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Telemetry Attributes Transfer Standard

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Acronyms

API application programming interface

ARINC Aeronautical Radio, Incorporated

ASCII American Standard Code for Information Interchange

CR carriage return

dB decibel

DDML Data Display Markup Language

FFI frame format identification

FM frequency modulation

HTML hypertext markup language

Hz hertz

IAW in accordance with

IHAL Instrumentation Hardware Abstraction Language

iNET integrated Network Enhanced Telemetry

kHz kilohertz

LF line feed

lsb least significant bit

MDL Metadata Description Language

MHz megahertz

MIL-STD Military Standard

msb most significant bit

ODBC open database connectivity

PCM pulse code modulation

PM phase modulation

RF radio frequency

SST serial streaming telemetry

SVG Scalable Vector Graphics

TMATS Telemetry Attributes Transfer Standard

TmNS Telemetry Network Standard

W3C World Wide Web Consortium

XidML eXtensible Instrumentation Definition Markup Language

XML eXtensible Markup Language

XSD XML schema document

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Telemetry Attributes Transfer Standard

* 1. General

Telemetry attributes are those parameters required by the receiving/processing system to acquire, process, and display the telemetry data received from the test item/source. The telemetry attributes defined in this chapter provide the information required to set up the telemetry receiving and processing equipment. The format, while not necessarily compatible with any receiving/processing system, will allow test ranges or other receiving systems to develop a computer conversion program to extract the information and to set up data required for their unique equipment configuration.

The intent of this chapter is to cover, primarily, attributes and terminology included in or consistent with the other chapters within this telemetry standards document. For example, pulse code modulation (PCM) format attributes should comply with the PCM standards as given in [Chapter 4](http://www.wsmr.army.mil/RCCsite/Documents/106-17_Telemetry_Standards/chapter4.pdf). Other attributes are sometimes included for service and utility, but should not be construed as endorsements apart from the other chapters.

* 1. Scope

The Telemetry Attributes Transfer Standard (TMATS) provides the definition of the telemetry attributes and specifies the media and data format necessary to permit the transfer of the information required to set up the telemetry receiving/processing functions at a test range. The standard does not conform to, nor does it define, existing or planned capabilities of any given test range. The parameters included in this document are defined by specific reference. Other nonstandard parameter values/ definitions may be included in the comments section of each group.

* 1. Purpose

The TMATS provides a common format for the transfer of information between the user and a test range or between ranges (see Appendix 9-A). This format will minimize the “station-unique” activities that are necessary to support any test item. In addition, TMATS is intended to relieve the labor-intensive process required to reformat the information by providing the information on computer-compatible media, thereby reducing errors and requiring less preparation time for test support.

* 1. Media and Data Structure

A variety of physical and electronic media is available for use in exchanging attribute information. The most important factor in selecting a medium is that the parties involved agree to use that specific medium. If any data compression (such as backup/restore or zip/unzip) will be used, both parties should agree to its use.

A cover sheet describing the system that produced the attribute medium should accompany the attribute information. A recommended format for the cover sheet is given in Appendix 9-B.

* + 1. Physical Format

Attributes for each mission configuration are to be supplied in a single physical file with contents as 7-bit American Standard Code for Information Interchange (ASCII) coded characters. Line feed (LF) and carriage return (CR) may be used to improve readability of the information. Nonprintable characters will be discarded by the destination agency prior to translating the attributes into telemetry system configuration information.

Multiple mission configurations may be provided on a single disk; however, each configuration must be in a separate file identified in the disk directory. File names should use the file extensions “.TXT” to indicate a text file or “.TMT” or “.TMA” to indicate a TMATS file. A stick-on label and the accompanying cover sheet identify the file names corresponding to the mission configuration used for each mission.

* + 1. Logical Format

[](#Summary_of_Changes)Each attribute appears in the file as a unique code name and as a data item. The code name appears first, delimited by a colon. The data item follows, delimited by a semicolon. Thus, an attribute is formatted as A:B; - where A is the code name and B is the data item, in accordance with (IAW) the tables in Section 9.5. Numeric values for data items may be either integer or decimal. Scientific notation (see note below) is allowed only for the specific data items defined for its use in the tables in Section 9.5. For alphanumeric data items, including keywords, either upper or lower case is allowed; TMATS is not case sensitive. All defined keyword values are shown as upper case and enclosed in quotes in the tables in Section 9.5. Leading, trailing, and embedded blanks are assumed to be intentional; they can be ignored in most cases but should not be used in code names, keywords, and data items used as links, such as measurement name. Semicolons are not allowed in any data item (including comment items). Any number of attributes may be supplied within a physical record. Attributes may appear in any order.

|  |  |
| --- | --- |
|  | Any numeric data item expressed in scientific notation must conform to the following regular expression:  ([-+]?(([0-9]+\.?[0-9]\*)|([0-9]\*\.[0-9]+)))([eE][-+]?[0-9]{1,3})  This expression limits the number of digits in the exponent to three or less, but allows any number of digits (including none) both before and after the decimal point in the fraction. Also, the decimal point can be omitted (for example, “3E5” is valid). |

The two basic types of attribute code names are single-entry and multiple-entry. Single-entry attributes are those for which there is only one data item. Multiple-entry attributes appear once in the definition tables in Section 9.5 but have multiple items; these items are assigned a number. The number appears in the code name preceded by a hyphen. For example, data source identifiers might have the following entries:

G\DSI-1:Aircraft;

G\DSI-2:Missile;

G\DSI-3:Target;

The code name COMMENT may be used to interject comments to improve readability. The comment data items, such as G\COM, are intended to convey further details within the TMATS file itself. Comments must follow the attribute logical format, as shown below:

COMMENT: This is an example of a comment;

Refer to Section 9.5 for detailed definitions of code names and attributes and Appendix 9-C for an example application of this standard.

|  |  |
| --- | --- |
|  | It is recommended that data source/link names and measurement names consist of only the following:   * Capitalized alphabetic characters * Numeric characters * The underscore symbol (“\_”)   Specifically, it is recommended to avoid the use of embedded spaces and other special characters in data source/link names and measurement names. |

* + 1. Extensible Markup Language Format

In addition to the code name format described in Subsection 9.4.2, TMATS attributes can also be expressed in extensible markup language (XML). The TMATS XML format is implemented as a standard XML schema consisting of a collection of XML schema document (XSD) files, which can be found [here](http://www.wsmr.army.mil/RCCsite/Pages/Publications.aspx?RootFolder=%2FRCCsite%2FDocuments%2FReferences%2Ftmats&FolderCTID=0x012000AF4E5B02D5A9F24DA72176DEABA8E665&View=%7B94F84375%2DDEE0%2D43B2%2DBE86%2D97E731BEF435%7D). Additionally, a graphical depiction of the schema in HTML format is available [here](http://www.wsmr.army.mil/RCCsite/Documents/References/tmats/HTML-TMATS.zip). The HTML files are very large and will take time to download.

The TMATS XML schema is identical in content to the telemetry attributes described in Section 9.5 below, with the exceptions shown in the following list.

1. There is a C group for each data link instead of only one C group in the TMATS file.
2. The schema has no counter (“\N”) attributes; they are not needed in XML.
3. Keyword attribute values are expanded for readability in the schema.
4. Date and time formats are different; the schema uses the XML standard date and time formats (not the ones in Section 9.5).
5. Text entries in the XML schema may contain semicolons; the code name format uses the semicolon as a delimiter.
6. The inherent structure of an XML schema implies order, while the code name format allows the attributes to be given in any order.

In addition to the TMATS XML schema, there are two other XML schemas that describe related areas of information. The first one, Data Display Markup Language (DDML), covers commonly used types of data displays. Refer to Section 9.6 for a full description of this standard format for data display definitions. The other one, Instrumentation Hardware Abstraction Language (IHAL), deals with the instrumentation hardware configuration on a test item. See Section 9.7 for a full description of this standard format for describing instrumentation hardware.

* 1. Telemetry Attributes

The description of the mission configuration includes all potential sources of data; these sources are radio frequency (RF) links, pre- or post-detected tapes, and onboard recorded tapes and storage media. Each of these data sources has unique characteristics that must be defined. Each source is given a unique identity and its characteristics are specifically defined in associated attribute fields. In multiplexed systems, each data stream is uniquely identified by a data link name, which is related to the data source name.

|  |  |
| --- | --- |
|  | Only the information that is essential to define the attributes of a system is required. Non-applicable information does not need to be included in the file; however, all attribute information given is to be provided in the specified format. |

The attributes defined in this section proceed from the general level to the detailed level. The groups, defined in terms of data to be entered, are:

1. General Information: Establishes the top-level program definition and identifies the data sources.
2. Transmission Attributes: Defines an RF link. There will be one group for each RF link identified in the General Information group.
3. Recorder-Reproducer Attributes: Identifies a tape or storage data source.
4. Multiplex/Modulation Attributes: Describes the FM/FM (frequency modulation), FM/PM (phase modulation), or PM/PM multiplex characteristics. Each multiplexed waveform must have a unique set of attributes. For the analog measurement, the tie to the engineering units conversion is made in this group.
5. Digital Data Attributes: Divided into four groups: the PCM Format Attributes, the PCM Measurement Description, the Bus Data Attributes, and the Message Data Attributes.
6. PCM Format Attributes: Defines the PCM data format characteristics, including embedded formats. Each PCM format will have a separate format attributes group.
7. PCM Measurement Descriptions: Defines each PCM measurement within the overall PCM format.
8. Bus Data Attributes: Specifies the PCM-encoded Military Standard (MIL-STD) 1553 or Aeronautical Radio, Incorporated (ARINC) 429 bus format characteristics or the direct recorder track/channel MIL-STD-1553 or ARINC 429 bus format characteristics.
9. Message Data Attributes: Specifies the message-based data streams.
10. Pulse Amplitude Modulation Attributes: As of RCC IRIG 106-13, this section has been removed. See [Annex A.1](http://www.wsmr.army.mil/RCCsite/Documents/106-17_Telemetry_Standards/annexa-1.pdf) for applicable Pulse Amplitude Modulation data standards.
11. Data Conversion Attributes: Contains the data conversion information for all measurements in this telemetry system. The calibration data and conversion definition of raw telemetry data to engineering units is included. The tie to the measurands of the telemetry systems defined in the previous groups is via the measurement name.
12. Airborne Hardware Attributes: Defines the configuration of airborne instrumentation hardware in use on the test item.
13. Vendor-Specific Attributes: Provides information that is specific to a vendor.
    * 1. Contents

The following subparagraphs discuss the organization of the attributes and their relationships with the various groups.

1. [](#Summary_of_Changes)Organization. Attribute information is organized according to a hierarchical structure in which related items are grouped and given a common heading. The number of levels varies within the overall structure and is a function of the logical association of the attributes. At the highest level, the telemetry attributes are defined for the groups displayed in Table 9‑1.

|  |  |
| --- | --- |
| Table 9‑1. Telemetry Attribute Groups | |
| **Identifier** | **Title** |
| G | General Information |
| T | Transmission Attributes |
| R | Recorder-Reproducer Attributes |
| M | Multiplex/Modulation Attributes |
| P | PCM Format Attributes |
| D | PCM Measurement Description |
| B | Bus Data Attributes |
| S | Message Data Attributes |
| C | Data Conversion Attributes |
| H | Airborne Hardware Attributes |
| V | Vendor-Specific Attributes |
| X | TMATS eXtension Attributes |

[](#Summary_of_Changes)Within the structure, a lower-case letter, for example, n, p, or r, indicates a multiple-entry item with the index being the lower-case letter. The range of these counters is from one to the number indicated in another data entry, usually with the appendage \N, and have no missing values.

The Usage Attributes column within each table describes how a particular attribute is to be used, when it is allowed, etc. If there are enumerations for the attribute, the enumeration values and their descriptions will appear in this column. There are 7 possible fields within this column for each attribute.

* R/R Ch 10 Status: This describes special rules for creating TMATS files to support setup of a Chapter 10 recorder. A value of “R” requires that the attribute be specified in the TMATS file whenever the attribute is allowed. A value of “RO” indicates that when an applicable data type or group is used, the attribute must be specified in the TMATS file. A value of “RO-PAK” indicates the attribute must be specified when the Data Packing Option (R-x\PDP-n) is either UNPACKED (UN) or PACKED (PFS). If the attribute is specified in the TMATS file, it must contain valid information.
* Allowed when: This describes when an attribute is allowed to be specified inside of a TMATS file.
* Required when: This describes when an attribute must be specified inside of a TMATS file. If the Required condition is “When Allowed”, then it must be specified when the “Allowed when” condition is met.
* Links to: Specifies a list of attributes that the attribute links to by value.
* Links from: Specifies a list of attributes that link to this attribute by value. Any attribute with a Links from: is a key and must be unique in the TMATS file.
* Range: This describes the values or ranges that may be specified. A range might be specified with exact values or may reference the value of another TMATS attribute. The range may also be simply a number of characters that represents the recommended maximum length of the value. Where possible, the valid ranges for numbers are specified, however each range should be consulted as to their specific capabilities. There are several special values for Range:
  + Enumeration: This specifies that the value must be one of the values listed in the description column of the attribute. The enumerations will follow.
  + Floating Point: This specifies a legal floating point, integer, or scientific notation value.
  + xxx.xxx.xxx.xxx: This specifies an Internet Protocol (IP) address where each “xxx” is a value from 0-255.
  + Hexadecimal: A numeric value base 16 containing 0-9 and A-F or a-f.
  + Binary: A numeric value base 2 containing 0-1
  + Binary pattern: A binary numeric pattern consisting of 0, 1, or “X” for don’t care.
  + “X”: the character “X”
  + MM-DD-YYYY-HH-MI-SS: This specifies a date and time. MM is the month from 01 to 12. DD is the day of the month from 01 to 31. YYYY is the 4 digit year. HH is the hour of the day from 00 to 23. MI is the minute of the hour from 00 to 59. SS is the second from 00 to 59.
* Default: This identifies the default value required to process a TMATS file when the file itself does not contain the attribute.

|  |  |
| --- | --- |
|  | In previous versions of this document, there existed code name tags \*R-CH10\*, \*RO-CH10\* and \*RO-CH10-PAK\*. These have been removed in favor of the above attribute column. If the R/R Ch10 Status field is “R”, then the attribute must be included in the TMATS file if all other conditions apply even if it has a default. |

1. Group Relationships. Representative interrelationships between the various groups are shown pictorially in Figure 9‑1. Not all valid paths are shown. All valid paths are documented in “Links to:” and “Links from:” attributes.

|  |  |
| --- | --- |
|  | 1. Data Source ID is unique within a General Information group (G). It ties the Transmission group (T) or the Recorder-Reproducer group (R) or both to the G group and to the Multiplex/Modulation group (M). 2. The tie from the M group to a PCM group (P) is the Data Link Name. 3. The tie from the P group to an embedded P group is another Data Link Name. 4. The tie from the M group to the Data Conversion group (C) for an analog measurement is the Measurement Name. 5. The tie from the P group to the PCM Measurement Description group (D) or Bus group (B) is the Data Link Name. 6. The tie from the R group to the P group is from the Channel Data Link Name (R) to the Data Link Name (P). 7. The tie from the R group to the B group is from the Channel Data Link Name or Sub-Channel Name (R) to the Data Link Name (B). 8. The tie from the R group to the Message Data group (S) is from the Channel Data Link Name, Sub-Channel Name, or Network Name (R) to the Data Link Name (S). 9. The tie from either the R, D, B, or S group to the Data Conversion group is the Measurement Name. |

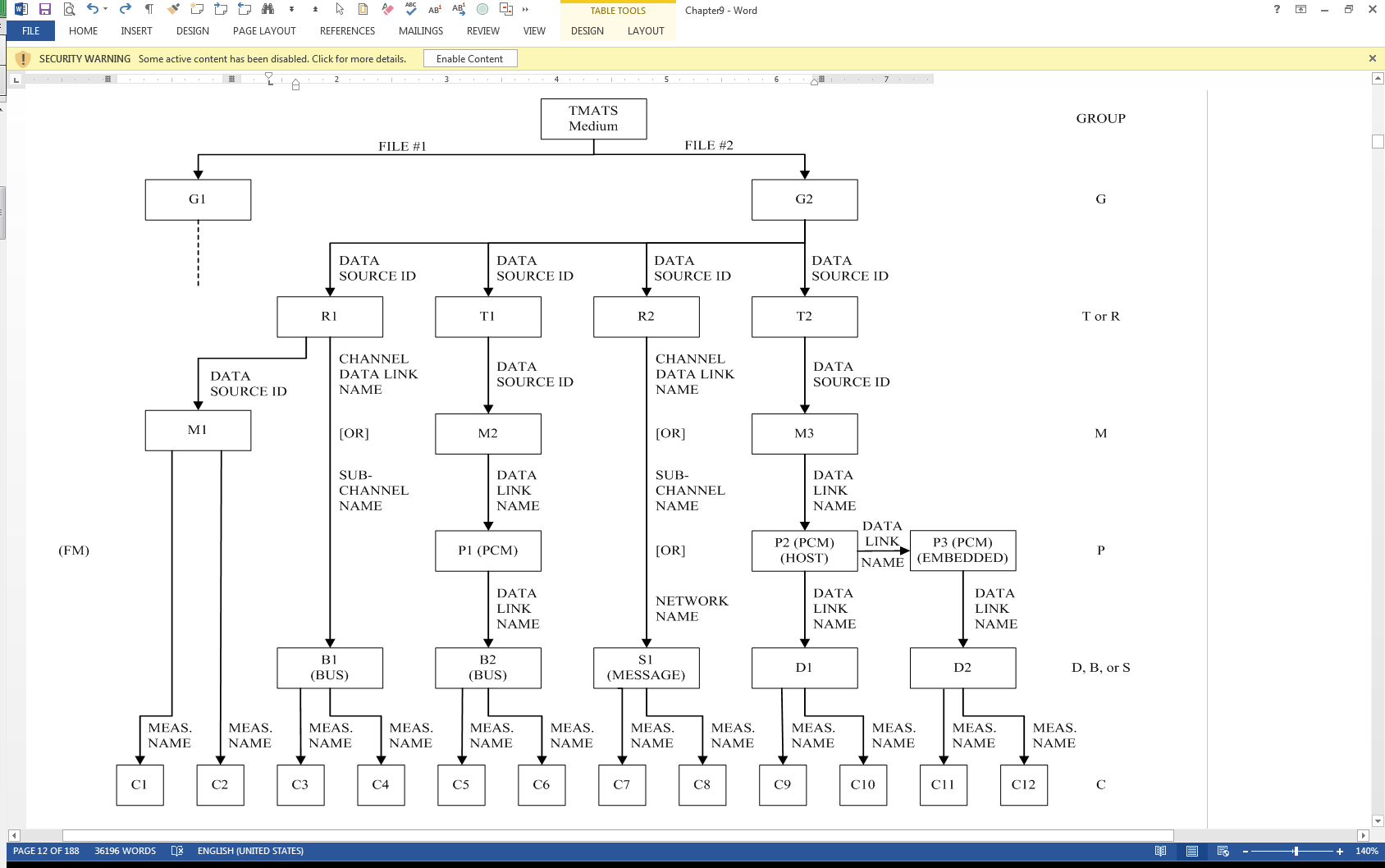


Figure 9‑1. Group Relationships

* + 1. General Information (G)

The General Information group provides overall program information. Figure 9‑2 below gives the overall information that is included in this group. Table 9‑2 identifies and defines the data required, including the dates associated with the detailed information. Since the identification of the data sources is an integral part of the remaining groups, each source must be uniquely identified.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Figure 9‑2. General Information Group (G)‑ | | | | | Code Name |
| PROGRAM NAME - 9-10 | | | | | (G\PN) |
| 9-10 | TEST ITEM | | | | (G\TA) |
|  | **\*Information** | | | |  |
|  |  | TMATS FILE NAME | | | (G\FN) |
|  |  | RCC IRIG 106 REVISION LEVEL | | | (G\106) |
|  |  | ORIGINATION DATE | | | (G\OD) |
|  |  | REVISION NUMBER | | | (G\RN) |
|  |  | REVISION DATE | | | (G\RD) |
|  |  | UPDATE NUMBER | | | (G\UN) |
|  |  | UPDATE DATE | | | (G\UD) |
|  |  | TEST NUMBER | | | (G\TN) |
|  |  | NUMBER OF POINTS OF CONTACT | | | (G\POC\N) |
| 9-11 |  | **\*Point of Contact** | | |  |
|  |  | | | NAME | (G\POC1-n) |
|  |  | | | AGENCY | (G\POC2-n) |
|  |  | | | ADDRESS | (G\POC3-n) |
|  |  | | | TELEPHONE | (G\POC4-n) |
| 9-11 | **\*Data Source Identification** | | | |  |
|  |  | NUMBER OF DATA SOURCES | | | (G\DSI\N) |
|  |  | | | DATA SOURCE ID | (G\DSI-n) |
|  |  | | | DATA SOURCE TYPE | (G\DST-n) |
|  |  | | | DATA SOURCE SECURITY CLASSIFICATION | (G\DSC-n) |
| 9-12 | **\*Test Information** | | | |  |
|  |  | TEST DURATION | | | (G\TI1) |
|  |  | PRE-TEST REQUIREMENT | | | (G\TI2) |
|  |  | POST-TEST REQUIREMENT | | | (G\TI3) |
|  |  | SECURITY CLASSIFICATION | | | (G\SC) |
| 9-13 | **\*TMATS Checksum** | | | |  |
|  |  | | MESSAGE DIGEST/CHECKSUM | | (G\SHA) |
| 9-13 | **\* Comments** | | | |  |
|  | | COMMENTS | | | (G\COM) |
| \*Heading Only - No Data Entry | | | | | |

| Table 9‑2. General Information Group (G) | | | | |
| --- | --- | --- | --- | --- |
| **Parameter** | **Code Name** | **Usage Attributes** | | **Definition** |
| PROGRAM NAME | G\PN | Allowed when: Always | | Name of program. |
| Range: 16 characters | |
| TEST ITEM | G\TA | Allowed when: Always | | Test item description in terms of name, model, platform, or identification code, as appropriate. |
| Range: 64 characters | |
| **Information** | | | | |
| TMATS FILE NAME | G\FN | Allowed when: Always | | Name of this TMATS file. |
| Range: 256 characters | |
| RCC IRIG 106 REVISION LEVEL | G\106 | R/R Ch 10 Status: R | | Version of RCC IRIG 106 standard used to generate this TMATS file. The last 2 digits of the year should be used. Use a leading 0 if necessary. |
| Allowed when: Always | |
| Required when: Always | |
| Range: 0 to 99 | |
| ORIGINATION DATE | G\OD | Allowed when: Always | | Date of origination of this mission configuration.  “DD” (Day). “MM” (Month). “YYYY” (Year). |
| Range: MM-DD-YYYY | |
| REVISION NUMBER | G\RN | Allowed when: Always | | Revision number associated with this mission configuration. |
| Range: 0 to 9999 | |
| REVISION DATE | G\RD | Allowed when: Always | | Date of revision. “DD” (Day). “MM” (Month).  “YYYY” (Year). |
| Range: MM-DD-YYYY | |
| UPDATE NUMBER | G\UN | Allowed when: Always | | Update number of current change that has not been incorporated as a revision. |
| Range: 0 to 99 | |
| UPDATE DATE | G\UD | Allowed when: Always | | Date of update. “DD” (Day). “MM” (Month).  “YYYY” (Year). |
| Range: MM-DD-YYYY | |
| TEST NUMBER | G\TN | Allowed when: Always | | Test identification. |
| Range: 16 characters | |
| NUMBER OF POINTS OF CONTACT | G\POC\N | Allowed when: Always | | Number of points of contact to be given. |
| Range: 0 to 9 | |
| Default: 0 | |
| **Point of Contact** | | | | |
| NAME | G\POC1-n | Allowed when: G\POC\N > 0 | | Identify the name point of contact for additional information. |
| Range: 24 characters | |
| AGENCY | G\POC2-n | Allowed when: G\POC\N > 0 | | Identify the agency point of contact for additional information. |
| Range: 48 characters | |
| ADDRESS | G\POC3-n | Allowed when: G\POC\N > 0 | | Identify the address point of contact for additional information. |
| Range: 48 characters | |
| TELEPHONE | G\POC4-n | Allowed when: G\POC\N > 0 | | Identify the telephone point of contact for additional information. |
| Range: 20 characters | |
| **Data Source Identification** | | | | |
| NUMBER OF DATA SOURCES | G\DSI\N | R/R Ch 10 Status: R | | Specify the number of data sources: for RF telemetry systems, give the number of carriers; for tape or storage recorded data, identify the number of tape or storage sources. |
| Allowed when: Always | |
| Required when: Allowed | |
| Range: 1 to 99 | |
| DATA SOURCE ID | G\DSI-n | R/R Ch 10 Status: R | | Provide a descriptive name for this source. Each source identifier must be unique. |
| Allowed when: G\DSI\N > 0 | |
| Required when: Allowed | |
| Links to: R-x\ID, T-x\ID, M-x\ID, V-x\ID | |
| Range: 32 characters | |
| DATA SOURCE TYPE | G\DST-n | R/R Ch 10 Status: R | | Specify the type of source. |
| Allowed when: G\DSI\N > 0 | |
| Required when: Allowed | |
| Range: Enumeration | |
| Enumeration | Description |
| RF | Radio Frequency |
| TAP | Tape |
| STO | Storage |
| REP | Reproducer |
| DSS | Distributed source |
| DRS | Direct source |
| OTH | Other |
| DATA SOURCE SECURITY CLASSIFICATION | G\DSC-n | Allowed when: G\DSI\N > 0 | | Provide the classification of the data for this source. Provide a description of the classification guide and any information concerning declassification and/or downgrading in comments. For Digital Recorder Data Sources, this specifies the classification and distribution statements of the data file produced by the Recorder. |
| Range: 2048 Characters | |
| **NOTE:** Provide the above three items for each data source. | | | | |
| **Test Information** | | | | |
| TEST DURATION | G\TI1 | Allowed when: Always | | Approximate duration of test in hours. |
| Range: 0 to 9999 | |
| PRE-TEST REQUIREMENT | G\TI2 | Allowed when: Always | | Indicate whether a pre-test requirement is applicable. Provide details in comments. |
| Range: Enumeration | |
| Enumeration | Description |
| Y | Yes |
| N | No |
| Default: N | |
| POST-TEST REQUIREMENT | G\TI3 | Allowed when: Always | | Specify whether a post-test requirement is applicable. Provide details in comments. |
| Range: Enumeration | |
| Enumeration | Description |
| Y | Yes |
| N | No |
| Default: N | |
| SECURITY CLASSIFICATION | G\SC | Allowed when: Always | | Provide the classification of the TMATS file. Provide a description of the classification guide and any information concerning declassification and/or downgrading in comments. |
| Range: 2048 Characters | |
| **TMATS Checksum** | | | | |
| MESSAGE DIGEST/ CHECKSUM | G\SHA | Allowed when: Always | | Provide a message digest / checksum of the TMATS. The entire contents of the TMATS file except the characters from “G\SHA:” to the following “;” (inclusive) shall be used to calculate the checksum. The value integer is an algorithm designator and the hex digits are the checksum. SHA2-256 shall be represented as “2-” followed by 64 hex characters. See Subsection 6.2.2.40 for more information. |
| Range: integer followed by “-” followed by hex characters | |
| **Comments** | | | | |
| COMMENTS | G\COM | Allowed when: Always | | Provide the additional information requested or any other information desired. |
| Range: 1600 characters | |

* + 1. Transmission Attributes (T)

The Transmission attributes are presented graphically in Figure 9‑3 and specified in Table 9‑3. The information contained within this group is used to set up the RF receiver through the detection and recovery of the baseband composite waveform. The format contains the information needed to configure the antenna and receiver subsystems.

Additional equipment inserted in a specific range configuration, such as microwave or other relay, is intended to be transparent to the user and is not described under Transmission Attributes.

Because the information is mutually exclusive, only the appropriate FM or PM system data set is required for a link.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Figure 9‑3. Transmission Attributes Group (T)‑ | | | | | | | Code Name | |
| **DATA SOURCE ID** - 9-16 | | | | | | | (T-x\ID) | |
|  | \***Source RF Attributes** | | | | | |  | |
|  |  | | TRANSMITTER ID | | | | (T-x\TID) | |
|  |  | | FREQUENCY | | | | (T-x\RF1) | |
|  |  | | RF BANDWIDTH | | | | (T-x\RF2) | |
|  |  | | DATA BANDWIDTH | | | | (T-x\RF3) | |
|  |  | | MODULATION TYPE | | | | (T-x\RF4) | |
|  |  | | TOTAL CARRIER MODULATION | | | | (T-x\RF5) | |
|  |  | | POWER (RADIATED) | | | | (T-x\RF6) | |
| 9-17 |  | | NUMBER OF SUBCARRIERS | | | | (T-x\SCO\N) | |
| 9-17 |  | |  | SUBCARRIER NUMBER | | | (T-x\SCO1-n) | |
|  |  | |  | MODULATION INDEX | | | (T-x\SCO2-n) | |
|  |  | | MODULATOR NON-LINEARITY | | | | (T-x\RF7) | |
| 9-17 |  | | \***Premodulation Filter** | | | |  | |
|  |  | |  | BANDWIDTH | | | (T-x\PMF1) | |
|  |  | |  | SLOPE | | | (T-x\PMF2) | |
|  |  | |  | TYPE | | | (T-x\PMF3) | |
| 9-18 |  | | \***Transmit Antenna** | | | |  | |
|  |  | | | TRANSMIT ANTENNA TYPE | | | (T-x\AN1) | |
|  |  | | | TRANSMIT POLARIZATION | | | (T-x\AN2) | |
|  |  | | | ANTENNA LOCATION | | | (T-x\AN3) | |
| 9-18 |  | | | \***Antenna Patterns** | | |  | |
|  |  | | | | DOCUMENT | | (T-x\AP) | |
|  |  | | | | \***Point of Contact** | |  | |
|  |  | | | | | NAME | (T-x\AP\POC1) | |
|  |  | | | | | AGENCY | (T-x\AP\POC2) | |
|  |  | | | | | ADDRESS | (T-x\AP\POC3) | |
|  |  | | | | | TELEPHONE | (T-x\AP\POC4) | |
| 9-18 | \***Ground Station Attributes** | | | | | |  | |
|  |  | IF BANDWIDTH | | | | | (T-x\GST1) | |
|  |  | BASEBAND COMPOSITE BANDWIDTH | | | | | (T-x\GST2) | |
| 9-19 |  | \***Gain Control** | | | | |  | |
|  |  |  | | AGC TIME CONSTANT | | | (T-x\GST3) | |
|  |  | OR | | MGC GAIN SET POINT | | | (T-x\GST4) | |
|  |  | AFC/APC | | | | | (T-x\GST5) | |
|  |  |  | | TRACKING BANDWIDTH | | | (T-x\GST6) | |
| 9-19 |  | POLARIZATION RECEPTION | | | | | (T-x\GST7) | |
| 9-20 |  | \***FM Systems** | | | | |  | |
|  |  | | | DISCRIMINATOR BANDWIDTH | | | (T-x\FM1) | |
|  |  | | | DISCRIMINATOR LINEARITY | | | (T-x\FM2) | |
| 9-20 | OR | **\*PM Systems** | | | | |  | |
|  |  | | | PHASE LOCK LOOP BANDWIDTH | | | (T-x\PLL) | |
|  | **\*Comments** | | | | | |  | |
| 9-20 | | COMMENTS | | | | | (T-x\COM) | |
| \*Heading Only - No Data Entry | | | | | | |  |

| Table 9‑3. Transmission Attributes Group (T) | | | | |
| --- | --- | --- | --- | --- |
| **Parameter** | **Code Name** | **Usage Attributes** | | **Definition** |
| DATA SOURCE ID | T-x\ID | Allowed when: Always | | Data source ID consistent with General Information group. |
| Required when: defining Transmitter attributes | |
| Links from: G\DSI-n | |
| Links to: M-x\ID | |
| Range: 32 characters | |
| **Source RF Attributes** | | | | |
| TRANSMITTER ID | T-x\TID | Allowed when: T-x\ID specified | | Transmitter identification. |
| Range: 12 characters | |
| FREQUENCY | T-x\RF1 | Allowed when: T-x\ID specified | | Carrier frequency, in megahertz (MHz). If programmable, enter “P” and define in comments. |
| Range: 6 characters | |
| RF BANDWIDTH | T-x\RF2 | Allowed when: T-x\ID specified | | Total RF bandwidth (−60 decibel [dB]) of modulated signal, in MHz. |
| Range: 6 characters | |
| DATA BANDWIDTH | T-x\RF3 | Allowed when: T-x\ID specified | | Composite baseband data bandwidth (3 dB), in kilohertz (kHz). |
| Range: 6 characters | |
| MODULATION TYPE | T-x\RF4 | Allowed when: T-x\ID specified | | Define the modulation type. |
| Range: Enumeration | |
| Enumeration | Description |
| FM |  |
| PM |  |
| BPSK |  |
| DPSK |  |
| QPSK |  |
| FQPSK-B |  |
| FQPSK-JR |  |
| SOQPSK-TG |  |
| MULTI-H-CPM |  |
| OTHR |  |
| TOTAL CARRIER MODULATION | T-x\RF5 | Allowed when: T-x\ID specified | | For FM system, define total carrier deviation, peak-to-peak, in kHz. For PM system, define total phase modulation, peak-to-peak, in radians. |
| Range: 6 characters | |
| POWER (RADIATED) | T-x\RF6 | Allowed when: T-x\ID specified | | Total transmitted power when modulated, in watts. |
| Range: 4 characters | |
| NUMBER OF SUBCARRIERS | T-x\SCO\N | Allowed when: T-x\ID specified | | Number of subcarriers in the composite baseband waveform, n. If none, enter “NO”. |
| Range: 0 to 99, “NO” | |
| Default: NO | |
| SUBCARRIER NUMBER | T-x\SCO1-n | Allowed when: T-x\SCO\N > 0 | | Give the IRIG channel number for the subcarrier. If nonstandard subcarrier, enter “NO” and enter frequency in the comments section where n is an identification tag for the subcarrier. |
| Required when: Allowed | |
| Range: 5 characters | |
| MODULATION INDEX | T-x\SCO2-n | Allowed when: T-x\SCO\N > 0 | | Specify the modulation index for each subcarrier in the composite waveform, as appropriate. |
| Range: 4 characters | |
| MODULATOR NONLINEARITY | T-x\RF7 | Allowed when: T-x\ID is specified | | Modulator nonlinearity, in percent. |
| Range: Floating point 0 to 100 | |
| Default: 0 | |
| **Premodulation Filter** | | | | |
| BANDWIDTH | T-x\PMF1 | Allowed when: T-x\ID is specified | | Pre-modulation composite filter bandwidth, 3 dB cut-off frequency, in kHz. |
| Range: 6 characters | |
| SLOPE | T-x\PMF2 | Allowed when: T-x\ID is specified | | Pre-modulation filter asymptotic roll-off slope, dB/octave. |
| Range: 2 characters | |
| TYPE | T-x\PMF3 | Allowed when: T-x\ID is specified | | Specify the filter type. |
| Range: Enumeration | |
| Enumeration | Description |
| CA | Constant amplitude |
| CD | Constant delay |
| OT | Other |
| **Transmit Antenna** | | | | |
| TRANSMIT ANTENNA TYPE | T-x\AN1 | Allowed when: T-x\ID is specified | | Transmit antenna type. |
| Range: 16 characters | |
| TRANSMIT POLARIZATION | T-x\AN2 | Allowed when: T-x\ID is specified | | Transmit antenna polarization. |
| Range: Enumeration | |
| Enumeration | Description |
| RHCP |  |
| LHCP |  |
| LIN | linear |
| ANTENNA LOCATION | T-x\AN3 | Allowed when: T-x\ID is specified | | Describe the antenna location. |
| Range: 16 characters | |
| **Antenna Patterns** | | | | |
| DOCUMENT | T-x\AP | Allowed when: T-x\ID is specified | | Identify document having antenna patterns. |
| Range: 16 characters | |
| **Point of Contact** | | | | |
| NAME | T-x\AP\POC1 | Allowed when: T-x\ID is specified | | Identify the name point of contact for additional information. |
|  |  | Range: 24 characters | |
| AGENCY | T-x\AP\POC2 | Allowed when: T-x\ID is specified | | Identify the agency point of contact for additional information. |
|  |  | Range: 48 characters | |
| ADDRESS | T-x\AP\POC3 | Allowed when: T-x\ID is specified | | Identify the address point of contact for additional information. |
|  |  | Range: 48 characters | |
| TELEPHONE | T-x\AP\POC4 | Allowed when: T-x\ID is specified | | Identify the telephone point of contact for additional information. |
|  |  | Range: 20 characters | |
| **Ground Station Attributes** | | | | |
| IF BANDWIDTH | T-x\GST1 | Allowed when: T-x\ID is specified | | Define IF bandwidth (3 dB) in MHz. |
| Range: 6 characters | |
| BASEBAND COMPOSITE BANDWIDTH | T-x\GST2 | Allowed when: T-x\ID is specified | | Define the cutoff frequency (3 dB), of the output filter, in kHz. |
| Range: 6 characters | |
| **Gain Control** | | | | |
| AGC TIME CONSTANT | T-x\GST3 | Allowed when: T-x\ID is specified | | Specify the AGC time constant desired in milliseconds. |
| Range: 4 characters | |
| MGC GAIN SET POINT | T-x\GST4 | Allowed when: T-x\ID is specified | | Provide the manual gain control set point in terms of received signal strength, dBm. |
| Range: 6 characters | |
| AFC/APC | T-x\GST5 | Allowed when: T-x\ID is specified | | Specify automatic frequency control, automatic phase control, or none. |
| Range: Enumeration | |
| Enumeration | Description |
| AFC | automatic frequency control |
| APC | automatic phase control |
| NON | none |
| Default: NON | |
| TRACKING BANDWIDTH | T-x\GST6 | Allowed when: T-x\ID is specified | | Specify tracking loop bandwidth, in hertz (Hz). |
| Range: 4 characters | |
| POLARIZATION RECEPTION | T-x\GST7 | Allowed when: T-x\ID is specified | | Specify polarization to be used. |
| Range: Enumeration | |
| Enumeration | Description |
| RHCP |  |
| LHCP |  |
| BOTH |  |
| Both with diversity combining: | |
| B&DPR | Pre-detection |
| B&DPO | Post-detection |
| Diversity combining only: | |
| PRE-D | Pre-detection |
| POS-D | Post-detection |
| OTHER | Specify in comments |
| **FM Systems** | | | | |
| DISCRIMINATOR BANDWIDTH | T-x\FM1 | Allowed when: T-x\ID is specified | | Specify the discriminator bandwidth required, in MHz. |
| Range: 4 characters | |
| DISCRIMINATOR LINEARITY | T-x\FM2 | Allowed when: T-x\ID is specified | | Specify the required linearity over the bandwidth specified. |
| Range: 4 characters | |
| **PM Systems** | | | | |
| PHASE LOCK LOOP BANDWIDTH | T-x\PLL | Allowed when: T-x\ID is specified | | Specify the phase-locked loop bandwidth. |
| Range: 4 characters | |
| **Comments** | | | | |
| COMMENTS | T-x\COM | Allowed when: T\ID is specified | | Provide the additional information requested or any other information desired. |
| Range: 1600 | |

* + 1. Recorder-Reproducer Attributes (R)

This group describes the attributes required when the data source is a magnetic tape as specified in [Annex A.2](http://www.wsmr.army.mil/RCCsite/Documents/106-17_Telemetry_Standards/annexa-2.pdf) or a data storage device as specified in [Chapter 10](http://www.wsmr.army.mil/RCCsite/Documents/106-17_Telemetry_Standards/chapter10.pdf). In the case of the tape data link identification, each data source must be identified. In some cases, the data source identification may be identical, particularly when the same information has been received from different receiver sites, on different polarizations, or on different carriers for redundancy purposes. Some of the information requested will be available only from the recording site or the dubbing location.

Figure 9‑4 indicates the information required. Various categories of information have been included. In the data section of the attributes, it will be necessary to repeat the items until all of the data sources, including the multiple tracks, have been defined that contain ground station data of interest. Table 9‑4 defines the information required. Any nonstandard tape recordings will require explanation in the comments and may require supplemental definition.

Recorder-reproducer filtering and post-process data filtering and overwrite will use TMATS attributes to describe the requirements. Recorder-reproducer channel types that support filtering and overwrite will define these attributes. The PCM channels will use R, P, and D attributes and the bus channels will use R and B attributes to define filtering and overwrite definitions.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Figure 9‑4. Recorder-Reproducer Attributes Group (R)‑ | | | | | | | | **Code Name** |
| **DATA SOURCE ID** - 9-30 | | | | | | | | (R-x\ID) |
| 9-30 | RECORDER-REPRODUCER ID | | | | | | | (R-x\RID) |
|  | RECORDER-REPRODUCER DESCRIPTION | | | | | | | (R-x\R1) |
| 9-30 | **\*Recorder-Reproducer Media Characteristics** | | | | | | |  |
|  |  | | RECORDER-REPRODUCER MEDIA TYPE | | | | | (R-x\TC1) |
|  |  | | RECORDER-REPRODUCER MEDIA MFG | | | | | (R-x\TC2) |
|  |  | | RECORDER-REPRODUCER MEDIA CODE | | | | | (R-x\TC3) |
|  |  | | RECORDER-REPRODUCER MEDIA LOCATION | | | | | (R-x\RML) |
|  |  | | EXTERNAL RMM BUS SPEED | | | | | (R-x\ERBS) |
|  |  | | TAPE WIDTH | | | | | (R-x\TC4) |
|  |  | | TAPE HOUSING | | | | | (R-x\TC5) |
|  |  | | TYPE OF TRACKS | | | | | (R-x\TT) |
|  |  | | NUMBER OF TRACKS/CHANNELS | | | | | (R-x\N) |
|  |  | | RECORD SPEED | | | | | (R-x\TC6) |
|  |  | | DATA PACKING DENSITY | | | | | (R-x\TC7) |
|  |  | | TAPE REWOUND | | | | | (R-x\TC8) |
|  |  | | NUMBER OF SOURCE BITS | | | | | (R-x\NSB) |
| 9-33 | **\*Recorder-Reproducer Information** | | | | | | |  |
|  |  | | RECORDER-REPRODUCER MANUFACTURER | | | | | (R-x\RI1) |
|  |  | | RECORDER-REPRODUCER MODEL | | | | | (R-x\RI2) |
|  |  | | ORIGINAL RECORDING | | | | | (R-x\RI3) |
|  |  | | ORIGINAL RECORDING DATE AND TIME | | | | | (R-x\RI4) |
| 9-33 |  | | **\*Creating Organization Point of Contact** | | | | |  |
|  |  | |  | NAME | | | | (R-x\POC1) |
|  |  | |  | AGENCY | | | | (R-x\POC2) |
|  |  | |  | ADDRESS | | | | (R-x\POC3) |
|  |  | |  | TELEPHONE | | | | (R-x\POC4) |
|  |  | | DATE AND TIME OF COPY | | | | | (R-x\RI5) |
| 9-34 |  | | **\*Copying Organization Point of Contact** | | | | |  |
|  |  | |  | NAME | | | | (R-x\DPOC1) |
|  |  | |  | AGENCY | | | | (R-x\DPOC2) |
|  |  | |  | ADDRESS | | | | (R-x\DPOC3) |
|  |  | |  | TELEPHONE | | | | (R-x\DPOC4) |
|  |  | | POST PROCESS MODIFIED RECORDING | | | | | (R-x\RI6) |
|  |  | | POST PROCESS MODIFICATION TYPE | | | | | (R-x\RI7) |
|  |  | | DATE AND TIME OF MODIFICATION | | | | | (R-x\RI8) |
|  |  | | **\*Modifying Organization Point of Contact** | | | | |  |
|  |  | |  | NAME | | | | (R-x\MPOC1) |
|  |  | |  | AGENCY | | | | (R-x\MPOC2) |
|  |  | |  | ADDRESS | | | | (R-x\MPOC3) |
|  |  | |  | TELEPHONE | | | | (R-x\MPOC4) |
|  |  | | CONTINUOUS RECORDING ENABLED | | | | | (R-x\CRE) |
|  |  | | RECORDER-REPRODUCER SETUP SOURCE | | | | | (R-x\RSS) |
|  |  | | RECORDER SERIAL NUMBER | | | | | (R-x\RI9) |
|  |  | | RECORDER FIRMWARE REVISION | | | | | (R-x\RI10) |
|  |  | | NUMBER OF MODULES | | | | | (R-x\RIM\N) |
|  |  | |  | MODULE ID | | | | (R-x\RIMI-n) |
|  |  | |  | MODULE SERIAL NUMBER | | | | (R-x\RIMS-n) |
|  |  | |  | MODULE FIRMWARE REVISION | | | | (R-x\RIMF-n) |
|  |  | | NUMBER OF RMMS | | | | | (R-x\RMM\N) |
|  |  | |  | RMM IDENTIFIER | | | | (R-x\RMMID-n) |
|  |  | |  | RMM SERIAL NUMBER | | | | (R-x\RMMS-n) |
|  |  | |  | RMM FIRMWARE REVISION | | | | (R-x\RMMF-n) |
|  |  | | **\* Recorder-Reproducer Ethernet Interfaces** | | | | |  |
|  |  | |  | NUMBER OF ETHERNET INTERFACES | | | | (R-x\EI\N) |
|  |  | |  | ETHERNET INTERFACE NAME | | | | (R-x\EINM-n) |
|  |  | |  | PHYSICAL ETHERNET INTERFACE | | | | (R-x\PEIN-n) |
|  |  | |  | ETHERNET INTERFACE LINK SPEED | | | | (R-x\EILS-n) |
|  |  | |  | ETHERNET INTERFACE TYPE | | | | (R-x\EIT-n) |
|  |  | |  | ETHERNET INTERFACE IP ADDRESS | | | | (R-x\EIIP-n) |
|  |  | |  | NUMBER OF ETHERNET INTERFACE PORTS | | | | (R-x\EIIP\N-n) |
|  |  | |  | PORT ADDRESS | | | | (R-x\EI\PA-n-m) |
|  |  | |  | PORT TYPE | | | | (R-x\EI\PT-n-m) |
|  |  | | **\* Recorder-Reproducer Channel Group Streams** | | | | |  |
|  |  | |  | NUMBER OF CHANNEL GROUPS | | | | (R-x\CG\N) |
|  |  | |  | CHANNEL GROUP NAME | | | | (R-x\CGNM-n) |
|  |  | |  | CHANNEL GROUP STREAM NUMBER | | | | (R-x\CGSN-n) |
|  |  | |  | NUMBER OF GROUP CHANNELS | | | | (R-x\CGCH\N-n) |
|  |  | |  | GROUP CHANNEL NUMBER | | | | (R-x\CGCN-n-m) |
|  |  | | **\* Recorder-Reproducer Drives and Volumes** | | | | |  |
|  |  | |  | NUMBER OF DRIVES | | | | (R-x\DR\N) |
|  |  | |  | DRIVE NAME | | | | (R-x\DRNM-n) |
|  |  | |  | DRIVE NUMBER | | | | (R-x\DRN-n) |
|  |  | |  | DRIVE BLOCK SIZE | | | | (R-x\DRBS-n) |
|  |  | |  | NUMBER OF DRIVE VOLUMES | | | | (R-x\DRVL\N-n) |
|  |  | |  | VOLUME NAME | | | | (R-x\VLNM-n-m) |
|  |  | |  | VOLUME NUMBER | | | | (R-x\VLN-n-m) |
|  |  | |  | VOLUME BLOCKS TO ALLOCATE | | | | (R-x\VLBA-n-m) |
|  |  | |  | VOLUME NUMBER OF BLOCKS | | | | (R-x\VLNB-n-m) |
|  |  | | **\* Recorder-Reproducer**  **Stream/Drive-Volume Links** | | | | |  |
|  |  | |  | NUMBER OF LINKS | | | | (R-x\L\N) |
|  |  | |  | LINK NAME | | | | (R-x\LNM-n) |
|  |  | |  | LINK SOURCE STREAM NAME | | | | (R-x\LSNM-n) |
|  |  | |  | LINK SOURCE STREAM NUMBER | | | | (R-x\LSSN-n) |
|  |  | |  | LINK DESTINATION DRIVE NUMBER | | | | (R-x\LDDN-n) |
|  |  | |  | LINK DESTINATION VOLUME NUMBER | | | | (R-x\LDVN-n) |
|  |  | | **\* Recorder-Reproducer**  **Ethernet Interface Publishing Links** | | | | |  |
|  |  | |  | NUMBER OF ETHERNET PUBLISHING LINKS | | | | (R-x\EPL\N) |
|  |  | |  | LINK NAME | | | | (R-x\EPL\LNM-n) |
|  |  | |  | LINK SOURCE STREAM NAME | | | | (R-x\EPL\LSNM-n) |
|  |  | |  | LINK SOURCE STREAM NUMBER | | | | (R-x\EPL\LSSN-n) |
|  |  | |  | LINK DESTINATION ETHERNET INTERFACE IP ADDRESS | | | | (R-x\EPL\LDEIP-n) |
|  |  | |  | LINK DESTINATION ETHERNET INTERFACE PORT ADDRESS | | | | (R-x\EPL\LDEPA-n) |
|  | **\* Computer-Generated Data Packet, User-Defined Definition** | | | | | | |  |
|  |  | | USER-DEFINED CHANNEL ID | | | | | (R-x\UD\TK1) |
| 9-42 | **\*Recording Event Definitions** | | | | | | |  |
|  |  | | RECORDING EVENTS ENABLED | | | | | (R-x\EV\E) |
|  |  | | RECORDING EVENTS CHANNEL ID | | | | | (R-x\EV\TK1) |
|  |  | | NUMBER OF RECORDING EVENTS | | | | | (R-x\EV\N) |
|  |  | | RECORDER INTERNAL EVENTS ENABLED | | | | | (R-x\EV\IEE) |
| 9-43 |  | | **\*Recording Event** | | | | |  |
|  |  | |  | EVENT ID | | | | (R-x\EV\ID-n) |
|  |  | |  | EVENT DESCRIPTION | | | | (R-x\EV\D-n) |
|  |  | |  | EVENT DATA PROCESSING ENABLED | | | | (R-x\EV\EDP-n) |
|  |  | |  | EVENT TYPE | | | | (R-x\EV\T-n) |
| 9-44 |  | |  | EVENT PRIORITY | | | | (R-x\EV\P-n) |
|  |  | |  | EVENT CAPTURE MODE | | | | (R-x\EV\CM-n) |
|  |  | |  | EVENT INITIAL CAPTURE | | | | (R-x\EV\IC-n) |
|  |  | |  | RECORDING EVENT LIMIT COUNT | | | | (R-x\EV\LC-n) |
|  |  | |  | EVENT TRIGGER MEASUREMENT SOURCE | | | | (R-x\EV\MS-n) |
|  |  | |  | EVENT TRIGGER MEASUREMENT NAME | | | | (R-x\EV\MN-n) |
|  |  | |  | EVENT PROCESSING MEASUREMENT DATA LINK NAME | | | | (R-x\EV\DLN-n) |
|  |  | |  | NUMBER OF MEASUREMENTS TO PROCESS | | | | (R-x\EV\PM\N-n) |
|  |  | |  | MEASUREMENT NAME TO PROCESS | | | | (R-x\EV\PM\MN-n-m) |
|  |  | |  | PRE-EVENT PROCESSING DURATION | | | | (R-x\EV\PM\PRE-n-m) |
|  |  | |  | POST-EVENT PROCESSING DURATION | | | | (R-x\EV\PM\PST-n-m) |
| 9-46 | **\*Recording Index** | | | | | | |  |
|  |  | | RECORDING INDEX ENABLED | | | | | (R-x\IDX\E) |
|  |  | | RECORDING INDEX CHANNEL ID | | | | | (R-x\IDX\TK1) |
|  |  | | RECORDING INDEX TYPE | | | | | (R-x\IDX\IT) |
| 9-46 |  | | **\* Time Index Type Attribute** | | | | |  |
|  |  | | | INDEX TIME VALUE | | | | (R-x\IDX\ITV) |
|  | OR | | **\* Count Index Type Attribute** | | | | |  |
|  |  | | | INDEX COUNT VALUE | | | | (R-x\IDX\ICV) |
| 9-47 | **\*MIL-STD-1553 Recorder Control** | | | | | | |  |
|  |  | | MESSAGE MONITOR RECORD CONTROL ENABLED | | | | | (R-x\MRC\E) |
|  |  | | CHANNEL ID NUMBER | | | | | (R-x\MRC\ID) |
|  |  | | MESSAGE RECORD CONTROL TYPE | | | | | (R-x\MRC\RCT) |
|  |  | | STOP-PAUSE COMMAND WORD | | | | | (R-x\MRC\SPM) |
|  |  | | START-RESUME COMMAND WORD | | | | | (R-x\MRC\SRM) |
|  | **\*Data** | | | | | | |  |
|  |  | | TRACK NUMBER/ CHANNEL ID | | | | | (R-x\TK1-n) |
|  |  | | RECORDING TECHNIQUE | | | | | (R-x\TK2-n) |
|  |  | | INPUT STREAM DERANDOMIZATION | | | | | (R-x\IDDR-n) |
| 9-48 |  | | DATA SOURCE ID | | | | | (R-x\DSI-n) |
| 9-48 |  | | DATA DIRECTION | | | | | (R-x\TK3-n) |
|  |  | | RECORDER PHYSICAL CHANNEL NUMBER | | | | | (R-x\TK4-n) |
|  |  | | CHANNEL ENABLE | | | | | (R-x\CHE-n) |
|  |  | | CHANNEL DATA TYPE | | | | | (R-x\CDT-n) |
|  |  | | CHANNEL DATA LINK NAME | | | | | (R-x\CDLN-n) |
|  |  | | SECONDARY HEADER TIME FORMAT | | | | | (R-x\SHTF-n) |
|  |  | | **\*Data Type Attributes** | | | | |  |
| 9-50 |  | | | **\*PCM Data Type Attributes** | | | |  |
|  |  | | | | | | PCM DATA TYPE FORMAT | (R-x\PDTF-n) |
|  |  | | | | | | DATA PACKING OPTION | (R-x\PDP-n) |
|  |  | | | | | | RECORDER POLARITY SETTING | (R-x\RPS-n) |
|  |  | | | | | | INPUT CLOCK EDGE | (R-x\ICE-n) |
|  |  | | | | | | INPUT SIGNAL TYPE | (R-x\IST-n) |
|  |  | | | | | | INPUT THRESHOLD | (R-x\ITH-n) |
|  |  | | | | | | INPUT TERMINATION | (R-x\ITM-n) |
|  |  | | | | | | PCM VIDEO TYPE FORMAT | (R-x\PTF-n) |
|  |  | | | | | | PCM RECORDER-REPRODUCER MINOR FRAME FILTERING ENABLED | (R-x\MFF\E-n) |
|  |  | | | | | | PCM POST PROCESS OVERWRITE AND FILTERING ENABLED | (R-x\POF\E-n) |
|  |  | | | | | | PCM POST PROCESS OVERWRITE AND FILTERING TYPE | (R-x\POF\T-n) |
|  |  | | | | | | MINOR FRAME FILTERING DEFINITION TYPE | (R-x\MFF\FDT-n) |
|  |  | | | | | | NUMBER OF MINOR FRAME FILTERING DEFINITIONS | (R-x\MFF\N-n) |
|  |  | | | | | | FILTERED MINOR FRAME NUMBER  RECORDER POLARITY SETTING | (R-x\MFF\MFN-n-m)  (R-x\RPS-n-m) |
|  |  | | | | | | NUMBER OF SELECTED MEASUREMENT OVERWRITE DEFINITIONS | (R-x\SMF\N-n) |
|  |  | | | | | | SELECTED MEASUREMENT NAME | (R-x\SMF\SMN-n-m) |
|  |  | | | | | | MEASUREMENT OVERWRITE TAG | (R-x\SMF\MFOT-n-m) |
| 9-55 | OR | | | **\*MIL-STD-1553 Bus Data Type Attributes** | | | |  |
|  |  | | | | | | MIL-STD-1553 BUS DATA TYPE FORMAT | (R-x\BTF-n) |
|  |  | | | | | | MIL-STD-1553 RECORDER-REPRODUCER FILTERING ENABLED | (R-x\MRF\E-n) |
|  |  | | | | | | MIL-STD-1553 POST PROCESS OVERWRITE AND FILTERING ENABLED | (R-x\MOF\T-n) |
|  |  | | | | | | MIL-STD-1553 MESSAGE FILTERING DEFINITION TYPE | (R-x\MFD\FDT-n) |
|  |  | | | | | | NUMBER OF MESSAGE FILTERING DEFINITIONS | (R-x\MFD\N-n) |
|  |  | | | | | | MESSAGE NUMBER | (R-x\MFD\MID-n-m) |
|  |  | | | | | | MESSAGE TYPE | (R-x\MFD\MT-n-m) |
|  |  | | | | | | COMMAND WORD ENTRY | (R-x\CWE-n-m) |
|  |  | | | | | | COMMAND WORD | (R-x\CMD-n-m) |
|  |  | | | | | | REMOTE TERMINAL ADDRESS | (R-x\MFD\TRA-n-m) |
|  |  | | | | | | TRANSMIT/RECEIVE MODE | (R-x\MFD\TRM-n-m) |
|  |  | | | | | | SUBTERMINAL ADDRESS | (R-x\MFD\STA-n-m) |
|  |  | | | | | | DATA WORD COUNT/MODE CODE | (R-x\MFD\DWC-n-m) |
|  |  | | | | | | RECEIVE COMMAND WORD ENTRY | (R-x\RCWE-n-m) |
|  |  | | | | | | RECEIVE COMMAND WORD | (R-x\RCMD-n-m) |
|  |  | | | | | | RT/RT REMOTE TERMINAL ADDRESS | (R-x\MFD\RTRA-n-m) |
|  |  | | | | | | RT/RT SUBTERMINAL ADDRESS | (R-x\MFD\RSTA-n-m) |
|  |  | | | | | | RT/RT DATA WORD COUNT | (R-x\MFD\RDWC-n-m) |
|  |  | | | | | | NUMBER OF SELECTED MEASUREMENT OVERWRITE DEFINITIONS | (R-x\BME\N-n) |
|  |  | | | | | | SELECTED MEASUREMENT NAME | (R-x\BME\SMN-n-m) |
|  |  | | | | | | MEASUREMENT OVERWRITE TAG | (R-x\BME\MFOT-n-m) |
| 9-59 | OR | | | **\*Analog Data Type Attributes** | | | |  |
|  |  | | | | | | ANALOG DATA TYPE FORMAT | (R-x\ATF-n) |
|  |  | | | | | | NUMBER OF ANALOG CHANNELS/PKT | (R-x\ACH\N-n) |
|  |  | | | | | | DATA PACKING OPTION | (R-x\ADP-n) |
|  |  | | | | | | SAMPLE RATE | (R-x\ASR-n) |
|  |  | | | | | | SUB CHANNEL ENABLED | (R-x\AMCE-n-m) |
|  |  | | | | | | NUMBER OF SUB CHANNEL ENABLED | (R-x\AMCN-n) |
| 9-60 |  | | | | | | MEASUREMENT NAME | (R-x\AMN-n-m) |
|  |  | | | | | | DATA LENGTH | (R-x\ADL-n-m) |
|  |  | | | | | | BIT MASK | (R-x\AMSK-n-m) |
|  |  | | | | | | MEASUREMENT TRANSFER ORDER | (R-x\AMTO-n-m) |
|  |  | | | | | | SAMPLE FACTOR | (R-x\ASF-n-m) |
|  |  | | | | | | SAMPLE FILTER 3DB BANDWIDTH | (R-x\ASBW-n-m) |
|  |  | | | | | | AC/DC COUPLING | (R-x\ACP-n-m) |
|  |  | | | | | | RECORDER INPUT IMPEDANCE | (R-x\AII-n-m) |
|  |  | | | | | | INPUT CHANNEL GAIN | (R-x\AGI-n-m) |
|  |  | | | | | | INPUT FULL SCALE RANGE | (R-x\AFSI-n-m) |
|  |  | | | | | | INPUT OFFSET VOLTAGE | (R-x\AOVI-n-m) |
|  |  | | | | | | RECORDED ANALOG FORMAT | (R-x\AF-n-m) |
|  |  | | | | | | INPUT TYPE | (R-x\AIT-n-m) |
|  |  | | | | | | AUDIO | (R-x\AV-n-m) |
|  |  | | | | | | AUDIO FORMAT | (R-x\AVF-n-m) |
| 9-63 | OR | | | **\*Discrete Data Type Attributes** | | | |  |
|  |  | | | | | | DISCRETE DATA TYPE FORMAT | (R-x\DTF-n) |
|  |  | | | | | | DISCRETE MODE | (R-x\DMOD-n) |
|  |  | | | | | | SAMPLE RATE | (R-x\DSR-n) |
|  |  | | | | | | NUMBER OF DISCRETE MEASUREMENTS | (R-x\NDM\N-n) |
|  |  | | | | | | MEASUREMENT NAME | (R-x\DMN-n-m) |
|  |  | | | | | | BIT MASK | (R-x\DMSK-n-m) |
|  |  | | | | | | MEASUREMENT TRANSFER ORDER | (R-x\DMTO-n-m) |
| 9-65 | OR | | | **\*ARINC 429 Bus Data Type Attributes** | | | |  |
|  |  | | | | | | ARINC 429 BUS DATA TYPE FORMAT | (R-x\ABTF-n) |
|  |  | | | | | | NUMBER OF ARINC 429 SUB-CHANNELS | (R-x\NAS\N-n) |
|  |  | | | | | | ARINC 429 SUB-CHANNEL NUMBER | (R-x\ASN-n-m) |
|  |  | | | | | | ARINC 429 SUB-CHANNEL NAME | (R-x\ANM-n-m) |
| 9-66 | OR | | | **\*Video Data Type Attributes** | | | |  |
|  |  | | | | | | VIDEO DATA TYPE FORMAT | (R-x\VTF-n) |
|  |  | | | | | | MPEG-2 CHANNEL XON2 FORMAT | (R-x\VXF-n) |
|  |  | | | | | | VIDEO SIGNAL TYPE | (R-x\VST-n) |
|  |  | | | | | | VIDEO SIGNAL FORMAT TYPE | (R-x\VSF-n) |
|  |  | | | | | | VIDEO CONSTANT BIT RATE | (R-x\CBR-n) |
|  |  | | | | | | VIDEO VARIABLE PEAK BIT RATE | (R-x\VBR-n) |
|  |  | | | | | | VIDEO ENCODING DELAY | (R-x\VED-n) |
|  |  | | | | | | OVERLAY ENABLED | (R-x\VCO\OE-n) |
|  |  | | | | | | OVERLAY X POSITION | (R-x\VCO\X-n) |
|  |  | | | | | | OVERLAY Y POSITION | (R-x\VCO\Y-n) |
|  |  | | | | | | OVERLAY EVENT TOGGLE ENABLED | (R-x\VCO\OET-n) |
|  |  | | | | | | OVERLAY FORMAT | (R-x\VCO\OLF-n) |
|  |  | | | | | | OVERLAY BACKGROUND | (R-x\VCO\OBG-n) |
|  |  | | | | | | ANALOG AUDIO CHANNEL INPUT LEFT | (R-x\ASI\ASL-n) |
|  |  | | | | | | ANALOG AUDIO CHANNEL INPUT RIGHT | (R-x\ASI\ASR-n) |
|  |  | | | | | | VIDEO DATA ALIGNMENT | (R-x\VDA-n) |
| 9-69 | OR | | | **\*Time Data Type Attributes** | | | |  |
|  |  | | | | | | TIME DATA TYPE FORMAT | (R-x\TTF-n) |
|  |  | | | | | | TIME FORMAT | (R-x\TFMT-n) |
|  |  | | | | | | TIME SOURCE | (R-x\TSRC-n) |
| 9-70 | OR | | | **\*Image Data Type Attributes** | | | |  |
|  |  | | | | | | IMAGE DATA TYPE FORMAT | (R-x\ITF-n) |
|  |  | | | | | | STILL IMAGE TYPE | (R-x\SIT-n) |
|  |  | | | | | | DYNAMIC IMAGE FORMAT | (R-x\DIF-n) |
|  |  | | | | | | IMAGE TIME STAMP MODE | (R-x\ITSM-n) |
|  |  | | | | | | DYNAMIC IMAGE ACQUISITION MODE | (R-x\DIAM-n) |
|  |  | | | | | | IMAGE FRAME RATE | (R-x\IFR-n) |
|  |  | | | | | | PRE-TRIGGER FRAMES | (R-x\PTG-n) |
|  |  | | | | | | TOTAL FRAMES | (R-x\TOTF-n) |
|  |  | | | | | | EXPOSURE TIME | (R-x\EXP-n) |
|  |  | | | | | | SENSOR ROTATION | (R-x\ROT-n) |
|  |  | | | | | | SENSOR GAIN VALUE | (R-x\SGV-n) |
|  |  | | | | | | SENSOR AUTO GAIN | (R-x\SAG-n) |
|  |  | | | | | | SENSOR WIDTH | (R-x\ISW-n) |
|  |  | | | | | | SENSOR HEIGHT | (R-x\ISH-n) |
|  |  | | | | | | MAX IMAGE WIDTH | (R-x\MIW-n) |
|  |  | | | | | | MAX IMAGE HEIGHT | (R-x\MIH-n) |
|  |  | | | | | | IMAGE WIDTH | (R-x\IW-n) |
|  |  | | | | | | IMAGE HEIGHT | (R-x\IH-n) |
|  |  | | | | | | IMAGE OFFSET X | (R-x\IOX-n) |
|  |  | | | | | | IMAGE OFFSET Y | (R-x\IOY-n) |
|  |  | | | | | | LINE PITCH | (R-x\ILP-n) |
|  |  | | | | | | BINNING HORIZONTAL | (R-x\IBH-n) |
|  |  | | | | | | BINNING VERTICAL | (R-x\IBV-n) |
|  |  | | | | | | DECIMATION HORIZONTAL | (R-x\IDH-n) |
|  |  | | | | | | DECIMATION VERTICAL | (R-x\IDV-n) |
|  |  | | | | | | REVERSE X | (R-x\IRX-n) |
|  |  | | | | | | REVERSE Y | (R-x\IRY-n) |
|  |  | | | | | | PIXEL DYNAMIC RANGE MINIMUM | (R-x\IPMN-n) |
|  |  | | | | | | PIXEL DYNAMIC RANGE MAXIMUM | (R-x\IPMX-n) |
|  |  | | | | | | TEST IMAGE TYPE | (R-x\TIT-n) |
| 9-75 | OR | | | **\*UART Data Type Attributes** | | | |  |
|  |  | | | | | | UART DATA TYPE FORMAT | (R-x\UTF-n) |
|  |  | | | | | | NUMBER OF UART SUB-CHANNELS | (R-x\NUS\N-n) |
|  |  | | | | | | UART SUB-CHANNEL NUMBER | (R-x\USCN-n-m) |
|  |  | | | | | | UART SUB-CHANNEL NAME | (R-x\UCNM-n-m) |
|  |  | | | | | | UART SUB-CHANNEL BAUD RATE | (R-x\UCR-n-m) |
|  |  | | | | | | UART SUB-CHANNEL BITS PER WORD | (R-x\UCB-n-m) |
|  |  | | | | | | UART SUB-CHANNEL PARITY | (R-x\UCP-n-m) |
|  |  | | | | | | UART SUB-CHANNEL STOP BIT | (R-x\UCS-n-m) |
|  |  | | | | | | UART SUB-CHANNEL INTERFACE | (R-x\UCIN-n-m) |
|  |  | | | | | | UART SUB-CHANNEL BLOCK SIZE | (R-x\UCBS-n-m) |
|  |  | | | | | | UART SUB-CHANNEL SYNC WORD LENGTH | (R-x\UCSL-n-m) |
|  |  | | | | | | UART SUB-CHANNEL BLOCK SYNC VALUE | (R-x\UCSV-n-m) |
|  |  | | | | | | UART SUB-CHANNEL BLOCK RATE | (R-x\UCBR-n-m) |
| 9-77 | OR | | | **\*Message Data Type Attributes** | | | |  |
|  |  | | | | | | MESSAGE DATA TYPE FORMAT | (R-x\MTF-n) |
|  |  | | | | | | NUMBER OF MESSAGE SUB-CHANNELS | (R-x\NMS\N-n) |
|  |  | | | | | | MESSAGE SUB-CHANNEL NUMBER | (R-x\MSCN-n-m) |
|  |  | | | | | | MESSAGE SUB-CHANNEL NAME | (R-x\MCNM-n-m) |
| 9-78 | OR | | | **\*IEEE-1394 Data Type Attributes** | | | |  |
|  |  | | | | | | IEEE-1394 DATA TYPE FORMAT | (R-x\IETF-n) |
| 9-78 | OR | | | **\*Parallel Data Type Attributes** | | | |  |
|  |  | | | | | | PARALLEL DATA TYPE FORMAT | (R-x\PLTF-n) |
| 9-78 | OR | | | **\*Ethernet Data Type Attributes** | | | |  |
|  |  | | | | | | ETHERNET DATA TYPE FORMAT | (R-x\ENTF-n) |
|  |  | | | | | | NUMBER OF ETHERNET NETWORKS | (R-x\NNET\N-n) |
|  |  | | | | | | ETHERNET NETWORK NUMBER | (R-x\ENBR-n-m) |
|  |  | | | | | | ETHERNET NETWORK NAME | (R-x\ENAM-n-m) |
| 9-79 | OR | | | **\*TSPI/CTS Data Type Attributes** | | | |  |
|  |  | | | | | | TSPI/CTS DATA TYPE FORMAT | (R-x\TDTF-n) |
|  | OR | | | **\*CAN Bus Data Type Attributes** | | | |  |
|  |  | | | | | | CAN BUS DATA TYPE FORMAT | (R-x\CBTF-n) |
|  |  | | | | | | NUMBER OF CAN BUS SUB-CHANNELS | (R-x\NCB\N-n) |
|  |  | | | | | | CAN BUS SUB-CHANNEL NUMBER | (R-x\CBN-n-m) |
|  |  | | | | | | CAN BUS SUB-CHANNEL NAME | (R-x\CBM-n-m) |
|  |  | | | | | | CAN BUS BIT RATE | (R-x\CBBS-n-m) |
| 9-80 | OR | | | | **\*Fibre Channel Data Type Attributes** | | |  |
|  |  | | | | | FIBRE CHANNEL DATA TYPE FORMAT | | (R-x\FCTF-n) |
|  |  | | | | | FIBRE CHANNEL SPEED | | (R-x\FCSP-n) |
| 9-81 | OR | | | | **\*Telemetry Output Attributes** | | |  |
|  |  | | | | | OUTPUT STREAM NAME | | (R-x\OSNM-n) |
|  | STREAM ID | | (R-x\SID-n) |
|  | CONFIGURATION HASH RATE | | (R-x\HRATE-n) |
|  | CONFIGURATION PACKET RATE | | (R-x\CRATE-n) |
| 9-81 | **\*Reference Track** | | | | | | |  |
|  |  | NUMBER OF REFERENCE TRACKS | | | | | | (R-x\RT\N) |
|  |  | TRACK NUMBER | | | | | | (R-x\RT1-n) |
|  |  | REFERENCE FREQUENCY | | | | | | (R-x\RT2-n) |
| 9-82 | **\*Comments** | | | | | | |  |
|  |  | | | COMMENTS | | | | (R-x\COM) |
| \*Heading Only - No Data Entry | | | | | | | |  |



| Table 9‑4. Recorder-Reproducer Attributes Group (R) | | | | | | |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Code Name** | **Usage Attributes** | | | | **Definition** |
| DATA SOURCE ID | R-x\ID | R/R Ch 10 Status: R | | | | Data source ID consistent with General Information group. |
| Allowed when: Always | | | |
| Links from: G\DSI-n | | | |
| Required when: defining a recorder | | | |
| Range: 32 characters | | | |
| RECORDER-REPRODUCER ID | R-x\RID | R/R Ch 10 Status: R | | | | Recorder-reproducer identification. |
| Allowed when: R\ID is specified | | | |
| Required when: Allowed | | | |
| Range: 32 characters | | | |
| RECORDER-REPRODUCER DESCRIPTION | R-x\R1 | Allowed when: R\ID is specified | | | | Recorder-reproducer description. |
| Range: 32 characters | | | |
| **Recorder-Reproducer Media Characteristics** | | | | | | |
| RECORDER-REPRODUCER MEDIA TYPE | R-x\TC1 | Allowed when: R\ID is specified | | | | Specify the recorder-reproducer media type. |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| ANAL | Analog | | |
| CASS | Cassette | | |
| HDDR | High Density Digital Recorder | | |
| PARA | Parallel | | |
| SSR | Solid State Recorder | | |
| MD | Magnetic Disk | | |
| N | None, Data Publishing Only | | |
| OTHR | Other, define in comments | | |
| RECORDER-REPRODUCER MEDIA MANUFACTURER | R-x\TC2 | Allowed when: R\TC1 is not “N” | | | | Name of manufacturer of the recorder-reproducer media. |
| Range: 8 characters | | | |
| RECORDER-REPRODUCER MEDIA CODE | R-x\TC3 | Allowed when: R\TC1 is not “N” | | | | Specify manufacturer’s recorder-reproducer media designation code. |
| Range: 8 characters | | | |
| RECORDER-REPRODUCER MEDIA LOCATION | R-x\RML | R/R Ch 10 Status: R | | | | Indicate the location of the recorder-reproducer media. |
| Allowed when: R\TC1 is not “N” | | | |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| I | Internal | | |
| E | External | | |
| B | Both internal and external | | |
| EXTERNAL RMM BUS SPEED | R-x\ERBS | R/R Ch 10 Status: RO | | | | Indicate the speed of an external RMM IEEE-1394b bus. |
| Allowed when: R\TC1 is not “N” | | | |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| AUTO | Speed set by host device | | |
| S100 | 100 Mbps | | |
| S200 | 200 Mbps | | |
| S400 | 400 Mbps | | |
| S800 | 800 Mbps | | |
| S1600 | 1600 Mbps | | |
| S3200 | 3200 Mbps | | |
| TAPE WIDTH | R-x\TC4 | Allowed when: R\TC1 is “ANAL” or “CASS” | | | | Physical dimension of tape width, in inches. |
| Range: Floating point 0.00 to 9.99 | | | |
| TAPE HOUSING | R-x\TC5 | Allowed when: R\TC1 is “ANAL” or “CASS” | | | | State the reel size. |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| 10.5 | 10.5 Inches | | |
| 14.0 | 14.0 Inches | | |
| 15.0 | 15.0 Inches | | |
| 16.0 | 16.0 Inches | | |
| 12.65 | 12.65 Millimeters | | |
| 19.0 | 19.0 Millimeters | | |
| OTHER | Other | | |
| TYPE OF TRACKS | R-x\TT | Allowed when: R\TC1 is “ANAL” or “CASS” | | | | State the type of tracks on the tape. |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| LO | Longitudinal | | |
| RO | Rotary | | |
| NUMBER OF TRACKS/ CHANNELS | R-x\N | R/R Ch 10 Status: R | | | | State the number of tracks on the tape or the number of channels on the storage media. |
| When: R\TC1 is not “N” | | | |
| Required when: Always | | | |
| Range: 1 to 65536 | | | |
| RECORD SPEED | R-x\TC6 | Allowed when: R\TC1 is “ANAL” or “CASS” | | | | State record speed (inches/second). |
| Range: Floating point 00.0 to 99.9 | | | |
| DATA PACKING DENSITY | R-x\TC7 | Allowed when: R\TC1 is “ANAL” or “CASS” | | | | State recording system bandwidth. |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| IM | Intermediate band | | |
| WB | Wide band | | |
| DD | Double density | | |
| OT | Other | | |
| TAPE REWOUND | R-x\TC8 | Allowed when: R\TC1 is “ANAL” or “CASS” | | | | Name of tape rewound. |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| Y | Yes | | |
| N | No | | |
| NUMBER OF SOURCE BITS | R-x\NSB | R/R Ch 10 Status: R | | | | Number of most significant bits (msbs) of the channel ID used for multiplexer source ID. Specify 0 for one source. |
| Allowed when: R\ID is specified  Required when: Allowed | | | |
| Range: 0 to 13 | | | |
| **Recorder-Reproducer Information** | | | | | | |
| RECORDER-REPRODUCER MANUFACTURER | R-x\RI1 | Allowed when: R\ID is specified | | | | Name of recorder-reproducer device manufacturer. |
| Range: 64 characters | | | |
| RECORDER-REPRODUCER MODEL | R-x\RI2 | Allowed when: R\ID is specified | | | | Manufacturer’s model number of recorder-reproducer device used to create the recording. |
| Range: 64 characters | | | |
| ORIGINAL RECORDING | R-x\RI3 | R/R Ch 10 Status: R | | | | Indicate if this is an original recording from the source. |
| Allowed when: R\TC1 is not “N” | | | |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| Y | Yes | | |
| N | No | | |
| ORIGINAL RECORDING DATE AND TIME | R-x\RI4 | Allowed when: R\TC1 is not “N” | | | | Date and time original recording was created using the format defined in Subsection 9.5.1.  Example 08-19-2014-17-33-59. |
| Range: Custom date and time | | | |
| **Creating Organization Point of Contact** | | | | | | |
| CREATING ORGANIZATION POC NAME | R-x\POC1 | Allowed when: R\TC1 is not “N” | | | | Identify the creating organization POC name for additional information |
| Range: 24 characters | | | |
| CREATING ORGANIZATION POC AGENCY | R-x\POC2 | Allowed when: R\TC1 is not “N” | | | | Identify the creating organization POC agency for additional information |
| Range: 48 characters | | | |
| CREATING ORGANIZATION POC ADDRESS | R-x\POC3 | Allowed when: R\TC1 is not “N” | | | | Identify the creating organization POC address for additional information |
| Range: 48 characters | | | |
| CREATING ORGANIZATION POC TELEPHONE | R-x\POC4 | Allowed when: R\TC1 is not “N” | | | | Identify the creating organization POC telephone for additional information. |
| Range: 20 characters | | | |
| DATE AND TIME OF COPY | R-x\RI5 | R/R Ch 10 Status: RO | | | | Date and time the copy was made using the format defined in Subsection 9.5.1. Example 08-19-2014-17-33-59 |
| Allowed when: R\TC1 is not “N” | | | |
| Range: Custom date and time | | | |
| **Copying Organization Point of Contact** | | | | | | |
| COPYING ORGANIZATION POC NAME | R-x\DPOC1 | Allowed when: R\TC1 is not “N”. | | | | Identify the copying organization POC name for additional information |
| Range: 24 characters | | | |
| COPYING ORGANIZATION POC AGENCY | R-x\DPOC2 | Allowed when: R\TC1 is not “N”. | | | | Identify the copying organization POC agency for additional information. |
| Range: 48 characters. | | | |
| COPYING ORGANIZATION POC ADDRESS | R-x\DPOC3 | Allowed when: R\TC1 is not “N”. | | | | Identify the copying organization POC address for additional information. |
| Range: 48 characters. | | | |
| COPYING ORGANIZATION POC TELEPHONE | R-x\DPOC4 | Allowed when: R\TC1 is not “N” | | | | Identify the copying organization POC telephone for additional information. |
| Range: 20 characters | | | |
| POST PROCESS MODIFIED RECORDING | R-x\RI6 | R/R Ch 10 Status: R | | | | Indicate modified recording. |
| Allowed when: R\TC1 is not “N” | | | |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| Y | Yes | | |
| N | No | | |
| POST PROCESS MODIFICATION TYPE | R-x\RI7 | R/R Ch 10 Status: RO | | | | Indicate the type of post-process modification to the recording. |
| Allowed when: R\TC1 is not “N” | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| 1 | Time subset | | |
| 2 | Channel subset | | |
| 3 | Time – channel subset | | |
| 4 | Channel superset | | |
| 5 | Time subset – channel superset | | |
| 6 | Filter | | |
| 7 | Overwrite | | |
| DATE AND TIME OF MODIFICATION | R-x\RI8 | R/R Ch 10 Status: RO | | | | Date and time the modification was made using the format defined in Subsection 9.5.1. Example 08-19-2014-17-33-59 |
| Allowed when: R\TC1 is not “N” | | | |
| Range: Custom date and time | | | |
| **Modifying Organization Point of Contact** | | | | | | |
| MODIFYING ORGANIZATION POC NAME | R-x\MPOC1 | Allowed when: R\TC1 is not “N”. | | | | Identify the modifying organization POC name for additional information |
| Range: 24 characters | | | |
| MODIFYING ORGANIZATION POC AGENCY | R-x\MPOC2 | Allowed when: R\TC1 is not “N”. | | | | Identify the modifying organization POC agency for additional information. |
| Range: 48 characters | | | |
| MODIFYING ORGANIZATION POC ADDRESS | R-x\MPOC3 | Allowed when: R\TC1 is not “N”. | | | | Identify the modifying organization POC address for additional information. |
| Range: 48 characters | | | |
| MODIFYING ORGANIZATION POC TELEPHONE | R-x\MPOC4 | Allowed when: R\TC1 is not “N” | | | | Identify the copying organization POC telephone for additional information. |
| Range: 20 characters | | | |
| CONTINUOUS RECORDING ENABLED | R-x\CRE | R/R Ch 10 Status: R | | | | Indicate if continuous recording is enabled. |
| Allowed when: R\TC1 is not “N” | | | |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| T | True | | |
| F | False | | |
| RECORDER-REPRODUCER SETUP SOURCE | R-x\RSS | R/R Ch 10 Status: R | | | | Indicate the recorder-reproducer setup source. |
| Allowed when: R\ID is specified | | | |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| R | Setup file on RMM only | | |
| C | Command setup file only | | |
| RP | RMM primary, command secondary | | |
| CP | Command primary, RMM secondary | | |
| RECORDER SERIAL NUMBER | R-x\RI9 | Allowed when: R\ID is specified | | | | Serial number of the recorder. |
| Range: 64 characters | | | |
| RECORDER FIRMWARE REVISION | R-x\RI10 | Allowed when: R\ID is specified | | | | Firmware revision number for the recorder. |
| Range: 256 characters | | | |
| NUMBER OF MODULES | R-x\RIM\N | Allowed when: R\ID is specified | | | | Number of modules in the recorder. |
| Range: 1-999 | | | |
| MODULE ID | R-x\RIMI-n | Allowed when: R\RIM\N > 0 | | | | Identify this module. |
| Range: 64 characters | | | |
| MODULE SERIAL NUMBER | R-x\RIMS-n | Allowed when: R\RIM\N > 0 | | | | Serial number of this module. |
| Range: 64 characters | | | |
| MODULE FIRMWARE REVISION | R-x\RIMF-n | Allowed when: R\RIM\N > 0 | | | | Firmware revision number for this module. |
| Range: 256 characters | | | |
| NUMBER OF RMMS | R-x\RMM\N | Allowed when: R\RIM\N > 0 | | | | Number of RMMs. |
| Range: 1 to 99 | | | |
| RMM IDENTIFIER | R-x\RMMID-n | Allowed when: R\RMM\N > 0 | | | | Identify this RMM. |
| Range: 64 characters | | | |
| RMM SERIAL NUMBER | R-x\RMMS-n | Allowed when: R\RMM\N > 0 | | | | Serial number of the RMM. |
| Range: 64 characters | | | |
| RMM FIRMWARE REVISION | R-x\RMMF-n | Allowed when: R\RMM\N > 0 | | | | Firmware revision number of the RMM. |
| Range: 256 characters | | | |
| **Recorder-Reproducer Ethernet Interfaces** | | | | | | |
| NUMBER OF ETHERNET INTERFACES | R-x\EI\N | R/R Ch 10 Status: RO | | | | Number of recorder-reproducer Ethernet interfaces. |
| Allowed when: R\ID is specified | | | |
| Range: 0 to 99 | | | |
| ETHERNET INTERFACE NAME | R-x\EINM-n | R/R Ch 10 Status: RO | | | | Name of the recorder-reproducer Ethernet interface. |
| Allowed when: R\EI\N > 0 | | | |
| Range: 32 characters | | | |
| PHYSICAL ETHERNET INTERFACE | R-x\PEIN-n | R/R Ch 10 Status: RO | | | | Number of the recorder-reproducer physical Ethernet interface |
| Allowed when: R\EI\N > 0 | | | |
| Range: 0 to 99 | | | |
| ETHERNET INTERFACE LINK SPEED | R-x\EILS-n | R/R Ch 10 Status: RO | | | | Ethernet interface link speed. |
| Allowed when: R\EI\N > 0 | | | |
| Range: Enumeration | | | |
| Enumeration | | Description | |
| Enumeration | | Description | |
| 0 | | Auto Negotiated | |
| 1 | | 10Mbps | |
| 2 | | 100Mbps | |
| 3 | | 1Gbps | |
| 4 | | 10Gbps | |
| ETHERNET INTERFACE TYPE | R-x\EIT-n | R/R Ch 10 Status: RO | | | | Type of recorder-reproducer Ethernet interface. |
| Allowed when: R\EI\N > 0 | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| 0 | Reserved | | |
| 1 | Download | | |
| 2 | Data streaming | | |
| 3 | Download and Data streaming | | |
| 4 | Control and status | | |
| 5 | Download and Control and status | | |
| 6 | Data streaming and Control and status | | |
| 7 | Download, Data streaming and Control and status | | |
| ETHERNET INTERFACE IP ADDRESS | R-x\EIIP-n | R/R Ch 10 Status: RO | | | | Recorder-reproducer Ethernet interface IP address: specify the IP address in the form “xxx.xxx.xxx.xxx” where each group of xxx can range from 0 to 255. |
| Allowed when: R\EI\N > 0 | | | |
| Range: xxx.xxx.xxx.xxx | | | |
| Links from: R-x\EPL\LDEIP-n | | | |
| NUMBER OF ETHERNET INTERFACE PORTS | R-x\EIIP\N-n | R/R Ch 10 Status: RO | | | | Number of Ethernet interface ports. |
| Allowed when: R\EI\N > 0 | | | |
| Range: 0 to 99 | | | |
| PORT ADDRESS | R-x\EI\PA-n-m | R/R Ch 10 Status: RO | | | | Recorder-reproducer Ethernet interface IP port address: specify the IP address in the form “xxxxx” where xxxxx can range from 0 to 65535 IAW ITF. |
| Allowed when: R\EI\N > 0 | | | |
| Range: 0 to 65535 | | | |
| Links from: R-x\EPL\LDEPA-n | | | |
| PORT TYPE | R-x\EI\PT-n-m | R/R Ch 10 Status: RO | | | | Recorder-reproducer Ethernet interface IP port type. |
| Allowed when: R\EI\N > 0 | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| 0 | Reserved | | |
| 1 | Download | | |
| 2 | Data streaming | | |
| 4 | Control and status | | |
| X | Sum values for multiple type | | |
| **Recorder-Reproducer Channel Group Streams** | | | | | | |
| NUMBER OF CHANNEL GROUPS | R-x\CG\N | R/R Ch 10 Status: RO | | | | Number of recorder-reproducer channel group streams. |
| Allowed when: R\ID specified | | | |
| Range: 0 to 99 | | | |
| CHANNEL GROUP NAME | R-x\CGNM-n | R/R Ch 10 Status: RO | | | | Name of the recorder-reproducer channel group. First character must be alphabetic. |
| Allowed when: R\CG\N > 0 | | | |
| Range: 32 characters | | | |
| Links from: R-x\OSNM-n, R-x\EPL\LSNM-n | | | |
| CHANNEL GROUP STREAM NUMBER | R-x\CGSN-n | R/R Ch 10 Status: RO | | | | Specify the channel group stream as an integer number. |
| Allowed when: R\CG\N > 0 | | | |
| Range: 1 to 99 | | | |
| Links from: R-x\EPL\LSSN-n | | | |
| NUMBER OF GROUP CHANNELS | R-x\CGCH\N-n | R/R Ch 10 Status: RO | | | | Number of channels in the channel group stream. |
| Allowed when: R\CG\N > 0 | | | |
| Range: 1 to 65536 | | | |
| GROUP CHANNEL NUMBER | R-x\CGCN-n-m | R/R Ch 10 Status: RO | | | | Specify the channel ID, from R-x\TK1-n. |
| Allowed when: R\CG\N > 0 | | | |
| Range: 0 to 65535 | | | |
| **Recorder-Reproducer Drives and Volumes** | | | | | | |
| NUMBER OF DRIVES | R-x\DR\N | R/R Ch 10 Status: RO | | | | Number of recorder-reproducer drives (stream destinations). Default is “1”. |
| Allowed when: R\ID is specified | | | |
| Range: 0 to 9999 | | | |
| DRIVE NAME | R-x\DRNM-n | R/R Ch 10 Status: RO | | | | Name of the recorder-reproducer drive. First character must be alphabetic. |
| Allowed when: R\DR\N > 0 | | | |
| Range: 32 characters | | | |
| DRIVE NUMBER | R-x\DRN-n | R/R Ch 10 Status: RO | | | | Specify the drive as an integer number. |
| Allowed when: R\DR\N > 0 | | | |
| Range: 1 to 9999 | | | |
| DRIVE BLOCK SIZE | R-x\DRBS-n | R/R Ch 10 Status: RO | | | | Specify the drive bytes per block size. |
| Allowed when: R\DR\N > 0 | | | |
| Range: 1 to 99999999 | | | |
| NUMBER OF DRIVE VOLUMES | R-x\DRVL\N-n | R/R Ch 10 Status: RO | | | | Number of volumes in the drive. Default is “1”. |
| Allowed when: R\DR\N > 0 | | | |
| Range:1 to 9999 | | | |
| VOLUME NAME | R-x\VLNM-n-m | R/R Ch 10 Status: RO | | | | Name of the drive volume. First character must be alphabetic. |
| Allowed when: R\DR\N > 0 | | | |
| Range: 32 characters | | | |
| VOLUME NUMBER | R-x\VLN-n-m | R/R Ch 10 Status: RO | | | | Specify the volume as an integer number. |
| Allowed when: R\DR\N > 0 | | | |
| Range: 1 to 9999 | | | |
| VOLUME BLOCKS TO ALLOCATE | R-x\VLBA-n-m | R/R Ch 10 Status: RO | | | | Specify how volume blocks will be allocated. |
| Allowed when: R\DR\N > 0 | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| 0 | All | | |
| 1 | Available | | |
| 2 | Number of blocks | | |
| VOLUME NUMBER OF BLOCKS | R-x\VLNB-n-m | R/R Ch 10 Status: RO | | | | Specify the volume as an integer number of blocks. |
| Allowed when: R\DR\N > 0 | | | |
| Range: 1 to 9999999999999999999999999999999 | | | |
| **Recorder-Reproducer Stream/Drive-Volume Links** | | | | | | |
| NUMBER OF LINKS | R-x\L\N | R/R Ch 10 Status: RO | | | | Number of recorder-reproducer channel group streams/drive-volume links. |
| Allowed when: R\ID is specified | | | |
| Range: 0 to 99 | | | |
| LINK NAME | R-x\LNM-n | R/R Ch 10 Status: RO | | | | Name of the recorder-reproducer channel group stream/drive-volume link. First character must be alphabetic. |
| Allowed when: R\L\N > 0 | | | |
| Range: 32 characters | | | |
| LINK SOURCE STREAM NAME | R-x\LSNM-n | R/R Ch 10 Status: RO | | | | Specify the recorder-reproducer channel group stream name. |
| Allowed when: R\L\N > 0 | | | |
| Range: 32 characters | | | |
| LINK SOURCE STREAM NUMBER | R-x\LSSN-n | R/R Ch 10 Status: RO | | | | Specify the recorder-reproducer channel group stream/drive-volume number, from R-x\CGSN-n. |
| Allowed when: R\L\N > 0 | | | |
| Range: 1 to 99 | | | |
| LINK DESTINATION DRIVE NUMBER | R-x\LDDN-n | R/R Ch 10 Status: RO | | | | Specify the recorder-reproducer channel group stream destination drive number, from  R-x\DRN-n. |
| Allowed when: R\L\N > 0 | | | |
| Range: 1 to 9999 | | | |
| LINK DESTINATION VOLUME NUMBER | R-x\LDVN-n | R/R Ch 10 Status: RO | | | | Specify the recorder-reproducer channel group stream destination volume number, from R-x\VLN-n-m. |
| Allowed when: R\L\N > 0 | | | |
| Range: 1 to 9999 | | | |
| **Recorder-Reproducer Ethernet Interface Publishing Links** | | | | | | |
| NUMBER OF ETHERNET PUBLISHING LINKS | R-x\EPL\N | R/R Ch 10 Status: RO | | | Number of Stream/Ethernet Interface Publish Links | |
| Allowed when: R\ID is specified | | |
| Range: 0 to 99 | | |
| ETHERNET PUBLISHING  LINK NAME | R-x\EPL\LNM-n | R/R Ch 10 Status: RO | | | Name of Stream/Ethernet Interface Publish Links | |
| Allowed when: R\EPL\N > 0 | | |
| Range: 32 characters | | |
| LINK SOURCE STREAM NAME | R-x\EPL\LSNM-n | R/R Ch 10 Status: RO | | | The Channel Group Stream Name to link this Ethernet Publishing Interface. | |
| Allowed when: R\EPL\N > 0 | | |
| Range: 32 characters | | |
| Links to: R-x\CGNM-n | | |
| LINK SOURCE STREAM NUMBER | R-x\EPL\LSSN-n | R/R Ch 10 Status: RO | | | The Channel Group Stream Number to link this Ethernet Publishing Interface from R-X\CGSN. | |
| Allowed when: R\EPL\N > 0 | | |
| Range = 0-99 | | |
| Links to: R-x\CGSN-n | | |
| LINK DESTINATION ETHERNET INTERFACE IP ADRESS | R-x\EPL\LDEIP-n | R/R Ch 10 Status: RO | | | The Destination Ethernet interface IP address for this link. | |
| Allowed when: R\EPL\N > 0 | | |
| Range: xxx.xxx.xxx.xxx | | |
| Links to: R-x\EIIP-n | | |
| LINK DESTINATION ETHERNET INTERFACE PORT ADDRESS | R-x\EPL\LDEPA-n | R/R Ch 10 Status: RO | | | The Destination Ethernet interface port address for this link. | |
| Allowed when: R\EPL\N > 0 | | |
| Range: 0 to 65535 | | |
| Links to: R-x\EI\PA | | |
| **Computer-Generated Data Packet, User-Defined Definition** | | | | | | |
| USER-DEFINED CHANNEL ID | R-x\UD\TK1 | R/R Ch 10 Status: RO | | | | Specify the channel ID for computer-generated user-defined packets. |
| Allowed when: R\ID is specified | | | |
| Range: 1 to 65535 | | | |
| **Recording Event Definitions** | | | | | | |
| RECORDING EVENTS ENABLED | R-x\EV\E | R/R Ch 10 Status: RO | | | | Indicate if events are enabled. Events must be enabled to generate event packets. |
| Allowed when: R\ID is specified | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| T | True | | |
| F | False | | |
| Default: F | | | |
| RECORDING EVENTS CHANNEL ID | R-x\EV\TK1 | R/R Ch 10 Status: RO | | | | Specify the channel ID for recording event packets. |
| Allowed when: R\EV\E = “T” | | | |
| Required when: Allowed | | | |
| Range: 1 to 65535 | | | |
| NUMBER OF RECORDING EVENTS | R-x\EV\N | R/R Ch 10 Status: RO | | | | Specify the number of individual recording event types. |
| Allowed when: R\EV\E = “T” | | | |
| Required when: Allowed | | | |
| Range: 1 to 999 | | | |
| RECORDER INTERNAL EVENTS ENABLED | R-x\EV\IEE | R/R Ch 10 Status: RO | | | | Indicate if recorder internal events are enabled. |
| Allowed when: R\EV\E = “T” | | | |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| T | True | | |
| F | False | | |
| **Recording Event** | | | | | | |
| EVENT ID | R-x\EV\ID-n | R/R Ch 10 Status: RO | | | | Identify the name of the individual recording event. |
| Allowed when: R\EV\N > 0 | | | |
| Range: 32 characters | | | |
| EVENT DESCRIPTION | R-x\EV\D-n | R/R Ch 10 Status: RO | | | | Identify the description of the event. |
| Allowed when: R\EV\N > 0 | | | |
| Range: 256 characters | | | |
| EVENT DATA PROCESSING ENABLED | R-x\EV\EDP-n | Allowed when: R\EV\N > 0 | | | | Indicate if event data processing is enabled. |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| T | True | | |
| F | False | | |
| EVENT TYPE | R-x\EV\T-n | R/R Ch 10 Status: RO | | | | Indicate the recording event type. |
| Allowed when: R\EV\N > 0 | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| E | External | | |
| D | Measurement discrete | | |
| L | Measurement limit | | |
| R | Recorder | | |
| O | Other | | |
| Default: R | | | |
| EVENT PRIORITY | R-x\EV\P-n | R/R Ch 10 Status: RO | | | | Indicate the recording event priority. |
| Allowed when: R\EV\N > 0 | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| 1 | Priority 1 | | |
| 2 | Priority 2 | | |
| 3 | Priority 3 | | |
| 4 | Priority 4 | | |
| 5 | Priority 5 | | |
| EVENT CAPTURE MODE | R-x\EV\CM-n | R/R Ch 10 Status: RO | | | | Indicate the recording event capture mode. |
| Allowed when: R\EV\N > 0 | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| 1 | Mode 1 | | |
| 2 | Mode 2 | | |
| 3 | Mode 3 | | |
| 4 | Mode 4 | | |
| 5 | Mode 5 | | |
| 6 | Mode 6 | | |
| 7 | Mode 7 | | |
| EVENT INITIAL CAPTURE | R-x\EV\IC-n | R/R Ch 10 Status: RO | | | | Indicate if initial capture of event is enabled. |
| Allowed when: R\EV\N > 0 | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| T | True | | |
| F | False | | |
| RECORDING EVENT LIMIT COUNT | R-x\EV\LC-n | R/R Ch 10 Status: RO | | | | Specify the limit count for the individual recording event. |
| Allowed when: R\EV\N > 0 | | | |
| Range: 1 to 99999999 | | | |
| EVENT TRIGGER MEASUREMENT SOURCE | R-x\EV\MS-n | R/R Ch 10 Status: RO | | | | Identify the data link name consistent with the mux/mod group that contains the event trigger measurement if event type is “D” or “L”. |
| Allowed when: R\EV\N > 0 | | | |
| Range: 32 characters | | | |
| EVENT TRIGGER MEASUREMENT NAME | R-x\EV\MN-n | R/R Ch 10 Status: RO | | | | Identify the event trigger measurand name if the event type is “D” or “L”. |
| Allowed when: R\EV\N > 0 | | | |
| Range: 32 characters | | | |
| EVENT PROCESSING MEASUREMENT DATA LINK NAME | R-x\EV\DLN-n | Allowed when: R\EV\N > 0 | | | | Identify the data link name consistent with the PCM format and PCM measurement groups, bus data group, or message data group that contains the measurements to be processed. |
| Links to: P-d\DLN, B-x\DLN, S-d\DLN | | | |
| Range: 32 characters | | | |
| NUMBER OF MEASUREMENTS TO PROCESS | R-x\EV\PM\N-n | Allowed when: R\EV\N > 0 | | | | Specify the number of measurements to process for this event. |
| Range: 0 to 9999 | | | |
| MEASUREMENT NAME TO PROCESS | R-x\EV\PM\MN-n-m | Allowed when: R\EV\PM\N > 0 | | | | Identify the measurement name to be processed for the event. |
| Links to: B-x\MN-i-n-p, D-x\MN-y-n, S-d\MN-i-n-p | | | |
| Range: 32 characters | | | |
| PRE-EVENT PROCESSING DURATION | R-x\EV\PM\PRE-n-m | Allowed when: R\EV\PM\N > 0 | | | | Specify the number of seconds the measurement will be processed before the event time. |
| Range: 0 to 9999 | | | |
| POST-EVENT PROCESSING DURATION | R-x\EV\PM\PST-n-m | Allowed when: R\EV\PM\N > 0 | | | | Specify the number of seconds the measurement will be processed after the event time. |
| Range: 0 to 9999 | | | |
| **Recording Index** | | | | | | |
| RECORDING INDEX ENABLED | R-x\IDX\E | R/R Ch 10 Status: RO | | | | Indicate if index is enabled. Index must be enabled to generate index packets. |
| Allowed when: R\ID is specified | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| T | True | | |
| F | False | | |
| RECORDING INDEX CHANNEL ID | R-x\IDX\TK1 | R/R Ch 10 Status: RO | | | | Specify the channel ID for recording index packets. |
| Allowed when: R\IDX\E = “T” | | | |
| Required when: Allowed | | | |
| Range: 1 to 65535 | | | |
| RECORDING INDEX TYPE | R-x\IDX\IT | R/R Ch 10 Status: RO | | | | Specify index type for recording index packets. |
| Allowed when: R\IDX\E = “T” | | | |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| T | Time | | |
| C | Count | | |
| **Time Index Type Attribute** | | | | | | |
| INDEX TIME VALUE | R-\IDX\ITV | R/R Ch 10 Status: RO | | | | Identify the number of microseconds for each index entry generation. |
| Allowed when: R\IDX\E = “T” | | | |
| Range: 0 to 99999999 | | | |
| **Count Index Type Attribute** | | | | | | |
| INDEX COUNT VALUE | R-\IDX\ICV | R/R Ch 10 Status: RO | | | | Identify the number of packets for each index entry generation. |
| Allowed when: R\IDX\E = “T” | | | |
| Range: 0 to 9999 | | | |
| **MIL-STD-1553 Recorder Control** | | | | | | |
| MESSAGE MONITOR RECORD CONTROL ENABLED | R-x\MRC\E | Allowed when: R\ID is specified | | | | Indicate if message monitor record control is enabled. |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| T | True | | |
| F | False | | |
| CHANNEL ID NUMBER | R-x\MRC\ID | Allowed when: R\MRC\E = “T” | | | | Specify the MIL-STD-1553 channel ID that contains the record control message. |
| Range: 1 to 65535 | | | |
| MESSAGE RECORD CONTROL TYPE | R-x\MRC\RCT | Allowed when: R\MRC\E = “T” | | | | Specify the MIL-STD-1553 message monitor record control type. |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| 0 | Stop-start | | |
| 1 | Pause-resume | | |
| STOP-PAUSE COMMAND WORD | R-x\MRC\SPM | Allowed when: R\MRC\E = “T” | | | | Specify the command word of the MIL-STD-1553 message to be used for stop-pause. |
| Range: Hexadecimal, 0000-FFFF | | | |
| START-RESUME COMMAND WORD | R-x\MRC\SRM | Allowed when: R\MRC\E = “T” | | | | Specify the command word of the MIL-STD-1553 message to be used for start-resume. |
| Range: Hexadecimal, 0000-FFFF | | | |
| **Data** | | | | | | |
| **NOTE**: Define information contained on each track of the tape or each channel of the storage media. | | | | | | |
| TRACK NUMBER/ CHANNEL ID | R-x\TK1-n | R/R Ch 10 Status: R | | | | Specify the track number or the channel ID that contains the data to be specified. |
| Allowed when: R\N > 0 | | | |
| Required when: Allowed | | | |
| Range: 1 to 65535 | | | |
| RECORDING TECHNIQUE | R-x\TK2-n | Allowed when: R\N > 0 | | | | Specify the recording technique used for this track. |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| FM/FM | Indirect FM | | |
| HDDR | Hard Disk Recording | | |
| PRE\_D | Pre-detection | | |
| DIRECT | Direct FM | | |
| FMWBI | FM-Wide Band GRP I | | |
| FMWBII | FM-Wide Band GRP II | | |
| FM-IM | FM-Intermediate Band | | |
| FM-NB | FM-Narrow Band | | |
| DOUDEN | Double Density | | |
| RO-K | (Rotary [Single Track]) | | |
| RO-MUX | (Rotary [Multiplexed]) | | |
| SSR | Solid State | | |
| OTHER | All other techniques | | |
| INPUT STREAM DE-RANDOMIZATION | R-x\IDDR-n | Allowed when: R\N > 0 | | | | Specify how input stream is recorded. Stream is recorded after being derandomized.  Stream is recorded as received. If PCM data type is not throughput and input data stream is randomized, this parameter must be “Y”. |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| Y | Yes | | |
| N | No | | |
| Default: N | | | |
| DATA SOURCE ID | R-x\DSI-n | R/R Ch 10 Status: R | | | | Specify the data source identification. For a site-recorded multiplexed track, provide a data source identification. |
| Allowed when: R\N > 0 | | | |
| Links from: G\DSI-n | | | |
| Links to: M-x\ID | | | |
| Required when: Allowed | | | |
| Range: 32 characters | | | |
| DATA DIRECTION | R-x\TK3-n | Allowed when: R\N > 0 | | | | Specify data direction. |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| FWD | Forward | | |
| REV | Reverse | | |
| Default: FWD | | | |
| RECORDER PHYSICAL CHANNEL NUMBER | R-x\TK4-n | R/R Ch 10 Status: R | | | | Specify the recorder physical channel for the channel ID (TK1). |
| Allowed when: R\N > 0 | | | |
| Required when: Allowed | | | |
| Range: 1 to 65535 | | | |
| CHANNEL ENABLE | R-x\CHE-n | R/R Ch 10 Status: R | | | | Indicate if source is enabled. Source must be enabled to generate data packets. |
| Allowed when: R\N > 0 | | | |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| T | True | | |
| F | False | | |
| CHANNEL DATA TYPE | R-x\CDT-n | R/R Ch 10 Status: R | | | | Specify the type of source if “STO” was specified in G group data source type. |
| Allowed when: R\N > 0 | | | |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| PCMIN | PCM Input | | |
| VIDIN | Video Input | | |
| ANAIN | Analog Input | | |
| 1553IN | 1553 Input | | |
| DISIN | Discrete Input | | |
| TIMEIN | IRIG Time Input | | |
| UARTIN | UART Input | | |
| 429IN | ARINC 429 Input | | |
| MSGIN | Message Data Input | | |
| IMGIN | Image Data Input | | |
| 1394IN | IEEE-1394 Input | | |
| PARIN | Parallel Input | | |
| ETHIN | Ethernet Input | | |
| TSPIIN | TSPI/CTS Input | | |
| CANIN | CAN bus Input | | |
| FBCHIN | Fibre Channel Input | | |
| TMOUT | Telemetry Output | | |
| CHANNEL DATA LINK NAME | R-x\CDLN-n | R/R Ch 10 Status: R | | | | Identify the data link name consistent with the PCM format, bus data, or message data group for the channel. |
| Allowed when: R\N > 0 | | | |
| Required when: A data link is associated with the channel. | | | |
| Links to: P-d\DLN, B-x\DLN, S-d\DLN | | | |
| Range: 32 characters | | | |
| SECONDARY HEADER TIME FORMAT | R-x\SHTF-n | R/R Ch 10 Status: RO | | | | If enabled, the secondary header time format. |
| Allowed when: R\N > 0 | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| 0 | [Chapter 4](http://www.wsmr.army.mil/RCCsite/Documents/106-17_Telemetry_Standards/chapter4.pdf) BCD | | |
| 1 | IEEE-1588 | | |
| 2 | ERTC | | |
| **Data Type Attributes** | | | | | | |
| **PCM Data Type Attributes** | | | | | | |
| PCM DATA TYPE FORMAT | R-x\PDTF-n | R/R Ch 10 Status: RO | | | | PCM data type format. Enumeration equates to format number in [Chapter](http://www.wsmr.army.mil/RCCsite/Documents/106-17_Telemetry_Standards/chapter10.pdf) 11. |
| Allowed when: R\CDT is “PCMIN” | | | |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| 0 | reserved | | |
| 1  2 | [Chapter 4](http://www.wsmr.army.mil/RCCsite/Documents/106-17_Telemetry_Standards/chapter4.pdf), [Chapter 7](http://www.wsmr.army.mil/RCCsite/Documents/106-17_Telemetry_Standards/chapter7.pdf), [Chapter 8](http://www.wsmr.army.mil/RCCsite/Documents/106-17_Telemetry_Standards/chapter8.pdf)  DQM/DQE | | |
| DATA PACKING OPTION | R-x\PDP-n | R/R Ch 10 Status: RO | | | | How data is placed in the packets. |
| Allowed when: R\CDT is “PCMIN” | | | |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| UN | Unpacked | | |
| TM | Throughput mode | | |
| PFS | Packed with frame sync | | |
| RECORDER POLARITY SETTING | R-x\RPS-n | R/R Ch 10 Status: RO | | | | Recorder Data polarity setting. Specify if the recorder is to invert the input stream before recording it. |
| Allowed when: P-d\CDT is “PCMIN” | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| N | Normal – Do not invert data prior to recording | | |
| I | Invert data prior to recording | | |
| Default: N | | | |
| INPUT CLOCK EDGE | R-x\ICE-n | R/R Ch 10 Status: RO | | | | Specify the input clock edge relative to the data in degrees. |
| Allowed when: R\CDT is “PCMIN” | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| 0 | 0 degrees | | |
| 180 | 180 degrees | | |
| Default: 0 | | | |
| INPUT SIGNAL TYPE | R-x\IST-n | R/R Ch 10 Status: RO | | | | Type of input signal. |
| Allowed when: R\CDT is “PCMIN” | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| SE | Single ended | | |
| DIFF | Differential | | |
| RS422 | RS-422 standard differential | | |
| TTL | Single ended with TTL | | |
| Default: DIFF | | | |
| INPUT THRESHOLD | R-x\ITH-n | R/R Ch 10 Status: RO | | | | Specify the input threshold level for selectable electrical interface. The value is the threshold level in volts. |
| Allowed when: R\CDT is “PCMIN” | | | |
| Required when: Allowed | | | |
| Range: Floating point −999.9 to 999.9 | | | |
| INPUT TERMINATION | R-x\ITM-n | R/R Ch 10 Status: RO | | | | Specify the input termination. |
| Allowed when: R\CDT is “PCMIN” | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| LOW-Z | Low impedance | | |
| HIGH-Z | High impedance | | |
| PCM VIDEO TYPE FORMAT | R-x\PTF-n | R/R Ch 10 Status: RO | | | | Compression technique for video recorded as standard [Chapter 4](http://www.wsmr.army.mil/RCCsite/Documents/106-17_Telemetry_Standards/chapter4.pdf) PCM. The compressed data is encapsulated in ISO Standard Transport Stream (TS) frames. If type format is “OTHER”, then a vendor spec is required to identify the data compression technique. Specify “NONE” if data is not video data. |
| Allowed when: R\CDT is “PCMIN” | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| NONE | Not video | | |
| MPEG1 | MPEG1 Compression | | |
| MPEG2 | MPEG2 Compression | | |
| H261 | H.261 Compression | | |
| WAVE | Wavelet Compression | | |
| OTHER | Other Compression (including uncompressed) | | |
| Default: NONE | | | |
| PCM RECORDER-REPRODUCER MINOR FRAME FILTERING ENABLED | R-x\MFF\E-n | R/R Ch 10 Status: RO | | | | Indicate if recorder-reproducer minor frame filtering is enabled for the PCM channel (not applicable for throughput mode PCM channels). |
| Allowed when: R\PDP = “PFS” or “UN” | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| T | True | | |
| F | False | | |
| PCM POST-PROCESS OVERWRITE AND FILTERING ENABLED | R-x\POF\E-n | R/R Ch 10 Status: RO | | | | Indicate if post-process overwrite and filtering is enabled for the PCM channel. |
| Allowed when: R\PDP = “PFS” or “UN” | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| T | True | | |
| F | False | | |
| PCM POST-PROCESS OVERWRITE AND FILTERING TYPE | R-x\POF\T-n | R/R Ch 10 Status: RO | | | | Indicate the type of post-process overwrite and filtering for the PCM channel. |
| Allowed when: R\POF\E = “T” | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| MF | Minor frame | | |
| SM | Selected measurement | | |
| B | Both | | |
| MINOR FRAME FILTERING DEFINITION TYPE | R-x\MFF\FDT-n | R/R Ch 10 Status: RO-PAK | | | | Specify the PCM minor frame filtering definition type. |
| Allowed when: R\POF\T is “B” or “MF” or R\MFF\E is “T” | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| IN | Inclusive filtering | | |
| EX | Exclusive filtering | | |
| NUMBER OF MINOR FRAME FILTERING DEFINITIONS | R-x\MFF\N-n | R/R Ch 10 Status: RO-PAK | | | | Specify the number of PCM minor frame filtering definitions. |
| Allowed when: R\POF\T is “B” or “MF” or R\MFF\E is “T” | | | |
| Range: 0 to 999 | | | |
| FILTERED MINOR FRAME NUMBER | R-x\MFF\MFN-n-m | R/R Ch 10 Status: RO-PAK | | | | Specify the PCM minor frame number to be filtered. |
| Allowed when: R\MFF\N > 0 | | | |
| Required when: Allowed | | | |
| Range: 0 to 999 | | | |
| REORDER POLARITY SETTING | R-x\RPS-n-m | R/R Ch 10 Status: RO  Allowed when: When P-d\CDT is “PCMIN” | | | | Recorder Data polarity setting  Note. The recorder is to invert the input stream before recording it. |
| Range: Enumeration | | | |
| Enumeration Description | | | |
| N Normal | | | |
| I Inverted | | | |
| Default: N | | | |
| **NOTE:** For PCM formats with multiple subframe ID counters, all minor frame numbers defined for filtering are associated with the first subframe ID counter. | | | | | | |
| NUMBER OF SELECTED MEASUREMENT OVERWRITE DEFINITIONS | R-x\SMF\N-n | R/R Ch 10 Status: RO | | | | Specify the number of PCM selected measurement overwrite definitions. |
| Allowed when: R\POF\T is “B” or “SM” or R\MFF\E is “T” | | | |
| Range: 0 to 99 | | | |
| SELECTED MEASUREMENT NAME | R-x\SMF\SMN-n-m | R/R Ch 10 Status: RO | | | | Specify the PCM selected measurement name to be overwritten. |
| Allowed when: R\SMF\N > 0 | | | |
| Required when: Allowed | | | |
| Links to: D-x\MN-y-n | | | |
| Range: 32 characters | | | |
| MEASUREMENT OVERWRITE TAG | R-x\SMF\MFOT-n-m | R/R Ch 10 Status: RO | | | | Indicate if the PCM measurement is tagged for overwriting. |
| Allowed when: R\SMF\N > 0 | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| O | Overwrite | | |
| N | No overwriting | | |
| Default: N | | | |
| **MIL-STD-1553** **Bus Data Type Attributes** | | | | | | |
| MIL-STD-1553 BUS DATA TYPE FORMAT | R-x\BTF-n | R/R Ch 10 Status: RO | | | | MIL-STD-1553 bus data type format. Enumeration equates to format number in [Chapter 10](http://www.wsmr.army.mil/RCCsite/Documents/106-17_Telemetry_Standards/chapter10.pdf). |
| Allowed when: R\CDT is “1553IN” | | | |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| 0 | reserved | | |
| 1 | MIL-STD-1553B data | | |
| 2 | 16PP194 bus | | |
| MIL-STD-1553 RECORDER-REPRODUCER FILTERING ENABLED | R-x\MRF\E-n | R/R Ch 10 Status: RO | | | | Indicate if recorder-reproducer filtering is enabled for the MIL-STD-1553 channel. |
| Allowed when: R\CDT is “1553IN” | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| T | True | | |
| F | False | | |
| MIL-STD-1553 POST-PROCESS OVERWRITE AND FILTERING ENABLED | R-x\MOF\T-n | R/R Ch 10 Status: RO | | | | Indicate if post-process overwrite and filtering is enabled for the MIL-STD-1553 channel. |
| Allowed when: R\CDT is “1553IN” | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| T | True | | |
| F | False | | |
| MIL-STD-1553 MESSAGE FILTERING DEFINITION TYPE | R-x\MFD\FDT-n | Allowed when: R\MRF\E or R\MOF\T is “T” | | | | Specify the message filtering definition type. |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| IN | Inclusive filtering | | |
| EX | Exclusive filtering | | |
| NUMBER OF MESSAGE FILTERING DEFINITIONS | R-x\MFD\N-n | Allowed when: R\MRF\E or R\MOF\T is “T” | | | | Specify the number of message filtering definitions. |
| Required when: Allowed | | | |
| Range: 0 to 99 | | | |
| MESSAGE NUMBER | R-x\MFD\MID-n-m | Allowed when: R\MFD\N > 0 | | | | Specify the message number to be filtered and overwritten. |
| Required when: Allowed | | | |
| Range: 1 to 999999999 | | | |
| MESSAGE TYPE | R-x\MFD\MT-n-m | Allowed when: R\MFD\N > 0 | | | | Specify the message type. |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| RTRT | RT/RT | | |
| RTBC | RT/BC | | |
| BCRT | BC/RT | | |
| MC | Mode code | | |
| COMMAND WORD ENTRY | R-x\CWE-n-m | Allowed when: R\MFD\N > 0 | | | | Method used to specify the command word. |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| W | Enter the entire command word in the “COMMAND WORD” attribute. | | |
| F | Enter the command word fields separately in the “REMOTE TERMINAL ADDRESS”, “SUBTERMINAL ADDRESS”, “TRANSMIT/ RECEIVE MODE”, and “DATA WORD COUNT/ MODE CODE” attributes. | | |
| Default: F | | | |
| COMMAND WORD | R-x\CMD-n-m | Allowed when: R\MFD\N > 0 | | | | Specify the entire command word for this message. |
| Required when: R\RCWE is “W” | | | |
| Range: Hexadecimal, 0000-FFFF | | | |
| REMOTE TERMINAL ADDRESS | R-x\MFD\TRA-n-m | Allowed when: R\MFD\N > 0 | | | | Specify the five-bit remote terminal address for this message. Use “X” to indicate a “don’t care” value. |
| Required when: R\CWE is “F” | | | |
| Range: Binary 00000-11111 | | | |
| TRANSMIT/ RECEIVE MODE | R-x\MFD\TRM-n-m | Allowed when: R\MFD\N > 0 | | | | Indicate if this command word is a transmit or receive command. For RT/RT, specify transmit. |
| Required when: R\CWE is “F” | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| 1 | Transmit | | |
| 0 | Receive | | |
| SUBTERMINAL ADDRESS | R-x\MFD\STA-n-m | Allowed when: R\MFD\N > 0 | | | | Specify the five-bit subterminal address for this message. Use “X” to indicate a “don’t care” value. |
| Required when: R\CWE is “F” | | | |
| Range: Binary 00000-11111 | | | |
| DATA WORD COUNT/MODE CODE | R-x\MFD\DWC-n-m | Allowed when: R\MFD\N > 0 | | | | Enter the number of data words as a binary string, using “X” to indicate a “don’t care” value. If the subterminal address indicates a mode code, enter the mode code value as a binary string. |
| Required when: R\CWE is “F” | | | |
| Range: Binary 00000-11111 | | | |
| RECEIVE COMMAND WORD ENTRY | R-x\RCWE-n-m | Allowed when: R\MFD\N > 0 | | | | Method used to specify the receive command word. |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| W | Enter the entire command word in the “RECEIVE COMMAND WORD” attribute. | | |
| F | Enter the command word fields separately in the “RT/RT REMOTE TERMINAL ADDRESS”, “RT/RT SUBTERMINAL ADDRESS”, and “RT/RT DATA WORD COUNT” attributes. | | |
| Default: F | | | |
| RECEIVE COMMAND WORD | R-x\RCMD-n-m | Allowed when: R\MFD\N > 0 | | | | Specify the entire receive command word for this RT/RT message. |
| Required when: R\RCWE is “W” | | | |
| Range: Hexadecimal, 0000-FFFF | | | |
| RT/RT REMOTE TERMINAL ADDRESS | R-x\MFD\RTRA-n-m | Allowed when: R\MFD\N > 0 | | | | Specify the five-bit remote terminal address for this RT/RT message. Use “X” to indicate a “don’t care” value. |
| Required when: R\RCWE is “F” | | | |
| Range: Binary, 00000 - 11111 | | | |
| RT/RT SUBTERMINAL ADDRESS | R-x\MFD\RSTA-n-m | Allowed when: R\MFD\N > 0 | | | | Specify the five-bit subterminal address for this RT/RT message. Use “X” to indicate a “don’t care” value. |
| Required when: R\RCWE is “F” | | | |
| Range: Binary 00000 - 11111 | | | |
| RT/RT DATA WORD COUNT | R-x\MFD\RDWC-n-m | Allowed when: R\MFD\N > 0 | | | | Enter the number of data words as a binary string, using “X” to indicate a “don’t care” value. Exclude status and time words (an RT/RT message cannot contain a mode code). |
| Required when: R\RCWE is “F” | | | |
| Range: Binary 00000 - 11111 | | | |
| NUMBER OF SELECTED MEASUREMENT OVERWRITE DEFINITIONS | R-x\BME\N-n | R/R Ch 10 Status: RO | | | | Specify the number of bus measurement overwrite definitions. |
| Allowed when: R\MRF\E or R\MOF\T is “T” | | | |
| Range: 0 to 99 | | | |
| SELECTED MEASUREMENT NAME | R-x\BME\SMN-n-m | R/R Ch 10 Status: RO | | | | Specify the bus measurement name to be overwritten. |
| Allowed when: R\BME\N > 0 | | | |
| Required when: Allowed | | | |
| Links to: B-x\MN-i-n-p | | | |
| Range: 32 characters | | | |
| MEASUREMENT OVERWRITE TAG | R-x\BME\MFOT-n-m | R/R Ch 10 Status: RO | | | | Indicate if the bus measurement is tagged for overwriting. |
| Allowed when: R\BME\N > 0 | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| O | Overwrite | | |
| N | No overwriting | | |
| Default: N | | | |
| **Analog Data Type Attributes** | | | | | | |
| ANALOG DATA TYPE FORMAT | R-x\ATF-n | R/R Ch 10 Status: RO | | | | Analog data type format. Enumeration equates to format number in [Chapter 10](http://www.wsmr.army.mil/RCCsite/Documents/106-17_Telemetry_Standards/chapter10.pdf). |
| Allowed when: R\CDT is “ANAIN” | | | |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| 0 | Reserved | | |
| 1 | Analog data | | |
| NUMBER OF ANALOG CHANNELS/PKT | R-x\ACH\N-n | R/R Ch 10 Status: RO | | | | Specify the number of analog channels per packet. |
| Allowed when: R\CDT is “ANAIN” | | | |
| Required when: Allowed | | | |
| Range: 1 to 256 | | | |
| DATA PACKING OPTION | R-x\ADP-n | R/R Ch 10 Status: RO | | | | How data is placed in the packets. |
| Allowed when: R\CDT is “ANAIN” | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| YES | Packed | | |
| NO | Unpacked | | |
| Default: YES | | | |
| SAMPLE RATE | R-x\ASR-n | R/R Ch 10 Status: RO | | | | Sample rate of the fastest channel(s) in samples per second. |
| Allowed when: R\CDT is “ANAIN” | | | |
| Required when: Allowed | | | |
| Range: positive floating point | | | |
| SUB CHANNEL ENABLED | R-x\AMCE-n-m | R/R Ch 10 Status: R | | | | Indicate if sub-channel is enabled. |
| Allowed when: R\CDT is “ANAIN” | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| T | True | | |
| F | False | | |
| Default: T | | | |
| SUB CHANNEL NUMBER | R-x\AMCN-n-m | R/R Ch 10 Status: R | | | | Indicate the analog sub channel number associated with the -n–m sub channel. First subchannel is 1. |
| Allowed when: R\CDT is “ANAIN” | | | |
| Required when: Allowed | | | |
| Range: 1 to 256 | | | |
| MEASUREMENT NAME | R-x\AMN-n-m | R/R Ch 10 Status: RO | | | | Identify the measurement name consistent with the Data Conversion group for an analog channel. |
| Allowed when: R\CDT is “ANAIN” | | | |
| Required when: R-x\ACH\N > 1 | | | |
| Links to: C-d\DCN | | | |
| Range: 32 characters | | | |
| DATA LENGTH | R-x\ADL-n-m | R/R Ch 10 Status: RO | | | | Number of bits per data word. |
| Allowed when: R\CDT is “ANAIN” | | | |
| Required when: Allowed | | | |
| Range: 1 to 64 | | | |
| BIT MASK | R-x\AMSK-n-m | R/R Ch 10 Status: RO | | | | Binary string of 1s and 0s to identify the bits in a word location that are assigned to this measurement. If the full word is used for this measurement, enter “FW.” Left-most bit corresponds to the msb. |
| Allowed when: R\CDT is “ANAIN” | | | |
| Range: Binary, maximum 64 characters or “FW” | | | |
| Default: FW | | | |
| MEASUREMENT TRANSFER ORDER | R-x\AMTO-n-m | R/R Ch 10 Status: RO | | | | Define the first bit transferred in normal time sequence. |
| Allowed when: R\CDT is “ANAIN” | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| M | msb first | | |
| L | lsb first | | |
| D | msb first | | |
| Default: M | | | |
| SAMPLE FACTOR | R-x\ASF-n-m | R/R Ch 10 Status: RO | | | | 1/(2n) times the fastest sample rate (defined above) gives the sample rate for this channel. Specify the value “n” in this field. |
| Allowed when: R\CDT is “ANAIN” | | | |
| Required when: Allowed | | | |
| Range: 0 to 63 | | | |
| SAMPLE FILTER 3DB BANDWIDTH | R-x\ASBW-n-m | R/R Ch 10 Status: RO | | | | Sample filter in units of Hz. |
| Allowed when: R\CDT is “ANAIN” | | | |
| Required when: Allowed | | | |
| Range: positive floating point | | | |
| AC/DC COUPLING | R-x\ACP-n-m | R/R Ch 10 Status: RO | | | | Analog signal coupling. |
| Allowed when: R\CDT is “ANAIN” | | | |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| A | AC Coupled | | |
| D | DC Coupled | | |
| RECORDER INPUT IMPEDANCE | R-x\AII-n-m | R/R Ch 10 Status: RO | | | | Analog signal input impedance to the recorder. Units of ohms. |
| Allowed when: R\CDT is “ANAIN” | | | |
| Required when: Allowed | | | |
| Range: positive floating point | | | |
| INPUT CHANNEL GAIN | R-x\AGI-n-m | R/R Ch 10 Status: RO | | | | Signal gain of analog signal. Milli units (10x = 010000). |
| Allowed when: R\CDT is “ANAIN” | | | |
| Required when: Allowed | | | |
| Range: positive floating point | | | |
| INPUT FULL SCALE RANGE | R-x\AFSI-n-m | R/R Ch 10 Status: RO | | | | Full-scale range of input signal. Units of millivolts (20vpp = 020000) (vpp = 2xvp). |
| Allowed when: R\CDT is “ANAIN” | | | |
| Required when: Allowed | | | |
| Range: positive floating point | | | |
| INPUT OFFSET VOLTAGE | R-x\AOVI-n-m | R/R Ch 10 Status: RO | | | | Offset voltage of input signal. Units of millivolts (10v=010000). |
| Allowed when: R\CDT is “ANAIN” | | | |
| Required when: Allowed | | | |
| Range: positive floating point | | | |
| RECORDED ANALOG FORMAT | R-x\AF-n-m | R/R Ch 10 Status: RO | | | | Format of input signal. |
| Allowed when: R\CDT is “ANAIN” | | | |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| 1 | One’s complement | | |
| 2 | Two’s complement | | |
| 3 | (Sign and magnitude binary [+=0]) | | |
| 4 | (Sign and magnitude binary [+=1]) | | |
| B | Offset binary | | |
| U | Unsigned binary | | |
| F | (IEEE 754 single-precision [IEEE 32] floating point) | | |
| INPUT TYPE | R-x\AIT-n-m | R/R Ch 10 Status: RO | | | | Type of input signal. |
| Allowed when: R\CDT is “ANAIN” | | | |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| S | Single-ended | | |
| D | Differential | | |
| AUDIO | R-x\AV-n-m | R/R Ch 10 Status: RO | | | | Indicate if input signal is audio. |
| Allowed when: R\CDT is “ANAIN” | | | |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| Y | Audio present | | |
| N | Audio not present | | |
| AUDIO FORMAT | R-x\AVF-n-m | R/R Ch 10 Status: RO | | | | Format of audio if present. |
| Allowed when: R\AV is “Y” | | | |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| RAW | Raw, headerless PCM | | |
| WAV | Waveform Audio | | |
| LPCM | Linear PCM | | |
| AC3 | Dolby AC-3 | | |
| PRED | “PRED” format | | |
| PSTD | “PSTD” format | | |
| CVSD | Continuously Variable Slope Delta modulation | | |
| O | Other | | |
| **Discrete Data Type Attributes** | | | | | | |
| DISCRETE DATA TYPE FORMAT | R-x\DTF-n | R/R Ch 10 Status: RO | | | | Discrete data type format. Enumeration equates to format number in [Chapter 10](http://www.wsmr.army.mil/RCCsite/Documents/106-17_Telemetry_Standards/chapter10.pdf). |
| Allowed when: R\CDT is “DISIN” | | | |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| 0 | Reserved | | |
| 1 | Discrete data | | |
| DISCRETE MODE | R-x\DMOD-n | R/R Ch 10 Status: RO | | | | Indicate the mode whereby discrete events are placed in the packets. |
| Allowed when: R\CDT is “DISIN” | | | |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| EV | Event mode | | |
| SAMP | Sample mode | | |
| SAMPLE RATE | R-x\DSR-n | R/R Ch 10 Status: RO | | | | Sample rate in samples per second. |
| Allowed when: R\CDT is “DISIN” | | | |
| Required when: Allowed | | | |
| Range: positive floating point | | | |
| NUMBER OF DISCRETE MEASUREMENTS | R-x\NDM\N-n | R/R Ch 10 Status: RO | | | | Specify the number of discrete measurements. |
| Allowed when: R\CDT is “DISIN” | | | |
| Required when: Allowed | | | |
| Range: 0 to 999 | | | |
| MEASUREMENT NAME | R-x\DMN-n-m | R/R Ch 10 Status: RO | | | | Identify the measurement name consistent with the data conversion group for one or more discrete bits. |
| Allowed when: R\NDM\N > 0 | | | |
| Required when: Allowed | | | |
| Links to: C-d\DCN | | | |
| Range: 32 characters | | | |
| BIT MASK | R-x\DMSK-n-m | R/R Ch 10 Status: RO | | | | Binary string of 1s and 0s to identify the bits in a word location that are assigned to this measurement. If the full word is used for this measurement, enter “FW”. Left-most bit corresponds to the msb. |
| Allowed when: R\NDM\N > 0 | | | |
| Required when: Allowed | | | |
| Range: Binary, max 16 characters or “FW' | | | |
| MEASUREMENT TRANSFER ORDER | R-x\DMTO-n-m | R/R Ch 10 Status: RO | | | | Shows msbs and least significant bits (lsbs). |
| Allowed when: R\NDM\N > 0 | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| M | msb first | | |
| L | lsb first | | |
| D | msb first | | |
| Default: M | | | |
| **ARINC 429 Bus Data Type Attributes** | | | | | | |
| ARINC 429 BUS DATA TYPE FORMAT | R-x\ABTF-n | R/R Ch 10 Status: RO | | | | ARINC 429 bus data type format. Enumeration equates to format number in [Chapter 10](http://www.wsmr.army.mil/RCCsite/Documents/106-17_Telemetry_Standards/chapter10.pdf). |
| Allowed when: R\CDT is “429IN” | | | |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| 0 | ARINC 429 data | | |
| 1 | Reserved | | |
| NUMBER OF ARINC 429 SUB-CHANNELS | R-x\NAS\N-n | R/R Ch 10 Status: RO | | | | Number of ARINC 429 bus sub-channels. |
| Allowed when: R\CDT is “429IN” | | | |
| Required when: Allowed | | | |
| Range: 1 to 256 | | | |
| ARINC 429 SUB-CHANNEL NUMBER | R-x\ASN-n-m | R/R Ch 10 Status: RO | | | | ARINC 429 bus sub-channel ID. First sub-channel is 1. |
| Allowed when: R\NAS\N > 0 | | | |
| Required when: Allowed | | | |
| Range: 1 to 256. | | | |
| ARINC 429 SUB-CHANNEL NAME | R-x\ANM-n-m | R/R Ch 10 Status: RO | | | | ARINC 429 bus sub-channel name. |
| Allowed when: R\NAS\N > 0 | | | |
| Required when: Allowed | | | |
| Range: 32 characters | | | |
| **Video Data Type Attributes** | | | | | | |
| VIDEO DATA TYPE FORMAT | R-x\VTF-n | R/R Ch 10 Status: RO | | | | Video data type format. Enumeration equates to format number in [Chapter 10](http://www.wsmr.army.mil/RCCsite/Documents/106-17_Telemetry_Standards/chapter10.pdf). |
| Allowed when: R\CDT is “VIDIN” | | | |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| 0 | MPEG-2/H.264 | | |
| 1 | MPEG-2 ISO 13818 | | |
| 2 | MPEG-4 ISO 14496 | | |
| MPEG-2 CHANNEL XON2 FORMAT | R-x\VXF-n | R/R Ch 10 Status: RO | | | | Type of video carried for XON2 formats (MPEG-2 video channels).  “0” (2ON2 [MPEG-2]). “1” (264ON2 [H.264]). |
| Allowed when: R\CDT is “VIDIN” | | | |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| 0 | 2ON2 (MPEG-2) | | |
| 1 | 264ON2 (H.264) | | |
| VIDEO SIGNAL TYPE | R-x\VST-n | R/R Ch 10 Status: RO | | | | The video signal input type. |
| Allowed when: R\CDT is “VIDIN” | | | |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| 0 | Auto detect | | |
| 1 | Composite | | |
| 2 | YUV | | |
| 3 | S-VIDEO | | |
| 4 | DVI | | |
| 5 | RGB | | |
| 6 | SDI | | |
| 7 | VGA | | |
| VIDEO SIGNAL FORMAT TYPE | R-x\VSF-n | R/R Ch 10 Status: RO | | | | The video signal input type. |
| Allowed when: R\CDT is “VIDIN” | | | |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| 0 | Auto detect | | |
| 1 | NTSC | | |
| 2 | PAL | | |
| 3 | ATSC | | |
| 4 | DVB | | |
| 5 | ISDB | | |
| 6 | SECAM | | |
| VIDEO CONSTANT BIT RATE | R-x\CBR-n | R/R Ch 10 Status: RO | | | | Contains aggregate stream bit rate in bits per second. |
| Allowed when: R\CDT is “VIDIN” | | | |
| Required when: Allowed | | | |
| Range: positive floating point | | | |
| VIDEO VARIABLE PEAK BIT RATE | R-x\VBR-n | R/R Ch 10 Status: RO | | | | Contains peak stream bit rate in bits per second. |
| Allowed when: R\CDT is “VIDIN” | | | |
| Required when: Allowed | | | |
| Range: positive floating point | | | |
| VIDEO ENCODING DELAY | R-x\VED-n | R/R Ch 10 Status: RO | | | | Delay introduced by video encoding hardware in milliseconds. |
| Allowed when: R\CDT is “VIDIN” | | | |
| Required when: Allowed | | | |
| Range: positive floating point | | | |
| OVERLAY ENABLED | R-x\VCO\OE-n | Allowed when: R\CDT is “VIDIN” | | | | Indicate if overlay is enabled. |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| T | True | | |
| F | False | | |
| OVERLAY X POSITION | R-x\VCO\X-n | Allowed when: R\VCO\OE is “T” | | | | Specify the X pixel position of the overlay in the video channel. Zero indicates the leftmost position of the video image. |
| Required when: Allowed | | | |
| Range: 0 to 99999 | | | |
| OVERLAY Y POSITION | R-x\VCO\Y-n | Allowed when: R\VCO\OE is “T” | | | | Specify the Y line position of the overlay in the video channel. Zero indicates the uppermost position of the video image. |
| Required when: Allowed | | | |
| Range: 0 to 99999 | | | |
| OVERLAY EVENT TOGGLE ENABLED | R-x\VCO\OET-n | Allowed when: R\VCO\OE is “T” | | | | Indicate if overlay event toggle is enabled. |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| T | True | | |
| F | False | | |
| OVERLAY FORMAT | R-x\VCO\OLF-n | Allowed when: R\VCO\OE is “T” | | | | Indicate format of the time overlay. |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| DT | Day and time (DDD:HH:MM:SS) | | |
| TO | Time only (HH:MM:SS) | | |
| TM | Time and milliseconds (HH:MM:SS:SSS) | | |
| DTM | Day, time, and milliseconds (DDD:HH:MM:SS:SSS) | | |
| OVERLAY BACKGROUND | R-x\VCO\OBG-n | Allowed when: R\VCO\OE is “T” | | | | Indicate background of the time overlay. |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| BOT | Black on transparent | | |
| WOT | White on transparent | | |
| BOW | Black on white | | |
| WOB | White on black | | |
| ANALOG AUDIO CHANNEL INPUT LEFT | R-x\ASI\ASL-n | Allowed when: R\CDT is “VIDIN” | | | | Indicate the analog channel source of the left audio channel ID for the video channel. |
| Range: 1 to 65536 | | | |
| ANALOG AUDIO CHANNEL INPUT RIGHT | R-x\ASI\ASR-n | Allowed when: R\CDT is “VIDIN” | | | | Indicate the analog channel source of the right audio channel ID for the video channel. |
| Range: 1 to 65536 | | | |
| VIDEO DATA ALIGNMENT | R-x\VDA-n | R/R Ch 10 Status: RO | | | | Specify the data alignment of the video data within the packet. |
| Allowed when: R\CDT is “VIDIN” | | | |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| L | Little endian | | |
| B | Big endian | | |
| **Time Data Type Attributes** | | | | | | |
| TIME DATA TYPE FORMAT | R-x\TTF-n | R/R Ch 10 Status: R | | | | Time data type format. Enumeration equates to format number in [Chapter 10](http://www.wsmr.army.mil/RCCsite/Documents/106-17_Telemetry_Standards/chapter10.pdf). |
| Allowed when: R\CDT is “TIMEIN” | | | |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| 0 | Reserved | | |
| 1 | Time data | | |
| 2 | Network time | | |
| TIME FORMAT | R-x\TFMT-n | R/R Ch 10 Status: R | | | | Indicate the format for the time. For additional information, see RCC 200-04.[[1]](#footnote-1) y is an optional last digit. |
| Allowed when: R\CDT is “TIMEIN” | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| A | IRIG-A 1xy | | |
| B | IRIG-B 1xy | | |
| G | IRIG-G 1xy | | |
| I | Internal | | |
| N | Native GPS time | | |
| U | UTC time from GPS | | |
| X | None | | |
| 0 | Network Time Protocol Version 3 RFC-1305 | | |
| 1 | IEEE Std 1588-2002 | | |
| 2 | IEEE Std 1588-2008 | | |
| Default: A | | | |
| TIME SOURCE | R-x\TSRC-n | R/R Ch 10 Status: R | | | | Indicate the time source. |
| Allowed when: R\CDT is “TIMEIN” | | | |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| I | Internal | | |
| E | External | | |
| R | Internal from RMM | | |
| X | None | | |
| **Image Data Type Attributes** | | | | | | |
| IMAGE DATA TYPE FORMAT | R-x\ITF-n | R/R Ch 10 Status: RO | | | | Image data type format. Enumeration equates to format number in [Chapter 10](http://www.wsmr.army.mil/RCCsite/Documents/106-17_Telemetry_Standards/chapter10.pdf). |
| Allowed when: R\CDT is “IMGIN” | | | |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| 0 | Image | | |
| 1 | Still imagery | | |
| 2 | Dynamic imagery | | |
| STILL IMAGE TYPE | R-x\SIT-n | R/R Ch 10 Status: RO | | | | Type of still imagery format. |
| Allowed when: R\CDT is “IMGIN” | | | |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| 0 | NITF | | |
| 1 | JPEG | | |
| 2 | JPEG2 | | |
| 3 | PNG | | |
| DYNAMIC IMAGE FORMAT | R-x\DIF-n | R/R Ch 10 Status: RO | | | | Type of dynamic imagery format IAW Genicam standard features naming convention v1.5 or later and GigE Vision v1.2 or later. |
| Allowed when: R\CDT is “IMGIN” | | | |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| (Permitted enumerated values are per standards referenced in the Definition column or the word DEVICESPECIFIC for any imagery format not referenced by those standards.) | | | |
| IMAGE TIME STAMP MODE | R-x\ITSM-n | R/R Ch 10 Status: RO | | | | Individual image time stamp mode. |
| Allowed when: R\CDT is “IMGIN” | | | |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| 0 | Image capture time | | |
| 1 | Image packetization time | | |
| DYNAMIC IMAGE ACQUISITION MODE | R-x\DIAM-n | R/R Ch 10 Status: RO | | | | Dynamic image acquisition mode. “0” (Single frame). “1” (Multi-frame). “2” (Continuous). |
| Allowed when: R\CDT is “IMGIN” | | | |
| IMAGE FRAME RATE | R-x\IFR-n | R/R Ch 10 Status: RO | | | | Frame rate in frames per second at which the frames are captured or streamed in continuous mode. |
| Required when: Allowed | | | |
| Range: positive floating point | | | |
| PRE-TRIGGER FRAMES | R-x\PTG-n | Allowed when: R\CDT is “IMGIN” | | | | Number of frames to capture before acquisition trigger. |
| Range: positive floating point | | | |
| TOTAL FRAMES | R-x\TOTF-n | Allowed when: R\CDT is “IMGIN” | | | | Total number of frames to be captured including pre-trigger frames. |
| Range: positive floating point | | | |
| EXPOSURE TIME | R-x\EXP-n | Allowed when: R\CDT is “IMGIN” | | | | Image exposure time in microseconds including fractional seconds if desired. |
| Range: positive floating point | | | |
| SENSOR ROTATION | R-x\ROT-n | Allowed when: R\CDT is “IMGIN” | | | | Sensor rotation 0-359. |
| Range: 0 to 359 | | | |
| SENSOR GAIN VALUE | R-x\SGV-n | Allowed when: R\CDT is “IMGIN” | | | | Sensor gain value in dB. |
| Range: floating point | | | |
| SENSOR AUTO GAIN | R-x\SAG-n | Allowed when: R\CDT is “IMGIN” | | | | Sensor auto gain. |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| 0 | Off | | |
| 1 | On | | |
| SENSOR WIDTH | R-x\ISW-n | R/R Ch 10 Status: RO | | | | Effective sensor width in pixels used to capture images. |
| Allowed when: R\CDT is “IMGIN” | | | |
| Required when: Allowed | | | |
| Range:1 to 9999999 | | | |
| SENSOR HEIGHT | R-x\ISH-n | R/R Ch 10 Status: RO | | | | Effective sensor height in pixels used to capture images. |
| Allowed when: R\CDT is “IMGIN” | | | |
| Required when: Allowed | | | |
| Range: 1 to 9999999 | | | |
| MAXIMUM IMAGE WIDTH | R-x\MIW-n | R/R Ch 10 Status: RO | | | | Maximum image width in pixels. |
| Allowed when: R\CDT is “IMGIN” | | | |
| Required when: Allowed | | | |
| Range: 1 to 9999999 | | | |
| MAXIMUM IMAGE HEIGHT | R-x\MIH-n | R/R Ch 10 Status: RO | | | | Maximum image height in pixels. |
| Allowed when: R\CDT is “IMGIN” | | | |
| Required when: Allowed | | | |
| Range: Integer, 1-9999999 | | | |
| IMAGE WIDTH | R-x\IW-n | R/R Ch 10 Status: RO | | | | Image width in pixels. |
| Allowed when: R\CDT is “IMGIN” | | | |
| Required when: Allowed | | | |
| Range: 1 to 9999999 | | | |
| IMAGE HEIGHT | R-x\IH-n | R/R Ch 10 Status: RO | | | | Image height in pixels. |
| Allowed when: R\CDT is “IMGIN” | | | |
| Required when: Allowed | | | |
| Range: 1 to 9999999 | | | |
| IMAGE OFFSET X | R-x\IOX-n | R/R Ch 10 Status: RO | | | | Image horizontal offset from origin to area of interest in pixels. |
| Allowed when: R\CDT is “IMGIN” | | | |
| Required when: Allowed | | | |
| Range: 1 to 9999999 | | | |
| IMAGE OFFSET Y | R-x\IOY-n | R/R Ch 10 Status: RO | | | | Image vertical offset from origin to area of interest in pixels. |
| Allowed when: R\CDT is “IMGIN” | | | |
| Required when: Allowed | | | |
| Range: 1 to 9999999 | | | |
| LINE PITCH | R-x\ILP-n | Allowed when: R\CDT is “IMGIN” | | | | Total number of bytes between two successive lines. |
| Range: 1 to 999999999 | | | |
| BINNING HORIZONTAL | R-x\IBH-n | Allowed when: R\CDT is “IMGIN” | | | | Number of horizontal photo-sensitive cells to combine together. A value of 1 indicates no horizontal binning. |
| Range: 1 to 9999999 | | | |
| BINNING VERTICAL | R-x\IBV-n | Allowed when: R\CDT is “IMGIN” | | | | Number of vertical photo-sensitive cells to combine together. A value of 1 indicates no vertical binning. |
| Range: 1 to 9999999 | | | |
| DECIMATION HORIZONTAL | R-x\IDH-n | Allowed when: R\CDT is “IMGIN” | | | | Horizontal sub-sampling of the image. A value of 1 indicates no horizontal decimation. |
| Range: 1 to 9999999 | | | |
| DECIMATION VERTICAL | R-x\IDV-n | Allowed when: R\CDT is “IMGIN” | | | | Vertical sub-sampling of the image. A value of 1 indicates no vertical decimation. |
| Range: 1 to 9999999 | | | |
| REVERSE X | R-x\IRX-n | Allowed when: R\CDT is “IMGIN” | | | | Flip horizontally the image sent by the device. “T” (True). “F” (False). |
| Range: Enumeration | | | |
| REVERSE Y | R-x\IRY-n | Allowed when: R\CDT is “IMGIN” | | | | Flip vertically the image sent by the device. |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| T | True | | |
| F | False | | |
| PIXEL DYNAMIC RANGE MINIMUM | R-x\IPMN-n | Allowed when: R\CDT is “IMGIN” | | | | Minimum value that can be returned during the digitization process. |
| Range: 1 to 9999999 | | | |
| PIXEL DYNAMIC RANGE MAXIMUM | R-x\IPMX-n | Allowed when: R\CDT is “IMGIN” | | | | Maximum value that can be returned during the digitization process. |
| Range: 1 to 9999999 | | | |
| TEST IMAGE TYPE | R-x\TIT-n | Allowed when: R\CDT is “IMGIN” | | | | Type of test image sent by the camera. |
| Range: Enumeration | | | |
| Enumeration | | | |
| OFF | | | |
| BLACK | | | |
| WHITE | | | |
| GREYHORIZONTALRAMP | | | |
| GREYVERTICALRAMP | | | |
| GREYHORIZONTALRAMPMOVING | | | |
| GREYVERTICALRAMPMOVING | | | |
| HORIZONTALLINEMOVING | | | |
| VERTICALLINEMOVING | | | |
| COLORBAR | | | |
| FRAMECOUNTER | | | |
| DEVICESPECIFIC | | | |
| **UART Data Type Attributes** | | | | | | |
| UART DATA TYPE FORMAT | R-x\UTF-n | R/R Ch 10 Status: RO | | | | UART data type format. |
| Allowed when: R\CDT is “UARTIN” | | | |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| 0 | Format 0 | | |
| 1 | Format 1 | | |
| NUMBER OF UART SUB-CHANNELS | R-x\NUS\N-n | R/R Ch 10 Status: RO | | | | Specify the number of UART sub-channels included within this channel. |
| Allowed when: R\CDT is “UARTIN” | | | |
| Required when: Allowed | | | |
| Range: 1 to 256 | | | |
| UART SUB-CHANNEL NUMBER | R-x\USCN-n-m | R/R Ch 10 Status: RO | | | | Specify the UART sub-channel number. First sub-channel is 1. |
| Allowed when: R\NUS\N > 0 | | | |
| Required when: Allowed | | | |
| Range: 1 to 256 | | | |
| UART SUB-CHANNEL NAME | R-x\UCNM-n-m | R/R Ch 10 Status: RO | | | | Specify the UART sub-channel name. |
| Allowed when: R\NUS\N > 0 | | | |
| Required when: Allowed | | | |
| Range: 32 characters | | | |
| UART SUB-CHANNEL BAUD RATE | R-x\UCR-n-m | R/R Ch 10 Status: RO | | | | Baud rate in bits per second. |
| Allowed when: R\NUS\N > 0 | | | |
| Required when: Allowed | | | |
| Range: positive floating point | | | |
| UART SUB-CHANNEL BITS PER WORD | R-x\UCB-n-m | R/R Ch 10 Status: RO | | | | Bits per word (7, 8, or 9). |
| Allowed when: R\NUS\N > 0 | | | |
| Required when: Allowed | | | |
| Range: 7, 8, or 9 | | | |
| UART SUB-CHANNEL PARITY | R-x\UCP-n-m | R/R Ch 10 Status: RO | | | |  |
| Allowed when: R\NUS\N > 0 | | | |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| O | Odd | | |
| E | Even | | |
| N | None | | |
| UART SUB-CHANNEL STOP BIT | R-x\UCS-n-m | R/R Ch 10 Status: RO | | | | Stop bit size. |
| Allowed when: R\NUS\N > 0 | | | |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| 0 | 1.0 | | |
| 1 | 1.5 | | |
| 2 | 2.0 | | |
| UART SUB-CHANNEL INTERFACE | R-x\UCIN-n-m | Allowed when: R\NUS\N > 0 | | | | UART interface. |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| 0 | Other | | |
| 1 | RS-232 | | |
| 2 | RS-422 | | |
| 3 | RS-485 | | |
| 4 | TTL | | |
| UART SUB-CHANNEL BLOCK SIZE | R-x\UCBS-n-m | Allowed when: R\NUS\N > 0 | | | | Block (frame) size in words. |
| Required when: Allowed | | | |
| Range: Integer, 0-999999 | | | |
| UART SUB-CHANNEL SYNC WORD LENGTH | R-x\UCSL-n-m | Allowed when: R\UCBS > 1 | | | | Sync word length in words. |
| Required when: Allowed | | | |
| Range: 0 to 9 | | | |
| UART SUB-CHANNEL BLOCK SYNC VALUE | R-x\UCSV-n-m | Allowed when: R\UCBS > 1 | | | | Block sync word value in binary. Specify all bits. |
| Required when: Allowed | | | |
| Range: Binary, 81 binary digits | | | |
| UART SUB-CHANNEL BLOCK RATE | R-x\UCBR-n-m | Allowed when: R\NUS\N > 0 | | | | Block rate in Hz |
| Range: positive floating point | | | |
| **Message Data Type Attributes** | | | | | | |
| MESSAGE DATA TYPE FORMAT | R-x\MTF-n | R/R Ch 10 Status: RO | | | | Message data type format. Enumeration equates to format number in [Chapter 10](http://www.wsmr.army.mil/RCCsite/Documents/106-17_Telemetry_Standards/chapter10.pdf). |
| Allowed when: R\CDT is “MSGIN” | | | |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| 0 | message data | | |
| NUMBER OF MESSAGE SUB-CHANNELS | R-x\NMS\N-n | R/R Ch 10 Status: RO | | | | Specify the number of message sub-channels included within this channel. |
| Allowed when: R\CDT is “MSGIN” | | | |
| Required when: Allowed | | | |
| Range: 1 to 256 | | | |
| MESSAGE SUB-CHANNEL NUMBER | R-x\MSCN-n-m | R/R Ch 10 Status: RO | | | | Specify the message sub-channel number. The first sub-channel is 1. |
| Allowed when: R\NMS\N > 0 | | | |
| Required when: Allowed | | | |
| Range: Integer, 1-256 | | | |
| MESSAGE SUB-CHANNEL NAME | R-x\MCNM-n-m | R/R Ch 10 Status: RO | | | | Specify the message sub-channel name. |
| Allowed when: R\NMS\N > 0 | | | |
| Required when: Allowed | | | |
| Range: 32 characters | | | |
| **IEEE-1394 Data Type Attributes** | | | | | | |
| IEEE-1394 DATA TYPE FORMAT | R-x\IETF-n | R/R Ch 10 Status: RO | | | | IEEE-1394 data type format. Enumeration equates to format number in [Chapter 10](http://www.wsmr.army.mil/RCCsite/Documents/106-17_Telemetry_Standards/chapter10.pdf). |
| Allowed when: R\CDT is “1394IN” | | | |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| 0 | IEEE-1394 TRANS | | |
| 1 | IEEE-1394 PHY | | |
| **Parallel Data Type Attributes** | | | | | | |
| PARALLEL DATA TYPE FORMAT | R-x\PLTF-n | R/R Ch 10 Status: RO | | | | Parallel data type format. Enumeration equates to format number in [Chapter 10](http://www.wsmr.army.mil/RCCsite/Documents/106-17_Telemetry_Standards/chapter10.pdf). |
| Allowed when: R\CDT is “PARIN” | | | |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| 0 | Parallel | | |
| **Ethernet Data Type Attributes** | | | | | | |
| ETHERNET DATA TYPE FORMAT | R-x\ENTF-n | R/R Ch 10 Status: RO | | | | Ethernet data type format. Enumeration equates to format number in [Chapter 10](http://www.wsmr.army.mil/RCCsite/Documents/106-17_Telemetry_Standards/chapter10.pdf). |
| Allowed when: R\CDT is “ETHIN” | | | |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| 0 | Ethernet data | | |
| NUMBER OF ETHERNET NETWORKS | R-x\NNET\N-n | R/R Ch 10 Status: RO | | | | Specify the number of Ethernet networks included within this channel. |
| Allowed when: R\CDT is “ETHIN” | | | |
| Required when: Allowed | | | |
| Range: 1 to 256 | | | |
| ETHERNET NETWORK NUMBER | R-x\ENBR-n-m | R/R Ch 10 Status: RO | | | | Specify the Ethernet network number. The first network number is 1. |
| Allowed when: R\NNET\N > 0 | | | |
| Required when: Allowed | | | |
| Range: Integer, 1 to 256 | | | |
| ETHERNET NETWORK NAME | R-x\ENAM-n-m | R/R Ch 10 Status: RO | | | | Specify the Ethernet network name. |
| Allowed when: R\NNET\N > 0 | | | |
| Required when: Allowed | | | |
| Range: 32 characters | | | |
| **TSPI/CTS Data Type Attributes** | | | | | | |
| TSPI/CTS DATA TYPE FORMAT | R-x\TDTF-n | R/R Ch 10 Status: RO | | | | TSPI/CTS data type format. Enumeration equates to format number in [Chapter 10](http://www.wsmr.army.mil/RCCsite/Documents/106-17_Telemetry_Standards/chapter10.pdf). |
| Allowed when: R\CDT is “TSPIN” | | | |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| 0 | NMEA-RTCM | | |
| 1 | EAG ACMI | | |
| 2 | ACTTS | | |
| **CAN Bus Data Type Attributes** | | | | | | |
| CAN BUS DATA TYPE FORMAT | R-x\CBTF-n | R/R Ch 10 Status: RO | | | | CAN bus data type format. Enumeration equates to format number in [Chapter 10](http://www.wsmr.army.mil/RCCsite/Documents/106-17_Telemetry_Standards/chapter10.pdf). |
| Allowed when: R\CDT is “CANIN” | | | |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| 0 | CAN bus | | |
| NUMBER OF CAN BUS SUB-CHANNELS | R-x\NCB\N-n | R/R Ch 10 Status: RO | | | | Specify the number of CAN bus sub-channels in the packet. |
| Allowed when: R\CDT is “CANIN” | | | |
| Required when: Allowed | | | |
| Range: 1 to 256 | | | |
| CAN BUS SUB-CHANNEL NUMBER | R-x\CBN-n-m | R/R Ch 10 Status: RO | | | | Specify the CAN bus sub-channel ID. First sub-channel is 1. |
| Allowed when: R\NCB\N > 0 | | | |
| Required when: Allowed | | | |
| Range: 1 to 256 | | | |
| CAN BUS SUB-CHANNEL NAME | R-x\CBM-n-m | R/R Ch 10 Status: RO | | | | Specify the CAN bus sub-channel name. |
| Allowed when: R\NCB\N > 0 | | | |
| Required when: Allowed | | | |
| Range: 32 characters | | | |
| CAN BUS BIT RATE | R-x\CBBS-n-m | R/R Ch 10 Status: RO | | | | Specify the bit rate of the CAN bus sub-channel in bits per second. |
| Allowed when: R\NCB\N > 0 | | | |
| Required when: Allowed | | | |
| Range: positive floating point | | | |
| **Fibre Channel Data Type Attributes** | | | | | | |
| FIBRE CHANNEL DATA TYPE FORMAT | R-x\FCTF-n | R/R Ch 10 Status: RO | | | | Fibre Channel data type format |
| Allowed when: R\CDT is “FBCHIN” | | | |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| 0 | FC-PH | | |
| 1 | FC-FS | | |
| FIBRE CHANNEL SPEED | R-x\FCSP-n | \* R/R Ch 10 Status: RO | | | | Fibre Channel speed (bit rate) for the port for frame capture. |
| Allowed when: R\CDT is “FBCHIN” | | | |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| 0 | 1GFC (1.0625 gigabits per second [Gbps]) | | |
| 1 | 2GFC (2.125 Gbps) | | |
| 2 | 4GFC (4.25 Gbps) | | |
| 3 | 8GFC (8.5 Gbps) | | |
| 4 | 10GFC (10.52 Gbps) | | |
| 5 | 16GFC (14.025 Gbps) | | |
| 6 | 32GFC (28.05 Gbps) | | |
| **Telemetry Output** | | | | | | |
| OUTPUT STREAM NAME | R-x\OSNM-n | Allowed when: R\CDT is “TMOUT” | | | | Specify the recorder-reproducer channel group stream name to be included in the telemetry output. |
| Required when: Allowed | | | |
| Links to: R-x\CGNM-n | | | |
| Range: 32 characters | | | |
| STREAM ID | R-x\SID-n | Allowed when: R\CDT is “TMOUT” | | | | Specify the stream ID for the minor frame header unprotected part |
| Range: 0 to 15 | | | |
| Default: 0 | | | |
| CONFIGURATION HASH RATE | R-x\HRATE-n | Allowed when: R\CDT is “TMOUT” | | | | Specify the rate of the Chapter 10 configuration packet hash code insertion into the telemetry output in seconds. Value 0 allows sending once after changes. Use character “N” for disable. |
| Range: 0 to 60, N | | | |
| Default: “N’, disabled | | | |
| CONFIGURATION PACKET RATE | R-x\CRATE-n | Allowed when: R\CDT is “TMOUT” | | | | Specify the rate of the Chapter 10 configuration packet insertion into the telemetry output in seconds. Value 0 allows sending once after changes. Use character “N” for disable. |
| Range: 0 to 60, N | | | |
| Default: “N’, disabled | | | |
| **Reference Track** | | | | | | |
| NUMBER OF REFERENCE TRACKS | R-x\RT\N | Allowed when: R\NCB\N > 0 | | | | Specify the number of reference tracks. |
| Range: 1 to 9 | | | |
| TRACK NUMBER | R-x\RT1-n | Allowed when: R\RT\N > 0 | | | | State the track location of the reference signal. |
| Required when: Allowed | | | |
| Range: 1 to 99 | | | |
| REFERENCE FREQUENCY | R-x\RT2-n | Allowed when: R\RT\N > 0 | | | | Frequency of reference signal, in kHz. |
| Required when: Allowed | | | |
| Range: 6 characters | | | |
| **NOTE:** There will be one tape/storage source attributes group for each tape or storage source. | | | | | | |
| **Comments** | | | | | | |
| COMMENTS | R-x\COM | R/R Ch 10 Status: RO | | | | Provide the additional information requested or any other information desired. |
| Allowed when: R\ID is specified | | | |
| Range: 3200 characters | | | |

* + 1. Multiplex/Modulation (Mux/Mod) Attributes (M)

The composite baseband waveform is received from the receiver or tape reproducer electronics and is passed to the demultiplexer/demodulator for further processing. Figure 9‑5 summarizes the information that is required to continue processing the data. The composite baseband waveform may consist of any number of signals that are modulated directly onto the RF carrier, including a baseband data signal and one or more subcarriers.

The baseband data signal may be PCM or analog data. The PCM data streams must be defined in terms of a data link name. This data link name is unique for each system that contains different data, has a different format, or has a different data rate. The analog measurand is typically converted into engineering units appropriate for the measurand. The measurement name provides the connection to the Data Conversion Attributes group (C).

Subcarriers, both standard and nonstandard, may be part of the baseband composite waveform. These, in turn, may be modulated with PCM or analog data. As with the baseband data signal, these data channels must be defined. Table 9‑5 specifies the required information for the data signal attributes.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Figure 9‑5. Multiplex/Modulation Attributes Group (M)‑ | | | | | | | | **Code Name** |
| **DATA SOURCE ID** - 9-85 | | | | | | | | (M-x\ID) |
| 9-85 | **\*Composite Signal Structure** | | | | | | |  |
|  |  | SIGNAL STRUCTURE TYPE | | | | | | (M-x\BB1) |
|  |  | MODULATION SENSE | | | | | | (M-x\BB2) |
|  |  | COMPOSITE LPF BANDWIDTH | | | | | | (M-x\BB3) |
| 9-85 | **\*Baseband Signal** | | | | | | |  |
|  |  | BASEBAND SIGNAL TYPE | | | | | | (M-x\BSG1) |
|  |  | **\*Low Pass Filter** | | | | | |  |
|  |  |  | BANDWIDTH | | | | | (M-x\BSF1) |
|  |  |  | TYPE | | | | | (M-x\BSF2) |
| 9-86 |  | **\*Baseband Data Link Type** | | | | | |  |
|  |  | | **\*PCM** | | | | |  |
|  | OR | | | DATA LINK NAME | | | | (M-x\BB\DLN) |
|  |  | | **\*Analog** | | | | |  |
|  |  | | | MEASUREMENT NAME | | | | (M-x\BB\MN) |
| 9-87 | **\*Subcarriers** | | | | | | |  |
|  |  | NUMBER OF SUBCARRIERS | | | | | | (M-x\SCO\N) |
|  |  | **\*IRIG Subcarriers** | | | | | |  |
|  |  |  | NUMBER OF SCOs | | | | | (M-x\SI\N) |
|  |  |  | | SCO NUMBER | | | | (M-x\SI1-n) |
|  |  |  | | | SCO #n DATA TYPE | | | (M-x\SI2-n) |
|  |  |  | | | MODULATION SENSE | | | (M-x\SI3-n) |
| 9-87 |  |  | | | **\*Low Pass Filter** | | |  |
|  |  |  | | |  | BANDWIDTH | | (M-x\SIF1-n) |
|  |  |  | | |  | TYPE | | (M-x\SIF2-n) |
| 9-88 |  |  | | | **\*Data Link Type** | | |  |
|  |  |  | | | | **\*PCM** | |  |
|  |  |  | | | | | DATA LINK NAME | (M-x\SI\DLN-n) |
|  |  | OR | | | | **\*Analog** | |  |
|  |  |  | | | | | MEASUREMENT NAME | (M-x\SI\MN-n) |
| 9-88 |  | OTHER | | | | | | (M-x\SO) |
|  | REFERENCE CHANNEL | | | | | | | (M-x\RC) |
| 9-89 | **\*Comments** | | | | | | |  |
|  | | COMMENTS | | | | | | (M-x\COM) |
| \*Heading Only - No Data Entry | | | | | | | | |

| Table 9‑5. Multiplex/Modulation Group (M) | | | | |
| --- | --- | --- | --- | --- |
| **Parameter** | **Code Name** | **Usage Attributes** | | **Definition** |
| DATA SOURCE ID | M-x\ID | Allowed when: defining multiplexed data | | Data source identification. |
| Required when: Allowed | |
| Links from: G\DSI-n, T-x\ID | |
| Range: 32 characters | |
| **Composite Signal Structure** | | | | |
| SIGNAL STRUCTURE TYPE | M-x\BB1 | Allowed when: M\ID is specified | | Specify the composite baseband signal structure. |
| Required when: Allowed | |
| Range: Enumeration | |
| Enumeration | Description |
| PCM |  |
| ANALOG |  |
| SCO’s |  |
| OTHER |  |
| ANA/SCO | Hybrid |
| PCM/SCO | Hybrid |
| MODULATION SENSE | M-x\BB2 | Allowed when: M\ID is specified | | Specify the modulation sense: “POS” - indicates that an increasing voltage results in an increase in frequency. “NEG” - indicates that a decreasing voltage results in an increase in frequency. |
| Range: Enumeration | |
| Enumeration | Description |
| POS |  |
| NEG |  |
| COMPOSITE LPF BANDWIDTH | M-x\BB3 | Allowed when: M\ID is specified | | Give the low pass bandwidth of the composite waveform (3 dB cutoff frequency), in kHz. |
| Range: 6 characters | |
| **Baseband Signal** | | | | |
| BASEBAND SIGNAL TYPE | M-x\BSG1 | Allowed when: M\BB1 is not “SCO's” or “OTHER' | | Type of baseband data. |
| Required when: Allowed | |
| Range: Enumeration | |
| Enumeration | Description |
| PCM |  |
| ANA | Analog |
| OTH | Other |
| NON | None |
| **Low-Pass Filter** | | | | |
| BANDWIDTH | M-x\BSF1 | Allowed when: defining multiplexed data | | Specify low pass filter bandwidth (3 dB cutoff frequency), in kHz. |
| Range: 6 characters | |
| TYPE | M-x\BSF2 | Allowed when: defining multiplexed data | | Specify the filter type. |
| Range: Enumeration | |
| Enumeration | Description |
| CA | Constant amplitude |
| CD | Constant delay |
| OT | Other, define in the comments |
| **Baseband Data Link Type** | | | | |
| **PCM** | | | | |
| DATA LINK NAME | M-x\BB\DLN | Allowed when: M\BB1 is not “SCO's' or “OTHER” and M\BSG1 is “PCM” | | Specify the data link name for PCM data format. |
| Required When: Allowed | |
| Links to: P-d\DLN | |
| Range: 32 characters | |
| **Analog** | | | | |
| MEASUREMENT NAME | M-x\BB\MN | Allowed when: M\BB1 is not “SCO's” or “OTHER” and M\BSG1 is “ANA” | | Give the measurand name. |
| Required When: Allowed | |
| Links to: C-d\DCN | |
| Range: 32 characters | |
| **Subcarriers** | | | | |
| NUMBER OF SUBCARRIERS | M-x\SCO\N | Allowed when: M\BB1 not “PCM” or “ANALOG” | | Specify the number of subcarriers on this data link. |
| Required when: Allowed | |
| Range: 2 characters | |
| **IRIG Subcarriers** | | | | |
| NUMBER OF SCOS | M-x\SI\N | Allowed when: M\BB1 is “SCO's” or “ANA/SCO” or “PCM/SCO” | | Specify the number of IRIG subcarriers. |
| Required when: Allowed | |
| Range: 2 characters | |
| SCO NUMBER | M-x\SI1-n | Allowed when: M\SI\N > 0 | | Give the IRIG channel number for the subcarrier. |
| Required when: Allowed | |
| Range: 5 characters | |
| SCO #N DATA TYPE | M-x\SI2-n | Allowed when: M\SI\N > 0 | | Specify the type of data on the subcarrier. |
| Required when: Allowed | |
| Range: Enumeration | |
| Enumeration | Description |
| PCM |  |
| ANA | Analog |
| OTH | Other |
| MODULATION SENSE | M-x\SI3-n | Allowed when: M\SI\N > 0 | | Specify the modulation sense: “POS” - indicates that an increasing voltage results in an increase in frequency. “NEG” - indicates that a decreasing voltage results in an increase in frequency. |
| Range: Enumeration | |
| Enumeration | Description |
| POS |  |
| NEG |  |
| **Low-Pass Filter** | | | | |
| BANDWIDTH | M-x\SIF1-n | Allowed when: M\ID is specified | | Specify the low pass filter cutoff frequency (3 dB), in kHz. |
| Range: 6 characters | |
| TYPE | M-x\SIF2-n | Allowed when: M\ID is specified | | Specify the filter type. |
| Range: Enumeration | |
| Enumeration | Description |
| CA | Constant amplitude |
| CD | Constant delay |
| OT | Other, define in the comments |
| **Data Link Type** | | | | |
| **PCM** | | | | |
| DATA LINK NAME | M-x\SI\DLN-n | Allowed when: M\BB1 is not “PCM” or “ANALOG” and M\SI2 is “PCM” | | Specify the data link name for PCM data formats. |
| Required when: Allowed | |
| Links to: P-d\DLN | |
| Range: 32 characters | |
| **Analog** | | | | |
| MEASUREMENT NAME | M-x\SI\MN-n | Allowed when: M\BB1 is not “PCM” or “ANALOG” and M\SI2 is “ANA” | | Give the measurand name. |
| Required when: Allowed | |
| Links to: C-d\DCN | |
| Range: 32 characters | |
| **NOTE:** Repeat the above for each IRIG subcarrier on this carrier. | | | | |
| OTHER | M-x\SO | Allowed when: M\ID is specified | | Are there nonstandard subcarriers? Define in the comments. |
| Range: Enumeration | |
| Enumeration | Description |
| Y | Yes |
| N | No |
| Default: N | |
| REFERENCE CHANNEL | M-x\RC | Allowed when: M\ID is specified | | Frequency of reference channel in kHz, if applicable. |
| Range: 6 characters | |
| **Comments** | | | | |
| COMMENTS | M-x\COM | Allowed when: M\ID is specified | | Provide the additional information requested or any other information desired. |
| Range: 3200 characters | |

* + 1. Digital Data Attributes (P, D, B, S)

The digital data attributes are separated into four groups containing PCM-related attribute information. The PCM Format Attributes group (P) is described in item a below. The PCM Measurement Description Attributes, contained in (D), are described in item b. Item c depicts the MIL-STD-1553 or ARINC 429 Bus Data Attributes (B). Item d describes the Message Data Attributes (S).

1. PCM Format Attributes (P). The PCM Format Attributes group contains the information required to decommutate the PCM data stream. Operations of both Class I and Class II are included. Limited information is incorporated for class II operations. Figure 9‑6 presents the flow and summary of the information required. In general, only standard methods of synchronization have been included except for cases where considerable application is already in place. Inclusion should not be taken to mean that the nonstandard approaches are better or desired. Table 9‑6 contains the PCM Format Attributes. The group defines and specifies the frame format and the information necessary to set up the PCM decommutation. Refer to [Chapter 4](http://www.wsmr.army.mil/RCCsite/Documents/106-17_Telemetry_Standards/chapter4.pdf) for the definition of terms (such as major and minor frames and subframes) and word numbering conventions.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Figure 9‑6. PCM Format Attributes Group (P)‑ | | | | | | **Code Name** |
| **DATA LINK NAME** - 9-93 | | | | | | (P-d\DLN) |
| 9-93 | **\*Input Data** | | | | |  |
|  |  | PCM CODE | | | | (P-d\D1) |
|  |  | BIT RATE | | | | (P-d\D2) |
|  |  | ENCRYPTED | | | | (P-d\D3) |
|  |  | POLARITY | | | | (P-d\D4) |
|  |  | AUTO-POLARITY CORRECTION | | | | (P-d\D5) |
|  |  | DATA DIRECTION | | | | (P-d\D6) |
|  |  | DATA RANDOMIZED | | | | (P-d\D7) |
|  |  | RANDOMIZER LENGTH | | | | (P-d\D8) |
| 9-95 | **\*Format** | | | | |  |
|  |  | TYPE FORMAT | | | | (P-d\TF) |
|  |  |  | COMMON WORD LENGTH | | | (P-d\F1) |
|  |  |  | WORD TRANSFER ORDER | | | (P-d\F2) |
|  |  |  | PARITY | | | (P-d\F3) |
|  |  |  | PARITY TRANSFER ORDER | | | (P-d\F4) |
|  |  |  | CRC | | | (P-d\CRC) |
|  |  |  | CRC CHECK WORD STARTING BIT | | | (P-d\CRCCB) |
|  |  |  | CRC DATA START BIT | | | (P-d\CRCDB) |
|  |  |  | CRC DATA NUMBER OF BITS | | | (P-d\CRCDN) |
| 9-97 |  | **\*Minor Frame** | | | |  |
|  |  |  | NUMBER OF MINOR FRAMES IN MAJOR FRAME | | | (P-d\MF\N) |
|  |  |  |  | NUMBER OF WORDS IN A MINOR FRAME | | (P-d\MF1) |
|  |  |  |  | NUMBER OF BITS IN A MINOR FRAME | | (P-d\MF2) |
|  |  |  | SYNC TYPE | | | (P-d\MF3) |
| 9-98 |  |  |  | **\*Synchronization Pattern** | |  |
|  |  |  |  | | LENGTH | (P-d\MF4) |
|  |  |  |  | | PATTERN | (P-d\MF5) |
| 9-98 | **\*Synchronization Criteria** | | | | |  |
|  |  | IN SYNC CRITERIA | | | | (P-d\SYNC1) |
|  |  |  | SYNC PATTERN CRITERIA | | | (P-d\SYNC2) |
| 9-99 |  | **\*Out of Synchronization Criteria** | | | |  |
|  |  |  | NUMBER OF DISAGREES | | | (P-d\SYNC3) |
|  |  |  | SYNC PATTERN CRITERIA | | | (P-d\SYNC4) |
|  |  |  | FILL BITS | | | (P-d\SYNC5) |
| 9-99 | **\*Minor Frame Format Definition** | | | | |  |
|  |  | NUMBER OF UNIQUE WORD SIZES | | | | (P-d\MFW\N) |
|  |  |  | WORD NUMBER | | | (P-d\MFW1-n) |
|  |  |  | NUMBER OF BITS IN WORD | | | (P-d\MFW2-n) |
| 9-100 |  | **\*Subframe Synchronization** | | | |  |
|  |  |  | NUMBER OF SUBFRAME ID COUNTERS | | | (P-d\ISF\N) |
|  |  |  | SUBFRAME ID COUNTER NAME | | | (P-d\ISF1-n) |
|  |  |  | SUBFRAME SYNC TYPE | | | (P-d\ISF2-n) |
| 9-100 |  |  | | **\*ID Counter** | |  |
|  |  |  | | | SUBFRAME ID COUNTER LOCATION | (P-d\IDC1-n) |
| 9-101 |  |  | | | ID COUNTER MSB STARTING BIT LOCATION | (P-d\IDC3-n) |
|  |  |  | | | ID COUNTER LENGTH | (P-d\IDC4-n) |
|  |  |  | | | ID COUNTER TRANSFER ORDER | (P-d\IDC5-n) |
|  |  |  | | | ID COUNTER INITIAL VALUE | (P-d\IDC6-n) |
|  |  |  | | | INITIAL COUNT MINOR FRAME NUMBER | (P-d\IDC7-n) |
|  |  |  | | | ID COUNTER END VALUE | (P-d\IDC8-n) |
|  |  |  | | | END COUNT MINOR FRAME NUMBER | (P-d\IDC9-n) |
|  |  |  | | | COUNT DIRECTION | (P-d\IDC10-n) |
| 9-102 |  | **\*Asynchronous Embedded Format** | | | |  |
|  |  |  | NUMBER OF ASYNCHRONOUS EMBEDDED FORMATS | | | (P-d\AEF\N) |
|  |  |  | | DATA LINK NAME | | (P-d\AEF\DLN-n) |
|  |  |  | | SUPERCOM | | (P-d\AEF1-n) |
|  |  |  | | LOCATION DEFINITION | | (P-d\AEF2-n) |
|  |  |  | |  | LOCATION | (P-d\AEF3-n-w) |
|  |  |  | |  | INTERVAL | (P-d\AEF4-n) |
|  |  |  | |  | WORD LENGTH | (P-d\AEF5-n-w) |
|  |  |  | |  | MASK | (P-d\AEF6-n-w) |
|  |  |  | | SUBCOMMUTATED | | (P-d\AEF7-n-w) |
|  |  |  | |  | START FRAME | (P-d\AEF8-n-w-m) |
|  |  |  | |  | FRAME INTERVAL | (P-d\AEF9-n-w-m) |
| 9-104 |  | **\*Format Change** | | | |  |
|  |  |  | **\*Frame Format Identifier** | | |  |
|  |  |  |  | LOCATION | | (P-d\FFI1) |
|  |  |  |  | MASK | | (P-d\FFI2) |
| 9-104 |  |  | **\*Measurement List Change** | | |  |
|  |  |  | | NUMBER OF MEASUREMENT LISTS | | (P-d\MLC\N) |
|  |  |  | | | FFI PATTERN | (P-d\MLC1-n) |
|  |  |  | | | MEASUREMENT LIST NAME | (P-d\MLC2-n) |
| 9-105 |  | OR | **\*Format Structure Change** | | |  |
|  |  |  | | NUMBER OF FORMATS | | (P-d\FSC\N) |
|  |  |  | | FFI PATTERN | | (P-d\FSC1-n) |
|  |  |  | | DATA LINK ID | | (P-d\FSC2-n) |
| 9-105 |  | **\*Alternate Tag And Data** | | | |  |
|  |  |  | NUMBER OF TAGS | | | (P-d\ALT\N) |
|  |  |  | NUMBER OF BITS IN TAG | | | (P-d\ALT1) |
|  |  |  | NUMBER OF BITS IN DATA WORD | | | (P-d\ALT2) |
|  |  |  | FIRST TAG LOCATION | | | (P-d\ALT3) |
|  |  |  | SEQUENCE | | | (P-d\ALT4) |
| 9-106 |  | **\*Asynchronous Data Merge Format** | | | |  |
|  |  | | NUMBER OF ASYNCHRONOUS DATA MERGE FORMATS | | | (P-d\ADM\N) |
|  |  | | | DATA MERGE NAME | | (P-d\ADM\DMN-n) |
|  |  | | | MASK AND PATTERN | | (P-d\ADM\MP-n) |
|  |  | | | OVERHEAD MASK | | (P-d\ADM\OHM-n) |
|  |  | | | FRESH DATA PATTERN | | (P-d\ADM\FDP-n) |
|  |  | | | DATA OVERFLOW PATTERN | | (P-d\ADM\DOP-n) |
|  |  | | | STALE DATA PATTERN | | (P-d\ADM\SDP-n) |
|  |  | | | USER DEFINED PATTERN | | (P-d\ADM\UDP-n) |
|  |  | | | SUPERCOM | | (P-d\ADM1-n) |
|  |  | | | LOCATION DEFINITION | | (P-d\ADM2-n) |
|  |  | | |  | LOCATION | (P-d\ADM3-n-w) |
|  |  | | |  | INTERVAL | (P-d\ADM4-n) |
|  |  | | |  | DATA LENGTH | (P-d\ADM5-n) |
|  |  | | |  | MSB LOCATION | (P-d\ADM6-n) |
|  |  | | |  | PARITY | (P-d\ADM7-n) |
|  |  | | | SUBCOMMUTATED | | (P-d\ADM8-n-w) |
|  |  | | | | START FRAME | (P-d\ADM9-n-w-m) |
|  |  | | | | FRAME INTERVAL | (P-d\ADM10-n-w-m) |
| 9-109 |  | **\*Chapter 7 Format** | | | |  |
|  |  | | CHAPTER 7 NUMBER OF SEGMENTS | | | (P-d\C7\N) |
|  |  | | CHAPTER 7 FIRST WORD OF SEGMENT | | | (P-d\C7FW-n) |
|  |  | | CHAPTER 7 NUMBER OF PCM WORDS IN SEGMENT | | | (P-d\C7NW-n) |
|  | **\*Comments** | | | | |  |
| 9-109 |  | COMMENTS | | | | (P-d\COM) |
| **\*Heading Only - No Data Entry** | | | | | |  |

| Table 9‑6. PCM Format Attributes Group (P) | | | | |
| --- | --- | --- | --- | --- |
| **Parameter** | **Code Name** | **Usage Attributes** | | **Definition** |
| DATA LINK NAME | P-d\DLN | R/R Ch 10 Status: RO | | Identify the data link name consistent with the mux/mod group. |
| Allowed when: defining PCM data | |
| Required when: Allowed | |
| Links from: M-x\BB\DLN, M-x\SI\DLN-n, R-x\CDLN, P-d\AEF\DLN-n, P-d\FSC2-n, P-d\ADM\DMN-n, R-x\EV\DLN-n | |
| Links to: D-x\DLN, B-d\DLN | |
| Range: 32 characters | |
| **Input Data** | | | | |
| PCM CODE | P-d\D1 | R/R Ch 10 Status: RO | | Define the data format code.  A randomized PCM stream can be specified as:  “P-d\D1=NRZ-L” and “P-d\D7=Y”; or  “P-d\D1=RNRZ-L” and “P-d\D7” is ignored. |
| Allowed when: P-d\DLN is specified | |
| Range: Enumeration | |
| Enumeration | Description |
| NRZ-L | Non-return-to-zero-level |
| NRZ-M | Non-return-to-zero-mark |
| NRZ-S | Non-return-to-zero-space |
| RNRZ-L | Randomized, non-return-to-zero-level |
| BIO-M | Bi-phase-mark |
| BIO-L | Bi-phase-level |
| BIO-S | Bi-phase-space |
| OTHER | Other encoding, define in comments |
| Default: NRZ-L | |
| BIT RATE | P-d\D2 | R/R Ch 10 Status: RO | | Data rate in bits per second. |
| Allowed when: P-d\DLN is specified | |
| Required when: Allowed | |
| Range: positive floating point | |
| ENCRYPTED | P-d\D3 | Allowed when: P-d\DLN is specified | | If the data is encrypted, provide details in comments. |
| Range: Enumeration | |
| Enumeration | Description |
| E | Data is encrypted |
| U | Data is unencrypted |
| Default: U | |
| POLARITY | P-d\D4 | R/R Ch 10 Status: RO | | Input Stream Data polarity.  Note. The polarity of the input stream at the source. The source could be an airborne DAU or a ground receiver. |
| Allowed when: P-d\DLN is specified | |
| Range: Enumeration | |
| Enumeration | Description |
| N | Normal |
| I | Inverted |
| Default: N | |
| AUTO-POLARITY CORRECTION | P-d\D5 | Allowed when: P-d\DLN is specified | | Is automatic polarity correction to be used? |
| Range: Enumeration | |
| Enumeration | Description |
| Y | Yes |
| N | No |
| Default: N | |
| DATA DIRECTION | P-d\D6 | Allowed when: P-d\DLN is specified | | Time sequence of data. |
| Range: Enumeration | |
| Enumeration | Description |
| N | Normal |
| R | Reversed |
| Default: N | |
| DATA RANDOMIZED | P-d\D7 | R/R Ch 10 Status: RO | | Randomization algorithm is specified in “RANDOMIZER LENGTH” (P-d\D8). |
| Allowed when: P-d\DLN is specified | |
| Range: Enumeration | |
| Enumeration | Description |
| Y | Yes |
| N | No |
| Default: N | |
| RANDOMIZER LENGTH | P-d\D8 | R/R Ch 10 Status: RO | | Specify the randomizer length. |
| Allowed when: P-d\D7 = Y | |
| Range: Enumeration | |
| Enumeration | Description |
| STD | 15 bits, per [Annex A.2](http://www.wsmr.army.mil/RCCsite/Documents/106-17_Telemetry_Standards/annexa-2.pdf) |
| OTH | Other, define in comments |
| N/A | Not applicable |
| Default: STD | |
| **Format** | | | | |
| TYPE FORMAT | P-d\TF | R/R Ch 10 Status: RO | | Type of PCM format. |
| Allowed when: P-d\DLN is specified | |
| Range: Enumeration | |
| Enumeration | Description |
| ONE | Class I |
| TWO | Class II |
| BUS | 1553 bus |
| 1553 | 1553 bus |
| ALTD | Alternate tag and data |
| OTHR | Other, define in comments |
| Default: ONE | |
| COMMON WORD LENGTH | P-d\F1 | R/R Ch 10 Status: RO-PAK | | Number of bits in common word length. |
| Allowed when: P-d\DLN is specified | |
| Required when: Allowed and defining CH10 non-throughput mode | |
| Range: 4-64 | |
| WORD TRANSFER ORDER | P-d\F2 | R/R Ch 10 Status: RO-PAK | | Define the default for the first bit transferred in normal time sequence. |
| Allowed when: P-d\DLN is specified | |
| Required when: Allowed and defining CH10 non-throughput mode | |
| Range: Enumeration | |
| Enumeration | Description |
| M | msb |
| L | lsb |
| Default: M | |
| PARITY | P-d\F3 | R/R Ch 10 Status: RO-PAK | | Normal word parity. |
| Allowed when: P-d\DLN is specified | |
| Required when: Allowed and defining CH10 non-throughput mode | |
| Range: Enumeration | |
| Enumeration | Description |
| EV | Even |
| OD | Odd |
| NO | None |
| Default NO | |
| PARITY TRANSFER ORDER | P-d\F4 | Allowed when: P-d\F3 is not NO | | Parity bit location. |
| Required when: Allowed | |
| Range: Enumeration | |
| Enumeration | Description |
| L | Leads word |
| T | Trails word |
| CRC | P-d\CRC | Allowed when: P-d\DLN is specified | | Specify what type of cyclic redundancy code is to be used. |
| Range: Enumeration | |
| Enumeration | Description |
| A | CRC-16-ANSI |
| C | CRC-16-CCITT |
| E | CRC-32-ANSI |
| N | None |
| Default: N | |
| CRC CHECK WORD STARTING BIT | P-d\CRCCB | Allowed when: When P-d\CRC is not N | | The starting bit number in the minor frame where the CRC check word begins. The CRC check word must occupy contiguous bits of the minor frame even if the check word crosses word boundaries. The check word shall always be inserted msb first. |
| Required when: Allowed | |
| Range: 1 to the value of P-d\MF2 | |
| CRC DATA START BIT | P-d\CRCDB | Allowed when: When P-d\CRC is not N | | The starting bit number in the minor frame of the data used in the CRC calculation. |
| Required when: Allowed | |
| Range: 1 to the value of P-d\MF2 | |
| CRC DATA NUMBER OF BITS | P-d\CRCDN | Allowed when: When P-d\CRC is not N | | The number of data bits used in the CRC calculation. The data being checked may span 2 minor frames but is never longer than a single minor frame. Minor frame fill bits are never used as part of a CRC calculation. |
| Required when: Allowed | |
| Range: 1 to the value of P-d\MF2 | |
| **Minor Frame** | | | | |
| NUMBER OF MINOR FRAMES IN MAJOR FRAME | P-d\MF\N | R/R Ch 10 Status: RO-PAK | | Number of minor frames in a major frame. |
| Allowed when: P-d\DLN is specified | |
| Required when: Allowed and defining CH10 non-throughput mode | |
| Range: 1 to 256 | |
| Default: 1 | |
| NUMBER OF WORDS IN A MINOR FRAME | P-d\MF1 | R/R Ch 10 Status: RO-PAK | | Specify the number of words in a minor frame, as defined in [Chapter 4](http://www.wsmr.army.mil/RCCsite/Documents/106-17_Telemetry_Standards/chapter4.pdf), Section 4.3 (the minor frame synchronization pattern is always considered as one word, regardless of its length). |
| Allowed when: P-d\DLN is specified | |
| Required when: Allowed and defining CH10 non-throughput mode | |
| Range: 2-4096 | |
| NUMBER OF BITS IN A MINOR FRAME | P-d\MF2 | R/R Ch 10 Status: RO-PAK | | Number of bits in a minor frame including minor frame synchronization pattern. |
| Allowed when: P-d\DLN is specified | |
| Required when: P-d\CRC is not N or defining CH10 non-throughput mode | |
| Range: 20 to 16384 | |
| SYNC TYPE | P-d\MF3 | Allowed when: P-d\DLN is specified | | Define minor frame synchronization type. |
| Range: Enumeration | |
| Enumeration | Description |
| FPT | Fixed pattern |
| ACC | Alternating Code Complement |
| OTH | Other, define in comments |
| Default: FPT | |
| **Synchronization Pattern** | | | | |
| LENGTH | P-d\MF4 | R/R Ch 10 Status: RO-PAK | | Specify the minor frame synchronization pattern length in number of bits. |
| Allowed when: P-d\DLN is specified | |
| Required when: Allowed and defining CH10 non-throughput mode | |
| Range: 16 to 33 | |
| PATTERN | P-d\MF5 | R/R Ch 10 Status: RO-PAK | | Define minor frame synchronization pattern in bits (1s and 0s) with the left-most bit as the first bit transmitted. “X” may be used to indicate a “don’t care” bit. |
| Allowed when: P-d\DLN is specified | |
| Required when: Allowed and defining CH10 non-throughput mode | |
| Range: The value of MF4 count of binary pattern | |
| **Synchronization Criteria** | | | | |
| IN-SYNC CRITERIA | P-d\SYNC1 | Allowed when: P-d\DLN is specified | | This specifies the desired criteria for declaring the system to be in sync. “0” (First good sync). Number of good sync patterns (1 or greater). “NS” (Not specified). |
| Range: 0 to 99 or NS | |
| Default: NS | |
| SYNC PATTERN CRITERIA | P-d\SYNC2 | Allowed when: P-d\SYNC1 is not NS | | Number of bits that may be in error in the synchronization pattern. |
| Required when: Allowed | |
| Range: 0 to the value of P-d\MF4 | |
| **Out of Synchronization Criteria** | | | | |
| NUMBER OF DISAGREES | P-d\SYNC3 | Allowed when: P-d\DLN is specified | | Specify the desired criteria for declaring the system out of sync. Number of bad sync patterns, (1 or greater). “NS” (Not specified). |
| Range: 0 to 99 or NS | |
| Default: NS | |
| SYNC PATTERN CRITERIA | P-d\SYNC4 | Allowed when: P-d\SYNC3 is not NS | | Number of bits that may be in error in the synchronization pattern. |
| Required when: Allowed | |
| Range: 0 to the value of P-d\MF4 | |
| FILL BITS | P-d\SYNC5 | Allowed when: P-d\DLN is specified | | Max number of fill bits between end of frame and next sync pattern that can be ignored. |
| Range: 0-16384 | |
| Default: 0 | |
| **Minor Frame Format Definition** | | | | |
| NUMBER OF UNIQUE WORD SIZES | P-d\MFW\N | R/R Ch 10 Status: RO-PAK | | Count of words that are not the default word size |
| Allowed when: P-d\DLN is specified and words are sized other than the default word size | |
| Required when: Allowed and defining CH10 non-throughput mode | |
| Range: 0 to the value of P-d\MF1 minus1 | |
| WORD NUMBER | P-d\MFW1-n | R/R Ch 10 Status: RO-PAK | | Word position in the minor frame. Word position 1 follows the synchronization pattern. |
| Allowed when: P-d\DLN is specified and words are sized other than the default word size | |
| Required when: Allowed and defining CH10 non-throughput mode | |
| Range: 1 to the value of P-d\MF1 minus 1 | |
| NUMBER OF BITS IN WORD | P-d\MFW2-n | R/R Ch 10 Status: RO-PAK | | The number of bits in word position defined by P-d\MFW1-n. If default value, do not include. |
| Allowed when: P-d\MFW1 is specified | |
| Required when: Allowed | |
| Range: 4-64 | |
| **NOTE:** The above pair set must be defined for all words that have a length other than the common word length. Therefore, all word positions not included in the above will have the common word length as a default value. | | | | |
| **Subframe Synchronization** | | | | |
| NUMBER OF SUBFRAME ID COUNTERS | P-d\ISF\N | R/R Ch 10 Status: RO-PAK | | Specify the number of subframe ID counters defined within the minor frame. |
| Allowed when: P-d\DLN is specified | |
| Range: 0-10 | |
| Default: 0 | |
| SUBFRAME ID COUNTER NAME | P-d\ISF1-n | R/R Ch 10 Status: RO-PAK | | Specify the subframe ID counter name. |
| Allowed when: P-d\ISF\N is greater than 0 | |
| Required when: P-d\ISF\N is greater than 1 | |
| Range: 32 characters | |
| SUBFRAME SYNC TYPE | P-d\ISF2-n | R/R Ch 10 Status: RO-PAK | | Define the subframe synchronization type. |
| Allowed when: P-d\ISF\N is greater than 0 | |
| Range: Enumeration | |
| Enumeration | Description |
| ID | ID counter |
| OT | Other, define in comments |
| Default: ID | |
| **ID Counter** | | | | |
| SUBFRAME ID COUNTER LOCATION | P-d\IDC1-n | R/R Ch 10 Status: RO-PAK | | If ID counter is designated as the subframe sync type, give the minor frame word position of the counter. |
| Allowed when: P-d\ISF\N is greater than 0 | |
| Required when: Allowed and defining CH10 non-throughput mode | |
| Range: 1 to value of P-d\MF1-1 | |
| ID COUNTER MSB STARTING BIT LOCATION | P-d\IDC3-n | R/R Ch 10 Status: RO-PAK | | Specify the bit location of the ID counter msb within the word. |
| Allowed when: P-d\ISF\N is greater than 0 | |
| Required when: Allowed and defining CH10 non-throughput mode | |
| Range: 1 to size of word (either P-d\MFW2-n or P-d\F1) | |
| ID COUNTER LENGTH | P-d\IDC4-n | R/R Ch 10 Status: RO-PAK | | Specify the subframe ID counter length, number of bits. |
| Allowed when: P-d\ISF\N is greater than 0 | |
| Required when: Allowed | |
| Range: 1 to size of word (either P-d\MFW2-n or P-d\F1) | |
| ID COUNTER TRANSFER ORDER | P-d\IDC5-n | R/R Ch 10 Status: RO-PAK | | Specify whether the msb or lsb is transferred first. |
| Allowed when: P-d\ISF\N is greater than 0 | |
| Range: Enumeration | |
| Enumeration | Description |
| M | msb |
| L | lsb |
| D | As specified in WORD TRANSFER ORDER (P-d\F2). |
| Default: D | |
| ID COUNTER INITIAL VALUE | P-d\IDC6-n | R/R Ch 10 Status: RO-PAK | | Specify the initial value of the ID counter. |
| Allowed when: P-d\ISF\N is greater than 0 | |
| Required when: Allowed | |
| Range: 0, 1, number of minor frames minus 1, number of minor frames | |
| INITIAL COUNT MINOR FRAME NUMBER | P-d\IDC7-n | R/R Ch 10 Status: RO-PAK | | Specify the minor frame number associated with the initial count value. |
| Allowed when: P-d\ISF\N is greater than 0 | |
| Range: 1 | |
| Default: 1 | |
| ID COUNTER END VALUE | P-d\IDC8-n | R/R Ch 10 Status: RO-PAK | | Specify the end value of the ID counter. |
| Allowed when: P-d\ISF\N is greater than 0 | |
| Required when: Allowed | |
| Range: 0,1,number of minor frames minus 1, number of minor frames | |
| END COUNT MINOR FRAME NUMBER | P-d\IDC9-n | R/R Ch 10 Status: RO-PAK | | Specify the minor frame number associated with the end count value. |
| Allowed when: P-d\ISF\N is greater than 0 | |
| Range: Number of minor frames | |
| COUNT DIRECTION | P-d\IDC10-n | R/R Ch 10 Status: RO-PAK | | Specify the direction of the count increment. |
| Allowed when: P-d\ISF\N is greater than 0 | |
| Range: Enumeration | |
| Enumeration | Description |
| INC | Increasing |
| DEC | Decreasing |
| Default: INC | |
| **Asynchronous Embedded Format** | | | | |
| NUMBER OF ASYNCHRONOUS EMBEDDED FORMATS | P-d\AEF\N | Allowed when: P-d\DLN specified | | Specify the number of asynchronous embedded formats. |
| Range: 0 to 99 | |
| Default: 0 | |
| DATA LINK NAME | P-d\AEF\DLN-n | Allowed when: P-d\AEF\N is greater than 0 | | Provide the data link name for this asynchronous embedded format. Repeat name and the following entries for the second format, as appropriate. A separate data link definition must be provided for each asynchronous embedded format. |
| Required when: Allowed | |
| Links to: P-d\DLN | |
| Range: 32 characters | |
| SUPERCOM | P-d\AEF1-n | Allowed when: P-d\AEF\N is greater than 0 | | If the asynchronous format is not supercommutated, enter “NO”. Otherwise, enter the number of host minor frame words that are used. |
| Required when: Allowed | |
| Range: 1 to P-d\MF1 minus 1 or NO | |
| LOCATION DEFINITION | P-d\AEF2-n | Allowed when: P-d\AEF\N is greater than 0 | | If supercommutated, specify how the word locations are defined. |
| Required when: Allowed | |
| Range: Enumeration | |
| Enumeration | Description |
| F1 | First word and interval |
| EL | Every location |
| CW | Contiguous words |
| NA | Not applicable |
| LOCATION | P-d\AEF3-n-w | Allowed when: P-d\AEF\N is greater than 0 | | Specify the first word within the minor frame that contains the asynchronous embedded format identified. For the method when every word location is defined, repeat this entry for each word position applicable. For the first word and interval method, include the next entry to define the interval. |
| Required when: Allowed | |
| Range: 1 to value of P-d\MF1 minus 1 | |
| INTERVAL | P-d\AEF4-n | Allowed when: P-d\AEF2-n is FI | | Specify the interval to be used to define the asynchronous embedded format locations. |
| Required when: Allowed | |
| Range: 1 to value of P-d\MF1 minus 1 | |
| WORD LENGTH | P-d\AEF5-n-w | Allowed when: P-d\AEF\N is greater than 0 | | Specify the number of embedded bits in this host word location. |
| Required when: Allowed | |
| Range: 1 to size of word (either P-d\MFW2-n or P-d\F1) | |
| MASK | P-d\AEF6-n-w | Allowed when: P-d\AEF\N is greater than 0 | | If the asynchronous portion of the word is shorter than the word length, then provide the binary mask required to indicate which bits are used (1s used, 0s not used). Left-most bit corresponds to the msb. |
| Required when: P-d\AEF5-n-w is not the full word length | |
| Range: 1 to size of word (either P-d\MFW2-n or P-d\F1) of 0,1 | |
| SUB-COMMUTATED | P-d\AEF7-n-w | Allowed when: P-d\AEF\N is greater than 0 | | If this embedded format is not subcommutated (and appears in every minor frame), enter “NO”; otherwise, enter the number of definitions to follow, m. |
| Range: 0 to size of number of minor frames or NO | |
| Default: NO | |
| START FRAME | P-d\AEF8-n-w-m | Allowed when: P-d\AEF7-n-w is not NO | | When the embedded format is subcommutated, enter the first minor frame number this embedded format appears in. If this field is missing, the default value “1” is assumed. Repeat P-d\AEF7-n-w number of times. |
| Range: 1 to size of number of minor frames | |
| Default: 1 | |
| FRAME INTERVAL | P-d\AEF9-n-w-m | Allowed when: P-d\AEF7-n-w is not NO | | When the embedded format is subcommutated, enter the interval between minor frames that this embedded format appears in. If this field is missing, the default value “1” is assumed. Repeat P-d\AEF7-n-w number of times. |
| Range: 0 to size of number of minor frames | |
| Default: 1 | |
| **Format Change** | | | | |
| **Frame Format Identifier** | | | | |
| LOCATION | P-d\FFI1 | Allowed when: P-d\DLN is specified | | Specify the position in the minor frame that contains the frame format identification (FFI) word. If more than one word location, provide the details in the comments. |
| Range: 1 to value of P-d\MF1 minus 1 | |
| MASK | P-d\FFI2 | Allowed when: P-d\FFI1 is specified | | If the FFI is shorter than the word length, then provide the binary mask required to indicate which bits are used. Leftmost bit corresponds to the msb. |
| Required when: Allowed | |
| Range: 1 to size of word (either P-d\MFW2-n or P-d\F1) of 0,1 | |
| **Measurement List Change** | | | | |
| NUMBER OF MEASUREMENT LISTS | P-d\MLC\N | Allowed when: If P-d\FSC\N is 0 | | Specify the number of measurement lists that are required to be selected. If none, enter “NO”. Otherwise, enter the number, n. |
| Range: 1-99, NO | |
| Default: NO | |
| FFI PATTERN | P-d\MLC1-n | Allowed when: P-d\MLC\N is not NO | | Specify the FFI pattern that corresponds to the measurement list (1s and 0s). This entry and the next are an ordered pair. |
| Required when: Allowed | |
| Range: 1 to the Size of the word (either P-d\MFW2-n or P-d\F1) of 0,1 | |
| MEASUREMENT LIST NAME | P-d\MLC2-n | Allowed when: P-d\MLC\N is not NO | | Specify the measurement list name. |
| Required when: Allowed | |
| Links to: D-x\MLN-y | |
| Range: 32 characters | |
| **Format Structure Change** | | | | |
| NUMBER OF FORMATS | P-d\FSC\N | Allowed when: P-d\MLC\N is NO | | Specify the number of formats to be defined. |
| Range: 0-99 | |
| Default: 0 | |
| FFI PATTERN | P-d\FSC1-n | Allowed when: P-d\FSC\N is specified | | Specify the FFI pattern that corresponds to the format that is defined. This entry and the next are an ordered pair. |
| Required when: Allowed | |
| Range: 1 to the Size of the word (either P-d\MFW2-n or P-d\F1) of 0,1 | |
| DATA LINK ID | P-d\FSC2-n | Allowed when: P-d\FSC\N is specified | | Identify the format that corresponds to this FFI code. |
| Required when: Allowed | |
| Links to: P-d\DLN | |
| Range: 32 characters | |
| **Alternate Tag And Data** | | | | |
| NUMBER OF TAGS | P-d\ALT\N | Allowed when: P-d\DLN specified | | Specify the number of tag/data pairs to be included within the minor frame. |
| Range: 0-999 | |
| Default: 0 | |
| NUMBER OF BITS IN TAG | P-d\ALT1 | Allowed when: if P-d\ALT\N is greater than 0 | | Specify the number of bits that are in the tag. |
| Required when: Allowed | |
| Range: Range 1 to the Size of word (P-d\F1) | |
| NUMBER OF BITS IN DATA WORD | P-d\ALT2 | Allowed when: if P-d\ALT\N is greater than 0 | | Specify the number of bits that are in the common data word. |
| Required when: Allowed | |
| Range: Range 1 to the Size of word (P-d\F1) | |
| FIRST TAG LOCATION | P-d\ALT3 | Allowed when: if P-d\ALT\N is greater than 0 | | Identify the location of the start of the first tag location in terms of bits, with the first bit position after the synchronization pattern being number 1. |
| Required when: Allowed | |
| Range: 1-16384 | |
| SEQUENCE | P-d\ALT4 | Allowed when: if P-d\ALT\N is greater than 0 | | If the tag/data word sequence is tag, then data enter “N” for normal. If the data precedes the tag, enter “R” for reversed. |
| Required when: Allowed | |
| Range: Enumeration | |
| Enumeration | Description |
| N | Normal |
| R | Reversed |
| **Asynchronous Data Merge Format** | | | | |
| NUMBER OF ASYNCHRONOUS DATA MERGE FORMATS | P-d\ADM\N | Allowed when: P-d\DLN specified | | Specify the number of asynchronous data merge formats. |
| Range: 0-99 | |
| Default: 0 | |
| DATA MERGE NAME | P-d\ADM\DMN-n | Allowed when: P-d\ADM\N is not 0 | | Provide the data merge name for this asynchronous data merge format. This can be used to identify the source of the data merge format, as appropriate. Use the comments field to describe this data source for the asynchronous data merge format. |
| Required when: Allowed | |
| Links to: P-d\DLN | |
| Range: 32 characters | |
| MASK AND PATTERN | P-d\ADM\MP-n | Allowed when: P-d\ADM\N is not 0 | | If the asynchronous data merge format uses the overhead bits as recommended in [Chapter 4](http://www.wsmr.army.mil/RCCsite/Documents/106-17_Telemetry_Standards/chapter4.pdf), enter “N”. Otherwise enter “Y” and specify the overhead mask and patterns. Default is “N” ([Chapter 4](http://www.wsmr.army.mil/RCCsite/Documents/106-17_Telemetry_Standards/chapter4.pdf)). |
| Range: Enumeration | |
| Enumeration | Description |
| N | No |
| Y | Yes |
| Default: N | |
| OVERHEAD MASK | P-d\ADM\OHM-n | Allowed when: P-d\ADM\MP-n is Y | | If “MASK AND PATTERN” is “Y”, provide the mask of the overhead bits in binary. Right-most bit corresponds to the lsb. |
| Required when: Allowed | |
| Range: 1 to the Size of word (either P-d\MFW2-n or P-d\F1) of 0,1 | |
| FRESH DATA PATTERN | P-d\ADM\FDP-n | Allowed when: P-d\ADM\MP-n is Y | | If “MASK AND PATTERN” is “Y”, provide the pattern for fresh data in binary. Right-most bit corresponds to the lsb. |
| Required when: Allowed | |
| Range: 1 to the Size of word (either P-d\MFW2-n or P-d\F1) of 0,1 | |
| DATA OVERFLOW PATTERN | P-d\ADM\DOP-n | Allowed when: P-d\ADM\MP-n is Y | | If “MASK AND PATTERN” is “Y”, provide the pattern for data overflow in binary. Left-most bit corresponds to the msb. |
| Required when: Allowed | |
| Range: 1 to the Size of word (either P-d\MFW2-n or P-d\F1) of 0,1 | |
| STALE DATA PATTERN | P-d\ADM\SDP-n | Allowed when: P-d\ADM\MP-n is Y | | If “MASK AND PATTERN” is “Y”, provide the pattern for stale data in binary. Left-most bit corresponds to the msb. |
| Required when: Allowed | |
| Range: 1 to the Size of word (either P-d\MFW2-n or P-d\F1) of 0,1 | |
| USER DEFINED PATTERN | P-d\ADM\UDP-n | Allowed when: P-d\ADM\MP-n is Y | | If “MASK AND PATTERN” is “Y”, provide the pattern for user defined in binary. Left-most bit corresponds to the msb. |
| Required when: Allowed | |
| Range: 1 to the Size of word (either P-d\MFW2-n or P-d\F1) of 0,1 | |
| SUPERCOM | P-d\ADM1-n | Allowed when: P-d\ADM\N is not 0 | | If the asynchronous data merge format is not super-commutated, enter “NO”. Otherwise, enter the number of host minor frame words that are used. |
| Required when: Allowed | |
| Range: Range of 1 to P-d\MF1 minus 1 or NO | |
| LOCATION DEFINITION | P-d\ADM2-n | Allowed when: P-d\ADM\N is not 0 | | If supercommutated, specify how the word locations are defined. |
| Required when: Allowed | |
| Range: Enumeration | |
| Enumeration | Description |
| FI | First word and interval |
| EL | Every location |
| CW | Contiguous words |
| NA | Not applicable |
| LOCATION | P-d\ADM3-n-w | Allowed when: P-d\ADM\N is not 0 | | Specify the first word within the minor frame that contains the asynchronous data merge format identified. For the method when every word location is defined, repeat this entry for each word position applicable. For the first word and interval method, include the next entry to define the interval. |
| Required when: Allowed | |
| Range: Range of 1 to the value of P-d\MF1 minus 1 | |
| INTERVAL | P-d\ADM4-n | Allowed when: If P-d\ADM2-n is FI | | Specify the interval to be used to define the asynchronous data merge format locations. |
| Required when: Allowed | |
| Range: Range of 0 to the value of P-d\MF1 minus 1 | |
| DATA LENGTH | P-d\ADM5-n | Allowed when: P-d\ADM\N is not 0 | | Specify the number of data bits used in this data merge format. |
| Required when: Allowed | |
| Range: 1 to the Size of word (P-d\F1) | |
| MSB LOCATION | P-d\ADM6-n | Allowed when: P-d\ADM\N is not 0 | | Provide the msb position within the host minor frame location. |
| Required when: Allowed | |
| Range: 1 to the Size of word (P-d\F1) | |
| PARITY | P-d\ADM7-n | Allowed when: P-d\ADM\N is not 0 | | If used, specify the parity information. |
| Range: Enumeration | |
| Enumeration | Description |
| EV | Even |
| OD | Odd |
| NO | None |
| Default: NO | |
| SUB-COMMUTATED | P-d\ADM8-n-w | Allowed when: P-d\ADM\N is not 0 | | If this data merge format is not subcommutated (and appears in every minor frame), enter “NO”; otherwise, enter the number of definitions to follow, m. |
| Range: Range 0 to the size of subframe, NO | |
| Default: NO | |
| START FRAME | P-d\ADM9-n-w-m | Allowed when: P-d\ADM8-n-w is not NO | | When the data merge format is subcommutated, enter the first minor frame number this data merge format appears in. If this field is missing, the default value “1” is assumed. Repeat m number of times. |
| Range: 1 to the size of subframe | |
| Default: 1 | |
| FRAME INTERVAL | P-d\ADM10-n-w-m | Allowed when: P-d\ADM8-n-w is not NO | | When the data merge format is subcommutated, enter the interval between minor frames that this data merge format appears in. If this field is missing, the default value “1” is assumed. Repeat m number of times. |
| Range: 0 to the size of subframe | |
| Default: 1 | |
| **Chapter 7 Format** | | | | |
| CHAPTER 7 NUMBER OF SEGMENTS | P-d\C7\N | R/R Ch 10 Status: RO | | If a Chapter 7 stream is defined, specify the number of Chapter 7 segments to be defined. |
| Allowed when: P-d\DLN is specified | |
| Required when: Defining a Chapter 7 stream | |
| Range: 0 to the value of P-d\MF1 minus 1 | |
| Default: 0 | |
| CHAPTER 7 FIRST WORD OF SEGMENT | P-d\C7FW-n | R/R Ch 10 Status: RO | | Specify the starting PCM word of the Chapter 7 segment. The first transmitted bit of this word is the first bit of the segment. |
| Allowed when: P-d\C7\N is not 0 | |
| Required when: Allowed | |
| Range: 1 to the value of P-d\MF1 minus 1 | |
| CHAPTER 7 NUMBER OF PCM WORDS IN SEGMENT | P-d\C7NW-n | R/R Ch 10 Status: RO | | Specify the number of PCM words used that the Chapter 7 segment occupies. An integral, packed number of Chapter 7 bytes is used. Any left-over (0-7) bits are ignored at the end. |
| Allowed when: P-d\C7\N is not 0 | |
| Required when: Allowed | |
| Range: 1 to the value of P-d\MF1 minus 1 | |
| **Comments** | | | | |
| COMMENTS | P-d\COM | Allowed when: defining PCM Data | | Provide the additional information requested or any other information desired. |



1. PCM Measurement Description Group (D). Figure 9‑7 and Table 9‑7 contain the PCM measurement descriptions. The descriptions define each measurand or data item of interest within the frame format specified in the PCM attributes. Table 9‑7 includes the measurement name, which links the measurement to the Data Conversion Attributes group.

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| --- | --- |
|  | Beginning with RCC IRIG 106-09, it is recommended that the “Word and Frame” location type be used instead of the other six traditional location types. Additionally, when using Word and Frame, it is recommended to avoid the use of subframes (as defined in the Subframe Definitions section of the PCM Format Attributes group in RCC IRIG 106-09 and previous releases) and locate measurements by word number and frame number within the major frame. As of the release of RCC IRIG 106-11, the other six location types and subframes have been removed. |



|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Figure 9‑7. PCM Measurement Description Group (D)‑ | | | | | | **Code Name** |
| **DATA LINK NAME** - 9-112 | | | | | | (D-x\DLN) |
|  | NUMBER OF MEASUREMENT LISTS | | | | | (D-x\ML\N) |
|  | MEASUREMENT LIST NAME | | | | | (D-x\MLN-y) |
|  | NUMBER OF MEASURANDS | | | | | (D-x\MN\N-y) |
| 9-112 | MEASUREMENT NAME | | | | | (D-x\MN-y-n) |
|  |  | PARITY | | | | (D-x\MN1-y-n) |
|  |  | PARITY TRANSFER ORDER | | | | (D-x\MN2-y-n) |
|  |  | MEASUREMENT TRANSFER ORDER | | | | (D-x\MN3-y-n) |
| 9-113 |  | **\*Measurement Location** | | | |  |
|  |  | | MEASUREMENT LOCATION TYPE | | | (D-x\LT-y-n) |
|  |  | | **\*Word And Frame** | | |  |
|  |  | | | SUBFRAME ID COUNTER NAME | | (D-x\IDCN-y-n) |
|  |  | | | NUMBER OF MEASUREMENT LOCATIONS | | (D-x\MML\N-y-n) |
|  |  | | | NUMBER OF FRAGMENTS | | (D-x\MNF\N-y-n-m) |
|  |  | | | WORD POSITION | | (D-x\WP-y-n-m-e) |
|  |  | | | WORD INTERVAL | | (D-x\WI-y-n-m-e) |
| 9-114 |  | | | FRAME POSITION | | (D-x\FP-y-n-m-e) |
|  |  | | | FRAME INTERVAL | | (D-x\FI-y-n-m-e) |
|  |  | | | BIT MASK | | (D-x\WFM-y-n-m-e) |
|  |  | | | FRAGMENT TRANSFER ORDER | | (D-x\WFT-y-n-m-e) |
|  |  | | | FRAGMENT POSITION | | (D-x\WFP-y-n-m-e) |
|  |  | | | **\*Simultaneous Sampling** | |  |
|  |  | | | | SAMPLING MODE | (D-x\SS-y-n) |
|  |  | | | | SAMPLE ON | (D-x\SON-y-n) |
|  |  | | | | SAMPLE ON MEASUREMENT NAME | (D-x\SMN-y-n) |
|  |  | | | | NUMBER OF WORD FRAME SAMPLES | (D-x\SS\N-y-n) |
|  |  | | | | SAMPLE ON WORD | (D-x\SS1-y-n-s) |
|  |  | | | | SAMPLE ON FRAME | (D-x\SS2-y-n-s) |
|  | OR | | **\*Tagged Data** | | |  |
|  |  | | | NUMBER OF TAG DEFINITIONS | | (D-x\TD\N-y-n) |
|  |  | | | TAG NUMBER | | (D-x\TD2-y-n-m) |
|  |  | | | BIT MASK | | (D-x\TD3-y-n-m) |
|  |  | | | FRAGMENT TRANSFER ORDER | | (D-x\TD4-y-n-m) |
|  |  | | | FRAGMENT POSITION | | (D-x\TD5-y-n-m) |
|  |  | | **\*Relative** | | |  |
|  |  | | | NUMBER OF PARENT MEASUREMENTS | | (D-x\REL\N-y-n) |
|  |  | | | PARENT MEASUREMENT | | (D-x\REL1-y-n-m) |
|  |  | | | BIT MASK | | (D-x\REL2-y-n-m) |
|  |  | | | FRAGMENT TRANSFER ORDER | | (D-x\REL3-y-n-m) |
|  |  | | | FRAGMENT POSITION | | (D-x\REL4-y-n-m) |
|  | **\*Comments** | | | | |  |
| 9-118 |  | COMMENTS | | | | (D-x\COM) |
| \***Heading Only - No Data Entry** | | | | | |  |

| Table 9‑7. PCM Measurement Description Group (D) | | | | |
| --- | --- | --- | --- | --- |
| **Parameter** | **Code Name** | **Usage Attributes** | | **Definition** |
| DATA LINK NAME | D-x\DLN | Allowed when: P-d\DLN is specified and decommutation is required | | Provide the data link name. |
| Required when: Allowed and defining CH10 non-throughput mode | |
| Links from: P-d\DLN | |
| Range: 32 characters | |
| NUMBER OF MEASUREMENT LISTS | D-x\ML\N | Allowed when: D-x\DLN is specified | | Specify the number of measurement lists to be provided. |
| Required when: Allowed | |
| Range: 1-99 | |
| MEASUREMENT LIST NAME | D-x\MLN-y | Allowed when: D-x\DLN is specified | | Provide the measurement list name associated with the following attributes. The following information will have to be repeated for each measurement list identified in the PCM Format Attributes group. |
| Required when: Allowed | |
| Links from: P-d\MLC2-n | |
| Range: 32 characters | |
| NUMBER OF MEASURANDS | D-x\MN\N-y | Allowed when: D-x\DLN is specified | | Specify the number of measurands included within this measurement list. |
| Required when: Allowed | |
| Range: 1-9999999 | |
| MEASUREMENT NAME | D-x\MN-y-n | Allowed when: D-x\DLN is specified | | Measurand name. |
| Required when: Allowed | |
| Links to: C-d\DCN | |
| Links from: D-x\REL1-y-n-m, R-x\SMF\SMN-n-m | |
| Range: 32 characters | |
| PARITY | D-x\MN1-y-n | Allowed when: D-x\DLN is specified | | Specify parity. |
| Range: Enumeration | |
| Enumeration | Description |
| EV | Even |
| OD | Odd |
| NO | None |
| DE | Minor frame default, as specified in PARITY (P-d\F3) |
| Default: DE | |
| PARITY TRANSFER ORDER | D-x\MN2-y-n | Allowed when: D-x\MN1-y-n is not NO | | Parity bit location. |
| Required when: Allowed | |
| Range: Enumeration | |
| Enumeration | Description |
| L | Leads measurement |
| T | Trails measurement |
| D | Minor frame default, as specified in PARITY TRANSFER ORDER (P-d\F4) |
| MEASUREMENT TRANSFER ORDER | D-x\MN3-y-n | Allowed when: D-x\DLN specified | | Measurement transfer order bit location. |
| Range: Enumeration | |
| Enumeration | Description |
| M | msb first |
| L | lsb first |
| D | Default, as specified in WORD TRANSFER ORDER, (P-d\F2) |
| Default: D | |
| **Measurement Location** | | | | |
| MEASUREMENT LOCATION TYPE | D-x\LT-y-n | Allowed when: D-x\DLN specified | | Specify the nature of the location of this measurand. |
| Required when: Allowed | |
| Range: Enumeration | |
| Enumeration | Description |
| WDFR | Word and frame |
| TD | Tagged data |
| REL | Relative |
| **Word And Frame** | | | | |
| SUBFRAME ID COUNTER NAME | D-x\IDCN-y-n | Allowed when: D\LT is “WDFR” | | Specify the subframe ID counter name (ISF1) that applies to this measurement (needed only if the PCM format contains multiple ID counters). |
| Required when: Allowed | |
| Range: 32 characters | |
| Required when: When P\ISF\N > 1 | |
| NUMBER OF MEASUREMENT LOCATIONS | D-x\MML\N-y-n | Allowed when: D\LT is “WDFR” | | Specify the number of location definitions to follow for this measurement. |
| Required when: Allowed | |
| Range: 1-9999 | |
| NUMBER OF FRAGMENTS | D-x\MNF\N-y-n-m | Allowed when: D\LT is “WDFR” | | Number of word positions that each fragmented measurement location occupies. Enter “1” if this measurement is not fragmented. |
| Required when: Allowed | |
| Range: 1-8 | |
| WORD POSITION | D-x\WP-y-n-m-e | Allowed when: D\LT is “WDFR” | | Specify the minor frame word position of this measurement location or fragment. |
| Required when: Allowed | |
| Range: 1 to (P\MF1 minus 1) | |
| WORD INTERVAL | D-x\WI-y-n-m-e | Allowed when: D\LT is “WDFR” | | Specify the interval that is the offset from the first word position and each subsequent word position. An interval of zero indicates that there is only one word position being defined. |
| Range: 0 to (P\MF1 minus 2) | |
| Default: 0 | |
| FRAME POSITION | D-x\FP-y-n-m-e | Allowed when: D\LT is “WDFR” | | Specify the frame location of this measurement location or fragment. |
| Range: 1 - P\MF\N | |
| Default: 1 | |
| FRAME INTERVAL | D-x\FI-y-n-m-e | Allowed when: D\LT is “WDFR” | | Specify the interval that is the offset from the first frame location and each subsequent frame location. An interval of zero indicates that there is only one frame location being defined. |
| Range: 0 to (P\MF\N minus 1) | |
| Default: 0 | |
| BIT MASK | D-x\WFM-y-n-m-e | Allowed when: D\LT is “WDFR” | | Binary string of 1s and 0s to identify the bit locations used in each measurement location or fragment. If the full word is used, enter “FW”. Left-most bit corresponds to the msb. |
| Range: 1-64 of 0,1 or FW | |
| Default: FW | |
| FRAGMENT TRANSFER ORDER | D-x\WFT-y-n-m-e | Allowed when: D\MNF\N > 1 | | Measurement Transfer Order bit location. |
| Range: Enumeration | |
| Enumeration | Description |
| M | msb first |
| L | lsb first |
| D | Default, as specified in WORD TRANSFER ORDER (P-d\F2) |
| Default: D | |
| FRAGMENT POSITION | D-x\WFP-y-n-m-e | Allowed when: D\MNF\N > 1 | | A number from 1 to N specifying the position of this fragment within the reconstructed binary data word. 1 corresponds to the most significant fragment. Each fragment position from 1 to N must be specified only once. |
| Range: 1 - D\MNF\N | |
| Default: 1 | |
| **NOTE:** Measurement word length, fragment transfer order, and fragment position attributes do not apply when the “number of fragments” attribute for a measurement is 1. | | | | |
| **Simultaneous Sampling** | | | | |
| SAMPLING MODE | D-x\SS-y-n | Allowed when: D-x\DLN is specified | | Specify the sampling mode. Default is Normal. |
| Range: Enumeration | |
| Enumeration | Description |
| N | Normal |
| SS | Simultaneous Sample |
| Default: N | |
| SAMPLE ON | D-x\SON-y-n | Allowed when: D-x\SS-y-n is SS | | Specify where the Simultaneous Sample occurs in the format.  Choices are Measurement Name, Word/Frame, On Minor Frame, or On Major Frame. |
| Required when: Allowed | |
| Range Enumeration | |
| Enumeration | Description |
| MN | Measurement |
| WF | Word/Frame |
| MNF | On Minor Frame |
| MJF | On Major Frame |
| SAMPLE ON MEASUREMENT NAME | D-x\SMN-y-n | Allowed when: When D-x\SON-y-n is MN | | Measurement name for the measurement where the simultaneous sample occurs. |
| Required when: Allowed | |
| Range: 32 characters | |
| NUMBER OF WORD FRAME SAMPLES | D-x\SS\N-y-n | Allowed when: D-x\SON-y-n is WF | | Number of Word/Frame pairs to follow. |
| Required when: Allowed | |
| Range: Positive Integer | |
| SAMPLE ON WORD | D-x\SS1-y-n-s | Allowed when: D-x\SON-y-n is WF | | Word position where the simultaneous sample occurs. |
| Required when: Allowed | |
| Range: 1 to the value of P\MF1 minus 1 | |
| SAMPLE ON FRAME | D-x\SS2-y-n-s | Allowed when: D-x\SON-y-n is WF | | Frame position where the simultaneous sample occurs. If not specified, then simultaneous sampling occurs on every minor frame. |
| Range: 1 to (P\MF\N-1) | |
| **Tagged Data** | | | | |
| NUMBER OF TAG DEFINITIONS | D-x\TD\N-y-n | Allowed when: D\LT is “TD” | | Specify the number of tag definitions, N. If not fragmented, enter “1”. |
| Required when: Allowed | |
| Range: 1 to 9999 | |
| TAG NUMBER | D-x\TD2-y-n-m | Allowed when: D\LT is “TD” | | The expected tag number from the input data stream. |
| Required when: Allowed | |
| Range: 1 to 9999999999 | |
| BIT MASK | D-x\TD3-y-n-m | Allowed when: D\LT is “TD” | | Binary string of 1s and 0s to identify the bit locations in a word position that are assigned to this tagged data measurement. If the full word is used for this measurement, enter “FW”. Left-most bit corresponds to the msb. |
| Range: 1 to 64 of 0,1 or FW | |
| Default: FW | |
| FRAGMENT TRANSFER ORDER | D-x\TD4-y-n-m | Allowed when: D\LT is “TD” | | Fragment Transfer Order bit location. |
| Range: Enumeration | |
| Enumeration | Description |
| M | msb first |
| L | lsb first |
| D | Default, as specified in WORD TRANSFER ORDER (P-d\F2) |
| Default: D | |
| FRAGMENT POSITION | D-x\TD5-y-n-m | Allowed when: D\LT is “TD” | | A number from 1 to N specifying the position of this fragment within the reconstituted binary data word. 1 corresponds to the most significant fragment. Each fragment position from 1 to N must be specified only once. |
| Range: 1 - D\TD\N | |
| Default: 1 | |
| **Relative** | | | | |
| NUMBER OF PARENT MEASUREMENTS | D-x\REL\N-y-n | Allowed when: D\LT is “REL” | | Specify the number of parent measurements, N. If not fragmented, enter “1”. |
| Required when: Allowed | |
| Range: 1-9999999 | |
| PARENT MEASUREMENT | D-x\REL1-y-n-m | Allowed when: D\LT is “REL” | | If fragmented, all parent measurements must be at same data rate. |
| Required when: Allowed | |
| Links to: D-x\MN-y-n | |
| Range: 32 characters | |
| BIT MASK | D-x\REL2-y-n-m | Allowed when: D\LT is “REL” | | Binary string of 1s and 0s to identify the bit locations in a word position that are assigned to this relative measurement. If the full word is used for this measurement, enter “FW”. Leftmost bit corresponds to the msb. |
| Range: 1-64 of 0,1 or FW | |
| Default: FW | |
| FRAGMENT TRANSFER ORDER | D-x\REL3-y-n-m | Allowed when: D\LT is “REL” | | Fragment Transfer Order bit location. |
| Range: Enumeration | |
| Enumeration | Description |
| M | msb first |
| L | lsb first |
| D | Default, as specified in WORD TRANSFER ORDER (P-d\F2) |
| Default: D | |
| FRAGMENT POSITION | D-x\REL4-y-n-m | Allowed when: D\LT is “REL” | | A number from 1 to N specifying the position of this fragment within the reconstituted binary data word. 1 corresponds to the most significant fragment. Each fragment position from 1 to N must be specified only once. |
| Range: 1-D\REL\N | |
| Default: 1 | |
| **Comments** | | | | |
| COMMENTS | D-x\COM | Allowed when: D-x\DLN specified | | Provide the additional information requested or any other information desired. |
| Range: 3200 characters | |
| **NOTE:** This group will contain a repetition of the above information until each measurement has been defined. Any word position not included will be treated as a spare channel or a “don’t care” channel. Information will not be processed for these “spare” channels. Note that measurement list changes and format changes that are a part of class II systems are included in the above, since the key to the measurement definition is the data link name (format) and the measurement list. | | | | |

1. Bus Data Attributes (B). Figure 9‑8 and Table 9‑8 describe bus-originated data formats. The Bus Data Attributes group defines the attributes of a MIL-STD-1553 data acquisition system that is compliant with [Chapter 8](http://www.wsmr.army.mil/RCCsite/Documents/106-17_Telemetry_Standards/chapter8.pdf) or an ARINC 429 data acquisition system that is consistent with the specification of ARINC 429 bus data. The primary components of this group are the recording description and message content definition. The former defines the method by which the data were recorded on the tape such as track spread versus composite. The latter consists of the message identification information and the measurement description set. The message identification information defines the contents of the control word that identifies each bus message. The measurement description set describes the measurement attributes and contains the measurement name that links the measurand to the Data Conversion Attributes group (C).

Mode codes are described in the message identification information. If the Subterminal Address field contains 00000 or 11111, the information in the Data Word Count/Mode Code field is a mode code and identifies the function of the mode code. If the mode code has associated data words, they are described in this section of the attributes. If the bus message is a remote terminal to remote terminal transfer, both the transmit command and the receive command are used to identify the message.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Figure 9‑8. Bus Data Attributes Group (B)‑ | | | | | | | **Code Name** |
| **DATA LINK NAME** - 9-121 | | | | | | | (B-x\DLN) |
|  | TEST ITEM | | | | | | (B-x\TA) |
|  | BUS PARITY | | | | | | (B-x\BP) |
|  | NUMBER OF BUSES | | | | | | (B-x\NBS\N) |
|  |  | BUS NUMBER | | | | | (B-x\BID-i) |
|  |  | BUS NAME | | | | | (B-x\BNA-i) |
|  |  | BUS TYPE | | | | | (B-x\BT-i) |
|  |  | **\* User-Defined Words** | | | | |  |
|  |  |  | USER-DEFINED WORD 1 MEASUREMENT | | | | (B-x\UMN1-i) |
|  |  |  |  | PARITY | | | (B-x\U1P-i) |
|  |  |  |  | PARITY TRANSFER ORDER | | | (B-x\U1PT-i) |
|  |  |  |  | BIT MASK | | | (B-x\U1M-i) |
|  |  |  |  | TRANSFER ORDER | | | (B-x\U1T-i) |
|  |  |  | USER-DEFINED WORD 2 MEASUREMENT | | | | (B-x\UMN2-i) |
|  |  |  |  | PARITY | | | (B-x\U2P-i) |
|  |  |  |  | PARITY TRANSFER ORDER | | | (B-x\U2PT-i) |
|  |  |  |  | BIT MASK | | | (B-x\U2M-i) |
|  |  |  |  | TRANSFER ORDER | | | (B-x\U2T-i) |
|  |  |  | USER-DEFINED WORD 3 MEASUREMENT | | | | (B-x\UMN3-i) |
|  |  |  | | PARITY | | | (B-x\U3P-i) |
|  |  |  | | PARITY TRANSFER ORDER | | | (B-x\U3PT-i) |
|  |  |  | | BIT MASK | | | (B-x\U3M-i) |
|  |  |  | | TRANSFER ORDER | | | (B-x\U3T-i) |
| 9-125 |  | **\*Recording Description** | | | | |  |
|  |  |  | NUMBER OF TRACKS | | | | (B-x\TK\N-i) |
|  |  |  | TRACK SEQUENCE | | | | (B-x\TS-i-k) |
| 9-125 |  | **\*Message Content Definition** | | | | |  |
|  |  | | NUMBER OF MESSAGES | | | | (B-x\NMS\N-i) |
|  |  | | | MESSAGE NUMBER | | | (B-x\MID-i-n) |
|  |  | | | MESSAGE NAME | | | (B-x\MNA-i-n) |
|  |  | | | COMMAND WORD ENTRY | | | (B-x\CWE-i-n) |
|  |  | | | COMMAND WORD | | | (B-x\CMD-i-n) |
|  |  | | | REMOTE TERMINAL NAME | | | (B-x\TRN-i-n) |
|  |  | | | REMOTE TERMINAL ADDRESS | | | (B-x\TRA-i-n) |
|  |  | | | SUBTERMINAL NAME | | | (B-x\STN-i-n) |
|  |  | | | SUBTERMINAL ADDRESS | | | (B-x\STA-i-n) |
|  |  | | | TRANSMIT/RECEIVE MODE | | | (B-x\TRM-i-n) |
|  |  | | | DATA WORD COUNT/MODE CODE | | | (B-x\DWC-i-n) |
|  |  | | | SPECIAL PROCESSING | | | (B-x\SPR-i-n) |
| 9-127 |  | | | **\*ARINC 429 Message Definition** | | |  |
|  |  | | |  | ARINC 429 LABEL | | (B-x\LBL-i-n) |
|  |  | | |  | ARINC 429 SDI CODE | | (B-x\SDI-i-n) |
| 9-127 |  | | | **\*RT/RT Receive Command List** | | |  |
|  |  | | |  | RECEIVE COMMAND WORD ENTRY | | (B-x\RCWE-i-n) |
|  |  | | |  | RECEIVE COMMAND WORD | | (B-x\RCMD-i-n) |
|  |  | | |  | REMOTE TERMINAL NAME | | (B-x\RTRN-i-n) |
|  |  | | |  | REMOTE TERMINAL ADDRESS | | (B-x\RTRA-i-n) |
|  |  | | |  | SUBTERMINAL NAME | | (B-x\RSTN-i-n) |
|  |  | | |  | SUBTERMINAL ADDRESS | | (B-x\RSTA-i-n) |
|  |  | | |  | DATA WORD COUNT | | (B-x\RDWC-i-n) |
| 9-128 |  | | | **\*Mode Code** | | |  |
|  |  | | |  | MODE CODE DESCRIPTION | | (B-x\MCD-i-n) |
|  |  | | |  | MODE CODE DATA WORD DESCRIPTION | | (B-x\MCW-i-n) |
| 9-129 |  | | | **\*Measurement Description Set** | | |  |
|  |  | | |  | NUMBER OF MEASURANDS | | (B-x\MN\N-i-n) |
|  |  | | |  | | MEASUREMENT NAME | (B-x\MN-i-n-p) |
|  |  | | |  | | MEASUREMENT TYPE | (B-x\MT-i-n-p) |
|  |  | | |  | | PARITY | (B-x\MN1-i-n-p) |
|  |  | | |  | | PARITY TRANSFER ORDER | (B-x\MN2-i-n-p) |
| 9-130 |  | | | **\*Measurement Location** | | |  |
|  |  | | |  | NUMBER OF MEASUREMENT LOCATIONS | | (B-x\NML\N-i-n-p) |
|  |  | | |  | | MESSAGE WORD NUMBER | (B-x\MWN-i-n-p-e) |
| 9-130 |  | | |  | | BIT MASK | (B-x\MBM-i-n-p-e) |
|  |  | | |  | | TRANSFER ORDER | (B-x\MTO-i-n-p-e) |
|  |  | | |  | | FRAGMENT POSITION | (B-x\MFP-i-n-p-e) |
|  | **\*Comments** | | | | | |  |
| 9-131 |  | COMMENTS | | | | | (B-x\COM) |
| \*Heading Only - No Data Entry | | | | | | |  |

| Table 9‑8. Bus Data Attributes Group (B) | | | | |
| --- | --- | --- | --- | --- |
| **Parameter** | **Code Name** | **Usage Attributes** | | **Definition** |
| DATA LINK NAME | B-x\DLN | Allowed when: defining bus data | | Identify the data link name consistent with the Multiplex/Modulation group. The PCM format of the data stream shall be defined in the PCM Format Attributes group. |
| Required when: Allowed | |
| Links from: R-x\CDLN, P-d\DLN, R-x\EV\DLN-n | |
| Range: 32 characters | |
| TEST ITEM | B-x\TA | Allowed when: B\DLN is specified | | Test item description in terms of name, model, platform, or identification code that contains the data acquisition system. |
| Range: 16 characters | |
| BUS PARITY | B-x\BP | Allowed when: B\DLN is specified | | Specify whether the msb of the 1553 words is a parity bit. If parity is used, it must be odd parity, as specified in [Chapter 8](http://www.wsmr.army.mil/RCCsite/Documents/106-17_Telemetry_Standards/chapter8.pdf), Paragraph 8.2.2. |
| Required when: Allowed | |
| Range: Enumeration | |
| Enumeration | Description |
| OD | Odd |
| NO | None |
| NUMBER OF BUSES | B-x\NBS\N | Allowed when: B\DLN is specified | | Specify the number of buses included within this data link. If parity is used, the maximum is 8 buses, and if parity is not used, the maximum is 16 buses, as specified in [Chapter 8](http://www.wsmr.army.mil/RCCsite/Documents/106-17_Telemetry_Standards/chapter8.pdf), Paragraph 8.2.3. |
| Required when: Allowed | |
| Range: 1-16 | |
| BUS NUMBER | B-x\BID-i | Allowed when: B\DLN is specified | | Enter the bus number as a binary string. |
| Required when: Allowed | |
| Range: Binary | |
| BUS NAME | B-x\BNA-i | Allowed when: B\DLN is specified | | Specify the bus name. |
| Range: 32 characters | |
| BUS TYPE | B-x\BT-i | Allowed when: B\DLN is specified | | Specify the bus type. |
| Required when: Allowed | |
| Range: Enumeration | |
| Enumeration | Description |
| 1553 | 1553 bus |
| A429 | ARINC 429 bus |
| **User-Defined Words** | | | | |
| USER-DEFINED WORD 1 MEASUREMENT | B-x\UMN1-i | Allowed when: defining chapter 8 bus data and using content ID label 0010 | | Specify the measurement name associated with the content ID label (bits 5-8) value of “0010”. |
| Links to: C-d\DCN | |
| Range: 32 characters | |
| PARITY | B-x\U1P-i | Allowed when: B-x\UMN1-i is specified | | Specify parity. |
| Range: Enumeration | |
| Enumeration | Description |
| EV | Even |
| OD | Odd |
| NO | None |
| Default: NO | |
| PARITY TRANSFER ORDER | B-x\U1PT-i | Allowed when: B\U1P is not “NO” | | Parity bit location. |
| Required when: Allowed | |
| Range: Enumeration | |
| Enumeration | Description |
| L | Leads word |
| T | Trails word |
| BIT MASK | B-x\U1M-i | Allowed when: B-x\UMN1-i is specified | | Binary string of 1s and 0s to identify the bit locations that are assigned to this measurement in the word identified above. If the full word is used for this measurement, enter “FW”. Left-most bit corresponds to the msb. |
| Range: Binary or “FW” | |
| Default: FW | |
| TRANSFER ORDER | B-x\U1T-i | Allowed when: B-x\UMN1-i is specified | | Transfer Order bit location. |
| Range: Enumeration | |
| Enumeration | Description |
| MSB | msb first |
| LSB | lsb first |
| DEF | Default as specified in WORD TRANSFER ORDER (P-d\F2) |
| Default: MSB | |
| USER-DEFINED WORD 2 MEASUREMENT | B-x\UMN2-i | Allowed when: defining chapter 8 bus data and using content ID label 0011 | | Specify the measurement name associated with the content ID label (bits 5-8) value of “0011”. |
| Links to: C-d\DCN | |
| Range: 32 characters | |
| PARITY | B-x\U2P-i | Allowed when: B-x\UMN2-i is specified | | Specify parity. |
| Range: Enumeration | |
| Enumeration | Description |
| EV | Even |
| OD | Odd |
| NO | None |
| Default: NO | |
| PARITY TRANSFER ORDER | B-x\U2PT-i | Allowed when: B\U2P is not “NO” | | Parity bit location. |
| Required when: Allowed | |
| Range: Enumeration | |
| Enumeration | Description |
| L | Leads word |
| T | Trails word |
| BIT MASK | B-x\U2M-i | Allowed when: B-x\UMN2-i is specified | | Binary string of 1s and 0s to identify the bit locations that are assigned to this measurement in the word identified above. If the full word is used for this measurement, enter “FW”. Left-most bit corresponds to the msb. |
| Range: Binary or “FW” | |
| Default: FW | |
| TRANSFER ORDER | B-x\U2T-i | Allowed when: B-x\UMN2-i is specified | | Transfer Order bit location. |
| Range: Enumeration | |
| Enumeration | Description |
| MSB | msb first |
| LSB | lsb first |
| DEF | Default as specified in WORD TRANSFER ORDER (P-d\F2) |
| Default: MSB | |
| USER-DEFINED WORD 3 MEASUREMENT | B-x\UMN3-i | Allowed when: defining chapter 8 bus data and using content ID label 0100 | | Specify the measurement name associated with the content ID label (bits 5-8) value of “0100” (valid only for 1553, when response time is not used). |
| Links to: C-d\DCN | |
| Range: 32 characters | |
| PARITY | B-x\U3P-i | Allowed when: B-x\UMN3-i is specified | | Specify parity. |
| Range: Enumeration | |
| Enumeration | Description |
| EV | Even |
| OD | Odd |
| NO | None |
| Default: NO | |
| PARITY TRANSFER ORDER | B-x\U3PT-i | Allowed when: B\U3P is not “NO” | | Parity bit location. |
| Required when: Allowed | |
| Range: Enumeration | |
| Enumeration | Description |
| L | Leads word |
| T | Trails word |
| BIT MASK | B-x\U3M-i | Allowed when: B-x\UMN3-i is specified | | Binary string of 1s and 0s to identify the bit locations that are assigned to this measurement in the word identified above. If the full word is used for this measurement, enter “FW”. Left-most bit corresponds to the msb. |
| Range: Binary or “FW” | |
| Default: FW | |
| TRANSFER ORDER | B-x\U3T-i | Allowed when: B-x\UMN3-i is specified | | Transfer Order bit location. |
| Range: Enumeration | |
| Enumeration | Description |
| MSB | msb first |
| LSB | lsb first |
| DEF | Default as specified in WORD TRANSFER ORDER (P-d\F2) |
| Default: MSB | |
| **Recording Description** | | | | |
| NUMBER OF TRACKS | B-x\TK\N-i | Allowed when: B\DLN specified | | Enter the number of tape tracks used to record data. Any entry greater than one indicates that the data has been spread across multiple tracks. |
| Range: Non-Negative Integer | |
| Default: 0 | |
| TRACK SEQUENCE | B-x\TS-i-k | Allowed when: B\TK\N > 1 | | In these entries, give the sequence order of tape tracks that should be used to recover the data stream in the correct order. The order given should correspond to the actual skew of the data on the tape. |
| Required when: Allowed | |
| Range: Positive Integer | |
| **Message Content Definition** | | | | |
| NUMBER OF MESSAGES | B-x\NMS\N-i | Allowed when: B\TK\N > 1 | | The number of messages to be defined. |
| Required when: Allowed | |
| Range: Positive Integer | |
| MESSAGE NUMBER | B-x\MID-i-n | Allowed when: B\TK\N > 1 | | The message number that contains the following data. |
| Range: Positive Integer | |
| MESSAGE NAME | B-x\MNA-i-n | Allowed when: B\TK\N > 1 | | Specify the message name. |
| Range: 32 characters | |
| COMMAND WORD ENTRY | B-x\CWE-i-n | Allowed when: dB-x\BT-I is 1553 | | Method used to specify the command word. |
| Range: Enumeration | |
| Enumeration | Description |
| W | Enter the entire command word in the COMMAND WORD attribute |
| F | Enter command word fields separately in the REMOTE TERMINAL ADDRESS, SUBTERMINAL ADDRESS, TRANSMIT/RECEIVE MODE, and DATA WORD COUNT/MODE CODE attributes |
| Default: F | |
| COMMAND WORD | B-x\CMD-i-n | Allowed when: B-x\CWE-i-n is “W” | | Specify the entire command word for this message. |
| Required when: Allowed | |
| Range: Hexadecimal | |
| REMOTE TERMINAL NAME | B-x\TRN-i-n | Allowed when: B-x\CWE-i-n is “F” | | Enter the name of the remote terminal that is sending or receiving this message. For RT/RT, specify the sending remote terminal name. |
| Range: 32 characters | |
| REMOTE TERMINAL ADDRESS | B-x\TRA-i-n | Allowed when: B-x\CWE-i-n is “F” | | Specify the five-bit remote terminal address for this message. |
| Required when: Allowed | |
| Range: Binary | |
| SUBTERMINAL NAME | B-x\STN-i-n | Allowed when: B-x\CWE-i-n is “F” | | Enter the name of the subterminal that is sending or receiving this message. |
| Range: 32 characters | |
| SUBTERMINAL ADDRESS | B-x\STA-i-n | Allowed when: B-x\CWE-i-n is “F” | | Specify the five-bit subterminal address for this message. Use “X” to indicate a “don’t care” value. |
| Required when: Allowed | |
| Range: Binary pattern of 5 | |
| TRANSMIT/ RECEIVE MODE | B-x\TRM-i-n | Allowed when: B-x\CWE-i-n is “F” | | Indicate if this command word is a transmit or receive command. For RT/RT, specify transmit. |
| Required when: Allowed | |
| Range: Enumeration | |
| Enumeration | Description |
| 1 | Transmit |
| 0 | Receive |
| DATA WORD COUNT/MODE CODE | B-x\DWC-i-n | Allowed when: B-x\CWE-i-n is “F” | | Enter the number of data words as a binary string, using “X” to indicate a “don’t care” value. If the subterminal address indicates a mode code, enter the mode code value as a binary string. |
| Required when: Allowed | |
| Range: Binary pattern of 5 | |
| SPECIAL PROCESSING | B-x\SPR-i-n | Allowed when: B\DLN is specified | | Provide any special processing requirements pertaining to this message. |
| Range: 200 characters | |
| **ARINC 429 Message Definition** | | | | |
| ARINC 429 LABEL | B-x\LBL-i-n | Allowed when: B-x\BT-i is “A429” | | Specify the eight-bit ARINC 429 label for this message. |
| Required when: Allowed | |
| Range: 8 Binary digits | |
| ARINC 429 SDI CODE | B-x\SDI-i-n | Allowed when: B-x\BT-i is “A429” | | Specify the two-bit ARINC 429 SDI code for this message. |
| Required when: Allowed | |
| Range: Enumeration | |
| Enumeration | Description |
| ALL | All SDI |
| 0 | SDI code 0 |
| 1 | SDI code 1 |
| 2 | SDI code 2 |
| 3 | SDI code 3 |
| **RT/RT Receive Command List** | | | | |
| RECEIVE COMMAND WORD ENTRY | B -x\RCWE-i-n | Allowed when: B\DLN is specified | | Method used to specify the receive command word. Default is “F”. |
| Range: Enumeration | |
| Enumeration | Description |
| W | Enter the entire command word in the RECEIVE COMMAND WORD attribute. |
| F | Enter the command word fields separately in the REMOTE TERMINAL ADDRESS, SUBTERMINAL ADDRESS, and DATA WORD COUNT attributes. |
| RECEIVE COMMAND WORD | B-x\RCMD-i-n | Allowed when: B-x\RCWE-i-n is “W” | | Specify the entire receive command word for this RT/RT message. |
| Required when: Allowed | |
| Range: Hexadecimal | |
| REMOTE TERMINAL NAME | B-x\RTRN-i-n | Allowed when: B-x\RCWE-i-n is “F” | | Enter the name of the remote terminal that is receiving this RT/RT message. |
| Range: 32 characters | |
| REMOTE TERMINAL ADDRESS | B-x\RTRA-i-n | Allowed when: B-x\RCWE-i-n is “F” | | Specify the five-bit remote terminal address for this RT/RT message. |
| Required when: Allowed | |
| Range: Binary | |
| SUBTERMINAL NAME | B-x\RSTN-i-n | Allowed when: B-x\RCWE-i-n is “F” | | Enter the name of the sub-terminal that is receiving this RT/RT message. |
| Range: 32 characters | |
| SUBTERMINAL ADDRESS | B-x\RSTA-i-n | Allowed when: B-x\RCWE-i-n is “F” | | Specify the five-bit subterminal address for this RT/RT message. Use “X” to indicate a “don’t care” value. |
| Required when: Allowed | |
| Range: Binary Pattern of 5 | |
| DATA WORD COUNT | B-x\RDWC-i-n | Allowed when: B-x\RCWE-i-n is “F” | | Enter the number of data words as a binary string, using “X” to indicate a “don’t care” value. Exclude status and time words. An RT/RT message cannot contain a mode code. |
| Required when: Allowed | |
| Range: Binary Pattern of 5 | |
| **Mode Code** | | | | |
| MODE CODE DESCRIPTION | B-x\MCD-i-n | Allowed when: B-x\DWC-i-n is 00000 or 11111 | | Describe the function or action associated with this mode code. |
| Range: 200 characters | |
| MODE CODE DATA WORD DESCRIPTION | B-x\MCW-i-n | Allowed when: B-x\DWC-i-n is 00000 or 11111 | | If the mode code has an associated data word following the mode code command, provide a complete description of the data word. |
| Range: 200 characters | |
| **Measurement Description Set** | | | | |
| NUMBER OF MEASURANDS | B-x\MN\N-i-n | Allowed when: B\DLN is specified | | Specify the number of measurands. |
| Required when: Allowed | |
| Range: Positive Integer | |
| MEASUREMENT NAME | B-x\MN-i-n-p | Allowed when: B\DLN is specified | | Measurand name. |
| Required when: Allowed | |
| Links to: C-d\DCN | |
| Links from: R-x\BME\SMN-n-m | |
| Range: 32 characters | |
| MEASUREMENT TYPE | B-x\MT-i-n-p | Allowed when: B\DLN is specified | | Content identification. |
| Required when: Allowed | |
| Range: Enumeration | |
| Enumeration | Description |
| D | Data word |
| C | Command word |
| S | Status word |
| T | Time word |
| PARITY | B-x\MN1-i-n-p | Allowed when: B\DLN is specified | | Specify parity. |
| Status: Optional | |
| Range: Enumeration | |
| Enumeration | Description |
| EV | Even |
| OD | Odd |
| NO | None |
| Default: NO | |
| PARITY TRANSFER ORDER | B-x\MN2-i-n-p | Allowed when: B\MN1 is not “NO” | | Parity bit location. |
| Required when: Allowed | |
| Range: Enumeration | |
| Enumeration | Description |
| L | Leads word |
| T | Trails word |
| **Measurement Location** | | | | |
| NUMBER OF MEASUREMENT LOCATIONS | B-x\NML\N-i-n-p | Allowed when: B\DLN is specified | | If this measurement is contained in one word, enter “1”. If this measurement is fragmented, enter the number of fragments. |
| Required when: Allowed | |
| Range: 1-8 | |
| MESSAGE WORD NUMBER | B-x\MWN-i-n-p-e | Allowed when: B\DLN is specified | | Enter the data word number within a message that contains the measurement or the fragmented measurand. |
| Required when: Allowed | |
| Range: Positive Integer | |
| BIT MASK | B-x\MBM-i-n-p-e | Allowed when: B\DLN is specified | | Binary string of 1s and 0s to identify the bit locations that are assigned to this measurement in the word identified above. If the full word is used for this measurement, enter “FW”. Left-most bit corresponds to the msb. |
| Range: Binary or “FW” | |
| Default: FW | |
| TRANSFER ORDER | B-x\MTO-i-n-p-e | Allowed when: B\DLN is specified | | Bit transfer order for the measurement. |
| Range: Enumeration | |
| Enumeration | Description |
| MSB | msb first. |
| LSB | lsb bit first. |
| DEF | Default as specified in WORD TRANSFER ORDER (P-d\F2). |
| Default: MSB | |
| FRAGMENT POSITION | B-x\MFP-i-n-p-e | Allowed when: B\DLN is specified | | A number from 1 to N specifying the position of this fragment within the reconstructed binary data word. 1 corresponds to the most significant fragment. Each fragment position from 1 to N must be specified only once. |
| Range: 1-8 | |
| Required when: B\NML\N is greater than 1 | |
| **NOTE:** Repeat the above to describe each fragment of a fragmented word. The transfer order indicates whether to transpose the order of the bit sequence or not (lsb indicates to transpose the bit sequence). | | | | |
| **Comments** | | | | |
| COMMENTS | B-x\COM | Allowed when: B\DLN is specified | | Provide the additional information requested or other information desired. |
| Range: 3200 characters | |

1. Message Data Attributes (S). The Message Data Attributes are presented graphically in Figure 9‑9 and specified in Table 9‑9. The information contained within this group is used to describe the characteristics and measurement locations within data streams as described by the UART, Message, Ethernet, IEEE-1394, and Fibre Channel Chapter 10 channel data types.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Figure 9‑9. Message Data Attributes Group (S)‑ | | | | | | | **Code Name** |
| **DATA LINK NAME** - 9-134 | | | | | | | (S-d\DLN) |
|  | TEST ITEM | | | | | | (S-d\TA) |
|  | NUMBER OF STREAMS | | | | | | (S-d\NS\N) |
|  |  | STREAM NAME | | | | | (S-d\SNA-i) |
|  |  | MESSAGE DATA TYPE | | | | | (S-d\MDT-i) |
|  |  | MESSAGE DATA LAYOUT | | | | | (S-d\MDL-i) |
|  |  | MESSAGE ELEMENT SIZE | | | | | (S-d\MES-i) |
|  |  | MESSAGE ID LOCATION | | | | | (S-d\MIDL-i) |
|  |  | MESSAGE LENGTH | | | | | (S-d\MLEN-i) |
|  |  | MESSAGE DELIMITER | | | | | (S-d\MDEL-i) |
|  |  | MESSAGE DELIMITER LENGTH | | | | | (S-d\MDLEN-i) |
|  |  | FIELD DELIMITER | | | | | (S-d\FDEL-i) |
|  |  | DATA ORIENTATION | | | | | (S-d\DO-i) |
| 9-136 |  | **\*Message Content Definition** | | | | |  |
|  |  | | NUMBER OF MESSAGES | | | | (S-d\NMS\N-i) |
|  |  | | | MESSAGE ID | | | (S-d\MID-i-n) |
|  |  | | | MESSAGE DESCRIPTION | | | (S-d\MNA-i-n) |
|  |  | | | NUMBER OF FIELDS | | | (S-d\NFLDS\N-i-n) |
|  |  | | | | FIELD NUMBER | | (S-d\FNUM-i-n-m) |
|  |  | | | | FIELD START | | (S-d\FPOS-i-n-m) |
|  |  | | | | FIELD LENGTH | | (S-d\FLEN-i-n-m) |
| 9-136 |  | | | **\*Measurement Description Set** | | |  |
|  |  | | | | NUMBER OF MEASURANDS | | (S-d\MN\N-i-n) |
|  |  | | | | | MEASUREMENT NAME | (S-d\MN-i-n-p) |
|  |  | | | | | PARITY | (S-d\MN1-i-n-p) |
|  |  | | | | | PARITY TRANSFER ORDER | (S-d\MN2-i-n-p) |
|  |  | | | | | DATA TYPE | (S-d\MBFM-i-n-p) |
|  |  | | | | | FLOATING POINT FORMAT | (S-d\MFPF-i-n-p) |
|  |  | | | | | DATA ORIENTATION | (S-d\MDO-i-n-p) |
| 9-138 |  | | | | **\*Measurement Location** | |  |
|  |  | | | | | NUMBER OF MEASUREMENT LOCATIONS | (S-d\NML\N-i-n-p) |
|  |  | | | | | MESSAGE FIELD NUMBER | (S-d\MFN-i-n-p-e) |
|  |  | | | | | BIT MASK | (S-d\MBM-i-n-p-e) |
|  |  | | | | | TRANSFER ORDER | (S-d\MTO-i-n-p-e) |
|  |  | | | | | FRAGMENT POSITION | (S-d\MFP-i-n-p-e) |
| 9-139 | **\*Comments** | | | | | |  |
|  |  | COMMENTS | | | | | (S-d\COM) |
| \*Heading Only - No Data Entry | | | | | | |  |

| Table 9‑9. Message Data Attributes Group (S) | | | | |
| --- | --- | --- | --- | --- |
| **Parameter** | **Code Name** | **Usage Attributes** | | **Definition** |
| DATA LINK NAME | S-d\DLN | Allowed when: R\CDT is either “UARTIN” or “MSGIN” or “ETHIN” or “FBCHIN” | | Identify the data link name consistent with the Recorder-Reproducer group. |
| Required when: Allowed | |
| Links from: R-x\CDLN, R-x\EV\DLN-n | |
| Range: 32 characters | |
| TEST ITEM | S-d\TA | Allowed when: S\DLN is specified | | Test item description in terms of name, model, platform, or identification code that contains the data acquisition system. |
| Range: 16 characters | |
| NUMBER OF STREAMS | S-d\NS\N | Allowed when: S\DLN is specified | | Specify the number of message data streams included within this data link. |
| Required when: Allowed | |
| Range: 2 characters | |
| STREAM NAME | S-d\SNA-i | Allowed when: S\DLN is specified | | Specify the message data stream name (subchannel name or same as data link name if no subchannel). |
| Required when: Allowed | |
| Range: 32 characters | |
| MESSAGE DATA TYPE | S-d\MDT-i | Allowed when: S\DLN is specified | | Data type - “ASCII” or “BINARY”. |
| Range: Enumeration | |
| Enumeration | Description |
| ASCII |  |
| BINARY |  |
| Default: ASCII | |
| MESSAGE DATA LAYOUT | S-d\MDL-i | Allowed when: S\DLN is specified | | Specify message data layout. |
| Required when: Allowed | |
| Range: Enumeration | |
| Enumeration | Description |
| DELIMITED | Data layout [ASCII data type only] |
| FIXED | ASCII or binary data types. |
| MESSAGE ELEMENT SIZE | S-d\MES-i | Allowed when: S\DLN is specified | | Element size in number of bits. |
| Required when: Allowed | |
| Range: 2 characters | |
| Default: 8 | |
| MESSAGE ID LOCATION | S-d\MIDL-i | Allowed when: S\DLN is specified | | Message ID field number. |
| Required when: Allowed | |
| Range: 4 characters | |
| MESSAGE LENGTH | S-d\MLEN-i | Allowed when: S-d\MDL-I is “FIXED” | | Message length in number of message elements (fixed data layout only). |
| Required when: Allowed | |
| Range: 8 characters | |
| MESSAGE DELIMITER | S-d\MDEL-i | Allowed when: S-d\MDL-I is “DELIMITED” | | Message delimiter - “CRLF” or “CR” or “LF” or hex value (delimited layout only). |
| Required when: Allowed | |
| Range: Hex or Enums | |
| MESSAGE DELIMITER LENGTH | S-d\MDLEN-i | Allowed when: S-d\MDL-I is “DELIMITED” | | Message delimiter length in number of message elements (delimited layout only). |
| Required when: Allowed | |
| Range: 2 characters | |
| FIELD DELIMITER | S-d\FDEL-i | Allowed when: S-d\MDL-I is “DELIMITED” | | Field delimiter - “,” or “|”, or “blank” or “tab”, or hex value (delimited layout only). |
| Required when: Allowed | |
| Range: Hex or Enums | |
| **NOTE:** A field is a set of elements determined by the number of elements or elements between field delimiters. A message consists of one or more fields, which can be fixed or variable length. | | | | |
| DATA ORIENTATION | S-d\DO-i | Allowed when: S-d\MDT-I = “BINARY”. | | Data orientation. Binary data type only. |
| Range: Enumeration | |
| Enumeration | Description |
| L | Little endian |
| B | Big endian |
| Default: Big Endian | |
| **Message Content Definition** | | | | |
| NUMBER OF MESSAGES | S-d\NMS\N-i | Allowed when: S\DLN is specified | | The number of messages to be defined. |
| Required when: Allowed | |
| Range: 8 characters | |
| MESSAGE ID | S-d\MID-i-n | Allowed when: S-d\MIDL-I is not “0” | | Message ID value. ASCII value in quotes or hex value. |
| Required when: Allowed | |
| Range: ASCII or Hex | |
| MESSAGE DESCRIPTION | S-d\MNA-i-n | Allowed when: S-d\MIDL-I is not “0” | | Message description. |
| Range: 64 characters | |
| NUMBER OF FIELDS | S-d\NFLDS\N-i-n | Allowed when: S-d\MIDL-I is not “0” | | Number of fields in the message. |
| Required when: Allowed | |
| Range: 4 characters | |
| FIELD NUMBER | S-d\FNUM-i-n-m | Allowed when: S-d\MIDL-I is not “0” | | Specify the field number. |
| Required when: Allowed | |
| Range: 4 characters | |
| FIELD START | S-d\FPOS-i-n-m | Allowed when: S-d\MDL-I is “FIXED” | | Enter the element position of the field (only for fixed column message data layout). |
| Required when: Allowed | |
| Range: 5 characters | |
| FIELD LENGTH | S-d\FLEN-i-n-m | Allowed when: S-d\MDL-I is “FIXED” | | Enter the field length (only for fixed message data layout). If message data type is ASCII, ASCII string in field is converted to specified data type, i.e., float. If message data type is binary, field is cast as specified data type, i.e., unsigned, signed, float, ASCII, etc. |
| Required when: Allowed | |
| Range: 5 characters | |
| **Measurement Description Set** | | | | |
| NUMBER OF MEASURANDS | S-d\MN\N-i-n | Allowed when: S\DLN is specified | | Specify the number of measurands. |
| Range: 4 characters | |
| MEASUREMENT NAME | S-d\MN-i-n-p | Allowed when: S\MN\N > 0 | | Measurand name. |
| Links to: C-d\DCN | |
| Range: 32 characters | |
| PARITY | S-d\MN1-i-n-p | Allowed when: S\MN\N > 0 | | Normal word parity. |
| Range: Enumeration | |
| Enumeration | Description |
| EV | Even |
| OD | Odd |
| NO | None |
| Default: NO | |
| PARITY TRANSFER ORDER | S-d\MN2-i-n-p | Allowed when: S\MN\N > 0 | | Parity bit location. |
| Range: Enumeration | |
| Enumeration | Description |
| L | Leads word |
| T | Trails word |
| DATA TYPE | S-d\MBFM-i-n-p | Allowed when: S\MN\N > 0 | | Data type. If message data type is binary then only ASCII, signed, unsigned, and float are valid. |
| Range: Enumeration | |
| Enumeration | Description |
| ASCII | ASCII characters |
| FLOAT | Binary floating point data |
| SIGNED | Binary signed integer data |
| UNSIGNED | Binary unsigned integer data |
| HEX | ASCII characters 0-9, A-F |
| OCTAL | ASCII characters 0-7 |
| BINARY | ASCII characters 0 and 1 |
| **NOTE:** For binary messages, the data type describes the format of the raw input data as it appears in the stream. If FLOAT is specified in a binary message, the floating point format attribute describes the specific floating point data type. For ASCII messages, FLOAT, SIGNED, and UNSIGNED define how to interpret the ASCII data for conversion to an output data type for numeric processing. | | | | |
| FLOATING POINT FORMAT | S-d\MFPF-i-n-p | Allowed when: S\MN\N > 0 | | If data type is “float”, specify which floating point format will be used. Only for binary message data type. See Appendix 9-D for more information. |
| Range: Enumeration | |
| Enumeration | Description |
| IEEE\_32 | IEEE 754 single precision |
| IEEE\_64 | IEEE 754 double precision |
| 1750A\_32 | MIL-STD 1750A single precision |
| 1750A\_48 | MIL-STD 1750A double precision |
| DEC\_32 | DEC single precision |
| DEC\_64 | DEC double precision |
| DEC\_64G | DEC “G” double precision |
| IBM\_32 | IBM single precision |
| IBM\_64 | IBM double precision |
| TI\_32 | TI single precision |
| TI\_40 | TI extended precision |
| DATA ORIENTATION | S-d\MDO-i-n-p | Allowed when: S\MN\N > 0 | | Data orientation. Binary data type only. |
| Range: Enumeration | |
| Enumeration | Description |
| L | Little endian |
| B | Big endian |
| Default: Big Endian | |
| **Measurement Location** | | | | |
| NUMBER OF MEASUREMENT LOCATIONS | S-d\NML\N-i-n-p | Allowed when: S\MN\N > 0 | | If this measurement is contained in one field, enter “1”. If this measurement is fragmented, enter the number of fragments. |
| Range: 2 characters | |
| MESSAGE FIELD NUMBER | S-d\MFN-i-n-p-e | Allowed when: S\NML\N > 0 | | Enter the field number within a message that contains the measurement or the fragmented measurand. |
| Range: 4 characters | |
| BIT MASK | S-d\MBM-i-n-p-e | Allowed when: S\NML\N > 0 | | Binary string of 1s and 0s to identify the bit locations that are assigned to this measurement in the field identified above. If the entire field is used for this measurement, enter “FW”. Left-most bit corresponds to the msb. |
| Range: Binary or FW | |
| TRANSFER ORDER | S-d\MTO-i-n-p-e | Allowed when: S\NML\N > 0 | | Specify transfer order bit as most significant or least significant. |
| Range: Enumeration | |
| Enumeration | Description |
| MSB | msb |
| LSB | lsb |
| FRAGMENT POSITION | S-d\MFP-i-n-p-e | Allowed when: S\NML\N > 0 | | A number from 1 to N specifying the position of this fragment within the reconstructed binary field. 1 corresponds to the most significant fragment. Each fragment position from 1 to N must be specified only once. |
| Range: 1-8 | |
| **NOTE:** Repeat the above to describe each fragment of a fragmented field. The transfer order indicates whether to transpose the order of the bit sequence or not (lsb indicates to transpose the bit sequence). | | | | |
| **Comments** | | | | |
| COMMENTS | S-d\COM | Allowed when: S\DLN is specified | | Provide the additional information requested or any other information desired. |
| Range: 3200 characters | |

* + 1. Data Conversion Attributes (C)

The Data Conversion Attributes group includes a definition of the method by which the raw telemetry data is to be converted to meaningful information. The sensor calibration is contained in the group for each type of sensor that uses a standard calibration curve or for each sensor or parameter that has a unique calibration requirement. The calibration information can be entered in several different formats. Provision is made to permit a test organization to convert data set entries to coefficients of an appropriate curve fit and record the derived coefficients. Figure 9‑10 shows the structure of the data conversion attributes. Table 9‑10 contains the detailed information required.

|  |  |
| --- | --- |
|  | For reference purposes, the following telemetry unit definitions apply:   * PCM - natural binary range as indicated by binary format entry * FM (Analog) - lower band edge (−100) to upper band edge (+100). |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Figure 9‑10. Data Conversion Attributes Group (C)‑ | | | | | | | **Code Name** |
| **MEASUREMENT NAME** - 9-143 | | | | | | | (C-d\DCN) |
| 9-143 | **\*Transducer Information** | | | | | |  |
|  |  | | TYPE | | | | (C-d\TRD1) |
|  |  | | MODEL NUMBER | | | | (C-d\TRD2) |
|  |  | | SERIAL NUMBER | | | | (C-d\TRD3) |
|  |  | | SECURITY CLASSIFICATION | | | | (C-d\TRD4) |
|  |  | | ORIGINATION DATE | | | | (C-d\TRD5) |
|  |  | | REVISION NUMBER | | | | (C-d\TRD6) |
|  |  | | ORIENTATION | | | | (C-d\TRD7) |
| 9-144 |  | | **\*Point of Contact** | | | |  |
|  |  | | | | NAME | | (C-d\POC1) |
|  |  | | | | AGENCY | | (C-d\POC2) |
|  |  | | | | ADDRESS | | (C-d\POC3) |
|  |  | | | | TELEPHONE | | (C-d\POC4) |
| 9-144 | **\*Measurand** | | | | | |  |
|  |  | | DESCRIPTION | | | | (C-d\MN1) |
|  |  | | MEASUREMENT ALIAS | | | | (C-d\MNA) |
|  |  | | EXCITATION VOLTAGE | | | | (C-d\MN2) |
|  |  | | ENGINEERING UNITS | | | | (C-d\MN3) |
|  |  | | LINK TYPE | | | | (C-d\MN4) |
| 9-144 | **\*Telemetry Value Definition** | | | | | |  |
|  |  | | BINARY FORMAT | | | | (C-d\BFM) |
|  |  | | **\*Floating Point** | | | |  |
|  |  | |  | | FLOATING POINT FORMAT | | (C-d\FPF) |
|  |  | | **\*Bit Weight** | | | |  |
|  |  | |  | | NUMBER OF BITS | | (C-d\BWT\N) |
|  |  | |  | | BIT NUMBER | | (C-d\BWTB-n) |
|  |  | |  | | BIT WEIGHT VALUE | | (C-d\BWTV-n) |
| 9-146 | **\*In-Flight Calibration** | | | | | |  |
|  |  | | NUMBER OF POINTS | | | | (C-d\MC\N) |
|  |  | | STIMULUS | | | | (C-d\MC1-n) |
|  |  | | TELEMETRY VALUE | | | | (C-d\MC2-n) |
|  |  | | DATA VALUE | | | | (C-d\MC3-n) |
| 9-147 | **\*Ambient Value** | | | | | |  |
|  |  | | NUMBER OF AMBIENT CONDITIONS | | | | (C-d\MA\N) |
|  |  | | STIMULUS | | | | (C-d\MA1-n) |
|  |  | | TELEMETRY VALUE | | | | (C-d\MA2-n) |
|  |  | | DATA VALUE | | | | (C-d\MA3-n) |
| x | **\*Measurement Filtering** | | | | | |  |
|  |  | | | FILTERING ENABLED | | | (C-d\FEN) |
|  |  | | | FILTERING DELAY | | | (C-d\FDL) |
|  |  | | | NUMBER OF FILTERS | | | (C-d\F\N) |
|  |  | | | FILTER TYPE | | | (C-d\FTY-n) |
|  |  | | | NUMBER OF POLES OR SAMPLES | | | (C-d\FNPS-n) |
| 9-147 | **\*Other Information** | | | | | |  |
|  |  | | HIGH MEASUREMENT VALUE | | | | (C-d\MOT1) |
|  |  | | LOW MEASUREMENT VALUE | | | | (C-d\MOT2) |
|  |  | | HIGH ALERT LIMIT VALUE | | | | (C-d\MOT3) |
|  |  | | LOW ALERT LIMIT VALUE | | | | (C-d\MOT4) |
|  |  | | HIGH WARNING LIMIT VALUE | | | | (C-d\MOT5) |
|  |  | | LOW WARNING LIMIT VALUE | | | | (C-d\MOT6) |
|  |  | | INITIAL VALUE | | | | (C-d\MOT7) |
|  |  | | SAMPLE RATE | | | | (C-d\SR) |
| 9-148 | **\*Data Conversion** | | | | | |  |
|  |  | | DATE AND TIME RELEASED | | | | (C-d\CRT) |
|  |  | | CONVERSION TYPE | | | | (C-d\DCT) |
| 9-149 |  | | **\*Engineering Units Conversion** | | | |  |
| 9-149 |  | | | | **\*Pair Sets** | |  |
|  |  | | | | | NUMBER OF SETS | (C-d\PS\N) |
|  |  | | | | | APPLICATION | (C-d\PS1) |
|  |  | | | | | ORDER OF FIT | (C-d\PS2) |
|  |  | | | | | TELEMETRY VALUE | (C-d\PS3-n) |
|  |  | | | | | ENGINEERING UNITS VALUE | (C-d\PS4-n) |
| 9-149 | OR | | | | **\*Coefficients** | |  |
|  |  | | | | | ORDER OF CURVE FIT | (C-d\CO\N) |
| 9-150 |  | | | | | DERIVED FROM PAIR SET | (C-d\CO1) |
|  |  | | | | | COEFFICIENT (0) | (C-d\CO) |
|  |  | | | | | N-TH COEFFICIENT | (C-d\CO-n) |
|  | OR | | | | **\*Coefficients (Negative Powers of X)** | |  |
|  |  | | | | | ORDER | (C-d\NPC\N) |
|  |  | | | | | DERIVED FROM PAIR SET | (C-d\NPC1) |
|  |  | | | | | COEFFICIENT (0) | (C-d\NPC) |
|  |  | | | | | N-TH COEFFICIENT | (C-d\NPC-n) |
| 9-151 | OR | | | | **\*Other** | |  |
|  |  | | | | | DEFINITION OF OTHER DATA CONVERSION | (C-d\OTH) |
| 9-151 | OR | | | | **\*Derived Parameter** | |  |
|  |  | | | | | ALGORITHM TYPE | (C-d\DPAT) |
|  |  | | | | | ALGORITHM | (C-d\DPA) |
|  |  | | | | | TRIGGER MEASURAND | (C-d\DPTM) |
|  |  | | | | | NUMBER OF OCCURRENCES | (C-d\DPNO) |
|  |  | | | | | NUMBER OF INPUT MEASURANDS | (C-d\DP\N) |
|  |  | | | | | MEASURAND #N | (C-d\DP-n) |
|  |  | | | | | NUMBER OF INPUT CONSTANTS | (C-d\DPC\N) |
|  |  | | | | | CONSTANT #N | (C-d\DPC-n) |
| 9-152 | OR | | | | **\*Discrete** | |  |
|  |  | | | | | NUMBER OF EVENTS | (C-d\DIC\N) |
|  |  | | | | | NUMBER OF INDICATORS | (C-d\DICI\N) |
|  |  | | | | | CONVERSION DATA | (C-d\DICC-n) |
|  |  | | | | | PARAMETER EVENT DEFINITION | (C-d\DICP-n) |
| 9-152 | OR | | | | **\* PCM Time** | |  |
|  |  | | | | | PCM TIME WORD FORMAT | (C-d\PTM) |
| 9-153 | OR | | | | **\* 1553 Time** | |  |
|  |  | | | | | 1553 TIME WORD FORMAT | (C-d\BTM) |
| 9-153 | OR | | | | **\*Digital Voice** | |  |
|  |  | | | | | ENCODING METHOD | (C-d\VOI\E) |
|  |  | | | | | DESCRIPTION | (C-d\VOI\D) |
| 9-153 | OR | | | | **\*Digital Video** | |  |
|  |  | | | | | ENCODING METHOD | (C-d\VID\E) |
|  |  | | | | | DESCRIPTION | (C-d\VID\D) |
|  | **\*Comments** | | | | | |  |
| 9-154 | |  | COMMENTS | | | | (C-d\COM) |
| \*Heading Only - No Data Entry | | | | | | |  |

| Table 9‑10. Data Conversion Attributes Group (C) | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Code Name** | | **Usage Attributes** | | | | **Definition** | |
| MEASUREMENT NAME | | C-d\DCN | | Allowed when: Always | | | | Give the measurement name. | |
| Links from: R-x\AMN-n-m , R-x\AMN-n-m M-x\SI\MN-n , M-x\BB\MN , D-x\MN-y-n , B-x\UMN1-i , B-x\UMN2-i , B-x\UMN3-i , B-x\MN-i-n-p , S-d\MN-i-n-p, R-x\DMN-n-m | | | |
| Range: 32 characters | | | |
| **Transducer Information** | | | | | | | | | |
| TYPE | | C-d\TRD1 | | Allowed when: C-d\DCN is specified | | | | Type of sensor, if appropriate. | |
| Range: 32 characters | | | |
| MODEL NUMBER | | C-d\TRD2 | | Allowed when: C-d\DCN is specified | | | | If appropriate. | |
| Range: 32 characters | | | |
| SERIAL NUMBER | | C-d\TRD3 | | Allowed when: C-d\DCN is specified | | | | If applicable. | |
| Range: 32 characters | | | |
| SECURITY CLASSIFICATION | | C-d\TRD4 | | Allowed when: C-d\DCN is specified | | | | Enter the security classification of this measurand. Append the following: If received telemetry signal (Counts) is classified, add “R”. If expressed in engineering units, the measurand value is classified, add “E”. If both are classified, add “B”. | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| U | Unclassified | | |
| C | Confidential | | |
| S | Secret | | |
| T | Top secret | | |
| O | Other | | |
| ORIGINATION DATE | | C-d\TRD5 | | Allowed when: C-d\DCN is specified | | | | Date of origination of this data file. “DD” (Day). “MM” (Month). “YYYY” (Year). | |
| Range: MM-DD-YYYY | | | |
| REVISION NUMBER | | C-d\TRD6 | | Allowed when: C-d\DCN is specified | | | | Specify the revision number of the data provided. | |
| Range: 4 characters | | | |
| ORIENTATION | | C-d\TRD7 | | Allowed when: C-d\DCN is specified | | | | Describe the physical orientation of the sensor. | |
| Range: 32 characters | | | |
| **Point of Contact** | | | | | | | | | |
| NAME | | C-d\POC1 | | Allowed when: C-d\DCN is specified | | | | Point of contact with the organization that provided the calibration data. | |
| Range: 24 characters | | | |
| AGENCY | | C-d\POC2 | | Allowed when: C-d\DCN is specified | | | | Point of contact with the organization that provided the calibration data. | |
| Range: 48 characters | | | |
| ADDRESS | | C-d\POC3 | | Allowed when: C-d\DCN is specified | | | | Point of contact with the organization that provided the calibration data. | |
| Range: 48 characters | | | |
| TELEPHONE | | C-d\POC4 | | Allowed when: C-d\DCN is specified | | | | Point of contact with the organization that provided the calibration data. | |
| Range: 20 characters | | | |
| **Measurand** | | | | | | | | | |
| DESCRIPTION | | C-d\MN1 | | Allowed when: C-d\DCN is specified | | | | Describe the parameter being measured. | |
| Range: 64 characters | | | |
| MEASUREMENT ALIAS | | C-d\MNA | | Allowed when: C-d\DCN is specified | | | | Alternate measurand name. | |
| Range: 32 characters | | | |
| EXCITATION VOLTAGE | | C-d\MN2 | | Allowed when: C-d\DCN is specified | | | | Sensor reference voltage, in volts. | |
| Range: 10 characters | | | |
| ENGINEERING UNITS | | C-d\MN3 | | Allowed when: C-d\DCN is specified | | | | Define the engineering units applicable to the output data. | |
| Range: 16 characters | | | |
| LINK TYPE | | C-d\MN4 | | Allowed when: C-d\DCN is specified | | | | Define the source data link type. | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| ANA | FM (analog) | | |
| PCM |  | | |
| OTH | Other | | |
| Default: PCM | | | |
| **Telemetry Value Definition** | | | | | | | | | |
| BINARY FORMAT | | C-d\BFM | | Allowed when: C-d\DCN is specified | | | | Format of the binary information. | |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| INT | Integer | | |
| UNS | Unsigned Binary | | |
| SIG | Sign And Magnitude Binary [+=0] | | |
| SIM | Sign And Magnitude Binary [+=1] | | |
| ONE | One’s Complement | | |
| TWO | Two’s Complement | | |
| OFF | Offset Binary | | |
| FPT | Floating Point | | |
| BCD | Binary Coded Decimal | | |
| BWT | Bit Weight | | |
| OTH | Other, define in comments | | |
| **Floating Point** | | | | | | | | | |
| FLOATING POINT FORMAT | | C-d\FPF | | Allowed when: C\BFM is “FPT” | | | | If binary format is “FPT”, specify which floating point format will be used. Other formats are not excluded. See Appendix 9-D for more information. | |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| IEEE\_32 | IEEE 754 single precision | | |
| IEEE\_64 | IEEE 754 double precision | | |
| 1750A\_32 | MIL-STD-1750A single precision | | |
| 1750A\_48 | MIL-STD-1750A double precision | | |
| DEC\_32 | DEC single precision | | |
| DEC\_64 | DEC double precision | | |
| DEC\_64G | DEC “G” double precision | | |
| IBM\_32 | IBM single precision | | |
| IBM\_64 | IBM double precision | | |
| TI\_32 | TI single precision | | |
| TI\_40 | TI extended precision | | |
| **Bit Weight** | | | | | | | | | |
| NUMBER OF BITS | | C-d\BWT\N | | Allowed when: C\BFM is “BWT” | | | | Specify the number of bits that will have a weighted value assigned. | |
| Required when: Allowed | | | |
| Range 1-64 | | | |
| BIT NUMBER | | C-d\BWTB-n | | Allowed when: C\BFM is “BWT” | | | | Bit number, as defined in [Chapter 4](http://www.wsmr.army.mil/RCCsite/Documents/106-17_Telemetry_Standards/chapter4.pdf), Subparagraph 4.3.1.c (msb is bit 1). | |
| Required when: Allowed | | | |
| Range 1-64 | | | |
| BIT WEIGHT VALUE | | C-d\BWTV-n | | Allowed when: C\BFM is “BWT” | | | | Numerical value indicated by each bit. To specify the sign bit, enter “S”. | |
| Required when: Allowed | | | |
| Range: Floating Point or “S” | | | |
| **In-Flight Calibration** | | | | | | | | | |
| NUMBER OF POINTS | | C-d\MC\N | | Allowed when: C-d\DCN is specified and defining “Inflight Calibration” | | | | Is in-flight calibration required? “N” for no or the number of calibration points. | |
| Range: 0-999 or “N” | | | |
| Default: N | | | |
| STIMULUS | | C-d\MC1-n | | Allowed when: C-d\MC\N is not N | | | | Provide the stimulus for this calibration point. | |
| Range: 32 characters | | | |
| TELEMETRY VALUE | | C-d\MC2-n | | Allowed when: C-d\MC\N is not N | | | | Telemetry units value. | |
| Required when: Allowed | | | |
| Range: Integer | | | |
| DATA VALUE | | C-d\MC3-n | | Allowed when: C-d\MC\N is not N | | | | Engineering units value. | |
| Required when: Allowed | | | |
| Range: Floating Point | | | |
| **NOTE:** The above set of three entries must be repeated for each in-flight calibration point. | | | | | | | | | |
| **Ambient Value** | | | | | | | | | |
| NUMBER OF AMBIENT CONDITIONS | | C-d\MA\N | | Allowed when: C-d\DCN is specified and defining “Ambient Values” | | | | Number of static or simulated conditions. | |
| Range: 0-999 | | | |
| Default: 0 | | | |
| STIMULUS | | C-d\MA1-n | | Allowed when: C-d\MA\N is not 0 | | | | Description of the static environment in which a non-test stimulus or simulator is the data source. | |
| Range: 32 characters | | | |
| TELEMETRY VALUE | | C-d\MA2-n | | Allowed when: C-d\MA\N is not 0 | | | | Telemetry units value for the static stimulus. | |
| Required when: Allowed | | | |
| Range: Integer | | | |
| DATA VALUE | | C-d\MA3-n | | Allowed when: C-d\MA\N is not 0 | | | | Engineering units value for the static or simulated condition. | |
| Required when: Allowed | | | |
| Range: Floating Point | | | |
| **Measurement Filtering** | | | | | | | | | |
| FILTERING ENABLED | | C-d\FEN | | Allowed when: C-d\DCN is specified | | | | Indicate if the data has been filtered by the data acquisition system | |
| Range: Enumeration | | | |
| Enumeration | | | Description |
| T | | | True |
| F | | | False |
| Default: F | | | |
| FILTERING DELAY | | C-d\FDL | | Allowed when: C-d\FEN is T | | | | Specify the signal conditioner filter delay in milliseconds | |
| Range: Floating Point | | | |
| NUMBER OF FILTERS | | C-d\F\N | | Allowed when: C-d\FEN is T | | | | Specify the number of filters for this measurement in the acquisition system | |
| Range: 0 to 10 | | | |
| Default: 0 | | | |
| FILTER TYPE | | C-d\FTY-n | | Allowed when: C-d\FEN is T | | | | Indicate the type of filter that was applied to the data by the data acquisition system | |
| Range: Enumeration | | | |
| Enumeration | | | Description |
| BUTTERWORTH | | | n-Pole Butterworth |
| BESSEL | | | n-Pole Bessel |
| CHEBYSHEV | | | n-Pole Chebyshev |
| FIR | | | FIR n Samples |
| OTHER | | | Specify in comments |
| NUMBER OF POLES OR SAMPLES | | C-d\FNPS-n | | Allowed when: C-d\FEN is T | | | | Indicate the number of poles or samples used in the filter | |
| **Other Information** | | | | | | | | | |
| HIGH MEASUREMENT VALUE | | C-d\MOT1 | | Allowed when: C-d\DCN is specified | | | | Highest engineering unit value defined in the calibration data. | |
| Range: Floating Point | | | |
| LOW MEASUREMENT VALUE | | C-d\MOT2 | | Allowed when: C-d\DCN is specified | | | | Lowest engineering unit value defined in the calibration data. | |
| Range: Floating Point | | | |
| HIGH ALERT LIMIT VALUE | | C-d\MOT3 | | Allowed when: C-d\DCN is specified | | | | Highest engineering unit value expected or safe operating value of the parameter (“red”). | |
| Range: Floating Point | | | |
| LOW ALERT LIMIT VALUE | | C-d\MOT4 | | Allowed when: C-d\DCN is specified | | | | Lowest engineering unit value expected or safe operating value of the parameter (“red”). | |
| Range: Floating Point | | | |
| HIGH WARNING LIMIT VALUE | | C-d\MOT5 | | Allowed when: C-d\DCN is specified | | | | Highest engineering unit value expected or safe operating value of the parameter (“yellow”). | |
| Range: Floating Point | | | |
| LOW WARNING LIMIT VALUE | | C-d\MOT6 | | Allowed when: C-d\DCN is specified | | | | Lowest engineering unit value expected or safe operating value of the parameter (“yellow”). | |
| Range: Floating Point | | | |
| INITIAL VALUE | | C-d\MOT7 | | Allowed when: C-d\DCN is specified | | | | For Chapter 10 recorders, this is the initial engineering unit value used for mode 7 measurement change event conditions. | |
| Range: Floating Point | | | |
| SAMPLE RATE | | C-d\SR | | Allowed when: C-d\DCN is specified | | | | Enter the sample rate in terms of samples per second. | |
| Range: 6 characters | | | |
| **Data Conversion** | | | | | | | | | |
| DATE AND TIME RELEASED | | C-d\CRT | | Allowed when: C-d\DCN is specified | | | | Date and time calibration was released using the format defined in Subsection 9.5.1. | |
| Range: MM-DD-YYYY-HH-MI-SS | | | |
| CONVERSION TYPE | | C-d\DCT | | Allowed when: C-d\DCN is specified | | | | Define the characteristics of the data conversion. | |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| NON | None | | |
| Engineering Units: | | | |
| PRS | Pair Sets | | |
| COE | Coefficients | | |
| NPC | Coefficients [Negative Powers Of X] | | |
| DER | Derived | | |
| DIS | Discrete | | |
| PTM | PCM Time | | |
| BTM | 1553 Time | | |
| VOI | Digital Voice | | |
| VID | Digital Video | | |
| OTH | Other | | |
| SP | Special Processing, enter in comments | | |
| **Engineering Units Conversion** | | | | | | | | | |
| **Pair Sets** | | | | | | | | | |
| NUMBER OF SETS | | C-d\PS\N | | Allowed when: C\DCT is “PRS” or C-d\CO1 is “Y” | | | | Specify the number of pair sets provided, n. | |
| Required when: Allowed | | | |
| Range: 2-32 | | | |
| APPLICATION | | C-d\PS1 | | Allowed when: C\DCT is “PRS” | | | | Are the pair sets to be used to define a polynomial curve fit? If the answer is no, then the pair sets are to be used as a “table lookup” with linear interpolation between the defined points. | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| Y | Yes | | |
| N | No | | |
| Default: N | | | |
| ORDER OF FIT | | C-d\PS2 | | Allowed when: C\PS1 is “Y” | | | | Specify the order of the curve fit to be performed, m. At least 2 pair sets must be provided, and a maximum of 32 pair sets may be included. Twelve or more pair sets are recommended for a fifth order fit. Use “BF” for Best Fit. | |
| Required when: Allowed | | | |
| Range: 1-100 or “BF” | | | |
| TELEMETRY VALUE | | C-d\PS3-n | | Allowed when: C\DCT is “PRS” or C-d\CO1 is “Y” | | | | Telemetry units value. | |
| Required when: Allowed | | | |
| Range: Floating Point | | | |
| ENGINEERING UNITS VALUE | | C-d\PS4-n | | Allowed when: C\DCT is “PRS” or C-d\CO1 is “Y” | | | | Engineering units value. | |
| Required when: Allowed | | | |
| Range: Floating Point | | | |
| **NOTE:** Repeat the above for the n pair sets. | | | | | | | | | |
| **Coefficients** | | | | | | | | | |
| ORDER OF CURVE FIT | | C-d\CO\N | | Allowed when: C\DCT is “COE” | | | | Specify the order of the polynomial curve fit, n. | |
| Required when: Allowed | | | |
| Range: 1-100 | | | |
| DERIVED FROM PAIR SET | | C-d\CO1 | | Allowed when: C\DCT is “COE” | | | | Were the coefficients derived from the pair set calibration data provided (“Y” or “N”)? If yes, provide a point of contact in the comments. | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| Y | Yes | | |
| N | No | | |
| Default: N | | | |
| COEFFICIENT (0) | | C-d\CO | | Allowed when: C\DCT is “COE” | | | | Value of the zero-order term (offset). | |
| Required when: Allowed | | | |
| Range: Floating Point | | | |
| N-TH COEFFICIENT | | C-d\CO-n | | Allowed when: C\DCT is “COE” | | | | Value of the coefficient of the nth power of x (first order coefficient is the equivalent of bit weight). | |
| Required when: Allowed | | | |
| Range: Floating Point | | | |
| **NOTE:** Repeat until all n+1 coefficients are defined. | | | | | | | | | |
| **Coefficients (Negative Powers of X)** | | | | | | | | | |
| ORDER | | C-d\NPC\N | | Allowed when: C\DCT is “NPC” | | | | Specify the order of negative power coefficients, n. | |
| Required when: Allowed | | | |
| Range: 1-100 | | | |
| DERIVED FROM PAIR SET | | C-d\NPC1 | | Allowed when: C\DCT is “NPC” | | | | Were the coefficients derived from the pair set calibration data provided (“Y” or “N”)? If yes, provide a point of contact in the comments. | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| Y | Yes | | |
| N | No | | |
| Default: N | | | |
| COEFFICIENT (0) | | C-d\NPC | | Allowed when: C\DCT is “NPC” | | | | Value of the zero-order term (offset). | |
| Required when: Allowed | | | |
| Range: Floating Point | | | |
| N-TH COEFFICIENT | | C-d\NPC-n | | Allowed when: C\DCT is “NPC” | | | | Value of the coefficient of the negative nth power of x. | |
| Required when: Allowed | | | |
| Range: Floating Point | | | |
| **NOTE:** Repeat until all n+1 coefficients are defined. This section describes the conversion equation y=c0 + c1\*(1/x) + c2\*(1/x2) + …+ cn\*(1/xn), where c0, c1, c2,…,cn are the coefficients, x is the telemetry value, and y is the resulting EU value. | | | | | | | | | |
| **Other** | | | | | | | | | |
| DEFINITION OF OTHER DATA CONVERSION | | C-d\OTH | | Allowed when: C\DCT is “OTH” or “SP” | | | | Define other data conversion technique or special processing requirement. | |
| Required when: Allowed | | | |
| Range: 1000 characters | | | |
| **Derived Parameter** | | | | | | | | | |
| ALGORITHM TYPE | | C-d\DPAT | | Allowed when: C\DCT is “DER” | | | | Specify whether the algorithm will be given (in C-d\DPA) as: “N” (Name of algorithm). “A” (Algorithm). See Appendix 9-E for additional details. | |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| N | Name of algorithm | | |
| A | Algorithm | | |
| ALGORITHM | | C-d\DPA | | Allowed when: C\DCT is “DER” | | | | Define the algorithm to be used in deriving the parameter. See Appendix 9-E for additional details. | |
| Required when: Allowed | | | |
| Range: 1024 characters | | | |
| TRIGGER MEASURAND | | C-d\DPTM | | Allowed when: C\DCT is “DER” | | | | Specify the name of the input measurand that triggers the calculation of the derived parameter. | |
| Required when: Allowed | | | |
| Range: 32 characters | | | |
| Links to: C-d\DCN | | | |
| NUMBER OF OCCURRENCES | | C-d\DPNO | | Allowed when: C\DCT is “DER” | | | | Specify how many times the trigger measurand must occur before the calculation is done. Default is 1. | |
| Range: 2 characters | | | |
| NUMBER OF INPUT MEASURANDS | | C-d\DP\N | | Allowed when: C\DPAT is “N” | | | | Specify the number of input measurands used to derive this parameter. | |
| Required when: Allowed | | | |
| Range: 1-100 | | | |
| MEASURAND #N | | C-d\DP-n | | Allowed when: C\DPAT is “N” | | | | Specify the name of the nth input measurand. | |
| Required when: Allowed | | | |
| Range: 32 characters | | | |
| Links to: C-d\DCN | | | |
| **NOTE:** Continue until all n measurands are defined. | | | | | | | | | |
| NUMBER OF INPUT CONSTANTS | | C-d\DPC\N | | Allowed when: C\DPAT is “N” | | | | Specify the number of input constants used to derive this parameter. | |
| Required when: Allowed | | | |
| Range: 1-100 | | | |
| CONSTANT #N | | C-d\DPC-n | | Allowed when: C\DPAT is “N” | | | | Specify the value for the nth constant. | |
| Required when: Allowed | | | |
| Range: Floating Point | | | |
| **NOTE:** Continue until all n constants are defined. | | | | | | | | | |
| **Discrete** | | | | | | | | | |
| NUMBER OF EVENTS | | C-d\DIC\N | | Allowed when: C\DCT is “DIS” | | | | How many events are associated with this discrete field, n? | |
| Required when: Allowed | | | |
| Range: 1-100 | | | |
| NUMBER OF INDICATORS | | C-d\DICI\N | | Allowed when: C\DCT is “DIS” | | | | Number of indicators: For a PCM system, provide the number of bits used for this discrete set. For an analog channel, provide the number of levels used to define this discrete set. | |
| Required when: Allowed | | | |
| Range: 1-100 | | | |
| CONVERSION DATA | | C-d\DICC-n | | Allowed when: C\DCT is “DIS” | | | | Telemetry value, counts for PCM, percent of full scale for analog. | |
| Required when: Allowed | | | |
| Range: Floating Point | | | |
| PARAMETER EVENT DEFINITION | | C-d\DICP-n | | Allowed when: C\DCT is “DIS” | | | | Define the event for the bit or bit field in a word that corresponds to a discrete event or the percent full scale value such as switch on or off. | |
| Required when: Allowed | | | |
| Range: 240 characters | | | |
| **NOTE:** Continue to define the events for each bit pattern or value of the discrete measurand. | | | | | | | | | |
| **PCM Time** | | | | | | | | | |
| PCM TIME WORD FORMAT | | C-d\PTM | | Allowed when: C\DCT is “PTM” | | | | Specify the PCM time word format used, as defined in [Chapter 4](http://www.wsmr.army.mil/RCCsite/Documents/106-17_Telemetry_Standards/chapter4.pdf) (Section 4.7). | |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| H | High-order time | | |
| L | Low-order time | | |
| M | Microsecond time | | |
| **1553 Time** | | | | | | | | | |
| 1553 TIME WORD FORMAT | | C-d\BTM | | Allowed when: C\DCT is “BTM” | | | | Specify the 1553 time word format used, as defined in [Chapter 4](http://www.wsmr.army.mil/RCCsite/Documents/106-17_Telemetry_Standards/chapter4.pdf) (Section 4.7) and [Chapter 8](http://www.wsmr.army.mil/RCCsite/Documents/106-17_Telemetry_Standards/chapter8.pdf) (Section 8.3). | |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| H | High-order time | | |
| L | Low-order time | | |
| M | Microsecond time | | |
| R | Response time | | |
| **Digital Voice** | | | | | | | | | |
| ENCODING METHOD | | C-d\VOI\E | | Allowed when: C\DCT is “VOI” | | | | Specify the voice encoding method used. | |
| Required when: Allowed | | | |
| Range: Enumeration | | | |
| Enumeration | Description | | |
| CVSD | Continuously Variable Slope Delta modulation | | |
| OTHR | Other | | |
| DESCRIPTION | | C-d\VOI\D | | Allowed when: C\DCT is “VOI” | | | | Specify the decoding algorithm to be used. | |
| Required when: Allowed | | | |
| Required condition: When C\VOI\E is “OTHR” | | | |
| Range: 640 characters | | | |
| **Digital Video** | | | | | | | | | |
| ENCODING METHOD | | C-d\VID\E | | Allowed when: C\DCT is “VID” | | | | Specify the video encoding method used. | |
| Required when: Allowed | | | |
| Range: 64 characters | | | |
| DESCRIPTION | | C-d\VID\D | | Allowed when: C\DCT is “VID” | | | | Specify the decoding algorithm to be used. | |
| Required when: Allowed | | | |
| Range: 640 characters | | | |
| **Comments** | | | | | | | | | |
| COMMENTS | | C-d\COM | | Allowed when: C-d\DCN is specified | | | | Provide the additional information requested or any other information desired. | |
| Range: 3200 characters | | | |

* + 1. Airborne Hardware Attributes (H)

The Airborne Hardware Attributes group defines the specific configuration of airborne instrumentation hardware in use on the item under test. This group allows the same TMATS file to describe the airborne hardware as well as the telemetry attributes.

Specific information on the structure and definition of airborne hardware attributes is not included in this standard. There are far too many hardware systems to try to define them all in one group. The main purpose of identifying this group is to reserve the “H” designation for those instrumentation organizations that choose to use the TMATS standard in this way.

The only H group attributes defined in this standard are the following:

1. Test Item (code name H\TA) - specifies the item under test and ties the H group to the G group.
2. Airborne System Type (code name H\ST-n) - identifies the airborne systems being described in the current file and determines how the rest of the attributes in the H group will be interpreted.

|  |  |
| --- | --- |
|  | For anyone wishing to define an H group, it is strongly recommended that the conventions laid out in this standard be followed. The resultant document should maintain the look and feel of this standard for consistency. |

* + 1. Vendor-Specific Attributes (V)

The Vendor-Specific Attributes group provides information that is specific to a vendor. This group allows the TMATS file to include information about a particular vendor’s equipment in use during a test. Detailed information about specific vendors’ equipment is not included in this standard.

The only V-group attributes defined in this standard are the following.

1. Data Source ID (code name V-x\ID) - specifies the Data Source ID consistent with the General Information group and ties the V group to the G group.
2. Vendor Name (code name V-x\VN) - a three-character acronym that identifies the specific vendor and determines how the rest of the attributes in the V group are interpreted.

All other code names for vendor-specific attributes will have the form:

V-x\acr\attribute-string

where: *acr* is the three-character acronym identifying a specific vendor.

*attribute-string* is any attribute that applies to this vendor.

|  |  |
| --- | --- |
|  | For anyone wishing to define a V group, it is strongly recommended that the conventions laid out in this standard be followed. The resultant document should maintain the look and feel of this standard for consistency. |

* + 1. TMATS eXtension Attributes (X)

The TMATS may be extended using X attributes. The format is described below:

X-x\ *ORGANIZATION* \*ORIGCODE*\*EXTENSION\_CODE*-i-j-m-n:Value;

Everything to the right of *ORGANIZATION* that matches an existing TMATS code is used to associate the extension with an existing object defined by the TMATS file.

The *ORIGCODE* contains the original group identifier (i.e., G,D,P, etc.) followed by a “\” and the original code that is to be extended (may include more “\” characters, but no “-”). The *EXTENSION\_CODE* identifies the specific extension and shall be unique (i.e., not overlapping any existing TMATS code name). The value of “-x” must match the first level index (P-x, etc.) value and the “-i-j” (the number of indexes defined by the original code) must match the same number of indexes in this extension code. The remaining “-m-n” values are unique to the extension.

For example, to extend a D section measurement:

D-1\MN-1-2:MEAS1;

To add a new extension code name for Sensor Gain, the following would define the extension:

X-1\MYORG\D\MN\SGAIN-1-2:10.75;

In this example, the -1 in the “X-1” and “-1-2” corresponds to the “-1” and “-1-2” in the original “D-1\MN-1-2” code word.

If the extension has more indexes than the original code, then the indexes of the original code link to the same number of left most indexes of the extension code.

The value of *ORGANIZATION* should be a unique name that identifies the organization that defined the extension.

The advantage of this extension is that software that is processing the TMATS will know that these codes refer to a particular item in the file (like a measurement or recorder). For software that recognizes the codes, it can process them. Otherwise they can be ignored.

If the file is being edited by a TMATS editor, it would notice the association and preserve it even if the editor doesn’t know what the code means. Thus if the measurements were re-numbered and the index was 1-5 instead of 1-2, the extension code could be updated to preserve the link.

The values of “x” in “X-x” are not necessarily contiguous. The “x” values must match the index of the original code word therefore no new values may be added.

* 1. Data Display Standard: Data Display Markup Language

The standard format, DDML, has been developed to describe commonly used data displays. This DDML standard exists only as a collection of XSD files; it does not exist in the TMATS code name format described in Section 9.5. The DDML schema can be found [here](http://www.wsmr.army.mil/RCCsite/Pages/Publications.aspx?RootFolder=%2FRCCsite%2FDocuments%2FReferences%2Fddml&FolderCTID=0x012000AF4E5B02D5A9F24DA72176DEABA8E665&View=%7B94F84375%2DDEE0%2D43B2%2DBE86%2D97E731BEF435%7D). Additionally, a graphical depiction of the schema in hypertext markup language (HTML) format is available [here](http://www.wsmr.army.mil/RCCsite/Documents/References/ddml/DDML_HTML.zip). The HTML files are very large and will take time to download. The following paragraphs explain the purpose, objectives, and structure of DDML, and define the global elements in the schema.

* + 1. Data Display Markup Language Purpose and Objectives

The purpose of DDML is to serve as the neutral interchange language between data display languages supported by different vendors. Built on XML, DDML has been designed with the following objectives in mind:

1. To include a standard terminology for describing data display components;
2. To be robust and highly expressive in order to accommodate any data display language;
3. To be highly unified and not a loose grouping of vendor formats.
   * 1. Data Display Markup Language Layered Structure

The DDML is built off of a layered structure as shown on the left of Figure 9‑11 below. This structure is parallel to a typical software layered architecture composed of graphics resources, visualization and user interfaces, information management, and persistence modules as shown on the right side of Figure 9‑11.

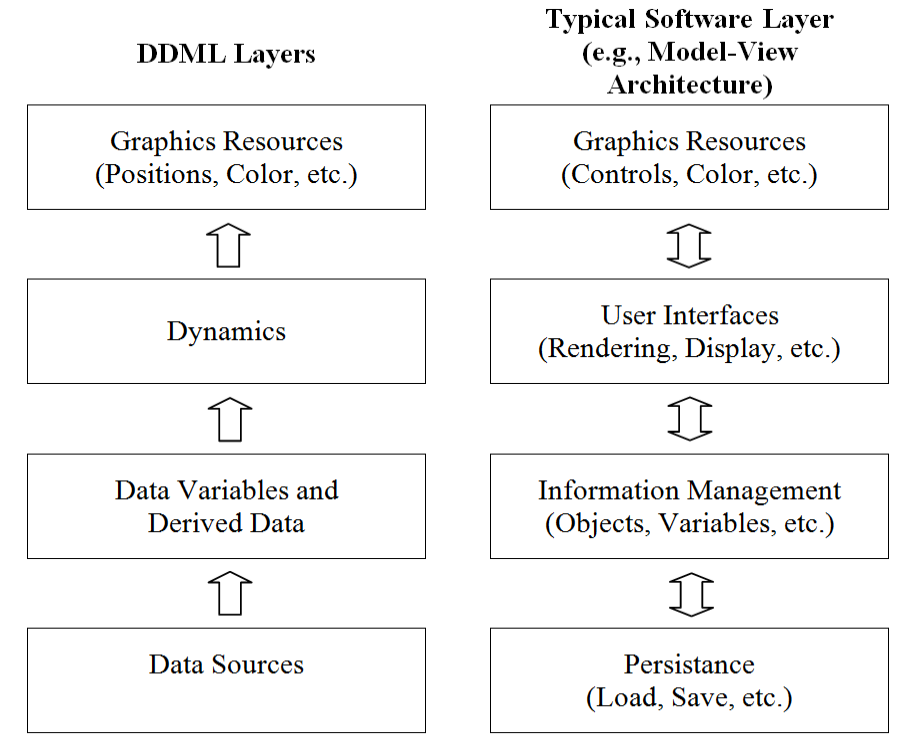


Figure 9‑11. Layered Structure of DDML

Parallel to the typical software modules, DDML is also composed of layers (as depicted above in Figure 9‑11) and as described below.

1. Graphics Resources. This layer is similar to “graphics resources” of a typical software tool. In DDML, this layer includes the visual components of a data display system such as sliders, plots, and strip charts as well as low-level graphic elements such as lines, rectangles, etc. Basic graphical shapes are modeled using a World Wide Web Consortium (W3C) recommended format called Scalable Vector Graphics (SVG).
2. Dynamics. The dynamics layer handles the behavior of an object. It manages the rules and the variable instances attached to an object.
3. Data Variables. Data variables are the links between the objects and the data sources. Data variables can be atomic or derived. Derived variables may use other derived or atomic variables in a mathematical expression.
4. Data Sources. The last layer of the DDML architecture is the Data Sources layer. This layer handles various data sources such as text files, Open Database Connectivity (ODBC), network ports, and ports on data acquisition cards.

At each layer, the parameters used to describe each DDML element are divided into two groups: DDML sub-elements and custom parameters. The DDML sub-elements make up the most common and most necessary pieces of information needed to represent each element. They are stored as named sub-elements in DDML. Custom parameters are used to store any vendor-specific information that is not explicitly defined as a DDML sub-element. These parameters are stored as DDML “param” elements.

* + 1. Data Display Markup Language Global Element Glossary

The DDML element names and descriptions can be seen in Table 9‑11.

| Table 9‑11. Data Display Markup Language Global Element Glossary | |
| --- | --- |
| **Element Name** | **Description** |
| mathml:apply | Defined in the mathml schema and used as a sub-element of variable in DDML, defines a variable as a function of other variables. |
| axis | A sub-element of a display object, represents an axis of any chart-type display object. It has a sub-element axisType that can be one of two values: VALUE or TIME. Other sub-elements allow the setting of min and max values, colors, grid line properties, etc. |
| barchart | A display object that shows one or more variables as vertical or horizontal bars whose lengths correspond to the values. |
| button | A display object that consists of an image or icon that, when clicked, can assign a value to a variable. |
| color | A commonly used sub-element of many DDML elements, it simply specifies the color of its parent object. All colors in DDML are stored as base-10 integers that are encoded as 0xRRGGBB. |
| comparisonOperator | Used in rules, defines the comparison between two values. Can be either GT (greater than), LT (less than), GTE (greater than or equal), LTE (less than or equal), EQ (equal), or NEQ (not equal). |
| custom\_parameters | A sub-element of a display object, serves as the parent element of a group of param elements that specify all of the custom (vendor-specific) parameters for a particular display object. |
| data\_source | A pool-level data source that is available for use by any of the variables in the variable pool. |
| data\_source\_pool | Contains data\_source child elements representing all of the data sources used by the various objects in the DDML file. Information about all data sources (files, db connections, etc.) is kept in the data source pool. |
| ddml | Root element of a DDML file describing a collection of data displays. |
| dial | A display object that consists of a circular or arc value axis and some sort of marker or needle that points to the current value along this axis. Example: a gauge or a compass. |
| display\_objects | A sub-element of a model, serves as a container for all of the display objects in that model. |
| dynamics | A set of variable uses and rules used to define the dynamic behavior of a display object. The dynamicType sub-element describes the dynamic behavior while the variable\_use and rules child elements define how variable values affect that behavior. A dynamicType of “builtin” is used for display objects that have implicit dynamic behavior, such as charts and sliders. Other possible values of dynamicType include: visibility, text, subdrawing, scale, scaleY, scaleX, rotate, relativeMoveY, relativeMoveX, pathMove, lineWidth, lineStyle, foregroundColor, fillUp, fillRight, fillLeft, fillDown, fillEffect, curveType, blink, backgroundColor, arcDirection, absoluteMoveX, absoluteMoveY, fillColor, edgeColor. |
| else | Part of a rule, specifies what to do if the criteria specified in the if element are false. The else element can be the parent of one or more additional rules, or can just specify a value or variable reference. |
| frequencyplot | A display object that is a chart in the frequency domain. |
| frequencyresponse | A display object that is a graph consisting of two value axes (frequency and magnitude) plotted against a single frequency axis. |
| grid | A table. The grid element is used to group several display objects (including other grids) together in a tabular layout. Each display sub-object’s location in the grid is specified with its gridRow and gridColumn elements. |
| hud | A display object that resembles a typical aircraft heads-up display that consists of three vertical axes (typically used for velocity, pitch, and altitude) and one horizontal axis (typically for heading). The center vertical axis rotates according to a fifth variable (typically roll). The variable\_uses in the dynamics section are applied in this order: center vertical axis rotation (roll), center vertical axis (pitch), horizontal axis (heading), right vertical axis (altitude), left vertical axis (velocity). |
| if | Part of a rule, specifies a comparison between the current variable and some value. |
| map | An area of a model that displays longitude/latitude map info. The coordinates of all child objects of a map are in decimal latitude/longitude values. For distance attributes (e.g., a circle’s radius), degrees latitude are used as the measurement unit. |
| model | A container for data displays. Typically interpreted as a single screen or “page” of display objects. The model object defines its own coordinate system with the minX, minY, maxX, maxY, xDirection, and yDirection sub-elements. All sub-objects of a model are specified in coordinates that conform to the system defined by the model. |
| object | A generic display object. An “object” can be any display object not specified in the DDML definition, or can be used as the top-level element in a group of sub-objects. |
| param | Used to specify any parameter of a DDML element that is not explicitly specified elsewhere in the schema. These are commonly referred to as “custom parameters” and are mostly used for vendor-specific information. |
| piechart | A circular display object that shows the values of multiple variables as a percentage slice of their sum. |
| project | A collection of models. |
| radialchart | A display object that represents variable values as distances outward from a central point. A radial chart consists of two axes: a linear value axis and a circular axis. The circular axis can be either a time axis or a value axis. The type of the circular axis is controlled by its axisType sub-element, which can have a value of either “TIME” or “VALUE”. If the value is “VALUE”, then a series of xyPair objects will specify how the variables are paired. In each of these xyPairs, the X-value corresponds to the value in the circular axis direction, and the Y-value corresponds to the value in the radial axis direction. |
| rule | Specifies a change in a property (e.g., color, visibility) when a variable reaches a certain value or range of values. The ranges of values and resulting property values are specified with if, then, and else child elements. |
| rules | The parent element of a group of rule elements |
| slider | A display object that consists of some kind of indicator or icon that slides along a single value axis. A slider can be vertical or horizontal. Example: A “gauge” in Range View or a “fader” in Data Views. |
| stripchart | A display object that is essentially a line graph that plots values vs. time along a scrolling “paper” grid. A stripchart can be vertical or horizontal, and can scroll in any of the four directions (up, down, left, right). This is controlled by the scrollDirection sub-element. The scrollDirection element refers to the direction that the paper or background scrolls. For example, in a DataViews horizontal strip chart, the paper scrolls to the left while new values are plotted at the right edge of the graph. Thus, the scrollDirection is “left”. |
| svg:svg | SVG is a W3C recommendation and is defined in its own schema. In DDML, the <svg> element is used as a sub-element of <object> to define a display object in terms of the basic shapes of which it is composed. |
| textual | A display object used for representing text and labels, including both static and dynamic text (such as annunciators). If the text is dynamic, the valuePosition sub-element specifies where the dynamic value is in relation to the static label. Use valuePosition=“center” if there is no label. The valueFormat sub-element is a C printf-style format string that specifies the format of the dynamic value. For example valueFormat = “%4.2f” indicates that the value should be output as a floating-point value with a maximum width of 4 and with 2 decimal places. |
| then | Part of a rule, the then element specifies the value to set the attribute to if the criteria specified in the if element is true. The then element can specify either the desired value or a reference to a variable containing the desired value. |
| variable | A pool-level data variable that is available for use by any of the display objects in the DDML file. |
| variable\_pool | Contains variable child elements representing all of the variables used by the various display objects in the DDML file. |
| variable\_use | A child of the dynamics element, variable\_use is used to specify which variable from the variable pool is used. The pool\_ref attribute must refer to the ID attribute of a variable element from the variable\_pool. |
| xychart | A display object that is a line or xy scatter plot of variables in the y axis vs. other variables in the x axis. The x,y variable pairs are specified with the xyPair sub-elements. |
| xyPair | A sub-element of certain display objects, it describes how a chart’s variable\_use items are paired. Each xVar and yVar sub-element must refer to the ID of a variable\_use element in the display object’s dynamics section. |

* 1. Instrumentation Hardware Abstraction Language

The IHAL is a standard for describing and interacting with instrumentation hardware in a vendor-neutral way. The IHAL was reviewed and adopted into IRIG 106 to serve the purpose originally intended for the Airborne Hardware Attributes (H) group described in Subsection 9.5.8, which has never been implemented. The IHAL standard consists of both an XML-based language and an application programming interface (API) specification, each of which are explained in greater detail below.

The IHAL language standard exists only as an XML schema; it does not exist in the TMATS code name format described in Section 9.5. The IHAL XML language schema consists of a collection of XSD files that define the structure of valid IHAL documents. The schemas are available [here](http://www.wsmr.army.mil/RCCsite/Pages/Publications.aspx?RootFolder=%2FRCCsite%2FDocuments%2FReferences%2Fihal&FolderCTID=0x012000AF4E5B02D5A9F24DA72176DEABA8E665&View=%7B94F84375%2DDEE0%2D43B2%2DBE86%2D97E731BEF435%7D). Additionally, a graphical depiction of the schema in HTML format is available [here](http://www.wsmr.army.mil/RCCsite/Documents/References/ihal/HTML-IHAL.zip). The HTML files are very large and will take time to download.

* + 1. Usage of External Schemas in IHAL

The IHAL XML schema makes use of three external XML schemas for describing concepts outside the scope of IHAL, such as data formats and engineering units. These schemas are not included with the IHAL schema and must be retrieved from the organization that produces them. Table 9‑12 lists these external schemas and the versions required for this release of IHAL.

|  |  |  |  |
| --- | --- | --- | --- |
| Table 9‑12. IHAL External Schemas | | | |
| **Standard** | **Version used by IHAL** | **Global Types/Sub-schemas used by IHAL** | **Organization’s URL** |
| Metadata Description Language (MDL) | 0.8.12 | DerivedUnitType  MeasurementsType  DataStreamsType | <http://www.inetprogram.org> |
| TMATS - XML Schema | 106-17 | TmatsPGroup.xsd  TmatsRGroup.xsd | <http://www.wsmr.army.mil/RCCsite/Documents/References/tmats> |
| eXtensible Instrumentation Definition Markup Language (XidML) | 3.0 | Network-TransportType | <http://www.xidml.org/> |

* + 1. What is the Instrumentation Hardware Abstraction Language?

The central concept in IHAL is the configurable attributes (i.e., settings) that each device exposes to the user; however, IHAL is also capable of describing the environmental and physical attributes of each device, such as its size, shape, and operating conditions.

The IHAL describes instrumentation hardware at two levels.

1. The “pool” level describes hardware according to its capabilities and configurability. The information in the IHAL pool is similar to the information found in a device’s marketing or engineering data sheet. A good way to think of the pool is to understand that each device in the pool can be uniquely identified by its model number.
2. The “use” level describes a specific configuration of instrumentation hardware. At the use level, devices from the pool are put into a specific use. That is, they are connected to other devices, and their configurable attributes are set to specific values. A good way to think of the use level is to understand that each device at this level can be uniquely identified by its serial number.
   * 1. What is the IHAL API?

The IHAL vendor web services API enables IHAL to be used not only as a language for describing instrumentation hardware, but also as a command and query language for configuring instrumentation hardware. The API defines a set of functions that an instrumentation hardware vendor can implement to provide access to their configuration engine to external users and applications. All inputs and outputs to the functions are properly formatted IHAL XML documents.

Implementing this API allows vendors to expose the functionality of their configuration engines in a vendor-neutral way, without disclosing the inner workings of their proprietary configuration logic. In this way, vendor-neutral, 3rd-party applications can be developed to configure the hardware of any vendor who implements the IHAL API. The developers of such 3rd- (or 1st-) party applications need not understand the inner workings of each vendor’s configuration engine.

* + 1. How Can IHAL Be Used?

The potential uses of IHAL fall into two major categories: 1) IHAL as a description language, and 2) IHAL as a command language.

* + - 1. IHAL as a Description Language

As a vendor-neutral, human-readable language for describing instrumentation hardware, IHAL provides a means for storing a permanent record of the devices used during a test and their settings during that test. This description will remain readable and relevant even if the hardware vendors radically change their file formats or cease to exist.

Additionally, providing such descriptions enables the development of vendor-neutral tools. The capabilities of these tools can range anywhere from simple visualization (e.g., instrumentation network and configuration visualization) to complex automated reasoning (e.g., automatically selecting and configuring devices from multiple vendors based on user-defined requirements).

* + - 1. IHAL as a Command Language

The IHAL constructs that describe the current configuration of a device can also be used to issue a command to the device to change its configuration. When combined with the API (described above), this feature of IHAL enables multi-vendor instrumentation configuration from a single user interface without requiring vendors to share knowledge about the internal workings of their configuration engines.

* + 1. IHAL Glossary

Below is an alphabetical list of definitions of key elements in the IHAL XML language.

A

**accelerometer:** A specialization of the “transducer” element for describing accelerometers (pool-level).

**analogSignalConditioningCard:** A specialization of the “card” element for describing analog signal conditioning cards (pool-level).

**analogSignalConditioningChannel:** A specialization of the “customHardwareChannel” element for describing analog signal conditioning channels (pool-level).

**analogSignalConditioningFunction:** A specialization of the “customFunction” element for describing analog signal conditioning.

**analogSignalFilterFunction:** A specialization of the “customFunction” element for describing analog signal filtering (pool-level).

**analogToDigitalConversionFunction:** A specialization of the “customFunction” element for describing analog-to-digital conversion.

B

**bridgeSensor:** A specialization of the “transducer” element for describing bridge sensors (pool-level).

**busMonitorCard:** A specialization of the “card” element for describing bus monitor cards.

**busMonitorChannel:** A specialization of the “customHardwareChannel” element for describing bus monitor channels (pool-level).

**busMonitorChannelUse:** A specialization of the “channelUse” element for bus monitors. This element includes an additional construct for defining a dataStreamUse associated with the channel.

**busMonitorFunction:** A specialization of the “customFunction” element for describing bus monitoring (pool-level).

C

**calibrationTable:** A use-level element for describing the calibration table associated with a particular transducer or other instrument.

**card:** A specialization of the “instrument” element for describing cards. A card in IHAL is an instrument that cannot operate stand-alone. It must be connected to another instrument in order to function.

**channelUse:** A specific implementation of a channel from the instrument pool. The channelUse description references a channel from the pool, specifies a specific channel number, and assigns values to settings on that channel.

**chargeAmplifierSensor:** A specialization of the “transducer” element for describing charge amplifier sensors (pool-level).

**configuration:** Container for multiple instrumentation graphs. Defines a single configuration or project.

**connection:** A use-level element used to describe a connection between two instruments in an instrumentationGraph.

**currentExcitationFunction:** A specialization of the “customFunction” element for describing current excitation (pool-level).

**currentLoopOutputSensor:** A specialization of the “transducer” element for describing current loop output sensors (pool-level).

**customAttribute:** A pool-level element for defining a generic attribute associated with a function. Each attribute may be either configurable or fixed, and may be either numeric, string, Boolean, or reference. If configurable, the attribute element will define which values are valid. Each specialized function description in IHAL will contain specializations of the “customAttribute” element for specific attributes such as “gain”, “offset”, etc.

**customFunction:** A pool-level element for defining generic instrumentation functions that don’t fit into one of the specific specializations. A function may be composed of 0 or more attributes and 0 or more sub-functions.

**customHardwareChannel:** A pool-level element for describing a generic hardware channel that does not fit into any of the specific specializations. A channel contains a “multiplicity” element that defines how many identical channels the device has. A channel is composed of one or more functions.

D

**dataRecorderFunction:** Specialization of the “customFunction” element (pool-level). This is a channel-level function for describing the recording of data from a specific source. See also recorderReproducerFunction.

**dataRecordingChannel:** Specialization of the “customHardwareChannel” element for describing a data recorder channel (pool-level).

**dataStreamPool:** Contains the global list of data streams and buses. This element makes use of constructs from the integrated Network Enhanced Telemetry (iNET) program’s MDL.

**dataStreamUse:** A use-level element used to define which measurements from a data stream are to be sampled by a bus monitor.

**dau:** A specialization of the “instrument” element for describing data acquisition units (pool-level).

**dauFunction:** Specialization of the “customFunction” element for describing the functions performed by a data acquisition unit (pool-level).

E

**errorList:** Top-level container for the IHAL error schema. An errorList may be returned as a response to any API function call.

F

**formatUse:** A specific implementation of a data format from the instrument pool. The formatUse element references a data format from the pool, specifies a format number, assigns values to settings associated with that format, and defines the measurements encoded in the format.

H

**highLevelVoltageSensor:** A specialization of the “transducer” element for describing high-level voltage sensors (pool-level).

I

**ihal:** The top-level element in a complete IHAL description

**instrument:** A pool-level element for describing a device that does not fit into one of the specific specializations. The pool-level instrument element defines the physical attributes of the hardware, the functionality it provides, and the settings available.

**instrumentationGraph:** A set of interconnected instrumentation hardware (instrumentUse elements). Separate instrumentationGraph elements could be used to describe the airborne system vs. the ground system, for example.

**instrumentPool:** Container for all pool-level device descriptions. The instrumentPool contains descriptions of all available instruments.

**instrumentUse:** A specific implementation of an instrument from the pool. The instrumentUse description references an instrument from the pool and assigns specific values to settings.

L

**lvdtrvdtSensor:** A specialization of the “transducer” element for describing linear/rotary variable differential transformers (pool-level).

M

**masterControllerFunction:** Specialization of the “customFunction” element for describing the functionality of a master controller (pool-level).

**measurementPool:** Contains a global list of measurements.

P

**potentiometricVoltageDivider:** A specialization of the “transducer” element for describing potentiometric voltage dividers (pool-level).

**programmingStatus:** A use-level element that describes the current status of programming the current configuration to the physical hardware. Values may be either “COMPLETE”, “IN\_PROGRESS”, “ERROR”, or “NOT\_STARTED”.

R

**recorderReproducer:** A specialization of the “instrument” element for describing a recorder/reproducer (pool-level).

**recorderReproducerFunction:** A specialization of the “customFunction” element for describing the function of recording/reproducing data associated with one or more channels to/from some medium.

**restrictedAttribute:** A use-level element that redefines the set of valid values for a configurable attribute from the pool. Restricted attributes are used whenever the valid values for a setting change as a result of the current configuration.

**resistanceSensor:** A specialization of the “transducer” element for defining resistance sensors (pool-level).

**rtdSensor:** A specialization of the “transducer” element for describing resistance temperature detectors (pool-level).

S

**setAttribute:** A use-level element that assigns a value to a configurable attribute from the pool.

**statusDataFunction:** Specialization of the “customFunction” element for describing the function of emitting status words (pool-level).

**strainGauge:** A specialization of the “transducer” element for describing strain gauges (pool-level).

**sstDataEncoderFunction:** A specialization of the “customFunction” element for describing a serial streaming telemetry (SST) data encoder.

**sstDataFormat:** Pool-level concept for describing an SST format that may be created by an instrument. Formats in IHAL are similar to channels in that they have a multiplicity and are composed of functions.

**sstFormatUse:** A specialization of the “formatUse” element for describing PCM output formats. sstFormatUse makes use of TMATS XML constructs.

T

**thermistor:** A specialization of the “transducer” element for describing thermistors (pool-level).

**thermocouple:** A specialization of the “transducer” element for describing thermocouples (pool-level).

**tmNSDataEncoderFunction:** Specialization of the “customFunction” element for describing the functionality of a Telemetry Network Standard (TmNS) data encoder (pool-level).

**tmNSDataFormat:** Pool-level concept for describing a TmNS data format that may be created by an instrument. Formats in IHAL are similar to channels in that they have a multiplicity and are composed of functions.

**transducer:** A specialization of the “instrument” element for describing generic transducers (pool-level)

U

**unitsPool:** Container for a global list of engineering units. Units can be built by combining other units and SI units. Unit descriptions make use of constructs from the iNET program’s MDL.

V

**voltageAmplificationFunction:** A specialization of the “customFunction” element for describing voltage amplification (pool-level).

**voltageExcitationFunction:** A specialization of the “customFunction” element for describing voltage excitation (pool-level).

X

**xidMLNetworkDataEncoderFunction:** A specialization of the “customFunction” element for describing the functionality of a non-TmNS network data encoder (pool-level).

**xidMLNetworkDataFormat:** Pool-level concept for describing a non-TmNS network data format that may be created by an instrument. Formats in IHAL are similar to channels in that they have a multiplicity and are composed of functions.

**xidMLNetworkFormatUse:** A specialization of the “formatUse” element for describing non-TmNS network data formats. This element makes use of constructs from XidML.

* + 1. Complete IHAL API Specification
       1. API Implementation Requirements

The IHAL API must be implemented as a RESTful web service. All functions must have a common base path (e.g., http://10.10.1.1:8080/ihalapi/). This base path is referred to as “<Vendor API Location>“ in this document.

All inputs are provided as the payload of the function call, with no named parameters or URL encoding. That is, inputs will NOT be part of the URL (e.g., http://.../?ihal=<ihal>... is NOT allowed).

* + - 1. Errors

All functions in the below specification may optionally return an <ihal:errorList> element instead of the defined response. The error list is intended to provide the user with a description of problems encountered if the requested function could not be performed.

* + - 1. API Functions

The following sections describe the functions that must be included as part of any IHAL API implementation.

* + - * 1. Retrieve a Vendor’s Pool

This method is used by a client to retrieve some part of a vendor’s pool description. There are multiple URLs for this function to retrieve different parts of the pool, as shown in Table 9‑13.

|  |  |
| --- | --- |
| Table 9‑13. Retrieve a Vendor’s Pool | |
| **URL** | <Vendor API Location>/pool/units to retrieve the units pool |
| <Vendor API Location>/pool/instrument to retrieve the instrument pool |
| <Vendor API Location>/pool/measurement to retrieve the global measurement list |
| <Vendor API Location>/pool/measurement/<deviceID> to retrieve the list of measurements available to a particular device (e.g., a data encoder) |
| <Vendor API Location>/pool/dataStream to retrieve the global list of data streams (e.g., buses) |
| <Vendor API Location>/pool/dataStream/<deviceID> to retrieve the global list of data streams (e.g., buses) available to a particular device |
| **HTTP Verb** | GET |
| **Function Input** | None |
| **Return Value** | Complete IHAL <instrumentPool>, <unitsPool>, <measurementPool>, or <dataStreamPool> element. |

* + - * 1. Retrieve the List of Available Configurations

This function queries the web service for a list of existing instrumentation configurations and is described in Table 9‑14.

|  |  |  |
| --- | --- | --- |
| Table 9‑14. Retrieve the List of Available Configurations | | |
| **URL** | <vendor API Location>/configurations/ |
| **HTTP Verb** | GET |
| **Function Input** | None |
| **Return Value** | A partial <ihal> specification containing 0 or more EMPTY <configuration> elements, each with only the basic required information. No pools should be returned. |

* + - * 1. Retrieve a Specific Configuration

This function uses the ID of a configuration returned from the previous function call to request the complete description of that configuration. It is illustrated in Table 9‑15.

|  |  |
| --- | --- |
| Table 9‑15. Retrieve a Specific Configuration | |
| **URL** | <vendor API Location>/configurations/<configurationID>. <configurationID> contains a unique identifier returned as the “id” attribute from a call to “Retrieve a list of Configurations” |
| **HTTP Verb** | GET |
| **Function Input** | None |
| **Return Value** | A complete IHAL <configuration> element |

* + - * 1. Change the Value of a Configurable Attribute

This function is used to change the values of settings on a particular device, as shown in Table 9‑16. The desired setting changes are passed via IHAL, and a description of everything that has changed as a result of these setting changes is returned as an IHAL description.

|  |  |
| --- | --- |
| Table 9‑16. Change the Value of a Configurable Attribute | |
| **URL** | <vendor API Location>/configurations/<configurationID>/  <configurationID> contains a unique identifier returned as the “id” attribute from a call to “Retrieve a list of Configurations” |
| **HTTP Verb** | PUT |
| **Function Input** | A partial <configuration> element. This element contains only the settings that the user wishes to modify. |
| **Return Value** | The impact: A partial IHAL <configuration> element containing only the new settings for everything that has changed:   * The new values for the settings the user requested (may or may not match the original request); * Any additional settings that changed as a result; * Any attribute “restrictions” that changed as a result. |

* + - * 1. Create a New Configuration

This function is used to create a new configuration in the vendor’s system. It is described in Table 9‑17. A partial or complete IHAL “configuration” element is passed as input, and then the vendor responds with a validated “configuration” element that matches (as closely as possible) the input. The vendor may change use-level IDs.

|  |  |
| --- | --- |
| Table 9‑17. Create a New Configuration | |
| **URL** | <vendor API Location>/configurations/ |
| **HTTP Verb** | POST |
| **Function Input** | A partial or complete <configuration> element. |
| **Return Value** | A validated <configuration> description that matches (as closely as possible) the input <configuration>. Use-level ID values may change. |

* + - * 1. Add a Device to a Configuration

This function is used to add a device from the pool to an existing configuration in the vendor’s system. The function is depicted in Table 9‑18. A partial or complete IHAL “instrumentUse” element is passed as input, and then the vendor responds with a valid “configuration” element that includes the new device. The vendor may change use-level IDs.

|  |  |
| --- | --- |
| Table 9‑18. Add a Device to a Configuration | |
| **URL** | <vendor API Location>/configurations/<configurationID>/devices |
| **HTTP Verb** | POST |
| **Function Input** | A partial or complete <instrumentUse> element. |
| **Return Value** | A valid <configuration> description that includes the new device. Use-level ID values may change. |

* + - * 1. Remove a Device from a Configuration

This function is used to remove an instrumentUse from an existing configuration in the vendor’s system. It is illustrated in Table 9‑19. The ID of the instrumentUse element is included in the URL, and the HTTP “DELETE” verb tells the system to remove that device. The vendor must respond with a valid configuration description, with the device removed.

|  |  |
| --- | --- |
| Table 9‑19. Remove a Device from a Configuration | |
| **URL** | <vendor API Location>/ configurations/<configurationID>/devices/<instrumentUseID> |
| **HTTP Verb** | DELETE |
| **Function Input** | None |
| **Return Value** | A valid <configuration> description with the device removed |

* + - * 1. “Program” the Hardware

This function is used to tell the vendor’s configuration engine to load a specific configuration onto the affected hardware. It is illustrated in Table 9‑20. The vendor responds with a <configuration> description that includes updated values for the programming status.

|  |  |
| --- | --- |
| Table 9‑20. “Program” the Hardware | |
| **URL** | <vendor API Location>/ configurations/<configurationID>/programRequest |
| **HTTP Verb** | POST |
| **Function Input** | None |
| **Return Value** | A partial <configuration> description with the current programming status of affected devices updated. |

* + - * 1. Add a New format to a Data Encoder

This function is used to add a new data format to a data encoder. This can be either a PCM (SST) format or a non-TmNS network format. The client sends a partial or complete description of the format, and the vendor’s service responds with an updated <configuration> element containing ONLY items that have changed (including the addition of the new format). The function is shown in Table 9‑21.

|  |  |
| --- | --- |
| Table 9‑21. Add a New Format to a Data Encoder | |
| **URL** | <vendor API Location>/ configurations/<configurationID>/<instrumentUseID>/formats |
| **HTTP Verb** | POST |
| **Function Input** | A complete or partial format “use” description (i.e., sstFormatUse or xidMLNetworkFormatUse) |
| **Return Value** | An updated <configuration> element containing the new format as well as any settings in the configuration that have changed as a result. |

* + - * 1. Add a Measurement to an Existing Format

This function is used to add a new measurement to an existing data format. The function is illustrated in Table 9‑22. The input uses either a XidML <Mapping> element or a TMATS <Measurement> element to describe the measurement and where it should be placed in the format. The vendor’s service responds with a <configuration> element that contains a complete description of the affected format as well as any settings changes that have occurred as a result.

|  |  |
| --- | --- |
| Table 9‑22. Add a Measurement to an Existing Format | |
| **URL** | <vendor API Location>/ configurations/<configurationID>/<formatUseID>/measurements |
| **HTTP Verb** | POST |
| **Function Input** | A description of the measurement and its location in the format. This will be either a XidML <Mapping> element or a TMATS-XML <Measurement> element. |
| **Return Value** | An updated <configuration> element containing the modified format as well as any settings in the configuration that have changed as a result. |

* + - * 1. Remove a Measurement from a Format

This function is used to remove a measurement from an existing data format. The function is illustrated in Table 9‑23. The client specifies the ID of the measurement in the URL. The vendor’s service must remove ALL instances of this measurement from the specified format. The service must then respond with a <configuration> element that contains a complete description of the affected format as well as any settings changes that have occurred as a result.

|  |  |
| --- | --- |
| Table 9‑23. Remove a Measurement From a Format | |
| **URL** | <vendor API Location>/ configurations/<configurationID>/<formatUseID>/<measurementID> |
| **HTTP Verb** | DELETE |
| **Function Input** | None |
| **Return Value** | An updated <configuration> element containing the modified format as well as any settings in the configuration that have changed as a result. |



Application of the Telemetry Attributes Transfer Standard

Elements of the telemetry attributes transfer process allow for the interchange of telemetry attributes between vehicle instrumentation organizations (the source) and the telemetry ground stations (the destination). Interchange may also take place between ranges. The following are typical elements of this process:

1. Data entry system
2. Source database
3. Export program
4. Interchange medium [this standard]
5. Import program
6. Destination database
7. Telemetry setup system
8. Telemetry processing equipment.

Figure A‑1 depicts these elements, which are defined after the figure.

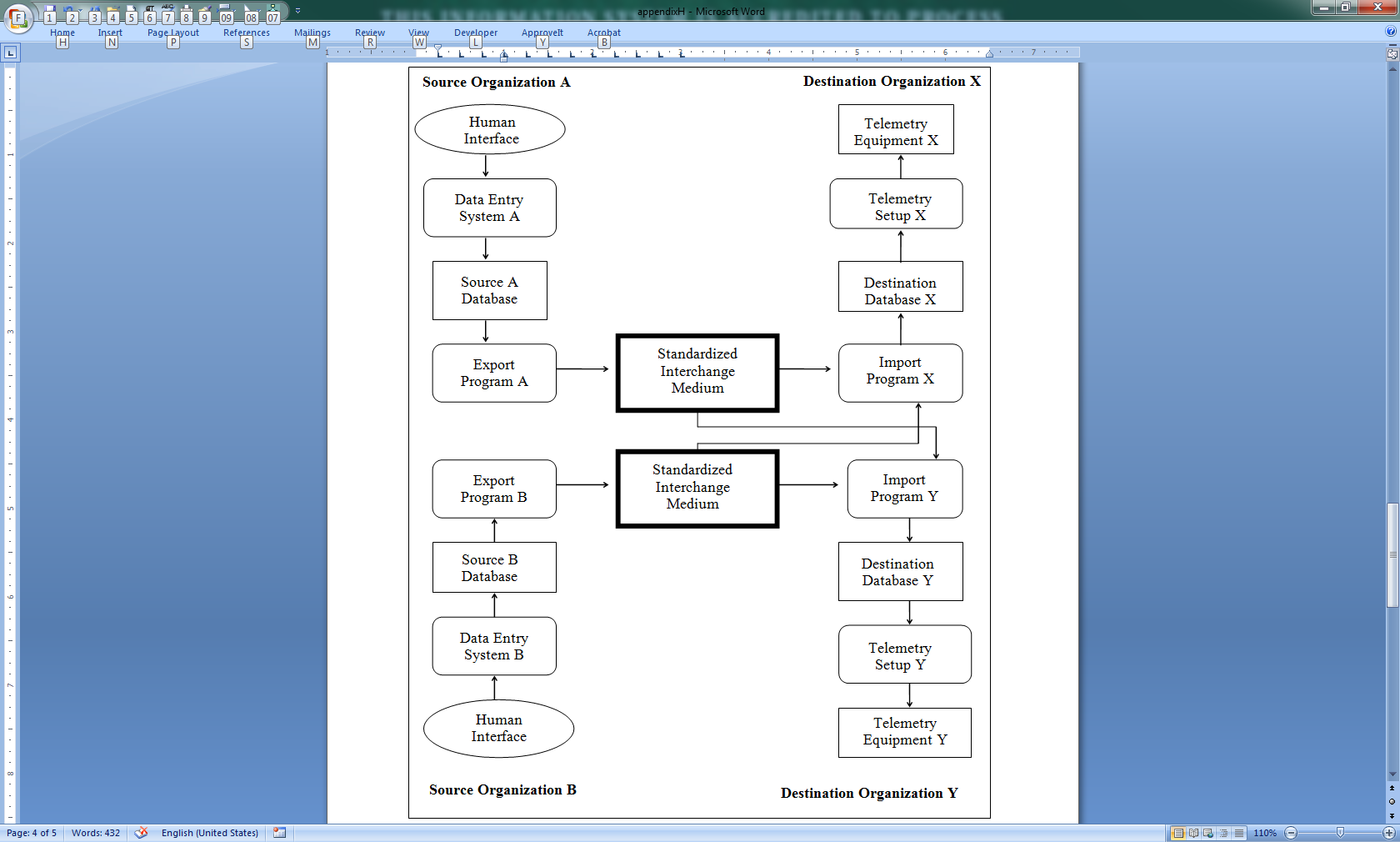


Figure A‑1. Typical Elements of the Telemetry Attributes Transfer Process

* 1. Data Entry System

The data entry system is the source organization's human interface where telemetry attributes are entered into a computer-based system (not affected by this standard).

* 1. Source Database

The source database is where telemetry attributes are maintained in a form appropriate to the local organization’s needs (not affected by this standard).

* 1. Export Program

The export program converts the telemetry attributes from the source database format to the format defined by this standard and stores them on the interchange medium.

* 1. Interchange Medium

The interchange medium contains the telemetry attributes being transferred from the source organization to the destination organization. Format and contents are defined by this standard.

* 1. Import Program

The import program reads the standardized interchange medium and converts the attributes to the destination database format in accordance with local needs, system characteristics, and limitations.

* 1. Destination Database

The destination database is where telemetry attributes are maintained in a form suitable to the local ground station’s needs (not affected by this standard).

* 1. Telemetry Setup System

The telemetry setup system accesses the destination database to load the telemetry processing equipment (not affected by this standard).

* 1. Telemetry Processing Equipment

The telemetry processing equipment is where the attributes will ultimately be used to properly handle the data being transmitted (not affected by this standard).

The interchange medium is intended as a standard means of information exchange. The source and destination organizations are not constrained by this standard as to how the attributes are stored, viewed, used, or maintained.

To use the attribute transfer standard, import and export software must be developed. Once in place, these programs should eliminate the need for test item or project-specific software at either the supplying (source) organizations or the processing (destination) organizations.

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Telemetry Attributes Transfer Standard Cover Sheet

Each attribute transfer file (disk or tape) should be accompanied by a cover sheet describing the originating agency’s computer system used to construct the attribute file. The recommended format for this cover sheet is given below as Figure B‑1.

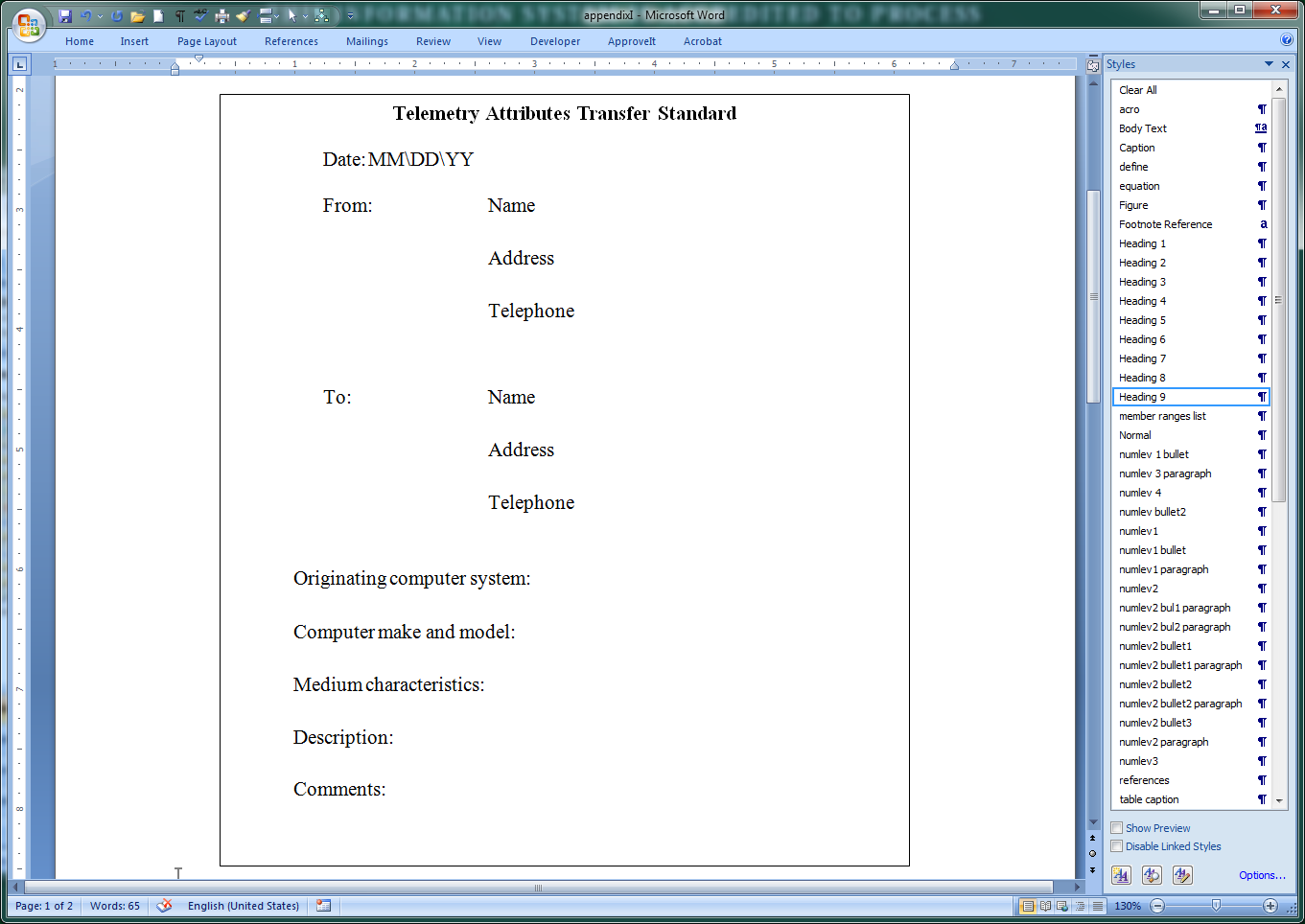


Figure B‑1. Sample Cover Sheet for Attribute Transfer Files

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Telemetry Attributes Transfer Standard Format Example

* 1. Introduction

The following example is for illustrative purposes and is by no means a complete attributes file; it is representative of the types of information likely to be transferred. Many attributes are purposely omitted to simplify the example. In some of the groups, only those entries necessary to link to other groups are provided. Attributes that link the various groups together are indicated in **boldface**.

* 1. Overview of Example

Selected attributes are described in text form as an aid to following the example. All text that describes the example is *printed in italics*. All text that is part of the example file is printed in plain text.

The example file being transferred consists of the attributes of a single RF data source and a stored data source containing two channels of data. The RF data source is a PCM signal, which contains an embedded asynchronous wave train. The two recorded channels of data are PCM signals: one is an aircraft telemetry stream, and the other is a radar data telemetry stream. Figure C‑1 shows the example file in terms of the attribute groups and their interrelationships. Refer to the attribute tables while reviewing the example.

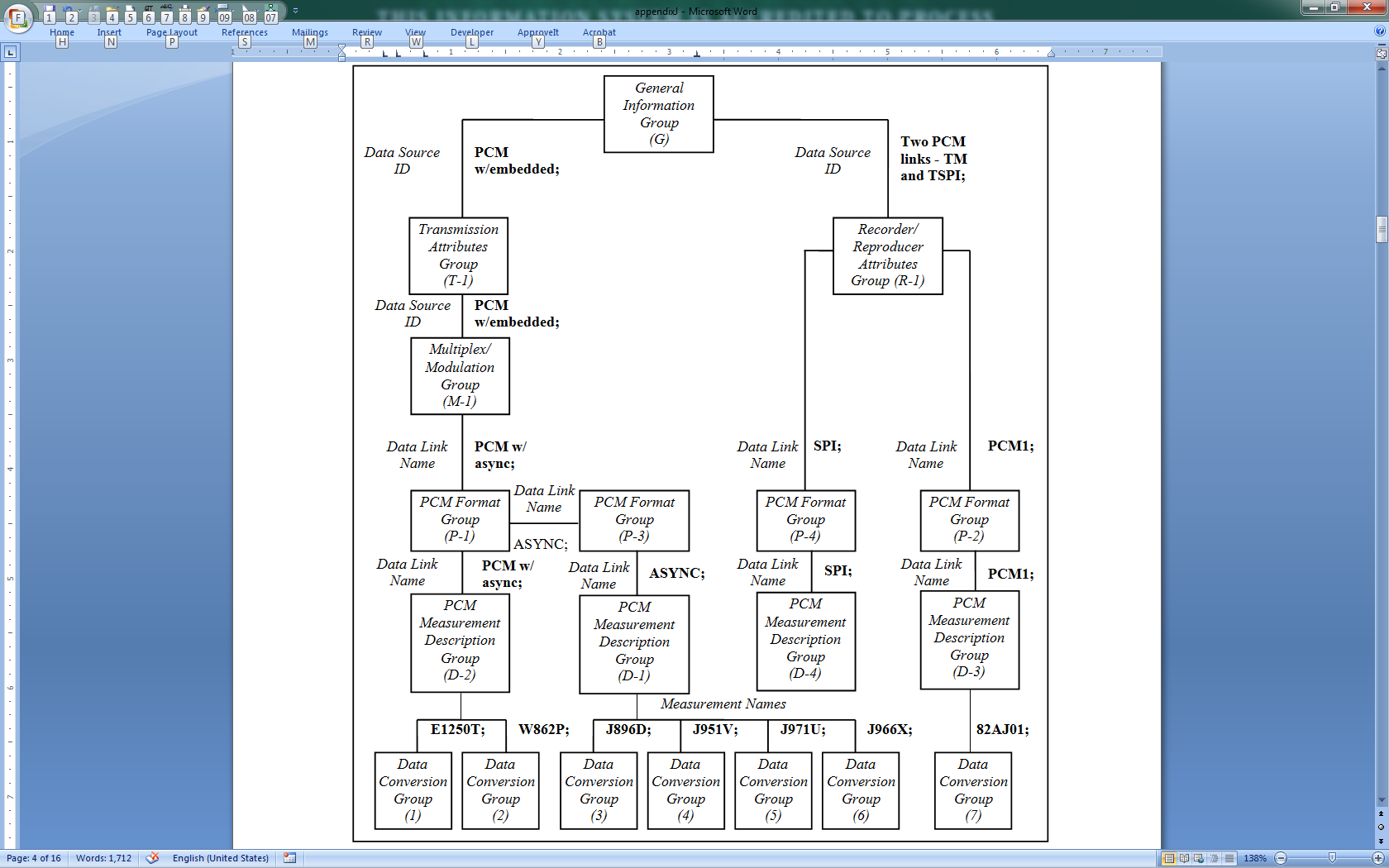


Figure C‑1. Group Linkages

General Information Group (G)

Program name, test name, origination date, revision number: 0, test number: 13.

G\PN: TMATS example; G\TA: Wright Flyer; G\OD: 07-12-1903; G\RN:0; G\TN:13;

G\POC1-1: Wilbur; G\POC2-1: Bikes,LTD; G\POC3-1: Dayton; G\POC4-1: 555-1212;

Live data source.

**G\DSI-1:PCM w/embedded;** G\DST-1:RF;

Data storage source.

**G\DSI-2:Two PCM links - TM & TSPI;** G\DST-2:STO;

G\COM: I hope this flies.; G\POC1-2: Orville;

G\POC2-2:Bikes,LTD; G\POC3-2: Dayton; G\POC4-2: 555-1212;

Transmission Attributes Group (T-1)

Frequency: 1489.5, RF bandwidth: 100, data bandwidth: 100; not encrypted, modulation type: FM, total carrier modulation: 500, no subcarriers, transmit polarization: linear.

**T-1\ID:PCM w/embedded;** T-1\RF1:1489.5; T-1\RF2:100; T-1\RF3:100;

T-1\RF4:FM; T-1\RF5:500; T-1\SCO\N:NO; T-1\AN2:LIN;

T-1\AP\POC1: Pat Tern; T-1\AP\POC2:Transmissions,Inc.;

T-1\AP\POC3:Amityville,NY; T-1\AP\POC4:800-555-1212;

Recorder-Reproducer Attributes Group (R-1)

**R-1\ID:Two PCM links - TM & TSPI;**

R-1\R1:Recorded Data; R-1\TC1:MD;

Two channels of data, manufacturer: ZZ; model: 13, original: yes.

R-1\RI1:ZZ; R-1\RI2:13;R-1\N:2; R-1\RI3:Y;

R-1\RI4:07-12-2011-07-55-59; R-1\POC1:Mr. Tenn; R-1\POC2:Data Creations;

R-1\POC3:Anywhere,Ttown; R-1\POC4:555-1212;

Channel ID 2 contains aircraft telemetry PCM (w/subframe fragmented)

R-1\TK1-1:2;

R-1\DSI-1:PCM w/subframe fragmented;

R-1\CDT-1:PCMIN; **R-1\CDLN-1:PCM1;**

Channel ID 4 contains Space Position Information via PCM link

R-1\TK1-2:4; R-1\DSI-2:Space Position Information;

R-1\CDT-2:PCMIN; **R-1\CDLN-2:SPI;**

Multiplex/Modulation Group (M-1)

Baseband type: PCM, modulation sense: POS, baseband data: PCM, low pass filter type: constant amplitude

**M-1\ID:PCM w/embedded;** M-1\BB1:PCM; M-1\BB2:POS; M-1\BSG1:PCM;

M-1\BSF2:CA;

**M-1\BB\DLN:PCM w/async;**

PCM Format Attributes Groups (P)

P-1 is a live PCM signal and contains the asynchronous wave train (see Table C‑1).

P-2 is a recorded signal (see Table C‑2).

P-3 is the asynchronous wave train (see Table C‑3).

P-4 is a recorded signal.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Table C‑1. PCM Format for PCM w/ASYNC | | | | | | | | | | | | | | |
|  |  | **Sync 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 • • • 39 40 41 42** | | | | | | | | | | | |  |
| **1**  **2**  **3**  **4**  **5**  **6**  **7**  **8**  **•**  **•**  **•**  **16** | 20 bits | ID  C  o  u  n  t  e  r |  | Embedded Format  (Words  6-10) | 8 B  i  t  s | 12  B  i  t  s |  |  |  | a  a  a  a  a  a  a  a  •  •  •  a |  |  |
|
|
|
|
|
|  |  |  |  |  |  |  | b |
|  |  |  |  |  |  |  |  |
|
|
| Major frame characteristics:  One major frame = 16 minor frames  Word lengths = 10 bits (default value) except Word 10 has 8 bits and Word 11 has 12 bits    a = measurement E1250T in word position 39  b = measurement W862P in word position 42, frame position 8.  PCM Format Group = P-1  PCM Measurement Description Group = D-2  Data Link Name = PCM w/async | | | | | | | | | | | | |

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Table C‑2. PCM Format for PCM1 | | | | | | | | | | | |
|  |  | **Sync 1 2 3 • • • 12 13 14 • • • 113 114 • • • 120 121 122 • • • 276** | | | | | | | | |  |
| **1**  **2**  **3**  **4**  **5**  **•**  **•**  **•**  **32**  **•**  **•**  **•**  **37**  **•**  **•**  **•**  **64** | 30 bits |  | ID  C  o  u  n  t  e  r |  |  |  |  |  |  |  |
|  |  |  | M |  | L |  | |
|  |  |  |  |  | 6  Bits | 4 Bits |  |
|  |  |  | M |  | L |  | |
|  |  |  |  |  |  |  |  |
| Major frame characteristics:  One major frame = 64 minor frames  ID counter counts 0 - 63  Word lengths = 10 (default value) except Word 121 has 6 bits and Word 122 has 4 bits  Measurement 82AJ01 is 16 bits, which is fragmented with the 10 msbs indicated as M and the 6 lsbs as L.  Measurement 82AJ01 occurs twice in the major frame.  The first location is in word positions 113 and 121, frame position 5.  The second location is in word positions 113 and 121, frame position 37.    PCM Format Group = P-2  PCM Measurement Description Group = D-3  Data Link Name = PCM1 | | | | | | | | | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Table C‑3. PCM Format for ASYNC | | | | | | | | | | | | | | | | | | | | | |
|  | **Sync 1 2 3 ••• 11 ••• 14 ••• 20 ••• 29 ••• 33 ••• 39 ••• 45 46 47 48 49** | | | | | | | | | | | | | | | | | | | | |
| **1** | 16  B  i  t  s | ID  C  o  u  n  t  e  r | a | b | ••• | a | ••• | c | ••• | a | ••• | a | ••• | a | ••• |  | ••• |  |  | a |  |
| **2** | a |  | ••• | a | ••• |  | ••• | a | ••• | a | ••• | a | ••• | c | ••• |  |  | a |  |
| **3** | a |  | ••• | a | ••• |  | ••• | a | ••• | a | ••• | a | ••• |  | ••• | d |  | a |  |
| Major frame characteristics:  One major frame = 3 minor frames  Word lengths = 16 bits (default value)  a = measurement J971U, supercommutated in word positions 2, 11, 20, 29, 33, and 47  b = measurement J951V in word position 3, frame position 1  c = measurement J896D in two locations: word position 14, frame position 1 and word position 39, frame position 2  d = measurement J966X in word position 45, frame position 3  PCM Format Group = P-3  PCM Measurement Description Group = D-1  Data Link Name = ASYNC | | | | | | | | | | | | | | | | | | | | | |

*(Start of P-1)*

Live PCM signal (host wave train): Class I

**P-1\DLN:PCM w/async;** P-1\D1:NRZ-L; P-1\D2:44000; P-1\D3:U;

P-1\D4:N; P-1\D6:N; P-1\D7:N; P-1\TF:ONE;

10 bits default word length, 16 minor frames/major frame, 43 words/frame

P-1\F1:10; P-1\F2:M; P-1\F3:NO; P-1\MF\N:16; P-1\MF1:43;

P-1\MF2:440; P-1\MF3:FPT; P-1\MF4:20;

P-1\MF5: 01111010011010110001; P-1\SYNC1:1; P-1\SYNC2:0;

P-1\SYNC3:1;P-1\SYNC4:0;

Word position #10, 8 bits, Word position #11, 12 bits

P-1\MFW1-1:10; P-1\MFW2-1:8; P-1\MFW1-2:11; P-1\MFW2-2:12;

One subframe ID counter in word position 1

P-1\ISF\N:1; P-1\ISF1-1:1; P-1\ISF2-1:ID; P-1\IDC1-1:1;

msb starting bit location: 7, ID counter length: 4

P-1\IDC3-1:7; P-1\IDC4-1:4; P-1\IDC5-1:M;

P-1\IDC6-1:0; P-1\IDC7-1:1; P-1\IDC8-1:15; P-1\IDC9-1:16;

P-1\IDC10-1:INC;

Asynchronous embedded wave train information

Data Link Name (to be referenced in the format definition of the asynchronous wave train) is ASYNC.

Five contiguous minor frame word positions starting at location 6.

P-1\AEF\N:1; **P-1\AEF\DLN-1:ASYNC;** P-1\AEF1-1:5; P-1\AEF2-1:CW;

P-1\AEF3-1-1:6;

*(End of P-1)*

*(Start of P-2)*

Recorded PCM signal format attributes.

Data Link Name is PCM1, Data Format is NRZ-L, Bit rate is 2 Mbit/sec, Unencrypted, Normal polarity, class I, Common word length is 10, msb first, No parity, 64 minor frames per major frame, 277 words per minor frame, Sync pattern length is 30. Word position 121 is 6 bits. Word position 122 is 4 bits.

**P-2\DLN:PCM1;**P-2\D1:NRZ-L; P-2\D2:2000000; P-2\D3:U; P-2\D4:N;

P-2\TF:ONE; P-2\F1:10; P-2\F2:M; P-2\F3:NO; P-2\MF\N:64;

P-2\MF1:277; P-2\MF4:30; P-2\MF5:101110000001100111110101101011; P-2\SYNC1:1;

P-2\MFW1-1:121; P-2\MFW2-1:6; P-2\MFW1-2:122;P-2\MFW2-2:4;

One subframe ID counter named 1. Sync type is ID counter. ID counter location is 13. ID counter msb location is 5. ID counter length is 6. ID counter transfer order is msb first. ID counter initial value is 0. ID counter initial frame is 1. ID counter end value is 63. ID counter end frame is 64. ID counter is increasing.

P-2\ISF\N:1; P-2\ISF1-1:1; P-2\ISF2-1:ID; P-2\IDC1-1:13;

P-2\IDC3-1:5; P-2\IDC4-1:6; P-2\IDC5-1:M;

P-2\IDC6-1:0; P-2\IDC7-1:1; P-2\IDC8-1:63; P-2\IDC9-1:64;

P-2\IDC10-1:INC;

*(End of P-2)*

*(Start of P-3)*

Asynchronous wave train PCM format attributes.

Data Link Name: ASYNC

Class I, Common word length: 16, lsb transfer order, no parity, 3 minor frames per major frame, 50 words/minor frame, 800 bits per minor frame, fixed pattern synchronization, 16 bit sync pattern.

**P-3\DLN:ASYNC;** P-3\TF:ONE; P-3\F1:16; P-3\F2:L; P-3\F3:NO;

P-3\MF\N:3; P-3\MF1:50; P-3\MF2:800; P-3\MF3:FPT; P-3\MF4:16;

P-3\MF5: 1111100110110001; P-3\SYNC1:1;

ID counter in word position 1.

P-3\ISF\N:1; P-3\ISF1-1:2; P-3\ISF2-1:ID; P-3\IDC1-1:1;

P-3\IDC3-1:15; P-3\IDC4-1:2; P-3\IDC5-1:L;

P-3\IDC6-1:0; P-3\IDC7-1:1; P-3\IDC8-1:2; P-3\IDC9-1:3;

P-3\IDC10-1:INC;

*(End of P-3)*

*(Start of P-4)*

**P-4\DLN:SPI;**

*(End of P-4)*

PCM Measurement Description (D)

D-1 contains the measurements that make up the asynchronous wave train,

D-2 contains the measurements that make up the live PCM signal (that hosts the asynchronous wave train),

D-3 contains the measurements that make up one of the recorded PCM signals, and

D-4 contains the measurements that make up the other recorded PCM signal.

*(Start of D-1)*

Asynchronous Wave Train: One measurement list, 4 measurements

**D-1\DLN:ASYNC;** D-1\ML\N:1; D-1\MLN-1:JUST ONE; D-1\MN\N-1:4;

Measurement Name: J896D, lsb first.

2 locations: word 14, frame 1 and word 39, frame 2.

**D-1\MN-1-1:J896D;** D-1\MN3-1-1:L; D-1\LT-1-1: WDFR;

D-1\MML\N-1-1:2: D-1\MNF\N-1-1-1:1: D-1\WP-1-1-1-1:14; D-1\WI-1-1-1-1:0;

D-1\FP-1-1-1-1:1; D-1\FI-1-1-1-1:0; D-1\WFM-1-1-1-1:FW; D-1\MNF\N-1-1-2:1:

D-1\WP-1-1-2-1:39; D-1\WI-1-1-2-1:0; D-1\FP-1-1-2-1:2; D-1\FI-1-1-2-1:0;

D-1\WFM-1-1-2-1:FW;

Measurement Name: J951V, lsb first, default parity, word 3, frame 1.

**D-1\MN-1-2:J951V;** D-1\MN1-1-2:DE; D-1\MN2-1-2:D; D-1\MN3-1-2:L;

D-1\LT-1-2: WDFR; D-1\MML\N-1-2:1: D-1\MNF\N-1-2-1:1: D-1\WP-1-2-1-1:3;

D-1\WI-1-2-1-1:0; D-1\FP-1-2-1-1:1; D-1\FI-1-2-1-1:0;

D-1\WFM-1-2-1-1:1111111100000000;

Measurement Name: J971U, lsb first,

supercommutated at 6 word positions: 2, 11, 20, 29, 33, and 47.

**D-1\MN-1-3:J971U;** D-1\MN1-1-3:DE; D-1\MN2-1-3:D; D-1\MN3-1-3:L;

D-1\LT-1-3: WDFR; D-1\MML\N-1-3:6:

D-1\MNF\N-1-3-1:1: D-1\WP-1-3-1-1:2; D-1\WI-1-3-1-1:0; D-1\FP-1-3-1-1:1;

D-1\FI-1-3-1-1:1; D-1\WFM-1-3-1-1:FW;

D-1\MNF\N-1-3-2:1: D-1\WP-1-3-2-1:11; D-1\WI-1-3-2-1:0; D-1\FP-1-3-2-1:1;

D-1\FI-1-3-2-1:1; D-1\WFM-1-3-2-1:FW;

D-1\MNF\N-1-3-3:1: D-1\WP-1-3-3-1:20; D-1\WI-1-3-3-1:0; D-1\FP-1-3-3-1:1;

D-1\FI-1-3-3-1:1; D-1\WFM-1-3-3-1:FW;

D-1\MNF\N-1-3-4:1: D-1\WP-1-3-4-1:29; D-1\WI-1-3-4-1:0; D-1\FP-1-3-4-1:1;

D-1\FI-1-3-4-1:1; D-1\WFM-1-3-4-1:FW;

D-1\MNF\N-1-3-5:1: D-1\WP-1-3-5-1:33; D-1\WI-1-3-5-1:0; D-1\FP-1-3-5-1:1;

D-1\FI-1-3-5-1:1; D-1\WFM-1-3-5-1:FW;

D-1\MNF\N-1-3-6:1: D-1\WP-1-3-6-1:47; D-1\WI-1-3-6-1:0; D-1\FP-1-3-6-1:1;

D-1\FI-1-3-6-1:1; D-1\WFM-1-3-6-1:FW;

Measurement Name: J966X, lsb first, word 45, frame 3.

**D-1\MN-1-4:J966X;** D-1\MN1-1-4:DE; D-1\MN2-1-4:D;

D-1\MN3-1-4:L; D-1\LT-1-4:WDFR; D-1\MML\N-1-4:1: D-1\MNF\N-1-4-1:1:

D-1\WP-1-4-1-1:45; D-1\WI-1-4-1-1:0; D-1\FP-1-4-1-1:3; D-1\FI-1-4-1-1:0;

D-1\WFM-1-4-1-1:FW;

*(End of D-1)*

*(Start of D-2)*

Live PCM signal: single measurement list, 2 measurements.

**D-2\DLN:PCM w/async;** D-2\ML\N:1; D-2\MLN-1:JUST ONE; D-2\MN\N-1:2;

Measurement name: E1250T, unclassified, unsigned, msb first, word 39.

**D-2\MN-1-1:E1250T;** D-2\MN1-1-1:DE; D-2\MN2-1-1:D;

D-2\MN3-1-1:M; D-2\LT-1-1:WDFR;

D-2\MML\N-1-1:1: D-2\MNF\N-1-1-1:1: D-2\WP-1-1-1-1:39; D-2\WI-1-1-1-1:0;

D-2\FP-1-1-1-1:1; D-2\FI-1-1-1-1:1; D-2\WFM-1-1-1-1:FW;

Measurement name: W862P, unclassified, msb first, word 42, frame 8, full word.

**D-2\MN-1-2:W862P;** D-2\MN1-1-2:DE; D-2\MN2-1-2:D; D-2\MN3-1-2:M;

D-2\LT-1-2: WDFR; D-2\MML\N-1-2:1: D-2\MNF\N-1-2-1:1: D-2\WP-1-2-1-1:42;

D-2\WI-1-2-1-1:0; D-2\FP-1-2-1-1:8; D-2\FI-1-2-1-1:0; D-2\WFM-1-2-1-1:FW;

*(End of D-2)*

*(Start of D-3)*

Recorded PCM signal: single measurement list: 1 measurement.

**D-3\DLN:PCM1;** D-3\MLN-1:ONLY ONE; D-3\MN\N-1:1;

Measurement name: 82AJ01, fragmented, in 2 locations: words 113 and 121, frame 5 and words 113 and 121, frame 37. Word 113 contains the most significant fragment and word 121 contains the least significant fragment.

**D-3\MN-1-1:82AJ01;** D-3\LT-1-1: WDFR; D-3\MML\N-1-1:1; D-3\MNF\N-1-1-1:2;

D-3\WP-1-1-1-1:113; D-3\WI-1-1-1-1:0; D-3\FP-1-1-1-1:5; D-3\FI-1-1-1-1:32;

D-3\WFM-1-1-1-1:FW;

D-3\WP-1-1-1-2:121; D-3\WI-1-1-1-2:0; D-3\FP-1-1-1-2:5; D-3\FI-1-1-1-2:32;

D-3\WFM-1-1-1-2:FW;

*(End of D-3)*

*(Start of D-4)*

Recorded PCM signal

**D-4\DLN:SPI;**

*(End of D-4)*

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Data Conversion Groups (C)

C-1 and C-2 are measurements that are part of the live PCM signal (see also D-2).

C-3, C-4, C-5, and C-6 are from the asynchronous wave train (see also D-1).

C-7 is from the recorded PCM signal (see also D-3).

Measurement: E1250T, description: Inlet Temp Bellmouth, units: Deg C, binary format: unsigned; high value: 128, low value: −0.4, conversion type: pair sets, number of pair sets: 2, application (polynomial): Yes; order of fit: 1, telemetry value #1: 0, engineering unit value #1: −0.4, telemetry value #2: 1023, engineering unit value #2: 128.

**C-1\DCN:E1250T;** C-1\MN1:Inlet Temp Bellmouth; C-1\MN3:DEGC;

C-1\BFM:UNS; C-1\MOT1:128; C-1\MOT2:-0.4; C-1\DCT:PRS;

C-1\PS\N:2; C-1\PS1:Y; C-1\PS2:1; C-1\PS3-1:0; C-1\PS4-1:-0.4;

C-1\PS3-2:1023; C-1\PS4-2:128;

Measurement: W862P, description: Fuel Pump Inlet, binary format: unsigned; conversion type: pair sets, number of pair sets: 2, application (polynomial): Yes; order of fit: 1, telemetry value #1: 0, engineering unit value #1: −0.1 telemetry value #2: 1023, engineering unit value #2: 76.7

**C-2\DCN:W862P;** C-2\MN1:Fuel Pump Inlet; C-2\BFM:UNS;

C-2\DCT:PRS; C-2\PS\N:2; C-2\PS1:Y; C-2\PS2:1; C-2\PS3-1:0;

C-2\PS4-1:-0.1; C-2\PS3-2:1023; C-2\PS4-2:76.7;

Measurement: J896D, description: Altitude, units: Feet, binary format: two’s complement; high value: 32768, low value: -32768, conversion type: pair sets; number of pair sets: 2, application (polynomial): Yes, order of fit: 1, telemetry value #1: -32768, engineering unit value #1: -32768, telemetry value #2: 32767, engineering unit value #2: 32767

**C-3\DCN:J896D;** C-3\MN1: Altitude; C-3\MN3:FEET;

C-3\BFM:TWO; C-3\MOT1:32768; C-3\MOT2:-32768; C-3\DCT:PRS;

C-3\PS\N:2; C-3\PS1:Y; C-3\PS2:1; C-3\PS3-1:-32768;

C-3\PS4-1:-32768; C-3\PS3-2:32767; C-3\PS4-2:32767;

Measurement: J951V, description: Throttle Command, units: VDC, high value: 10.164, low value: -10.164, conversion type: pair sets, number of pair sets: 2, application(polynomial): Yes, order of fit: 1, telemetry value #1: -128, engineering unit value #1: -10.164, telemetry value #2: 127, engineering unit value #2: 10.164, binary format: two’s complement

**C-4\DCN:J951V;** C-4\MN1:Throttle Command; C-4\MN3:VDC;

C-4\MOT1:10.164; C-4\MOT2:-10.164; C-4\DCT:PRS; C-4\PS\N:2;

C-4\PS1:Y; C-4\PS2:1; C-4\PS3-1:-128; C-4\PS4-1:-10.164;

C-4\PS3-2:127; C-4\PS4-2:10.164; C-4\BFM:TWO;

Measurement: J971U; description: DISC, conversion type: discrete, binary format: unsigned.

**C-5\DCN:J971U;** C-5\MN1:DISC; C-5\DCT:DIS; C-5\BFM:UNS;

Measurement: J966X; description: Discrete, conversion type: discrete, binary format: unsigned.

**C-6\DCN:J966X;** C-6\MN1:Discrete; C-6\DCT:DIS; C-6\BFM: UNS;

Measurement: 82AJ01, description: LANTZ Norm acceleration, units: MTR/S/S, High value: 1023.97, Low value: -1023.97, conversion type: Coefficients. Order of curve fit: 1, derived from pair sets: No, Coefficient (0): 0, Coefficient(1): 0.03125, binary format: two’s complement

**C-7\DCN:82AJ01;** C-7\MN1:LANTZ Norm acceleration; C-7\MN3:MTR/S/S;

C-7\MOT1:1023.97; C-7\MOT2:-1023.97; C-7\DCT:COE; C-7\CO\N:1;

C-7\CO1:N; C-7\CO:0; C-7\CO-1:.03125; C-7\BFM:TWO;

1. XML Version of Example

The entire example is presented beginning on the next page in the XML version of the TMATS. The XML elements are commented with TMATS code names to aid in associating the XML version of the example with the code name version of the example given above.

<?xml version="1.0" encoding="utf-8"?>

<Tmats>

<!-- G Group -->

<ProgramName>TMATS example</ProgramName><!--PN-->

<TestItem>Wright Flyer</TestItem><!--TA-->

<OriginationDate>1903-07-12</OriginationDate><!--OD must follow XML date format-->

<Revision>

<Number>0</Number><!--RN-->

</Revision>

<TestNumber>13</TestNumber><!--TN-->

<PointOfContact>

<Name>Wilbur</Name><!--POC1-->

<Agency>Bikes,LTD</Agency><!--POC2-->

<Address>Dayton</Address><!--POC3-->

<Telephone>555-1212</Telephone><!--POC4-->

</PointOfContact>

<DataSource Name="PCM w/embedded" Type="RF"><!--DSI-1:PCM w/embedded;DST-1:RF-->

<!-- T Group -->

<TransmissionAttributes>

<SourceRFAttributes>

<Frequency>1489.5</Frequency><!--RF1-->

<RFBandwidth>100</RFBandwidth><!--RF2-->

<DataBandwidth>100</DataBandwidth><!--RF3-->

<ModulationType>FM</ModulationType><!--RF4 enumeration-->

<TotalCarrierModulation>500</TotalCarrierModulation><!--RF5-->

<!--Subcarriers not needed SCO\N:NO-->

<TransmitAntenna>

<Polarization>Linear</Polarization><!--AN2:LIN-->

</TransmitAntenna>

<AntennaPatterns>

<PointOfContact>

<Name>Pat Tern</Name><!--AP\POC1-->

<Agency>Transmissions,Inc.</Agency><!--AP\POC2-->

<Address>Amityville,NY</Address><!--AP\POC3-->

<Telephone>800-555-1212</Telephone><!--AP\POC4-->

</PointOfContact>

</AntennaPatterns>

</SourceRFAttributes>

</TransmissionAttributes>

<!-- M Group -->

<!--M1\ID:PCM w/embedded is implicit-->

<MultiplexModulationGroup>

<CompositeSignalStructure>

<SignalStructureType>PCM</SignalStructureType><!--BB1:PCM-->

<ModulationSense>Positive</ModulationSense><!--BB2:POS-->

</CompositeSignalStructure>

<BasebandSignal>

<SignalType>PCM</SignalType><!--BSG1:PCM-->

<LowPassFilter>

<Type>Constant Amplitude</Type><!--BSF2:CA-->

</LowPassFilter>

<DataLinkName>PCM w/async</DataLinkName><!--BB\DLN-->

</BasebandSignal>

</MultiplexModulationGroup>

<DataLink Name="PCM w/async"><!--P-1\DLN-->

<!-- P Group -->

<PCMFormatAttributes>

<InputData>

<PCMCode>NRZ-L</PCMCode><!--D1:NRZ-L-->

<BitRate>44000</BitRate><!--D2:44000-->

<Encrypted>Unencrypted</Encrypted><!--D3:U-->

<Polarity>Normal</Polarity><!--D4:N-->

<DataDirection>Normal</DataDirection><!--D6:N-->

<DataRandomized>No</DataRandomized><!--D7:N-->

</InputData>

<Format>

<TypeFormat>Class 1</TypeFormat><!--TF:ONE-->

<CommonWordLength>10</CommonWordLength><!--F1:10-->

<WordTransferOrder>MSB First</WordTransferOrder><!--F2:M-->

<Parity>None</Parity><!--F3:NO-->

<MinorFrame>

<NumberOfMinorFrames>16</NumberOfMinorFrames><!--MF\N:16-->

<WordsPerMinorFrame>43</WordsPerMinorFrame><!--MF1:43-->

<BitsPerMinorFrame>440</BitsPerMinorFrame><!--MF2:440-->

<SyncType>Fixed Pattern</SyncType><!--MF3:FPT-->

<!--MF4:20 is implicit-->

<SyncPattern>01111010011010110001</SyncPattern><!--MF5:01111010011010110001-->

</MinorFrame>

</Format>

<SyncCriteria>

<InSync>

<Criteria>1</Criteria><!--SYNC1:1-->

<NumberOfFSPBits>0</NumberOfFSPBits><!--SYNC2:0-->

</InSync>

<OutOfSync>

<NumberOfDisagrees>Not Specified</NumberOfDisagrees><!--SYNC3:1-->

<NumberOfFSPBits>0</NumberOfFSPBits><!--SYNC4:0-->

</OutOfSync>

</SyncCriteria>

<VariableWordLength>

<Word>10</Word><!--MFW1-1-->

<Length>8</Length><!--MFW2-1-->

</VariableWordLength>

<VariableWordLength>

<Word>11</Word><!--MFW1-2-->

<Length>12</Length><!--MFW2-2-->

</VariableWordLength>

<SubframeSynchronization>

<IDCounter><!--ISF\N:1 is implicit-->

<Name>1</Name><!--ISF1:1-->

<SyncType>ID Counter</SyncType><!--ISF2:ID-->

<Location>1</Location><!--IDC1:1-->

<CounterStartingBitLocation>7</CounterStartingBitLocation><!--IDC3:7-->

<CounterLength>4</CounterLength><!--IDC4:4-->

<TransferOrder>MSB First</TransferOrder><!--IDC5:M-->

<InitialValue>0</InitialValue><!--IDC6:0-->

<InitialSubframeNumber>1</InitialSubframeNumber><!--IDC7:1-->

<EndValue>15</EndValue><!--IDC8:15-->

<EndSubframeNumber>16</EndSubframeNumber><!--IDC9:16-->

<CountDirection>Increasing</CountDirection><!--IDC10:INC-->

</IDCounter>

</SubframeSynchronization>

<AsyncEmbeddedFormat>

<!--AEF\N:1 is implicit-->

<DataLinkName>ASYNC</DataLinkName><!--AEF\DLN-1:ASYNC-->

<Supercom>5</Supercom><!--AEF1-1:5-->

<LocationDefinition>Contiguous Words</LocationDefinition><!--AEF2-1:CW-->

<Location>6</Location><!--AEF3-1-1:6-->

</AsyncEmbeddedFormat>

<!-- D Group -->

<!--D-2\DLN:PCM w/async is implicit-->

<PCMMeasurements>

<!--D-2\ML\N:1 is implicit-->

<MeasurementList Name="JUST ONE"><!--MLN-1:JUST ONE-->

<!--MN\N-1:2 is implicit-->

<Measurement Name="E1250T"><!--MN-1-1:E1250T-->

<Parity>Default</Parity><!--MN1-1-1:DE-->

<ParityTransferOrder>Default</ParityTransferOrder><!--MN2-1-1:D-->

<MeasurementTransferOrder>MSB First</MeasurementTransferOrder><!--MN3-1-1:M-->

<LocationType>Word and Frame</LocationType><!--LT-1-1:WDFR-->

<!--MML\N-1-1:1 is implicit-->

<MeasurementLocation>

<!--MNF\N-1-1-1:1 is implicit-->

<MeasurementFragments>

<StartWord>39</StartWord><!--WP-1-1-1-1:39-->

<WordInterval>0</WordInterval><!--WI-1-1-1-1:0-->

<StartFrame>1</StartFrame><!--FP-1-1-1-1:1-->

<FrameInterval>1</FrameInterval><!--FI-1-1-1-1:1-->

<BitMask>Full Word</BitMask><!--WFM-1-1-1-1:FW-->

</MeasurementFragments>

</MeasurementLocation>

</Measurement>

<Measurement Name="W862P"><!--MN-1-2:W862P-->

<Parity>Default</Parity><!--MN1-1-2:DE-->

<ParityTransferOrder>Default</ParityTransferOrder><!--MN2-1-2:D-->

<MeasurementTransferOrder>MSB First</MeasurementTransferOrder><!--MN3-1-2:M-->

<LocationType>Word and Frame</LocationType><!--LT-1-2:WDFR-->

<!--MML\N-1-2:1 is implicit-->

<MeasurementLocation>

<!--MNF\N-1-2-1:1 is implicit-->

<MeasurementFragments>

<StartWord>42</StartWord><!--WP-1-2-1-1:42-->

<WordInterval>0</WordInterval><!--WI-1-2-1-1:0-->

<StartFrame>8</StartFrame><!--FP-1-2-1-1:8-->

<FrameInterval>0</FrameInterval><!--FI-1-2-1-1:0-->

<BitMask>Full Word</BitMask><!--WFM-1-2-1-1:FW-->

</MeasurementFragments>

</MeasurementLocation>

</Measurement>

</MeasurementList>

</PCMMeasurements>

</PCMFormatAttributes>

<!-- C Group -->

<DataConversionAttributes>

<Measurement Name="E1250T"><!--C-1\DCN:E1250T-->

<Measurand>

<Description>Inlet Temp Bellmouth</Description><!--MN1:Inlet Temp Bellmouth-->

<EngineeringUnits>DEGC</EngineeringUnits><!--MN3:DEGC-->

</Measurand>

<TelemetryValueDefinition>

<BinaryFormat>Unsigned Binary</BinaryFormat><!--BFM:UNS-->

</TelemetryValueDefinition>

<OtherInformation>

<MeasurementValue>

<Low>-0.4</Low><!--MOT2:-0.4-->

<High>128.0</High><!--MOT1:128-->

</MeasurementValue>

</OtherInformation>

<DataConversion Type="Pair Sets"><!--DCT:PRS-->

<PairSets>

<!--PS\N:2 is implicit-->

<Application>Polynomial Curve Fit</Application><!--PS1:Y-->

<OrderOfFit>1</OrderOfFit><!--PS2:1-->

<Pair>

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<EuValue>-0.4</EuValue><!--PS4-1:-0.4-->

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<Pair>

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<EuValue>128</EuValue><!--PS4-2:128-->

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</Measurand>

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</TelemetryValueDefinition>

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<EuValue>-0.1</EuValue><!--PS4-1:-0.1-->

</Pair>

<Pair>

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<EuValue>76.7</EuValue><!--PS4-2:76.7-->

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</PairSets>

</DataConversion>

</Measurement>

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<Parity>None</Parity><!--F3:NO-->

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<WordsPerMinorFrame>50</WordsPerMinorFrame><!--MF1:50-->

<BitsPerMinorFrame>800</BitsPerMinorFrame><!--MF2:800-->

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</Format>

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</InSync>

</SyncCriteria>

<SubframeSynchronization>

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<Name>2</Name><!--ISF1-1:2-->

<SyncType>ID Counter</SyncType><!--ISF2-1:ID-->

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<CounterStartingBitLocation>15</CounterStartingBitLocation><!--IDC3-1:15-->

<CounterLength>2</CounterLength><!--IDC4-1:2-->

<TransferOrder>LSB First</TransferOrder><!--IDC5-1:L-->

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<EndValue>2</EndValue><!--IDC8-1:2-->

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</IDCounter>

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<!--D-1\ML\N:1 is implicit-->

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<FrameInterval>0</FrameInterval><!--FI-1-1-1-1:0-->

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<ParityTransferOrder>Default</ParityTransferOrder><!--MN2-1-2:D-->

<MeasurementTransferOrder>LSB First</MeasurementTransferOrder><!--MN3-1-2:L-->

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<!--MNF\N-1-2-1:1 is implicit-->

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<Parity>Default</Parity><!--MN1-1-3:DE-->

<ParityTransferOrder>Default</ParityTransferOrder><!--MN2-1-3:D-->

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<FrameInterval>1</FrameInterval><!--FI-1-3-1-1:1-->

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<FrameInterval>1</FrameInterval><!--FI-1-3-3-1:1-->

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<FrameInterval>1</FrameInterval><!--FI-1-3-4-1:1-->

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<WordInterval>0</WordInterval><!--WI-1-3-5-1:0-->

<StartFrame>1</StartFrame><!--FP-1-3-5-1:1-->

<FrameInterval>1</FrameInterval><!--FI-1-3-5-1:1-->

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<!--MNF\N-1-3-6:1 is implicit-->

<MeasurementFragments>

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<StartFrame>1</StartFrame><!--FP-1-3-6-1:1-->

<FrameInterval>1</FrameInterval><!--FI-1-3-6-1:1-->

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<ParityTransferOrder>Default</ParityTransferOrder><!--MN2-1-4:D-->

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<LocationType>Word and Frame</LocationType><!--LT-1-4:WDFR-->

<!--MML\N-1-4:1 is implicit-->

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<!--MNF\N-1-4-1:1 is implicit-->

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<StartFrame>3</StartFrame><!--FP-1-4-1-1:3-->

<FrameInterval>0</FrameInterval><!--FI-1-4-1-1:0-->

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<High>32768.0</High><!--MOT1:32768-->

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<EuValue>-32768.0</EuValue><!--PS4-1:-32768-->

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<EngineeringUnits>VDC</EngineeringUnits><!--MN3:VDC-->

</Measurand>

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</TelemetryValueDefinition>

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<High>10.164</High><!--MOT1:10.164-->

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</OtherInformation>

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<OrderOfFit>1</OrderOfFit><!--PS2:1-->

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<EuValue>-10.164</EuValue><!--PS4-1:-10.164-->

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<Pair>

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<EuValue>10.164</EuValue><!--PS4-2:10.164-->

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</PairSets>

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</Measurand>

<TelemetryValueDefinition>

<BinaryFormat>Unsigned Binary</BinaryFormat><!--BFM:UNS-->

</TelemetryValueDefinition>

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<Agency>Bikes,LTD</Agency><!--POC2-2:Bikes,LTD-->

<Address>Dayton</Address><!--POC3-2: Dayton-->

<Telephone>555-1212</Telephone><!--POC4-2: 555-1212-->

</PointOfContact>

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<!-- R Group -->

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<Description>Recorded Data</Description><!--R1:Recorded Data-->

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<Type>Magnetic Disk</Type><!--TC1:MD-->

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</Characteristics>

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<Model>13</Model><!--RI2:13-->

<OriginalRecording>Yes</OriginalRecording><!--RI3:Y-->

<OriginalRecordingDateAndTime>2011-07-12T07:55:59</OriginalRecordingDateAndTime><!--RI4:07-12-2011-07-55-59-->

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<Name>Mr. Tenn</Name><!--POC1:Mr. Tenn-->

<Agency>Data Creations</Agency><!--POC2:Data Creations-->

<Address>Anywhere,Ttown</Address><!--POC3:Anywhere,Ttown-->

<Telephone>555-1212</Telephone><!--POC4:555-1212-->

</CreatingOrganizationPointOfContact>

</RecorderReproducerInfo>

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<ChannelDataLinkName>PCM1</ChannelDataLinkName><!--CDLN-1:PCM1-->

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<ChannelDataType>PCM Input</ChannelDataType><!--CDT-2:PCMIN-->

<ChannelDataLinkName>SPI</ChannelDataLinkName><!--CDLN-2:SPI-->

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<!-- P Group -->

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<Encrypted>Unencrypted</Encrypted><!--D3:U-->

<Polarity>Normal</Polarity><!--D4:N-->

</InputData>

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<Parity>None</Parity><!--F3:NO-->

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<WordsPerMinorFrame>277</WordsPerMinorFrame><!--MF1:277-->

<!--MF4:30 is implicit-->

<SyncPattern>101110000001100111110101101011</SyncPattern><!--MF5:101110000001100111110101101011-->

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</InSync>

</SyncCriteria>

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<Word>121</Word><!--MFW1-1:121-->

<Length>6</Length><!--MFW2-1:6-->

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<Word>122</Word><!--MFW1-2:122-->

<Length>4</Length><!--MFW2-2:4-->

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<SyncType>ID Counter</SyncType><!--ISF2-1:ID-->

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<CounterStartingBitLocation>5</CounterStartingBitLocation><!--IDC3-1:5-->

<CounterLength>6</CounterLength><!--IDC4-1:6-->

<TransferOrder>MSB First</TransferOrder><!--IDC5-1:M-->

<InitialValue>0</InitialValue><!--IDC6-1:0-->

<InitialSubframeNumber>1</InitialSubframeNumber><!--IDC7-1:1-->

<EndValue>63</EndValue><!--IDC8-1:63-->

<EndSubframeNumber>64</EndSubframeNumber><!--IDC9-1:64-->

<CountDirection>Increasing</CountDirection><!--IDC10-1:INC-->

</IDCounter>

</SubframeSynchronization>

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<FrameInterval>32</FrameInterval><!--FI-1-1-1-2:32-->

<BitMask>FW</BitMask><!--WFM-1-1-1-2:FW-->

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</MeasurementList>

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<Measurand>

<Description>LANTZ Norm acceleration</Description><!--MN1:LANTZ Norm acceleration-->

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<High>1023.97</High><!--MOT1:1023.97-->

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</OtherInformation>

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<DerivedFromPairSet>No</DerivedFromPairSet><!--CO1:N-->

<Coefficient N="0">0</Coefficient><!--CO:0-->

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</Measurement>

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<!-- D Group -->

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<!--D-4\DLN:SPI is implicit-->

</PCMMeasurements>

</PCMFormatAttributes>

</DataLink>

<Comment>I hope this flies.</Comment><!--COM: I hope this flies.-->

</Tmats>

<!-- Last revised on: v3 2012/02/21 -->

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Floating Point Formats

* 1. Introduction

Table D‑1 provides a summary of floating point formats. Details of each format are shown on the pages following the table.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Table D‑1. Floating Point Formats | | | | | | | |
| **Type** | **Size** | **Radix** | **Sign** | **Exponent** | **Fraction** | **Bias** | **Formula** |
| IEEE\_32 | 32 | 2 | 1 | 8 | 23 | 127 | (−1S)(1.F)(2(E−127)) |
| IEEE\_64 | 64 | 2 | 1 | 11 | 52 | 1023 | (−1S)(1.F)(2(E−1023)) |
| 1750A\_32 | 32 | 2 | 0 | 8 | 24 | 0 | (0.F)(2E) |
| 1750A\_48 | 48 | 2 | 0 | 8 | 40 | 0 | (0.F)(2E) |
| DEC\_32 | 32 | 2 | 1 | 8 | 23 | 128 | (−1S)(0.1F)(2(E−128)) |
| DEC\_64 | 64 | 2 | 1 | 8 | 55 | 128 | (−1S)(0.1F)(2(E−128)) |
| DEC\_64G | 64 | 2 | 1 | 11 | 52 | 1024 | (−1S)(0.1F)(2(E−1024)) |
| IBM\_32 | 32 | 16 | 1 | 7 | 24 | 64 | (−1S)(0.F)(16(E−64)) |
| IBM\_64 | 64 | 16 | 1 | 7 | 56 | 64 | (−1S)(0.F)(16(E−64)) |
| TI\_32 | 32 | 2 | 1 | 8 | 24 | 0 | ((−2)S + (0.F))(2E) |
| TI\_40 | 40 | 2 | 1 | 8 | 32 | 0 | ((−2)S + (0.F))(2E) |

* 1. IEEE 754 32-Bit Single Precision Floating Point

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S** | **Exponent** | | **Fraction** | |
| 1 | 2 | 9 | 10 | 32 |
|  | | | 2−1 | 2−23 |

Value = (−1S)(1.F)(2(E−127))

where S = sign: 0 = Positive, 1 = Negative

Exponent = power of 2 with bias of 127

Fraction = F portion of 23-bit fraction 1.F

0: E = 0, F = 0

* 1. IEEE 754 64-Bit Double Precision Floating Point

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S** | **Exponent** | | **Fraction** | |
| 1 | 2 | 12 | 13 | 64 |
|  | | | 2−1 | 2−52 |

Value = (−1S)(1.F)(2(E−1023))

where S = sign: 0 = Positive, 1 = Negative

Exponent = power of 2 with bias of 1023

Fraction = F portion of 52-bit fraction 1.F

0: E = 0, F = 0

* 1. MIL-STD-1750A 32-Bit Single Precision Floating Point

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S** | **Fraction** | | **Exponent** | |
| 1 | 2 | 24 | 25 | 32 |
|  | 2−1 | 2−23 |  | |

Value = (0.F)(2E)

where Exponent = 2’s complement power of 2

S = sign: 0 = Positive, 1 = Negative

S + Fraction = Normalized, 2’s complement F portion of 24-bit fraction 0.F (Bit 2 MUST be set for positive, clear for negative)

0: F = 0

* 1. MIL-STD-1750A 48-Bit Double Precision Floating Point

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **S** | **Fraction (MSW)** | | **Exponent** | | **Fraction (LSW)** | |
| 1 | 2 | 24 | 25 | 32 | 33 | 48 |
|  | 2−1 | 2−23 |  | | 2−24 | 2−31 |

Value = (0.F)(2E)

where Exponent = 2’s complement power of 2

S = sign: 0 = Positive, 1 = Negative

S + Fraction = Normalized, 2’s complement F portion of 40-bit fraction 0.F (Bit 2 MUST be set for positive, clear for negative)

0: F = 0

* 1. DEC 32-Bit Single Precision Floating Point

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S** | **Exponent** | | **Fraction** | |
| 1 | 2 | 9 | 10 | 32 |
|  | | | 2−2 | 2−24 |

Value = (−1S)(0.1F)(2(E−128))

where S = sign: 0 = Positive, 1 = Negative

Exponent = power of 2 with bias of 128

Fraction = F portion of 23-bit fraction 0.1F

0: S = 0 & F = 0 & E = 0

* 1. DEC 64-Bit Double Precision Floating Point

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S** | **Exponent** | | **Fraction** | |
| 1 | 2 | 9 | 10 | 64 |
|  | | | 2−2 | 2−56 |

Value = (−1S)(0.1F)(2(E−128))

where S = sign: 0 = Positive, 1 = Negative

Exponent = power of 2 with bias of 128

Fraction = F portion of 55-bit fraction 0.1F

0: S = 0 & F = 0 & E = 0

* 1. DEC 64-Bit “G” Double Precision Floating Point

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S** | **Exponent** | | **Fraction** | |
| 1 | 2 | 12 | 13 | 64 |
|  | | | 2−2 | 2−53 |

Value = (−1S)(0.1F)(2(E−1024))

where S = sign: 0 = Positive, 1 = Negative

Exponent = power of 2 with bias of 1024

Fraction = F portion of 52-bit fraction 0.1F

0: S = 0 & F = 0 & E = 0

* 1. IBM 32-Bit Single Precision Floating Point

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S** | **Exponent** | | **Fraction** | |
| 1 | 2 | 8 | 9 | 32 |
|  | | | 2−1 | 2−24 |

Value = (−1S)(0.F)(16(E−64))

where S = sign: 0 = Positive, 1 = Negative

Exponent = power of 16 with bias of 64

Fraction = Normalized F portion of 24-bit fraction 0.F (Bits 9-12 cannot be all zero)

0: F = 0

* 1. IBM 64-Bit Double Precision Floating Point

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S** | **Exponent** | | **Fraction** | |
| 1 | 2 | 8 | 9 | 64 |
|  | | | 2−1 | 2−56 |

Value = (−1S)(0.F)(16(E−64))

where S = sign: 0 = Positive, 1 = Negative

Exponent = power of 16 with bias of 64

Fraction = Normalized F portion of 56-bit fraction 0.F (Bits 9-12 cannot be all zero)

0: F = 0

* 1. TI (Texas Instruments) 32-Bit Single Precision Floating Point

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Exponent** | | **S** | **Fraction** | |
| 1 | 8 | 9 | 10 | 32 |
|  | |  | 2−1 | 2−23 |

Value = ((−2)S+(0.F))(2E)

where Exponent = 2’s complement power of 2

S = sign: 0 = Positive, 1 = Negative

Fraction = 2’s complement F portion of 24-bit fraction 1.F

0: E = −128

* 1. TI (Texas Instruments) 40-Bit Extended Precision Floating Point

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Exponent** | | **S** | **Fraction** | |
| 1 | 8 | 9 | 10 | 40 |
|  | |  | 2−1 | 2−31 |

Value = ((−2)S+(0.F))(2E)

where Exponent = 2’s complement power of 2

S = sign: 0 = Positive, 1 = Negative

Fraction = 2’s complement F portion of 32-bit fraction 1.F

0: E = −128



Derived Parameter Specification

* 1. Derived Parameter Definition

Derived parameters are measurements that do not appear in any data stream; instead, they are calculated from telemetry measurements in a data stream, numeric constants, and/or other derived measurements. In a Telemetry Attributes Transfer Standard (TMATS) file, derived measurements will only have entries in the C group; the other TMATS groups containing measurement names that link to C group entries only include telemetry measurements.

Derived parameters are defined using the Algorithm Type (C-d\DPAT) and Algorithm (C-d\DPA) attributes in the Derived Parameter section of the TMATS C group. They can be defined in one of two methods. The first method to specify the name of an algorithm (“function style”) and the second method is to specify a text string of the algorithm itself (“formula style”). Both of these methods are currently used in telemetry processing systems.

In function style, Algorithm Type is set to “N” and Algorithm contains the name of a function, which will be one of the mathematical functions or operators as defined in the derived algorithm grammar shown in this appendix. The Input Measurand attributes (C-d\DP\N and C-d\DP-n) and Input Constant attributes (C-d\DPC\N and C-d\DPC-n) are used to specify the arguments needed by the named function (measurements and numeric constants, respectively, as defined in the derived algorithm grammar in this appendix). The Trigger Measurand and Number of Occurrences attributes are used to specify when and how often the derived parameter will be calculated.

In formula style, Algorithm Type is set to “A” and Algorithm contains the actual function, given according to the derived algorithm grammar defined in this appendix. The Input Measurand attributes and Input Constant attributes are not used. The Trigger Measurand and Number of Occurrences attributes are used to specify when and how often the derived parameter will be calculated.

* 1. Derived Algorithm Grammar: Components

Derived algorithm grammar is from the four components listed below. The derived algorithm may be any combination of operators, functions, measurements, and numeric constants strung together using the guidelines in this document to create complex mathematical expressions (see Subsection E.6.b). Sample syntaxes for the Yet Another Compiler Compiler (Yacc) grammar and Lexicon (Lex) grammar are provided in Section E.8.

1. Operators (Section E.3)
2. Numeric Constants (Section E.4)
3. Measurements (Section E.5)
4. Mathematical Functions (Section E.6).
   1. Operators

Operators are simply mathematical functions that have a special syntax in the grammar. They have operator symbol(s) that have well-defined arguments and return a value as a result. Logical operators are merely functions that return a value of 0 and non-zero for false and true respectively.

* + 1. Arithmetic Operators

|  |  |  |
| --- | --- | --- |
| Table E‑1. Arithmetic Operators | | |
| **Operator** | **Description** | **Example** |
| + | Addition (Sum) | A + B |
| - | Subtraction (Difference) | A – B |
| \* | Multiplication (Product) | A \* B |
| / | Division (Quotient) | A / B |
| % | Modulus (Remainder) | A % B |
| \*\* | Exponentiation | A \*\* B |

* + 1. Bit Manipulation Operators

|  |  |  |
| --- | --- | --- |
| Table E‑2. Bit Manipulation Operators | | |
| **Operator** | **Description** | **Example** |
| | | Bit-wise OR | A | B |
| & | Bit-wise AND | A & B |
| ^ | Bit-wise XOR | A ^ B |
| ~ | Bit-wise NOT | ~A |
| << | Bit-wise Left Shift | A << B |
| >> | Bit-wise Right Shift | A >> B |

* + 1. Relational Operators

|  |  |  |
| --- | --- | --- |
| Table E‑3. Relational Operators | | |
| **Operator** | **Description** | **Example** |
| = = | Equal To | A = = B |
| != | Not Equal To | A != B |
| <= | Less Than or Equal To | A <= B |
| >= | Greater Than or Equal To | A >= B |
| < | Less Than | A < B |
| > | Greater Than | A > B |
| || | Logical OR | A || B |
| && | Logical AND | A && B |
| ! | Logical NOT (Negation) | !A |

* + 1. Ternary (if then else) Operator

|  |  |  |
| --- | --- | --- |
| Table E‑4. Ternary (if then else) Operator | | |
| **Operator** | **Description** | **Example** |
| ?: | Ternary Operator (if-then-else) | A ? B : C |

* + 1. Associativity Operator

|  |  |  |
| --- | --- | --- |
| Table E‑5. Associativity Operator | | |
| **Operator** | **Description** | **Example** |
| ( ) | Associativity | (A + B) \* C |

* + 1. Precedence and Associativity of Operators From Highest to Lowest

|  |  |
| --- | --- |
| Table E‑6. Precedence and Associativity of Operators from Highest to Lowest | |
| **Operators** | **Associativity** |
| ( ) | Left to right |
| -(UNARY) | Right to left |
| ! ~ | Right to left |
| \*\* | Left to right |
| & | Left to right |
| ^ | Left to right |
| | | Left to right |
| \* / % | Left to right |
| + - | Left to right |
| << >> | Left to right |
| < > <= >= | Left to right |
| = = != | Left to right |
| && | Left to right |
| || | Left to right |
| ?: | Right to left |
| , | Left to right |

* 1. Numeric Constants

Numeric constants are simply numbers used in the calculations.

|  |  |
| --- | --- |
| Table E‑7 Numeric Constants (Examples) | |
| **Description** | **Examples** |
| Any string of characters that contains only numerals | 1234  0 |
| Any string of characters that contains only numerals and a-f preceded by "0x" (hex) | 0x12ab  0x1 |
| Any string of characters that contains only numerals and a single ".". | 1.2  1.  .2 |
| Any string of characters that contains only numerals, in scientific notation. | 1.0E+10  10E−10  .1e6 |
| Note: As in the TMATS standard itself, alphanumeric data items are case insensitive; either upper or lower case characters are allowed. | |

* 1. Measurements

Measurements may be telemetry measurements or other derived measurements.

|  |  |
| --- | --- |
| Table E‑8. Measurements (Examples) | |
| **Description** | **Examples** |
| Any string of characters beginning with an alphabetic character and containing only alphanumerics and "$\_" | A00.1  A$1 |
| Any string of characters that is quoted with " and does not contain ". | "0001"  “measurement ’quoted’, though this is insane - it is legal” |
| Any string of characters quoted with ' and does not contain '. | 'Air Speed' |
| Any string of characters that contains only numerals and at least one alphabetic character. This differs from hex because it does not begin with “0x”. | 00A1  0X (this is ok, because it does not have a number after “0X”) |
| Note: As in the TMATS standard itself, alphanumeric data items are case insensitive; either upper or lower case characters are allowed. | |

* 1. Mathematical Functions
     1. Mathematical Function Format

Mathematical functions are numerical functions that take some input, perform a specific calculation, and return a value as the result. Each mathematical function has the form “name(arg1,arg2,...)” that identifies a well-defined name and contains argument(s) that are separated by commas and surrounded by parentheses. A list of selected mathematical functions is provided in Table E‑9.

* + 1. Complex Use of Functions

Examples of how functions can be used in mathematical expressions are:

1. A\*(SIN(B/C)+D)
2. A\*3.0
3. "0001"\*A+~B
4. A<B || B<<C ? D : E

|  |  |
| --- | --- |
| Table E‑9. Table of Selected Mathematical Functions | |
| **Name** | **Description** |
| acos(x) | cos−1(x) in range [0,π], x Є [−1,1]. |
| asin(x) | sin−1(x) in range [−π/2, π/2], x Є [−1,1]. |
| atan(x) | tan−1(x) in range [−π/2, π/2] |
| atan2(y,x) | tan−1(y/x) in range [−π, π] |
| ceil(x) | smallest integer not less than x |
| cos(x) | cosine of x |
| cosh(x) | hyperbolic cosine of x |
| exp(x) | exponential function, computes ex |
| fabs(x) | absolute value |x| |
| floor(x) | largest integer not greater than x |
| fmod(x) | floating point remainder |
| frexpx(d) | Find x in [.5,1] and y so that d = x\*pow(2,y), return x |
| frexpy(d) | Find x in [.5,1] and y so that d = x\*pow(2,y), return y |
| ldexp(d,i) | returns d\*pow(2,i) |
| log(x) | natural logarithm ln(x), x > 0 |
| log10(x) | base-10 logarithm log10(x), x > 0 |
| max(x,y) | if x>y, then return x, else return y |
| min(x,y) | if x<y, then return x, else return y |
| modfd(d) | returns integral part of d |
| modfp(d) | returns fractional part of d |
| pow(x,y) | compute a value taken to an exponent, xy. An error occurs when x<=0 and y <= 0 or x < 0 and y is not an integer |
| sin(x) | sine of x |
| sinh(x) | hyperbolic sine of x |
| sqrt(x) | square root √x, x>= 0 |
| tan(x) | tangent of x |
| tanh(x) | hyperbolic tangent of x |

* 1. Derived Grammar Syntax Overview

The following grammar, strictly speaking, does not match the C language. Although loosely based on C, the grammar attempts to follow the “spirit” of the C language. The grammar contains three terminal symbols (MEASUREMENT, NUMERIC\_CONSTANT, and FUNCTION\_NAME) not defined here, but easily understood by their names. The grammar contains two non-terminals, expression and expression-list, which define the entire grammar. The “|” operator used in the grammar denotes a choice meaning “this or that or …”. Quoted strings are literal tokens of the grammar.

|  |
| --- |
| expression:  expression '+' expression  | expression '-' expression  | expression '\*' expression  | expression '/' expression  | expression '|' expression  | expression '&' expression  | expression '%' expression  | expression '\*\*' expression  | expression '?' expression ':' expression  | expression '<' expression  | expression '>' expression  | expression '<=' expression  | expression '>=' expression  | expression '!=' expression  | expression '==' expression  | expression '&&' expression  | expression '||' expression  | '-' expression  | '!' expression  | '~' expression  | ' (' expression ') '  | MEASUREMENT  | NUMERIC\_CONSTANT  | FUNCTION\_NAME '(' expression\_list ')'  | FUNCTION\_NAME ' (' ')'  expression-list:  expression  | expression-list ',' expression |

Figure E‑1. Grammar Syntax

* 1. Grammar Examples

Examples of Yacc and Lex grammar are shown in Figure E‑2 and Figure E‑3, respectively. The grammar will recognize the derived syntax; that is, they will report whether or not a given text string is valid syntax; however, the examples are not intended to be complete; in other words, they will not compile or perform the calculation. The user needs only to build a program around them in order to use them; a simple example “main” is shown in Figure E‑4.

The Yacc is a parser generator developed by Stephen C. Johnson at American Telephone and Telegraph (AT&T) for the Unix operating system. It generates a parser, in C language code, based on an analytic grammar written in a notation similar to Backus-Naur Form (BNF). The Lex, a program that generates lexical analyzers, is commonly used along with the Yacc parser generator. Originally written by Eric Schmidt and Mike Lesk, Lex is the standard lexical analyzer generator on many Unix systems. A tool exhibiting its behavior is specified as part of the Portable Operating System Interface standard.

|  |
| --- |
| %{  %}  %token ERR  %token NAME  %token CONSTANT  // Operator Precedence Rules (Lowest First, Highest Last)  %left ','  %right COND '?'  %left OR  %left AND  %left EQUAL NOTEQUAL  %left '<' '>' LESSEQUAL GREATEREQUAL  %left LSHIFT RSHIFT  %left '-' '+'  %left '\*' '/' '%'  %left '|'  %left '^'  %left '&'  %left POWER  %right '!' '~'  %right UMINUS  // Definition of Rules  %%  expression:  expression '+' expression  | expression '-' expression  | expression '\*' expression  | expression '^' expression  | expression '&' expression  | expression '%' expression  | expression LSHIFT expression  | expression RSHIFT expression  | expression POWER expression  | expression '?' expression ':' expression %prec COND |

Figure E‑2. Yacc Grammar Example, Page 1 of 2

|  |
| --- |
| | '-' expression %prec UMINUS  | '!' expression  | '~' expression  | '(' expression ')'  | NAME  | CONSTANT  | NAME '(' expression\_list ')'  | NAME '(' ')'  | expression '<' expression  | expression '>' expression  | expression LESSEQUAL expression  | expression GREATEREQUAL expression  | expression NOTEQUAL expression  | expression EQUAL expression  | expression OR expression  | expression AND expression  ;  expression\_list:  expression  | expression\_list ',' expression  ;  %% |

Figure E‑3. Yacc Grammar Example, Page 2 of 2

|  |
| --- |
| %{  #include “y.tab.h”  %}  %%  [\t\n ] {}  \=\= { return(EQUAL); } // Equal To  \!\= { return(NOTEQUAL); } // Not Equal To  \<\= { return(LESSEQUAL); } // Less Than or Equal To  \>\= { return(GREATEREQUAL); } // Greater Than or Equal To  (\\*\\*) { return(POWER); } // Power (FORTRANish)  \|\| { return(OR); } // Logical OR  \&\& { return(AND); } // Logical AND  \<\< { return(LSHIFT); } // Bitwise Left Shift  \>\> { return(RSHIFT); } // Bitwise Right Shift  \> | // Greater Than  \< | // Less Than  \! | // Logical Negation  \? | // Ternary Operator ?  \: | // Ternary Operator :  \% | // Modulus (Remainder)  \, | // Comma Operator (function)  \\* | // Multiplication (Product)  \/ | // Division (Quotient)  \+ | // Addition (Sum)  \− | // Subtraction (Difference)  \| | // Bitwise OR  \& | // Bitwise AND  \^ | // Bitwise XOR  \~ | // Bitwise NOT  \( |  \) { return(yytext[0]); } |

Figure E‑4. Lex Grammar Example, Page 1 of 2

|  |
| --- |
| ([0][xX][0-9a-fA-F]+)|([0-9]+) {  return(CONSTANT);  }  (([0-9]+\.?[0-9]\*)|([0-9]\*\.[0-9]+))([eE][-+]?[0-9]+)? {  return(CONSTANT);  }  \"[^\"\n]\*\" |  \'[^'\n]\*\' {  return(NAME);  }  ([0-9]+[a-zA-Z])?[a-zA-Z0-9$\_\.]+ {  return(NAME);  }  . { return(ERR); } // Catchall Error  %% |

Figure E‑5. Lex Grammar, Page 2 of 2

|  |
| --- |
| yywrap()  {  return 1;  }  yyerror(char \*s)  {  printf("error: %s\n",s);  }  main()  {  yyparse();  } |

Figure E‑6. Example Program (Main)

* 1. Telemetry Attributes Transfer Standard (TMATS) Examples

In the following examples, input measurement names are in the form of MA, MB, and MC. Derived parameter names are in the form of DMA, DMB, and DMC.

* + 1. TMATS Example 1

**DMA = MA + MB**

*Function style*

C-1\DCN:DMA; Derived parameter

C-1\DCT:DER; Derived conversion type

C-1\DPAT:N; Name of algorithm will be given

C-1\DPA:+; Addition operator

C-1\DPTM:MB; Measurement MB triggers the calculation

C-1\DPNO:1; Every sample of MB triggers the calculation

C-1\DP\N:2; Two input measurements

C-1\DP-1:MA;

C-1\DP-2:MB;

*Formula style*

C-2\DCN:DMA;

C-2\DCT:DER;

C-2\DPAT:A; Algorithm will be given

C-2\DPA:MA + MB; Algorithm syntax

C-2\DPTM:MB;

C-2\DPNO:1;

* + 1. TMATS Example 2

**DMB = MC / MD**

*Function style*

C-3\DCN:DMB; Derived parameter

C-3\DCT:DER; Derived conversion type

C-3\DPAT:N; Name of algorithm will be given

C-3\DPA:/; Division operator

C-3\DPTM:MD; Measurement MD triggers the calculation

C-3\DPNO:1; Every sample of MD triggers the calculation

C-3\DP\N:2; Two input measurements

C-3\DP-1:MC;

C-3\DP-2:MD;

**Note:** In function style, the algorithm determines the meaning of the input measurements. In this example, the division algorithm assigns the first input measurement as the dividend and the second input measurement as the divisor.

*Formula style*

C-4\DCN:DMB;

C-4\DCT:DER;

C-4\DPAT:A; Algorithm will be given

C-4\DPA:MC / MD; Algorithm syntax

C-4\DPTM:MD;

C-4\DPNO:1;

* + 1. TMATS Example 3

**DMC = square root of ME**

*Function style*

C-5\DCN:DMC; Derived parameter

C-5\DCT:DER; Derived conversion type

C-5\DPAT:N; Name of algorithm will be given

C-5\DPA:SQRT; Square root function

C-5\DP\N:1; One input measurement

C-5\DP-1:ME;

*Formula style*

C-6\DCN :DMC;

C-6\DCT :DER;

C-6\DPAT:A; Algorithm will be given

C-6\DPA:SQRT(ME); Algorithm syntax

**Note:** The trigger measurand is not given; there is only one input, which must trigger the calculation.

* + 1. TMATS Example 4

**DMD = MF\*(SIN(MG/MH)+MJ)**

*Function style*

C-7\DCN:XA; Derived parameter

C-7\DCT:DER; Derived conversion type

C-7\DPAT:N; Name of algorithm will be given

C-7\DPA:/; Division operator

C-7\DP\N:2; Two input measurements

C-7\DP-1:MG;

C-7\DP-2:MH;

C-8\DCN:XB; Derived parameter

C-8\DCT:DER; Derived conversion type

C-8\DPAT:N; Name of algorithm will be given

C-8\DPA:SIN; Sine function

C-8\DP\N:1; One input measurement

C-8\DP-1:XA;

C-9\DCN:XC; Derived parameter

C-9\DCT:DER; Derived conversion type

C-9\DPAT:N; Name of algorithm will be given

C-9\DPA:+; Addition operator

C-9\DP\N:2; Two input measurements

C-9\DP-1:XB;

C-9\DP-2:MJ;

C-10\DCN:DMD; Derived parameter

C-10\DCT:DER; Derived conversion type

C-10\DPAT:N; Name of algorithm will be given

C-10\DPA:\*; Multiplication operator

C-10\DP\N:2; Two input measurements

C-10\DP-1:MF;

C-10\DP-2:XC;

**Note:** In this example, several steps are needed, each generating an intermediate result (XA, XB, and XC), before the derived parameter is obtained. This method is shown only for illustrative purposes and is not recommended. If this function is needed, a custom algorithm should be written to implement it. Then the function style could be used, as follows:

C-11\DCN:DMD; Derived parameter

C-11\DCT:DER; Derived conversion type

C-11\DPAT:N; Name of algorithm will be given

C-11\DPA:NEWALG; Name of custom algorithm

C-11\DPTM:MJ;

C-11\DPNO:1;

C-11\DP\N:4; Four input measurements

C-11\DP-1:MF;

C-11\DP-2:MG;

C-11\DP-3:MH;

C-11\DP-4:MJ;

*Formula style*

C-12\DCN:DMD;

C-12\DCT:DER;

C-12\DPAT:A; Algorithm will be given

C-12\DPA:MF\*(SIN(MG/MH)+MJ);

C-12\DPTM:MJ;

C-12\DPNO:1;

* 1. Glossary of Terms

**Backus-Naur Form**: A metasyntax used to express context-free grammar; that is, a formal way to describe formal languages. John Backus and Peter Naur developed a context free grammar to define the syntax of a programming language by using two sets of rules: i.e., lexical rules and syntactic rules

**Compiler:** A computer program (or set of programs) that transforms source code written in a computer language (the source language) into another computer language (the target language, often having a binary form known as object code).

**Compiler (Compiler Generator):** A tool that creates a parser, interpreter, or compiler from some form of formal description. The earliest and still most common form of compiler-compiler is a parser generator, whose input is a grammar (usually in BNF) of a programming language, and whose generated output is the source code of a parser.

**Computer Programs:** Also called software programs, or just programs, are instructions for a computer.

**Grammar:** A set of formation rules that describe which strings formed from the alphabet of a formal language are syntactically valid within the language.

**Interpreter:** Normally means a computer program that executes instructions written in a programming language.

**Parser Generator:** See Compiler.

**Parsing:** The process of analyzing a sequence of tokens (for example, words) to determine their grammatical structure with respect to a given (more or less) formal grammar.

**Programming Language:** A machine-readable artificial language designed to express computations that can be performed by a machine, particularly a computer.

**Source Code:** Any collection of statements or declarations written in some human-readable computer programming language.

**Unix:** A computer operating system originally developed in 1969 by a group of AT&T employees at Bell Labs.

**Yet Another:** In hacker jargon, the use of yet another as a way of padding out an acronym is fairly common. It was first used by Stephen C. Johnson in the late 1970s in naming Yacc as a humorous reference to the proliferation of such compiler-compilers at the time.

**Yet Another Compiler Compiler (Yacc ):** Supplied with Unix and Unix-like systems.

Citations

Range Commanders Council. “IRIG Serial Time Code Formats.” RCC 200-04. May be superseded by update. Retrieved 4 June 2015. Available at <http://www.wsmr.army.mil/RCCsite/Documents/200-04_IRIG_Serial_Time_Code_Formats/>.

**\*\*\*\* END OF CHAPTER 9 \*\*\*\***

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