED	Light Emitting Diode
LFA	Laminar Flow Array
LHC	Left-Hand Circular
LLC	Line Length Code
LS	Line Start
LSB	Least Significant Bit
LSD	Landsat-D
LSW	Least Significant Word
MA	Multiple Access
MDB	Multiplex Data Bus
MDM	Multiplexer-Demultiplexer (MUX-DEMUX)
M/F	Minor Frame
MMS	Multimission Modular Spacecraft
MNFS	Minor Frame Sync Code
Mod	Modulator

MSB	Most Signficant Bit
MSS	Multispectral Scanner or Module Support Structure
MSW	Most Significant Word
MUX	Multiplexer
NASCOM	NASA Communications Network
NBTR	Narrowband Tape Recorder
NDS	Navigation Data Satellite
NETD	Noise Equivalent Temperature Difference
NRZ	Nonreturn to Zero (digital code)
NRZ-L	Non-Return to Zero Level
OBC	On Board Computer
OCC	Operation Control Center
OCG	Orbital Computations Group
ONS	Operational Navigation Satellite
P	Passive Analog (Telemetry)
PAM	Pulse Amplitude Modulation
PCD	Payload Correction Data
PDU	Power Distribution Unit
PFD	Pre-Flight Disconnect
PM	Propulsion Module
PMP	Pre-Modulation Processor
PN	Pseudo Noise
POCC	Payload Operations Control Center
PROM	Programmable Read Only Memory

PROP	Propulsion (Subsystem)
PS	Polar Stereographic
PSK	Phase Shift Keyed
RAM	Random Access Memory
RF	Radio Frequency
RHC	Right Hand Circular
RIU	Remote Interface Unit
R/PA	Receiver/Processor Assembly (GPS)
RT	Real Time
S	Serial Digital (Telemetry)
SAM	Scan Angle Monitor
SBRC	Santa Barbara Research Center
S/C	Spacecraft
SC&CU	Signal Conditioning & Control Unit
SiFPA	Silicon Focal Plane Array (Assembly)
SiFPA	Silicon Focal Plane Array (Assembly)
SLC	Scan Line Corrector
SLS	Scan Line Sync
SMA	Scan Mirror Assembly
SMC	Scan Mirror Control
SME	Scan Mirror Electronics
SMM	Solar Maximum Mission
SOM	Space Oblique Mercator
SQPSK	Staggered Quadriphase Phase Shift Keyed

SSA	S-Band Single Access
STACC	Standard Telemetry and Command Components
STDN	Spaceflight Tracking Data Network
STINT	STACC Interface Unit
SUBCOM	Subcommutation
TA	Telemetry Address
TBS	To Be Supplied
TC	Time Code
TCG	Time Code Generator
TCS	Thermal Control Subsystem
TDRS	Tracking and Data Relay Satellite
TDRSS	Tracking and Data Relay Satellite System
TGS	Transportable Ground Station
TLM	Telemetry
TM	Thematic Mapper
TU	Transponder Unit (for NBTR)
UQPSK	Unbalanced Quadrature Phase Shift Keyed
UTM	Universal Transverse Mercacor
VRS	Vertical Resampling
WB	Wideband
WBVT	Wide Band Video Tape
WBVTR	Wideband Video Tape Recorder

SECTION 5

REFERENCES

1. "Landsat D Data Format Control Book," Volume III, (Command), SVS-10124, 30 November 1982.

2. "Landsat-D Data Format Control Book," Volume IV, (GPS), SVS-10125, 31 July 1981.

3. "Landsat D Data Format Control Book," Volume V, (Payload), SVS-10126, 31 July 1981.

4. "MMS Flight Executive Users Guide," July 21, 1977, prepared by DAO.

5. S-700-56 Rev B MMS Onboard Computer Flight Executive Technical Description, February 1980.

6. Drawing Number 47J249400AR Diagram, Schematic, Elec, Landsat-D System, Telemetry List.

7. Landsat-D Ground Segment Data Base, Version 113.