July 12, 1990

INTEROFFICE MEMORANDUM

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PROJECT MAGELLAN	NUMBER: SES-115
SOFTWARE INTERFACE SPECIFICATION	Revision: REV-F
Cover Sheet	Date: June 15, 1990

SIS NAME: TELEMETRY DECOMMUTATION/DECALIBRATION DATA (TMDDAT)

DOMAIN:

System	Subsystem	Program	Make/Use
MOS-GDS	S/C Engineering(SES)	dBASE-III+	Make
MOS-GDS	Telemetry Processing(TPS)	DMD	Use
MOS-GDS	Science (ON EDR)	EDRs	Use
MOS-GDS	RES (ON EDR)	RAS	Use
MOS-GDS	SDPS (ON EDR)	Control	Use
MOS-GDS	IDPS (ON EDR)	RCBR	Use

COMPUTER SYSTEM: PC/SUN

PURPOSE OF INTERFACE (SUMMARY): This interface describes the tables which allow for the interpretation and definition of the engineering telemetry data by the Telemetry Processing Subsystem (TPS).

INTERFACE MEDIUM:

Disk File: [x]
Magnetic Tape: [] Tracks:____ Density:____ Data Code:____
Other: [x] Paper as auxiliary.

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Mission Operations System (MOS)

Software Interface Specification (SIS)

SIS SES-115

June 15, 1990

Abstract: This SIS describes the logical file (TMDDAT) that is used to generate and maintain spacecraft (S/C) specifics on mnemonics, conversion factors, and decommutation maps, etc., for use in the Space Flight Operations Center (SFOC) provided work stations to process incoming S/C telemetry.

Change Control: See 630-82, Magellan Configuration Management Plan.

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Change Letter	Date	Affected Portions
Original	12/85	All
Basic-1	5/86	All
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REV-C	6/88	All: SCR-080
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REV-F	06/90	Pages 1-2, 1-3, 4-4, 4-7 - 4-11 MCR-464

LIST OF TBD ITEMS

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SECTION 1

1.0 GENERAL DESCRIPTION

1.1 CONTENT OVERVIEW

The spacecraft team (SCT) must be able to generate and maintain the TMDDAT files for each engineering telemetry channel. The files shall contain all the information required to convert raw spacecraft (S/C) telemetry into meaningful data on the ground. The file shall contain: commutator position and frequency, data number (dn) to engineering unit (eu) conversion/calibration factors, default alarm limits, definition of derived channels and other parameters as needed for interpreting S/C telemetry. In particular, variations to cover different variable packet contents according to Commutator Map Index (CMI) values are required.

1.2 SCOPE

The specifications in this document apply to all S/C engineering telemetry measurements during mission operations. Any measurement in the incoming engineering telemetry stream is a candidate that may be processed. This document does not necessarily dictate specifications for Monitor or QQC channels.

1.3 APPLICABLE DOCUMENTS

a) VRM Mission Operations System Requirements GDS Spacecraft Engineering Subsystem (630-300-VRM-MOS-004-240 Functional Requirements)

b) VRM Mission Operations System Requirements Telemetry Processing Subsystem (630-300-VRM-MOS-004-251 Functional Requirements)

c) VRM-SE018 Telemetry Calibration Report (Limits and Conversion Factors)

d) MGN SIS:TPS-110 Engineering Telemetry File

e) VRM-SE-001-002: VRM-2-280 Telemetry Measurements and Data Formats

f) DMD SDD; (Derived) Channel Conversion Language (CCL)

1.4 SUBSYSTEM SITING

1.4.1 Interface Location, Medium

The interface shall consist of a set of character files originating on/from an IBM PC-XT or PC-AT, which may be any Engineering Analysis Workstation (EA WS) in the Mission Support Areas. The medium for file transfer is a local or wide area network depending on the location of the destination, Denver or JPL.

1.4.2 Data Source, Destination, and Transfer Method

The files will be produced using any package convenient to the Spacecraft Team which writes ASCII records. In particular the dBASE-III+ software provides a good front-end utility. The authoritative source for file content is the VRM-2-280 document. Destination is a set of TPS disk image files. An SFOC network compatible file transfer package will accommodate the transfers.

1.4.3 Generation Method and Frequency

A TMDDAT file set shall be generated which accommodates all engineering telemetry measurements. It shall consist of a series of separate files. The DECOM File shall contain the engineering measurement number, and commutator locating information. A data identifier key field of the DECOM File will be held in common with the same key field in the DECAL file which contains the necessary parameters for presenting useful telemetry information to the user, including dn to eu conversion and alarming. A separate file for each conversion type (STATUS, CALIBRATION CURVE, or INTERPOLATION) contains conversion factors/values. The sixth file contains derived channel definitions or other channel conversion language. Variable packet specifics are encoded within the DECOM File. It is the responsibility of TPS to correlate these to the downlinked telemetry stream for proper decoding. VRM-MOS-4-240 identifies the frequency and data volume estimates of downlink traffic.

One DECOM file will be generated for each Map Sequence Number (MSN). Eight MSN values are possible. DECAL file data will be provided according to an SCLK start-stop range over which it is valid. A subset of DECAL data will be locally changeable at user discretion.

1.4.4 Pertinent Relationships with Other Interfaces

The interfaces to this SIS shall consist of the TPS activity which converts these ASCII files into the internal structure required for TPS processing of telemetry. In this way the TMDDAT tables are used to support channelization of telemetry for the Central Data Base (CDB), data presentation by the Data Monitor and Display (DMD) subsystem as well as satisfy queries for engineering telemetry at the various EA WSs.

As an ancillary operation the TMDDAT information (not including the decom file) will also be included on the Science Experiment Data Records (EDRs) for archival purposes.

1.4.5 Labeling and Identification

The basic TMDDAT file set shall have the following names. These names will also be used as an external label when the medium is diskette. These files are called:

```
DECOMnab.DBF
DECALMab.DBF
DECALSab.dbf
STATa-b.DBF
COEFa-b.DBF
INTa-b.DBF
DMDCCL.a-b
```

The files will be converted to a strict textual form prior to transmission across the network or when structured as a Standard Formatted Data Unit (SFDU). In this mode the files on the PC are called:

```
DECOMnab.TXT
DECALMab.TXT
DECALSab.TXT
STATa-b.TXT
COEFa-b.TXT
INTa-b.TXT
```

Derived channel definitions in the DMDCCL.a-b file will not be structured as SFDU's.

Corresponding file names in the SFOC environment will be:

```
DECOMn.a.b.DCM
DECAL-MAP.a.b.CPT        (RADAR Alarms in mapping mode)
DECAL-SBY.a.b.CPT        (RADAR Alarms in Standby mode)
DECAL-ST.a.b.DST
DECAL-CC.a.b.DCC
DECAL-IT.a.b.DIT
dmdccl.a.b.src
```

where "n" is the map sequence number (0-7), "a" is a primary version character (1-9,A-Z) and "b" is a secondary version character (0-9,A-Z).

1.5 ASSUMPTIONS AND CONSTRAINTS

All capabilities shall be implemented before GDS integration begins.

SECTION 2

2.0 INTERFACE CHARACTERISTICS

2.1 HARDWARE CHARACTERISTICS AND LIMITATIONS

2.1.1 Special Equipment and Device Interfaces

SFOC LAN or hand-carry of the diskettes can be used to deliver the files to TPS. An IBM PC (DOS)-compatible reader is required to input the information to TPS when diskettes are used.

2.1.2 Special Setup Requirements

The dBASE-III+ software package will be used to create and maintain the ASCII version by the SCT. Derived channel definitions in CCL will be maintained with an Editor. The SFDU form of the files will be created, and header information maintained within DOS on the IBM PC.

2.2 VOLUME AND SIZE

The DECOM file shall consist of one set of unique data which includes fixed packet telemetry as well as one subset for each variable packet according to the Commutation Map Index (CMI). There are 4 variable packet subsets for a total of approximately 2872 channel occurrences. Each record requires approximately 86 bytes for a total of 247K bytes. The DECAL data, excluding CCL, represents approximately 2267 channel occurrences which requires a minimum of 93 bytes per measurement and an average of 75 bytes for dn-eu conversion data. The collective size of this information is then about 276K bytes. Derived channels in CCL utilize 80 character records in a "C"-like language; 100 derivations require about 1550 records, but there is no real upper limit. The SFDU header requires approximately 290 characters, and, since "length by marker" is used, the SFDU trailer must be present at 30-50 characters. SFDU headers and trailers are applied on each transmitted file.

2.3 INTERFACE MEDIUM CHARACTERISTICS

Remote or local access to the TPS host via PC or LAN.

2.4 FAILURE PROTECTION, DETECTION, AND RECOVERY FEATURES

2.4.1 File Backup Requirements

Backup capability exists through the archiving capabilities supported by the IBM PC. The TPS may provide its own backup services.

2.4.2 Security/Integrity Measures

The TMDDAT file set will be access protected for update purposes under the control of a data base manager. Configuration management is performed in conjunction with updates to ref 1.3 c) and e).

2.5 END-OF-FILE (OR MEDIUM) CONVENTIONS

Standard DOS end of file conventions will apply: each file is terminated by a Control-Z (hex 1A).

SECTION 3

3.0 ACCESS

3.1 PROGRAMS USING THE INTERFACE

The program using the interface directly is dBASE-III+ on the input side plus an Editor for CCL. The programs on the output side are part of the TPS, and include translators to convert DECOM and DECAL data into internal form and the CCL Processor.

3.2 SYNCHRONIZATION CONSIDERATIONS

3.2.1 Timing and Sequencing Characteristics

All files in TMDDAT use the same key identifier field to reflect their inter-relationship. Typically this field will be a measurement name (E-#). In CCL this identifier is called the trigger channel.

3.2.2 Effective Duration

Duration of the TMDDAT DECOM file shall typically be for the life of the mission since changes to the telemetry formats after launch are not anticipated. Anomalous conditions may require variable packet redefinition. Inadequacies in the selection of downlink information may cause redefinition of the fixed packet selections. One version of DECOM will be provided for each MSN value from the spacecraft.

The TMDDAT DECAL file information (including CCL and conversion factors) will be much more volatile. It is expected to change frequently early in the mission, then stabilize until major mission phase changes produce further impacts. Versions will be provided with a specific valid coverage over a SCLK range. The duration of locally changeable decal information (e.g. alarm limits and CCL) is not addressed in this SIS.

3.2.3 Priority Interrupts

Not applicable.

3.3 INPUT/OUTPUT PROTOCOLS, CALLING SEQUENCES

The DECOM and DECAL file I/O interfaces in the network environment can be handled by text processing software. The CCL file interface is handled by any ASCII record processing capability. Each of the six files will be separately transmitted (with SFDU headers and trailers as necessary).

SECTION 4

4.0 DETAILED INTERFACE SPECIFICATIONS

4.1 STRUCTURE AND ORGANIZATION OVERVIEW

The TMDDAT file set is a database structure that will contain all the parameters necessary to convert raw spacecraft (S/C) telemetry into meaningful data on the ground. All records in the DECOM file represent accessible telemetry data items on either a minor frame basis or multiple thereof. For example, the entire 800-bit frame can be viewed as a single data block, as can a single one-byte channel in the fixed packet area. In this sense the DECOM File represents a hierarchical structure where each data block has a parent data block to which it belongs. The "root" of this hierarchy is the full minor frame which is designated as such by having its parent value set equal to a special key (e.g. "null"). For every "leaf" of this hierarchy, a DECAL record of channel parameters is provided. Derived channels are also identified but the derivation itself is recorded in the "DERIVED" file. In the interest of storage efficiency, DECAL data and dn-to-eu conversion factors are also stored in separate files. The overall inter file relationship is shown in Figure 4-1.

Information in TMDDAT must be easily referenced back to the VRM-2-280 document. Consequently there is a strong correspondence between the two. Moreover, data base utility operations on TMDDAT must allow various sort orders and subsetting operations for report generation at the convenience of SCT maintenance. The file organization must be such that all engineering telemetry measurements and fields can be represented in formatted report outputs.

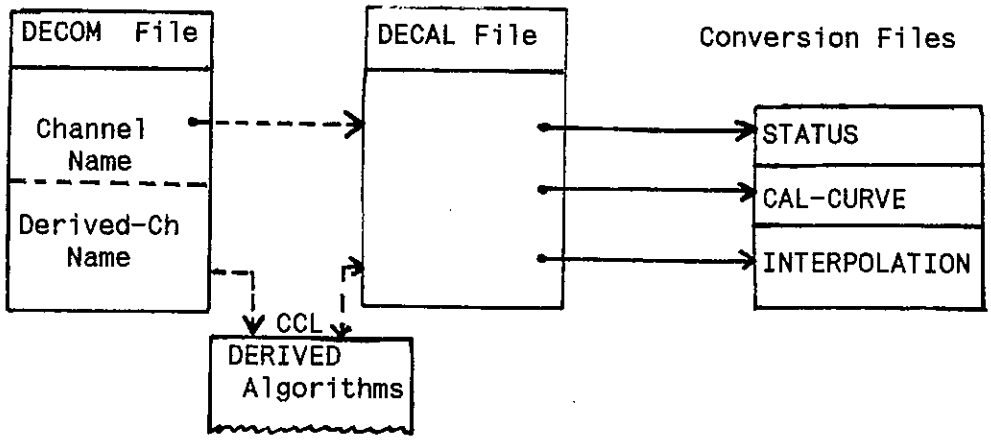

Figure 4-1. TMDDAT Files Relationships

4.2 STRUCTURE DEFINITION AND FORMAT

4.2.1 File Field Definitions

The definition and semantics of each of the TMDDAT files is provided in this section.

4.2.1.1 DECOM File

FIELD	NAME	TYPE	WIDTH	CONTENT
1	BLOCK_ID	CHARACTER	8	Name of data item (header, channel, etc)
2	TITLE	CHARACTER	40	Long data item title
3	PARENT	CHARACTER	8	BLOCK_ID of previous level or "DERIVED"
4	CASE	CHARACTER	4	Value of "SWITCH" for this BLOCK_ID
5	SWITCH	CHARACTER	8	For framing & sub-decom, some BLOCK-ID
6	FREQUENCY	NUMERIC	2	Frequency indicator by deck/cycle
7	OFFSET	NUMERIC	5	Length from bit zero of PARENT
8	SIZE	NUMERIC	5	Width in bits of field size (dn)
9	SUBSYS_NR	CHARACTER	4	Code of subsystem or sort key

BLOCK_ID: For any record in the DECOM File this may not be unique. In particular, the same BLOCK_ID value will appear whenever the same measurement occurs in more than one place. There are four cases:
i) occurrence in both fixed and variable packets;
ii) occurrence in two different maps (e.g. MAP 0 and MAP 2);
iii) either i) or ii) plus the DED buffer;
iv) multiple occurrences in either fixed or variable packets.
AACS Flood, StarCal, and Trickle measurements are all unique and occur only once.

TITLE: Long title from 2-280, used only for reference in hardcopy.

PARENT: Self-explanatory.

CASE: A value from "channelized telemetry" which must occur every minor frame.

SWITCH: A BLOCK_ID logic is: IF <SWITCH> = <CASE> THEN decommutate according to this PARENT/OFFSET/SIZE.

FREQUENCY: Only applies for terminal data definitions (standard channels).

OFFSET: Self-explanatory.

SIZE: Self-explanatory.

SUBSYS_NR: This field can be any alphanumeric string left-justified with trailing blanks. In dBASE, it is a very useful primary sort key. The Magellan subsystem codes are:
IUS - Inertial Upper Stage (#0)
TCS - Telecommunications Subsystem (#2)
EPS - Electrical Power Subsystem (#4)
CDS - Command and Data Subsystem (#6)
AACS- Attitude and Articulation Control Subsystem (#7)
PPS - Propulsion and Pyro Subsystem (#10)
THRM- Thermal Subsystem (#11)
RS - Radar Subsystem (#23)

MON - DSN Monitor Data
QQC - Quality, Quantity, and Continuity Data
HDR - Header Data

Note: (1) If PARENT is blank and/or FREQUENCY is zero, the channel is defined but does not occur in the downlink. Spare or unused bits/bytes/words may be indicated in this way. Some unused commutator slots have E'#'s, some do not.

(2) Only BLOCK_ID's formed in accordance with the established channel naming conventions represent retrievable channels. All other BLOCK_ID's are provided for completeness in defining the hierarchical data structure of the commutator and are used to support the creation of the internal form of the DECOM table.

4.2.1.2 DECAL File

There will be two separate DECAL files that exist within the system for any given version number. These files will be identical with the exception that one file will contain valid red alarm values for RADAR channels for the RADAR in mapping mode and the other file will contain valid red alarm values for the RADAR in Standby mode. The file structure will be identical for both implementations. The only unique identifiers between the two files will be the internal SFDU header (Section 4.2.2) and the external filename (Section 1.4.5).

Channel parameters required by DMD software which are not specified in this file will be universally defaulted for every channel. These parameters are:

- o Tolerance ALL
- o RANGE_TYPE OFF

The DECAL file will not provide values for the Yellow_Alarm_Type field, meaning that no change to any previously tabled values for this field is desired.

This file not only specifies the basic channel parameter data, but also the initial default values for user modifiable parameters which are broadcast to all DMDs when a new file version is released. Derived channels will be included just like normal channels. The ALARM values (fields 9-12) represent system or "red" limits.

FIELD NAME	TYPE	WIDTH	CONTENT
1 BLOCK_ID	CHARACTER	8	Name of Data Item
2 SHORT_TITL	CHARACTER	12	Short name of data item
3 CONV_TYPE	CHARACTER	2	DN conversion technique, if any
4 DN_DAT_TYP	CHARACTER	2	Data type of the raw dn
5 EX_DAT_TYP	CHARACTER	1	Data type of the value externally
6 EU_UNITS	CHARACTER	5	Units of EU, from 2-280
7 EU_RANGE	CHARACTER	14	Range of EU, from 2-280
8 CCL_FLAG	CHARACTER	1	Associated CCL Processing Flag
9 TEST_TYPE	CHARACTER	2	DN or EU, which value to alarm on
10 ALARM_LO	CHARACTER	11	Lower bound below which alarm occurs.
11 ALARM_HI	CHARACTER	11	Upper bound above which alarm occurs.
12 ALARM_HYS	CHARACTER	1	Hysteresis (sic) flag.
13 ALARM_ENV	CHARACTER	1	Alarm envelope code.
14 SUBSYS_NR	CHARACTER	4	Code of assigned subsystem/sort key.
15 SENSOR_TYP	CHARACTER	1	Sensor type codes, from 2-280.

BLOCK_ID: Self-explanatory.
SHORT_TITL: Text used in representation for ETF or Channel Display.
CONV_TYPE: ST=STATUS, CC=CalCurve, IT=Interpolation. (These conversion types require another TMDDAT file.)
DN_DAT_TYP: Legal values are: UI=Unsigned Integer, SI=Signed Integer, H=Hex, AF=ATAC-16 Floating Point, HF=Host computer Floating Point, D=Digital, A=ASCII, MF=Modcomp Floating Point. Note: all Magellan signed integers use 2's-complement representation for negative numbers.
EX_DAT_TYP: Legal values are: I=Integer, F=FLoating Point, H=Hex, B=Binary, C=Character. This is the data type of the measurement as the user wants to see it (Display or ETF).
EU_UNITS: From 2-280, used in ETF or Channel Display.
EU_RANGE: From 2-280, (not used by DMD).
CCL_FLAG: T(rue)=ON means this is a trigger, else F(alse)=OFF.
TEST_TYPE: Tells whether to alarm on DN or EU

ALARM_LO: Alarm values are expressed in DN or EU data types depending on the value of TEST_TYPE. If the alarm envelope is M(ask) this value will represent the mask of the bits to be alarmed.
ALARM_HI: Alarm values are expressed in DN or EU data types depending on the value of TEST_TYPE. If the alarm envelope is M(ask) this value will represent the complement of the alarm limit.
ALARM_HYS: ON(N) or OFF(F).
ALARM_ENV: E=Exclusive, I=Inclusive, N=Not to be applied, H=High, L=Low, C=On Change, M=Mask.
SUBSYS_NR: ibid, Left-justified with trailing blanks.
SENSOR_TYP: A=Analog, T=Thermal, D=Digital, S=S/W, (not used by DMD).

NOTE: A conversion type of ST causes a status channel to be defined.

4.2.1.3 Conversion Factors - STATUS Channels File

FIELD	NAME	TYPE	WIDTH	CONTENT
1	BLOCK_ID	CHARACTER	8	Data name of STATUS channel.
2	NR_SEGMNTS	NUMERIC	2	Number of dn-State pairs which follow.
3	FIRST_ST	CHARACTER	12	1st state to associate ("EU" for this dn)
4	SECOND_ST	CHARACTER	12	2nd state to associate
5	THIRD_ST	CHARACTER	12	3rd state to associate
6	FOURTH_ST	CHARACTER	12	4th state to associate

Note: This format allows 1 to 2-bit wide state fields; state values appear in ascending order to correspond to the numeric value of the DN.

4.2.1.4 EU Conversion Factors - Calibration Curve File

FIELD	NAME	TYPE	WIDTH	CONTENT
1	BLOCK_ID	CHARACTER	8	Data name of CC channel.
2	NR_SEGMNTS	NUMERIC	2	Number of coefficients (Poly. terms)
3	COEF1	NUMERIC	12	First coefficient (constant term)
4	COEF2	NUMERIC	12	Second coefficient
5	COEF3	NUMERIC	12	Third coefficient
6	COEF4	NUMERIC	12	Fourth coefficient
7	COEF5	NUMERIC	12	Fifth coefficient
8	COEF6	NUMERIC	12	Sixth coefficient

Note: Up to a fifth order polynomial curve fit is allowed. The coefficient values will be represented in scientific notation.

4.2.1.5 EU Conversion Factors - Interpolation Table File

FIELD	NAME	TYPE	WIDTH	CONTENT
1	BLOCK_ID	CHARACTER	8	Data name of IT channel.
2	NR_SEGMNTS	NUMERIC	2	Number of interpolation pairs (16 max)
3	FRST_DN	CHARACTER	5	1st dn value
4	FRST_EU	CHARACTER	7	1st eu value
5	SCND_DN	CHARACTER	5	2nd dn value
6	SCND_EU	CHARACTER	7	2nd eu value
7	THIRD_DN	CHARACTER	5	3rd dn value
8	THIRD_EU	CHARACTER	7	3rd eu value
9	FOURTH_DN	CHARACTER	5	4th dn value
10	FOURTH_EU	CHARACTER	7	4th eu value
11	FIFTH_DN	CHARACTER	5	5th dn value
12	FIFTH_EU	CHARACTER	7	5th eu value
13	SIXTH_DN	CHARACTER	5	6th dn value
14	SIXTH_EU	CHARACTER	7	6th eu value
15	SEVENTH_DN	CHARACTER	5	7th dn value
16	SEVENTH_EU	CHARACTER	7	7th eu value
17	EIGHTH_DN	CHARACTER	5	8th dn value
18	EIGHTH_EU	CHARACTER	7	8th eu value
19	NINTH_DN	CHARACTER	5	9th dn value
20	NINTH_EU	CHARACTER	7	9th eu value
21	TENTH_DN	CHARACTER	5	10th dn value
22	TENTH_EU	CHARACTER	7	10th eu value
23	ELVNTH_DN	CHARACTER	5	11th dn value
24	ELVNTH-EU	CHARACTER	7	11th eu value
25	TWLFTH_DN	CHARACTER	5	12th dn value
26	TWLFTH_EU	CHARACTER	7	12th eu value
27	THRTNTH_DN	CHARACTER	5	13th dn value
28	THRTNTH_EU	CHARACTER	7	13th eu value
29	FRTNTH_DN	CHARACTER	5	14th dn value
30	FRTNTH_EU	CHARACTER	7	14th eu value
31	FFTNTH_DN	CHARACTER	5	15th dn value
32	FFTNTH_EU	CHARACTER	7	15th eu value
33	SIXTEEN-DN	CHARACTER	5	16th dn value
34	SIXTEEN_EU	CHARACTER	7	16th eu value

Note: The dn values must be in ascending order.

4.2.1.6 Derived Channel Definitions File

This file contains the definitions of the derivations of each derived channel (see reference 1.3f). In order to ensure compatibility with the representation of "raw" channels in the DECOM and DECAL files, Magellan Derived Channel algorithms will consistently produce a DN value.

4.2.2 File Formats

In the data base, all TMDDAT files will be structured as defined above. For inclusion in the broader SFOC environment, e.g. transmission over the network, they will be formatted as SFDU's using the data aggregation by marker scheme. The CCL file is an exception; it will be in free format in accordance with CCL requirements using an 80-character record. SFDU forms will be built on the IBM PC by converting the appropriate header and trailer records. The TEXT files will be formed as dBASE "TYPE SDF" (System Data Format) copies of the structured (.DBF) type. The following sections define each SFDU form explicitly.

4.2.2.1 DECOM.TXT SFDU File

SFDU Header Data - DECOM File

Bytes 00-11	CCSD1Z000001
Bytes 12-19	00000409
Bytes 20-31	NJPL1K00KL00
Bytes 32-39	00000296
Bytes 40-53	MISSION_ID=4<cr><lf>
Bytes 54-79	SPACECRAFT_NAME=MAGELLAN<cr><lf>
Bytes 80-97	SPACECRAFT_ID=18<cr><lf>
Bytes 98-120	MISSION_NAME=MAGELLAN<cr><lf>
Bytes 121-158	PROCESS_TIME=yyyy-mm-ddThh:mm:ss.fff<cr><lf>
Bytes 159-181	DATA_TYPE=ENGINEERING<cr><lf>
Bytes 182-211	DATA_SET_NAME=DECOMn.a.b.DCM<cr><lf>
Bytes 212-239	DATA_OBJECT_TYPE=DECOM_MAP<cr><lf>
Bytes 240-262	MAP_SEQUENCE_NUMBER=n<cr><lf>
Bytes 263-278	VERSION_ID=a.b<cr><lf>
Bytes 279-301	MAP_NAME=aaaaaaaaaaaa<cr><lf> (note: aaa... must be UPPER case)
Bytes 302-335	SCLK_START_VALUE=dddddddd:dd:d:d<cr><lf>
Bytes 336-347	CCSD1R000003
Bytes 348-355	00000073
Bytes 356-374	DELIMITER=SMARKER<cr><lf>
Bytes 375-394	PRODUCT_NAME=DECOM<cr><lf>
Bytes 395-413	TYPE=NJPL1I000170<cr><lf>
Bytes 414-428	PROTOCOL=NONE<cr><lf>

{DATA HERE} - 84 Characters per record, fields as defined in 4.2.1.1

Bytes 00-11	CCSD1R000003
Bytes 12-19	00000039
Bytes 20-38	DELIMITER=EMARKER<cr><lf>
Bytes 39-58	PRODUCT_NAME=DECOM<cr><lf>

4.2.2.2.1 DECAL.TXT MAPPING Mode SFDU File

SFDU Header Data - DECAL File

Bytes 00-11	CCSD1Z000001
Bytes 12-19	00000430
Bytes 20-31	NJPL1K00KL00
Bytes 32-39	00000319
Bytes 40-53	MISSION_ID=4<cr><lf>
Bytes 54-79	SPACECRAFT_NAME=MAGELLAN<cr><lf>
Bytes 80-97	SPACECRAFT_ID=18<cr><lf>
Bytes 98-120	MISSION_NAME=MAGELLAN<cr><lf>
Bytes 121-158	PROCESS_TIME=yyyy-mm-ddThh:mm:ss.fff<cr><lf>
Bytes 159-181	DATA_TYPE=ENGINEERING<cr><lf>
Bytes 182-214	DATA_SET_NAME=DECAL-MAP.a.b.CPT<cr><lf>
Bytes 215-239	DATA_OBJECT_TYPE=DECAL1<cr><lf>
Bytes 240-255	VERSION_ID=a.b<cr><lf>
Bytes 256-271	DECAL_NAME=CPT<cr><lf>
Bytes 272-291	RADAR_MODE=MAPPING<cr><lf>
Bytes 292-325	SCLK_START_VALUE=ddddddddd:dd:d:d<cr><lf>
Bytes 326-358	SCLK_STOP_VALUE=eeeeeeee:ee:e:e<cr><lf>
Bytes 359-370	CCSD1R000003
Bytes 371-378	00000071
Bytes 379-397	DELIMITER=SMARKER<cr><lf>
Bytes 498-415	PRODUCT_NAME=CPT<cr><lf>
Bytes 416-434	TYPE=NJPL1I000171<cr><lf>
Bytes 435-449	PROTOCOL=NONE<cr><lf>

{DATA HERE} - 76 Characters per record, fields as defined in 4.2.1.2

Bytes 00-11	CCSD1R000003
Bytes 12-19	00000037
Bytes 20-38	DELIMITER=EMARKER<cr><lf>
Bytes 39-56	PRODUCT_NAME=CPT<cr><lf>

4.2.2.2.2 DECAL.TXT STANDBY Mode SFDU File

SFDU Header Data - DECAL File

Bytes 00-11	CCSD1Z000001
Bytes 12-19	00000430
Bytes 20-31	NJPL1K00KL00
Bytes 32-39	00000319
Bytes 40-53	MISSION_ID=4<cr><lf>
Bytes 54-79	SPACECRAFT_NAME=MAGELLAN<cr><lf>
Bytes 80-97	SPACECRAFT_ID=18<cr><lf>
Bytes 98-120	MISSION_NAME=MAGELLAN<cr><lf>
Bytes 121-158	PROCESS_TIME=yyyy-mm-ddThh:mm:ss.fff<cr><lf>
Bytes 159-181	DATA_TYPE=ENGINEERING<cr><lf>
Bytes 182-214	DATA_SET_NAME=DECAL-SBY.a.b.CPT<cr><lf>
Bytes 215-239	DATA_OBJECT_TYPE=DECAL1<cr><lf>
Bytes 240-255	VERSION_ID=a.b<cr><lf>
Bytes 256-271	DECAL_NAME=CPT<cr><lf>
Bytes 272-291	RADAR_MODE=STANDBY<cr><lf>
Bytes 292-325	SCLK_START_VALUE=ddddddddd:dd:d:d<cr><lf>
Bytes 326-358	SCLK_STOP_VALUE=eeeeeeee:ee:e:e<cr><lf>
Bytes 359-370	CCSD1R000003
Bytes 371-378	00000071
Bytes 379-397	DELIMITER=SMARKER<cr><lf>
Bytes 398-415	PRODUCT_NAME=CPT<cr><lf>
Bytes 416-434	TYPE=NJPL1I000171<cr><lf>
Bytes 435-449	PROTOCOL=NONE<cr><lf>

{DATA HERE} - 76 Characters per record, fields as defined in 4.2.1.2

Bytes 00-11	CCSD1R000003
Bytes 12-19	00000037
Bytes 20-38	DELIMITER=EMARKER<cr><lf>
Bytes 39-56	PRODUCT_NAME=CPT<cr><lf>

4.2.2.3 DN-EU-ST.TXT SFDU File

SFDU Header Data - STATUS File

Bytes 00-11 CCSD1Z000001
Bytes 12-19 00000415
Bytes 20-31 NJPL1K00KL00
Bytes 32-39 00000301
Bytes 40-53 MISSION_ID=4<cr><lf>
Bytes 54-79 SPACECRAFT_NAME=MAGELLAN<cr><lf>
Bytes 80-97 SPACECRAFT_ID=18<cr><lf>
Bytes 98-120 MISSION_NAME=MAGELLAN<cr><lf>
Bytes 121-158 PROCESS_TIME=yyyy-mm-ddThh:mm:ss.fff<cr><lf>
Bytes 159-181 DATA_TYPE=ENGINEERING<cr><lf>
Bytes 182-213 DATA_SET_NAME=DECAL-ST.a.b.DST<cr><lf>
Bytes 214-238 DATA_OBJECT_TYPE=DECAL4<cr><lf>
Bytes 239-254 VERSION_ID=a.b<cr><lf>
Bytes 255-273 DECAL_NAME=STATUS<cr><lf>
Bytes 274-307 SCLK_START_VALUE=dddddddd:dd:d:d<cr><lf>
Bytes 308-340 SCLK_STOP_VALUE=eeeeeeee:ee:e:e<cr><lf>
Bytes 341-352 CCSD1R000003
Bytes 353-360 00000074
Bytes 361-379 DELIMITER=SMARKER<cr><lf>
Bytes 380-400 PRODUCT_NAME=STATUS<cr><lf>
Bytes 401-419 TYPE=NJPL1I000174<cr><lf>
Bytes 420-434 PROTOCOL=NONE<cr><lf>

{DATA HERE} - 58 Characters per record, fields as defined in 4.2.1.3

Bytes 00-11 CCSD1R000003
Bytes 12-19 00000040
Bytes 20-38 DELIMITER=EMARKER<cr><lf>
Bytes 39-59 PRODUCT_NAME=STATUS<cr><lf>

4.2.2.4 DN-EU-CC.TXT SFDU File

SFDU Header Data - Calibration Coefficients File

Bytes 00-11 CCSD1Z000001
Bytes 12-19 00000421
Bytes 20-31 NJPL1K00KL00
Bytes 32-39 00000305
Bytes 40-53 MISSION_ID=4<cr><lf>
Bytes 54-79 SPACECRAFT_NAME=MAGELLAN<cr><lf>
Bytes 80-97 SPACECRAFT_ID=18<cr><lf>
Bytes 98-120 MISSION_NAME=MAGELLAN<cr><lf>
Bytes 121-158 PROCESS_TIME=yyyy-mm-ddThh:mm:ss.fff<cr><lf>
Bytes 159-181 DATA_TYPE=ENGINEERING<cr><lf>
Bytes 182-213 DATA_SET_NAME=DECAL-CC.a.b.DCC<cr><lf>
Bytes 214-238 DATA_OBJECT_TYPE=DECAL2<cr><lf>
Bytes 239-254 VERSION_ID=a.b<cr><lf>
Bytes 255-277 DECAL_NAME=CAL-COEFFS<cr><lf>
Bytes 278-311 SCLK_START_VALUE=dddddddd:dd:d:d<cr><lf>
Bytes 312-344 SCLK_STOP_VALUE=eeeeeeee:ee:e:e<cr><lf>
Bytes 345-356 CCSD1R000003
Bytes 357-364 00000076
Bytes 365-383 DELIMITER=SMARKER<cr><lf>
Bytes 384-406 PRODUCT_NAME=CALCOEFF<cr><lf>
Bytes 407-425 TYPE=NJPL1I000172<cr><lf>
Bytes 426-440 PROTOCOL=NONE<cr><lf>

{DATA HERE} - 82 Characters per record, fields as defined in 4.2.1.4

Bytes 00-11 CCSD1R000003
Bytes 12-19 00000042
Bytes 20-38 DELIMITER=EMARKER<cr><lf>
Bytes 39-61 PRODUCT_NAME=CALCOEFF<cr><lf>

4.2.2.5 DN-EU-IT.TXT SFDU File

SFDU Header Data - Interpolation Table File

Bytes 00-11	CCSD1Z000001
Bytes 12-19	00000420
Bytes 20-31	NJPL1K00KL00
Bytes 32-39	00000304
Bytes 40-53	MISSION_ID=4<cr><lf>
Bytes 54-79	SPACECRAFT_NAME=MAGELLAN<cr><lf>
Bytes 80-97	SPACECRAFT_ID=18<cr><lf>
Bytes 98-120	MISSION_NAME=MAGELLAN<cr><lf>
Bytes 121-158	PROCESS_TIME=yyyy-mm-ddThh:mm:ss.fff<cr><lf>
Bytes 159-181	DATA_TYPE=ENGINEERING<cr><lf>
Bytes 182-213	DATA_SET_NAME=DECAL-IT.a.b.DIT<cr><lf>
Bytes 214-238	DATA_OBJECT_TYPE=DECAL3<cr><lf>
Bytes 239-254	VERSION_ID=a.b<cr><lf>
Bytes 255-276	DECAL_NAME=INT-TABLE<cr><lf>
Bytes 277-310	SCLK_START_VALUE=dddddddd:dd:d:d<cr><lf>
Bytes 311-343	SCLK_STOP_VALUE=eeeeeeee:ee:e:e<cr><lf>
Bytes 344-355	CCSD1R000003
Bytes 356-363	00000076
Bytes 364-382	DELIMITER=SMARKER<cr><lf>
Bytes 383-405	PRODUCT_NAME=INTTABLE<cr><lf>
Bytes 406-424	TYPE=NJPL1I000173<cr><lf>
Bytes 425-439	PROTOCOL=NONE<cr><lf>

{DATA HERE} - 202 Characters per record, fields as defined in 4.2.1.5

Bytes 00-11	CCSD1R000003
Bytes 12-19	00000042
Bytes 20-38	DELIMITER=EMARKER<cr><lf>
Bytes 39-61	PRODUCT_NAME=INTTABLE<cr><lf>

4.3 EXAMPLES - dBASE

Actual data base records are shown in the tables of this section as produced by dBASE-III+. Each file of TMDDAT could be presented in a variety of external formats for user reference or verification of content. A minimum of one record of each type is provided to illustrate field sizes, uses, and entry detail. For the hierarchical DECOM file, all branches are shown with samples of each type.

4.3.1 TMDDAT DECOM File Example

Table 4.3-1a shows all of the DECOM File branches. Table 4.3-1b illustrates several detail records, including at least one of each decom type such as fixed packet, variable packet and DED locator cases, all of which are also detailed in the DECAL file.

4.3.2 TMDDAT DECAL File Example

Table 4.3-2 demonstrates channel parameter information for the corresponding key fields from the DECOM file. At least one of each conversion type is shown.

4.3.3 Conversion (STATUS Type)

Table 4.3-3 illustrates this file content.

4.3.4 EU Conversion (Calibration Curve Types)

See Table 4.3-4.

4.3.5 EU Conversion (Interpolation Table Types)

See Table 4.3-5.

4.3.6 DERIVED Channels

See Table 4.3-6.

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* * * * TMDDAT : DECOM.MAP * * * *
VERSION_NUMBER=3.7 CREATION_TIME=1989-02-06
MAP_NAME=Baseline MAP_SEQUENCE_NUMBER=0
START_SCLK_VALUE=00000000:00:0

BLOCK-ID	TITLE	PARENT	FR	OFFS	SIZE	CASE	SWITCH	S/S
AACSSFDU	AACS STAR CALIBRATION DATA		0	0	5964			99
SED_SFDU	MGN ENG SFDU		0	0	2160			99
PRIM_HDR	PRIMARY HEADER	SED_SFDU	0	192	64			98
PRIM_LBL	PRIMARY HEADER LABEL	SED_SFDU	0	0	160			98
SCALHDR2	SECONDARY HEADER	AACSSFDU	0	256	640			97
SEC_HDR	SECONDARY HEADER	SED_SFDU	0	256	640			97
SCALHDR3	TERTIARY HEADER	AACSSFDU	0	928	160			96
TERT_HDR	TERTIARY HEADER	SED_SFDU	0	928	160			96
QUAT_HDR	QUATERNARY HEADER	SED_SFDU	0	1120	224			95
CMI	COMMUTATION MAP INDEX	TERT_HDR	0	38	2			92
MRO	MEMORY READOUT FLAG	TERT_HDR	0	37	1			92
RF_INDEX	RADAR SCIENCE MINOR FRAME INDEX	QUAT_HDR	0	179	5			91
RMF_REF	RADAR MINOR FRAME REFERENCE BIT	QUAT_HDR	0	184	1			91
TRICKREF	AACS TRICKLE REFERENCE	QUAT_HDR	0	186	1			91
TRICK_ID	AACS TRICKLE ID	QUAT_HDR	0	192	16			91
SED	S/C ENGINEERING DATA	SED_SFDU	0	1360	800			90
FIXEDPKT	FIXED PACKET SECTION	SED	0	96	424			89
HEADER	HEADER FOR S/C MINOR FRAME	SED	0	0	96			89
MRO_AREA	MEMORY READOUT AREA	SED	0	520	200			89
VAR_PKT	VARIABLE PACKETS SECTION	SED	0	720	80			89
FID	FORMAT AND ID OF DATA	HEADER	0	32	16			88
FSC	FRAME SYNCH CODE	HEADER	0	0	32			88
MAP_SEQ	MAP SEQUENCE NUMBER	FID	0	8	3			88
MOD_10	MODULO 10 COUNTER OF SCLK	SCLK	0	32	8			88
MOD_8	MODULO 8 COUNTER OF SCLK	SCLK	0	40	8			88
MOD_91	MODULO 91 COUNTER OF SCLK	SCLK	0	24	8			88
RT_DLINK	R/T DOWNLINK RATE AND FORMAT	FID	0	0	5			88
REC_ID	RECORD IDENTIFIER	FID	0	11	5			88
RIM	REALTIME IMAGE COUNT	SCLK	0	0	24			88
SCLK	SPACECRAFT CLOCK	HEADER	0	48	48			88
AACS	AACS TELEMETRY AREA	FIXEDPKT	0	176	128			87
HLM1A	CDS HLM1A AREA	FIXEDPKT	0	0	40			87
HLM1B	CDS HLM1B AREA	FIXEDPKT	0	88	40			87
LLM1A	CDS LLM1A AREA	FIXEDPKT	0	40	48			87
LLM1B	CDS LLM1B AREA	FIXEDPKT	0	128	48			87
RADAR	RADAR MINOR FRAME	FIXEDPKT	0	304	120	0	RMF_REF	87
HLM1AN1F	CDS HLM1A_N1F AREA	HLM1A	0	0	32			86
HLM1AN1S	CDS HLM1A_N1S AREA	HLM1A	0	32	8			86
HLM1BN1F	CDS HLM1B_N1F AREA	HLM1B	0	0	32			86
HLM1BN1S	CDS HLM1B_N1S AREA	HLM1B	0	32	8			86

Table 4.3-1a DECOM FILE WITH PARENT AND HEADER DEFINITIONS

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* * * * TMDDAT : DECOM.MAP * * * *
VERSION_NUMBER=3.7 CREATION_TIME=1989-02-06
MAP_NAME=Baseline MAP_SEQUENCE_NUMBER=0
START_SCLK_VALUE=00000000:00:0

BLOCK-ID	TITLE	PARENT	FR	OFFS	SIZE	CASE	SWITCH	S/S
LLM1AN1D	CDS LLM1A_N1D AREA	LLM1A	0	32	16			86
LLM1AS1S	CDS LLM1A_S1S AREA	LLM1A	0	0	8			86
LLM1AS2S	CDS LLM1A_S2S AREA	LLM1A	0	8	8			86
LLM1AT1S	CDS LLM1A_T1S AREA	LLM1A	0	16	8			86
LLM1AT2S	CDS LLM1A_T2S AREA	LLM1A	0	24	8			86
LLM1BN1D	CDS LLM1B_N1D AREA	LLM1B	0	32	16			86
LLM1BS1S	CDS LLM1B_S1S AREA	LLM1B	0	0	8			86
LLM1BS2S	CDS LLM1B_S2S AREA	LLM1B	0	8	8			86
LLM1BT1S	CDS LLM1B_T1S AREA	LLM1B	0	16	8			86
LLM1BT2S	CDS LLM1B_T2S AREA	LLM1B	0	24	8			86
AACS_N1D	AACS FIRST NINETY-ONE DECK	AACS	0	48	16			85
AACS_N2D	AACS SECOND NINETY-ONE DECK	AACS	0	64	16			85
AACS_T1D	AACS FIRST THIRTEEN DECK	AACS	0	0	16			85
AACS_T2D	AACS SECOND THIRTEEN DECK	AACS	0	16	16			85
AACS_T3D	AACS THIRD THIRTEEN DECK	AACS	0	32	16			85
AACS_Z1D	AACS FIRST ZERO DECK	AACS	0	80	16			85
AACS_Z2D	AACS SECOND ZERO DECK	AACS	0	96	16			85
AACS_Z3D	AACS THIRD ZERO DECK	AACS	0	112	16			85
VP_1	VARIABLE PACKET 1	MRO_AREA	0	0	40	0	MRO	84
VP_2	VARIABLE PACKET 2	MRO_AREA	0	40	40	0	MRO	84
VP_3	VARIABLE PACKET 3	MRO_AREA	0	80	40	0	MRO	84
VP_4	VARIABLE PACKET 4	MRO_AREA	0	120	40	0	MRO	84
VP_5	VARIABLE PACKET 5	MRO_AREA	0	160	40	0	MRO	84
VP_6	VARIABLE PACKET 6	VAR_PKT	0	0	40			84
VP_7	VARIABLE PACKET 7	VAR_PKT	0	40	40			84
DED	DELAYED ENGINEERING DATA		0	0	32768			80
AACSFLD	AACS FLOOD MODE DATA		0	0	200			79
DED_FF	DED GROUP 2	DED	0	26392	3000			78
DED_G0	GROUP 0 INDEX	DED	0	24	16			78
DED_G1	GROUP 1 INDEX	DED	0	2920	16			78
DED_G2	GROUP 2 INDEX	DED	0	26376	16			78
DED_MAJF	DED GROUP 1 DATA	DED	0	2936	23440			78
DED_SAR	DED GROUP 0 DATA	DED	0	40	2880			78
DED_TIME	COLLECTION START TIME	DED	0	0	24			78
DSAR_SON	DED GROUP 0 DATA CHILD	DED_SAR	0	40	32			78
AACSSCAL	S/C ENGINEERING DATA	AACSSFDU	0	1360	3680			77
AACSTRKL	AACS TRICKLE DATA	AACS_Z3D	0	0	16	0	TRICKREF	77
FL_INDEX	AACS FLOOD MINOR FRAME INDEX	AACSFLD	49	0	16			77

Table 4.3-1a DECOM FILE WITH PARENT AND HEADER DEFINITIONS

* * * * TMDDAT : DECOM.MAP * * * *
VERSION_NUMBER=3.7 CREATION_TIME=1989-02-06
MAP_NAME=Baseline MAP_SEQUENCE_NUMBER=0
START_SCLK_VALUE=00000000:00:0

BLOCK-ID	TITLE	PARENT	FR	OFFS	SIZE	CASE SWITCH	S/S
E-0069	S-Band Xmitter B O/P RF Monitor	LLM1BT1S	7	32	8		TCS
E-0070	S-Band Xmitter B O/P RF Monitor	LLM1AT1S	7	48	8		TCS
E-0072	TWTA A Helix Current	LLM1BT2S	7	48	8		TCS
E-0074	TWTA B Helix Current	LLM1AT2S	7	48	8		TCS
E-0076	TWTA A Output RF Monitor (WAP)	LLM1BT1S	7	56	8		TCS
E-0078	TWTA B Output RF Monitor (WAP)	LLM1AT2S	7	56	8		TCS
E-0080	TWTA A Heater Current	LLM1BT1S	7	48	8		TCS
E-0081	TWTA B Heater Current	LLM1BT2S	7	32	8		TCS
E-0082	TWTA B Heater Current	LLM1AT1S	7	56	8		TCS
E-0083	X-Band Exciter O/P RF Monitor	LLM1AT2S	7	88	8		TCS
E-0084	X-Band Exciter O/P RF Monitor	LLM1BT2S	7	16	8		TCS
E-0085	Receiver A VCO Temp	LLM1AN1D	1	1120	8		TCS
E-0086	Receiver B VCO Temp	LLM1BN1D	1	1120	8		TCS
E-0087	S-Band Xmitter A Temp	LLM1AN1D	1	136	8		TCS
E-0087	S-Band Xmitter A Temp	DED_MAJF	61	296	8		TCS
E-0088	S-Band Xmitter B Temp	LLM1BN1D	1	1144	8		TCS
E-0089	WAP A Temp	LLM1AN1D	1	1312	8		TCS
E-0090	WAP B Temp	LLM1BN1D	1	1112	8		TCS
E-0091	X-Band Filter-Hybrid Temp	LLM1AN1D	1	1136	8		TCS
E-0092	X-Band TWT A Temp	DED_FF	15	112	8		TCS
E-0092	X-Band TWT A Temp	LLM1AN1D	1	320	8		TCS
E-0093	X-Band TWT B Temp	LLM1BN1D	1	1128	8		TCS
E-0094	Auxiliary Oscillator A Temp	LLM1AN1D	1	1144	8		TCS
E-0096	X/S DC LO Voltage Drive	LLM1BS1S	13	0	8		TCS
E-0097	X/S DC Temp	LLM1AN1D	1	8	8		TCS
E-0098	HGA S-Band Feed Horn Temp	LLM1BN1D	1	208	8		TCS
E-0099	HGA X-Band Feed Horn Temp	LLM1BN1D	1	216	8		TCS
E-0100	HGA Reflector Temp	LLM1AN1D	1	208	8		TCS
E-0105	LGA Temp	LLM1AN1D	1	232	8		TCS
E-0106	MGA Temp	LLM1BN1D	1	1048	8		TCS
E-0107	TCS Status Word 3B	LLM1AT2S	7	80	8		TCS
E-0107/1	S-Band Transmitter A	LLM1AT2S	7	80	1		TCS
E-0107/2	S-Band Transmitter B	LLM1AT2S	7	81	1		TCS
E-0107/3	CDU Lock	LLM1AT2S	7	82	1		TCS
E-0107/4	2.4 kHz Clock	LLM1AT2S	7	83	1		TCS
E-0107/5	AUX OSC Only	LLM1AT2S	7	84	1		TCS
E-0107/6	X/S Downconverter	LLM1AT2S	7	85	1		TCS
E-0107/7	Tape Recorder Routing	LLM1AT2S	7	86	1		TCS
E-0107/8	X-Band SAR Subcarrier	LLM1AT2S	7	87	1		TCS

Table 4.3-1b DECOM FILE WITH TERMINAL BRANCHES

* * * * TMDDAT : CHANNEL PARAMETERS (DECAL)* * *
VERSION_NUMBER=3.3 CREATION_TIME=1989-02-06
START_SCLK_VALUE=00000000:00:0
END_SCLK_VALUE=99999999:00:0

BLOCK-ID	ABBREV	CT	DN	EX	UNITS	RANGE	CCL	TT	A-LO	A-HI	A H	A E	S T	S/S
D-0201	TWTA A Pwr A		HF	F	Watts		F	DN	0.00	0.00	N	N		TCS
D-0202	TWTA A Pwr B		HF	F	Watts		F	DN	0.00	0.00	N	N		TCS
D-0203	TWTA B Pwr B		HF	F	Watts		F	DN	0.00	0.00	N	N		TCS
D-0204	TWTA B Pwr A		HF	F	Watts		F	DN	0.00	0.00	N	N		TCS
D-0205	S/XmitAPwrA		HF	F	Watts		F	DN	0.00	0.00	N	N		TCS
D-0206	S/XmitAPwrB		HF	F	Watts		F	DN	0.00	0.00	N	N		TCS
D-0207	S/XmitBPwrB		HF	F	Watts		F	DN	0.00	0.00	N	N		TCS
D-0208	S/XmitBPwrA		HF	F	Watts		F	DN	0.00	0.00	N	N		TCS
D-0209	X/SVoltDrPwr		HF	F	Watts		F	DN	0.00	0.00	N	N		TCS
D-0213	TWTABHtrPwrA		HF	F	Watts		F	DN	0.00	0.00	N	N		TCS
D-0214	TWTAAHelPwrA		HF	F	Watts		F	DN	0.00	0.00	N	N		TCS
D-0215	TWTAAHelPwrB		HF	F	Watts		F	DN	0.00	0.00	N	N		TCS
D-0216	TWTABHelPwrB		HF	F	Watts		F	DN	0.00	0.00	N	N		TCS
E-0051	TCS-St Wd 1A		H	H	NONE	00-FF	T	DN	00	00	F	N	D	TCS
E-0051/1	CU-Actv Unit	ST	H	C	CHAR	STATUS	F	DN	00	00	F	N	D	TCS
E-0051/2	S-Band AmpAB	ST	H	C	CHAR	STATUS	F	DN	00	00	F	N	D	TCS
E-0051/3	X-Band AmpAB	ST	H	C	CHAR	STATUS	F	DN	00	00	F	N	D	TCS
E-0051/4	S-Band ModIn	ST	H	C	CHAR	STATUS	F	DN	00	00	F	N	D	TCS
E-0051/5	RCVR-CDU	ST	H	C	CHAR	STATUS	F	DN	00	00	F	N	D	TCS
E-0051/6	CU-POR Ind.	ST	H	C	CHAR	STATUS	F	DN	00	00	F	N	D	TCS
E-0051/7	XmitSel Swch	ST	H	C	CHAR	STATUS	F	DN	00	00	F	N	D	TCS
E-0051/8	Ant-Sel Swch	ST	H	C	CHAR	STATUS	F	DN	00	00	F	N	D	TCS
E-0057	RcvrA SPhErr	CC	UI	F	kHz	-200/+200	F	EU	-150.00	150.00	F	E	A	TCS
E-0058	RcvrA SPhErr	CC	UI	F	kHz	-200/+200	F	EU	-150.00	150.00	F	E	A	TCS
E-0059	RcvrB SPhErr	CC	UI	F	kHz	-200/+200	F	EU	-150.00	150.00	F	E	A	TCS
E-0060	RcvrB SPhErr	CC	UI	F	kHz	-200/+200	F	EU	-150.00	150.00	F	E	A	TCS
E-0067	S-BandXmA RF	CC	UI	F	dBm	+32.3/+39.1	T	EU	0.00	39.30	F	E	A	TCS
E-0068	S-BandXmA RF	CC	UI	F	dBm	+32.3/+39.1	T	EU	0.00	39.30	F	E	A	TCS
E-0088	S-XmtB-Temp	CC	UI	F	Deg.C	-78/100	F	EU	-78.00	100.00	F	E	T	TCS
E-0089	WAP A Temp	CC	UI	F	Deg.C	-78/100	F	EU	-78.00	100.00	F	E	T	TCS
E-0090	WAP B Temp	CC	UI	F	Deg.C	-78/100	F	EU	-78.00	100.00	F	E	T	TCS
E-0092	X-TWT A Temp	CC	UI	F	Deg.C	-78/100	F	EU	-78.00	100.00	F	E	T	TCS
E-0093	X-TWT B Temp	CC	UI	F	Deg.C	-78/100	F	EU	-78.00	100.00	F	E	T	TCS
E-0098	HGA S-Horn T	CC	UI	F	Deg.C	-190/161	F	EU	-190.00	161.00	F	E	T	TCS
E-0099	HGA X-Horn T	CC	UI	F	Deg.C	-190/161	F	EU	-190.00	161.00	F	E	T	TCS
E-0100	HGA Reflct T	CC	UI	F	Deg.C	-190/161	F	EU	-190.00	161.00	F	E	T	TCS
E-0200	InvtrMntoSby	IT	UI	F	Vdc	0 or 3	F	EU	0.00	0.00	F	E	A	EPS
E-0201	InvtrMntoSby	IT	UI	F	Vdc	0 or 3	F	EU	0.00	0.00	F	E	A	EPS

Table 4.3-2 DECAL FILE EXAMPLE, All Conversion Types

```
          * * * *  TMDDAT : STATUS  * * * *
      VERSION_NUMBER=3.1     CREATION_TIME=1989-01-25
             START_SCLK_VALUE=00000000:00:0
              END_SCLK_VALUE=99999999:00:0

BLOCK_ID   # dn=00        dn=01        dn=10        dn=11


E-0051/1   2 CU-B         CU-A
E-0051/2   2 Off          On
E-0051/3   2 Off          On
E-0152/8   2 Separation   NoSeparation
E-0153/8   2 Separation   NoSeparation
E-0154/8   2 Separation   NoSeparation
```

TABLE 4.3-3 CONVERSION - STATUS TYPE

* * * * TMDDAT : CAL-COEFFS * * * *
VERSION_NUMBER=3.1 CREATION_TIME=1989-01-25
START_SCLK_VALUE=00000000:00:0
END_SCLK_VALUE=99999999:00:0

BLOCK-ID	#	C0	C1	C2	C3	C4	C5
	0	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
E-0000	2	-.793460E+2	.697470000	0.00000	0.00000	0.00000	0.00000
E-0001	3	-.778830E+2	.674060000	.933140E-4	0.00000	0.00000	0.00000
E-0002	2	-.790460E+2	.696760000	0.00000	0.00000	0.00000	0.00000

TABLE 4.3-4 EU CONVERSION - CALIBRATION CURVE FIT

* * * * TMDDAT : INTERPOLATION TABLES * * * *
VERSION_NUMBER=3.0 CREATION_TIME=1988-12-30
START_SCLK_VALUE=00000000:00:0
END_SCLK_VALUE=99999999:00:0

BLOCK-ID	# Pairs	dn-1	eu-1	dn-2	eu-2
E-0200	2	0	0.0	255	3.0
E-0201	2	0	0.0	255	3.0
E-0202	2	0	0.0	127	1.5
E-0203	2	0	0.0	127	1.5

Table 4.3-5 EU CONVERSION - INTERPOLATION VALUES

```
/* Derives the 4th quaternion element from scaled versions of*/
/* the first 3 elements.                                     */
FUNCT CHAN="E-1024"
DIRECTION=1
SCALE = 123456.789
If(GET_LAD("E-1025") & OX0080 != 0) DIRECTION=-1
Q1    = SCALE * GET_CCV("E-1022")
Q2    = SCALE * GET_CCV("E-1023")
Q3    = SCALE * GET_EU()
Q4    = SQRT(1.-(Q1**2) - (Q2**2) - (Q3**2))*DIRECTION
DERIVE ("D-0701",Q4)
ENDFUNCT
```

Table 4.3-6 Channel Derivation Example Using CCL