APPENDIX II

Data File Definition for AEwin™

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APPENDIX II

DATA FILE DEFINITION FOR AEwin™

This document gives the format of the AEwin data files. These files are created by the AEwin when acquiring data in AUTODUMP mode. When data is dumped to disk, a file specified by the user, with the extension .DTA (e.g., TEST0000.DTA) is created.

The data file consists of three basic types of variable length messages. These messages are (I) Products Definition Messages (II) Test Setup Messages and (III) Messages from the test. Each message has two bytes for length, 1 byte for ID (2 bytes for ID followed by 2 bytes for format version number in messages with ID41 to 44 only) and a variable length body. The messages 41-44 are special messages in that they are also included in the INI files.

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PAC MESSAGE DEFINITIONS

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PAC MESSAGE DEFINITIONS

1. INTRODUCTION

This document describes the messages used to communicate between various processes within the data acquisition and replay environment of PAC products including; SPARTAN, MISTRAS, DiSP, PCI-2, PCI-8(SAMOS), and Digital AIMS ADTI. These messages may be commands and/or data depending on where they are generated within the system and where they are sent. The same types of messages are saved in the data files.

The message structure was developed for the first SPARTAN implementation to allow communication between the SPARTAN main chassis (GCC) and High End (HE), but it has been extended as our products have matured and have grown technically. Other general principals have been applied when assigning message ID numbers: the IDs from 200 to 255 were reserved for applications, ID = 0 is illegal, once an ID assigned a meaning and implemented for some product, it can only be used by a different product for the same function. By the time the second application program was designed it seemed that the 55 message ID values would quickly be used up, and therefore later application messages have added structure by using a message "subfunction" byte (e.t., 172, 42 for MI-TRA.

Once assigned, we try to avoid changing the meaning of a message ID according to where it is at a given time or which direction it is going. Thus, AE data messages always have a message ID of 1 and the Resume message has an ID of 128. Commands and messages may be built up using other messages by "sequence" or by using an new id to combine a series of messages into a "single" block. The "Start" command is actually 2 commands; a Clear Time of Test Clock command and a "Resume" command. The "Resume" command and the "Resume" message share the same message ID; user commands are sent to the GCC as 1 byte versions of message and the returned (data) message with the Time of Test confirms that the GCC has completed the requested action. So the "command" message is "hidden" from the rest of the world. Any subsequent use of the message may or may not use the time of test attached to it depending to the application. The "Resume" which is a start, normally has its time of test IGNORED (the program treats it as 0 since it follows a Clear Clock) but subsequent "Resume" messages have a new time of test which the programs can use.

This structure has been extended for the TRA products and the AEDSP software.

2. GENERAL MESSAGE INFORMATION

Classes of Messages

(I) HARDWARE STATUS AND CONTROL Messages [[NOT IN THE DATA FILES]]

(II) PRODUCT SPECIFIC Messages

These are messages, only found in the data files, which have a general form but their details will vary with the products.

Product Identification Message: Identifies the Product and its Version.

Product Special Message: Test, Product specific information PRIMARILY for post test report generation but may contain configuration information.

Product Post Test Filter Description Message: While the form of this message should be the same for all the products, the details of the filter process are product specific. Similar to the setup message, THIS OUGHT TO CONTAIN ALL THE INFORMATION FOR THE FILTER AND ALSO SERVE AS THE BASE FOR ANY CODE TO SAVE OR RESTORE FILTERS FOR FUTURE USE.

(III) TEST SETUP Messages

These messages are used to set up the system hardware and the test parameters. The Test Setup messages include Test Label, Date and Time, Location Setup and the Hardware Setup Messages.

Test Label: Title or Name of the test.

Date and Time: Date and Time of Day (ASCII string) of start of test.

Location Setup: Defined in Location version data file only.

Hardware Setup: The Hardware setup message is group of setup messages.

(IV) Messages from the TEST

(A) DATA Messages: DATA messages include AE Hit Data, Time Driven Data, Sample Data, Alarm Data and User Comment Messages.

(B) CONTROL Messages: PAUSE, RESUME, STOP, and ABORT.

(V) Synchronization and Control Messages for "external" tasks

These include commands sent to the mGCC or AEDSP processors.

(VI) Data File Messages

Typical raw data (.DTA) files contain the following messages:

Type	Id	Description of Message Body
II	41	Product Definition
III	7	Test Label
III	99	Time of Day of start of test
III	44	Location setup message
III	42	Hardware setup message
V	128	Start/Resume test
IV	1	AE hit data
IV	2	Time Driven data
IV	3	Sample data
IV	7	User Comment
IV	130	Test Pause
IV	129	Test Stop
IV	15	Test Abort message

Message Format

Each message has two bytes for length and a body of that length of bytes. Thus the total length of the "transmission" is Length+2 bytes. The body of the message starts with a message id byte. Unfortunately it was felt that the software would be easier if the messages which "define" the file (Presently they have ID values from 40 to 49) if the ID space was an integer quantity. In fact, because the files contain messages with 1 byte id values, all the message IDs should be identified by the byte value. The legal range for an ID is 1 to 255.

Special setup files would contain only (primary) messages with 2 byte ID values for example the ".INI" files for setup of LOCAN 420, MISTRAS or SPARTAN 2000 data acquisition and replay. I would expect that we will expand this concept to at least the post test filtering programs when they have to be coded to save and restore user setup information.

The INI file contains the messages:

41 Product Definition
42 Hardware Setup
43 Graph Setup
44 Location Group Setup (even in non-location versions)
45 Acquisition Control
46 Auto Run
7 Test Title

and possibly:

49 Product Specific Information

In order to help the user to understand the structure of various types of messages, a set of them from the data file header will be briefly described. This should help to explain the message concept and give a good idea of the structure of a DTA or INI file.

ID 41 — ASCII Product Definition
(With example values)

LEN	b1, b2	2 bytes
ID	b1= 4 (29H) b2= 00	Product Definition Message ID high byte of ID (2 bytes)
PVERN	b1= 200 (C8H) b2= 00	Product version number (200) (2 bytes)
Prod_string	"LOCAN-AT",CR,LF ,"VERSION 2.00",CR,LF number, CR,LF	ASCII Product name, Carriage Return, Line Feed, Version

ID 7 — User Comments/Test Label

LEN	b1, b2	2 bytes
ID	b1=7 (07H)	User Comments or Test Label
	b1 | | bn	Text in ASCII

ID 99 — Time and Date Of Test Start

EN	b1, b2	2 bytes
ID	b1= 99 (63H)	Time and date of test start ID
"Sun Jul 03, " "08:49:55 1988"	(For Example)	ASCII date string, ASCII time and year string.

ID 44 — Location Definition
(Dummy message in Non-Location version)

LEN	b1, b2	2 bytes
ID	b1= 44 (2CH) b2= 00	Location Definition ID high byte of ID (2 bytes)

The MISTRAS DTA file also includes two TRA setup messages when the wave forms are being recorded.

ID 173,42 — Hardware Setup

ID 172,29 — Digital Filter Setup

ID 42 — Hardware Setup

LEN	b1, b2	2 bytes
ID	b1= 42 (2AH)	Hardware Setup ID
	b2= 00	high byte of ID (2 bytes)
MVERN	b1= 200 (C8H)	Message version number
b2= 00	(0 filled)	
LSUB 1		length of submessage 1 (2 bytes)
SUBID 1		submessage 1 ID (1 bytes),
SUBMSG 1		submessage 1 body.
|		
|		
LSUB I		length of submessage I (2 bytes),
SUBID I		submessage I ID (1 bytes),
SUBMSG I		submessage I body.
|		
|		
LSUB n		length of submessage n (2 bytes),
SUBID n		submessage n ID (1 bytes),
SUBMSG n		submessage n body

Note: Submessages are:

Start of Test Setup	ID = 100 (64H)
Set Sampling Interval	ID = 27 (1BH)
Set Demand Sampling Rate	ID = 102 (66H)
Pulser Rate	ID = 133 (85H)
Event Data Set Definition	ID = 5 (05H)
Demand Data Set Definition	ID = 6 (06H)
Group Definition	ID = 106 (6AH)
Alarm Definition	ID = 28 (1CH)
AE Filter Definition	ID = 29 (1DH)
Group Parametric Assignment	ID = 110 (6EH)
Group Settings	ID = 111 (6FH)
End of Group Settings	ID = 124 (7CH)
End of Setup	ID = 101 (65H)

3. DETAILED MESSAGE DESCRIPTIONS

The following is a list in numeric order of the messages. Each message has the two bytes for length explicitly shown, 1 byte for ID. (Remember there are a few messages with 2 bytes for the ID field EVEN THOUGH the ID is 1 byte long. They are shown with the O BYTE in the ID field.

Notation:

AM	-	Acquisition Module
#	-	'the number (of)'
PID	-	the Parametric Channel ID
CID	-	an AE channel ID
CHID	-	the AE characteristic ID number (List after Message #5) b1,b2,b3,b4,...
	-	bytes (least significant first)
V	-	value
RTOT	-	Time of test relative to the start of test
PVERN	-	Product version number
MVERN	-	Message version number
LEN	-	length of a message
Internal	-	Defined but never appear in the data file
Defined	-	Assigned for some product(s) may appear in a data file at some later date
Not Used	-	Reserved by PAC for future use

Setup Message Units

Threshold and Gain Units:	dB
HDT, Rearm Time:	2 µsec
PDT	1 µsec
Sampling Interval	1 msec

[Also MID 102 is in msec steps]
msec == milliseconds
µsec == microseconds

Front End Filter Types (ICC filtering)

SCSH Single Channel, Single Hit

GCC or Parametric Voltage Filtering

Alarms

SCSH Single Channel, Single Hit
SCTC Single Channel, Test Cumulative
GTC All Channels (Group), Test Cumulative
Parametric

ID 1 — AE Hit or Event Data

LEN	b1, b2	2 bytes
ID	b1=1 (01H)	AE Hit ID
RTOT	b1 b2 | | b6	Relative time of test
CID	b1	AE Channel Number
V1 | V1 | | Vm | Vm	b1 | bn | | b1 | bx	Value of First AE Characteristic as many as defined Value of Last AE Characteristic
PID1 V1 V2 V3 PIDj V1 V2 V3	b1 b2 b3 (b4) | | b1 b2 b3 (b4)	Hit Parametric Channel ID Parametric value (low byte) Parametric value (high byte) Cycle Counter MSB byte Last Hit Parametric Channel ID

ID 2 — "Time Driven" Sample Data

LEN	b1, b2	2 bytes
ID	b1 = 2 (02H)	Time Driven ID
RTOT	b1	Relative time of test
	b2	
	|	
	|	
	b6	
PID1	b1	First Parametric Channel ID
V1	b2	Parametric value (low byte)
V2	b3	Parametric value (high byte
(V3)	(b4)	(Cycle Counter MSB byte)
	|	
	|	
PIDj	b1	Last Parametric Channel ID
V1	b2	
V2	b3	
V3	(b4)	
CID	b1	ID of the first channel in use
V1	b1	Value of first AE Characteristic
.	.	
V1	bn	|
|	|	
|	|	
Vm	b1	Value of Last AE Characteristic
.	.	
Vm	bx	end of first channel
|	|	
|	|	
CID	b1	ID of the last channel in use
V1	b1	Value of First AE Characteristic
|	|	
V1	bn	|
|	|	
|	|	
Vm	B1	Value of Last AE Characteristic
|	|	
|	|	
Vm	bx	end of last channet
		end of Time data set

ID 3 — "User Forced" Sample Data — Now also a GCC Command

The message body is the same as the "Time Driven" Sample Data except that the ID changes from 2 to 3. The GCC forces one after all PAUSE commands or when the user invokes the keypad function.

ID 4 - GCC Module Detection of Error

Defined for mGCC Ver. 1.53 and later.
(V1.8+ planned to have control from H.E.)

LEN	b1, b2	2 bytes
ID	b1 = 4 (04H)	GCC detection of error
Error Code	b1	Error identification
Error Bytes	eb1 | ebX	Error information. May be text or garbled message from ICC.

Error Codes

b1 = 1	This is ICC-GCC transmission error. Bad CID, bad MID or bad message length. MID is part of the fifo information (1,2...). Also the fifo presents a total byte count = 2 + message length. The CID can only be the ICC's low or high channel.
eb1...ebX	The message that was not received correctly
b1 = 2	Internal GCC error detection: Error message displayed on LCD. {May be only in debug version.} and saved in error bytes field.
eb1...ebX	The text of the front panel error message.
b1 = 100 and 200-203	Used by the Combustion Engineering special software.

ID 5 — Event Data Set Definition

LEN	b1, b2	2 bytes
ID	b1=5 (05H)	Event Data set definition ID
# CHID	b1	Number of AE characteristics
V1 | Vm	b1 | b1	Value of CHID 1 Value of CHID m (last one) Value of CHID m (last one)
# PID	b1	Maximum number of Hit parametric

AE Characteristics Presently Defined or Planned

CHID Value	Size	Item
1	2	Rise Time of AE signal
2	2	AE Counts to Rise Time (or "Counts to peak")
3	2	Total AE counts
4	2	Energy counts (ASTM has another name for this)
5	4	Duration
6	1	Amplitude
7	1	RMS (volts) - After both were defined, the H/W
8	1	ASL (dB) - design allowed only 1 at a time.
9	1	Gain
10	1	Threshold
11	1	Pre-Amp Current
12	4	Lost Hits (per channel) WAS Overlap flag
13	2	Average Frequency (kHz) (1000* [3]/[5])

Tentative Assignments

14	2	Reserved (2 byte duration)
15	6	Reserved (6 byte TOT)
16	(4)	Reserved (Vari. length TOT with Message 12) (Example: Msg12 used in TI for 4 byte TOT.)

This is clearly a system with expansion capability, but we will need to try to do the expansion in an intelligent manner.

ID 6 — Time Driven/Demand Data Set Definition

LEN	b1, b2	2 bytes
	b2	High byte value
ID	b1=6 (06H)	Demand Data Set Definition ID
# CHID	b1	Number of AE char. in the demand data set
V1	b1	First CHID
|	|	
|	|	
Vn	b1	Last CHID
# PID	b1	Number of Parametric in user
V1	b1	First PID
|	|	
|	|	
Vn	b1	Last PID

ID 7 — User Comments/Test Label

LEN	b1, b2	2 bytes
ID	b1=7 (07H)	User Comments or Test Label
	b1	Text in ASCII
	|	
	|	
	bn	

ID 8 — Message for Continued File TYPE A

This one is at the END of the file and indicates that there was more data when space ran out on the disk.

LEN	b1, b2	2 bytes
ID	b1=8 (08H)	File continuation
	b1	Time & Date of continuation in DOS
	|	format so that 'gaps' in time in the
	|	continuation can be detected.
	b8	{CX,DX of DOS Time, CX,DX of DOS
		Date INT 21 DOS calls.}

ID 8 — Message for Continued File TYPE B

Appears only at the beginning of a file and indicates that the file is NOT the start of a test.

LEN	b1, b2	2 bytes
ID	b1=8 (08H)	File continuation
	b1	Time of continuation in DOS format
	|	exactly the same as written at the
	|	end of the preceding file.
	b8	
{complete setup record from the first file of the test}		

This is all the messages up to the "Start Test Command" which were written at the beginning of the first file. If that file were to be unavailable, then this allows this file to be analyzed.

ID 9/ID 10 — Not Used

ID 11 — Reset Absolute Time Clock

LEN	b1, b2	2 bytes
ID	b1=11 (0BH)	Reset Absolute Time Clock

ID 12 — Define the Size of the Clock Base ("Tick") Reserved

ID 13/ID 14 — Not Defined

ID 15 — Abort Data Acquisition

LEN	b1, b2	2 bytes
ID	b1=15(0FH)	Abort data acquisition/transfer ID
RTOT	b1	Relative time of test
	b2	
	|	
	|	
	b6y	

ID 16 — Alarm Data

LEN	b1, b2	2 bytes
ID	b1=16(10H)	Alarm message ID
RTOT	b1	Relative time of test
	b2	
	|	
	|	
	b6	
Level	b1	0 = warning, 1 = trip [C.E. 16,17]
AID	b1	Slarm ID
CID	b1	Channel number that generated the alarm
		0 if time alarm (C.E.)]
V	b1	Value of the alarm (LSB)
	b2	
	b3	
	b4	

ID 17 — Reserved

ID 18 — Reserved

ID 19 — Reserved

ID 20 — Reserved for Recording Pre-amp Gain
TRA 212 uses this as a sub-function code.

ID 21 — Reserved

ID 22 — Set Threshold

LEN	b1, b2	2 bytes
ID	b1= 22 (16H)	Set threshold value (dB) ID
ID		
CID	b1	Which channel
V	b1	byte value for threshold
		(MSBit = 1 float, = 0 fix)

ID 23 — Set Gain

LEN	b1, b2	2 bytes
ID	b1= 23 (17H)	Set gain value (dB) ID
ID		
CID	b1	Which channel
V	b1	1 byte value for gain

ID 24 — Set Hit Definition Time

LEN	b1, b2	2 bytes
ID	b1= 24 (18H)	Set Hit Definition Time (mS) ID
CID	b1	Which channel
V	b	low byte value
V	b2	high byte value in steps of 2 mS

ID 25 — Set Hit Lockout Time

LEN	b1, b2	2 bytes
ID	b1= 25 (19H)	Set Hit Lockout Time (mS) ID
ID		
CID	b1	Which channel
V	b1	low byte value
V	b2	high byte value in steps of 2 mS

ID 26 — Set Peak Definition Time

LEN	b1, b2	2 bytes
ID	b1= 26 (1AH)	Set Peak Definition Time (mS) ID

CID	b1	Which channel
V	b1	low byte value
	b2	high byte value in steps of 1 mS

ID 27 — Set the Sampling Interval

LEN	b1, b2	2 bytes
ID	b1= 27 (1BH)	Set the sampling interval (mS) ID
V	b1	low byte value
V	b2	high byte value in steps of 1 mS

ID 28 — Alarm Definition

LEN	b1, b2	2 bytes
ID	b1= 28 (1CH)	Alarm definition ID
j	b1	Number of alarm definition sent
Alarm #	b1	Which one is being defined
CID	b1	Which channel
Type code	b1	Type of alarm
CHID #	b1	AE characteristic used
Level 1	b1	Warning level
	b2	
	b3	|
	b4	
Level 2	b1	Trip level
	b2	
	b3	
	b4	j times

ID 29 — AE Filter Definition

LEN	b1, b2	2 bytes
ID	b1= 29 (1DH)	AE filter definition ID
k	b1	Number of filter definitions sent
Filter #	b1	Which one is being defined
CID	b1	Which channel
Type code	b1	Type of filter (scsh only)
CHID #	b1	AE characteristic used
Level 1	b1	Low level
	b2	
	b3	
	b4	
Level 2	b1	High level
	b2	
	b3	
	b4	k times

ID 30 — Delta-T AE Filter Definition

(INI and DTA, AEDSP board)

LEN	b1, b2	2 bytes
ID	b1 = 30	Location definition ID
FS		1 byte # of filter definitions to follow
FID		1 byte Delta-T filter ID number
BDID		1 byte Board number (2 channels per board) 0 = all boards 1 = first board (channels 1,2) 2 = second board (channels 3,4),etc
TYPE		1 byte type of delta-T operation = accept events (hit pairs) with delta-T between LOW and HIGH reject other events Only one type presently defined
INDHITS		1 byte independent hit control 0 = reject independent hits delta-T over CAL) 1 = accept independent hits
LOW		4 bytes Low level in usec (signed long integer)
HIGH		4 bytes High level in usec (signed long integer)
EDT		4 bytes Calibration time in usec (unsigned long) FS times

ID 31 — Reserved

ID 32 — Reserved

ID 33 — Reserved

ID 34 — Reserved

ID 35 — Reserved

ID 36 — Reserved

ID 37 - INI Write Protect Password
(INI file)

LEN	b1, b2	2 bytes
ID	b1 = 37	Location definition ID
MVERN		1 byte = Message version*100 e.g., V1.00=100
TOT		6 bytes (least significant first) Time of hit
SZPW		n bytes Zero terminated string

ID 38 - Test Information
(INI and DTA files)

LEN	1, b2	2 bytes
ID	1 = 38	Location definition ID
MVERN		1 byte = Message version*100 e.g., V1.00=100
ENEDIT		1 byte Enable edit of title fields
EDISPF9		1 byte Enable display of test info.at start of test
ZTITLE		n bytes Zero terminated string title
SZFIELD		n bytes Zero terminated string field

These two fields repeat for the duration of the message.
If there is no entry, the field will be 1 '0' byte as a placeholder.

ID 39 — Reserved (Not Implemented)

ID 40 — Reserved (Not Implemented)

ID 41 — Product Definition Message

LEN	b1, b2	2 bytes
ID	b1= 41 (29H)	ASCII Product Definition ID
	b2= 00	high byte of ID (2 bytes)
PVERN	b1= pv#	Product version number (2 bytes)
	b2= 00	MESSAGE FORMAT=100*Product ID ONLY FOR THIS ONE
TEXT	a1	SCII Product name, Carriage return,
	a2	Line feed, Version number, Carriage
	a3	return, Line feed
	|	
	|	
	an	

ID 42 — Hardware Setup

LEN	b1, b2	2 bytes
ID	b1= 42 (2AH)	Hardware Setup ID
	b2= 00	high byte of ID (2 bytes)
MVERN	b1= fv#	Message version number (2 bytes)

	b2= 00	(200. at the present)
LSUB 1		length of submessage 1 (2 bytes),
SUBID 1		submessage 1 ID (1 bytes),
SUBMSG 1		submessage 1 body
LSUB I		length of submessage I (2 bytes),
SUBID I		submessage I ID (1 bytes),
SUBMSG I		submessage I body
LSUB n		length of submessage n (2 bytes),
SUBID n		submessage n ID (1 bytes),
SUBMSG n		submessage n body.

Note: Submessages are:

Start of Test	ID = 100 (64H)
Set Sampling Interval	ID = 27 (1BH)
Set Demand Sampling Rate	ID = 102 (66H)
Pulser Rate	ID = 133 (85H)
Event Data Set Definition	ID = 5 (05H)
Demand Data Set Definition	ID = 6 (06H)
Group Definition	ID = 106 (6AH)
Alarm Definition	ID = 28 (1CH)
AE Filter Definition	ID = 29 (1DH)
Group Parametric Assignment	ID = 110 (6EH)
Group Settings	ID = 111 (6FH)
End of Group Settings	ID = 124 (7CH)
End of Setup	ID = 101 (65H)

ID 43 — Graph Definition (*.INI file only)

LEN	b1, b2	2 bytes
ID	b1= 43 (2BH)	Graph Definition ID
	b2= 00	high byte of ID (2 bytes)
MVERN	b1= fv#	Message version number (2 bytes)
	b2= 00	
Product Specific Information		

ID 44 — Location Definition
(if found in a non-location data file, length is 1 or 2).

LEN	b1, b2	2 bytes
ID	b1= 44 (2CH)	ocation Definition ID
	b2= 00	high byte of ID (2 bytes)
MVERN	b1= 200 (C8H)	Message version number (2 bytes)
	b2= 00	
Product Specific Information		

ID 45 — Acquisition Control Information Product specific information (in the Multichannel AT products, "F8" information)

LEN	b1, b2	2 bytes
ID	b1= 45 (2DH) b2= 00	Location Definition ID high byte of ID (2 bytes)
MVERN	b1= fv# b2= 00	Message version number (2 bytes)
Product Specific Information		

ID 46 — Autorun Message — "Command" for Acquisition Program — Product specific information

LEN	b1, b2	2 bytes
ID	b1= 46 (2EH) b2= 00	Location Definition ID high byte of ID (2 bytes)
MVERN	b1= fv# b2= 00	Message version number (2 bytes)
Product Specific Information		

ID 47 — Reserved

ID 48 — Filtered File Information

LEN	b1, b2	2 bytes
ID	b1= 48 (30H) b2= 00	Location Definition ID high byte of ID (2 bytes)
MVERN	b1= fv# b2= 00	Message version number (2 bytes)
Text follows		Product specific subkeys & maybe some product specific keys (see Appendix A, Part 1)

ID 49 — Special Product Specific Information

LEN	b1, b2	2 bytes
ID	b1= 49 (31H) b2= 00	Location Definition ID high byte of ID (2 bytes)
MVERN	b1= fv# b2= 00	Message version number (2 bytes)
Product Specific Information		

Note: Messages from 50 to 53 are defined in some versions of LOCAN AT software. These messages will not be supported in LOCAN AT version 2.00 and higher.

ID 50 — Reserved

ID 51 — Reserved

ID 52 — Reserved

ID 53 — Reserved

ID 54 to ID 98 — Not Used
See 59 (V1.8) and C.E. specific MIDs

ID 59 — Turn Off Alarm Command from HE to mGCC
Version 1.8 supports this.

LEN	b1, b2	2 bytes
ID	b1= 59 (3BH)	Turn off alarm

ID 99 — Time and Date of Test Start

LEN	b1, b2	2 bytes
ID	b1= 99 (63H)	Time and date of test start ID
"Sun Jul 03, " (For Example)		ASCII date string,
"08:49:55 1988"		ASCII time and year string.

ID 100 — Begin Setup

LEN	b1, b2	2 bytes
ID	b1= 100 (64H)	Begin Setup ID

ID 101 — End of Setup

LEN	b1, b2	2 bytes
ID	b1= 101 (65H)	End of Setup ID

ID 102 — Set Demand Sampling Rate

LEN	, b2	2 bytes
ID	= 102 (66H)	Set Demand Sampling Rate ID
V		Multiple of Parametric Sampling Rate)

V

ID 103 to ID 105 (Not Used)

ID 106 — Define a Group

LEN	b1, b2	2 bytes
ID	b1= 106 (6AH)	Define a group ID
Grp #	b1	Which group
# CHNs	b1	How many channels IDs in list
CHID1	b1	First channel id
CHID2	b1	
|		
|		
CHIDn	b1	Last channel

ID 107 — Reserved

ID 108 and 109 Not Used

(110) Group Parametrics Assignment

LEN	b1, b2	2 bytes
ID	b1= 110 (6EH)	Group parametrics assignment ID
# PIDs		Number of PIDs to follow
PID1	b1	First PID
|		
|		
PIDm	b1	Last PID

ID 111 — Group Settings

LEN	b1, b2	2 bytes
ID	b1= 111	Group settings ID
j		Number of group messages
[body 1]		Body of first message (ID # = 22-26)
[body 2]		Body of second message
[body j]		Last body

ID 112 to ID 123 — Not Used

ID 124 — End of Group Setting

LEN	b1, b2	2 bytes
ID	b1= 124 (7CH)	End of group message ID

ID 125 — Internal

ID 126 — Internal

ID 127 — Internal

ID 128 — Resume Test or Start Of Test

Test Start only when the Clear Clock was sent after Legal Setup and no intervening Resume, Stop nor Pause was sent. Normally the HE sends the messages sequentially.

LEN	b1, b2	2 bytes
ID	b1= 128 (80H)	Resume/start a test ID
(End of command)		
RTOT	b1	Relative time of test
	b2	Added when message is built from
	|	the command.
	|	ALSO FOR STOP AND PAUSE messages
	b6	

ID 129 — Stop the Test

len	b1, b2	2 bytes
ID	b1= 129 (81H)	Stop the test ID
{End of Command}		
RTOT	b1	Relative time of test
	b2	
	|	
	|	
	b6	

ID 130 — Pause the Test

LEN	b1, b2	2 bytes
ID	b1= 130 (82H)	Pause the test ID

{End of Command}		
RTOT	b1 b2 | | b6	Relative time of test

ID 131 — Configuration Status/Report (Response to Command Mess. 132)
NEW definition for PAC Bus 488 Inquire/Report (BOEING)

Len	b1	Length of body
	b2	
Message ID	131 (H)	MID byte
Prod ID or	a1	ASCII Prod ID code (byte 1)
version.	a2	byte 2
	a3	byte 3
	a4	byte 4
Prod Ver	b1	Product Version Number (16 bits)
	b2	

Product specific information follows

SPARTAN mGCC Response in version 1.8 is shown below

LEN	b1, b2	2 bytes
ID	b1=131	Status report message ID
	b1	GCC version string (e.g., V1.8)
	b2	
	b3	
	b4	
	b1	GCC version number (e.g., 180)
	b2	
	b1	ICC version string (e.g., 2.11 or MIX)
	b2	
	b3	
	b4	
STAT	b1	Test state code
AECH	b1	Number of active AE channels(=number of bytes to follow)
	b1	number of first active channel
	|	
	|	
	bn	number of last active channel
PCH	b1	Number of active parametric channels
		(= 4 for mGCC, 8 for PACbus)

The GCC valid states are 0 through 7.

0 Power Up	1 In Setup	2 Setup Done	3 T.O.T cleared
4 Active(Acq.)	5 Waiting	6 Test Paused	7 Stopped

ID 132 — Status Report (Command HE ® GCC) {C.E. only}

ID 133 — Pulser Rate

LEN	b1, b2	2 bytes
ID	b1= 133 (85H)	Pulser rate in milliseconds ID
v	b1	low byte of rate
	b2	high byte of rate

ID 134 — Reserved

ID 135 — Reserved

ID 136 — Analog Filter Definition
(INI and DTA files only, AEDSP software)

LEN	b1, b2	2 bytes
ID	b1= 136	
AFID	b1	First analog multi-filter ID number
HFS	b1	k = # of highpass filters to follow
HPF1	b2	First highpass cutoff frequency, in kHz
HPF2	b2	
|		
|		
HPFk	b2	Last highpass cutoff frequency, in kHz
LFS	b1	n = # of lowpass filters to follow
LPF1	b2	First lowpass cutoff frequency, in kHz
LPF2	b2	
|		
LPFn	b2	Last lowpass cutoff frequency, in kHz

Repeat above for as many different multi-filters as need to be defined

NOTE: one multi-filter is produced by the combination of available filters on a plug-in filter module with the fixed filters on the underlying board (e.g., AEDSP-32/16), if selections exist to bypass the plug-in filter.

Presently, only one combination is available. In the future, different options for plug-in and on-board filters may become available and will be described, per channel, in a modified configuration report message. At that point, the software will process the configuration report, determine all possible combinations, and generate this message.

EXAMPLE: Use this for first version of the code	
LEN	20
ID	136
AFID	1
HFS	4
HPF1	10 kHz
HPF2	20 kHz
HPF3	100 kHz
HPF4	200 kHz
LFS	4
LPF1	1200 kHz
LPF2	100 kHz
LPF3	200 kHz
LPF4	400 kHz

ID 137 - Analog Filter Selection
(INI and DTA files, AEDSP board)

LEN	b1, b2	2 bytes	
ID	b1 = 137		
CID		1 byte	Channel number, if 0 then all channels
AFID +		1 byte	Multi-filter ID type number, must be one defined with message 136
Highpass code		1 byte	0-15, in the order that is defined for the plug-in filter
Lowpass code		1 byte	0-15, in the order that is defined for the plug-in filter

NOTE: the AFID number is ignored by the AEDSP board, which will just take the highpass and lowpass selection codes and set the plug-in filter control lines to these codes.

ID 138 — Analog Parametric Setup
(INI and DTA files, AEDSP board)

LEN	b1, b2	2 bytes	
CID		1 byte	Channel number, if 0 then all channels
Gain code 0 = x 1 1 = x 10 2 = x 100 3 = x 1000		1 byte	
Filter code 0 = no filter 1 = filter ON		1 byte	

ID 139 — Cycle Counter Analog Setup
(INI and DTA files, AEDSP board)

LEN	b1, b2	2 bytes	
CID		1 byte	Channel number, for future expansion
Threshold Range : -5080 to 5120		2 bytes	Threshold in millivolts
Source 0 = parametric 1 1 = filtered parametric 1 2 = parametric 2 3 = filtered parametric 2		1 byte	

ID 140–ID 170 (Not defined)

ID 171 — TRA Messages (TRA2.5)

ID 171 — TRA Messages 1(TRA212)

ID 172,29 — Digital AE Data Filter Definition
(INI and DTA, AEDSP board)

LEN	b1, b2	2 bytes
ID	b1 = 173	Message ID
Sub-ID	b1 = 29	Submessage ID

Exact copy of the body of ID 29 message (AE filter definition):

FS	1 byte	# of filter definitions to follow
FID	1 byte	Waveform filter ID number
CID	1 byte	Channel number
TYPE	1 byte	Type of filter operation
		1 = SCSH (single channel, single hit)
	Only one	type presently defined
CHID	1 byte	AE characteristic
		0 = none (reject all waveforms)
		1 = risetime, 2 = counts to peak,
		3 = counts, 4 = ICC energy
		5 = duration, 6 = amplitude
		13 = average frequency
LOW	4 bytes	Low level in msec (signed long integer)
HIGH	4 bytes	High level in msec (signed long integer)
		FS times

Will determine which hits are eligible to be recorded as waveforms

To block all waveforms, the AE characteristic (CHID) is set to 0 and the LOW and HIGH limits are also set to 0.

172, 42 Hardware setup

LEN	b1, b2	2 bytes
ID	b1 = 172 (ACH)	Message ID
Sub-ID	b1 = 42 (2AH)	Message sub-ID
MVERN	b1 = 100	Message version number, 100 is V 1.00
	b2 = 0	
ADT	b1	A/D converter data type
		2 = 16 bit signed (only type currently defined for MI-TRA)
SETS	b1 = n	Number of TRA channels (setups)
	b2	
SLEN	b1	Size of hardware setup, in bytes
	b2	
TRA setup 1		
CHID	b1	Channel ID. If 0, setup for all channels
HLK	b1	Hit length, in K samples (K = 1024)
	b2	
HITS	b1	Not used for MI-TRA.
	b2	
SRATE	b1	Sampling rate, in kHz
	b2	(8000, 4000, 2000, 1000, 500, 200, 100)
TMODE	b1	Trigger mode
	b2	0 = individual
TSRC	b1	Trigger source

	b2	1 = digital
TDLY	b1	Trigger delay in samples (negative is pretrigger)
	b2	
MXIN	b1	Maximum input voltage
	b2	10 = 10 Volts, only one for AEDSP
THRD	b1	Trigger threshold in dBae
	b2	
TRA setup 2		
|		As many setups as necessary
TRA setup n		

ID 172,134 - Reserved

ID 173,1 — Digital AE Waveform Data
(DTA file, AEDSP board)

LEN	b1, b2	2 bytes
ID	b1 = 173	Message ID
Sub-ID	b1 = 1	Submessage ID
TOT		6 bytes (least significant first) time of hit
CID		1 byte Channel number
ALB		1 byte Alignment byte (dummy)
N		2 bytes Number of 16-bit samples following
s1		2 bytes First sample of waveform
s2		2 bytes Second sample
|		
sN		2 bytes Last sample
AEF		Many bytes Copy of part of message 1 after CID (AE features and TD data)

ID 173,3 — Digital AE Power Spectrum Data (AEDSP board)
Reserved for external use

ID 174 to ID 196 — Not defined

ID 197 IDIBVALSCRN — Screen Template for Display of Improved b-Value data

LEN	b1, b2	2 bytes
ID	b1	Message ID byte
VID	b1	Version of the current message
b1		TRUE/FALSE flag Controls which event plot is shown
b2		not used

	struct graph_def array defines the special graphs
bn	

ID 198 IBVALCALC — Improved b-Value Calculation Definition

LEN	b1, b2	2 bytes
ID	b1	Message ID byte
VID	b1	Version of the current message
b1		First byte of the information which contains
|		the user setting to control the b-value
|		calculations.
bn		

ID 199 — Internal

ID 200–ID 254 — Reserved for Application Programs

(See MID = 211)

ID 211 — Time Mark [Command] ® mGCC

(Lets the user make a time mark in the data set to indicate when some special action or external event occurs.)

ID 211 — (Extended) Time Mark Message(s) (Time Stamp)

LEN	b1, b2	2 bytes
ID	b1= 211 (D3H)	Time mark ID
RTOT	b1	Relative time of test
	b2	
	|	
	|	
	bn	(n = 6 if MONPAC, SPARTAN, ...
		(n = 4 if TRANSPORTATION)*

IF LEN = (5 or) 7, then the 211 message is a plain time mark message.

IF LEN >7, then it is a SPARTAN-AT style Extended time mark. Version 1.54 and higher of the mGCC will send to the high end gain and threshold changes with the Time Of Test stamp.

```
Extended message:  Len = 7 + total length of the appended message.
                   Body of 211 message                  (7 bytes)
                   Len of appended message   Body length (2 bytes)
                   Body of appended message  {Total is 2+Body}
```

The "unnecessary" length of the appended message is so that appended message can be processed as though it didn't have a time stamp (i.e.

skip the first 9 bytes and pass the rest onto the message processing for appropriate message type).

*NOTE: The Transportation Instrument does not have extended messages.

ID 220 & ID 221 — Reserved for Boeing Programs

```
NOTE:  Short Hand   W == Word, DW == Double Word, TW == Triple Word
    W1     Length of Message
    B      Message ID      = 206
    W      SubFunction Code [0-8]
    X      subfunction body
           _____________________________
           SubFunction 0:          Velocity conversion Factor
           DW                      Value

           SubFunction 1:          Display Limits
           DW                      Value {Horiz. Low Lim}
           DW                      Value {Horiz. High Lim}
           DW                      Value {Vert. Low Lim}
           DW                      Value {Vert. High Lim}
    Opt.[  DW                      Value {Depth Low Lim}
           DW                      Value {Depth High Lim}
          ]
           SubFunction 2:          Sensor Position
           DW                      Horiz. Value
           DW                      Vert. Value
    Opt.[  DW                      Depth Value
          ]
          SubFunction 3:           Event Data
          W                        +1 Start  -1 Stop
          SubFunction 4:           Channel Timing
          W                        CID (Channel ID)
          TW                       6 byte Time
          W                        Time to Peak
          SubFunction 5:           Turns ON/OFF S100 Data Display
          W                        1 == ON , else OFF
          SubFunction 6:           Special 3-D algorithm control values
          SubFunction 7:           Special 3-D setup Command to Draw
                                   Either (1) All Sensors or (2) Last one
          SubFunction 8:           Use Rise Time in 3-D location calculate
          W                        1==Yes, 0==No
```

ID 255 — Reserved

ID 255 — Reserved

4. SUMMARY:

Condensed System Messages & Commands

Id	Description
1	AE hit/Event Data
2	Time Demand Data
3	Sample/Last Time Demand Data
4	GCC detected an error condition.
5	Hit Data Set Definition
6	Time driven/Demand Data Set Definition
7	User Comments/Test Label
8	Continued File Mark
9–10	Not Used
11	Reset Real Time Clock
12	Reserved
13–14	Not Used
15	Abort acquisition/transfer
16	Alarm Data
17	Reserved
18	ICC self test (Internal)
19	Single ICC Reset (Internal)
20	{Reserved for pre-amp gain}
21	(AST messages)
22	Set Threshold
23	Set Gain
24	Set Hit Definition Time
25	Set Hit Lockout Time
26	Set Peak Definition Time
27	Set Parametric Sampling Time
28	Alarm Definition
29	Filter Definition
30	AEDSP Delta-T AE Filter Definition
31	Reserved
32	High end Alarm Detected (Internal)
33–36	Reserved
37	INI Write-Protect Password
38	Test Info
39–40	Reserved
41	ASCII Product Definition
42	Hardware Setup
43	Graph setup (*.ini file Only)
44	Location Setup
45	Acquisition Control Information
46	Auto Run Message
47	Reserved
48	Post Filter Definition and Information
49	Product Specific Setup & Configuration Information
50	Reserved
51	Reserved

Id	Description
52	Reserved
53	Reserved
54–58	Not Used
59	Ignore Alarm" - HE command to mGCC
60–98	Not Used
99	Time and Date of Test Start
100	Begin setup
101	End Setup
102	Set Demand Data Sampling Rate
103–105	Not Used
106	Begin a Group Setup
107	Reserved
108–109	Not Used
110	Define Group Parametric Channels
111	Group Parametric Settings (msgs 22-26)
112–123	Not Used
124	End of Current Group Setup
125	Internal
126	Internal
127	Internal
128	Begin Test
129	Stop Test
130	Pause Test
131	Configuration report [PRODUCT SPECIFIC]
132	Status report [PRODUCT SPECIFIC]
133	Pulser Rate
134	Reserved
135	Reserved
136	Analog Filter Definition (INI and DTA Files only, AEDSP software)
137	Analog Filter Selection (INI and DTA Files only, AEDSP board)
138	Analog Parametric Setup (INI and DTA Files only, AEDSP board)
139	Cycle Counter Analog Setup (INI and DTA Files only, AEDSP board)
140–170	Not Used
171	TRA2.5
172	TRA212
173	AEDSP waveform recording
174–196	Not Used
197	Screen template for display of omproved b-value data
198	Improved b-value calculation definition
199	Internal
200–203	Not Used
204–210	Reserved
211	Time Mark (also in the MONPAC and Transportion Instrument)
220-221	Reserved {Boeing}
222-254	Not defined
255	Reserved