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Microwave Landing System (MLS) Station Interface Control Report

Program Engineering and Maintenance Service
Federal Aviation Administration
Washington, D.C. 20591

June 1986

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16. Abstract

This report contains requirements which are applicable to the MLS Interfaces for the system control functions, Remote Monitoring and Maintenance System status and maintenance reporting functions, and the synchronization function. The purpose is to provide for complete interoperability of MLS ground equipments which may have a different design and/or manufacturer, serving opposite ends of the same runway.

Information is provided for the communication protocol and message/data formats between the Maintenance Processor Subsystem (MPS) and the Remote Monitoring System (RMS) of an MLS. The Remote Control and Status Unit (RCSU) is the RMS focal point for the MLS. Similar information is provided for the interface/communications between the RCSU and the stations of the MLS. A Printer/Terminal (P/T) provides active interface with the MLS stations. Information on the P/T interface and the set of P/T commands is provided. The various operating/non operating states of the MLS are given. A set of data parameters are given which may be transmitted to the MPS as descriptors of the MLS operating status history, site related parameters, monitor related parameters and maintenance related parameters. Parameter information is provided for the intra-system synchronization function.

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1. SCOPE AND CLASSIFICATION

1.1 Scope - This Interface Control Report contains requirements which are applicable to the Microwave Landing System Interfaces for the system control functions, Remote Monitoring and Maintenance System status and maintenance reporting functions, and the synchronization function.

1.2 Purpose - The purpose is to provide for interoperability of MLS ground equipments which may have a different design and/or manufacturer. An MLS shall be compatible and interoperable when installed with an MLS ground equipment procured under contract DTFA01-84-C-00008. Included is the capability for the replacement or addition of a single angle station, or the addition of ground stations to serve a runway end opposite to one already instrumented with MLS. The system performance shall be in accordance with FAA-E-2721.

1.3 Classification - For interface purposes, an MLS system shall provide service for an airport runway and shall consist of a Remote Control and Status Unit (RCSU), and an Azimuth Station (AZ1); and may also include some or all of the following equipments: A Precision Distance Measuring Equipment (DME/P1) associated with AZ1; an Elevation Station (EL1) serving the same approach direction as AZ1; an AZ2, DME/P2, an EL2 serving the other approach direction, and standby equipments for each. A runway equipped with MLS for each direction will have only one system operational and radiating at any one time, however, the opposite system AZ will be reconfigured to a Back Azimuth (BAZ), i.e., AZ2 will reconfigure to BAZ1. In addition to operational MLS functions, the system shall be capable of interface with the Remote Monitor and Maintenance System (RMMS) - per NAS-MD-790, NAS-MD-792, and NAS-MD-793.

2. APPLICABLE DOCUMENTS

2.1 FAA documents - The following FAA documents of the issues in effect on the date of the invitation for bids or request for proposals, form a part of this Interface Control Report and are applicable to the extent specified herein:

FAA-E-2721	Microwave Landing System Ground Equipment
FAA-STD-022	Microwave Landing System Interoperability and Performance Requirements.
NAS-MD-790	Interface Control Document (ICD) for the Remote Maintenance Monitoring System (RMMS)
NAS-MD-792	Configuration Management Document for Operational Requirements for the Remote Maintenance Monitoring System
NAS-MD-793	Remote Maintenance Monitoring System Functional Requirements for the Remote Monitoring Subsystem (RMS)

2.2 Government Documents - The following Government publications of the issues in effect on the date of the invitation for bids or request for proposals, form a part of this report and are applicable to the extent specified herein:

Federal Standard 1005	Telecommunications, Coding and Modulation Requirements for Nondiversity 2400 bit/second
EIA-RS-232C	Interface Between Data Terminal Equipment and Data Communication Equipment Employing Serial Binary Data Interchange

2.3 Other Publications - The following publications of the issues in effect on the date of the invitation for bids or request for proposals, form a part of this report and are applicable to the extent specified herein:

ANSI X3.4-1977	American National Standard for Information Interchange
ANSI X3.66-1979	American National Standard for Advanced Data Communications Control Procedures (ADCCP)
Bell Publication 43401	

Documents from Contract DTFA01-84-C-00008 reprocurement data package (RDR).

Specification 703747	Data Base Table Design Specification
Specification 703206	Printer/Terminal Interface Control Document
Specification 703276	MLS RMMS/RCSU Interface Control Document
Specification 703277	MLS MICNET Interface Control Document
Specification 703709	MLS Communications Board Module Specification
Report 11713	MLS Control Operation

3. GENERAL - The equipment, system interfaces, and interface configurations shall be compatible and/or interoperable with the baseline requirements herein. The interfaces and interface configurations may also be compatible and/or interoperable with other requirements by adjustable parameters during site installation such as message addresses (in software or firmware), or hardware output characteristics, (by straps, pin selection, or locking switches internal in the equipment).

3.1 Baseline Summary - The MLS Ground Equipment is considered a Remote Monitoring Subsystem (RMS) within the RMMS network. The main control system within the RMMS is the Maintenance Processor Subsystem (MPS).

The MLS Remote Control and Status Unit Electronics Assembly (RCSU EA), or (RCSU) is the main control of the RMS/MLS. The RCSU EA is responsible for gathering MLS data and sending it over the RMMS network to the MPS. It is also responsible for receiving messages from the MPS and routing them to the appropriate MLS equipment for processing.

3.1.1 - Data Links - The RMMS/MPS data link connects to one or more RMS/MLS installations. The connection is made to the RCSU of an RMS/MLS installation. The RCSU (RMS) in turn has a data link (MICNET) which connects to the MLS equipment stations (AZ, EL, BAZ, etc.). The data links, protocol and interfaces provide communications transparency on both sides of the RCSU, both ways between MPS and MLS equipment. Protocol for the physical and link ISO levels (1 and 2) shall be in accordance with ANSI ADCCP, X3.66-1979 and NAS-MD-790. All text transmissions from secondary stations are sent to the link master (the store and forward protocol) regardless of the ultimate destination.

3.1.2 RMMS Interface - The RCSU and modem interface to a single 4 wire nonswitched, multipoint, full duplex synchronous communication channel to the RMMS. The modem shall operate at 2400 bits per second.

3.1.3 Intra System Interface - Each system element (ground station or RCSU) interfaces to a common, shared, single channel communication medium. The transmission rate is 2400 bits per second, synchronous, half duplex. The architecture is considered to be multipoint.

3.1.3.1 Serial MICNET Connections - Serial connections are made between the MLS elements, with the RCSU designated as System master control, and all stations acting as line repeaters until a message reaches its final destination. (Note that a station without two neighbors would have one of its channels terminated). Repeater switching time shall not exceed 5 milliseconds. (See Figure 1).

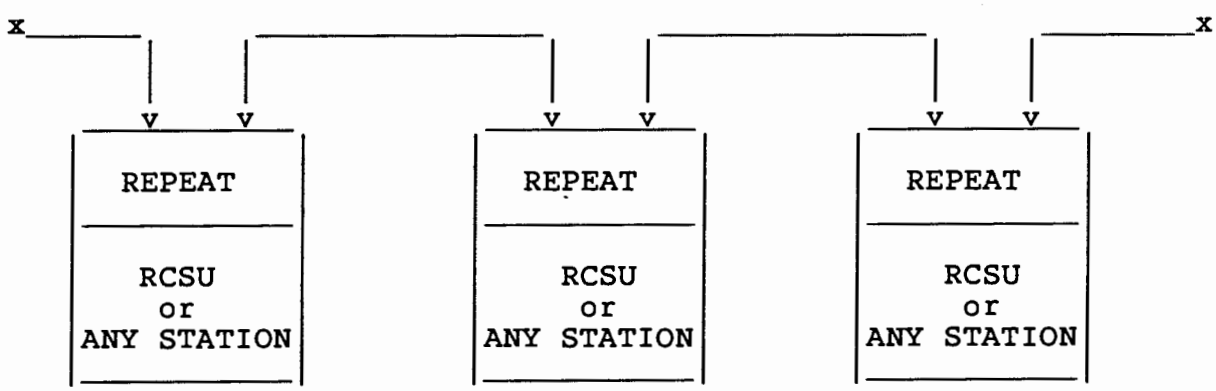


FIGURE 1. SERIAL MICNET CONNECTIONS

3.1.3.2 Time Division Multiplex - Synchronization and messages are transmitted on the same channel using time division multiplexing (TDM). The channel medium may be twisted pair wire, fibre optics cable or radio link.

3.1.3.3 C-Band Synchronization - A back up mode for synchronization is provided via an azimuth station transmission on the operating channel frequency.

3.2 Communications Data Characteristics - The communications characteristics include the communications medium characteristics, the protocols and the messages transmitted.

3.2.1 MICNET Electrical characteristics - Information/data transfer shall be accomplished by synchronous transmission of binary bits using Manchester encoding, also called Biphase Level encoding. The clock frequency shall be 2400 Hz, with a clock jitter, required by system synchronization considerations, of no more than $\pm$ 20 usec. The MICNET data transfer error performance shall be equal to or less than 1 error per 10^6 bits for the wire, fibre optics or radio link medium.

3.2.1.1 Wire - The transmitter/line driver shall be A.C. coupled to the wire line. The output level shall be -10 dBm into 3.5 miles of 19 gauge twisted wire pair terminated with a 600 ohm load. The input signal to noise ratio shall be 20 dB or better. The input signal shall be at the end of 3.5 miles of 19 gauge twisted wire pair fed with a -10 dBm signal source. The spectrum and level shall be in accordance with Bell Publication 43401.

3.2.1.2 Fiber Optics - The fiber optics transducer shall drive 3.5 miles of 50/125 micron fiber optic cable. The input signal to noise ratio of the end of the 3.5 miles of fiber optic cable shall be 35dB.

3.2.1.3 Radio Link - The UHF transceiver shall provide transmit power and receiver sensitivity for a signal to noise ratio of 20db for the 2400 BPS data. The transceiver shall operate on one of 280 channels spaced 50 KHz in the frequency range of 406 MHz to 420MHz inclusive. The carrier modulation technique shall be selectable between amplitude modulation and narrow band frequency modulation.

3.2.2 MPS Data Link Protocol - The link protocol is defined by the American National Standard for Advanced Data Communication Control Procedures (ANSI ADCCP X3.66-1979). A subset of this protocol is used as is defined in NAS-MD-790, Chapter 5.

The ADCCP ANSI X3.66 standard for unbalanced (UN) configuration is supported. Unbalanced configurations have one primary station and one or more secondary stations. The RMS's are the secondary stations, therefore, the RCSU EA is a secondary station on the communication link to the RMMS network.

Both Two Way Simultaneous (TWS) and Two Way Alternate (TWA) operation are supported. The use of TWS or TWA operation is determined and controlled by the primary station in accordance with the ADCCP Protocol.

The ADCCP options (reference the ADCCP standard) implemented are: 1(b) and 2. The Normal Response Mode (NRM) is supported. The exceptions (see NAS-MD-790, sections 5a, 5b, 5c) to these options are: only normal 16-bit Frame Check Sequence (FCS) is supported, Asynchronous Response Opportunity (ARO) Detection will not be supported, and Asynchronous Response Mode (ARM) and Asynchronous Balanced Mode (ABM) will not be supported.

All other ADCCP features and options not explicitly listed are not supported.

The implementation options are follows:

- o Window size of 7.
- o Maximum information field size is 504 bytes.
- o One message per frame.

The "window size" defines the number of outstanding unacknowledged frames.

The "maximum information field" size is the number of octets (bytes) of data in the information field of a transmission frame. This excludes the flag bytes, control field, address field and frame check sequence (FCS).

A message is carried in the information field.

3.2.3 MICNET Data Link Protocol - The ADCCP ANSI X3.66 standard for an unbalanced (UN) configuration is supported. The other characteristics supported are: normal response mode (NRM), multipoint, non-switched, normal 16-bit FCS is supported, and two-way alternate communication. The ADCCP frame options (reference the ADCCP standard) used are: 1(b) and 2. All other ADCCP features and options not explicitly listed are not supported.

The implementation options are as follows:

- o Window size of 1.

- Maximum frame size of 108 bytes, not including MICNET prefix bytes.

- One frame per message except if message is too large for frame then message is segmented as defined in the MICNET ICD.

The "window size" defines the number of outstanding unacknowledged frames.

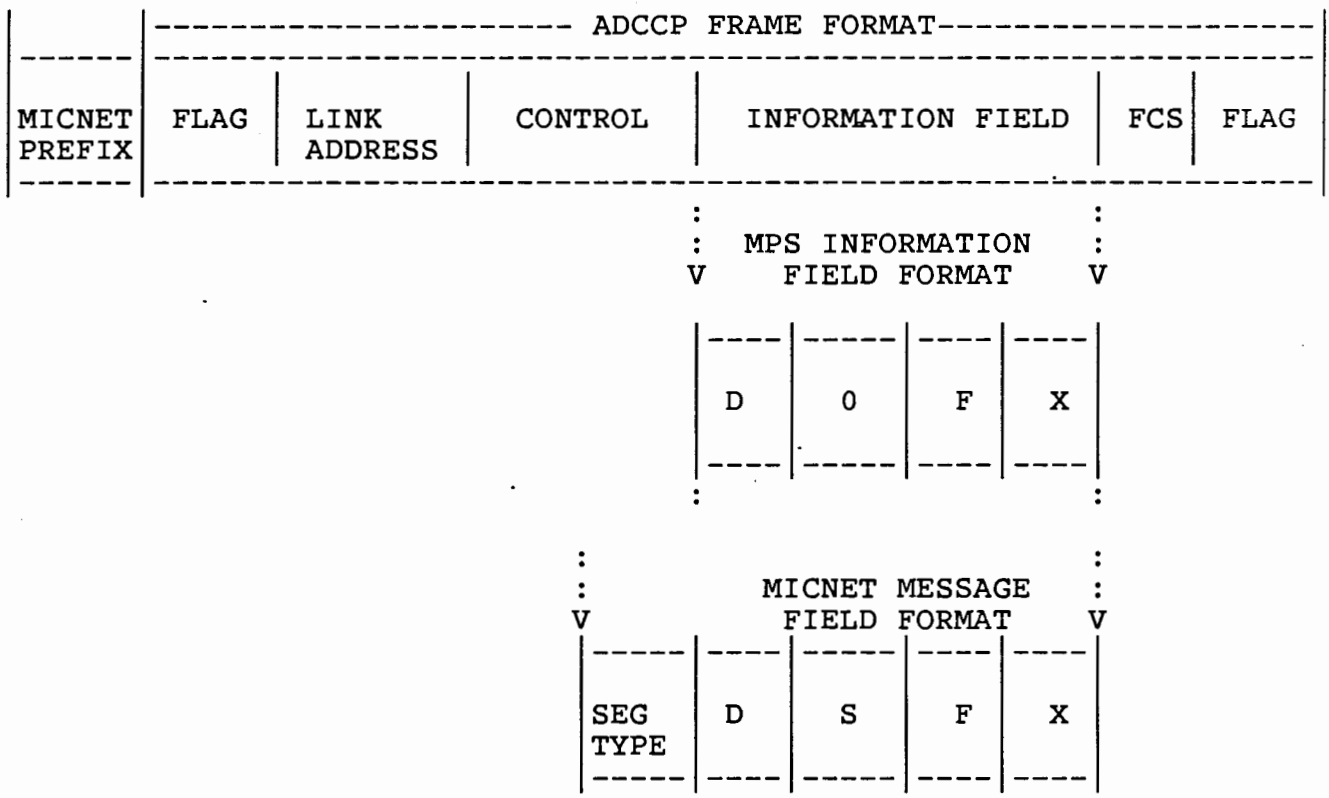
The "maximum ADCCP frame" size is the number of octets (bytes) of data in the transmission frame. This includes the flag bytes, control field, address field, frame check sequence (FCS), and information field. It does not include the MICNET frame prefix of the physical layer.

The message may exceed the frame size and require segmenting into two or more frames. In this case, the first frame must contain only the first segment of the message. The last part of the message must be the only message in the frame.

NOTE: THE ADCCP term "primary station" refers to the master control station (the RCSU EA) and the term "secondary station" refers to the slave stations (AZ, EL, BAZ) in the MICNET Link.

3.2.4 ADCCP/MICNET Frame Format - The frame formats showing the differences between ADCCP and MICNET are shown below.

COMMAND/RESPONSE FRAME FORMAT



MICNET PREFIX	-	A 16-bit sequence of alternating 1's and 0's, beginning with "1", transmitted to allow MICNET receiving circuits to achieve phase lock.
FLAG	-	An 8-bit sequence, beginning and ending with a zero bit, i.e., (01111110) which delimits the beginning and end of each frame. The flag is used for frame synchronization.

LINK ADDRESS - an 8-bit secondary station address (least significant bit transmitted first, e.g., hex 93 binary is 10010011 and would be transmitted as 11001001)

CONTROL - an 8-bit field containing a specified link level operation command or response; may contain sequence numbers (least significant bit transmitted first)

INFORMATION FIELD

SEG TYPE - an 8-bit field indicating if the message is segmented or not;

0 = not segmented (full message)
1 = first segment
2 = segment n (if any)
255 = last segment

MICNET (and RMMS) MESSAGE - bits representing the RMS address, Destination LU, 0, Message Function, and Message Data to be transferred. These are identified in MICNET as S, D, 0, F, and X fields. The following define the functions of each field:

D-8 bits. The address of the logical unit to which the message is directed

S-8 bits. On the MICNET side, the address of the logical unit originating the message; on the MPS net side, a delimiter (binary zero).

F-1 byte Message Function

X- Message Data

Maximum information field
size = 504 bytes (RMS)
= 103 bytes (MICNET).

FCS - frame check sequence is a cyclic redundancy check (CRC) as defined in ANSI X3.66, chapter 12 (16-bit only supported) (MOST significant bit transmitted first)

3.2.5 Link Level Control - The command/response frames supported on both the MPS and MICNET links are:

TYPE OF CMD/RESP	HEX CODE		MEANING
I Frames	0	-	Information frames
RR	1	-	Receiver ready
RNR	A	-	Receiver not ready
FRMR	97	-	Frame reject
SNRM	93	-	Set normal response mode
DISC	53	-	Disconnect
RD	53	-	Request disconnect
UA	73	-	Unnumbered acknowledge
DM	1F	-	Disconnected mode
REJ	9	-	Reject command/response

NOTE: Least significant bit transmitted first.

3.2.6 Transmission Order - The Order of transmission is flag, link address, control, information field, FCS and flag. Each field, except FCS, is transmitted least significant bit first. A control field example: SNRM is 93H(hex) or 10010011 binary, and the order of transmission is 1,1,0,0,1,0,0,1. FCS is transmitted most significant bit first.

3.2.7 Addressing

3.2.7.1 MPS Link Addressing - The RMS/MLS address is placed in the Link address field.

3.2.7.2 MPS Message Address - The MPS message address field uses the same Logical Unit and Data Point addresses as the MICNET messages.

3.2.7.3 MICNET Link Address - The link or device addresses correspond to the physical addresses of the secondary stations (AZ1, AZ2, EL1, EL2). (As used in this document AZ1, AZ2, etc. are used in a generic sense. When installed on a specific runway AZ1 shall become AZ(Low R/W #,), AZ2 shall become AZ(High R/W #), etc.) The primary station (the RCSU) places the physical address into the link address field of the frame. The link addresses are defined in Table I. (Note that the link level address differs from the message level address.)

Since the communication path to the secondary stations is multipoint line (i.e., multiple stations may be dropped on the same communication line) each secondary station must recognize its own MICNET link level address. Frames transmitted from secondary stations to the primary station (the RCSU) require the transmitting station's address. Since there is only one destination on an unbalanced configuration, the RCSU is the only

allowed recipient of secondary station frames.

Table I Secondary Station Link Address

SECONDARY STATION	LINK LEVEL ADDRESS
AZ1	1
AZ2	2
EL1	3
EL2	4

Table II Range of Logical Unit IDs Assigned to Each Equipment

LU IDs (decimal)	Component
32 Note (1)	RMS Control
33 - 39	spare
40 - 64	AZ1 Equipment
65 - 89	AZ1 DME/P1
90 - 114	AZ2 Equipment
115 - 139	AZ2 DME/P1
140 - 164	EL1 Equipment
165 - 189	EL2 Equipment
190 - 214	RSCU
215 - 254	spare
255	MPS Note (2)

NOTE: (1) The term RMS (Remote Monitoring Subsystem) refers to one MLS system in the Remote Maintenance Monitoring System (RMMS) network. The Maintenance Processor Subsystem (MPS) node of the RMMS network specifies the RMS Master LU when a particular MLS control is needed. Refer to NAS-MD-790 for more information.

(2) This address is defined only for use on MICNET.

3.2.7.4 MICNET Message Address - The MICNET message level addressing requirements are:

(a) Messages must be transferred between the MPS and equipment, RCSU EA and equipment, equipment and equipment (e.g., terminal messages from AZ P/T to the EL P/T).

(b) Messages must have source and destination addresses for the following reasons; (1) certain messages sent to the MPS require LU source identification, (2) certain messages need responses, and (3) system debugging.

The MICNET messages must include a source and destination logical unit. Since an RMMS message format doesn't have a field defined for the source address and has a separator field (binary 0) which is not needed on MICNET, the source logical unit can be accommodated on MICNET in that field without changing the size of the NAS-MD-790 message header.

See Appendix II for the layout of each of the MICNET messages.

3.2.7.5 LU and DP Identifiers and Numbers - Logical units are also grouped into similar classes of data and identified by assigned numbers and identifiers. The LU Numbers are from 1 to 25. See Table III for the list of LU's and the assigned numbers. Additional assignments may be made if required. Logical Unit Numbers are used to identify specific Logical Units within an equipment's list of LU and IDs. LU Number 1 designates the first logical Unit in the list.

The use of LU numbers allows for an easier Printer/Terminal (P/T) human interface and for a better organization of a data base. For example, the thresholds for the DME/P and the thresholds for the angle equipment are assigned one common LU Number (5).

The assigned identifiers are allocated according to NAS-MD-790 and therefore, must be used in all MPS communication where a logical Unit and Datapoint are specified. Since TTY messages are ASCII encoded and are used for direct P/T output, whenever a logical unit/datapoint is included within the ASCII text, it is in normalized, assigned number format. (Refer to NAS-MD-790 for explanations of the various messages).

Table III Logical Units Offset Numbers

LU NO.	LOGICAL UNIT	RCSU EA	Angle	DME/P
1	Control Parameters	Yes	Yes	Yes
2	Terminal	Yes	Yes	Yes
3	Alarm/Alert Parameters	N/A	Yes	Yes
4	Maintenance Parameters	Yes	Yes	Yes
5	Alarm/Alert Thresholds	N/A	Yes	Yes
6	Maintenance Thresholds	N/A	Yes	Yes
7	Site Parameters	Yes	Yes	Yes
8	User Access	Yes	Yes	Yes
9	Scheduled Periods	Yes	Yes	Yes
10	Miscellaneous Parameters	Yes	Yes	Yes
11	Confidence Checks	Yes	Yes	Yes
12	Comm Statistics	Yes	Yes	Yes
13	Hard Alarm Historical	N/A	Yes	Yes
14	Soft alarm Historical	Yes	Yes	Yes
15	State Change Historical	Yes	Yes	Yes
16	Periodic Historical	Yes	Yes	Yes
	RMS Master Note (1)	Yes	N/A	N/A

Notes:

(1) The RMS Master Logical Unit does not have a LU Number Assignment. (Its ID is 32, Table II). It is only used between the MPS and the entire MLS Equipment, considered as one RMS.

The Logical Unit identifier is calculated by adding the Logical Unit ID of its equipment to its logical Unit Number subtracted one. For example, the Terminal LU Number is 2. To obtain the

EL-1 Terminal LU identifier, add the base LU for EL-1 (=140, see Table II) to the Terminal LU number, then subtract 1, to give the resultant LU identifier 0f 141.

The datapoints within a logical unit are also assigned numbers and identifiers, called DP Numbers and IDs. The DP IDs start at 32 (20H) and the DP numbers are from 1 to 999. The DP Number is dependent only on the order of the datapoints within each LU. To obtain the DP ID add 31 to the DP Number. See Appendix IV for descriptions of datapoints and their assigned numbers. The maximum DP Number assigned is 166 and additional assignments may be made if required.

3.2.8 Messages

3.2.8.1 Communications Link Channel Control - The MPS and MICNET link command/response frames supported are listed in paragraph 3.2.5.

3.2.8.2 MPS Messages - The MPS message protocol is responsible for transferring messages between the MPS and the RMS/MLS (the MLS Master Control). The message functions supported are given in Table IV. Additional detail is given in Appendix I.

Table IV. MPS Message Summary

MESSAGE NAME	DESCRIPTION
Commands: -	Messages from the MPS to the RMS/MLS requiring a response
CONTINUOUS POLL	Same as ADCCP response opportunity frame (RR with poll bit set).
SCHEDULED POLL	All site data logical units are requested by the MPS
SPECIFIC POLL	A specific logical unit is requested by the MPS
TTY INPUT	Printer/Terminal (P/T) message requiring parsing.

Table IV. MPS Message Summary (Cont'd)

MESSAGE NAME	DESCRIPTION
Responses: -	Messages from the RMS/MLS to the MPS in response to a poll.
SITE DATA REPORT	The site data report requested by a SCHEDULE POLL or SPECIFIC POLL
COMMAND ERROR	Response to an invalid message
Unsolicited: -	Messages from the RMS/MLS to the MPS when an event has to be reported, transmitted when polled
ALARM	The report of an integrity alarm, secondary alert or maintenance alert by an equipment.
RETURN-TO-NORMAL	The report of an integrity alarm, secondary alert or maintenance alert returning to normal condition
STATE CHANGE	The report of a site parameter change.
TTY OUTPUT	A message to be printed at a P/T
BUSY STATUS	A message indicating that the RMS is temporarily not ready to receive a message

3.2.8.3 MPS Message Priority - Priority is applicable only for messages from the RCSU to the MPS. There are four priorities (from highest to lowest):

1 - ALARM, RETURN-TO-NORMAL messages
2 - STATE CHANGE message
3 - TTY OUTPUT messages
4 - all other messages

Higher priority messages are transmitted before lower priority messages. If there is a lower priority message being transmitted and a high priority message is pending then the current transmission is concluded before the pending message is transmitted.

3.2.8.4 MICNET Messages - The MICNET message protocol is responsible for transferring messages between the RCSU and the MLS stations. The message functions supported are given in Table V. Additional detail is provided in Appendix I.

Table V. MICNET Message Summary

MESSAGE NAME	DESCRIPTION
Commands:	- Sent by the RCSU EA (primary station) to force an action by an equipment (secondary station). These include site data report commands and control command messages. Note that the source of the message is either the MPS or RCSU since MPS messages must "pass through" the RCSU.
CONTINUOUS POLL	Same as ADCCP response opportunity frame (RR with poll bit set).
SITE DATA COMMAND	Site data requested by the RCSU EA.
CHANGE DATAPOINT	Auxiliary or basic data word change is requested by the RCSU EA.
STATUS COMMAND	Equipment state data is requested by the RCSU EA.
CONFIG. COMMAND	Equipment state change is requested by the RCSU EA.
CONTROL COMMAND	A control state is specified for the equipment.
Requests:	- Sent by an equipment to the RCSU EA requesting to be granted a new operational state. These include requests for change of configuration; i.e., remote control to local control.
STATUS REQUEST	The current equipment state data is requested by an equipment.
CONFIG. REQUEST	The equipment state is requested to be changed by an equipment.
CONTROL REQUEST	A change in the control state of an equipment is requested by the equipment.

Table V. MICNET MESSAGE SUMMARY (CONT'D)

MESSAGE NAME		DESCRIPTION
Reports:		- Sent as a reply to a command message.
SITE DATA REPORT		The site data report requested by a SITE DATA COMMAND.
DATA POINT REPORT		The confirmation of a DATA POINT COMMAND.
CONFIG. REPORT		The report of the current equipment state.
COMMAND ERROR		Report of an invalid message.
Unsolicited:		- Sent by an equipment when an event occurs that must be reported.
ALARM		The report of a hard or soft alarm by an equipment.
RETURN-TO-NORMAL		The report of a hard or soft alarm returning to normal condition.
STATE CHANGE		The report of a site parameter change.
TTY INPUT		P/T message requiring parsing.
TTY OUTPUT		A message to be printed at the P/T.
Printer/Terminal:		- Access to MICNET through attach interface at equipment.
CHANGE PARAMETER	CP	Change a parameter to a new value.
DATA	DA	Change or display the date.
DIAGNOSE	DI	Cause the execution of diagnostics.
ENTER DIALOGUE	ED	Enter into dialogue mode.
ENVIRONMENT	EN	Simulate the LCSU Panel.
HELP	H	Print of full set of commands available.
LOGON	LN	Identify the operator to the system.

LOGOFF	LO	Conclude operator access to commands.
MPS REPORTS	M	Enable/disable the printing of MPS reports.
PRINT	P	Print a report of parameters.
REQUEST CONTROL	RC	Request control of the equipment.
REQUEST SYSTEM	RS	Requests control to the system.
RESET	RE	Causes the system to do a partial reset.
TIME	TI	Changes or displays the time.
TRANSMISSION MODE	TM	Set the transmission mode to maintenance or normal.

3.2.8.5 Message Flow Rules - The message protocol flow of control rules are given in Tables VI and VII.

Table VI. RCSU EA Message Flow to Equipment

MESSAGE TYPE	ALLOWED TO OCCUR	EXPECTED RESPONSE FROM EQUIPMENT
SITE DATA COMMAND	after initialization	SITE DATA REPORT
CHANGE DATAPOINT	after initialization	DATAPOINT REPORT
STATUS COMMAND	anytime	STATUS REQUEST or CONFIGURATION REPORT (see Table 5.703)
CONFIGURATION COMMAND (unsolicited)	anytime	CONFIGURATION REPORT
CONTROL COMMAND	anytime	No response expected
COMMAND ERROR	anytime	No response expected
TTY INPUT	after initialization	TTY OUTPUT
TTY OUTPUT	after initialization	No response expected

Table VII. Equipment Message Flow to RCSU EA

MESSAGE TYPE	ALLOWED TO OCCUR	EXPECTED RESPONSE FROM RCSU EA
STATUS REQUEST	anytime	CONTROL COMMAND or CONFIGURATION COMMAND
CONFIGURATION REQUEST	after initialization	CONFIGURATION COMMAND (soliciated)
CONTROL REQUEST	after initialization	CONFIGURATION COMMAND
SITE DATA REPORT	after initialization	No response expected
DATAPOINT REPORT	after initialization	No response expected
CONFIGURATION REPORT	anytime the state of the equipment changes	No response expected
COMMAND ERROR	anytime	No response expected
ALARM	after initialization	No response expected
RETURN-TO-NORMAL	after initialization	No response expected
STATE CHANGE	after initialization	No response expected
TTY INPUT	after initialization	TTY OUTPUT
TTY OUTPUT	after initialization	No response expected

3.2.8.6 Message Error Recovery - When an invalid message is received, the response is a COMMAND ERROR message (NAS-MD-790, Section 3.5.2). There are a number of cases to be considered for handling these messages.

Case 1: When the RCSU EA receives a COMMAND ERROR message from an equipment, the link level "disconnect" process is initiated.

Case 2: When the RCSU EA determines that a command is in error, it sends a COMMAND ERROR message to the equipment and causes the link level "disconnect" process to be initiated.

Case 3: When an equipment receives a COMMAND ERROR message from the RCSU EA the equipment does not take any action (except possibly reporting the event to the P/T).

The "disconnect" process is a logical process, allowing reinitialization and sets the stage for a "logical connect".

3.3 Synchronization - Synchronization is required among the MLS stations serving a runway to ensure a station radiates in its assigned time period without overlap with another station function (which is on the same radiating frequency). A synchronization signal is multiplexed on the communication channel with the command, control and status messages.

Each station on the MICNET link level decides, based on the predicted occurrence of the synchronization signal, if the next data or communication frame ready for transmission will interfere with the synchronization. If there will be interference then the transmission is delayed until the ISYNC period is concluded. If the transmission will not interfere, then the frame is initiated.

The synchronization window is 35 milliseconds. This means that for every 615 milliseconds, 35 milliseconds are reserved for transmission of the synchronization signal.

If the signal does not occur then a "listen" mode is required. This mode allows for the resynchronizing of the signal. At least every 20 seconds a listen mode is activated for a period greater than 615 milliseconds, but less than 1 second. During this time no data or communications transmission can take place.

3.3.1 Definitions

a. Start Sync. This is an encoded word preceeding the ISYNC word, and its reception by the synchronization circuits provides an alert that the next word may be ISYNC. It also carries a limited location/airport ID and the Morse code trigger.

b. ISYNC. This is the encoded sync word received over a MICNET link (or C-band) by a slave station. ISYNC is only generated by the master sync station.

c. LSYNC. This defines the start of Sequence-1 after the two-ms time slot containing no words in the full cycle (see Figure 9, FAA-STD-022b). LSYNC shall be considered the timing reference for station sequences and transmissions.

d. Full Cycle. Full cycle is a 615-ms time interval after which a station's transmission timing begins to repeat. This time is defined as the time interval between LSYNC pulses.

e. Master Sync Station. The master sync station is that station which generates the MICNET Sync. This station is the approach azimuth station for the current runway configuration. In special cases, this station can also be a back azimuth station (when an azimuth station is configured as a back azimuth station for a single approach runway).

f. Slave Station. The slave station is that station which receives and synchronizes to the generated MICNET Sync from the Master.

3.3.2 MICNET Synchronization Transmission - The MICNET prefix is required so the receiving circuits can achieve phase lock. The prefix is followed by START SYNC and ISYNC. ISYNC contains an airport ID code and the MORSE code trigger. The leading edge of the last bit of ISYNC Message defines ISYNC time of occurrence. Each station observes a 35 ms window for the expected ISYNC, when

no other messages are allowed. The MICNET Sync Frame Format is shown below:

MICNET SYNC FRAME FORMAT

MICNET PREFIX	START SYNC	ISYNC

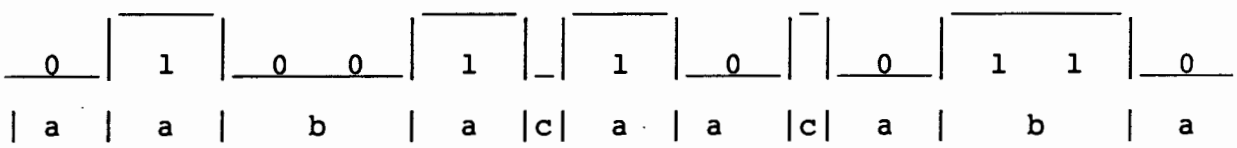
MICNET PREFIX	-	A 16-bit sequence of alternating 1's and 0's, beginning with '1'
START SYNC	-	A 16-bit sequence of 1's
ISYNC	-	Bits 0-2 8 codes Bits 3-7 01010 MORSE CODE Bits 8-15 11111111

The eight airport ID codes provide synchronization security/differentiation from other MLS runways. The Morse Code bits reverse as trigger for the MORSE Code transmission. The order of transmission starts with bit 0 of each word.

3.3.3 C-Band Synchronization - The C-Band sync is a special RF transmission from the azimuth station during the 2 ms time no word-period between SEQ 2 and SEQ 1. (The Sequence 1 and 2 multiplex transmission cycle is given in FAA-STD-022.)

The bit pattern for C-Band synchronization is listed below. This pattern is transmitted at 200 Khz in NRZI format. A constraint (hardware) on this data is that no more than 2 ones or 2 zeroes should occur in a row.

The C-BAND SYNChronization Signal shall meet the following requirements.



a - Stable data bit width: 5usec ± 1.5usec

b - 2 ones or 2 zeros in a row without a glitch between them: combined pulse width of 10usec ± 1.5usec.

c - Glitches between successive ones or successive zeros: 1 usec max.

C-BAND SYNCH FRAME FORMAT

MICNET PREFIX	START SYNC	ISYNC

MICNET PREFIX - A 16-bit sequence of alternating 1's and 0's, beginning with '1'

START SYNC - Bits 0-8 alternating 1's > 0's beginning with '1'
9-14 110010
15 1 except 0 if ID code = 110

ISYNC - Bits 0-2 4 codes
Bits 3-7 are 01010 - MORSE Code
Bits 8-15 01100101

The order of transmission starts with bit 0 of each word.

The four airport ID codes permitted are 001, 010, 101 and 110 from C-Band sync hardware considerations restricting the bit pattern to no more than 2 ones or 2 zeros in a row. The codes provide synchronization security/differentiation from other MLS runways or nearby airports. The MORSE Code bits reverse as trigger for the MORSE code transmission.

3.3.4 Transmission Delays - A programmable delay shall be provided to account for delays in receiving and processing ISYNC. ISYNC as received, plus the delay will generate a station local LSYNC such that all LSYNCs of the runway system will occur at the same time within the requirements for meeting the two minute operation without function overlap after loss of ISYNC. The programmable delay shall cover at least 520 us to 9000 us.

3.4 Printer/Terminal Interface - The Printer/Terminal (P/T) may be "attached" to the station equipment where the P/T is physically located, or it may be "remotely attached" to station equipment at some other physical location. The P/T output is transmitted as an ASCII string to the attached equipment. That equipment has total interface responsibility for the P/T. The physically collocated equipment (with the P/T) provides communication transparency for the P/T.

3.4.1 Physical Link Interface - The Physical Link Interface is implemented as an RS-232C link with asynchronous character transmission. It supports the interface specification of the Texas Instrument Model 745 Portable Data Terminal (TI 745) or compatible device. This configuration requires 10 bits per character: 7 bit ASCII, 1 start bit, 1 stop bit, and an even parity bit.

The transmission speed of the link is determined by the rate set on the Printer/Terminal (P/T). Valid transmission rates are 110, 300, 600, 1200, 2400, 4800, and 9600 bps. Full duplex mode is used. The data echo (after a key is depressed the character printed is called the "echo") is performed by the MLS/Interface system (not by the terminal).

The default transmission rate, when the equipment is powered on, is 2400 bps. After the transmission rate is determined, the default rate is the transmission rate of the last time the Printer/Terminal was connected to the equipment. The MLS/Interface automatically adjusts the transmission rate in response to keyed RETURNs until it matches the P/T rate.

Each equipment and the RCSU shall have a receptacle for the connection of the P/T. P/T electrical and mechanical connection to the communication interface shall be in accordance with NAS-MD-790 and E/A Standard RS232 interface D. The connector shall be 25-pin, D-type, female configured as Data Terminal equipment.

3.4.2 Printer/Terminal States - The Printer/Terminal can be in one of three logical states: the INITIAL state, the READY state, and the LOGGED-ON state.

3.4.2.1 INITIAL State - The INITIAL state of the Printer/Terminal is the state in which it is found upon physical connection to an equipment or following Equipment Reset or Power-on.

In the Initial state, the Printer/Terminal (P/T) command set is not accessible by the operator. Printing of Maintenance Processor System (MPS) Reports (see below for a definition), if previously requested from the LOGGED-ON state, continues.

3.4.2.2 READY State - The READY state is reached from the INITIAL state upon successful completion of Automatic Transmission Rate Algorithm, and the operator prompt appears. The prompt indicates the equipment the P/T is attached to: AZ1, AZ2, EL1, EL2, DME1, DME2 or RCSU. During the LOGON, the P/T can be attached to a remote equipment.

At the prompt, a subset of the Printer/Terminal commands is accessible by the operator; LOGON Command, ENTER DIALOGUE Command, and HELP Command. The LOGON Command is valid only within the READY state.

3.4.2.3 LOGGED-ON State - The LOGGED-ON state is the state in which the P/T operator can access the full set of commands. The LOGGED-ON state can only be reached by successfully completing the Log-on Sequence: LOGON or LN, the operators three alphanumeric character ID and, if attachment is desired to a remote equipment, the equipment name, enter; and after the PASSWORD prompt, enter the five alphanumeric character password. Twenty-four unique ID/Password combinations are possible per equipment.

3.4.3 Operator Interface -The P/T operator interaction is accomplished through a prompt/response protocol that generates a prompt when operator entry is required. The system response to a command consists of the confirmation of the execution of the command or an error message indicating an input error (Appendix III).

Entering commands requires the typing of characters, which appear on the Printer/Terminal. The operator can choose to enter the mnemonic of the requested command (e.g., CP for the CHANGE PARAMETER command), or the full command name ("CHANGE PARAMETER"). The command text is processed when the operator types RETURN. Until RETURN is entered, the text may be edited with the following control sequences:

CONTROL-R	reprints the previously entered text (except when entering a password)
CONTROL-U	cancels the current text and a new prompt is printed

Selective editing consists of deleting characters beginning with those most recently entered. This is accomplished by typing RUBOUT. For each character deleted, a slash character (/) and the deleted character are printed. Then the new characters are entered.

3.4.4 Access Levels

The P/T interface is responsible for access levels controls. Access Levels are used to control operator access to the system's command set and database. The access levels are 1, 2, 3 where 1 (the "first level") confers the highest level of access rights (i.e., "1" has access to all commands) on the system. Each command is defined indicating the minimum access level required for its use. The access levels are defined in accordance with FAA-E-2721/1b-3.5.3.12.3.

3.4.5 Printer Terminal Commands - The P/T commands are given in Table VIII. Certain commands require that the P/T obtain MLS Control Mastership and turn the transmitter off. The access level authority required for exercising the commands is also shown. Table IX provides additional control and access level requirements for the Logical Units associated with the CHANGE PARAMETER Command. Additional information on the P/T commands is given in Appendix III.

TABLE VIII
P/T COMMANDS AND ACCESS LEVEL SUMMARY

Command	Transmit to OFF and Control REQ	Access Level	Comment
CHANGE PARAMETER	*	*	* See Table IX
DATE	YES	1	Change and display
	NO	2,3	Display only
DIAGNOSE	YES	1	
DIALOGUE	NO	1,2,3	
ENVIRONMENT	YES	1	Change and display
	NO	2,3	Display status only
HELP	NO	1,2,3	
LOGON	NO	N/A	
LOGOFF	NO	1,2,3	
MPS REPORTS	NO	1,2,3	
PRINT	NO	1,2	All logical units
	NO	3	Restricted logical units
REQUEST CONTROL	NO	1	
REQUEST SYSTEM	YES	1	
RESET	YES	1	
TIME	YES	1	Change and display
	NO	2,3	Display only
TRANSMISSION MODE	YES	1	

Notes:

1. TRANSMIT OFF;

   CONTROL REQ - a "yes" indicates that control (either local or remote) and the transmitter off are required before a datapoint in the logical unit can be changed. "n/a" means that since the datapoints in the logical unit cannot be written, the control state is not relevant.

TABLE IX
P/T CHANGE PARAMETER COMMAND AND ACCESS SUMMARY TABLE

LOGICAL UNIT	ACCESS LEVEL CHANGE	ACCESS LEVEL DISPLAY	TRANSMIT OFF CONTROL REQ	DME/P CONNECT
Control	n/a	3	n/a	n/a
Terminal	n/a	n/a	n/a	n/a
Alarm/Alert Parameters	n/a	3	n/a	n/a
Maintenance Parameters	n/a	3	n/a	n/a
Alarm/Alert Thresholds	2	3	Yes	Yes
Maintenance Thresholds	2	3	No	Yes
Misc. Parameters	n/a	3	n/a	n/a
Site Parameters	2	3	Yes	Yes
Confidence Checks	n/a	3	n/a	n/a
Comm Statistics	n/a	3	n/a	n/a
Hard Alarm Historical	n/a	3	n/a	n/a
Soft Alarm Historical	n/a	3	n/a	n/a
State Change Historical	n/a	3	n/a	n/a
Periodic Historical	n/a	3	n/a	n/a
User Access	2	2	No	No
Scheduled Periods	2	3	No	No

Notes:

1. CHANGE - The minimum access level needed to change a datapoint in the logical unit. The term "n/a" means that the logical unit cannot be changed using the CHANGE PARAMETER command.

2. DISPLAY - The minimum access level needed to display a datapoint in the logical unit. "n/a" means that the datapoints in the logical unit cannot be displayed.

3. TRANSMIT OFF CONTROL REQ. - A "yes" indicates that control (either local or remote) and the transmitter off are required before a datapoint in the logical unit can be changed. "n/a" means that since the datapoints in the logical unit cannot be written, the control state is not relevant.

4. DME/P CONNECT - Indicates if the DME/P must be in the "connected" state before a datapoint in the logical unit can be changed. (The connected state is active when communication has been established between the AZ and DME/P). This is only relevant for the DME/P logical units. "n/a" means that since the datapoints in the logical unit cannot be written, the connect state is not relevant.

3.5 Time-Outs

3.5.1 MPS Link-Poll Timer - A poll from the primary station (MPS) is expected by a secondary station at least once every 2.5 seconds. The time-out value is 5 seconds (FAA-E-2721/4-3.2.1). If this time is exceeded the primary station is declared disconnected by the secondary station (RMS/MLS).

3.5.2 MPS Link -Busy condition Timer - A station is expected to recover from a busy condition (signalled by an RNR frame) within 10 seconds. If the time is exceeded then the primary station is declared disconnected by the secondary station.

3.5.3 MPS Link - Frame Reception Timer - A timer is used to detect if a frame being received is terminated prematurely. The timer is started upon detection of a FLAG. It is set to the time period needed to receive a maximum size frame plus error factor (1.25 seconds). If the timer expires the terminated frame is considered to be an invalid frame and therefore ignored.

3.5.4 MPS Link -Streaming Transmitter Counter - The secondary station provides a character counter which is started upon detection of a FLAG and continues to count until the frame is completely received. If the maximum frame character count is exceeded the reception process is aborted and a frame error is declared.

3.5.5 MICNET Link Level - Poll Time-Out - A poll from the primary station (RCSU) is expected by a secondary station at least once every 1.5 seconds. If this time is exceeded the primary station is declared disconnected.

When a secondary station is polled, a response is expected from a connected stations within 500 milliseconds. Two time-outs in sequence cause the secondary station to be declared disconnected.

3.5.6 MICNET Link -Streaming Transmitter Timer - A time-out is activated if the transmitter is active for greater than 420 milliseconds. There is no retry on this error. The line is immediately considered disconnected and the equipment operates in a repeat only mode. (This is a safe guard to ensure that the ISYNC signal is not corrupted for an extended period of time).

3.5.7 MICNET Link -Streaming Character Counter - Each secondary station provides a character counter which is started upon detection of a FLAG and continues to count until the frame is completely received. If the maximum frame character count is exceeded the reception process is aborted and a frame error is declared.

3.5.8 MICNET Link -Busy Condition Timer - A station is expected to recover from a busy condition (signalled by an RNR frame) within 1 second. If the time is exceeded then the station (primary or secondary) is declared disconnected.

3.5.9 MICNET Link -Frame Reception Timer - A timer is used to detect if a frame being received prematurely terminates. The timer is started upon detection of a FLAG. It is set to the time period needed to receive a maximum size frame plus error factor (0.5 seconds). If the timer expires a frame reception error is declared.

3.5.10 Message Response Time-Out -The primary station expects responses to command messages. If a response is not received within a 10 second time period, the primary station declares the link disconnected.

The secondary station expects responses to CONFIGURATION REQUEST and STATUS messages within a 10 second time period. If a CONFIGURATION REQUEST or a STATUS REQUEST was sent and the response not received then the secondary station declares the link disconnected.

3.5.11 Master Control-Request for Transfer Time-Out - Master control may be requested from a LCSU (local control and status unit) or from a remote printer terminal. The operator at the RCSU has a 5 minute time-out period during which he may grant or deny control transfer. If he takes no action, after 5 minutes the request is assumed granted and Master Control resides with the requestor.

3.5.12 Printer/Terminal-Inactive Time Out - No typing at the Printer/Terminal for 5 minutes causes a TIMEOUT or a TIMEOUT and LOGOFF. The processing of a subset of the commands may, depending on the current system utilization, take longer than five seconds before the first character appears. When this occurs the operator is made aware of this condition by printing the interim response character on the P/T (an "*" - asterisk). The interim response is printed every 5 seconds until the awaited confirmation is printed at the Printer/Terminal.

3.6 Station and System Control - There shall be only one master control point in control of the system. The prime master control is the RCSU, considered to have the equivalent of a high level password because of the controlled access in the ATC tower. Transfer of master control may be requested from a remote terminal or an LCSU.

The master control point may deny the request, permit the transfer or not acknowledge the request. In the case of no acknowledgement, after a 5 minute timeout, the requesting remote terminal or LCSU will assume control mastership automatically. When master control is no longer desired, it will be relinquished to the RCSU. Power-up will be under RCSU master control except if a station was under LCSU when powered down, it will power up under LCSU as an aid to speed maintenance procedures.

The LCSU has a lower security level associated and thus has a limited sub set of control commands. A terminal attached at the LCSU shall have, with a high security level password, access to the full subset of control commands.

In the event of RCSU failure or disconnection, the MLS will continue to perform its guidance function. The master control shall support the operating states of the system stations.

If the station design does not require a state, the absence or skipping of that state shall not cause a system failure. The permissible station states as commanded by the various command points are given in Table X.

Table X

STATES WHEN UNDER REMOTE OR RCSU CONTROL

Master Control Point

	RCSU	REMOTE
ALLOWED STATES	- INITIALIZATION - PERSONALITY INITIALIZATION - START - TRANSMITTER OFF - NORMAL - FATAL FAULT - ALERT - ALARM - NON-FATAL FAULT - FAST CALIBRATE	(With High Security Password) - Maintenance/Monitor on (TX on) - Maintenance/Monitor Bypass (TX on) - Maintenance/Alert (TX on) and those under RCSU Note: (Normal/ Monitor-Bypass) not allowed except in local control)

3.6.1 Cold State (Transmitter Off) - This state is entered when power switch(s) turned off.

3.6.2 Initialization State (Transmitter Off) - This state provides for built-in tests on all hardware. This state is entered when either of the following conditions occur:

a. Exit from Cold State
b. Reset or Restart is Received

3.6.3 Personality Initialization State (Transmitter Off) - In this state, the equipments complete initialization with personality data from the Control Master or internal memory. This state is entered when there is a:

a. Successful completion of INITIALIZATION State;

or

b. Configuration command received from Control Master.

Before exiting this state, the approach azimuth equipment will generate interstation synch, while an elevation and back azimuth equipment will attempt to synchronize to any received interstation synch.

3.6.4 Non-Fatal Fault State (Transmitter Off) - In this state, the subsystem is reporting errors. This state is entered if any of the following conditions occur:

a. Failure of a built-in (LRU) test.
b. Monitor verification failure while in a radiating state.
c. Single subsystem failure within subsystem.

3.6.5 Fatal Fault State (Transmitter Indeterminant) - In this state, the subsystem does not respond to queries from the RMS, and may be communications disconnected.

3.6.6 Start State (Transmitter Off) - Upon entering this state, the subsystem will clear all alarm and alert indicators and filter values. This state may be entered under any of the following conditions:

a. Re-start function performed.
b. Completion of PERSONALITY INITIALIZATION state.

3.6.7 Fast Calibrate State (Transmitter On) - While in this state, the subsystem is performing a fast automatic calibration of internal circuits. This state is entered when the transmitter is turned on while in the START state.

This state will be completed in less than one second (angle) or 8.5 seconds (DME/P).

3.6.8 Normal State (Transmitter On) - While in this state, the subsystem is radiating full guidance/data information capable of being decoded at the aircraft. Monitors are fully active and monitor verification is performed. This state is entered when the FAST CALIBRATION state is completed after the subsystem is commanded to radiate normally while in START state.

3.6.9 Normal/Monitor Bypass State (Transmitter On) - While in this state, the subsystem is radiating full guidance/data signals capable of being decoded at the aircraft. The monitor's ability to turn the transmitter off or inhibit alert parameters, however, is suppressed (angle transmitter still turned off for synch alarms, however). All alert and alarm indicators still operate. Monitor verification is performed.

This state is entered when the following condition occurs: FAST CALIBRATION state completes, after the angle subsystem is commanded to turn on the transmitter, with the monitor bypassed, while in the START state.

3.6.10 Maintenance/Monitor On State (Transmitter On) - While in this state, the angle subsystem is radiating full guidance/data information with Morse I.D. and basic data word 6 suppressed. In addition, even parity is changed to odd parity in all preambles. The monitor is fully operational except for ignoring alarms and alert due to the maintenance transmission itself. Monitor verification is performed. The DME/P is not transponding or generating morse code. The DME/P is, however, transmitting squitter pulses, and the monitor is fully operational. Morse code alerts are suppressed while in this state. Monitor verification is performed.

This state is entered when the FAST CALIBRATE state completes after the angle subsystem is commanded to enter maintenance mode, with the monitor on while in the START state.

3.6.11 Maintenance/Monitor Bypass State (Transmitter On) - While in this state, the angle subsystem is radiating guidance/data. DME/P is not transponding or generating Morse code. All monitors except the synch monitor, are bypassed. Monitor verification is performed.

This state is entered when the following FAST CALIBRATE state completes, after the angle subsystem is commanded to enter the maintenance transmission with the monitor bypassed, while in the START state.

3.6.12 Alert State (Transmitter On) - While in this state, the angle subsystem is radiating partial guidance/data information capable of being decoded at the aircraft. All monitors are fully active with the alert parameter suppressed. Diagnostics are performed from alert status information collected. Monitor verification is performed. The DME/P continues to transpond and will report the cause of the alert. The DME/P will continue to monitor the secondary parameter while in this state. If this parameter becomes within tolerance, the DME/P will enter the last state it was in.

This state is entered when a secondary parameter falls out of tolerance while in the NORMAL state.

3.6.13 Alert/Maintenance State (Transmitter On) - While in this state, the angle subsystem is radiating partial maintenance transmission. The radiation of the alert parameter is suppressed while the monitors are fully operational except for ignoring alarms and alerts due to the maintenance transmission itself. Diagnostics are performed from alert status information collected. Monitor verification is performed. For the DME/P, Morse code I.D. and transponding are suppressed. Monitor verification is performed.

This state is entered when a secondary parameter falls out-of-tolerance while in the MAINTENANCE/MONITOR ON state.

3.6.14 Alarm State - While in this state, the angle subsystem is not radiating. Diagnostics are performed from alarm status information collected.
This state is entered when any of the following conditions occur:

a. Integrity parameter out-of-tolerance while in NORMAL, ALERT, MAINTENANCE/MONITOR ON, or ALERT/MAINTENANCE states.

b. Interstation synch perturbation in any state from the level of START state or below (this can only occur on a back azimuth or elevation equipment; never on an approach azimuth equipment).

While in this state, the DME/P may be transponding in either Initial Approach mode (IA), Final Approach Mode (FA), or may not be transponding at all. Both IA and FA modes never operate simultaneously while in the ALARM state. LRU diagnostics are performed only when both the IA and FA modes are inoperative.

The DME/P ALARM state may be entered from any of the following conditions:

a. An IA or FA integrity parameter falls out-of-tolerance while in the NORMAL or ALERT states or a generic perturbation is detected.

b. A generic perturbation occurs while in the MAINTENANCE/MONITOR ON, ALERT/MAINTENANCE, NORMAL, ALERT, or FAST CALIBRATE STATE.

c. A high VSWR generic alarm occurs in any state discussed in (b) in addition to the NORMAL/MONITOR BYPASS and MAINTENANCE/MONITOR BYPASS states.

APPENDIX I
MPS MESSAGE FORMATS

10.1 Scope - This section defines the format of the messages transferred between the MLS and the MPS (via the RMMS network).

Table I-I provides the section number to find the detailed formats and explanations for each message. The table also includes a summary of the source and destinations for the messages.

Note that the term "Equipment" refers to either the AZ, EL, DME/P, RCSU EA, etc.

The data parameters with numeric values are translated into 16 and 32 bit signed integers (as per NAS-MD-790) whenever they are sent to the MPS.

TABLE I-I MESSAGE SUMMARY

MESSAGE NAME	SOURCE	DESTINATION	SECTION
Commands:			
SCHEDULED POLL	MPS	RMS Master LU	10.3.1
SPECIFIC POLL	MPS	Equipment LU	10.3.2
TTY INPUT	MPS	Equipment Terminal LU	10.3.3
Responses:			
SITE DATA REPORT	Equipment LU	MPS	10.3.4
COMMAND ERROR	RMS Master	MPS	10.3.5
Unsolicited:			
ALARM	Equipment LU	MPS	10.3.6
RETURN-TO-NORMAL	Equipment LU	MPS	10.3.7
	RMS Master	MPS	
STATE CHANGE	Equipment LU	MPS	10.3.8
TTY OUTPUT	Equipment Terminal LU	MPS	10.3.9
	MPS	Equipment Terminal LU	
BUSY STATUS	RMS Master	MPS	10.3.10

10.2 MPS Message Description Conventions - All messages have address fields (RMS address or MLS LU), a delimiter field (binary 0), a message function identifier, and the specific data content for the message function (the message data). The basic format is as follows:

MLS LU
Delimiter of binary zero
MESSAGE FUNCTION
MESSAGE DATA

The general definitions of these fields are presented in the paragraphs that follow.

10.2.1 MLS Logical Unit (MLS LU) - Defined as a logical unit within an equipment, specified as:

(Equipment) : (Logical Unit)

Example: "AZ1 : Control"

(Equipment) : = [AZ1, AZ2, DME/P1, DME/P2, EL1, EL2, RCSU EA]
(Logical Unit) : = [RMS Master, Control, Terminal, User Access Scheduled Periods, Alarm/Alert Parameters, Maintenance Parameters, Alarm/Alert Thresholds, Maintenance Thresholds, Miscellaneous Parameters, Site Paramters, Confidence Checks, Comm Statistics, Hard Alarm Historical, Soft Alarm Historical, State Change Historical, Periodic Historical]

10.2.2 Delimiter - The "delimiter" of binary 0 is a constant for all messages.

10.2.3 Message Function - The MESSAGE FUNCTION value is either directly from NAS-MD-790 or is derived from the conventions used in NAS-MD-790. The MESSAGE FUNCTION values are summarized in Table I-II.

TABLE I-II MESSAGE FUNCTION SUMMARY

MESSAGE FUNCTION	MESSAGE
"A"	ALARM (hard)
"a"	ALARM (soft)
"B"	RETURN-TO-NORMAL
"C"	STATE CHANGE
"c"	STATE CHANGE
"E"	COMMAND ERROR
"F"	BUSY STATUS
"G"	SITE DATA REPORT
"g"	SITE DATA REPORT
"H"	TTY INPUT
"I"	TTY OUTPUT
" "	SCHEDULE POLL or SPECIFIC POLL

10.2.4 MPS Message Data - The MESSAGE DATA FIELD following the MESSAGE FUNCTION is dependent on the type of message indicated by MESSAGE FUNCTION. The format of the message data is either directly from NAS-MD-790 or is derived from the conventions used in NAS-MD-790.

Messages with MESSAGE FUNCTON of "H" have an additional code to specify the type of message within the "H". This code is called the COMMAND CODE. Note that the value is in hexadecimal representaton.

The definitions of each logical unit and the datapoints for each logical unit are provided in Appendix IV, the Data Description.

The MESSAGE DATA may include fields defining the applicable datapoint (DATAPOINT), the datapoints value (VALUE) and the datapoints condition (CONDITION).

DATAPOINT	The datapoint number in the specified logical unit (MLS LU).
CONDITION	BYTE, an 8-bit number that represents the condition of a datapoint. The values for CONDITION are defined in Appendix IV, Data Description. Note that Appendix IV uses only upper case. If the parameter is translated into a 32 bit numeric value then the lower case code is used in the MPS message.
VALUE	The value of the specified datapoint (see Appendix IV for the representation of the data for each datapoint).

NOTE: Datapoint Values

The numeric parameters defined for MICNET must be translated into 16 or 32 bit signed integers when they are placed into MPS messages. The translation is as follows:

MICNET Representation	MPS Message Representation
8 bit unsigned integer (BYTE)	16 bit signed integer
16 bit unsigned integer (WORD)	32 bit signed integer
16 bit signed integer (INTEGER)	16 bit signed integer
32 bit unsigned integer (DWORD)	32 bit signed integer

10.3 MESSAGES

10.3.1 Scheduled Poll Message - The SCHEDULED POLL message requests that the MLS report all of the logical units considered to be "site" related. Table IV indicates the logical units included in this category.

The response to this message is a SITE DATA REPORT for every logical unit considered to be "site" related. There is no specified order to these response messages.

MESSAGE FORMAT

MLS LU:	global (255 or ØFFH hexadecimal representation)
DELIMITER:	Ø
MESSAGE FUNCTION:	"@" (40 hexadecimal representation)
MESSAGE DATA:	none

10.3.2 SPECIFIC POLL Message - The SPECIFIC POLL message requests that the MLS report the datapoints of a specific logical unit. The response to this message is s SITE DATA REPORT for the specified logical unit.

MESSAGE FORMAT

MLS LU:	Specific LU to report
DELIMITER:	Ø
MESSAGE FUNCTION:	"@" (40 hexadecimal representation)
MESSAGE DATA:	none

10.3.3 TTY INPUT Message - The TTY INPUT message is processed as if it came from the local MLS printer/terminal. The text of the message must be entire command strings as defined for the P/T (Appendix III). Note that a line termination character (carriage return, line feed) are not required. These messages are sent by the MPS to the MLS.

MESSAGE FORMAT

MLS LU:	Equipment:	Terminal Logical Unit
DELIMITER:	Ø	
MESSAGE FUNCTION:	"H"	
MESSAGE DATA:		
COMMAND CODE	BYTE	28H = TTY INPUT code
TEXT	BYTE(n)	ASCII text string of n characters; maximum n = 8Ø characters; range = 20H - 7EH
TERMINATOR	BYTE	ASCII carriage return (CR)

10.3.4 SITE DATA REPORT Message - The SITE DATA REPORT message reports the contents of a logical unit. It is sent in response to either a SPECIFIC POLL or SCHEDULED POLL message.

A SITE DATA REPORT with a negative status (MESSAGE FUNCTION = "g") is sent to the MPS if an equipment is unable to reply due to (1) the MLS station, responsible for the logical unit, being disconnected from the RCSU EA (e.g., communication is not established) or (2) the equipment is in a fault or initialization state.

MESSAGE FORMAT

MLS LU:	Specific LU being reported.
DELIMITER	Ø
MESSAGE FUNCTION:	"G" or "g"
MESSAGE DATA:	

The message data is the content of the specified logical unit if the MESSAGE FUNCTION is "G." (See Appendix IV.) There is no message data if the MESSAGE FUNCTION is "g" which indicates that the LU is "non-operating."

10.3.5 COMMAND ERROR Message

The COMMAND ERROR Message is sent to the MPS whenever a received message cannot be interpreted due to either format or data content errors. (Note that the message was received correctly by the link level.) Feed back is provided to the message source.

MESSAGE FORMAT

MLS LU: RMS Master

DELIMITER: Ø

MESSAGE FUNCTION: "E"

MESSAGE DATA:

The erroneous received message is placed here beginning with the erroneous message's MESSAGE FUNCTION field. The link level fields are excluded.

10.3.6 ALARM Message - An ALARM message is sent to the MPS whenever a monitored parameter (e.g., a datapoint in the Alarm/Alert Parameter and the Maintenance Parameter Logical Units) makes the transition from normal to integrity alarm or secondary alert or maintenance alert depending on the parameter. Integrity alarms and secondary alerts are "hard" alarms and maintenance alerts are "soft" alarms.

ALARM messages are sent as stated above even if the monitor is being by-passed.

MESSAGE FORMAT

MLS LU: Logical unit with parameter that changed condition

DELIMITER: Ø

MESSAGE FUNCTION: "A" for hard alarm, "a" for soft alarm

MESSAGE DATA:

For each datapoint the following information is required:

DATA POINT	BYTE	The datapoint that transitioned from normal to integrity alarm, secondary alert or maintenance alert.
CONDITION	BYTE	See Appendix IV.
VALUE	-	The value of the datapoint or Ø if not applicable. See Appendix IV.

A maximum of 1Ø datapoints in the same logical unit can be reported in one message.

<u>10.3.7 RETURN-TO-NORMAL Message</u> - The RETURN-TO-NORMAL message is sent by an equipment to the MPS whenever any of the following conditions are satisfied:

- o One or more datapoints in a maintenance parameter logical unit returns to normal from a maintenance alert state.
- o One or more datapoints in an alarm/alert parameter logical unit return to normal from an integrity alarm or secondary alert state.
- o The busy condition (see BUSY STATUS message) identified with the RMS Master logical unit is terminated.

However, Alarm/Alert parameter RETURN-TO-NORMAL messages are not sent for the Angle Equipment when the monitor is on since a major equipment state transition is needed before the parameters are assumed back to normal. The state transition is independently reported in a STATE CHANGE message (10.3.8) which is defined to assure the parameters have returned-to-normal.

MESSAGE FORMAT

MLS LU: Logical unit with parameter that changed condition or RMS Master logical unit.

DELIMITER: Ø

MESSAGE FUNCTION: "B"

MESSAGE DATA:

For each datapoint the following information is required:

DATAPOINT	BYTE	The datapoint that is transitioned to integrity alarm, secondary alert or maintenance alert to normal.
CONDITION	BYTE	See Appendix IV.
VALUE	-	The value of the datapoint or Øif not applicable. See Appendix IV.

A maximum of 1Ø datapoints in the same logical unit can be reported in one message.

10.3.8 STATE CHANGE Message - The STATE CHANGE message reports any change in the operational and site parameters.

MESSAGE FORMAT

MLS LU: Equipment: Site Parameters
Control Parameters
User Access Parameters
Scheduled Periods Parameters
Alarm/Alert Thresholds
Maintenance Thresholds

DELIMITER: Ø

MESSAGE FUNCTION: "C" for Site Parameters, Control Parameters Access, and Schedules Periods ~~Logical~~ Units

"c" for Alarm/Alert Threshold and Maintenance Threshold Logical Units

MESSAGE DATA

For each datapoint the following information is required:

DATAPOINT	BYTE	The datapoint that transitioned to integrity alarm, secondary alert or maintenance alert to normal.
CONDITION	BYTE	See Appendix IV.
VALUE	-	The value of the datapoint or Ø if not applicable. See Appendix IV.

A maximum of 1Ø datapoints in the same logical unit can be reported in one message.

10.3.9 TTY OUTPUT Message - The TTY OUTPUT message provides data to be printed on equipment's currently assigned Printer/Terminal (P/T). The data to be printed is not interpreted in any manner before being printed.

MESSAGE FORMAT

MLS LU:	Equipment:	Terminal Logical Unit
DELIMITER:	Ø	
MESSAGE FUNCTION:	"I"	
MESSAGE DATA:		
DATAPOINT	BYTE	2ØH for the only datapoint within the Terminal Logical Unit.
TEXT	BYTE(n)	Text string of n characters; maximum n = 5ØØ characters;

range = ØØH - FFH

10.3.10 BUSY STATUS Message - The BUSY STATUS message is used to report and identify the cause whenever the MLS is temporarily not ready to receive a message or respond to a message.

When the condition inhibiting message transfer at the MLS no longer exists, the MLS shall notify the MPS by sending a RETURN-TO-NORMAL message with a logical unit of RMS Master, datapoint of 32 (2Ø hexadecimal), condition status of "A" for normal, and a datapoint value of Ø. See 10.3.7.

MESSAGE FORMAT

MLS LU:	RMS Master	
DELIMITER	Ø	
MESSAGE FUNCTION:	"F"	
MESSAGE DATA:		
CAUSE	BYTE(4)	The reason for the busy condition is indicated as a four character ASCII string. The possible values are:
		"BUFF" -buffers not available
		"DIAG" -diagnostic processing in progress
		"INIT" -initialization is in progress
		"FAUL" -a non-fatal fault state is active

APPENDIX V DEFINITIONS, ABBREVIATIONS AND ACRONYMS

ABM	Asynchronous Balanced Mode
ADCCP	American National Standard for Advanced Data Communication Control Procedures (ANSI X3.66)
AEE	Angle Guidance/Data Electronic Equipment
ARM	Asynchronous Response Mode
ARO	Asynchronous Response Opportunity
AZ	Azimuth Equipment
DBTDS	Data Base Table Design Specification
DME/P	Precision Distance Measuring Equipment
DP	Datapoint
DISC	Disconnect
DM	Disconnected mode
EA	Electronic Assembly
EL	Elevation Equipment
FCS	Frame Check Sequence
Frame	The Data Link Level envelope for transmitting data
FRMR	Frame reject
I	Information frames
ICD	Interface Control Document
ISO	International Standards Organization
LU	Logical Unit
Message	A collection of data transmitted in frames
MICNET	MLS Intercommunication Network
MLS	Microwave Landing System
MPS	Maintenance Processing System
OSI	Open Systems Interconnection (ISO Standard)
P/T	Printer/Terminal
REJ	Reject command/response
RCSU	Remote Control and Status Unit
RCSU EA	Remote Control and Status Unit Electronics Assembly
RD	Request disconnect
RMMS	Remote Maintenance Monitoring System
RMS	Remote Monitoring Equpment
RNR	Receiver not ready
RL	Receiver ready
SDR	Site Data Report
SNRM	Set normal response mode
UA	Unnumbered acknowledge

APPENDIX II

MICNET MESSAGE FORMATS

20.1 Scope - This section defines the messages transferred on MICNET.

A list of the messages is given in Table II-1 with the section number to find the detailed explanation for each message. The table also includes a summary of the source and destinations for the messages.

Note that the term "Equipment" refers to either the AZ1, AZ2, EL2, DME/P1, DME/P2. The term "All" refers to any "Equipment" and the RCSU EA. For certain messages the destination is the MPS. This means that the message is addressed to the MPS but first must pass through the RCSU EA.

TABLE II-I. MESSAGE SUMMARY

MESSAGE NAME	SOURCE	DESTINATION	SECTION
COMMAND GROUP			
SITE DATA COMMAND	MPS,RCSU EA	Equipment	20.3.1
CHANGE DATAPOINT	RCSU EA	Equipment	20.3.2
STATUS COMMAND	RCSU EA	Equipment	20.3.3
CONFIGURATION COMMAND	RCSU EA	Equipment	20.3.4
CONTROL COMMAND	RCSU EA	Equipment	20.3.5
REQUEST GROUP			
STATUS REQUEST	Equipment	RCSU EA	20.3.6
CONFIGURATION REQUEST	Equipment	RCSU EA	20.3.7
CONTROL REQUEST	Equipment	RCSU EA	20.3.8
REPORT GROUP			
SITE DATA REPORT	Equipment	MPS,RCSU/EA	20.3.9
DATAPOINT REPORT	Equipment	RCSU EA	20.3.10
CONFIGURATION REPORT	Equipment	RCSU EA	20.3.11
COMMAND ERROR	All	All	20.3.12

TABLE II-I. MESSAGE SUMMARY (Cont'd)

MESSAGE NAME	SOURCE	DESTINATION	SECTION
UNSOLICITED GROUP			
ALARM	Equipment	MPS	20.3.13
RETURN-TO-NORMAL	Equipment	MPS	20.3.14
STATE CHANGE	Equipment	MPS	20.3.15
TTY INPUT	All, MPS	All	20.3.16
TTY OUTPUT	All, MPS	All, MPS	20.3.17

<u>20.2 Message Description Conventions</u> - Message function and data are contained in the information field, along with destination and source LU's.

Information Field

SEG	D	S	F	X

The general message format was presented and defined in Section 3.2.1.4 All messages have address fields (DESTINATION LU, SOURCE LU) and a MESSAGE FUNCTION indicator. The MESSAGE DATA field is dependent on the MESSAGE FUNCTION field. The basic format is as follows:

D DESTINTION LU
S SOURCE LU
F MESSAGE FUNCTION
X MESSAGE DATA

The formatting conventions used to describe these fields for each message are as follows:

SOURCE or DESTINATION LU

Defined as a logical unit within an equipment, specified as:

(Equipment): [Which is the sum of the equipment address
(Logical unit) and the LU offset address subtract 1.]

Example: "AZ1 : Control", [Which is 40 (decimal). See Table II and III]

(Equipment) : = [AZ1, AZ2, DME/P1, DME/P2, EL1, EL2, RCSU EA]
(Logical Unit) : = [Control, Terminal, User Access, Scheduled Periods, Alarm/Alert Parameters, Maintenance Parameters, Alarm/Alert Thresholds, Maintenance Thresholds, Miscellaneous Parameters, Site Parameters, Confidence Checks, Comm Statistics, Hard Alarm Historical, Soft Alarm Historical, State Change Historical, Periodic Historical]

MESSAGE FUNCTION

The MESSAGE FUNCTION value is either directly from NAS-MD-790 or is derived from the conventions used in NAS-MD-790. The MESSAGE FUNCTION values are summarized in Table II-II.

TABLE II-II. MESSAGE FUNCTION SUMMARY

MESSAGE FUNCTION	COMMAND_CODE	MESSAGE
"A"	-	ALARM (hard)
"a"	-	ALARM (soft)
"B"	-	RETURN-TO-NORMAL
"C"	-	STATE CHANGE - logical unit dependent
"c"	-	STATE CHANGE - logical unit dependent
"E"	-	COMMAND ERROR
"F"	-	BUSY STATUS
"G"	-	SITE DATA REPORT
"g"	-	SITE DATA REPORT - non-operating
"H"	24H - 26H	SITE DATA COMMAND
	20H	CONFIGURATION REPORT
	21H	CHANGE DATAPOINT
	30H	STATUS COMMAND
	31H	CONFIGURATION COMMAND
	32H	CONTROL COMMAND
	40H	STATUS REQUEST
	41H	CONFIGURATION REQUEST
	42H	CONTROL REQUEST
	28H	TTY INPUT
"I"	-	TTY OUTPUT
"J"	-	DATAPOINT REPORT
"j"	-	DATAPOINT REPORT - non-operating

MESSAGE DATA

The message data following the MESSAGE FUNCTION is dependent on the type of message indicated by MESSAGE FUNCTION.

The format of the message data is either directly from NAS-MD-790 or is derived from the conventions used in NAS-MD-790.

Messages with MESSAGE FUNCTION of "H" have an additional code to specify the type of message within the "H" category it is. This code is called the COMMAND_CODE. The COMMAND CODE values are summarized in Table II-II. Note that the value is in hexadecimal representation.

The definitions of each logical unit and the datapoints for each logical unit are provided in Appendix IV.

NOTE: Message destined for the MPS are formatted as per Appendix I. This means that numeric values in MPS messages are converted to either a 16 or 32 bit signed integer. All other MICNET messages with numeric datapoint values use the parameter format as defined in Appendix IV.

20.3 Messages

20.3.1 Site Data Command - Requests that an equipment report the information specified using the SITE DATA REPORT or DATAPOINT REPORT messages.

The RCSU EA sends the message to the addressed equipment. The SITE DATA COMMAND source (originating) address may be the MPS or RCSU EA. [The source address is used as the destination address in the response message.]

There are three different requests differentiated gy the COMMAND CODE (see message format). Each request requires a different response:

COMMAND_CODE	DEFINITION	RESPONSE
24H	All LUs	SITE DATA REPORT messages for each LU
25H	specific LU	SITE DATA REPORT message for the LU
26H	one datapoint	DATAPOINT REPORT message for LU/DP

(Note that the MPS, as specified in NAS-MD-790, does not define the request for a single datapoint but it is expected to be needed by the RCSU EA.)

MESSAGE FORMAT

DESTINATION LU:	Equipment:	Logical Unit depends on COMMAND_CODE (see below)
SOURCE LU:	MPS, RCSU EA:	Control Logical Unit
MESSAGE FUNCTION:	"H"	
MESSAGE DATA:		
COMMAND_CODE	BYTE	24H = Generate a report for all logical units 25H = Generate a report for one specific logical unit 26H = Generate a report for one specific data point in a logical unit
DATAPOINT	BYTE	(defined only if command code = 26) - datapoint number

<u>20.3.2 Change DATAPOINT</u> - The datapoint to be changed is specified. The response to this command once the datapoint is changed is a DATAPOINT REPORT.

This command is currently intended only to be used as a result of a auxiliary data word (ADW) or basic data word (BDW) change caused by the RCSU panel operator selecting a different value for the data.

MESSAGE FORMAT

DESTINATION LU:	Equipment:	Logical Unit with datapoint to change
SOURCE LU:	RCSU EA:	Control Logical Unit
MESSAGE FUNCTION:	"H"	
MESSAGE DATA:		
COMMAND_CODE	BYTE	21H = UPDATE DATAPOINT code
DATAPOINT	BYTE	The datapoint number to modify.
VALUE	BYTE(n)	The new value of the datapoint

20.3.3 Status Command - The addressed equipment reports its current status by responding with either a CONFIGURATION REPORT or STATUS request message. (Note: refer to the message flow sections for the logic for selecting one response over the other.)

MESSAGE FORMAT

DESTINATION LU:	Equipment:	Control Logical Unit
SOURCE LU:	RCSU EA:	Control Logical Unit
MESSAGE FUNCTION:	"H"	
MESSAGE DATA:		
COMMAND_CODE	BYTE	30H = STATUS COMMAND code.

20.3.4 Configuration Command - This message commands the specified equipment into a given configuration. If a response is required (see message flow section 3.2.8.5) the response is a CONFIGURATION REPORT message.

The specified equipment is forced into the state indicated in this message. If the equipment is not capable of entering the indicated state then a CONFIGURATION report is sent to the RCSU EA indicating the best attempt at achieving the specified state.

MESSAGE FORMAT

```
DESTINATION LU:     Equipment:     Control Logical Unit
SOURCE LU:          RCSU EA:       Control Logical Unit
MESSAGE FUNCTION:   "H"
MESSAGE DATA:

  COMMAND_CODE      BYTE    31H = CONFIGURATION COMMAND code

  TYPE              BYTE    1   = unsolicited - sent when required
                                  by RCSU EA
                            2   = solicited response to a
                                  CONFIGURATION REQUEST

  CONFIGURE         BYTE    1   = approach azimuth
                            2   = back azimuth
                            3   = online EL
                            4   = offline EL
                            5   = online DME/P
                            6   = offline DME/P

  STATE             BYTE    1   = normal
                            2   = maintenance

  TRANSMISSION      BYTE    1   = on
                            2   = off

  MONITOR           BYTE    1   = on  (not by-passed)
                            2   = off (by-pass)

  BDW 5 STATUS      BYTE    1   = transmit BDW 5
                            2   = do not transmit BDW 5

  BDW 2 VALUE       BYTE    Bit 0 - BAZ status
                                  0 = function not radiated,
                                      or radiated in test mode
                                      (not reliable for naviga-
                                      tion)
                                   1 = function radiated in
                                       normal mode
                            Bits 1,2   - DME status
                                  Bit
                                  2 1
                                  - -
                                  0 0 = DME transonder inoperative,
                                        or not available
                                  1 0 = Only IA  mode or DME/N
                                        available
                                  0 1 = FA mode, Standard 1,
                                        available
```

```
                    1 1 = FA mode, Standard 2,
                          available
Bit 3                 - Approach AZ status
                    0 = function not radiated, or
                          radiated in test mode (not
                          reliable for navigation)
                    1 = function radiated in normal
                          mode
Bit 4                 - Approach EL status
                    0 = function not radiated, or
                          radiated in test mode (not
                          reliable for navigation)
                    1 = function radiated in
                          normal mode.
```

20.3.5 Control Command - The CONTROL COMMAND message is sent (1) as a response to a CONTROL REQUEST message and (2) to set the control state of an equipment. This message indicates the control state that should be active at the equipment.

An example of its use is if a local control state was requested, and then granted by the RCSU EA, the CONTROL COMMAND message indicates "local control". If it wasn't granted then the message indicates no change in the control state (e.g., "system control").

MESSAGE FORMAT

```
DESTINATION LU:    Equipment:     Control Logical Unit
SOURCE LU:         RCSU EA:       Control Logical Unit
MESSAGE FUNCTION:  "H"
MESSAGE DATA:

  COMMAND_CODE     BYTE    32H = CONTROL COMMAND code

  CONTROL_STATE    BYTE    1 = local control
                           2 = remote control
                           3 = system control
```

20.3.6 Status Request - The STATUS REQUEST message is a request for configuration information from the RCSU EA. A CONFIGURATION COMMAND message is sent in response to the RCSU EA.

MESSAGE FORMAT

DESTINATION LU:	RCSU EA:	Control Logical Unit
SOURCE LU:	Equipment:	Control Logical Unit
MESSAGE FUNCTION:	"H"	
MESSAGE DATA:		

COMMAND_CODE	BYTE	32H = STATUS REQUEST code.

20.3.7 Configuration Request - The equipment sends a CONFIGURATION REQUEST when the configuration is requested to be changed from either a Printer/Terminal (P/T) command or LCSU panel switch toggle.

Only one CONFIGURATION REQUEST message can be outstanding at any one time. This request must be acknowledged by a CONFIGURATION COMMAND before another CONFIGURATION REQUEST can be sent.

A CONFIGURATION REQUEST message cannot be sent unless local or remote control was previously granted by a CONTROL COMMAND message. Note that a CONTROL REQUEST message is used to request local or remote control.

MESSAGE FORMAT

DESTINATION LU:	RCSU EA:	Control Logical Unit
SOURCE LU:	Equipment:	Control Logical Unit
MESSAGE FUNCTION:	"H"	
MESSAGE DATA:		

COMMAND_CODE	BYTE	41H	= CONFIGURATION REQUEST code.
CONFIGURE	BYTE	1	= approach azimuth
		2	= back azimuth
		0	= not applicable for equipment (EL or DME/P)

STATE	BYTE	1	= normal
		2	= maintenance
TRANSMISSION	BYTE	1	= on
		2	= off
MONITOR	BYTE	1	= on (not by-passed)
		2	= off (by-pass)

20.3.8 Control Request - The equipment sends a CONTROL REQUEST when the control state of the equipment has been requested to change from either a Printer/Terminal (P/T) command or LCSU panel switch toggle.

Only one CONTROL REQUEST message can be outstanding at any one time. This request must be acknowledged by a CONTROL COMMAND before another CONTROL REQUEST message can be sent.

MESSAGE FORMAT

DESTINATION LU:	RCSU EA:	Control Logical Unit
SOURCE LU:	Equipment:	Control Logical Unit
MESSAGE FUNCTION:	"H"	
MESSAGE DATA:		

COMMAND_CODE	BYTE	42H	= CONTROL REQUEST code.
CONTROL_STATE	BYTE	1	= local control requested
		2	= remote control requested
		3	= system control requested

20.3.9 Site Data Report - The SITE DATA REPORT message is generated in response to SITE DATA COMMAND message. For a SITE REPORT COMMAND message requesting all logical units, multiple SITE DATA REPORT messages are generated: one per LU.

MESSAGE FORMAT

DESTINATION LU:	MPS, RCSU EA	
SOURCE LU:	Equipment:	Logical Unit depends on COMMAND_CODE (see SITE DATA command)
MESSAGE FUNCTION:	"G" = SITE DATA REPORT follows "g" = invalid logical unit definition in SITE DATA command	
MESSAGE DATA:		

The message data is the content of the specified logical unit if the MESSAGE FUNCTION IS "G". There is no message data if the MESSAGE FUNCTION is "g" which indicates that the LU is "non-operating".

<u>20.3.20 DATAPOINT Report</u> - The DATAPOINT REPORT message is generated in response to SITE DATA COMMAND message for a single datapoint.

MESSAGE FORMAT

DESTINATION LU:	RCSU EA	
SOURCE LU:	Equipment:	Logical Unit
MESSAGE FUNCTION:	"J" = datapoint report follows "j" = not a valid logical unit - no data	
MESSAGE DATA:		

The message is the content of the specified logical unit datapoint.

<u>20.3.11 Configuration Report</u> - The CONFIGURATION REPORT is sent by an equipment to the RCSU EA in response to STATUS COMMAND and CONFIGURATION COMMAND messages. The equipment also sends unsolicited CONFIGURATION REPORT messages when the configuration unconditionally changes (e.g., alarm).

The current state of the equipment is reported in this report.

MESSAGE FORMAT

DESTINATION LU:	RCSU EA:	Control Logical Unit
SOURCE LU:	Equipment:	Control Logical Unit
MESSAGE FUNCTION:	"H"	
MESSAGE DATA:		

COMMAND_CODE	BYTE	20H	= CONFIGURATION REPORT
CONFIGURE	BYTE	1	= approach azimuth
		2	= back azimuth
		3	= online EL
		4	= offline EL
		5	= online DME/P
		6	= offline DME/P
STATE	BYTE	1	= normal
		2	= maintenance
		3	= fault or disconnect (no communication path to equipment)
TRANSMISSION	BYTE	1	= on
		2	= off
		3	= unknown due to state of fault or disconnect
MONITOR	BYTE	1	= on (not by-passed)
		2	= off (by-pass)
		3	= unknown due to state of fault or disconnect
SYNC	BYTE	1	= normal sync
		2	= C-band sync
		3	= unknown due to state of fault or disconnect
BDW 5 STATUS	BYTE	see CONFIGURATION COMMAND	
BDW 2 VALUE	BYTE	see CONFIGURATION COMMAND	
CONDITION	BYTE	1	= normal (no alarm or alert active)
		2	= alarm
		3	= alert
		4	= fault or disconnect active
ALARM TYPE	BYTE	1	= not applicable since not DME/P or not one of following conditions
		2	= IA Alarm (DME/P only)
		3	= FA Alarm (DME/P only)

WARNING	BYTE	1	= maintenance alert active
		2	= no maintenance alert active
BATTERY	BYTE	1	= on (in use)
		2	= off
CONTROL_STATE	BYTE	1	= local control
		2	= remote control
		3	= system control
PENDING_CONTROL	BYTE	1	= local control pending
		2	= remote control pending
		3	= system control pending
		4	= no change pending

20.3.12 Command Error - The COMMAND ERROR message is sent when a message is received with erroneous message information. There is no response to this message. The link is considered disconnected due to this error message.

MESSAGE FORMAT

DESTINATION LU:	any:	Control Logical Unit
SOURCE LU:	any:	Control Logical Unit
MESSAGE FUNCTION:	"E"	
MESSAGE DATA:		

ERROR CODE	BYTE	1	= COMMAND_CODE error (if applicable)
		2	= delimiter error (expected "0")
		3	= illegal Logical Unit specified
		4	= illegal Datapoint specified
		5	= MESSAGE FUNCTION error
		6	= inconsistent MESSAGE DATA (too few or too many arguments or argument with invalid value)

20.3.13 Alarm - An ALARM message is sent to the MPS whenever a monitored parameter (e.g., a datapoint in the Alarm/Alert Parameter and the Maintenance Parameter Logical Units) makes the transition from normal to integrity alarm or secondary alert or maintenance alert depending on the parameter. Integrity alarms and secondary alerts are "hard" alarms and maintenance alerts are "soft" alarms.

ALARM messages are sent as stated above even if the monitor is being by-passed.

When the current state of the equipment changes to the alarm state then the ALARM message is followed by a CONFIGURATION REPORT.

MESSAGE FORMAT

DESTINATION LU:	MPS
SOURCE LU:	Equipment: Alarm/Alert Parameters
MESSAGE FUNCTION:	"A" = hard alarm (integrity alarm and secondary alert parameter)
	"a" = soft alarm (maintenance alert parameter)

MESSAGE DATA:

For each alarm/alert datapoint the following information is required:

DATAPOINT	BYTE	The datapoint that transitioned from normal to integrity alarm, secondary alert or maintenance alert.
CONDITION	BYTE	See Appendix IV.
VALUE	-	The value of the datapoint or 0 if not applicable. The formats for each datapoint are defined in Appendix IV.

A maximum of 10 datapoints in the same logical unit can be reported in one message.

<u>20.3.14 Return-to-Normal</u> - The RETURN-TO-NORMAL message is sent by an equipment to the MPS whenever the following conditions are satisfied:

- o Whenever one or more datapoints in a maintenance paramter logical unit returns to normal from a maintenance alert state.

- o Whenever one or more datapoints in a alarm/alert parameter logical unit return to normal from a alarm or alert state.

- o Alarm/Alert parameter RETURN-TO-NORMAL messages are not sent for the Angle Equipment when the monitor is on since a major equipment state transition is needed before the parameters are assumed back to normal which is defined to assume the parameters have returned-to-normal. Reference "Configuration Report" for further information about the use of this command in this case.

MESSAGE FORMAT

DESTINATION LU:	MPS:	
SOURCE LU:	Equipment:	Alarm/Alert Parameters Maintenance Alert Parameters
MESSAGE FUNCTION:	"B"	
MESSAGE DATA:		

For each datapoint the following information is required:

DATAPOINT	BYTE	The datapoint that transitioned to integrity alarm, secondary alert or maintenance alert to normal.
CONDITION	BYTE	See Appendix IV.
VALUE	-	The value of the datapoint or 0 if not applicable. (See Appendix IV).

A maximum of 10 datapoints in the same logical unit can be reported in one message.

<u>20.3.15 State Change</u> - The STATE CHANGE message reports any change in the major operation and site parameters (Site Parameters, control Parameters, User Access, Scheduled Periods logical units).

MESSAGE FORMAT

DESTINATION LU:	MPS:	
SOURCE LU:	Equipment:	Site Parameters Control Parameters User Access Parameters Scheduled Periods Parameters Alarm/Alert Thresholds Maintenance Thresholds

MESSAGE FUNCTION: "C" for Site Parameters, Control Parameters, User Access, an Schedules Periods Logical Units
"c" for Alarm/Alert Threshold and Maintenance Threshold Logical Units

MESSAGE DATA:

For each datapoint the following information is required:

DATAPOINT	BYTE	The datapoint that transitioned to integrity alarm, secondary alert or maintenance alert to normal.
CONDITION	BYTE	See Appendix IV.
VALUE	-	The value of the datapoint or 0 if not applicable. See Appendix IV.

A maximum of 10 datapoints in the same logical unit can be reported in one message.

<u>20.3.16 TTY Input</u> - The TTY INPUT message is parsed/interpreted as if it came from the local printer/ terminal (see the Printer/Terminal, 3.2.4). The response is always a TTY OUTPUT message.

MESSAGE FORMAT

DESTINATION LU:	any:	Terminal Logical Unit
SOURCE LU:	any:	Terminal Logical Unit
MESSAGE FUNCTION:	"H"	
MESSAGE DATA:		
COMMAND_CODE	BYTE	28H = TTY INPUT code
TEXT	BYTE(n)	ASCII text string of n characters; maximum n = 80 characters; range = 20H - 7EH
TERMINATOR	BYTE	ASCII carriage return (CR)

20.3.17 TTY Output - The TTY OUTPUT message provides data to be printed on equipments currently assigned Printer/Terminal (P/T). The data to be printed is not interpreted in any manner before being printed.

MESSAGE FORMAT

DESTINATION LU:	any:	Terminal Logical Unit
SOURCE LU:	any:	Terminal Logical Unit
MESSAGE FUNCTION:	"I"	
MESSAGE DATA:		
COMMAND_CODE	BYTE	20H for the only data point within the Terminal Logical Unit.
TEXT	BYTE(n)	text string of n characters; maximum n = 500 characters; range = 00H - FFH

APPENDIX III

PRINTER/TERMINAL COMMANDS AND ERROR MESSAGES

30.1 Introduction

This Appendix describes the P/T commands and their effect on the MLS equipment. Each command's syntax, access level, type of control, operation and possible parameters are defined. If there are special considerations for the proper operation of the command then the special condition is described.

The full set of commands, in alphabetical order, is: (Note that "AB" means abbreviation.)

COMMAND	AB	EXPLANATION
CHANGE PARAMETER	CP	Change a parameter to a new value.
DATE	DA	Change or display the date.
DIAGNOSE	DI	Cause the execution of diagnostics.
ENTER DIALOGUE	ED	Enter into dialogue mode.
ENVIRONMENT	EN	Simulate the LCSU Panel.
HELP	H	Print of full set of commands available.
LOGON	LN	Identify the operator to the system.
LOGOFF	LO	Conclude operator access to commands.
MPS REPORTS	M	Enable/disable the printing of MPS reports.
PRINT	P	Print a report of parameters.
REQUEST CONTROL	RC	Request control of the equipment.
REQUEST SYSTEM	RS	Requests control to the system.
RESET	RE	Causes the system to do a partial reset.
TIME	TI	Change or display the time.
TRANSMISSION MODE	TM	Set the transmission mode to maintenance or normal.

A design criterion for the Printer/Terminal Interface is to make the interface suitable for both expert and novice operators. The operator can choose to enter the mnemonic of the requested command

(e.g., CP for the CHANGE PARAMETER command), or the full command name ("CHANGE COMMAND").

The commands are listed alphabetically in the following sections. Each section gives the name of the command with the command's mnemonic, the command syntax, the minimum access level required (see Chapter 3), the type of control required, and the description of the command. This information is then followed by one or more examples detailing the usage of the command.

Error messages for the commands are listed and described in 30.3.

The notational conventions for the command syntax definitions are as follows:

1. All upper case characters, decimal digits, punctuation and special characters are required.

2. All lower case characters or abbreviations (e.g., LU) refer to definitions.

3. Arguments enclosed in braces, "{}", indicate that the argument must be chosen.

4. Arguments enclosed in brackets, "[]", indicate that the argument is optional.

5. Arguments separated by a vertical bar, "|", indicate either argument but not both arguments may be chosen.

6. Arguments enclosed by angle brackets, "<>", indicate that the operator must type a value in place of the parameter.

   Table IX presents a summary of the access and control characteristics of each logical unit. Note that some datapoints may require local controland/or the transmitter

being turned off. Certain DME/P parameters require the DME/P to be "connected" (e.g., communication is established). Also certain logical units cannot be changed (e.g., control, terminal, historic) from the P/T. Note the station equipment to which the P/T is attached (physically or remotely) provides the P/T interface function.

30.2 Command Descriptions

30.2.1 CHANGE PARAMETER Command - The CHANGE PARAMETER command is used by the operator to change an equipment parameter to a new value. The parameter is referenced by its logical unit and datapoint identification numbers. The complete set of parameters is defined in Appendix IV.

SYNTAX:

CHANGE PARAMETER {<LU>/<DP><value>}

MNEMONIC: CP

PARAMETERS:

LU - is the logical unit number containing the datapoint

DP - is the datapoint number assigned to the datapoint.

Value - is the value to be assigned to the datapoint. If the value being assigned is a text string, then the text string must be enclosed in single quotes ('). Single quote characters can not be included in text strings.

ACCESS LEVEL:

1,2 - change and display datapoints

CONTEXT: Local control, transmitter off or DME/P connected for changing certain logical units (see Table IX).

DESCRIPTION:

The CHANGE PARAMETER command changes the value of the indicated logical unit's datapoint. A solicited report is sent to the Printer/Terminal indicating the logical unit datapoint's identity and its new value. If the datapoint could not be changed then a message indicating the reason is printed. See 30.3 for error messages.

The operator must first acquire local control of the equipment, using the REQUEST CONTROL command, before certain datapoints in certain logical units can be changed. (See Table IX.)

EXAMPLE:

```
AZ1>CP 12/10 24,3
12/10/85 22:30:12
V_CIRCUIT-48                , 12/104          24.3  VOLTS C
```

(The next example shows the entry of a value to two decimal places but the number is only required to one decimal place. The number is automatically adjusted to one place for printing.)

```
AZ1>CP 12/10 24,31
12/10/85 22:30:12
V_CIRCUIT-48                , 12/104          24.3  VOLTS C
```

30.2.2 DATE COMMAND - The DATA command allows the operator to display or set the current date of the system.

SYNTAX:

DATA [<mm/dd/yy>]

MNEMONIC: DA

PARAMETERS:

mm/dd/yy -is the format in which the date must be entered
mm - is in the range Ø1-12 for current month
dd - is in the range Ø-31 for current day
yy - is the current year

ACCESS LEVEL:

1 - can change and display the date
2,3 - can only display the date

CONTEXT: Control must be obtained to change date.

DESCRIPTION:

The DATE command allows for the viewing or setting of the current date at the equipment. This date is used on all reports and alarm messages generated by the equipment. The date must be set on each of the ground stations in the MLS system. If the date is omitted from the command line, the system displays the current date in the system. If no date has been entered, then the default date is January 1, 1978 (01/01/78). Note that the time is also displayed along with the date.

EXAMPLE:

```
AZ1>DA 12/31/85
12/31/85  12:10:09
AZ1>
```

30.2.3 DIAGNOSE Command - The Diagnose command allows the operator to execute diagnostic and performance measurement procedures on the equipment.

SYNTAX:

DIAGNOSE {<Diagnostic number>} [<LU>/<DP> <value>]

MNEMONIC: DI

PARAMETERS:

diagnostic number - is the number of the subassembly upon which the diagnostic is to be executed.

Diagnostic Number	COMPONENTS
1	Executive Monitor Board
2	Station Control Board
3	EQM/COMM Board
4	Communication Board
5	BSU Board
6	RCSU Panel
7	RSU1 Panel
8	RSU2 Panel
9	RCSU Electronic Assembly
10	DME/P Equipment

LU - The logical unit where the performance parameter is located. This parameter can be entered only when DME/P Performance Measurements is specified

DP - The datapoint where the performance parameter is located. This parameter can be entered only when DME/P Performance Measurements is specified.

Value - Certain performance parameters require that a value be entered. This value is needed for certain DME/P Performance Measurement tests.

ACCESS LEVEL: 1

CONTEXT: Control must be obtained and the transmitter must be turned off.

DESCRIPTION:

The DIAGNOSE Command causes diagnostics and performance measurements to be run on the requested subassembly. Only diagnostics applicable to the equipment currently logged onto can be executed. The diagnostic and applicable equipment are as follows:

DIAGNOSTIC	APPLICABLE EQUIPMENT
Executive Monitor Board	AZ1, EL1, AZ2, EL2
Station Control Board	AZ1, EL1, AZ2, EL2
EQM/COMM Board	AZ1, EL1, AZ2, EL2
Communication Board	AZ1, EL1, AZ2, EL2
BSU Board	AZ1, EL1, AZ2, EL2
RCSU Panel	RCSU
RCS1 Panel	RCSU
RCS2 Panel	RCSU
RCSU Electronic Assembly	RCSU
DME/P Equipment	DME1, DME2
DME/P Performance Measurement	DME1, DME2

The operator must gain control of the equipment (see REQUEST CONTROL command) and turn the transmitter off prior to requesting the DIAGNOSE command. If control has not been granted then the diagnostic can not be run. The results of the diagnostic are stored in the Confidence Checks logical unit, and can be printed, using the PRINT command.

A special case of Diagnostics is provided for the DME/P. The DME/P can have performance monitoring performed. In addition to selecting the Performance Monitoring Diagnostic number, the operator also enters the performance measurement logical unit/datapoint. When the performance test has completed, the results of the test is stored in the specified datapoint. Reference the Appendix IV for the DME/P Performance Measurement datapoints.

EXAMPLE:

AZ1>DI 2
DIAGNOSTIC COMPLETED

30.2.4 ENTER DIALOGUE Command - The ENTER DIALOGUE command allows the operator to communicate with another operator at another location.

SYNTAX:

ENTER DIALOGUE { MPS | AZ1 | AZ2 | EL1 | EL2 | DME1 | DME2 | RCSU }

MNEMONIC: ED

PARAMETERS: The operator can choose from any physical device specified in the argument list. The operator cannot specifies its own physical device.

ACCESS LEVEL: 1,2,3 - operator need not be logged-on.

CONTEXT: No special conditions

DESCRIPTION:

The ENTER DIALOGUE command places the equipment into the dialogue mode with the indicated destination equipment's Printer/Terminal. The prompt is modified to indicate dialogue mode. (See 3.4.2.2.)

All text typed at the dialogue prompt is transmitted directly to the destination equipment. The text transmitted are the ASCII characters entered until the RETURN key is depressed. Only one line is transmitted at a time. Any number of lines can be transmitted in this manner.

Dialogue mode continues until the operator enters the exit dialogue mode sequence, CONTROL-Z. The normal command mode is then in operation. To receive dialogue from another equipment, the receiving equipment need not be in dialogue mode; the received dialogue is treated as an unsolicited report similar to the printing of the MPS Report. The unsolicited report is stamped with the equipment name of the originator's physical device, the date and the time.

EXAMPLE:

This example shows the operator at AZ1 entering into a dialogue with the operator at AZ2. Note that the prompt was printed on line three but an unsolicited message arrived from AZ2 which is printed on line 4. The prompt is then printed again and this time the AZ1 operator terminates dialogue mode.

```
AZ1>ENTER DIALOGUE AZ2
AZ1 to AZ2>READY TO POWER OFF SYSTEM
AZ1 to AZ2>
12/14/86  14:21:03
AZ2 to AZ1>WAIT 1 MINUTE BEFORE YOU DO IT.
AZ1 to AZ2>^Z
AZ1>
```

30.2.5 ENVIRONMENT Command

The ENVIRONMENT command allows the operator to use the Printer/ Terminal to display and change the operational conditions as if attached to the Local Status and Control (LCSU) panel.

SYNTAX:

ENVIRONMENT {[configure],[transmitter],[monitor],[c-band sync],[restart]}

MNEMONIC: EN

PARAMETERS:

Configure	Is the desired personality of the equipment. The operator can choose between approach azimuth 'AAZ', back azimuth 'BAZ' or no entry. This value is valid only if the equipment is an Azimuth equipment.
Transmitter	Is the desired state of the transmitter. The operator can choose between "ON', 'OFF' or no entry.
Monitor	Is the desired state of the monitor. The operator can choose between 'ON', 'OFF' or no entry.

C-Band Sync Is the desired state of C-band Sync. The operator can choose between 'ON', 'OFF' or no entry.

Restart Indicates to restart the equipment. The operator can choose between 'YES' or no entry.

ACCESS LEVEL: 1 - to change and display the environment
2,3 - to disply the environmental status

CONTEXT: Control must be obtained for changing the environment

DESCRIPTION:

The ENVIRONMENT Command is used to display and change the operating environment of an equipment.

The EN command causes the current and pending environment status to be printed. The environment includes the operational equipment state data as per the LCSU panel (configuration of approach Az or back AZ , transmitter on/off, monitor on/bypass, C band synchronization on/off, maintenance transmission on/off, alarm on/off, alert on/off, maintenance alert on/off, normal operation on/off, battery on/off) and miscellaneous operator information (control state, MPS reports enabled/disabled).

The equipment must be under local or remote control for the environment change command to be accepted. Each of the environment arguments corresponds to a switch on the equipment's LCSU panel. (In fact the LCSU may also be used to change the pending environment.)

The "configure", "transmitter", "monitor" and "c-band" arguments cause the pending environment to change. The pending environment are the ones to be in effect after a "Restart" is accepted. Note

that the request may be denied by the system if an "unsafe" condition or invalid MLS system configuration would result. The Station and System Control is described in 3.6.

The "configuration" parameter is displayed only at Azimuth equipments.

The specified arguments, if any, are saved as pending paramters. if the "restart" argument is specified then the pending environment attempts to become the current environment. An indication of success or failure is then displayed.

The ENVIRONMENT command at the RCSU only prints the miscellaneous operator information (operator/system control, MPS reports enabled/disabled).

Arguments that are not needed are skipped by typing ',' and then the next argument.

EXAMPLE:

Printing the environmental status:

```
AZ1>EN
CURRENT ENVIRONMENT:
    CONTROL:       LOCAL        MPS REPORTS:      ON
    CONFIGURE:     AAZ          NORMAL:           NO
    TRANSMITTER:   OFF          ALARM:            NO
    MONITOR:       ON           ALERT:            NO
    C-BAND SYNC:   ON           WARNING:          NO
    MAINTENANCE:   ON           BATTERY:          NO
```

```
PENDING ENVIRONMENT:
    CONFIGURE:     BAZ
    TRANSMITTER:   OFF
    MONITOR:       ON
    C-BAND SYNC:   ON
AZ1>
```

Printing the environmental status from the RCSU:

```
AZ1>EN
CURRENT ENVIRONMENT:
    CONTROL:       LOCAL        MPS REPORTS:       ON
```

Request to change the transmitter state to "on": (Note that the request is not started until the "restart" argument is specified.

```
AZ1>EN , ON, , ,
CURRENT ENVIRONMENT:
    CONTROL:       LOCAL        MPS REPORTS:       ON
    CONFIGURE:     AAZ          NORMAL:            NO
    TRANSMITTER:   OFF          ALARM:             NO
    MONITOR:       ON           ALERT:             NO
    C-BAND SYNC:   ON           WARNING:           NO
    MAINTENANCE:   ON           BATTERY:           NO

PENDING ENVIRONMENT:
    CONFIGURE:     BAZ
    TRANSMITTER:   OFF
    MONITOR:       ON
    C-BAND SYNC:   ON
AZ1>
```

Requesting that C-band synchronization is used and start the request of the pending requests; (Note that in this case the request is acted upon and may be either accpeted or denied.)

AZ1&EN ,,,ON,YES

CURRENT ENVIRONMENT:

CONTROL:	LOCAL	MPS REPORTS:	ON
CONFIGURE:	AAZ	NORMAL:	NO
TRANSMITTER:	OFF	ALARM:	NO
MONITOR:	ON	ALERT:	NO
C-BAND SYNC:	ON	WARNING:	NO
MAINTENANCE:	ON	BATTERY:	NO

PENDING ENVIRONMENT:

CONFIGURE:	BAZ
TRANSMITTER:	OFF
MONITOR:	ON
C-BAND SYNC:	ON

****

REQUEST GRANTED

30.2.6 HELP Command

The HELP command is used by the operator to obtain the mnemonic and the syntax for the commands available at the Printer/Terminal.

SYNTAX:

HELP

MNEMONIC: H

PARAMETERS: None

ACCESS LEVEL: 1,2,3 - operators need not be logged-on

CONTEXT: No special conditions

DESCRIPTION

The HELP command generates a general Help Report showing the full command syntax for all commands availabel at this equipment.

EXAMPLE:

```
AZ1>H
HELP REPORT - P/T COMMANDS

CP  CHANGE PARAMETER <LU>/<DP><value>
DA  DATE [<mm/dd/yy>]
DI  DIAGNOSE <diagnostic number>  [<LU>/<DP> <value>]
ED  ENTER DIALOGUE <MPS | AZ1 | AZ2 | EL1 | EL2 | DME1 | DME2 |RCSU>
    (to exit dialogue - enter CONTROL-Z)
EN ENVIRONMENT [configure],[transmitter],[monitor],[c-band],[restart]
                (AZ,BAZ)    (ON,OFF)   (ON,BYPASS) (ON,OFF) (YES)
H   HELP
LN  LOGON  <ID> [ AZ1 | AZ2 | EL1 | EL2 | DME1 | DME2 | RCSU ]
LO  LOGOFF
M   MPS REPORTS <ON | OFF>
P*  PRINT [<LU> | *][/<DP>| *] [10|20|30|40|50|60]
    P*                    logical units titles
    P*/*                  all the LU's and DP's
    P <LU>/*              all the datapoints of LU
    P <LU>/<DP>           a DP in LU
    P <LU>/<DP>  time     a DP in LU every n seconds
RC  REQUEST CONTROL
RS  REQUEST SYSTEM Control
RE  RESET
TI  TIME [<hh:mm:ss>]
TM  TRANSMISSION MODE [NORMAL @ MAINTENANCE]

        <...> fill in paramter    [ ... ] parameter is optional

AZ1>
```

30.2.7 LOGON Command

The LOGON command is used for operator identification and equipment selection. The access level of the operator is associated with the Password and ID of the operator.

SYNTAX:

LOGON {<ID>} [<equipment>]

MNEMONIC: LN

PARAMETERS:

ID - A three-character access code assigned to the operator; the ID must be exactly three alphanumeric characters.

equipment - Optionally entered name of the equipment to be remotely logged-on. The equipment can be AZ1, AZ2, EL1, EL2, DME1, DME2, or RCSU. If this argument is not entered the local P/T is assumed.

(Password) - Used in the Log-on Sequence (see Appendix II) - it is a five alphanumeric character password assigned to the operator; the password must be exactly five characters.

ACCESS LEVEL: Not applicable

CONTEXT: No special conditions

DESCRIPTION:

The LOGON Command initiates the Log-on Sequence. This sequence starts with the request to enter the password (see parameter list given above).

Upon successful completion of the Log-on Sequence, the operator's access level is determined by the system. Only commands allowed for that access level can be entered by the operator.

Upon prompting for the Password, the operator has 5 minutes to enter a valid password. If 5 minutes expires, the LOGON sequence is cancelled and the INITIAL state is entered.

If the equipment name entered is different than the physically attached equipment, then a remote logon is requested. A remote logon allows the operator at one equipment to perform the same commands as if the operator was at the remote equipment's P/T. This service provides a logical connection to the specified equipment.

Default connection is to the local physical equipment. Note that the password and ID must valid for the equipment logged onto.

An equipment is allowed to have only one operator logged-on at a time. This means that two operators cannot be logged onto the same equipment. For example, if operator X at the AZ1 P/T is logged on then operator Y cannot also log-on to the AZ1 equipment until the operator X logs-off.

The logon facility allows for an operator at an equipment to be remotely logged-on to another equipment while the operator at the remote equipment is logged-on to another equipment. In fact, they could be logged on to each other. For example operator X at AZ1 P/T is logged-on to the EL2 equipment. Operator Y at the EL2 P/T can be logged-on to the AZ1 equipment.

EXAMPLE:

```
AZ1>LOGON JOE AZ2
PASSWORD: XXXXX
OPERATOR LOGGED ON
AZ2>
```

30.2.8 LOGOFF Command

The LOGOFF command is used by the operator to terminate a session with the equipment.

SYNTAX:

LOGOFF

MNEMONIC: LO

PARAMETERS: None

ACCESS LEVEL: 1,2,3

CONTEXT: No special conditions

DESCRIPTION

The LOGOFF command resets the P/T to the INITIAL state.

If a remote (logical) log-on was in effect, the logical connection is broken and the default local physical connection is restored (e.g., the new prompts is for the local equipment).

If MPS Reports were requested (using the MPS REPORTS command) the reports continue at the local equipment's P/T. See the MPS REPORTS command.

If control was obtained (REQUEST CONTROL command) during the session and not returned back to the system (REQUEST SYSTEM command), control is not automatically cancelled. The operator must specifically release control.

EXAMPLE:

AZ2>LO
LOGGED OFF

30.2.9 MPS REPORTS Command

The MPS REPORTS command is used to enable and inhibit the printing of MPS reports on the Printer/Terminal.

SYNTAX:

MPS REPORTS {ON | OFF}

MNEMONIC: M

PARAMETERS: None

ACCESS LEVEL: 1,2,3

CONTEXT: No special conditions

DESCRIPTION

The MPS REPORTS ON command causes all MPS reports to be sent to the Printer/Terminal in addition to the MPS.

If a remote log-on is in effect then the printing of MPS reports is directed at the remote P/T.

The MPS reports will continue to be printed following a LOGOFF. If a remote log-on was in effect, the reports are no longer printed on the remote P/T but are directed to the local equipments P/T (if it is attached to the equipment).

The MPS REPORTS OFF command is the converse of MPS REPORTS ON. The MPS reports are no longer printed.

EXAMPLE:

AZ1>M ON
MPS REPORTS ON

AZ1>M OFF
MPS REPORTS OFF

30.2.10 PRINT Command

The PRINT command is used by the operator to display the contents of the logical unit database. The command allows for various types of reports:

- o single paramter (a datapoint),
- o all paramters in a logical unit,
- o all paramters in all logical units
- o periodic printing of a paramter
- o logical unit HELP report

SYNTAX:

PRINT {<LU>|<*>/<DP>|<*>} [<time>]

MNEMONIC: P

PARAMETERS:

LU - the logical unit identification number containing the datapoint(s). The operator can enter the wild card character (*) to print the titles of all of the logical units.

DP - The datapoint identification number assigned to the datapoint. The operator can enter the wild card character (*) to print all of the datapoints of a logical unit.

time - The time interval for automatically printing a datapoint. (e.g., period printing) - The LU and DP arguments must indicate a single datapoint from a single logical unit. The value of time is either 10, 20, 30, 40, 50, or 60 seconds.

ACCESS LEVEL: 1,2 - all datapoints

3 - Datapoints in the following logical units: site data, thresholds, historic logical units, control, scheduled periods, miscellaneous DME/P, confidence checks, communication statistics - see Appendix IV for a complete list.

CONTEXT: No special conditions

DESCRIPTION

The PRINT command provides for the printing of reports containing the values of the parameters requested. Various report types can be selected using this command. The different report requests are:

Command Form	Print Results
P*	Prints all the logical unit titles.
P* /*	Prints all the logical units and all the datapoints in each logical unit.
P <LU>/*	Prints all the datapoints of a single logical unit.
P <LU>/<DP>	Prints the specified datapoint of the specified logical unit.
P <LU>/<DP> <time>	Prints the specified datapoint of the specified logical unit every time seconds.

Note: P*/<DP> Prints nothing, as this is an illegal wild card combination.

The "PRINT " command is a type of help command. A complete list of the logical unit numbers and a description of each logical unit are printed in response to the command. See the example given below.

The "PRINT LU/DP time" command causes the automatic periodic printing of a parameter. The command acts as if the operator entered a PRINT command every (time) seconds. The automatic printing is cancelled as soon as the operator enter a CONTROL Z (Z) character or a new command at the P/T. See the example provided below.

EXAMPLE:

Printing a parameter:

```
AZ1>P 12/10
12/01/85 12:10:09
V_CIRCUIT_48                    , 12/104            24.3 VOLTS C

AZ1>PRINT 12/10 20
12/01/85 12:10:09
V_CIRCUIT_48                    , 12/104            24.3 VOLTS C
AZ1>
12/01/85 12:10:29
V_CIRCUIT_48                    , 12/104            24.3 VOLTS C
AZ1>
12/01/85 12:10:49
V_CIRCUIT_48                    , 12/104            24.3 VOLTS C
AZ1> Z
```

Printing a logical unit help report:

```
AZ>PRINT*
LOGICAL UNIT HELP REPORT
```

LU NAME	LU NUMBER
CONTROL	1
TERMINAL	2
ALARM/ALERT PARAMETERS	3
MAINTENANCE PARAMETERS	4
ALARM/ALERT THRESHOLDS	5
MAINTENANCE THRESHOLDS	6
MISCELLANEOUS PARAMETERS	7
SITE PARAMETERS	8
CONFIDENCE CHECKS	9
COMM STATISTICS	10
HARD ALARM HISTORICAL	11
SOFT ALARM HISTORICAL	12
STATE CHANGE HISTORICAL	13
PERIODIC HISTORICAL	14
USER ACCESS	15
SCHEDULED PERIODS	16

Printing all paramters of a logical unit.

```
AZ1>PRINT 4/*
12/10/85 12:20:30
MEAN_ANGLE_ERR_MANIFOLD        , 04/001       0.08 DEG   C
MEAN_ANGLE_ERR_FIELD           , 04/002       0.98 DEG   E
AVERAGE_BEAMWIDTH              , 04/003      -1.49 DEG   C
CONTROL_MOTION_NOISE           , 04/004       0.51 DEG   C
EXCITER_OUTPUT_POWER           , 04/005     -19.5  DBM   C
POWER AMP POWER                , 04/006     -44.6  DBM   A
BATTERY_VOLTAGE                , 04/007     -15.41 VOLTS E
```

30.2.11 REQUEST CONTROL Command

The REQUEST CONTROL command is used by the operator to gain operational control of an MLS equipment.

SYNTAX:

REQUEST CONTROL

MNEMONIC: RC

PARAMETERS: None

ACCESS LEVEL: 1

CONTEXT: No special conditions

DESCRIPTION

The REQUEST CONTROL Command is used to request local or remote control of the equipment from the system. Local control is control from the local P/T and remote control is from a remotely logged-on P/T or MPS. (Note that the RCSU panel indicates LOC for either local or remote control.)

Upon being granted control the equipment is automatically placed into the following state: maintenance mode (test signal transmission when transmitter is turned on) and transmitter off.

The RCSU panel operator must grant or deny control by performing an action at the RCSU panel. Therefore, the REQUEST CONTROL command may take some time to complete. It is also possible that there is no RCSU panel operator to make a decision. If this is the case then control is automatically granted after 5 minutes. (Note that the automatic log-off feature is disabled during this time interval.)

The request must be granted prior to issuing any of the commands requiring control: ENVIRONMENT, REQUEST SYSTEM, TRANSMISSION MODE, CHANGE PARAMETER for specific logical units (see Tables IIIV and IX), DIAGNOSE, and RESET.

There is one restriction for the remote control mode which is not a restriction under local control. While under remote control the equipment cannot be placed into the normal transmission with monitor off (by-passed) operational state. An error message (see 30.3) is printed if the operator attempts to violate this rule.

The local or remote control state continues until the REQUEST SYSTEM command is issued. This means that the operator can logoff or be automatically logged-off and the equipment is considered to still be under local or remote control. If another operator then logs on, the operator must have the proper access level to utilize the commands allowed once local or remote control is active.

EXAMPLE:

AZ1>RC (Note that the asterisks indicate time passing.)
****
****
*****
REQUEST GRANTED

30.2.12 REQUEST SYSTEM Control Command

The REQUEST SYSTEM Control Command is used to return the control of an MLS equipment to system control.

SYNTAX:

REQUEST SYSTEM

MNEMONIC: RS

PARAMETERS: None

ACCESS LEVEL: 1

CONTEXT: Control must be obtained

DESCRIPTION

The REQUEST SYSTEM Control Command is used to relinquish local control of an equipment. Upon granting of system control the equipment is automatically placed into a non-radiating state.

EXAMPLE:

AZ1>RS
****
REQUEST GRANTED

30.2.13 RESET Command

The RESET Command is used to perform a hardware reset of the components relevant to the logged-on equipment.

SYNTAX:

RESET

MNEMONIC: RE

PARAMETERS: None

ACCESS LEVEL: 1

CONTEXT: Control must be obtained

DESCRIPTION

The RESET Command performs a partial reset of the equipment. The components reset are dependent on the current logged-on equipment:

EQUIPMENT	COMPONENTS RESET
AZ1	Angle Guidance and Data subsystem except the Equipment Monitoring and Communication (EC) subsystem.
AZ2	same as AZ1
AL1	same as AZ1
AL2	same as AZ1
DME1	all DME/P subsystems
DME2	all DME/P subsystems
MPS	not applicable
RCSU	not applicable

EXAMPLE:

AZ1>RESET
RESET COMPLETED

30.2.14 TIME Command

The TIME Command is used to display and set the current time of an equipment.

SYNTAX:

TYME [<hh:mm:ss>]

MNEMONIC: TI

PARAMETERS:

hh:mm:ss - Is the format in which the time must be entered
hh is in the range 01-24 for the current hour
mm is in the range 00-59 for the current minute
ss is in the range 00-59 for the current second

ACCESS LEVEL: 1 to set and display the time
2,3 to display the time

CONTEXT: Control must be obtained to change the time.

DESCRIPTION

The TIME Command allows for the viewing or setting of the current time at the equipment. This time is used in all reports and alarm messages generated by the equipment. The TIME Command sets the time at the logged-on equipment. Note that the date is also displayed along with the time.

EXAMPLE:

```
AZ1>TI
13/31/85 12:10:09
AZ1>
```

30.2.15 TRANSMISSION MODE Command

The TRANSMISSION MODE Command is used to change the signal-in-space characteristic between maintenance mode and normal mode.

SYNTAX:

TRANSMISSION MODE <mode>

MNEMONIC: TN

PARAMETERS: mode - the transmission mode desired: NORMAL or MAINTENANCE

ACCESS LEVEL: 1

CONTEXT: Control must be obtained

DESCRIPTION

The TRANSMISSION MODE command specifies the type of signal to be transmitted by an equipment when under local or remote control.

When normal mode transmission is selected the equipment generates a signal capable of being received by airborne equipment. If maintenance mode is selected then the equipment generates a signal that can only be received by maintenance equipment.

The transmission mode takes effect following an ENVIRONMENTAL command "restart" (see ENVIRONMENT command). The command can be thought of as an extension of the ENVIRONMENT command. The TRANSMISSION MODE command is a separate command since this action cannot be performed from the LCSU panel.

RESTRICTION: If remote control is active and the monitor is currently by-passed then normal mode cannot be granted.

EXAMPLE:

```
AZ1>TM NORMAL        (Note that the asterisks indicate time passing.)
***
REQUEST GRANTED
```

30.3 Printer/Terminal Error Messages

When an error condition or other factor exists which prevents an operator's command from successfully executing, an appropriate message is printed and the prompt is again displayed. The following is the list of possible messages.

ERROR MESSAGE	DESCRIPTION
OPERATOR NOT LOGGED-ON	The operator attempts to enter a command without first identifying himself or herself.
REMOTE EQUIPMENT ALREADY LOGGED-ON	The remote equipment has another operator logged-on
REMOTE OPERATOR ALREADY LOGGED-ON	The local equipment has a remote operator logged-on.
ALREADY LOGGED-ON	The local equipment is already logged-on.

ILLEGAL OPERATOR ID, PASSWORD	The operator has entered an operator ID and password that are not valid.
ILLEGAL REMOTE EQUIPMENT	The remote equipment specified is not part of the MLS ground equipment.
TIMEOUT	No activity was detected for 5 minutes. Operator has been logged-off.
INVALID COMMAND	The operator enters a command that was not identifiable by the system.
INVALID LOGICAL UNIT	The operator entered a logical unit that is invalid for this equipment.
INVALID DATAPOINT	The operator entered a datapoint that does not exist in the logical unit.
ILLEGAL WILD CARD COMBINATION	The operator has entered a wild card combination that is not permitted.
WILD CARD NOT ALLOWED	The operator has tried to use the wild card feature of PRINT command when the feature is not allowed.
TRANSMISSION MUST BE OFF FOR COMMAND	The operator has attempted to change a parameter datapoint while the transmitter was active.
CONTROL REQUIRED	The operator must obtain control of the equipment before the command can be accepted.
ACCESS LEVEL VIOLATION	The operator does not have the minimum access level required for the command.

ILLEGAL DATA TYPE	The operator has tried to enter an incorrect data type for a datapoint, (e.g., "12.0" when 'ABC' was expected).
ILLEGAL MONTH	The operator has entered a month that is not in the valid range.
ILLEGAL DAY	The operator has entered a day tht is not in the valid range, (e.g., February 31).
INCOMPLETE COMMAND	The entered command is missing argument(s).
TOO MANY ARGUMENTS	The entered command has extra argument(s).
ILLEGAL DIAGNOSTIC	The operator has specified a diagnostic that does not exist or does not apply to the equipment.
ILLEGAL DESTINATION	The operator has selected a destination equipment that does not exist.
ILLEGAL CONFIGURATION	The operator has attempted an illegal configuration of the equipment.
ILLEGAL TRANSMITTER STATE	The operator has attempted an illegal setting of the transmitter's state.
ILLEGAL MONITOR STATE	The operator has attempted an illegal setting of the monitor's state.
ILLEGAL C-BAND STATE	The operator has attempted an illegal setting of the c-band sync state.
ILLEGAL RESTART	The operator has attempted an illegal restart setting.

REQUEST DENIED	(ENVIRONMENT command) - The system has denied the environment change request because of an unsafe condition (e.g., two elevation equipments radiating at the same time).
LOCAL CONTROL REQUIRED	The operator attempted a Normal, Monitor off Transmission without being locally attached to the equipment.

APPENDIX IV
DATA DESCRIPTIONS

40.1 Scope - This section presents the data definitions for each Logical Unit. There are two basic types, "Datapoint" and, "Historical."

The "Datapoint" Logical Units are collections of related parameters organized by assigning an identifier to each collection (Logical Unit). The "datapoint" parameters are accessed by LU and DP Identifier. This access provides the datapoint parameter values and condition codes. The condition code indicates the status of the parameter.

The Historical Logical Units are collections of parameters from "Datapoint" Logical Units organized into records with time-of-day tags. The Datapoints are collected based on an event. Examples of events which cause records to be generated include an alarm, and a scheduled time of day for periodic data collection.

The historical records are saved in a time ordered manner where the newest one replaces the oldest one. The newest record is considered to be record 1, the next newest is record 2, etc.

The Historical Logical Units are Hard Alarm, Soft Alarm, State Change, and Periodic.

40.1 Introduction - The Logical Units are summarized in Table 40-I. Note that "Yes" indicates that the Logical Unit is defined and can be accessed for the equipment.

Table 40-I Summary of Logical Units by Equipment

LU NO.	LOGICAL UNIT	RCSU EA	AEE	DME/P	Reference Paragraph
1	Control Parameters	Yes	Yes	Yes	40.2.1
2	Terminal	Yes	Yes	Yes	40.2.2
3	Alarm/Alert Parameters	No	Yes	Yes	40.2.3
4	Maintenance Parameters	Yes	Yes	Yes	40.2.4
5	Alarm/Alert Thresholds	** No	Yes	Yes	40.2.5
6	Maintenance Thresholds	** No	Yes	Yes	40.2.6
7	Site Parameters	** Yes	Yes	Yes	40.2.7
8	User Access	** Yes	Yes	Yes	40.2.8
9	Scheduled Periods	** Yes	Yes	Yes	40.2.9
10	Miscellaneous Parameters	Yes	Yes	Yes	40.2.10
11	Confidence Checks	Yes	Yes	Yes	40.2.11
12	Comm Statistics	Yes	Yes	Yes	40.2.12
13	Hard Alarm Historical	No	Yes	Yes	40.2.13
14	Soft Alarm Historical	Yes	Yes	Yes	40.2.14
15	State Change Historical	Yes	Yes	Yes	40.2.15
16	Periodic Historical	Yes	Yes	Yes	40.2.16
*	RMS Master	Yes	No	No	40.2.17

*Note: The RMS Master Logical Unit does not have a LU Number assignment. It is only used between the MPS and the entire MLS Equipment, considered as one RMS.

**Note: These data are required to be preserved in event of power outage.

40.2 Definitions/Format - The next section defines the data content of each Logical Unit. A format has been defined to organize the data. The explanation of the format follows:

a. DEFINITION (paragraph 40.2.n.1)

A description of the Logical Unit is presented. The subsection labelled "MPS:" summarizes the interaction with the Maintenance Processor Subsystem (MPS) within the Remote Maintenance Monitoring System (RMMS). The RMMS ICD should be used as the primary reference for further detail.

b. LOGICAL UNIT CHARACTERISTICS (paragraph 40.2.n.2)

The Logical Unit characteristics are given below.

LOGICAL UNIT CHARACTERISTICS

XMTR	NON_TRANSMITTING, NOT_CARE - the associated equipment must be in a non-transmitting state before the parameter can be written from a P/T or other external device.
LOCAL CONTROL	YES, NO - the associated equipment must be in localcontrol before the parameter can be written from a P/T or other external device. The required security or access level is determined by the P/T interface. N/A - Not applicable (only 5 logical units maybe written from a P/T)
COMPONENT	AEE, DME/P, RCSU, All_COMPONENTS - Component associated with this logical unit. AEE implies the AZ-1 AEE, AZ-2 AEE, EL-1 AEE, EL-2 AEE. RCSU implies the RCSU EA. All COMPONENTS indicates all component of the MLS. DME/P implies the AZ-1 DME/P and AZ-2 DME/P.

HISTORICAL	NO - indicates that this is a datapoint logical unit. YES - for historical logical unit.
MAX_DATA	MAXIMUM NUMBER of Datapoints in the LU or if historical: The number of datapoints in a record.
MAX_RECORDS	If Historical: maximum, number of records in LU (6 or 8). else NULL_BYTE.

c. LOGICAL UNIT DATAPOINT ENTRIES (paragraph 40.2.n.2)

The data entry for each datapoint includes:

c	LU/DP NO.	-assigned Logical Unit/Datapoint Numbers
o	DP_MNEMONIC	-the mnemonic assigned to Datapoint used for P/T output
o	DP_TYPE	-data.type (e.g., ASCII, Word, Integer, and Byte)
o	DP_UNITS	-the engineering Unit to use for the P/T

Note: Information sent to the Printer/Terminal will be in appropriate engineering units.

Each DP_TYPE entry may consist of two parts: a condition and a parameter. Both parts may be present or one of the two parts may be present. An entry for a Datapoint can have the following forms:

o DP(n)

CONDITION	Byte	Definition of the present condition of the parameter (see below for the definition).
PARAMETER	Byte(n)	Value of the parameter; from 1 to n bytes depending on DP_TYPE.

or

o DP(m)

CONDITION	Byte	Definition of a datapoint with only a condition defined.

or

o DP(n)

PARAMETER	Byte(n)	Value of the parameter; from 1 to n bytes depending on DP_TYPE.

CONDITION is defined as follows:

An 8-bit number that represents the condition of a Datapoint in generic agreement with NAS-MD-790. This is done for two reasons: (1) to make the data structure easier to read since it is ASCII and (2) to be able to use the condition value directly, without conversion, when a message is composed for the MPS. The value is an 8-bit ASCII code. The differences from the NAS-MD-790 definition are (1) there are additional codes assigned, and (2) the case of the character is not used to distinguish between different size values.

The values for a CONDITION are (note that not all conditions apply to every parameter):

Bits 0-7 (ASCII)

For monitored parameters only:

"A" - The parameter is normal

"B" - The parameter is not being monitored

"C" - The parameter is in the hard alarm state and has exceeded its upper threshold.

"D" - The parameter is in the hard alarm state and has exceeded its lower threshold.

"E" - The parameter is in the soft alarm state and has exceeded it upper threhsold.

"F" - The parameter is in the soft alarm state and has exceeded its lower threshold.

For site and threshold parameters only:

"X" - The parameter has not been assigned an initial value.

"V" - The parameter is defined/initialized and the operational equipment is using the value.

d. Definitions or specific meaning of commonly used terms are given below:

ASCII - An 8-bit binary number, ASCII encoded. The valid values are: 20H to 7FH, 0AH, 0CH, and 0DH.

ADC - Automatic Delay Correction

AEE_STATE	-	Indicates the current state; Fatal fault, Non-fatal fault, Initialization, Start, Normal/Alert, Normal/Monitor-Bypass, Maintenance/Monitor-on, Maintenance/Alert, and Alarm
BYTE	-	An 8-bit binary number ranging from 0 to 255 and occupying one byte of memory.
CHANNEL_FAIL	-	Phase shifter address/data channels.
DATAPOINT	-	An MLS Parameter with associated data.
DATAPOINT ID	-	An MLS Parameter Identifier starting from 32 to the last parameter. Used in MPS messages.
DATAPOINT NUMBER	-	An assigned number from 1 to the last parameter for Printer/Terminal input.
FCN_CNT	-	Function Count
FREQ_FAIL	-	The number of frequency PROM pauses received is not equal to the reference count.
FREQ_PROM_PAUSE	-	Pauses output by the BSU board to the phase shifters.
GDNC	-	ABBREV, Guidance or Guidance Function

HIRA_AZ	-	High Rate AZ
INTEGER	-	A 16-bit signed number ranging from -32,768 to +32,767.
K1_COUNT	-	The number of retransmission attempts due to a no response(time out) at the communication level since the power-on reset condition.
K2_COUNT	-	The number of retransmission attempts resulting from sequence number, NAK, FCS or checksum discrepancies.
L2_COUNT	-	The number of erroneous frames received at the link level.
K5_COUNT	-	The number of retransmission attempts due to a no response(time out) at the communication level since the power-on reset condition.
K6_COUNT	-	The total number of messages successfully transmitted since power-up/reset.
L6_COUNT	-	The total number of messages successfully received since power-up/reset.
K7_COUNT	-	The total number of times the link has disconnected since power-up/reset.

LOGGED_ON_PT	-	Which P/T is logged on this equipment.
LOGGED_ON_PT	-	Which equipment this P/T is logged onto.
"_L"	-	For all the Alarm/Alert Logical Unit Datapoints, there are two datapoints associated with a parameter: one for the current value with its condition and one for the previous value (the one collected before the current one and with a name ending with "_L") of the parameter.
LOGICAL UNIT	-	An MLS terminology for a group of related parameters.
LOGICAL UNIT NUMBER	-	An assigned nunber from 1 to 16.
LOGICAL UNIT ID	-	An MLS assigned number from 32 to 222.
MAE	-	ABBREV, Mean angle error
MV	-	Monitor verification
NORMALIZED DATAPOINT IDENTIFIER	-	A Datapoint Number.

NORMALIZED LOGICAL UNIT IDENTIFIER	-	A Logical Unit Number.
OTC	-	Current count of out-of-tolerance samples for a given Monitoring parameter.
PARAMETER	-	An MLS requirement terminology. It is implemented as a Datapoint in a Logical Unit.
PCL	-	Proportional coverage
PERMANENT/SEMI PERMANENT DATA	-	The Permanent data can be retrieved after power down and requires strict control of updates. The semi-permanent data may be lost after power down.
RMS MASTER	-	The Logical Unit Identifier 32 is assigned for the "RMS MASTER" Logical Unit. This LU is used by the Maintenance Processor Subsystem (MPS) when the entire MLS is addressed as one Remote Maintenance Unit (RMS). There are no datapoints in this LU.

SCHEDULE_PERIOD_n	-	A character string which is interpreted as the hour and minute of the day that the collection initiated, e.g., "15:25" for 3:25pm, "9:30" for 9:30 am.
UEL	-	ABBREV, A parameter's upper executive limit.
UML	-	ABBREV, A parameter's upper maintenance limit.
USER_ACCESS_n	-	For n = 0 to 24, a character string which is interpreted as Access Code: " ", "1", "2", "3", or "4"; Password: ASCII values; Identification Code: ASCII values; Example, "3, HARRY, ABC"
WB	-	ABBREV, Wide Band
WORD	-	A 16-bit binary number ranging from 0 to 65,535.

40.2.0 Logical Units Datapoints Description - The following sections define the Logical Unit characteristics and their corresponding Datapoint characteristics:

40.2.1 Control Datapoints

40.2.1.1 Definition - The control Logical Unit provides the current states of the hardware and system components for the relevant equipment, i.e., AEE Control, DME/P Control, RCSU Control. The AEE Control Logical Unit also includes the RMS/Comm subsystem.

MPS: Whenever one of these datapoints is changed, a State Change message is sent to the MPS.

40.2.1.2 Logical Unit Characteristics -

XMTR	NOT_CARE
LOCAL CONTROL	NO N/A
COMPONENT	ALL_COMPONENTS
HISTORICAL	NO
MAX_DATA	7 datapoints per Logical Unit

40.2.1.3.1 AEE Control Parameters Logical Units

LU/DP NUM.	DP_MNEMONIC (ASCII)	DP_TYPE (QUANTITY)	DP_UNITS
1/1	CONTROL_TYPE	T_BYTE	U_NONE
1/2	AEE_STATE	T_BYTE	U_NONE
1/3	AEE_SYNC	T_BYTE	U_NONE
1/4	RMS_COMM_STATE	T_BYTE	U_NONE
1/5	LOGGED_ONTO_PT	T_BYTE	U_NONE
1/6	LOGGED_ON_PT	T_BYTE	U_NONE
1/7	CONFIGURE	T_BYTE	U_NONE

40.2.1.3.2 DME/P Control Parameters Logical Units

LU/DP NUM.	DP_MNEMONIC (ASCII)	DP_TYPE (QUANTITY)	DP_UNITS
1/1	CONTROL_TYPE	T_BYTE	U_NONE
1/2	DME_STATE	T_BYTE	U_NONE
1/3	LOGGED_ONTO_PT	T_BYTE	U_NONE
1/4	LOGGED_ON_PT	T_BYTE	U_NONE

40.2.1.3.3 RCSU EA Control Parameters Logical Units

LU/DP NUM.	DP_MNEMONIC (ASCII)	DP_TYPE (QUANTITY)	DP_UNITS
1/1	CONTROL_TYPE	T_BYTE	U_NONE
1/2	RCSU_STATE	T_BYTE	U_NONE
1/3	LOGGED_ONTO_PT	T_BYTE	U_NONE
1/4	LOGGED_ON_PT	T_BYTE	U_NONE

40.2.2 TERMINAL

40.2.2.1 Definition - A Printer/Terminal attached to an equipment is addressed as a "Terminal" Logical Unit for that equipment for the purpose of printing text at that terminal. This Logical Unit has no associated datapoints.

There are five terminal Logical Units, one is associated with each equipment.

- AEE Terminals (approach and back azimuth)
- AEE Terminals (elevation online and offline)
- DME/P Terminals (online and offline)
- RCSU Terminal

40.2.2.2 Logical Unit Characteristics

XMTR	NOT_CARE
LOCAL CONTROL	NO
COMPONENT	ALL_COMPONENTS
HISTORICAL	NO

40.2.2.3 Terminal Logical Unit - There are no datapoints in this Logical Unit.

40.2.3 ALARM/ALERT PARAMETERS

40.2.3.1 Definition - The Alarm/Alert monitored parameters (integrity alarms and secondary alerts) are Datapoints within this Logical Unit. The previous parameter values (before the integrity alarm and secondary alert) are also assigned datapoints.

The Datapoints for the Azimuth/Elevation Guidance/Data Electronics (AEE) and DME/P components are different.

MPS: The current datapoints may cause Hard Alarm messages as well as Return-To-Normal messages to be generated based on the condition of the datapoints and the operating state of the associated equipment.

40.2.3.2 Logical Unit Characteristics

XMTR	NOT_CARE
LOCAL CONTROL	NO N/A
COMPONENT	AEE or DME/P
HISTORICAL	NO
MAX_DATA	130 datapoints per Logical Unit

40.2.3.3 Logical Unit Datapoint Entries - The datapoint descriptor and data entries for each datapoint are as follows. There are two datapoints associated with a parameter: one for the current value with its condition and one for the previous value (the one collected before the current and ending with "_L") of the parameter.

40.2.3.3.1 AEE Alarm/Alert: Parameters Logical Unit

ALARM/ALERT MONITORED LOGICAL UNITS

LU/DP NUM.	DP_MNEMONIC (ASCII)	(QUANTITY)	DP_TYPE	DP_UNITS
3/1	DATE_TIME_OF_MEASUREMENT		T_ASCII	U_NONE
3/2	DATE_TIME_OF_MEASUREMENT_L		T_ASCII	U_NONE
3/3	CMN_N		T_INTEGER	U_DEG
3/4	CMN_N_L		T_INTEGER	U_DEG
3/5	PFE_N_FLD		T_INTEGER	U_DEG
3/6	PFE_N_FLD_L		T_INTEGER	U_DEG
3/7	PFE_N_INT		T_INTEGER	U_DEG
3/8	PFE_N_INT_L		T_INTEGER	U_DEG
3/9	DELETED			
3/10	DELETED			
3/11	CLR_LT_RAW_ANGLE_ERROR		T-INTEGER	U_NSEC
3/12	CLR_LT_RAW_ANGLE_ERROR_L		T_INTEGER	U_NSEC
3/13	CLR_RT_RAW_ANGLE_ERROR		T_INTEGER	U_NSEC
3/14	CLR_RT_RAW_ANGLE_ERROR_L		T_INTEGER	U_NSEC
3/15	RAW_ANGLE_ERROR_FLD		T-INTEGER	U_NSEC
3/16	RAW_ANGLE_ERROR_FLD_L		T_INTEGER	U_NSEC
3/17	RAW_ANGLE_ERROR_INT		T_INTEGER	U_NSEC
3/18	RAW_ANGLE_ERROR_INT_L		T_INTEGER	U_NSEC
3/19	ADW_A1_RCVD_DATA	10	T_BYTE	U_NONE
3/20	ADW_A1_RCVD_DATA_L	10	T_BYTE	U_NONE
3/21	ADW_A2_RCVD_DATA	10	T_BYTE	U_NONE
3/22	ADW_A2_RCVD_DATA_L	10	T_BYTE	U_NONE
3/23	ADW_A3_RCVD_DATA	10	T_BYTE	U_NONE
3/24	ADW_A3_RCVD_DATAL	10	T_BYTE	U_NONE
3/25	ADW_A4_RCVD_DATA	10	T_BYTE	U_NONE
3/26	ADW_A4_RCVD_DATA_L	10	T-BYTE	U_NONE
3/27	BDW_1_RCVD_DATA	4	T_BYTE	U_NONE
3/28	BDW_1_RCVD_DATA_L	4	T_BYTE	U_NONE

40.2.3.3.1 AEE Alarm/Alert Parameters Logical Unit

LU/DP NUM.	DP_MNEMONIC (ASCII)	(QUANTITY)	DP_TYPE	DP_UNITS
3/29	BDW_2_RCVD_DATA	4	T_BYTE	U_NONE
3/30	BDW 2 RCVD_DATA_L	4	T-BYTE	U_NONE
3/31	BDW_3_RCVD_DATA	4	T_BYTE	U_NONE
3/32	BDW_3_RCVD_DATA_L	4	T_BYTE	U_NONE
3/33	BDW_4_RCVD_DATA	4	T-BYTE	U_NONE
3/34	BDW_4_RCVD_DATA_L	4	T_BYTE	U_NONE
3/35	BDW_5_RCVD_DATA	4	T_BYTE	U_NONE
3/36	BDW_5_RCVD_DATA_L	4	T_BYTE	U_NONE
3/37	BDW_6_RCVD_DATA	4	T_BYTE	U_NONE
3/38	BDW_6_RCVD_DATA_L	4	T_BYTE	U_NONE
3/39	GDNC_PRE_RCVD_DATA		T_BYTE	U_NONE
3/40	GDNC_PRE_RCVD_DATA_L		T_WORD	U_NONE
3/41	CODE\MORSE/RCVD_DATA	49	T_BYTE	U_NONE
3/42	CODE\MORSE/RCVD_DATA_L	49	T_BYTE	U_NONE
3/43	I_SYNC_OTC		T_BYTE	U_NONE
3/44	I_SYNC_OTC_L		T_WORD	U_NONE
3/45	BDW_1_PRE_ERP		T_INTEGER	U_DBM
3/46	BDW_1_PRE_ERP_L		T_INTEGER	U_DBM
3/47	BDW_2_PRE_ERP		T_INTEGER	U_DBM
3/48	BDW_2_PRE-ERP-L		T_INTEGER	U_DBM
3/49	BDW_5_PRE-ERP		T_INTEGER	U_DBM
3/50	BDW_5_PRE_ERP-L		T_INTEGER	U_DBM
3/51	CLR_LT_ERP		T_INTEGER	U_DBM
3/52	CLR_LT_ERP		T_INTEGER	U_DBM
3/53	CLR_RT_ERP		T_INTEGER	U_DBM
3/54	CLR_RT_ERP_L		T_INTEGER	U_DBM
3/55	GDNC_PRE_ERP		T_INTEGER	U_DBM
3/56	GDNC_PRE_ERP_L		T_INTEGER	U_DBM
3/57	OCI_1-ERP		T_INTEGER	U_DBM
3/58	OCI_1_ERP_L		T_INTEGER	U_DBM
3/59	OCI_2_ERP		T_INTEGER	U_DBM
3/60	OCI_2_ERP_L		T_INTEGER	U_DBM
3/61	OCI_3_ERP		T_INTEGER	U_DBM
3/62	OCI_3_ERP_L		T_INTEGER	U_DBM
3/63	OCI_4_ERP		T_INTEGER	U_DBM
3/64	OCI_4_ERP-L		T_INTEGER	U_DBM
3/65	OCI_5_ERP		T_INTEGER	U_DBM
3/66	OCI_5_ERP-L		T_INTEGER	U_DBM
3/67	OCI_6_ERP		T_INTEGER	U_DBM
3/68	OCI_6_ERP_L		T_INTEGER	U_DBM
3/69	SB_INT_ERP		T_INTEGER	U_DBM

3/70	SB_INT_ERP_L		T_INTEGER	U_DBM
3/71	SB_SL_INT_ERP		T_INTEGER	U_DBM
3/72	SB_SL_INT_ERP_L		T_INTEGER	U_DBM
3/73	CHANNEL_FAIL_SUM		T_BYTE	NULL_BYTE
3/74	CHANNEL_FAIL_SUM_L		T_BYTE	NULL_BYTE
3/75	PHSHFTR_FAIL_COUNT		T_BYTE	NULL_BYTE
3/76	PHSHFTR_FAIL_COUNT_L		T_BYTE	NULL_BYTE
3/77	FREQ_PROM_PAUSE_CNT		T_BYTE	NULL_BYTE
3/78	FREQ_PROM_PAUSE_CNT_L		T_BYTE	NULL_BYTE
3/79	SPARE			
: :	:			
3/90	ADW_A5_RCVD_DATA	10	T_BYTE	U_NONE
3/91	ADW_A5_RCVD_DATA_L	10	T_BYTE	U_NONE
: :	:			
3/129	ADW_A24_RCVD_DATA_L	10	T_BYTE	U_NONE

40.2.3.3.2 DME/P Alarm/Alert Parameters Logical Unit

DME/P ALARM/ALERT MONITORED LOGICAL UNITS

LU/DP NUM.	DP_MNEMONIC (ASCII)	(QUANTITY)	DP_TYPE	DP_UNITS
3/1	DATE_TIME_OF_MEASUREMENT		T_ASCII	U_NONE
3/2	DATE_TIME_OF_MEASUREMENT		T_ASCII	U_NONE
3/3	IA_PFE		T_INTEGER	U_NSEC
3/4	IA_PFE_L		T_INTEGER	U_NSEC
3/5	IA_10_RAD		T_INTEGER	U_NSEC
3/6	IA_10_RAD_L		T_INTEGER	U_NSEC
3/7	FA_PFE		T_INTEGER	U_NSEC
3/8	FA_PFE_L		T_INTEGER	U_NSEC
3/9	FA_10_RAD		T_INTEGER	U_NSEC
3/10	FA-10_RAD_L		T_INTEGER	U_NSEC
3/11	IA_REPLY_OUT_OF_RANGE_CNT		T_WORD	U_NONE
3/12	IA_REPLY_OUT_OF_RANGE_CNT_L		T_WORD	U_NONE
3/13	FA_REPLY_OUT_OF_RANGE_CNT		T_WORD	U_NONE
3/14	FA_REPLY_OUT_OF_RANGE_CNT_L		T_WORD	U_NONE
3/15	IA_REPLY_EFFICIENCY		T_WORD	U_%
3/16	IA_REPLY_EFFICIENCY		T_WORD	U_%
3/17	FA_REPLY_EFFICIENCY		T_WORD	U_%
3/18	FA_REPLY_EFFICIENCY_L		T_WORD	U_%
3/19	REPLY_PULSE_CODE_ERR		T_WORD	U_%
3/20	REPLY_PULSE_CODE_ERR_L		T_WORD	U_%
3/21	ANTENNA_INPUT_POWER		T_WORD	U_DB
3/22	ANTENNA_INPUT_POWER_L		T_WORD	U_DB
3/23	ANTENNA_RESISTANCE1		T_WORD	U_OHMS
3/24	ANTENNA_RESISTANCE1_L		T_WORD	U_OHMS
3/25	ANTENNA_RESISTANCE2		T_WORD	U_OHMS
3/26	ANTENNA_RESISTANCE2_L		T_WORD	U_OHMS
3/27	LOW_TRANSMISSION_RATE		T_WORD	U_PPPS
3/28	LOW_TRANSMISSION_RATE_L		T_WORD	U_PPPS
3/29	IA_INTERROG_PULSE_CODE_REJ		T_WORD	U_%
3/30	IA_INTERROG_PULSE_CODE_REJ_L		T_WORD	U_%
3/31	FA_INTTERROG_PULSE_CODE_REJ		T_WORD	U_%
3/32	FA_INTTERROG_PULSE_CODE_REJ_L		T_WORD	U_%
3/33	REPLY_PARTIAL_RISE_TIME		T_WORD	U_NSEC
3/34	REPLY_PARTIAL_RISE_TIME_L		T_WORD	U_NSEC
3/35	IA_CMN		T_INTEGER	U_NSEC
3/36	IA_CMN_L		T_INTEGER	U_NSEC
3/37	FA_CMN		T_INTEGER	U_NSEC
3/38	FA_CMN_L		T_INTEGER	U_NSEC
3/39	MORSE_CODE_CYCLE_TIME		T_WORD	U_SEC
3/40	MORSE_CODE_CYCLE_TIME_L		T_WORD	U_SEC
3/41	MORSE_CODE_DURATION_TIME		T_WORD	U_SEC
3/42	MORSE_CODE_DURATION_TIME_L		T_WORD	U_SEC
3/43	MORSE_CODE_SEQUENCE_BITMAP_LEN		T_BYTE	U_NONE
3/44	MORSE_CODE_SEQUENCE_BITMAP_LEN_L		T_BYTE	U_NONE
3/45	MORSE_CODE_SEQUENCE_BITMAP		T_BYTE	U_NONE
3/46	MORSE_CODE_SEQUENCE_BITMAP_L	3	T_BYTE	U_NONE

40.2.3.3.2 DME/P Alarm/Alert Parameters Logical Unit

CONFIDENCE PARAMETERS

LU/DP NUM.	DP_MNEMONIC (ASCII)	DP_TYPE (QUANTITY)	DP_UNITS
3/47	INTERROGATION_RATE	T_WORD	U_PPS
3/48	INTERROGATION_RATE_L	T_WORD	U_PPS
3/49	INTERR_PARTIAL_RISE_TIME	T_WORD	U_NSEC
3/50	INTERR_PARTIAL_RISE_TIME_L	T_WORD	U_NSEC
3/51	INTERROGATION_LINEARITY	T_WORD	U_%
3/52	INTERROGATION_LINEARITY_L	T_WORD	U_%
3/53	IA_ADC_CORRECT_FACTOR	T-WORD	U_NSEC
3/54	IA_ADC_CORRECT_FACTOR_L	T_WORD	U_NSEC
3/55	FA_ADC_CORRECT_FACTOR	T_WORD	U_NSEC
3/56	FA_ADC_CORRECT_FACTOR_L	T_WORD	U_NSEC
3/57	IA_ADC_CORRECT_DIFFER	T_WORD	U_NSEC
3/58	IA_ADC_CORRECT_DIFFER_L	T_WORD	U_NSEC
3/59	FA_ADC_CORRECT_DIFFER	T_WORD	U_NSEC
3/60	FA_ADC_CORRECT_DIFFER_L	T_WORD	U_NSEC
3/61	IA_ADC_CLOCK	T_WORD	U_KHZ
3/62	IA_ADC_CLOCK_L	T_WORD	U_KHZ
3/63	FA_ADC_CLOCK	T_WORD	U_KHZ
3/64	FA_ADC_CLOCK_L	T_WORD	U_KHZ
3/65	FA_MEAN_REPLY_DELAY_L1	T_WORD	U_NSEC
3/66	FA_MEAN_REPLY_DELAY_L1_L	T_WORD	U_NSEC
3/67	FA_MEAN_REPLY_DELAY_L2	T_WORD	U_NSEC
3/68	FA_MEAN_REPLY_DELAY_L2_L	T_WORD	U_NSEC
3/69	WATCHDOG_OSCILLATOR_PERIOD	T_WORD	U_NSEC
3/70	WATCHDOG_OSCILLATOR_PERIOD_L	T_WORD	U_NSEC

40.2.4 MAINTENANCE PARAMETERS

40.2.4.1 Definition - The Maintenance Monitored Parameters are Datapoints within this Logical Unit. Maintenance Datapoints are compared against maintenance thresholds. When a threshold is exceeded it is an indication of a potential problem.

The Datapoints for the AEE, RCSU and DME/P components are different.

MPS: The current datapoints may cause Soft Alarm messages as well as Return-To-Normal messages to be generated based on the condition (CONDITION) of the datapoints and the operating state of the associated equipment.

40.2.4.2 Logical Unit Characteristics

XMTR	NOT_CARE (not applicable)
LOCAL CONTROL	NO N/A
COMPONENT	ALL_COMPONENTS
HISTORICAL	NO
MAX DATA	74 datapoints per Logical Unit

40.2.4.3 Logical Unit Datapoint Entries

40.2.4.3.1 AEE Maintenance Parameters

MAINTENANCE MONITORED LOGICAL UNITS

LU/DP NUM.	DP_MNEMONIC (ASCII)	(QUANTITY)	DP_TYPE	DP_UNITS
4/1	DATE_TIME_OF_MEASUREMENT		T_ASCII	U_NONE
4/2	ARRAY_MAINT_TABLE_A	112	T_BYTE	U_NONE
4/3	ARRAY_MAINT_TABLE_B	112	T_BYTE	U_NONE
4/4	AUX_1_RF_SWITCH_BITE_STATUS	2	T_BYTE	U_NONE
4/5	AUX_2_RF_SWITCH_BITE_STATUS	2	T_BYTE	U_NONE
4/6	PFE_N_FLD		T_INTEGER	U_DEG
4/7	PFE_N_INT		T_INTEGER	U_DEG
4/8	CMN_N		T_INTEGER	U_DEG
4/9	3DB_CROSSING_TIMES_INT	4	T_WORD	U_NSEC
4/10	EXCITER_DPSK_180_BITE_RESULT		T_BYTE	U_NONE
4/11	EXCITER_PLL_LOSS_BITE_RESULT		T_BYTE	U_NONE
4/12	EXCITER_POWER		T_BYTE	U_DBM
4/13	EXCITER_RF_SWITCH_BITE_RESULT	2	T_BYTE	U_NONE
4/14	EXCITER_TCx0_SLCT_STATE		T_BYTE	U_NONE
4/15	MAIN_RF_SWITCH_BITE_STATUS	2	T_BYTE	U_NONE
4/16	MORSE_SYNC_MISSING_CNT		T_BYTE	U_NONE
4/17	PHSHFTR_AMPLITUDE_TABLE	112	T_WORD	U_DBM
4/18	POWER_AMP_POWER		T_BYTE	U_DBM
4/19	SYNC_PERIOD_AVG_VALUE		T_WORD	U_NONE
4/20	V_BATT_96		T_BYTE	U_VOLT
4/21	V_PS_P15		T_BYTE	U_VOLT
4/22	V_PS_N15		T_BYTE	U_VOLT
4/23	V_PS_P5		T_BYTE	U_VOLT
4/24	ADW_A1_FCN_CNT		T_WORD	U_NONE
4/25	ADW_A2_FCN_CNT		T_WORD	U_NONE
4/26	ADW_A3_FCN_CNT		T_WORD	U_NONE
4/27	ADW_A4_FCN_CNT		T_WORD	U_NONE
4/28	BDW_1_FCN_CNT		T_WORD	U_NONE
4/29	BDW_2_FCN_CNT		T_WORD	U_NONE
4/30	BDW_3_FCN_CNT		T_WORD	U_NONE
4/31	BDW_4_FCN_CNT		T_WORD	U_NONE
4/32	BDW_5_FCN_CNT		T_WORD	U_NONE
4/33	BDW_6_FCN-CNT		T_WORD	U_NONE

4/34	GDNC_PRE_FCN_CNT	T_WORD	U_NONE
4/35	DELAYED_SYNC_SIG_POSITION	T_BYTE	U_NSEC
4/36	I_SYNC_OTC	T_WORD	U_NONE
4/37	CHANNEL_FAIL_SUM	T_BYTE	U_NONE
4/38	PHSHFTR_FAIL_COUNT	T_BYTE	U_NONE
4/39	FREQ_PROM_PAUSE_CNT	T_BYTE	U_NONE
4/40	BATT_CASE_TEMP_FAIL	T_BYTE	U_NONE
4/41	CHARGER_STATUS	T_BYTE	U_NONE
4/42	BATT_SW_OVER_DETECT	T_BYTE	U_NONE
4/43	PLL_LOCK_ALERT	T_BYTE	U_NONE
4/44	DOOR_OPEN_STATUS	T_BYTE	U_NONE
4/45	DEICER_HEATER_ACT	T_BYTE	U_NONE
4/46	DEICER_ICE_DETECT	T_BYTE	U_NONE
4/47	POWER_AMP_THERMAL_SHUTOFF	T_BYTE	U_NONE
4/48	CARD_RACK_OVER_TEMP	T_BYTE	U_NONE
4/49	COMM_DATA_BUS	T_BYTE	U_NONE
4/50	COMM_MICNET	T_BYTE	U_NONE
4/51	BIT_FAILURE	T_BYTE	U_NONE
4/52	DELETED		
4/53	EQM_ISOLATION	T_BYTE	U_NONE
4/54	ADW_A5_FCN_CNT	T_WORD	U_NONE
: :	:	:	:
4/74	ADW_A25_FCN_CNT	T_WORD	U_NONE

40.2.4.3.2 DME/P Maintenance Parameters

MAINTENANCE MONITORED LOGICAL UNITS

LU/DP NUM.	DP_MNEMONIC (ASCII)	DP_TYPE (QUANTITY)	DP_UNITS
4/1	DATE_TIME_OF_MEASUREMENT	T_ASCII	U_NONE
4/2	IA_PFE	T_INTEGER	U_NSEC
4/3	IA_10_RAD	T_INTEGER	U_NSEC
4/4	IA_INVALID_REPLY_COUNT	T_WORD	U_NONE
4/5	FA_PFE	T_INTEGER	U_NSEC
4/6	FA_10_RAD	T-INTEGER	U_NSEC
4/7	FA_INVALID_REPLY_COUNT	T_WORD	U_NONE
4/8	IA_REPLY_EFFICIENCY	T_WORD	U_%
4/9	FA_REPLY_EFFICIENCY	T_WORD	U_%
4/10	IA_CMN	T_INTEGER	U_NSEC
4/11	FA_CMN	T_INTEGER	U_NSEC
	POWER SUPPLY VOLTAGES		
4/12	V_PS_P60	T_INTEGER	U_VOLT
4/13	V_PS_P45	T_INTEGER	U_VOLT
4/14	V_PS_P26	T_INTEGER	U_VOLT
4/15	V_PS_P15	T_INTEGER	U_VOLT
4/16	V_PS_P5	T_INTEGER	U_VOLT
4/17	V_PS_N15	T_INTEGER	U_VOLT
4/18	TRANSMITTING_POWER	T_WORD	U_DBM
4/19	FA_DECODES_SECOND	T_WORD	U_PPPS
4/20	REFLECTION_COEFFICIENT	T_WORD	U_NONE
4/21	IA_ADC_ADJUSTMENT_RANGE	T_WORD	U_NSEC
4/22	FA_ADC_ADJUSTMENT_RANGE	T_WORD	U_NSEC
4/23	REPLY_LINEARITY	T_WORD	U_%
4/24	BLOWER_1_SPEED	T_WORD	U_RPS
4/25	BLOWER_2_SPEED	T_WORD	U_RPS
4/26	COMM_DME	T_WORD	U_NONE
4/27	BIT_FAILURE	T_BYTE	U_NONE

40.2.4.3.3 RCSU EA Maintenance Parameters

MAINTENANCE MONITORED LOGICAL UNITS

LU/DP NUM.	DP_MNEMONIC (ASCII)	DP_TYPE (QUANTITY)	DP_UNITS
4/1	DELETED		
4/2	DELETED		
4/3	BIT_FAILURE	T_BYTE	U_NONE
4/4	COMM_RMMS	T_BYTE	U_NONE
4/5	COMM_RCSU_PANEL	T_BYTE	U_NONE
4/6	COMM_RSU1_PANEL	T-BYTE	U_NONE
4/7	COMM_RSU2_PANEL	T_BYTE	U_NONE
4/8	COMM_MICNET_AZ1	T_BYTE	U_NONE
4/9	COMM_MICNET_AZ2	T_BYTE	U_NONE
4/10	COMM_MICNET_EL1	T_BYTE	U_NONE
4/11	COMM_MICNET_EL2	T_BYTE	U_NONE

40.2.5 ALARM/ALERT THRESHOLDS

40.2.5.1 Definition - The Alarm/Alert Thresholds are datapoints within this Logical Unit. Whenever a threshold is changed, a state change message is generated.

Alarm/Alert Threshold Logical Units contain datapoints which are used as limits for comparison with datapoints in Alarm/Alert Parameters Logical Unit.

MPS: Whenever one of these datapoints is changed, a State Change message is sent to the MPS.

40.2.5.2 Logical Unit Characteristics

XMTR	NON_TRANSMITTING
LOCAL CONTROL	YES
COMPONENT	AEE or DME/P
HISTORICAL	NO
MAX_DATA	69 datapoints per Logical Unit

40.2.5.3 Logical Unit Datapoint Entries

40.2.5.3.1 AEE Alarm/Alert Thresholds

ALARM/ALERT THRESHOLDS DATAPOINTS

LU/DP NUM.	DP_MNEMONIC (ASCII)	DP_TYPE (QUANTITY)	DP_UNITS
5/1	DELETED		
5/2	DELETED		
5/3	DELETED		
5/4	DELETED		
	EM Angle Monitor Datapoints		
5/5	CLR_LT_ANGLE_LIMIT	T_WORD	U_NSEC
5/6	CLR_LT_ANGLE_UEL	T_BYTE	U_NONE
5/7	CLR_RT_ANGLE_LIMIT	T_WORD	U_NSEC
5/8	CLR_RT_ANGLE_UEL	T_BYTE	U_NONE
5/9	CMN_ANGLE_LIMIT	T_WORD	U_DEG
5/10	CMN_ANGLE_UEL	T_BYTE	U_NONE
5/11	MAE_FLD_REFERENCE	T_WORD	U_NSEC
5/12	MAE_PFE_ANGLE_LIMIT	T_WORD	U_DEG
5/13	MAE_PFE_FLD_ANGLE_UEL	T_BYTE	U_NONE
5/14	MAE_PFE_INT_ANGLE_UEL	T_BYTE	U_NONE
5/15	MAE_WB_ANGLE_LIMIT	T_WORD	U_DEG
5/16	MAE_WB_FLD_ANGLE_UEL	T_BYTE	U_NONE
5/17	MAE_WB_INT_ANGLE_UEL	T_BYTE	U_NONE
	DPSK Data Monitor Datapoints		
5/18	ADW_A1_DPSK_UEL	T_BYTE	U_NONE
5/19	ADW_A2_DPSK_UEL	T_BYTE	U_NONE
5/20	ADW_A3_DPSK_UEL	T_BYTE	U_NONE
5/21	ADW_A4_DPSK_UEL	T_BYTE	U_NONE
5/22	BDW_1_DPSK_UEL	T_BYTE	U_NONE
5/23	BDW_2_DPSK_UEL	T_BYTE	U_NONE
5/24	BDW_3_DPSK_UEL	T_BYTE	U_NONE
5/25	BDW_4_DPSK_UEL	T_BYTE	U_NONE
5/26	BDW_5_DPSK_UEL	T_BYTE	U_NONE
5/27	BDW_6_DPSK_UEL	T_BYTE	U_NONE
5/28	GDNC_PRE_EXPECTED	T_WORD	U_NONE
5/29	GDNC_PRE_DPSK_UEL	T_BYTE	U_NONE
5/30	MORSE_CODE_DPSK_UEL	T_BYTE	U_NONE
	EM Synchronization Monitor Datapoints		
5/31	DELAYED_SYNC_WINDOW_SIZE	T_WORD	U_NSEC
5/32	I_SYNC_UEL	T_WORD	U_NONE
5/33	I_SYNC_WINDOW_SIZE	T_WORD	U_NSEC
5/34	L_SYNC_WINDOW_SIZE	T_WORD	U_NSEC

40.2.5.3.1 AEE Alarm/Alert Thresholds

ALARM/ALERT THRESHOLDS DATAPOINTS

LU/DP NUM.	DP_MNEMONIC (ASCII)	DP_TYPE (QUANTITY)	DP_UNITS
	EM ERP Monitor Datapoints		
5/35	BDW_1_PRE_ERP_UEL	T_BYTE	U_NONE
5/36	BDW_2_PRE_ERP_UEL	T_BYTE	U_NONE
5/37	BDW_3_PRE_ERP_UEL	T_BYTE	U_NONE
5/38	CLR_ERP_UEL	T_BYTE	U_NONE
5/39	GDNC_ERP_UEL	T_BYTE	U_NONE
5/40	OCI_ERP_UEL	T_BYTE	U_NONE
5/41	SB_INT_ERP_DEL	T_BYTE	U_NONE
	EM Array Integrity Monitor Datapoints		
5/42	CHANNEL_FAIL_LIMIT	T_BYTE	U_NONE
5/43	CHANNEL_UEL	T_BYTE	U_NONE
5/44	DYN_SL_LIMIT	T_BYTE	U_DB
5/45	DYN_SL_UEL	T_BYTE	U_NONE
5/46	FREQ_FAIL_UEL	T_BYTE	U_NONE
5/47	PHSHFTR_FAIL_LIMIT	T_BYTE	U_NONE
5/48	PHSHFTR_FAIL_UEL	T_BYTE	U_NONE
5/49	ADW_A5_DPSK_UEL	T_BYTE	U_NONE
: :	:	:	:
5/69	ADW_A25_DPSK_UEL	T_BYTE	U_NONE

40.2.5.3.2 DME/P Alarm/Alert Thresholds

DME/P ALARM/ALERT THRESHOLDS DATAPOINTS

LU/DP NUM.	DP_MNEMONIC (ASCII)	DP_TYPE (QUANTITY)	DP_UNITS
5/1	IA_PFE_LEL	T_INTEGER	U_NSEC
5/2	IA_PFE_UEL	T_INTEGER	U_NSEC
5/3	IA_10_RAD_LEL	T_INTEGER	U_NSEC
5/4	IA_10_RAD_UEL	T_INTEGER	U_NSEC
5/5	FA_PFE_LEL	T_INTEGER	U_NSEC
5/6	FA_PFE_UEL	T_INTEGER	U_NSEC
5/7	FA_10_RAD_LEL	T_INTEGER	U_NSEC
5/8	FA_10_RAD_UEL	T_INTEGER	U_NSEC
5/9	IA_REPLY_EFFICIENCY_LIMIT	T_WORD	U_%
5/10	FA_REPLY_EFFICIENCY_LIMIT	T_WORD	U_%
5/11	IA_CMN_LEL	T_INTEGER	U_NSEC
5/12	IA_CMN_UEL	T_INTEGER	U_NSEC
5/13	FA_CMN_LEL	T_INTEGER	U_NSEC
5/14	FA_CMN_UEL	T_INTEGER	U_NSEC
5/15	REPLY_PULSE_CODE_ERR_LEL	T_WORD	U_%
5/16	REPLY_PULSE_CODE_ERR_UEL	T_WORD	U_%
5/17	ANTENNA_INPUT_POWER_LEL	T_WORD	U_DB
5/18	ANTENNA_INPUT_POWER_UEL	T_WORD	U_DB
5/19	ANTENNA_RESISTANCE1_LEL	T_WORD	U_OHMS
5/20	ANTENNA_RESISTANCE1_UEL	T_WORD	U_OHMS
5/21	ANTENNA_RESISTANCE2_LEL	T_WORD	U_OHMS
5/22	ANTENNA_RESISTANCE2_UEL	T_WORD	U_OHMS
5/23	LOW_TRANSMISSION_RATE_LEL	T_WORD	U_PPPS
5/24	IA_INTERROG_PULSE_CODE_REJ_LIMIT	T_WORD	U_%
5/25	F_INTERROG_PULSE_CODE_REJ_LIMIT	T_WORD	U_%
5/26	REPLY_PARTIAL_RISE_TIME_LEL	T_WORD	U_NSEC
5/27	REPLY_PARTIAL_RISE_TIME_UEL	T_WORD	U_NSEC
5/28	MORSE_CODE_CYCLE_TIME_LIMIT	T_WORD	U_NSEC
	CONFIDENCE CHECKS ALARM LIMITS		
5/29	INTERROGATION_RATE_LEL	T_WORD	U_PPPS
5/30	INTERROGATION_RATE_UEL	T_WORD	U_PPPS
5/31	INTERR_PARTIAL_RISE_TIME_LEL	T_WORD	U_NSEC
5/32	INTERR_PARTIAL_RISE_TIME_UEL	T_WORD	U_NSEC
5/33	INTERROGATION_LINEARITY	T_WORD	U_%
5/34	IA_ADC_ADJUSTMENT_RANGE_LEL	T_WORD	U_NSEC

5/35	IA_ADC_ADJUSTMENT_RANGE_UEL	T_WORD	U_NSEC
5/36	FA_ADC_ADJUSTMENT_RANGE_LEL	T_WORD	U_NSEC
5/37	FA_ADC_ADJUSTMENT_RANGE_UEL	T_WORD	U_NSEC
5/38	IA_ADC_EXCESSIVE_CHANGE_LIMIT	T_WORD	U_NSEC
5/39	FA_ADC_EXCESSIVE_CHANGE_LIMIT	T_WORD	U_NSEC
5/40	IA_ADC_CLOCK_LEL	T_WORD	U_KHZ
5/41	IA_ADC_CLOCK_UEL	T_WORD	U_KHZ
5/42	FA_ADC_CLOCK_LEL	T_WORD	U_KHZ
5/43	FA_ADC_CLOCK_UEL	T_WORD	U_KHZ
5/44	FA_MEAN_REPLY_DELAY_L1_LEL	T_WORD	U_NSEC
5/45	FA_MEAN_REPLY_DELAY_L1_UEL	T_WORD	U_NSEC
5/46	FA_MEAN_REPLY_DELAY_L2_LEL	T_WORD	U_NSEC
5/47	FA_MEAN_REPLY_DELAY_L2_UEL	T_WORD	U_NSEC
5/48	WATCHDOG_OSCILLATOR_PERIOD_LEL	T_WORD	U_NSEC
5/49	WATCHDOG_OSCILLATOR_PERIOD_UEL	T_WORD	U_NSEC

40.2.6 MAINTENANCE THRESHOLDS

40.2.6.1 Definition - The Maintenance Thresholds are Datapoints within this Logical Unit. Maintenance thresholds are compared against the associated maintenance parameter.

The Datapoints for the AEE, RCSU and DME/P components are different.

MPS: Whenever one of these datapoints is changed, a State Change message is sent to the MPS.

40.2.6.2 Logical Unit Characteristics

XMTR	NOT_CARE for AEE
LOCAL CONTROL	NO
COMPONENT	AEE or DME/P
HISTORICAL	NO
MAX DATA	68 DATAPOINTS PER Logical Unit

40.2.6.3 Logical Unit Datapoint Entries

40.2.6.3.1 AEE Maintenance Thresholds

MAINTENANCE THRESHOLDS DATAPOINTS

LU/DP NUM.	DP_MNEMONIC (ASCII)	DP_TYPE (QUANTITY)	DP_UNITS
6/1	V_BATT_96_UML	T_BYTE	U_VOLT
6/2	V_BATT_96_LML	T_BYTE	U_VOLT
6/3	V_PS_P15_UML	T_BYTE	U_VOLT
6/4	V_PS_P15_LML	T_BYTE	U_VOLT
6/5	V_PS_N15_UML	T_BYTE	U_VOLT
6/6	V_PS_N15_LML	T_BYTE	U_VOLT
6/7	V_PS_P5_UML	T_BYTE	U_VOLT
6/8	V_PS-P5_LML	T_BYTE	U_VOLT
6/9	ADW_A1_FCN_RAT_LML	T_WORD	U_NONE
6/10	ADW_A2_FCN_RAT_LML	T_WORD	U_NONE
6/11	ADW_A3_FCN_RAT_LML	T_WORD	U_NONE
6/12	ADW_A4_FCN_RAT_LML	T_WORD	U_NONE
6/13	BDW_1-FCN_RAT_LML	T_WORD	U_NONE
6/14	BDW_2_FCN_RAT_LML	T_WORD	U_NONE
6/15	BDW_3_FCM_RAT_LML	T_WORD	U_NONE
6/16	BDW_4_FCN_RAT_LML	T_WORD	U_NONE
6/17	BDW_5_FCN_RAT_LML	T_WORD	U_NONE
6/18	BDW_6_FCN_RAT_LML	T_WORD	U_NONE
6/19	GDNC_PRE_FCN_RAT_LML	T_WORD	U_NONE
6/20	GDNC_PRE_FCN_RAT_LML	T_WORD	U_NONE
6/21	D_SYNC_SIG_POSITION_UML	T_BYTE	U_NSEC
6/22	D_SYNC_SIG_POSITION_LML	T_BYTE	U_NSEC
6/23	DELETED		
6/24	I_SYNC_OTC_UML	T_WORD	U_NONE
6/25	MORSE_SYNC_MISSING_CNT_LIMIT	T_WORD	U_NONE
6/26	EXCITER_POWER_LML	T_BYTE	U_DBM
6/27	POWER_AMP_POWER_LML	T_BYTE	U_DBM
6/28	CHANNEL_FAIL_SUM_UML	T_BYTE	U_NONE
6/29	PHSHFTR_FAIL_COUNT_UML	T_BYTE	U_NONE
6/30	FREQ_PROM_PAUSE_CNT_UML	T_BYTE	U_NONE
6/31	FREQ_PROM_PAUSE_CNT_LML	T_BYTE	U_NONE
6/32	MAE_PFE_ANGLE_UML	T_WORD	U_DEG
6/33	DELETED		
6/34	DELETED		
6/35	DELETED		

6/36	CMN_ANGLE_UML	T_WORD	U_DEG
6/37	DELETED		
6/38	AVG_BWIDTH_UML	T_WORD	U_DEG
6/39	AVG_BWIDTH_UML	T_WORD	U_DEG
6/40	NORM_AZ_ANGLE_FUNC_RATE_UML	T_BYTE	U_NONE
6/41	NORM_AZ_ANGLE_FUNC_RATE_LML	T_BYTE	U_NONE
6/42	HIRA_AZ_ANGLE_FUNC_RATE_UML	T_BYTE	U_NONE
6/43	HIRA_AZ_ANGLE_FUNC_RATE_LML	T_BYTE	U_NONE
6/44	BAZ_ANGLE_FUNC_RATE_UML	T_BYTE	U_NONE
6/45	BAZ_ANGLE_FUNC_RATE_LML	T_BYTE	U_NONE
6/46	EL_ANGLE_FUNC_RATE_UML	T_BYTE	U_NONE
6/47	EL_ANGLE_FUNC_RATE_LML	T_BYTE	U_NONE
6/48	ADW_A5_FCN_RAT_LML	T_WORD	U_NONE
: :	:	:	:
6/68	ADW_A25_FCN_RAT_LML	T_WORD	U_NONE

40.2.6.3 Logical Unit Datapoint Entries

40.2.6.3.1 DME/P Maintenance Thresholds

MAINTENANCE THRESHOLDS DATAPOINTS

LU/DP NUM.	DP_MNEMONIC (ASCII)	DP_TYPE (QUANTITY)	DP_UNITS
6/1	IA_PFE_LML	T_INTEGER	U_NSEC
6/2	IA_PFE_UML	T_INTEGER	U_NSEC
6/3	IA_10_RAD_LML	T_INTEGER	U_NSEC
6/4	IA_10_RAD_UML	T_INTEGER	U_NSEC
6/5	FA_PFE_LML	T_INTEGER	U_NSEC
6/6	FA_PFE_UML	T_INTEGER	U_NSEC
6/7	FA_10_RAD_LML	T_INTEGER	U_NSEC
6/8	FA_10_RAD_UML	T_INTEGER	U_NSEC
6/9	IA_REPLY_EFF_LML	T_WORD	U_%
6/10	FA_REPLY_EFF_LML	T_WORD	U_%
6/11	IA_CMN_LML	T_INTEGER	U_NSEC
6/12	IA_CMN_UML	T_INTEGER	U_NSEC
6/13	FA_CMN_LML	T_INTEGER	U_NSEC
6/14	FA_CMN_UML	T_INTEGER	U_NSEC
6/15	BATTERY_VOLTAGE_LML	T_INTEGER	U_VOLT
6/16	PS_P45V_LML	T_INTEGER	U_VOLT
6/17	PS_P26V_LML	T_INTEGER	U_VOLT
6/18	PS_P15V_LML	T_INTEGER	U_VOLT
6/19	PS_P5V_LML	T_INTEGER	U_VOLT
6/20	PS_N15V-LML	T_INTEGER	U_VOLT
6/21	BATTERY_VOLTAGE_UML	T_INTEGER	U_VOLT
6/22	PS_P45V-UML	T_INTEGER	U_VOLT
6/23	PS_P26V_UML	T_INTEGER	U_VOLT
6/24	PS_P15V_UML	T_INTEGER	U_VOLT
6/25	PS-P5V_UML	T_INTEGER	U_VOLT
6/26	PS_N15V-UML	T_INTEGER	U_VOLT
6/27	TRANS_POWER_UML	T_WORD	U_DBM
6/28	TRANS_POWER_LML	T_WORD	U_DBM
6/29	FA_DECODES_SECOND_UML	T_WORD	U_PPPS
6/30	LOAD_VSWR_UML	T_WORD	U_NONE
6/31	LOAD_VSWR_LML	T_WORD	U_NONE
6/32	IA_ADC_ADJUST_RANGE_UML	T_WORD	U_NSEC
6/33	IA_ADC_ADJUST_RANGE_LML	T_WORD	U_NSEC
6/34	FA_ADC_ADJUST_RANGE_UML	T_WORD	U_NSEC
6/35	FA_ADC_ADJUST_RANGE_LML	T_WORD	U_NSEC
6/36	REPLY_LINEARITY_UML	T_WORD	U_%
6/37	BLOWER_SPEED_LML	T_WORD	U_RPS

40.2.7 SITE PARAMETERS

40.2.7.1 Definition - The Site Parameters are datapoints within this Logical Unit. These datapoints are necessary for tailoring an MLS to its environment.

Site Parameter Logical Units contain datapoints which are used to determine a variety of equipment characteristics and used mainly during the Initialization of the MLS components.

Some of these datapoints are used to construct the Basic Data Words and the Auxiliary Data Words which are sent to the transmitter for transmission.

Note that there are other Logical Units (e.g., Thresholds, User Access, schedule periods) which are considered "site" parameters but are more conveniently grouped under unique Logical Units.

The datapoints for the AEE, RCSU and DME/P components are different.

MPS: Whenever one of these datapoints is changed, a State Change message is sent to the MPS.

40.2.7.2 Logical Unit Characteristics

XMTR	NO TRANSMITTING
LOCAL CONTROL	YES
COMPONENT	ALL_COMPONENT
HISTORICAL	NO
MAX DATA	150 DATAPOINTS PER Logical Unit

40.2.7.2 Logical Unit Datapoint Entries

40.2.7.2.1 AEE Site Parameter Logical Unit

LU/DP NUM.	DP-MNEMONIC (ASCII)	(QUANTITY)	DP_TYPE	DP_UNITS
SC, EM Datapoints				
7/1	OCI_ANTENNA_COUNT		T_BYTE	U_NONE
7/2	OCI_SELECTION_TABLE	6	T_BYTE	U_NONE
7/3	SB_ANTENNA_TYPE		T_BYTE	U_NONE
7/4	STATION_ID		T_BYTE	U_NONE
7/5	FIELD_MONITOR_POSITION		T_INTEGER	U_NSEC
7/6	MULTIPLEX_TX_RATE		T_BYTE	U_NONE
7/7	SCAN_ANGLE_NEG_COVERAGE		T_INTEGER	U_DEG
7/8	SCAN_ANGLE_POS_COVERAGE		T_INTEGER	U_DEG
Miscellaneous parameter				
7/9	EQUIPMENT_TYPE		T_BYTE	U_NONE
7/10	MPS_MESSAGE_STATUS		T_BYTE	U_NONE
Synchronization Datapoints				
7/11	MORSE_CODE_SQNC_NMBR		T_BYTE	U_NONE
7/12	SYNC_AIRPORT_CODE		T_BYTE	U_NONE
7/13	SYNC_COMM_MEDIUM		T_BYTE	U_NONE
7/14	SYNC_DELAY		T_WORD	U_MSEC
7/15	SYNC_PERIOD_AVG_VALUE		T_WORD	U_NSEC
7/16	SYNC_STATION_MODE		T_BYTE	U_NONE
BS System Datapoints				
7/17	ANGLE_REFERENCE		T_WORD	U_NSEC
7/18	AUTO_STAB_ALPHA_VALUE		T_BYTE	U_NONE
7/19	BORESIGHT_ADJUSTMENT		T_WORD	U_NSEC
7/20	FREQ_CHANNEL		T_BYTE	U_NONE
7/21	PHSHFR_AVAIL_COUNT		T_BYTE	U_NONE

SC Signal-in-Space Datapoints

7/22	AW1_AAZ_ANT_OFFSET	T_WORD	U_M
7/23	AW1_AAZ_DP_DIST	T_WORD	U_M
7/24	AW1_AAZ_ANTALG RWYCTR	T_WORD	U_DEG
7/25	AW1_AAZ_ANT_COOO	T_BYTE	U_NONE
7/26	AW2_AEL_ANT_OFFSET	T_WORD	U_M
7/27	AW2_AEL_DP_THD_DIST	T_WORD	U_M
7/28	AW2_AEL_ANT_HEIGHT	T_BYTE	U_M
7/29	AW3_DME_OFFSET	T_WORD	U_M
7/30	AW3_DME_DP_DIST	T_WORD	U_M
7/31	AW4_BAZ_ANT	T_WORD	U_M
7/32	AW4_BAZ_OP_DIST	T_WORD	U_M
7/33	AW4_BAZ_ANTALG RWYCTR	T_WORD	U_DEG
7/34	BW1_AAZ_TH_DIST	T_BYTE	U_M
7/35	BW1_AAZ_PCL_NEG	T_BYTE	U_DEG
7/36	BW1_AAZ_PCL_POS	T_BYTE	U_DEG
7/37	BW1_CLR_SIG_TYP	T_BYTE	U_NONE
7/38	BW2_MIN_GLD_PTH	T_BYTE	U_DEG
7/39	BW2_BAZ_STATUS	T_BYTE	U_NONE
7/40	BW2_DME_STATUS	T_BYTE	U_NONE
7/41	BW2_AAZ_STATUS	T_BYTE	U_NONE
7/42	BW2_AEL_STATUS	T_BYTE	U_NONE
7/43	BW3_AAZ_BEAMWH	T_BYTE	U_DEG
7/44	BW3_AEL_BEAMWH	T_BYTE	U_DEG
7/45	BW3_DME_DIST	T_WORD	U_M
7/46	BW4_AAZ_ZGP	T_WORD	U_DEG
7/47	BW4_BAZ_ZGP	T_WORD	U_DEG
7/48	BW5_BAZ_PCL_NEG	T_BYTE	U_DEG
7/49	BW5_BAZ_PCL_POS	T_BYTE	U_DEG
7/50	BW5_BAZ_BEAMWH	T_BYTE	U_DEG
7/51	BW6_GRD_IDENT	T_ASCII	U_NONE

Monitor Verification Datapoints

7/52	MV_MAE_ANGLE_FLD_NEG	T_WORD	U_NSEC
7/53	MV_MAE_ANGLE_FLD_POS	T_WORD	U_NSEC
7/54	MV_MAE_ANGLE_INT_NEG	T_WORD	U_NSEC
7/55	MV_MAE_ANGLE_INT_POS	T_WORD	U_NSEC
7/56	MV_PFE_N_MINUS_1_FLD_NEG	T_WORD	U_NSEC
7/57	MV_PFE_N_MINUS_1_FLD_POS	T_WORD	U_NSEC
7/58	MV_PFE_N_MINUS_1_INT_NEG	T_WORD	U_NSEC
7/59	MV_PFE_N_MINUS_1_INT_POS	T_WORD	U_NSEC
7/60	MV_PFE_1_N_MINUS_1_FLD_NEG	T_WORD	U_NSEC
7/61	MV_PFE_1_N_MINUS_1_FLD_POS	T_WORD	U_NSEC
7/62	MV_PFE_1_N_MINUS_1_INT_NEG	T_WORD	U_NSEC
7/63	MV_PFE_1_N_MINUS_1_INT_POS	T_WORD	U_NSEC
7/64	AW5_xxx_xxx_xxxxxxx	T_WORD	U_x
: :	:	:	:
7/150	AW25_xx_xxx_xxxxxx	T_WORD	U_x
7/151	EXCITER_TCXD_SLCT_STATE	T_BYTE	U_NONE
7/152	BDW_1_PRE_ERP_OFFSET	T_WORD	U_VOLT
7/153	BDW_2_PRE_ERP_OFFSET	T_WORD	U_VOLT
7/154	BDW_5_PRE_ERP_OFFSET	T_WORD	U_VOLT
7/155	CLR_LT_ERP_OFFSET	T_WORD	U_VOLT
7/156	CLR_RT_ERP_OFFSET	T_WORD	U_VOLT
7/157	GDNC_PRE_ERP_OFFSET	T_WORD	U_VOLT
7/158	OCI_1_ERP_OFFSET	T_WORD	U_VOLT
7/159	OCI_2_ERP_OFFSET	T_WORD	U_VOLT
7/160	OCI_3_ERP_OFFSET	T_WORD	U_VOLT
7/161	OCI_4_ERP_OFFSET	T_WORD	U_VOLT
7/162	OCI_5_ERP_OFFSET	T_WORD	U_VOLT
7/163	OCT_6_ERP_OFFSET	T_WORD	U_VOLT
7/164	SB_INT_ERP_OFFSET	T_WORD	U_VOLT
7/165	SB_SL_INT_ERP_OFFSET	T_WORD	U_VOLT
7/166	MICNET_TYPE	T_WORD	U_NONE

40.2.7.2.1 DME/P Site Parameters Logical Unit

LU/DP NUM.	DP-MNEMONIC (ASCII)	DP_TYPE (QUANTITY)	DP_UNITS
	OPERATOR CHANGEABLE VALUES		
7/1	NUMERIC_CHANNEL	T_WORD	U_NONE
7/2	LETTER_CHANNEL	T_ASCII	U_NONE
7/3	IDENTITY	T_ASCII	U_NONE
7/4	RUNWAY_OFFSET	T_WORD	U_NSEC
7/5	MAIN_RF_CABLE_LENGTH	T_WORD	U_NSEC
7/6	MAIN_RF_CABLE_LOSS	T_WORD	U_DB
7/7	IA_REPLY_DELAY_CALIBRATION	T_INTEGER	U_NSEC
7/8	FA_REPLY_DELAY_CALIBRATION	T_INTEGER	U_NSEC
7/9	IA_PFE_SAMPLE_PERIOD	T_WORD	U_SEC
7/10	FA_PFE_SAMPLE_PERIOD	T_WORD	U_SEC
7/11	IA_REPLY_EFF_SAMPLE_PERIOD	T_WORD	U_SEC
7/12	FA_REPLY_EFF_SAMPLE_PERIOD	T_WORD	U_SEC
7/13	REPLY_PULSE_CODE_SAMPLE_PERIOD	T_WORD	U_SEC
7/14	LOW_TRANS_RATE_SAMPLE_PERIOD	T_WORD	U_SEC
7/15	IA_PULSE_CODE_REJ_SAMPLE_PERIOD	T_WORD	U_SEC
7/16	FA_PULSE_CODE_REJ_SAMPLE_PERIOD	T_WORD	U_SEC
7/17	REPLY_PARTIAL_RISE_TIME_SAM_PERIOD	T_WORD	U_SEC
7/18	IA_CMN_SAMPLE_PERIOD	T_WORD	U_SEC
7/19	FA_CMN_SAMPLE_PERIOD	T_WORD	U_SEC
7/20	ERP_SAMPLE_PERIOD	T_WORD	U_SEC
7/21	ECHO_SUP_TIME_INSTALLED	T_WORD	U_USEC
7/22	TRANS_OUTPUT_POWER_SET_NUM	T_WORD	U_NONE
7/23	IA_DEADTIME_ADJUSTMENT	T_WORD	U_USEC
7/24	FA_DEADTIME_ADJUSTMENT	T_WORD	U_USEC
7/25	CO_LOCATED_ILS_TYPE	T_WORD	U_NONE
7/16	SQUITTER_RATE	T_WORD	U_PPPS
7/27	REMOTE_DETECTOR_PATH_LOSS	T_WORD	U_DB
7/28	MPS_MESSAGE_STATUS	T_WORD	U_NONE

40.2.7.2.2 RCSU EA Site Parameters Logical Unit

LU/DP NUM.	DP-MNEMONIC (ASCII)	DP_TYPE (QUANTITY)	DP_UNITS
7/1	RMMS_ADDRESS	T_BYTE	U_NONE
7/2	EQUIPMENT_TYPE	T_BYTE	U_NONE
7/3	MLS_CONFIGURATION	T_BYTE	U_NONE
7/4	K2_COUNT_MAX_RMMS	T_WORD	U_NONE
7/5	MPS_MESSAGE_STATUS	T_BYTE	U_NONE
7/6	MICNET_TYPE	T_WORD	U_NONE
7/7	RSU1_TYPE	T_WORD	U_NONE
7/8	RSU2_TYPE	T_WORD	U_NONE

40.2.8 USER ACCESS

40.2.8.1 Definition - The User Access Logical Units provide the Printer/Terminal (P/T) user identification, password, and access codes for each equipment. Each datapoint consists of a password, ID and access code. The password is 5 characters, the user ID is 3 characters and the access code is one character.

The data points are in ASCII and formatted for ease of entry at a P/T. A data point cannot be read or changed unless the P/T user has the appropriate access level.

MPS: Whenever a datapoint is changed, a state change message is sent to the MPS.

40.2.8.2 Logical Unit Characteristics

XMTR	NOT_CARE
LOCAL CONTROL	NO
COMPONENT	ALL_COMPONENTS
HISTORICAL	NO
MAX DATA	25 datapoints per Logical Unit

40.2.8.3 Logical Unit Datapoint Entries - Each of the datapoints have the same format. The same Datapoint Entry format is applicable to AEE, DME/P and RCSU sections.

NOTE: see USER_ACCESS_n in 40.2

LU/DP NUM.	DP-MNEMONIC (ASCII)	DP_TYPE (QUANTITY)	DP_UNITS
8/1	USER_ACCESS_0	T_ACSCII	U_NONE
8/2	USER_ACCESS_1	T_ACSCII	U_NONE
8/3	USER_ACCESS_2	T_ACSCII	U_NONE
8/4	USER_ACCESS_3	T_ACSCII	U_NONE
8/5	USER_ACCESS_4	T_ACSCII	U_NONE
8/6	USER_ACCESS_5	T_ACSCII	U_NONE
8/7	USER_ACCESS_6	T_ACSCII	U_NONE
8/8	USER_ACCESS_7	T_ACSCII	U_NONE
8/9	USER_ACCESS_8	T_ACSCII	U_NONE
8/10	USER_ACCESS_9	T_ACSCII	U_NONE
8/11	USER_ACCESS_10	T_ACSCII	U_NONE
8/12	USER_ACCESS_11	T_ACSCII	U_NONE
8/13	USER_ACCESS_12	T_ACSCII	U_NONE
8/14	USER_ACCESS_13	T_ACSCII	U_NONE
8/15	USER_ACCESS_14	T_ACSCII	U_NONE
8/16	USER_ACCESS_15	T_ACSCII	U_NONE
8/17	USER_ACCESS_16	T_ACSCII	U_NONE
8/18	USER_ACCESS_17	T_ACSCII	U_NONE
8/19	USER_ACCESS_18	T_ACSCII	U_NONE
8/20	USER_ACCESS_19	T_ACSCII	U_NONE
8/21	USER_ACCESS_20	T_ACSCII	U_NONE
8/22	USER_ACCESS_21	T_ACSCII	U_NONE
8/23	USER_ACCESS_22	T_ACSCII	U_NONE
8/24	USER_ACCESS_23	T_ACSCII	U_NONE
8/25	USER_ACCESS_24	T_ACSCII	U_NONE

40.2.9 SCHEDULED PERIODS

40.2.9.1 Definition - The Scheduled Periods Logical Unit provides the user entered times when periodic data collections are initiated. The collected data is then deposited into the periodic historical Unit.

Each datapoint consists of a time-of-day. This Logical Unit is only changed by P/T Command. It cannot be accessed unless the user has the appropriate access level.

MPS: Whenever a datapoint is changed, a state change message is sent to the MPS.

40.2.9.2 Logical Unit Characteristics

XMTR	NOT_CARE
LOCAL CONTROL	NO
COMPONENT	AEE or DME/P
HISTORICAL	NO
MAX_DATA	16 datapoints per Logical Unit

40.2.9.3 Logical Unit Datapoint Entries - Each of the datapoints have the same format. The same Datapoint Entry format is applicable to AEE, DME/P and RCSU sections.

NOTE: see SCHEDULE_PERIOD_n in 40.2.

LU/DP NUM.	DP-MNEMONIC (ASCII)	DP_TYPE (QUANTITY)	DP_UNITS
9/1	SCHEDULE_PERIOD_0	T_ACSCII	U_NONE
9/2	SCHEDULE_PERIOD_01	T_ACSCII	U_NONE
9/3	SCHEDULE_PERIOD_02	T_ACSCII	U_NONE
9/4	SCHEDULE_PERIOD_03	T_ACSCII	U_NONE
9/5	SCHEDULE_PERIOD_04	T_ACSCII	U_NONE
9/6	SCHEDULE_PERIOD_05	T_ACSCII	U_NONE
9/7	SCHEDULE_PERIOD_06	T_ACSCII	U_NONE
9/8	SCHEDULE_PERIOD_07	T_ACSCII	U_NONE
9/9	SCHEDULE_PERIOD_08	T_ACSCII	U_NONE
9/10	SCHEDULE_PERIOD_09	T_ACSCII	U_NONE
9/11	SCHEDULE_PERIOD_010	T_ACSCII	U_NONE
9/12	SCHEDULE_PERIOD_011	T_ACSCII	U_NONE
9/13	SCHEDULE_PERIOD_012	T_ACSCII	U_NONE
9/14	SCHEDULE_PERIOD_013	T_ACSCII	U_NONE
9/15	SCHEDULE_PERIOD_014	T_ACSCII	U_NONE
9/16	SCHEDULE_PERIOD_015	T_ACSCII	U_NONE

40.2.10 MISCELLANEOUS PARAMETERS

40.2.10.1 Definition - The AEE and DME/P Miscellaneous Parameters are datapoints within this Logical Unit which are collected datapoints. They are not used for any threshold checking.

MPS: Mo messages are sent to the MPS when these datapoints are modified.

40.2.10.2 Logical Unit Characteristics

XMTR		NON_TRANSMITTING
LOCAL CONTROL		NO N/A
COMPONENT		ALL_COMPONENTS
HISTORICAL		NO
MAX_DATA	Byte	28 datapoints per Logical Unit

40.2.10.3 Logical Unit Datapoint Entries

40.2.10.3.1 AEE Miscellaneous Logical Unit

AEE MISCELLANEOUS DATAPOINTS

LU/DP NUM.	DP-MNEMONIC (ASCII)	(QUANTITY)	DP_TYPE	DP_UNITS
10/1	EEPROM_WRITE_MAX		T_WORD	U_NONE
10/2	EEPROM_WRITE_MAX		T_WORD	U_NONE
10/3	EEPROM_WRITE_MAX		T_WORD	U_NONE

40.2.10.3.2 DME/P miscellaneous Logical Unit

DME/P MISCELLANEOUS DATAPOINTS

LU/DP NUM.	DP-MNEMONIC (ASCII)	(QUANTITY)	DP_TYPE	DP_UNITS
10/1	EEPROM_ACTIVITY_COUNT1		T_WORD	U_NONE
10/2	EEPROM_ACTIVITY_COUNT2		T_WORD	U_NONE
10/3	SOFTWARE_VERSION_SYSTEM		T_ASCII	U_NONE
10/4	SOFTWARE_VERSION_EQM		T_ASCII	U_NONE
10/5	SOFTWARE_VERSION_MON_VER		T_ASCII	U_NONE
	DIAGNOSTIC PERFORMANCE VALUES			
10/6	IA_DEADTIME		T_WORD	U_NSEC
10/7	FA_DEADTIME		T_WORD	U_NSEC
10/8	ECHO_SUPPRESSION_TIME		T_WORD	U_NSEC
10/9	1350-HZ-RATE		T_WORD	U_PPS
10/10	IA_DECODES_1_SECOND		T_WORD	U_PPS
10/11	IA_DECODES_10_SECOND		T_WORD	U_PPS
10/12	FA_DECODES_10_SECOND		T_WORD	U_PPS
10/13	SQUITTER_RATE_1_SECOND		T_WORD	U_PPPS
10/14	SQUITTER_RATE_10_SECOND		T_WORD	U_PPPS
10/15	LOAD-VSWR		T_WORD	U_NONE
10/16	IA_ADC_COR_FTR1	128	T_INTEGER	U_NSEC
10/17	IA_ADC_COR_FTR2	128	T_INTEGER	U_NSEC
10/18	FA_ADC_COR_FTR1	128	T_INTEGER	U_NSEC
10/19	FA_AOC_COR_FTR2	128	T_INTEGER	U_NSEC
10/20	TIMER_CORRECTION_FACTOR		T_INTEGER	U_NSEC
10/21	INT_COR_FTR		T_WORD	U_NSEC
10/22	REPLY_CORRECT		T_WORD	U_NSEC

40.2.10.3.2 DME/P Miscellaneous Logical Unit

LU/DP NUM.	DP-MNEMONIC (ASCII)	DP_TYPE (QUANTITY)	DP_UNITS
	PARAMETER MONITOR PERCENTAGE		
10/23	IA_PFE_PERCENTAGE	T_WORD	U_%
10/24	IA_10_RAD_PERCENTAGE	T_WORD	U_%
10/25	FA_PFE_PERCENTAGE	T_WORD	U_%
10/26	FA_10_RAD_PERCENTAGE	T_WORD	U_%
10/27	IA_CMN_PERCENTAGE	T_WORD	U_%
10/28	FA_CMN-PERCENTAGE	T_WORD	U_%

40.2.10.3.3 RCSU Miscellaneous Logical Unit

RCSU MISCELLANEOUS DATAPOINTS

LU/DP NUM.	DP-MNEMONIC (ASCII)	DP_TYPE (QUANTITY)	DP_UNITS
10/1	EEPROM_WRITE_MAX	T_WORD	U_NONE
10/2	EEPROM_WRITE_COUNT1	T_WORD	U_NONE
10/3	EEPROM_WRITE_COUNT2	T_WORD	U_NONE

40.2.11 CONFIDENCE CHECKS

40.2.11.1 Definition - The Confidence Checks Logical Unit parameters are datapoints within this Unit. These datapoints are the results of BIT tests.

The datapoints for the AEE RCSU a DME/P components are different.

MPS: No MPS messages are directly related to this Logical Unit.

40.2.11.2 Logical Unit Characteristics

XMTR	NOT_CARE
LOCAL CONTROL	NO N/A
COMPONENT	ALL_COMPONENTS
HISTORICAL	NO
MAX_DATA	20 datapoints per Logical Unit

40.2.11.3 Logical Unit Datapoint Entries

40.2.11.3.1 AEE Confidence Checks Logical Unit

LU/DP NUM.	DP-MNEMONIC (ASCII)	DP_TYPE (QUANTITY)	DP_UNITS
11/1	BS-RAM_TEST_RESULT	T_BYTE	U_NONE
11/2	BS-ROM_TEST_RESULT	T_BYTE	U_NONE
11/3	BS-SB_PROM_CS_TEST_RESULT	T_BYTE	U_NONE
11/4	BS-TIMERS_TEST_RESULT	T_BYTE	U_NONE
11/5	SC-RAM_TEST_RESULT	T_BYTE	U_NONE
11/6	SC-ROM_TEST_RESULT	T_BYTE	U_NONE
11/7	SC-TIMERS_TEST_RESULT	T_BYTE	U_NONE
11/8	SC_UART_TEST_RESULT	T_BYTE	U_NONE
11/9	EM_RAM_TEST_RESULT	T_BYTE	U_NONE
11/10	EM_ROM_TEST_RESULT	T_BYTE	U_NONE
11/11	EM_TIMERS_TEST_RESULT	T_BYTE	U_NONE
11/12	EC_RAM_TEST_RESULT	T_BYTE	U_NONE
11/13	EC_ROM_TEST_RESULT	T_BYTE	U_NONE
11/14	EC_TIMERS_TEST_RESULT	T_BYTE	U_NONE
11/15	EC_UART1_TEST_RESULT	T_BYTE	U_NONE
11/16	EC_UART2_TEST_RESULT	T_BYTE	U_NONE
11/17	EC_UART3_TEST_RESULT	T_BYTE	U_NONE
11/18	EC_UART4_TEST_RESULT	T_BYTE	U_NONE
11/5	SM-RAM_TEST_RESULT	T_BYTE	U_NONE
11/20	EC-COM_LOOPBACK_TEST_RESULT	T_BYTE	U_NONE

40.2.11.3.2 DME/P Confidence Checks Logical Unit

LU/DP NUM.	DP-MNEMONIC (ASCII)	DP_TYPE (QUANTITY)	DP_UNITS
11/1	EQM_RAM_TEST_RESULT	T_BYTE	U_NONE
11/2	EQM-ROM_TEST_RESULT	T_BYTE	U_NONE
11/3	EQM_TIMERS_TEST_RESULT	T_BYTE	U_NONE
11/4	EQM_UART_TEST_RESULT	T_BYTE	U_NONE
11/5	LCSU_RAM_TEST_RESULT	T_BYTE	U_NONE
11/6	LCSU-ROM_TEST_RESULT	T_BYTE	U_NONE
11/7	LCSU-TIMERS_TEST_RESULT	T_BYTE	U_NONE
11/8	LCSU_UART_TEST_RESULT	T_BYTE	U_NONE

40.2.11.3.3 RCSU EA Confidence Checks Logical Unit

LU/DP NUM.	DP-MNEMONIC (ASCII)	DP_TYPE (QUANTITY)	DP_UNITS
11/1	EA_RAM_TEST_RESULT	T_BYTE	U_NONE
11/2	EA_ROM_TEST_RESULT	T_BYTE	U_NONE
11/3	EA_TIMERS_TEST_RESULT	T_BYTE	U_NONE
11/4	EA_UART1_TEST_RESULT	T_BYTE	U_NONE
11/5	EA_UART2_TEST_RESULT	T_BYTE	U_NONE
11/6	EA_UART3_TEST_RESULT	T_BYTE	U_NONE
11/7	EA_UART4_TEST_RESULT	T_BYTE	U_NONE
11/8	EA-COM_LOOPBACK_TEST_RESULT	T_BYTE	U_NONE
11/9	PNL1_RAM_TEST_RESULT	T_BYTE	U_NONE
11/10	PNL1_ROM_TEST_RESULT	T_BYTE	U_NONE
11/11	PNL1_TIMERS_TEST_RESULT	T_BYTE	U_NONE
11/12	PNL1_UART_TEST_RESULT	T_BYTE	U_NONE
11/13	PNL2_RAM_TEST_RESULT	T_BYTE	U_NONE
11/14	PNL2_ROM_TEST_RESULT	T_BYTE	U_NONE
11/15	PNL2_TIMERS_TEST_RESULT	T_BYTE	U_NONE
11/16	PNL2_UART_TEST_RESULT	T_BYTE	U_NONE
11/17	PNL3_RAM_TEST_RESULT	T_BYTE	U_NONE
11/18	PNL3_ROM_TEST_RESULT	T_BYTE	U_NONE
11/19	PNL3_TIMERS_TEST_RESULT	T_BYTE	U_NONE
11/20	PNL3_UART_TEST_RESULT	T_BYTE	U_NONE

40.2.12 COMMUNICATION STATISTICS

40.2.12.1 Definition - The Communication Statistics datapoints are Datapoints within this Logical Unit. These datapoints are the results of continuous communication statistics gathering performed by the communication software. The statistics are collected periodically and deposited in this Logical Unit.

The Datapoints for the AEE, RCSU and DME/P components are different.

MPS: No MPS messages are directly related to this Logical Unit.

40.2.12.2 Logical Unit Characteristics

XTMR	NOT_CARE
LOCAL CONTROL	NO N/A
COMPONENT	ALL_COMPONENTS
HISTORICAL	NO
MAX_DATA	35 datapoints per Logical Unit

40.2.12.3 Logical Unit Datapoint Entries

40.2.12.3.1 AEE Communication Statistics Logical Unit

AEE COMMUNICATION STATISTICS DATAPOINTS

LU/DP NUM.	DP-MNEMONIC (ASCII)	DP_TYPE (QUANTITY)	DP_UNITS
12/1	K1_COUNT_MICNET	T_WORD	U_NONE
12/2	K2_COUNT_MICNET	T_WORD	U_NONE
12/3	L2_COUNT_MICNET	T_WORD	U_NONE
12/4	K5_COUNT_MICNET	T_WORD	U_NONE
12/5	L5_COUNT_MICNET	T_WORD	U_NONE
12/6	K6_COUNT_MICNET	T_WORD	U_NONE
12/7	K7_COUNT_MICNET	T_WORD	U_NONE
12/8	K1_COUNT_DATABUS	T_WORD	U_NONE
12/9	K2_COUNT_DATABUS	T_WORD	U_NONE
12/10	L2_COUNT_DATABUS	T_WORD	U_NONE
12/11	K5_COUNT_DATABUS	T_WORD	U_NONE
12/12	L5_COUNT_DATABUS	T_WORD	U_NONE
12/13	K6-COUNT_DATABUS	T_WORD	U_NONE
12/14	K7_COUNT_DATABUS	T_WORD	U_NONE

40.2.12.3.2 DME/P Communication Statistics Logical Unit

DME/P COMMUNICATION STATISTICS DATAPOINTS

LU/DP NUM.	DP-MNEMONIC (ASCII)	DP_TYPE (QUANTITY)	DP_UNITS
12/1	K1_COUNT_DME	T_WORD	U_NONE
12/2	K2_COUNT_DME	T_WORD	U_NONE
12/3	L2_COUNT_DME	T_WORD	U_NONE
12/4	K5_COUNT_DME	T_WORD	U_NONE
12/5	L5_COUNT_DME	T_WORD	U_NONE
12/6	K6-6OUNT_DME	T_WORD	U_NONE
12/7	K7_COUNT_DME	T_WORD	U_NONE

40.2.12.3.3 RCSU EA Communication Statistics Logical Unit

RCSU EA COMMUNICATION STATISTICS DATAPOINTS

LU/DP NUM.	DP-MNEMONIC (ASCII)	DP_TYPE (QUANTITY)	DP_UNITS
12/1	K1_COUNT_MICNET	T_WORD	U_NONE
12/2	K2_COUNT_MICNET	T_WORD	U_NONE
12/3	L2_COUNT_MICNET	T_WORD	U_NONE
12/4	K5_COUNT_MICNET	T_WORD	U_NONE
12/5	L5_COUNT_MICNET	T_WORD	U_NONE
12/6	K6_COUNT_MICNET	T_WORD	U_NONE
12/7	K7_COUNT_MICNET	T_WORD	U_NONE
12/8	K1_COUNT_RMMS	T_WORD	U_NONE
12/9	K2_COUNT_RMMS	T_WORD	U_NONE
12/10	L2_COUNT_RMMS	T_WORD	U_NONE
12/11	K5_COUNT_RMMS	T_WORD	U_NONE
12/12	L5_COUNT_RMMS	T_WORD	U_NONE
12/13	K6_COUNT_RMMS	T_WORD	U_NONE
12/14	K7_COUNT_RMMS	T_WORD	U_NONE
12/15	K1_COUNT_RCSU_PANEL	T_WORD	U_NONE
12/16	K2_COUNT_RCSU_PANEL	T_WORD	U_NONE
12/17	L2_COUNT_RCSU_PANEL	T_WORD	U_NONE
12/18	K5_COUNT_RCSU_PANEL	T_WORD	U_NONE
12/19	L5_COUNT_RCSU_PANEL	T_WORD	U_NONE
12/20	K6_COUNT_RCSU_PANEL	T_WORD	U_NONE
12/21	K7_COUNT_RCSU_PANEL	T_WORD	U_NONE
12/22	K1_COUNT_RSU1_PANEL	T_WORD	U_NONE
12/23	K2_COUNT_RSU1_PANEL	T_WORD	U_NONE
12/24	L2_COUNT_RSU1_PANEL	T_WORD	U_NONE
12/25	K5_COUNT_RSU1_PANEL	T_WORD	U_NONE
12/26	L5_COUNT_RSU1 PANEL	T_WORD	U_NONE
12/27	K6_COUNT_RSU1_PANEL	T_WORD	U_NONE
12/28	K7_COUNT_RSU1_PANEL	T_WORD	U_NONE
12/29	K1_COUNT_RSU2_PANEL	T_WORD	U_NONE
12/30	K2_COUNT_RSU2_PANEL	T_WORD	U_NONE
12/31	L2_COUNT_RSU2_PANEL	T_WORD	U_NONE
12/32	K5_COUNT_RSU2_PANEL	T_WORD	U_NONE
12/33	L5_COUNT_RSU2_PANEL	T_WORD	U_NONE
12/34	K6_COUNT_RSU2_PANEL	T_WORD	U_NONE
12/35	K7_COUNT_RSU2_PANEL	T_WORD	U_NONE

40.2.13 HARD ALARM HISTORICAL

40.2.13.1 Definition - Historical hard alarm records are created whenever a Azimuth/Elevation Electronics (AEE) or DME/P transitions occur due to an integrity alarm or secondary alert parameter exceeding a threshold.

The transitions causing Historical Alarm records to be created are:

Azimuth/Elevation Electronics (AEE):

TRANSITION FROM STATE	TO STATE	CAUSE
Start	Alarm	Synchronization alarm
Normal/Mon. Bypass	Alarm	Synchronization alarm
Maint./Mon. Bypass	Alarm	Synchronization alarm
Alert/Mon. Bypass	Alarm	Synchronization alarm
Normal	Alarm	Any alarm
Normal/Alert	Alarm	Any alarm
Maint.	Alarm	Any alarm
Main/Alert	Alarm	Any alarm
Normal	Alarm	Any alarm
Maint.	Alarm	Any alarm*

Definitions:		
	Alarm	- Integrity Alarm
	Alert	- Secondary Alert
	Maint.	- Maintenace
	Mon.	- Monitor

The datapoints for the AEE and DME/P components are different.

* Morse Code ID and Basic Data Word 6 are suppressed in the maintenance mode. The preambles are radiated with odd parity.

Precision Distance Measuring Equipment (DME/P):

TRANSITION FROM STATE	TO STATE	CAUSE
Fast Calibrate	Alarm	IA Alarm, FA alarm or generic integrity parameter alarm
Normal	Alarm	IA Alarm, FA alarm or generic integrity parameter alarm
Normal/Alert	Alarm	IA Alarm, FA alarm or generic integrity parameter alarm
Maintenance	Alarm	IA Alarm, FA alarm or generic integrity parameter alarm
Maintenance/Alert	Alarm	IA Alarm, FA alarm or generic integrity parameter alarm
Maintenance	Alert	Any alert*
Normal	Alert	See alert
Alarm	Alarm	See note
Normal/Monitor Bypass	Alarm	High VSWR alarm
Main./Monitor Bypass	Alarm	High VSWR alarm

Note: If the current state is FA alarm then a IA Alarm or generic integrity parameter alarm causes the transition to the alarm state. If the current state is IA Alarm then a FA Alarm or generic integrity parameter causes the transition to the alarm state.

* Morse Code and "transponding" are suppressed

MPS: Hard alarm MPS messages are sent whenever an entry is made in this Logical Unit. Note: there are other times when hard alarm messages are sent that do not correspond to the creation of a historical record. (For example, when the monitor is bypassed then no record is created but an MPS hard alarm message is sent.

40.2.13.2 Logical Unit Characteristics

XTMR	NOT_CARE
LOCAL CONTROL	NO
COMPONENT	AEE or DME/PS
HISTORICAL	YES
MAX_DATA	10 datapoints per records
MAX_RECORDS	6

40.2.13.3 Logical Unit Datapoint Entries

40.2.13.3.1 AEE Hard Alarm Historical Logical Unit

RECORD(n) AEE HARD ALARM HISTORICAL RECORD

LU/DP NUM.	DP-MNEMONIC (ASCII)	DP_TYPE (QUANTITY)	DP_UNITS
13/1	DATE_TIME_OF_EVENT	T_ASCII	U_NONE
13/2	ALARM_ALERT_LU	T_BYTE	U_NONE
13/3	ALARM_ALERT_DP	T_BYTE	U_NONE
13/4	LRU_RESULT_1	T_BYTE	U_NONE
13/5	LRU_RESULT_2	T_BYTE	U_NONE
13/6	LRU_RESULT_3	T_BYTE	U_NONE

13/7 (datapoints from the AEE Alarm/Alert Parameter Logical Unit are placed here)

13/8 (datapoints from the AEE Alarm/Alert Thresholds Logical Unit are placed here)

13/9 (datapoints from the AEE Maintenance Parameter Logical Unit are placed here)

13/10 (datapoints from the AEE Maintenance Thresholds Logical Unit are placed here)

40.2.13.3.2 DME/P Hard Alarm Historical Logical Unit

RECORD(n) DME/P HARD ALARM HISTORICAL RECORD

LU/DP NUM.	DP-MNEMONIC (ASCII)	DP_TYPE (QUANTITY)	DP_UNITS
13/1	DATE_TIME_OF_EVENT	T_ASCII	U_NONE
13/2	ALARM_ALERT_LU	T_BYTE	U_NONE
13/3	ALARM_ALERT_DP	T_BYTE	U_NONE
13/4	LRU_RESULT_1	T_BYTE	U_NONE
13/5	LRU_RESULT_2	T_BYTE	U_NONE
13/6	LRU_RESULT_3	T_BYTE	U_NONE

13/7 (datapoints from the DME/P Alarm/Alert Parameter Logical Unit are placed here)

13/8 (datapoints from the DME/P Alarm/Alert Thresholds Logical Unit are placed here)

13/9 (datapoints from the DME/P Maintenance Parameter Logical Unit are placed here)

13/10 (datapoints from the DME/P Maintenance Thresholds Logical Unit are placed here)

40.2.14 SOFT ALARM HISTORICAL

40.2.14.1 Definition - Historical Soft Alarm records are created whenever a AEE or DME/P transition occurs due to a maintenance alert parameter exceeding a threshold.

The transitions causing Historical Soft Alarm records to be created are related to individual datapoints and the state of the equipment. The datapoints must be in a normal condition and transition to a exceed threshold condition before a maintenance alert is declared. The states where this transition causes a record to be created are given below:

Azimuth/Elevation Electronics (AEE):

Normal
Start
Alarm
Normal/Secondary Alert
Maintenance
Maintenance/Secondary Alert

DME/P:

Normal
Start
Alarm
Normal/Secondary Alert
Maintenance
Maintenance/Secondary Alert

RCSU EA:

Normal

The datapoints for the AEE, RCSU EA and DME/P components are different.

MPS: Soft alarm MPS messages are sent whenever an entry is made in this Logical Unit.

40.2.14.2 Logical Unit Characteristics

XTMR	NOT_CARE
LOCAL CONTROL	NO
COMPONENT	ALL_COMPONENTS
HISTORICAL	YES
MAX_DATA	3 datapoints per records
MAX_RECORDS	6

40.2.14.3 Logical Unit Datapoint Entries

40.2.14.3.1 AEE Soft Alarm Historical Logical Unit

RECORD(n) AEE SOFT ALRARM HISTORICAL RECORD

LU/DP NUM.	DP-MNEMONIC (ASCII)	DP_TYPE (QUANTITY)	DP_UNITS
14/1	DATE_TIME_OF_EVENT	T_ASCII	U_NONE
14/2	MAIN_ALERT_LU	T_BYTE	U_NONE
14/3	MAIN_ALERT_DP	T_BYTE	U_NONE

40.2.14.3.2 DME/P Soft Alarm Historical Logical Unit

RECORD(n) DME/P SOFT ALARM HISTORICAL RECORD

LU/DP NUM.	DP-MNEMONIC (ASCII)	DP_TYPE (QUANTITY)	DP_UNITS
14/1	DATE_TIME_OF_EVENT	T_ASCII	U_NONE
14/2	MAIN_ALERT_LU	T_BYTE	U_NONE
14/3	MAIN_ALERT_DP	T_BYTE	U_NONE

40.2.14.3.3 RCSU EA Soft Alarm Historical Unit

RECORD(n) RCSU EA SOFT ALRARM HISTORICAL RECORD

LU/DP NUM.	DP-MNEMONIC (ASCII)	DP_TYPE (QUANTITY)	DP_UNITS
14/1	DATE_TIME_OF_EVENT	T_ASCII	U_NONE
14/2	MAIN_ALERT_LU	T_BYTE	U_NONE
14/3	MAIN_ALERT_DP	T_BYTE	U_NONE

40.2.15 STATE CHANGE HISTORICAL

40.2.15.1 Definition - Historical state change records are created whenever a datapoint considered a "state" parameter by the MPS is changed. These datapoints are in the following Logical Units:

Logical Unit	AEE	DME/P	RCSU EA
Site Parameters	Yes	Yes	Yes
Alarm/alert Thresholds	Yes	Yes	No
Maintenance Thresholds	Yes	Yes	Yes
User Access	Yes	Yes	Yes
Schedule Periods	Yes	Yes	Yes
Control Parameters	Yes	Yes	Yes

MPS: STATE CHANGE MPS messages are sent whenever a state parameter is modified.

40.2.15.2 Logical Unit Characteristics

XTMR	NOT_CARE
LOCAL CONTROL	NO N/A
COMPONENT	ALL_COMPONENTS
HISTORICAL	YES
MAX_DATA	4 datapoints per Logical Unit
MAX_RECORDS	6

40.2.15.3 Logical Unit Datapoint Entries

40.2.15.3.1 AEE State Change Historical Logical Unit

RECORD(n) AEE STATE CHANGE HISTORICAL RECORD

LU/DP NUM.	DP-MNEMONIC (ASCII)	(QUANTITY)	DP_TYPE	DP_UNITS
15/1	DATE_TIME_OF_EVENT		T_ASCII	U_NONE
15/2	STATE_CHANGE_LU		T_BYTE	U_NONE
15/3	STATE_CHANGE_DP		T_BYTE	U_NONE
15/4	STATE_VALUE	(up to) 20	T_BYTE	U_NONE

40.2.15.3.2 DME/P State Change Historical Logical Unit

RECORD(n) DME/P STATE CHANGE HISTORICAL LOGICAL UNIT

LU/DP NUM.	DP-MNEMONIC (ASCII)	(QUANTITY)	DP_TYPE	DP_UNITS
15/1	DATE_TIME_OF_EVENT		T_ASCII	U_NONE
15/2	STATE_CHANGE_LU		T_BYTE	U_NONE
15/3	STATE_CHANGE_DP		T_BYTE	U_NONE
15/4	STATE_VALUE	(up to) 20	T_BYTE	U_NONE

40.2.15.3.3 RCSU EA State Change Historical Logical Unit

RECORD(n) RCSU EA STATE CHANGE HISTORICAL RECORD

LU/DP NUM.	DP-MNEMONIC (ASCII)	(QUANTITY)	DP_TYPE	DP_UNITS
15/1	DATE_TIME_OF_EVENT		T_ASCII	U_NONE
15/2	STATE_CHANGE_LU		T_BYTE	U_NONE
15/3	STATE_CHANGE_DP		T_BYTE	U_NONE
15/4	STATE_VALUE	(up to) 20	T_BYTE	U_NONE

40.2.16 PERIODIC HISTORICAL

40.2.16.1 Definition - Historical periodic records are created whenever a periodic schedule is undertaken. These collections occur according to the times specified in the scheduled periods Logical Unit. The process is to copy the data from the Logical Units specified in the data definition section (see below) and create a record in this Logical Unit.

MPS: No messages are sent to the MPS when datapoints are modified.

40.2.16.2 Logical Unit Characteristics

XTMR	NOT_CARE
LOCAL CONTROL	NO N/A
COMPONENT	ALL COMPONENTS
HISTORICAL	YES
MAX_DATA	6 datapoints per record
MAX_RECORDS	8

40.2.16.3 Periodic Historical Logical Unit

40.2.16.3.1 AEE Periodic Historical Logical Unit

RECORD(n) AEE PERIODIC HISTORICAL RECORD

LU/DP NUM.	DP-MNEMONIC (ASCII)	DP_TYPE (QUANTITY)	DP_UNITS
16/1	DATE_TIME_OF_EVENT	T_ASCII	U_NONE
16/2	(datapoints from the AEE Alarm/Alert Parameter Logical Unit are placed here)		
16/3	(datapoints from the AEE Alarm/Alert Thresholds Logical Unit are placed here)		
16/4	(datapoints from the AEE Maintenance Parameter Logical Unit are placed here)		
16/5	(datapoints from the AEE Maintenance Thresholds Logical Unit are placed here)		
16/6	(datapoints from the AEE Control Logical Unit are placed here)		

40.2.16.3.2 DME/P Periodic Historical Logical Unit

RECORD(n) DME/P PERIODIC HISTORICAL RECORD

LU/DP NUM.	DP-MNEMONIC (ASCII)	DP_TYPE (QUANTITY)	DP_UNITS
16/1	DATE_TIME_OF_EVENT	T_ASCII	U_NONE
16/2	(datapoints from the DME/P Alarm/Alert Parameter Logical Unit are placed here)		
16/3	(datapoints from the DME/P Alarm/Alert Thresholds Logical Unit are placed here)		
16/4	(datapoints from the DME/P Maintenance Parameter Logical Unit are placed here)		
16/5	(datapoints from the DME/P Maintenance Thresholds Logical Unit are placed here)		
16/6	(datapoints from the DME/P Control Logical Unit are placed here)		

40.2.16.3.3 RCSU EA Periodic Historical Logical Unit

RECORD(n) RCSU EA PERIODIC HISTORICAL RECORD

LU/DP NUM.	DP_MNEMONIC (ASCII)	DP_TYPE (QUANTITY)	DP_UNITS
16/1	DATE_TIME_OF_EVENT	T_ASCII	U_NONE
16/2	(datapoints from the RCSU Maintenance Parameters Logical Unit are placed here)		
16/3	(datapoints from the RCSU Maintenance Thresholds Logical Unit are placed here)		
16/4	(datapoints from the RCSU Control Logical Unit are placed here)		

40.2.17 RMS MASTER

40.2.17.1 Definition - The Logical Unit Identifier 32 is assigned for the "RMS MASTER" logical Unit. This LU is used by the Maintenance Processing Subsystem (MPS) when the entire MLS is addressed as one Remote Maintenance Unit (RMS). There is no datapoint in this LU.

40.2.17.2 Logical Unit Characteristics

Not applicable.

40.2.17.3 Logical Unit Datapoint Entries

Not applicable.