This standard has been approved by the SEG Executive Committee at the 1999 SEG annual convention. UKOOA accepted this ratification by the SEG Executive Committee.
Norris, Hares, Faichney, 2001, SEG-UKOOA Ancillary Data Standard - ADS Trace Attributes: Geophysics, 66, no. 06, 1999-2039.

SEG/UKOOA Ancillary Data Standard[1]

ADS Trace Attributes[2]

Version 1.01

Last revised 2nd February 2002

SEG Technical Standards Committee

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1. Introduction

1.1 Background

The ADS Trace Attribute, ADS-TA, format is intended to be used with the SEG/UKOOA Ancillary Data Standard, ADS, to allow derived, trace and shot domain attributes to be exchanged in a standard manner. The format is a modification of an original ASCII format devised by QC Tools-Input/Output. As the format name implies, the ADS-TA is designed to be used as part of a larger body of ancillary data contained within an ADS metafile. The ADS metafile provides the context and data dependencies for an ADS_AT dataset. Although potentially possible to store raw, primary data in an ADS-TA dataset, the intent is for the ADS-TA format to be an adjunct to other formats such as SEG-D, SEG-SPS, UKOOA-P1/90 and SEG-P1 not a replacement for these existing primary data formats.

1.2 Conventions

Within the text <> are used to enclose unprintable ASCII text and descriptions. An example of this notation is <Hex 0D0A> to represent the ASCII characters carriage return and line feed and <keyword> to indicate the inclusion of a keyword phrase. To denote the repeat of a previous structure … are placed immediately after the structure. The structure can be repeated as many times as required up to the physical limit of the record.

1.3 Controlling Organization

The ADS Trace Attribute format was created by a joint committee of the SEG and UKOOA. The format is administered by the SEG Technical Standards Committee. Any questions, corrections or problems encountered in the format should be addressed to:

Society of Exploration Geophysicist
P.O. Box 702740
Tulsa, Ok 74170-2740

Attention: SEG Technical Standards Committee

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1.4 Acknowledgement

As with all SEG standards, the ADS Trace Edit was developed by individuals volunteering their time and talents. Special acknowledgement and thanks go to Alan Faichney, Mike Hares Bonnie Rippere, Don Funkhouser, Stuart Jackson, Paul Cattermole and Jon Stigant for their efforts toward the completion of this format. Special thanks are extended to Input/Output and Dave Ridyard for allowing the ASR format to be used as the basis for this ADS-TA format.

2. GENERAL DESCRIPTION

2.1 ADS-TA Dataset Structure

An ADS-TA dataset is either a single Data Segment or a series of Data Segments. Each Data Segment consists of Header section followed by a Data section followed by Termination records.

The simplest ADS-TA dataset would consist of a Data segment, a Data Segment Terminator record and a Dataset Terminator record. The Data segment would contain a Header section and a Data section. The Header section contains Header, Attribute Definition, Attribute Parameters and Comments records. The Data section contains Source, Entity, Fix, Receiver, Template and Comments records. In Figure 1 the complete structure of a simple ADS-TA dataset is outlined.

Description	Section	Records
A Data Segment	Header Section records	Header records
		Attribute Definition records
		Attribute Parameters records
		Comment records
	Data Section records	Source records
		Receiver records
		Entity records
		Fix records
		Template records
Data Segment Terminator	Segment Terminator	Y record
Dataset Terminator	Dataset Terminator	Z record

Figure 1 A simple ADS-TA dataset

A more complex ADS-AT dataset can contain multiple Data Segments separated by Data Segment Terminators. Figure 2 outlines a more complex ADS-TA structure. In this figure, the records have been omitted to simplify the figure.

Description	Section
Data Segment 1	Header Section 1 records

	Data Section 1 records
Data Segment Terminator	First Y record
Data Segment 2	Header Section 2 records Data Section 2 records
Data Segment Terminator	Second Y record
…	…
Data Segment N	Header Section N records Data Section N records
Data Segment Terminator	Nth Y record
Dataset Terminator	Z record

Figure 2 A complex ADS-TA dataset

2.2 ADS-TA Records

Each record begins with an ASCII character that identifies the function of the record. The record types are:

Header Section Records

- Header
- Attribute Definition
- Attribute Parameters
- Comments

Data Section Records

- Source
- Entity (multiple per Source – Vibrator, Tailbuoy, Air gun, etc.)
- Fix (multiple per Entity - asynchronous with Source time)
- Receiver (receiver/trace)
- Template (cross-reference)
- Comments

Termination Records

- Segment Terminator
- Dataset Terminator

ADS-TA data is typically stored in a file on a PC or workstation. The format is based on ASCII characters and is designed to be intelligible to a human reader, while making some compromises to ensure efficient machine readability by both standard applications (spreadsheets etc.) and custom applications. The format is adaptable to a range of applications using fully specified 'public' attribute definitions, whilst also permitting private or semi-public vendor specific extensions.

An ADS-TA record consists of a sequence of comma delimited fields. The maximum length for an ADS-TA record is 255 bytes. This includes the carriage return and line feed characters that terminate an ADS-TA record. If the number of attributes to be recorded exceeds the 255 byte record limit, a subset of the desired attributes are recorded in a first Data segment and the remainder of the attributes are recorded in subsequent Data segments. When multiple Data segments are used to record attributes for the same suite of source or receiver points, it is an advisable practice to maintain a one to one correspondence between records within each Data segment. Although a one to one correspondence is recommended, it is not mandatory.

In a Data Segment a Header section must precede a Data section and the Data section must be terminated with a Data Segment Terminator. Each new file MUST start with a Header section. Each Data section may contain multiple records, covering multiple shots, each having multiple receivers.

Two types of ADS-TA Data section structures are supported:

Trace mode

In this mode, a single Source record is followed by one or more Receiver records, representing all the receivers that were active for that Source point. The receiver records in this mode are effectively 'trace' records in this structure. This mode is typically used in marine streamer surveys, and in land surveys where trace domain attributes are required (First Break Picks, RMS Noise Estimates etc.).

Template mode

In this mode, a block of Shots is defined, followed by a block of Receivers. This block of receivers is then followed by a block of Template records defining which receivers are active for each shot. This mode is analogous to a SEG SPS structure in a single file, but permitting indefinite extension to cover supplementary attributes. However, in this mode (as in SEG SPS) trace domain attributes such as RMS noise for each receiver at each shot are not supported.

A file may contain multiple Header sections. The Data section to which it applies follows each Header section. Each Data section is terminated by a Data Segment Terminator record.

Entity and Fix records are not required, except where demanded by, and appropriate to a specific application.

2.3 Record Definition

Each record consists of a variable number of ASCII characters, terminated by a carriage return/line feed pair <Hex 0D,0A>. The individual value fields in a record are comma <Hex 2C> delimited.

The first character of each record is an upper case ASCII character identifying the record type. The following are valid record identifiers.

Table 1 Record types

Section	Starting Character	Name	Description
Header Section	H	Header	Identifies the beginning of an ADS-TA data section. This record occurs only once at the beginning of a data section.
	A	Attribute Definition	Describes each attribute field that is to be included in S, R, E or F records
	P	Attribute Parameters	If applicable, P records define the processing parameters used to compute the attribute described by the proceeding attribute, A, record.
	C	Comment	Comments records provide descriptive information to explain an attribute or to provide additional detail for events in a dataset. Comment records can occur at any place within a dataset except before the H record.
Data Section	S	Source	The attributes associated with a source event. The preceding A records define the order and type of attributes recorded in the S record.
	E	Entity	Contain all data that refers to a particular entity at a particular source point
	F	Fix	Contain information that refers to either a Source Record or an Entity record
	R	Receiver	The attributes associated with a receiver point. The preceding A records define the order and type of attributes recorded in the R record.
	T	Template	Define which receivers are active for a source point

Section	Starting Character	Name	Description
	C	Comment	Comments records provide descriptive information to explain an attribute or to provide additional detail for events in a dataset. Comment records can occur at any place within a dataset except before the H record.
	Y	Data Segment Terminator	Terminator record that marks the end of a Data Segment
	Z	Dataset Terminator	Terminator record that marks the end of the ADS-TA dataset

Each record contains a number of fields. The number of fields in a particular record type is either fixed by its format or is defined in the Header record for the Data Segment. The number of fields can only be varied by terminating the current Data Segment and generating another Data Segment. The Header section for the new Data Segment can define a different number of fields from the previous Data Segment. Each field is comma <Hex 2C> delimited from the next field.

Fields may contain trailing or leading space characters <Hex 20>. These characters may be used to create the appearance of a column-aligned format to make human reading easier in applications where file size optimization is not an issue. Any application program reading an ADS-TA file should ignore space characters, except where they are part of a specified TEXT field, enclosed by quotes.

Fields may be one of two types, each of which may have a number of valid sub-types:

Numeric — Numeric fields may contain numbers in scientific notation (123.456) or in engineering notation (123.4E4). Leading zeros (0123.456 or 0123.4E04) will be permitted, but are not required.

Text — Text fields may be enclosed by quotes (“) <Hex 22>

Numeric subtypes are:

Integer

Typically used for subsequent data structure interpretation; i.e. ‘number of attributes’

Flag

A flag is an unsigned, integer number which should be interpreted bit-wise, with each bit having some significance as an ON-OFF status indicator; i.e. a value of 13 (Binary 1101) might indicate

satellites 1, 3 and 4 are active for a particular GPS fix. The flag can be represented by a 1, 2 or 4 byte unsigned integer.

Floating Point

Where no sub-type is specified the field must be interpreted as floating point number of unknown precision. The header records contain data scalars permitting optimum preservation of resolution.

Text Fields may not contain the double quote character (“) <Hex 22>.

2.4 Mandatory Fields

2.4.1. Point ID

The first field in both Source and Receiver records should be the Point ID. The source and receiver point ids are the keys that identify events and locations within the seismic data volume. It is highly recommended that these keys be made unique within the scope of the complete prospect. If possible, it is advised that the Source Point ID be tied to the master shot record in the ADS metafile. It is an absolute requisite that these keys be unique within an ADS-AT dataset.

For a Source record the Point ID is defined as:

> The Source Point ID is an integer number, which is unique to a particular source point within a given ADS-TA file. For a Source Point, this could be a Shotpoint number, a file number, a sequential index, or some composite of other identifiers (see Section Point Identifiers page 10).

For a Receiver record the Point ID is defined as:

> The Receiver Point ID is an integer number, which is either (a) unique within a Source Point in a Trace mode ADS-TA file, or (b) unique within an ADS-TA file in a Template mode ADS-TA file.

In marine applications (typically in Trace mode) Receiver Point ID is typically the channel number, or a composite of the streamer trace number and the streamer ID. In the first case, it is preferable to follow the SEG SPS definition of trace number where the trace number is the sequential occurrence of the seismic traces on the SEG-D dataset. For a dual, 480 streamer application, valid sets of Receiver Point ID’s would include:

1, 2, 3 ..... 958, 959, 960
1, 2, 3 ..... 479, 480, 501, 502 ..... 978, 979, 980
1001, 1002, 1003 ..... 1479, 1480, 2001, 2002 .....2478, 2479, 2480

In land applications, more options are possible. In the case of a static spread, the channel number could be used in a similar way to the marine case. However, in more complex situations where roll is employed, or stations are re-occupied (potentially with slightly different co-ordinates) the receiver

point ID may be some composite of Line and Station Numbers and the Point Index. (See section 2.5 page 10).

2.4.2. Time and date

Time is a mandatory for Shot Records only, and is defined to encompass five fields:

Year	4 digit integer (e.g. 1998)
Julian Day	integer
Hours	integer
Minutes	integer
Seconds	floating point (ss.sss)

The time fields are in local time, with a reference to UTC defined in the Attribute definition.

2.4.3. Template ID

The Template ID refers to the ID of one or more Template records, defining which Receiver points are active for the source point. (See section 4.5 page 26). Template ID is a mandatory field only for Source records in a Template mode ADS-TA File.

2.4.4. Line ID

Line ID is a numeric description of a group of points that may be logically grouped together for some reason. This field is only mandatory for Source records in Template mode files, thus allowing multiple lines (potentially a whole survey) to be contained in a single file.

2.4.5. Good Bad Flag

The Good/Bad Flag is an integer, having the following definition:

-1 Status Unknown

0 Bad Shot

1 Good, Processable Shot

Note that this flag refers to the overall 'processability' of the data for a particular point. Thus for a point which has been surveyed, but not yet acquired, the status should be "-1" (Unknown). The status is NOT Good simply because the survey data is adequate. Note that if the survey data is BAD, the shot can be defined as BAD. Thus, when combining GOOD/BAD Flags from multiple sources, the logic to apply is as follows.

If all flags are -1, then combined status is –1

If any flag is 0, then combined status is 0

If any flag is 1, and no flags are 0, then status is 1

2.5 Point Identifiers

The Point ID field defined for Sources and Receivers is the only mandatory field employed in ADS-TA to allow unique identification of particular source and receiver points. Although this number may be sufficient in some applications, in many field situations, more complex numbering regimes may be employed, which must be carried through the ADS-TA structure. The following identifiers are all optional identifiers that are explicitly supported by ADS-TA.

Line Name	A text description of a logical group of points
Station Name	A text description of a single point
Line ID	A numeric description of a logical group of points
Station ID	A numeric description of a single point
Point Index	An integer index describing the number of previous occupations of the point
Sequence ID	An integer index describing the chronological group of points to which the point belongs. Typically used in marine to indicate the vessel pass", or used in land to indicate the "swath ID". Thus a swath may contain parts of many lines, and a line may contain parts of many swaths.

Line and Station Names ID's usually represent a nominal orthogonal grid, pseudo-coordinate reference system, which is defined in the attribute parameter records.

Note that Line and Station Names and Line and Station ID's could be identical. However, if a Line/Station Name is used rather than Line/Station ID, the application reading the file is alerted to the fact that the ID's may contain non-numeric characters.

In situations where a particular shot or receiver location is re-occupied, a Point Index field can be used to identify each discrete occupation of a particular Source or Receiver point.

Note that it is possible for two points to have the same Line and Station ID/Name. Typically in this case, a Point Index should be used to differentiate them (as in SEG SPS). However, in ADS-TA, this is not mandatory. It is only mandatory that the Point ID field be unique, as described in Section 2.4.1 page 8.

2.6 ADS Dependencies

Figure 3 illustrates the creation of two ADS metafiles. The two metafiles share a common raw data root. Using the ADS metafile chunk dependencies, ADS-TA 2 can be made dependent on ADS-TA1 and ADS-TA 3 can be made dependent on both ADS-TA 1 and ADS-TA2. Likewise in Metafile 2, ADS-TA 5 can be made dependent on ADS-TA 4. ADS-TA 4 cannot be made dependent on ADS-TA 1 because ADS chunk dependencies cannot reference chunks that are external to a metafile.

For the dependency of ADS-TA 4 and ADS-TA 5 to be explicitly stated, the two metafiles would need to be combined. This can be achieved without ambiguity because the metafile chunk serial number is designed to be unique across processes and instances of processes. For more information on chunk dependencies refer to the “Ancillary Data Standard Metafile Format Description”.

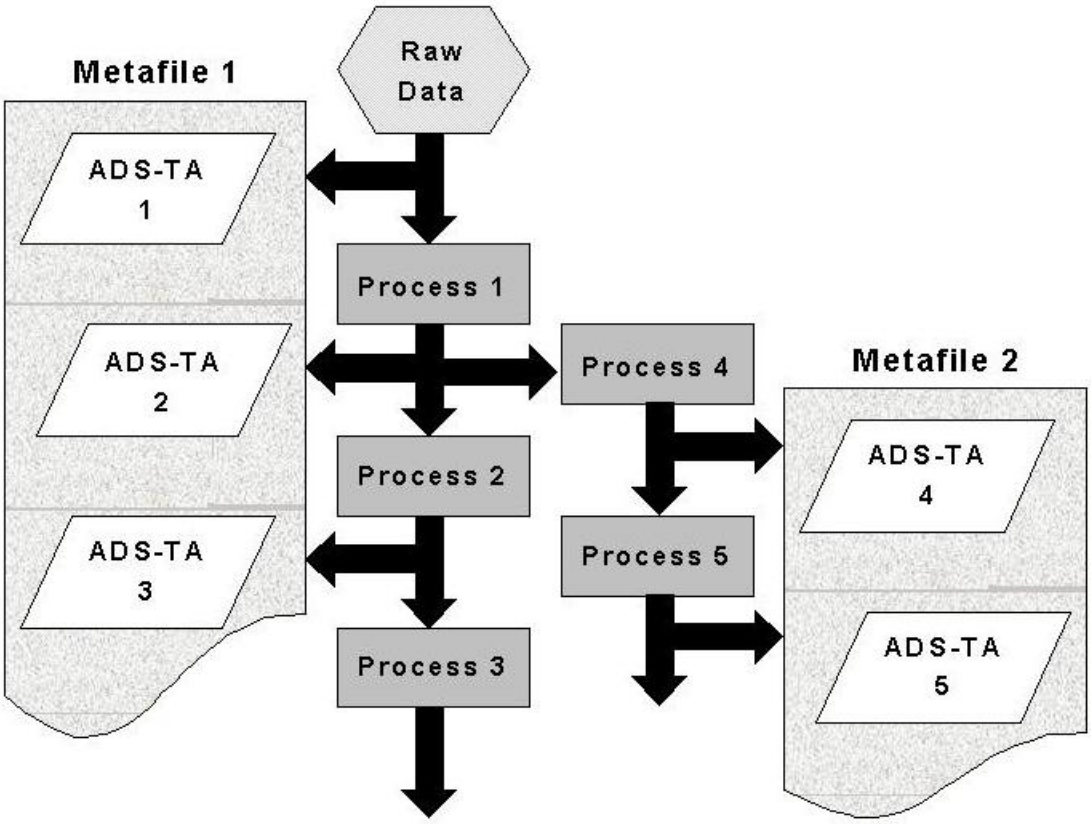

Figure 3 Creation of two independent ADS metafiles

3. HEADER SECTION

3.1 Header Section Structure Overview

Each Header section must contain one and only one Header record, and must contain one Attribute record for each attribute specified in the Header record. Attribute Parameter records are optional, and there should be one Parameter record for each parameter required to define an Attribute. Attribute Parameter records should follow immediately after the Attribute for which they are defining the parameters. Comment records may appear at any point in the Header or Data sections. Comment records contain freeform text containing any pertinent information required for archival or future interpretation of the data.

3.2 Header Record

Each Header section must contain one (and one only) Header Record.

The Header record will contain an “H” character in the first column of the record, and eleven other fields.

Table 2 Header record

Field	Type	Sub-type	Name	Description
1	Character		REV_LEVEL	Revision level of the dataset. Must be ADS-TA_rev_1.0
2	Numeric	Integer	N_SRC_ATT	Number of Attributes defined for each Source Record
3	Numeric	Integer	N_RCV_ATT	Number of Attributes defined for each Receiver Record
4	Numeric	Integer	N_ENT_ATT	Number of Attributes defined for each Entity Record
5	Numeric	Integer	N_FIX_ATT	Number of Attributes defined for each Fix Record
6	Numeric	Integer	N_TEMPLATE	Template record status. <0 Template records are required =0 Structure is not Template based >0 Structure requires Templates

Field	Type	Sub-type	Name	Description
7	Character		Process	Text identifying the process and/or subsystem that is evaluating the trace attributes
8	Character		Date/Time	Time the process started: Four digit year, Julian day, HHMMSS.SS
9	Character		Personnel	Name of key personnel responsible for the trace edit evaluation
10	Character		Input Data Volume	Name of the data volume being edited
11	Character		Output Data Volume	Name of the data volume created by the trace edits

If N_SRC_ATT is <0, then no Source records are in the file and the ADS-TA file is a Partial structure. It is a legal implementation for N_SRC_ATT to equal 0; for this case no source attributes are defined but Source records may exist in the dataset.

If N_RRV_ATT is <0, then no Receiver records are in the file and the ADS-TA file is a Partial structure. It is a legal implementation for N_RRV_ATT to equal 0; for this case no receiver attributes are defined but Receiver records may exist in the dataset.

If N_ENT_ATT is <0, then no Entity records are in the file

If N_FIX_ATT is <0 then no Fix records are in the file

N_TEMPLATE can be decoded as follows: -

<0 Template records are required, but not present in this file – structure is Partial

=0 Structure is not Template based, no Templates present or required

>0 Structure requires Templates, and Templates are present in file

3.3 Attribute Record

The number of Attribute Records in each Header section is the summation of the N_SRC_ATT, N_REC_ATT, N_ENT_ATT and N_FIX_ATT fields for the fields whose values is greater than zero. Field values less than zero are treated as zero.

The Attribute records will appear in the order that the attributes will appear in the corresponding data records, with Source Attributes being described first, followed by Entity, Fix and Receiver Attributes in that order.

Each Attribute record will contain an “A” character in the first column of the record, and twelve other fields.

Table 3 Attribute record

Field	Type	Sub-type	Name	Description
1	Numeric	Integer	ATT_FIELD	Field at which attribute will appear in Data Record
2	Text		ATT_NAME	Text Attribute description e.g. First_Break_Pick
3	Numeric	Integer	ATT_G_CLASS	Global Attribute Classification. Defined in Global Attribute Classes page 37
4	Char		ATT_TYPE	S for Source, R for Receiver, E for Entity, F for Fix
5	Numeric	Integer	ENTITY_CODE	Entity code to associate with this attribute record. This field only has meaning when the previous field is an E, entity record, or an F, fix record. See Table 8 **Entity codes** page 22
6	Numeric		ATT_NULL	NULL value for specified attribute
7	Numeric		ATT_BASE	Attribute Base Value
8	Numeric		ATT_MULT	Attribute Multiplier
9	Numeric	Integer	ATT_INDEX	Number of occurrences of ATT_G_CLASS
10	Numeric	Integer	ATT_V_CLASS	Vendor Attribute Classification. Undefined attribute class defined by a vendor.
11	Numeric	Integer	ATT_VENDOR	Vendor code, Appendix C page 61

Field	Type	Sub-type	Name	Description
12	Numeric	Integer	ATT_PARMS	Number of Attribute Parameters Specified

Notes:

Duplicate ATT_NAMEs are permitted, but the combination of ATT_TYPE, ATT_G_CLASS and ATT_INDEX should always be unique within a Header Section, allowing unique specification of each attribute.

ATT_INDEX should be 1 for the first occurrence of a given ATT_G_CLASS, and should increment by 1 for each subsequent occurrence.

In Data Records, NULL values for attributes can be described either by two (non-space) delimiters with no valid value between them, or by two delimiters containing the value specified as ATT_NULL. The value of ATT_NULL should be some value with no valid interpretation as a data point. For example, for a RMS calculation, a value of -0.1 would be a suitable value for ATT_NULL.

In Data Records, true values of attributes can be calculated by application of ATT_BASE and ATT_MULT.

True Value = ATT_BASE +(Raw_Value x ATT_MULT)

This method of number storage allows data to be stored in the file more efficiently in many situations.

The ATT_FIELD and ATT_INDEX fields can actually be implied from other available information, but are included in the format to allow easier human reading of the headers.

The ATT_V_CLASS parameter is used to identify a vendor specific attribute. An Attribute Parameter record should always be used when defining vendor specific attributes. The Attribute Parameter record should be followed by Comment records describing the attribute.

3.3.1. Global Attribute Classification

Appendix A defines standard attribute classes. The attribute classes are divided into receiver attributes and source attributes. The system of Global Attribute Classification allows common attribute types to be communicated between vendors. It should be noted that a common Global Attribute Class does not ensure identical types of parameters. For example, Receiver Global Attribute Class 102 represents a First_Break_Pick time. One vendor may use a single trace rolling power gate method, and another vendor may use a Neural Net method. The two attributes may be fully described by totally different sets of parameters, but since they share a Global Attribute Class,

this will allow a client application to identify that the attributes are both suitable for use in a refraction statics analysis or positioning solution.

Common Global Attribute Class implies a common *type* of attribute, but does not infer *identical* calculation methodology.

Attachment A contains a detailed list of currently defined Global Attribute Classes. Attachment B contains details of all the relevant Attribute Parameter Definitions. These lists may be amended at the discretion of the SEG and the ADS administration.

3.4 Attribute Parameter Record

For each Attribute Record, a number of Attribute Parameter Records should be made available to describe the method of calculation of the attribute. For example, for Global Attribute Receiver Class 101 (RMS Power in Gate), the following Attribute Parameters could be specified:

Gate Type (Hyperbolic, Linear, Constant)
Gate Length (ms)
Gate Start Time (ms)
Low Cut Filter
High Cut Filter

Each Attribute Parameter record has the following fields.

Table 4 Attribute parameter record

Field	Type	Subtype	Name	Description
1	Numeric	Integer	PARM_CODE	Parameter code as defined in ADS-TA specification (Appendix B page 45)
2	Variable		PARM	Parameter value as defined in ADS-TA specification (Appendix B page 45)
3	Text		PARM_DESC	Optional text description of parameter (*)

(*) For attributes that are fully defined in the specification, the PARM_DESC field is effectively a duplication of the information conveyed in the PARM_CODE field by reference to this specification. However, the PARM_DESC field should be used (a) to make human interpretation of the file without reference to the specification easier, and (b) to allow description of parameters for attributes that are NOT fully specified in this specification.

3.5 Comment Record

Comment Records can be used to add any relevant information, concerning operational details, personnel, environmental conditions etc. or to add extra detail about attribute definition. Comment

records can occur any place within a header section or a data section. Comment records cannot occur prior to the first H, Header, record or after the Z, Dataset Terminator, record.

4. DATA SECTION

4.1 Source Record

Source Records contain all data that refers to a particular source point. There are six mandatory fields:

Source Point ID

Source Time (Year, I4)

Source Time (Julian Day, I3)

Source Time (Hours, I2)

Source Time (Minutes, I2)

Source Time (Seconds, SS.sss)

See Section 2.4, page 8, and Section 2.5, page 10, for detailed descriptions of mandatory fields.

In Template mode, there are three additional mandatory fields:

Line ID
Good/Bad Flag
Template ID

These fields are fully described in see Section 2.4, page 8, and Section 2.5, page 10.

Other fields are optional and should be described by Attribute definition records in the Header section.

Table 5 Source point record

Field	Type	Subtype	Name	Description
1	Numeric or Text	Integer or Text	SRC_PNT_ID	Identifies the source point
2	Numeric	Integer	SRC_YEAR	4 digit year, I4
3	Numeric	Integer	SRC_DAY	Julian day, I3
4	Numeric	Integer	SRC_HOUR	Hour the source point occurred, I2
5	Numeric	Integer	SRC_MINUTE	Minute the source point occurred, I2
6	Numeric	Floating	SRC_SEC	Second the source point occurred. Seconds are recorded to the nearest millisecond in a SS.sss format

Field	Type	Subtype	Name	Description
7			ATTR_1	First source attribute defined in the previous Header section. The type and format of the field are defined by the Attribute record.
8			ATTR_2	Second source attribute defined in the previous Header section. The type and format of the field are defined by the Attribute record.
…	…	…	…	…
N+6			ATTR_N	Nth source attribute defined in the previous Header section. The type and format of the field are defined by the Attribute record.

Table 6 Source point record in template mode

Field	Type	Subtype	Name	Description
1	Numeric or Text	Integer or Text	SRC_PNT_ID	Identifies the source point
2	Numeric	Integer	SRC_YEAR	4 digit year
3	Numeric	Integer	SRC_DAY	Julian day
4	Numeric	Integer	SRC_HOUR	Hour the source point occurred
5	Numeric	Integer	SRC_MINUTE	Minute the source point occurred
6	Numeric	Floating	SRC_SEC	Second the source point occurred. Seconds are recorded to the nearest millisecond in a ss.sss format
7	Numeric or Text	Integer or Text	LINE_ID	Identifies the line number of name the source is located at.

Field	Type	Subtype	Name	Description
8	Numeric	Integer	GB_FLAG	Good/bad flag status for the source point
9	Numeric	Integer	TEMPLATE_ID	Template identifier
10			ATTR_1	First source attribute defined in the previous Header section. The type and format of the field are defined by the Attribute record.
11			ATTR_2	Second source attribute defined in the previous Header section. The type and format of the field are defined by the Attribute record.
…	…	…	…	…
N+9			ATTR_N	Nth source attribute defined in the previous Header section. The type and format of the field are defined by the Attribute record.

4.2 Receiver Record

Receiver records contain all data that refers to a particular Receiver point. There is one mandatory field:

Receiver Point ID

In Partial and Template mode Receiver Point ID must be unique within a Data Section. In Trace mode, Receiver Point ID must be unique within a Source.

Other fields are optional and should be described by Attribute definition records in the Header section.

Table 7 Receiver point record

Field	Type	Subtype	Name	Description
1	Numeric or Text	Integer or Text	RCV_PNT_ID	Identifies the receiver point

Field	Type	Subtype	Name	Description
2			ATTR_1	First receiver attribute defined in the previous Header section. The type and format of the field are defined by the Attribute record.
3			ATTR_2	Second receiver attribute defined in the previous Header section. The type and format of the field are defined by the Attribute record.
…	…	…	…	…
N+1			ATTR_N	Nth receiver attribute defined in the previous Header section. The type and format of the field are defined by the Attribute record.

4.3 Entity Record

Entity Records contain all data that refers to a particular entity at a particular source point. These entities could be any of the following:

Table 8 Entity codes

Entity Code	Description
1	Vibrator
2	Vibrator Group
3	Vessel
4	Tailbuoy
5	Individual air gun
6	Air gun subarray
7	Other Towed Buoy
8	Multi-channel Recorder Box

Entity Code	Description
9	Streamer Depth Transducer
10	Streamer Heading Sensor
11	Other in Streamer Device
12	Other

There are four mandatory fields:

Source Point ID
Entity Shot Relative Time
Entity Code
Entity ID

Source Point ID must match the Source record that precedes the Entity record.

The Entity ID's must be unique within a shot, and should be consistent over all shots within a Data section. For example, if five vibrators are in use during a line, and that line is represented as a single Data section, then each ID should represent a particular physical vibrator during that line. Thus one Source point may have E records for Vibrators 1, 2, 3 and 4; but the next may have E records for 1, 2, 5 and 4, if vibrator 3 is replaced by vibrator 5.

The Entity Shot Relative Time is the time in seconds prior to the time logged for the Source Point.

Other fields are optional and should be described by Attribute definition records in the Header section.

Also, it should be noted that since Entity records are optional, the number of Entity records may vary from Source point to Source point. For example, in land, Entity records may be used for vibrators, and one Source point may use four vibrators, while another may only use three vibrators. In this case, it would be valid to either have four E records at one Source, and three at the next, or to have four records at both Source points, with one record being populated with NULLs at the second Source point.

Table 9 Entity record

Field	Type	Subtype	Name	Description
1	Numeric or Text	Integer or Text	SRC_PNT_ID	Identifies the source point the entity record is associated with.

Field	Type	Subtype	Name	Description
2	Floating	Integer	ENTITY_TIME	Time in seconds prior to the time logged for the Source Point. The time is in the form ss.sss
3	Numeric	Integer	ENTITY_CODE	Code from Table 8 Entity codes that defines the type of entity
4	Numeric	Integer	ENTITY_ID	An integer value used to identify a particular entity (e.g. a vibrator number)
5			ATTR_1	First entity attribute defined in the previous Header section. The type and format of the field are defined by the Attribute record.
6			ATTR_2	Second entity attribute defined in the previous Header section. The type and format of the field are defined by the Attribute record.
…	…	…	…	…
N+4			ATTR_N	Nth entity attribute defined in the previous Header section. The type and format of the field are defined by the Attribute record.

4.4 Fix Record

Fix records contain information that refers to either a Source record or an Entity record, but which may be repeated several times within the Source. For example, in marine, raw asynchronous observations could be recorded in this form (albeit rather inefficiently) but more practically, individual vibrator pad locations could be recorded for vibrator arrays where the vibrators move within each Source point. There are four mandatory fields:

Source Point ID
Fix Shot Relative Time
Entity ID
Fix Index

Source Point ID must match the Source Point to which the Fix record applies.

The Fix Index is a count (starting at 1) of each fix epoch included in the Source. For example, where a vibrator sweeps four times during a source point, four Fix records would be generated with Fix indices of 1, 2, 3 and 4. Note that an attribute such as Ground Force can either be stored at the Fix record level, or as an Average at the Entity record level.

The Fix Shot relative time is the time in seconds prior to the time logged for the Source Point.

The Entity ID refers the Fix record to an Entity. Entity Code 0 (zero) means that the Fix applies directly to the source.

Other fields are optional and should be described by Attribute definition records in the Header section.

Table 10 Fix record

Field	Type	Subtype	Name	Description
1	Numeric or Text	Integer or Text	SRC_PNT_ID	Identifies the source point the fix record is associated with.
2	Floating	Integer	FIX_TIME	Time in seconds prior to the time logged for the Source Point. The time is in the form ss.sss
3	Numeric	Integer	ENTITY_ID	An integer value used to identify a particular entity (e.g. a vibrator number)
4	Numeric	Integer	FIX_INDEX	Index for a fix record for the entity. This number starts at 1 and increments by 1 for each fix record associated with a particular entity (i.e. a particular vibrator or tailbuoy) for a given source point (i.e. the count starts over at 1 when the source point changes)
5			ATTR_1	First fix attribute defined in the previous Header section. The type and format of the field are defined by the Attribute record.
6			ATTR_2	Second fix attribute defined in the previous Header section. The type and

Field	Type	Subtype	Name	Description
				format of the field are defined by the Attribute record.
…	…	…	…	…
N+4			ATTR_N	Nth fix attribute defined in the previous Header section. The type and format of the field are defined by the Attribute record.

4.5 Template Record

Template records are optional and can minimum file size. Template records are used only when all the following conditions are met:

Receivers are stationary for multiple shots
No Trace domain attributes are required
The shooting geometry is explicitly known at the time of file creation

Template records are not required for the normal Trace mode ADS-TA files. Template records can be used to perform essentially the same function as cross-reference records in SEG SPS (i.e. to define which receivers are active for each source). Like SEG SPS, ADS-TA files structured in this way do not permit the storage of trace domain data, since each Receiver record may be active for multiple shots.

Template records have a fixed structure, containing three fields:

Template ID
First Receiver ID
Last Receiver ID

Template records must appear in the file arranged in ascending order of Template ID.

Multiple Template records may share the same ID. This allows a particular Template ID specified for a Source to allow multiple ranges of receivers to be made inactive or active in a spread. This is typically used for multi-line roll in land applications.

Table 11 Template record

Field	Type	Subtype	Name	Description
1	Numeric	Integer	TEMPLATE_ID	Identifies the source point the template

Field	Type	Subtype	Name	Description
				record is associated with.
2	Numeric or Text	Integer or Text	FST_RCV_ID	First receiver
3	Numeric or Text	Integer or Text	LST_RCV_ID	Last receiver

4.6 Data Segment Terminator Record

Each ADS-TA Data Segment consists of a Header Section, a Data Section and a Data Segment Terminator Record. The form of the Data Segment Terminator is:

Y, Segment_Terminator

Table 12 Data Segment terminator record

Field	Type	Subtype	Name	Description
1	Text	Text	SEG_TERM	Must be the text characters Segment_Terminator

4.7 Dataset Terminator Record

An ADS-TA dataset can contain a single Data Segment or it may contain multiple Data Segments. In both cases, the ADS-AT dataset is terminated with a Dataset Terminator Record. The form of the Dataset Terminator record is:

Z, Dataset_Terminator

Table 13 Dataset terminator record

Field	Type	Subtype	Name	Description
1	Text	Text	FILE_TERM	Must be the text characters Dataset_Terminator

4.8 Comment Record

Comment Records can be used to add any relevant information, concerning operational details, personnel, environmental conditions etc. or to add extra detail about attribute definition. Comment records can occur any place within a header section or a data section. Comment records cannot occur prior to the first H, Header, record or after the Z, Dataset Terminator, record.

5. Sample Files

5.1 Trace Mode - Simple

This example file is almost the simplest possible configuration, and excludes any optional records. Only a small number of attributes have been included. All attributes are specified to be of a simple numeric type, with ATT_MULT=1 and ATT_BASE=0. ATT_NULL is set to 0 for some parameters, but is set to -1 for the RMS_Noise attribute, since 0.0 is (theoretical a valid RMS value). Note that the uncalculated value for Noise on Receiver 501 on shot 102 is indicated by two adjacent delimiters, rather than a NULL value.

The file contains three shots, each having the same three receivers active. For the sample comment, C records with the field numbers have been included in the sample. These are not necessary for an ADS Trace Attribute dataset and are only included to make the sample easier to follow.

```
H,ADS-TA_rev_1.0, 4, 3, -1, -1, 0,ZDX-2000,1998/307/083000.000,Able,/raw/Line20,/none
C
C -------------- Source Attributes --------------------
C 1,                2,  3, 4,5,   6,  7,  8, 9,10,11,12
A,7,Source_Easting   ,  1, S,0, 0.0,0.0,1.0, 1, 0, 0, 0
A,8,Source_Northing  ,  2, S,0, 0.0,0.0,1.0, 1, 0, 0, 0
A,9,Source_Elevation ,  7, S,0, 0.0,0.0,1.0, 1, 0, 0, 0
A,10,Avg_Ground_Force,505, S,0, 0.0,0.0,1.0, 1, 0, 0, 0
C
C -------------- Receiver Attributes ------------------
C 1,                2,  3, 4,5,   6,  7,  8, 9,10,11,12
A,2,Receiver_Easting ,  1, R,0, 0.0,0.0,1.0, 1, 0, 0, 0
A,3,Receiver_Northing,  2, R,0, 0.0,0.0,1.0, 1, 0, 0, 0
A,4,RMS_Noise        ,101, R,0,-1.0,0.0,1.0, 1, 0, 0, 0
C
C ----------------- Data Segment ----------------------
C,   1,   2,  3, 4, 5,     6,       7,        8,    9,      10
S, 100,1998,306,14,22,23.667,123486.1,3344556.6, 12.4, 50067.2
C,   1,       2,        3,      4
R, 500,123480.0,3344655.7, 0.0013
R, 501,123580.0,3344755.7, 0.0015
R, 502,123682.0,3344855.7, 0.0008
C,   1,   2,  3, 4, 5,     6,       7,        8,    9,      10
```

```
S, 101,1998,306,14,23,18.328,123586.1,3344651.2, 12.4, 50067.2
C,   1,       2,        3,      4
R, 500,123480.0,3344655.7, 0.0012
R, 501,123580.0,3344755.7, 0.0016
R, 502,123682.0,3344855.7, 0.0008
C,   1,   2,  3, 4, 5,     6,       7,        8,    9,      10
S, 102,1998,306,14,24,45.728,123686.1,3344656.3, 12.4, 50067.2
C,   1,       2,        3,      4
R, 500,123480.0,3344655.7, 0.0015
R, 501,123580.0,3344755.7,       ,
R, 502,123682.0,3344855.7, 0.0005
C,   1,   2,  3, 4, 5,     6,       7,        8,    9,      10
S, 103,1998,306,14,25,53.635,123786.1,3344752.2, 12.4, 50067.2
C,   1,       2,        3,      4
R, 500,123480.0,3344655.7, 0.0011
R, 501,123580.0,3344755.7, 0.0014
R, 502,123682.0,3344855.7, 0.0009
Y,Segment_Terminator
Z,Dataset_Terminator
```

Also, note that the name assigned to Receiver field 4 is RMS_Noise - which is a specific name assigned to an instance of Global Attribute Class 6 (RMS Power in Specified Gate). This highlights the fact that the Attribute Class determines how the attribute was calculated, but the attribute name indicates the immediate significance of the attribute; i.e. RMS power in a gate late in the record is effectively a measure of noise.

5.2 Trace Mode - Explicit

In this example, we have expanded the simple example in Section 5.1, page 29 to include:

A partial set of Attribute Parameter Records
Some comments to aid in interpretation of the file
Some Entity and Fix records providing additional information about vibrator positioning
Ground Force for each of the 2 vibrators, each sweeping twice.

Base values and multipliers have been used to make the numbers more easily readable.

Note that in real data, the volume of Receiver records is always very large with respect to the header section, and with respect to all Source, Entity and Fix records.

```
H, ADS-TA_rev_1.0, 5, 4, 2, 4, 0,ZDX-2000,1998/307/083000.000,Able,/raw/Line20,/none
C
C ---------------------- Source Attributes --------------------------
C  1,                2,   3,4,5,   6,         7,    8, 9, 10,   11,12
A, 7,Source_Easting   ,   1,S,0, 0.0,  123000.0, 10.0, 1,  0,    0, 0
A, 8,Source_Northing  ,   2,S,0, 0.0, 3344000.0, 10.0, 1,  0,    0, 0
A, 9,Source_Elevation ,   7,S,0, 0.0,       0.0, 10.0, 1,  0,    0, 0
A,10,Number_of_Vibes  , 501,S,0, 0.0,       0.0,  1.0, 1,  0,    0, 0
A,11,Vibe_Pos.Quality ,   0,S,0, 0.0,       0.0,  1.0, 1, 63, 1045, 0
C Vibe Pos. Quality is an Input/Output Inc Proprietary measure
C of Vibrator array Center of Gravity Positioning quality. Valid
C values are in the range 0.0 to 100.0. Good data is <20. Bad data is >30.
C Values in the range 20-30 are marginal, and should be treated with caution.
C
C -------------------- Receiver Attributes -------------------------
C  1,                2,   3,4,5,   6,         7,    8, 9, 10,   11,12
A, 2,Receiver_Easting ,   1,R,0, 0.0,  123000.0, 10.0, 1,  0,    0, 0
A, 3,Receiver_Northing,   2,R,0, 0.0, 3344000.0, 10.0, 1,  0,    0, 0
A, 4,RMS_Noise        ,   6,R,0,-1.0,       0.0,  1.0, 1,  0,    0, 5
P,        1,     1,    Gate_Type-Constant time,
P,        2,  4800,    Gate_start,
P,        3,   200,    Gate_length,
P,      201,     8,    Low_cut_filter,
P,      205,    90,    High_cut_filter,
C  1,                2, 3,  4,5,   6,   7,   8, 9, 10,11,12
A, 5,RMS_Signal       , R,  6,0,-1.0, 0.0, 1.0, 2,  0, 0, 6
P,        1,     2,    Linear_gate_type-based_around first break_V=2000 m/s
P,        2,     0,    Gate_start_time_at_zero_offset_trace
P,        3,   200,    Gate_length
P,        4,  2000,    Velocity 2000 m/s
P,      201,     8,    Low_cut_filter
P,      205,    90,    High_cut_filter
C
C -------- Entity Attributes Associated with Source ------------------
C Entity records are defined for Vibrators, describing how many times
C each vibrator swept during the source point.
C Fix records are then defined for each vibe for each sweep.Vib_Easting C and
C Northing are meaningless (avg. of 2 sweeps) and will be NULL. Fix
```

```
C Eastings/Northings are raw values used to compute CoG of Source array
C  1,                  2,   3,4,5,  6,       7,  8, 9,10,11,12
A, 5, Vib_Easting       ,   1,E,1,  0,  123000, 10, 1, 0, 0, 0
A, 6, Vib_Northing      ,   2,E,1,  0, 3344000, 10, 1, 0, 0, 0
A, 7, NUM_VIB_SWEEPS    , 502,E,1, -1,       0,  1, 1, 0, 0, 0
C  1,                  2,   3,4,5,   6,       7,  8, 9,10,11,12
A, 5, Fix_Easting       ,   1,F,1,   0,  123000, 10, 1, 0, 0, 0
A, 6, Fix_Northing      ,   2,F,1,   0, 3344000, 10, 1, 0, 0, 0
A, 7, NS_GPS_DOP        , 228,F,1,  -1,       0,  1, 1, 0, 0, 0
A, 8, NS_GPS_Diff_Status, 233,F,1,  -1,       0,  1, 1, 0, 0, 0
C GPS Diff Status is a flag: 1 implies valid differential corrections
C available, 0 implies not diff corrections available.
C
C --------------------- Data Segment ---------------------------
C    1,    2,   3,  4,  5,      6,    7,    8,   9,10,  11
S, 100, 1998, 306, 08, 24, 00.000, 4861, 5566, 124, 2, 5.3
C    1,     2, 3, 4, 5, 6, 7
E, 100, 0.000, 1, 1, 0, 0, 2
E, 100, 0.000, 1, 3, 0, 0, 2
C    1,      2, 3, 4,   5,    6,    7, 8
F, 100,  0.000, 1, 1,4851, 5564,  1.2, 1
F, 100,  0.000, 3, 1,4866, 5562,  1.3, 1
F, 100, 30.000, 1, 2,4856, 5568,  1.2, 1
F, 100, 30.000, 3, 2,4871, 5570,  1.2, 1
C    1,    2,    3,      4,      5
R, 500, 4800, 6557, 0.0013, 0.1261
R, 501, 5800, 7557, 0.0015, 0.1122
R, 502, 6820, 8557, 0.0008, 0.1023
C -------------------------------------------------------
C    1,    2,   3,  4,  5,      6,    7,    8,   9,10,  11
S, 101, 1998, 306, 08, 25, 00.000, 5861, 6512, 124, 2, 57.4
C    1,     2, 3, 4, 5, 6, 7
E, 101, 0.000, 1, 1, 0, 0, 2
E, 101, 0.000, 1, 3, 0, 0, 1
C    1,      2, 3, 4,   5,    6,    7,  8
F, 101,  0.000, 1, 1,5859, 6520,  1.3,  1
F, 101,  0.000, 3, 1,9432,  234,  2.1,  0
F, 101, 30.000, 1, 2,5863, 6504,  1.3,  1
```

```
F, 101, 30.000, 3, 2,   0,    0, -1.0, -1
C Vibe Positioning Quality poor due to lost differential corrections on
C Vibe ID 03 - Foliage blocking data path
C Vibe ID 03 taken off line - 1 sweep only, ID 02 brought back on line
R, 500,4800, 6557, 0.0012,  0.1276
R, 501,5800, 7557, 0.0016,  0.1188
R, 502,6820, 8557, 0.0008,  0.1011
C ------------------------------------------------------
C    1,    2,   3,  4,  5,     6,    7,    8,   9,10,  11
S, 102, 1998, 306, 08, 26, 0.000, 6861, 6563, 124, 2, 7.8
C    1,     2, 3, 4, 5, 6, 7
E, 102, 0.000, 1, 1, 0, 0, 2
E, 102, 0.000, 1, 2, 0, 0, 2
C    1,      2, 3, 4,   5,    6,    7,  8
F, 102,  0.000, 1, 1,6850, 6560,  1.2,  1
F, 102,  0.000, 2, 1,6856, 6561,  1.3,  1
F, 102, 30.000, 1, 2,6866, 6568,  1.3,  1
F, 102, 30.000, 2, 2,6872, 6565,  1.3,  1
R, 500,4800, 6557, 0.0015,  0.1301
R, 501,5800, 7557, -1.0,    0.1145
R, 502,6820, 8557, 0.0005,  0.1002
C ------------------------------------------------------
C    1,    2,   3,  4,  5,     6,    7,    8,   9,10,  11
S, 103, 1998, 306, 08, 27, 0.000, 7861, 7522, 124, 2, 8.1
C    1,     2, 3, 4, 5, 6, 7
E, 103, 0.000, 1, 1, 0, 0, 2
E, 103, 0.000, 1, 2, 0, 0, 2
C    1,      2, 3, 4,   5,    6,    7,  8
F, 103,  0.000, 1, 1,7864, 7532,  1.2,  1
F, 103,  0.000, 1, 2,7868, 7542,  1.8,  1
F, 103, 30.000, 2, 1,7854, 7512,  1.2,  1
F, 103, 30.000, 2, 2,7858, 7502,  1.2,  1
R, 500,4800, 6557, 0.0011,  0.1321
R, 501,5800, 7557, 0.0014,  0.1256
R, 502,6820, 8557, 0.0009,  0.1004
Y, Segment_Terminator
Z, Dataset_Terminator
```

5.3 Template Mode - Simple

In this example, two lines of 3 receivers are laid out, Line 10 is active for shots 100 and 101, both lines are active for shots 200 and 201, and only line 20 is active for shots 300 and 301. This “roll” is defined in the Template records.

```
H, ADS-TA_rev_1.0,5,4,-1,-1,1,ZDX-2000,1998/307/083000.000,Able,/raw/Line20,/none
C ‘1’ as last attribute in H record implies this is a Template mode
C file
C -------------------- Source Attributes ------------------------
C   1,                   2, 3, 4, 5,    6,   7,   8, 9,10,11,12
A,  7,  Source_Easting    , 1, S, 0,  0.0, 0.0, 1.0, 1, 0, 0, 0
A,  8,  Source_Northing   , 2, S, 0,  0.0, 0.0, 1.0, 1, 0, 0, 0
A,  9,  Source_Line       , 4, S, 0,  0.0, 0.0, 1.0, 1, 0, 0, 0
A, 10,  Good-Bad_Flag     , 5, S, 0,  0.0, 0.0, 1.0, 1, 0, 0, 0
A, 11,  Template_ID       , 6, S, 0,  0.0, 0.0, 1.0, 1, 0, 0, 0
C ------------------- Receiver Attributes ----------------------
A,  2,  Receiver_Easting  , 1, R, 0,  0.0, 0.0, 1.0, 1, 0, 0, 0
A,  3,  Receiver_Northing , 2, R, 0,  0.0, 0.0, 1.0, 1, 0, 0, 0
A,  4,  Receiver_Line     , 4, R, 0,  0.0, 0.0, 1.0, 1, 0, 0, 0
A,  5,  Receiver_Elevation, 7, R, 0, -1.0, 0.0, 1.0, 1, 0, 0, 0
C
C ----------------------- Date Segment -----------------------
C    1,    2,   3,  4,  5,      6,     7,       8,   9,10,  11
S, 100, 1998, 306, 08, 24, 00.000,120000, 5301000, 719, 1, 230
S, 101, 1998, 306, 08, 25, 00.000,120050, 5301000, 719, 1, 230
S, 200, 1998, 306, 08, 28, 00.000,120000, 5301500, 720, 1, 240
S, 201, 1998, 306, 08, 29, 00.000,120050, 5301500, 720, 0, 240
S, 300, 1998, 306, 08, 32, 00.000,120000, 5302000, 721, 1, 250
S, 301, 1998, 306, 08, 33, 00.000,120050, 5302000, 721, 1, 260
C   1,      2,       3,  4,   5
R, 51, 120100, 5300500, 10, 12.1
R, 52, 120100, 5300600, 10, 13.5
R, 53, 120100, 5300700, 10, 18.5
R, 71, 120200, 5301000, 20, 14.2
R, 72, 120200, 5301100, 20, 15.3
R, 73, 120200, 5301200, 20, 17.2
C    1,   2,    3
T, 230,  51,   53
```

```
T, 240,  51,   53
T, 240,  71,   73
T, 250,  71,   73
T, 260,  73,   73
C Note that Template 240 is actually 2 records describing a non-continuous
C range of active receivers.
C Also note the GOOD-BAD flag showing shot 201 as bad.
Y, Segment_Terminator
Z, Dataset_Terminator
```

Appendix A Global Attribute Classes

A.1 Source Attributes

Table 14 Source attributes

Class	Name	Description
0	UNDEF	Undefined/Other
1	S_EASTING	Easting
2	S_NORTHING	Northing
3	S_POINT_ID	Point ID
4	S_LINE	Source Line Number
5	GOOD_BAD	Good Bad Flag (1=Good, 0=Bad, anything else = UNKNOWN)
6	TEMPLATE	Template ID (Used only in Template mode)
7	ELEV	Elevation (Depths appear as negative numbers in marine use ATT_MULT=-1)
8	TIME	Time (Seconds since 00:00 1/1/1990)
101	GC_LINE_NO	Air gun Controller Line Number
102	GC_SHOT_NO	Air gun Controller Shot Number
103	GC_ARRAY_MASK	Air gun Controller Array Mask
104	GC_TRIG_MODE	Air gun Controller Trigger Mode
105	GC_DATE	Air gun Controller Date: (DDMMYY)
106	GC_YEAR	Air gun Controller Year
107	GC_JULIAN_DAY	Air gun Controller Julian Day
108	GC_TIME	Air gun Controller Time: (HHMMSS.sssss)
109	GC_ACTGUN_NO	Air gun Controller Number Active Guns
110	GC_DERR_NO	Air gun Controller Number Delta Errors

Class	Name	Description
111	GC_AFIRE_NO	Air gun Controller Number Autofires
112	GC_MFIRE_NO	Air gun Controller Number Misfires
113	GC_MFIRE_NO	Air gun Controller Delta Spread for Total Array
114	GC_VOLUME	Air gun Controller Volume Fired
115	GC_GUNTIME_A	Air gun Controller Average Delta
116	GC_GUNTIME_B	Air gun Controller Average Deviation of Delta
117	GC_MANF_PRES	Air gun Controller Manifold Pressure
118	GC_DEEP_TOW	Air gun Controller Deep Tow
119	GC_SEQ_NUMB	Air gun Controller Current Sequence Number
120	GC_SUBARR_NO	Air gun Controller Number Sub-arrays
121	GC_GUNARR_NO	Air gun Controller Number Guns in Array
201	NS_DATE	Navigation System Date (YYMMDD)
202	NS_YEAR	Navigation System Year
203	NS_JD	Navigation System Julian Date
204	NS_SHIP_LAT	Navigation System Ship Latitude (negative for Southern Hemisphere)
205	NS_SHIP_LON	Navigation System Ship Longitude (negative for Western Hemisphere)
206	NS_SHIP_EASTING	Navigation System Ship Easting
207	NS_SHIP_NORTHING	Navigation System Ship Northing
208	NS_SHIP_SPEED	Navigation System Ship Speed
209	NS_SHIP_CMG	Navigation System Ship Course Made Good
210	NS_GYRO_HEAD	Navigation System Ship Gyro Heading
211	NS_KF_RAW_X	Navigation System Source Raw X co-ord

Class	Name	Description
212	NS_KF_RAW_Y	Navigation System Source Raw Y co-ord
213	NS_KF_PRED_X	Navigation System Source Predicted X co-ord
214	NS_KF_PRED_Y	Navigation System Source Predicted Y co-ord
215	NS_SP_ERR_X	Navigation System Source Shotpoint Error (X)
216	NS_SP_ERR_Y	Navigation System Source Shotpoint Error (Y)
217	NS_ANT_LAT	Navigation System Antenna Latitude (-ive for South)
218	NS_ANT_LON	Navigation System Antenna Longitude (-ive for West)
219	NS_DGPS_POSMODE	Navigation System Positioning Mode (1 Differential, 0 Non-Differential)
220	NS_DGPS_AGE	Navigation System Age of DGPS correction (s)
221	NS_DGPS_NUM_VU	Navigation System Number of Satellites in view
222	NS_DGPS_NUM_USE	Navigation System Number of Satellites used in fix
223	NS_DGPS_FLAG_VU	Navigation System Satellites in view (Flags)
224	NS_DGPS_FLAG_USE	Navigation System Satellites in use (Flags)
225	NS_DGPS_ALTITUDE	Navigation System DGPS Altitude
226	NS_DGPS_VVEL	Navigation System DGPS Vertical Velocity
227	NS_DGPS_HVEL	Navigation System DGPS Horizontal Velocity
228	NS_DGPS_DOP	Navigation System DGPS DOP
229	NS_DIST_INLINE	Navigation System Downline Distance
230	NS_DIST_XLINE	Navigation System Offline Distance (Port negative)
231	NS_LINE_NAME	Navigation system line name
232	NS_SP_NUMBER	Navigation System SP Number
233	NS_GPS_Diff_Status	Flag showing status of GPS differential corrections, 0 = invalid or no GPD differential corrections, 1 = valid differential corrections are being received and used.

Class	Name	Description
234	NS_GPS_RTCM/RTK	Flag showing status of GPS: 0 – Unknown status 1 – RTCM calculation 2 – RTK calculation
301	SEGD_YEAR	SEG-D General Header Year
302	SEGD_DAY	SEG-D General Header Day
303	SEGD_HOUR	SEG-D General Header Hour
304	SEGD_MINUTE	SEG-D General Header Minute
305	SEGD_SECOND	SEG-D General Header Second
306	SEGD_FILE_NO	SEG-D General Header File No
307	SEGD_REEL_NO	SEG-D General Header Reel No.
308	SEGD_LINE__CNT	SEG-D General Extended Header Number of active Receiver Lines
309	SEGD_AUX_CNT	SEG-D General Extended Header Number of Aux channels on tape
310	SEGD_FM_SWITCH	SEG-D General Extended Header Feet Meters Switch
311	SEGD_LINE_TAP_LEN	SEG-D General Extended Header Nominal Length of Line Tap Cable
312	SEGD_CABLE_LEN	SEG-D General Extended Header Nominal Receiver Cable Length
313	SEGD_LN_INTERVAL	SEG-D General Extended Header Nominal Receiver Line Spacing
314	SEGD_ST_INTERVAL	SEG-D General Extended Header Nominal Receiver Station Interval
315	SEGD_SPREAD TYPE	SEG-D General Extended Header Spread Type
316	SEGD_HPE_FRQ_ST	SEG-D Ancillary Header HPE Start Frequency

Class	Name	Description
317	SEGD_HPE_FRQ_END	SEG-D Ancillary Header HPE End Frequency
318	SEGD_HARM_A	SEG-D Ancillary Header Harmonic A
319	SEGD_HARM_B	SEG-D Ancillary Header Harmonic B
320	SEGD_HARM_C	SEG-D Ancillary Header Harmonic C
321	SEGD_HARM_D	SEG-D Ancillary Header Harmonic D
322	SEGD_HARM_E	SEG-D Ancillary Header Harmonic E
323	SEGD_BW_A	SEG-D Ancillary Header Bandwidth A
324	SEGD_BW_B	SEG-D Ancillary Header Bandwidth B
325	SEGD_BW_C	SEG-D Ancillary Header Bandwidth C
326	SEGD_BW_D	SEG-D Ancillary Header Bandwidth D
327	SEGD_BW_E	SEG-D Ancillary Header Bandwidth E
328	SEGD_HPE_REF	SEG-D Ancillary Header HPE Reference
329	SEGD_HPE_AV_TIME	SEG-D Ancillary Header HPE Averaging Time
330	SEGD_LC_FRQ_A	SEG-D Ancillary Header Low cut Filter Freq. A
331	SEGD_LC_ATTN_A	SEG-D Ancillary Header Low cut Filter Attenuation A
332	SEGD_LC_FRQ_B	SEG-D Ancillary Header Low cut Filter Freq. B
333	SEGD_LC_ATTN_B	SEG-D Ancillary Header Low cut Filter Attenuation B
334	SEGD_LC_FRQ_C	SEG-D Ancillary Header Low cut Filter Freq. C
335	SEGD_SSF_LC_FRQ	SEG-D Ancillary Header Spectral shaping Filter Low cut
336	SEGD_SSF_FLT_GAIN	SEG-D Ancillary Header Spectral shaping Filter Final Gain
337	SEGD_LINE_NO	SEG-D Ancillary Header Shot Line Number
338	SEGD_SHOT_ST	SEG-D Ancillary Header Shot Station Number
339	SEGD_CNL_CNT_RCD	SEG-D Ancillary Header Channel Count

Class	Name	Description
340	SEGD_NOISE_CODE	SEG-D Ancillary Header Noise Edit Code
341	SEGD_SWEEP_CODE	SEG-D Ancillary Header Sweep Type Code
342	SEGD_SWEEP_LEN	SEG-D Ancillary Header Sweep Length
343	SEGD_STACK_CNT	SEG-D Ancillary Header Number of Stacks
344	SEGD_SWP_FRQ_ST	SEG-D Ancillary Header Starting Sweep Frequency
345	SEGD_SWP_FRQ_END	SEG-D Ancillary Header Ending Sweep Frequency
346	SEGD_SWP_TT_ST	SEG-D Ancillary Header Starting Sweep Tape Length
347	SEGD_SWP_TT_END	SEG-D Ancillary Header Ending Sweep Taper Length
348	SEGD_TT_TYPE	SEG-D Ancillary Header Taper Type
349	SEGD_CORR_MODE	SEG-D Ancillary Header Correction Mode
350	SEGD_SRC_TYPE	SEG-D Ancillary Header Source Type
401	DYN_CHG_SIZE	Dynamite Charge Size
402	DYN_CHG_DEPTH	Dynamite Charge Depth
403	DYN_UP_HOLE	Dynamite Up Hole Time
501	VIB_NUM	Number of vibrators per sweep
502	NUM_VIB_SWEEPS	Number of Sweeps per VP (Note – See also SEG-D Vibrator parameters). When referring to a group of vibrators or a single vibrator, this is the number times a single vibrator sweeps within a single vibration point.
503	VIB_MIN_FORCE	Vibrator Minimum Force
504	VIB_MAX_FORCE	Vibrator Maximum Ground Force
505	VIB_AVG_FORCE	Vibrator Average Ground Force
506	VIB_MAX_PH_ERR	Vibrator Max Phase Error (degrees)
507	VIB_GRD_STIFFNESS	Computed ground stiffness
508	VIB_GRD_VISCOSITY	Computed ground viscosity

Class	Name	Description
509	VIB_MAX_DISTORTION	Maximum vibrator distortion (dB)

A.2 Receiver Attributes

Table 15 Receiver attributes

Class	Name	Description
0	UNDEF	Undefined / Other
1	R_EASTING	Easting
2	R_NORTHING	Northing
3	R_POINT_ID	Point ID
4	R_LINE	Receiver Line (Streamer ID in Marine)
5	ELEV	Elevation (Depths appear as negative numbers in marine use ATT_MULT=-1)
101	RMS	RMS Power in specified Gate (mV)
102	FBP	First Break Pick (ms)
103	FBPQ	Quality of First Break Pick
104	FBPA	Amplitude of First Break Pick
105	PFQ	Peak Frequency (Frequency at which peak power occurs)
106	MNFQ	Minimum Frequency (All frequencies between PFQ and MNFQ are above some threshold)
107	MXFQ	Maximum Frequency (All frequencies between PFQ and MXFQ are above some threshold)
108	AMP	Amplitude at Specified Time
109	MIN_AMP	Maximum Negative Amplitude in Specified Gate
110	MAX_AMP	Maximum Positive Amplitude in Specified Gate
111	AVG_AMP	Average Amplitude in Specified Gate (effectively DC offset)

Class	Name	Description
112	AVG_ABS	Average Absolute Amplitude in Specified Gate
113	SPIKE	Absolute Value of MAX_AMP-MIN_AMP)/AVG_ABS
201	SEGD_CS_TP	SEG-D Channel Set Header Scan Type
202	SEGD_CS_NO	SEG-D Channel Set Header Channel Set Number
203	SEGD_CS_ST	SEG-D Channel Set Header Channel Set Start Time
204	SEGD_CS_TE	SEG-D Channel Set Header Channel Set End Time
205	SEGD_CH_TY	SEG-D Channel Set Header Channel Type
206	SEGD_CH_GA	SEG-D Channel Set Header Channel Gain
207	SEGD_AL_FRQ	SEG-D Channel Set Header Anti-alias Filter Frequency
207	SEGD_AL_SL	SEG-D Channel Set Header Anti-alias Filter Slope
209	SEGD_TR_NO	SEG-D Trace Header Trace Number
210	SEGD_SE_TY	SEG-D Trace Header Sensor Type
211	SEGD_FTW	SEG-D Trace Header First Timing word
212	SEGD_TBW	SEG-D Trace Header Time Break Window
213	SEGD_LINE_NO	SEG-D Trace Header Receiver Line Number
214	SEGD_ST_NO	SEG-D Trace Header Receiver Station Number
215	SEGD_OFFSET	SEG-D Trace Header Source-Receiver Offset
216	SEGD_AZM	SEG-D Trace Header Source-Receiver Azimuth
217	SEGD_DX	SEG-D Trace Header Delta X
218	SEGD_DY	SEG-D Trace Header Delta Y

Appendix B Attribute Parameter Definitions

The attribute parameter definitions in this section represent the default standard attribute parameter definitions for attributes defined in Appendix A page 37.

Note that one of the objectives of ADS-TA is to allow a quick, simple and flexible approach to transferring diverse data between applications. In many cases, these applications may have very brief lifetimes, and generation of full Attribute Parameter definition records may be inappropriate. For this reason, the following rules and recommendations are suggested:

- Attribute Parameter Records are optional. Client applications reading ADS-TA files should deal gracefully with a complete absence of Attribute Parameter Records.
- All Attribute Parameter Records should be accurate - it is better to have no P records than wrong P records
- Major applications with long projected life spans, who are creating ADS-TA files that may form part of a long term archival storage (rather than short term temporary data transfer) should create full sets of P records.

Section numbers in this attachment refer to the Attribute code in Appendix A page 37. If a section is missing, the relevant attribute has no defined parameters. Most Source Attributes do not have many parameters, as many are either (a) self-explanatory or (b) derived directly from the SEG-D header, which implies a very specific definition.

B.1 Source Attributes

B.1.1 UNDEF

See Section B.2.1 page 45

B.1.2 S_EASTING

See Section B.2.2 page 46

B.1.3 S_NORTHING

See Section B.2.2 page 46

B.2 Receiver Attributes

B.2.1 UNDEF

No attribute parameter definition records are required for UNDEF attributes. It is recommended that a comment record follow an UNDEF attribute definition, describing the attribute.

B.2.2 R_EASTING

Attribute Parameters for EASTINGS should contain a full set of Geodetic Parameters, as described here. However, to avoid over complication of the Header Section, where multiple sets of coordinates are contained in a file, the parameters should only be described for the Source Record Easting. The ADS-TA format does not permit mixing of coordinate types in a single ADS-TA file structure. Code definitions are based on UKOOA P1-90.

Table 16 Coordinate attributes

Code	Name	Type/Subtype	Description
1	Projection	Numeric Integer	Type of Projection 1 UTM Northern Hemisphere 2 UTM Southern Hemisphere 3 Transverse Mercator (North Oriented) 4 Transverse Mercator (South Oriented) 5 Lambert Conic Conformal (1 std. Parallel) 6 Lambert Conic Conformal (2 std. parallel) 7 Mercator8Cassini-Soldner 9 Skew Orthomorphic 10 Stereographic 11 New Zealand Map Grid 999 Other
2	Grid Unit	Numeric Integer	Grid Unit (After application of ATT_BASE and ATT_MULT) 1 meters 2 feet (US Survey)3Other
3	Zone	Numeric	Projection Zone (Negative zone implies South for UTM)
4	Origin Latitude	Numeric	Grid Origin Latitude
5	Origin Longitude	Numeric	Grid Origin Longitude
6	Origin Easting	Numeric	Easting at Grid Origin
7	Origin Northing	Numeric	Northing at Grid Origin
8	Datum dx	Numeric	Transformation to WGS-84
9	Datum dy	Numeric	Transformation to WGS-84

Code	Name	Type/Subtype	Description
10	Datum dz	Numeric	Transformation to WGS-84
11	Datum rx	Numeric	Transformation to WGS-84
12	Datum ry	Numeric	Transformation to WGS-84
13	Datum rz	Numeric	Transformation to WGS-84
14	Datum s	Numeric	Transformation to WGS-84
15	Datum Name	Numeric Integer	Datum Name – Codes defined as below1
16	Spheroid Name	Numeric Integer	Spheroid Name – Codes defined as below1
17	1/f	Numeric	Inverse Flattening
18	Scale Factor	Numeric	Scale Factor
19	SF Latitude	Numeric	Latitude at which scale factor is defined
20	SF Longitude	Numeric	Longitude at which scale factor is defied

B.2.3 R_NORTHING

See Section B.2.2 page 46

B.2.4 RMS

Table 17 Trace RMS amplitude attributes

Code	Name	Type/Subtype	Description
1	Gate type	Numeric Integer	-1=Whole Record 0=Other 1=constant time 2=linear with offset 3=hyperbolic with offset 4=linear with ‘knee times’ 5=linear with line number/station number 6=hyperbolic with line number/station number

Code	Name	Type/Subtype	Description
			If Gate type is not ‘1’, a Comment record should generally follow this parameter record describing time(offset)
2	Gate Start	Numeric	Zero Offset Gate Start time (in ms)
3	Gate Length	Numeric	Zero Offset Gate Length (in ms)
4	Velocity	Numeric	Constant velocity to use with “linear with offset” option in Gate Type parameter. Velocity is in m/s.
201	Low Filter F1	Numeric	Low Cut Filter Frequency at D1
202	Low Filter D	Numeric	Low Cut Filter dB down from peak at start of roll off
203	Low Filter F	Numeric	Low Cut Filter Frequency at D2
204	Low Filter D	Numeric	Low Cut Filter dB down from peak at end of roll off
205	Hi Filter F3	Numeric	Hi Cut Filter Frequency at D3
206	Hi Filter D3	Numeric	Hi Cut Filter dB down from peak at start of roll off
207	Hi Filter F4	Numeric	Hi Cut Filter Frequency at D4
208	Hi Filter D4	Numeric	Hi Cut Filter dB down from peak at end of roll off
209	Notch Filter F5	Numeric	Center Frequency of Notch Filter
210	Notch Width W5	Numeric	Width of Notch Filter in Hz
211	Notch Filter D5	Numeric	Notch Filter dB down at F5 +/- W5/2
301	Recovery Scalar	Numeric Integer	Type of recovery scaling applied 0=Other 1=None 2=Linear with time 3=Linear with Offset

Code	Name	Type/Subtype	Description
			4=Linear with time/offset 5=True Amplitude Recovery If Recovery Scalar is >=2, a comment record should follow this parameter to fully define the applied scaling algorithm.

B.2.5 First Break Pick Attributes

Table 18 First break attributes

Code	Name	Type/Subtype	Description
1	Search Gate type	Numeric Integer	-1=Whole Record 0=Other 1=constant time 2=linear with offset 3=hyperbolic with offset 4=linear with 'knee times' 5=linear with line number/station number 6=hyperbolic with line number/station number If Gate type is not '1', a Comment record should generally follow this parameter record describing time(offset)
2	Search Gate Start	Numeric	Zero Offset Search Gate Start time (in ms)
3	Search Gate Len.	Numeric	Zero Offset Search Gate Length (in ms)
201	Low Filter F1	Numeric	Low Cut Filter Frequency at D1
202	Low Filter D1	Numeric	Low Cut Filter dB down from peak at start of roll off
203	Low Filter F2	Numeric	Low Cut Filter Frequency at D2
204	Low Filter D2	Numeric	Low Cut Filter dB down from peak at end of roll off
205	Hi Filter F3	Numeric	Hi Cut Filter Frequency at D3

Code	Name	Type/Subtype	Description
206	Hi Filter D3	Numeric	Hi Cut Filter dB down from peak at start of roll off
207	Hi Filter F4	Numeric	Hi Cut Filter Frequency at D4
208	Hi Filter D4	Numeric	Hi Cut Filter dB down from peak at end of roll off
209	Notch Filter F5	Numeric	Center Frequency of Notch Filter
210	Notch Width W5	Numeric	Width of Notch Filter in Hz
211	Notch Filter D5	Numeric	Notch Filter dB down at F5 +/- W5/2
301	Recovery Scalar	Numeric Integer	Type of recovery scaling applied 0=Other 1=None 2=Linear with time 3=Linear with Offset 4=Linear with time/offset 5=True Amplitude Recovery If Recovery Scalar is >=2, a comment record should follow this parameter to fully define the applied scaling algorithm.
302	Min Offset	Numeric	Minimum Offset picked
303	Max Offset	Numeric	Max Offset picked
304	Min Azm	Numeric	Minimum Azimuth picked (degrees)
305	Max Azm	Numeric	Maximum Azimuth picked (degrees)
306	Algorithm Type	Numeric Integer	0=Other 1=Threshold detect 2=Noise Floor Ratio 3=Max Signal Slope Detection 4=Correlation 5=Neural Net 6=Manual

Code	Name	Type/Subtype	Description
			7=Non-seismic acoustic
307	Wavelet Phase	Numeric Integer	0=Other 1=Raw Coarse Pick 2=Peak 3=Trough 4=Zero crossing(positive slope) 5=Zero crossing(negative slope)
308	Envelope Length	Numeric	Envelope Length (ms) for Algorithm Types 1-4
309	Envelope Taper	Numeric	Envelope Taper Length (ms) for Algorithm Types 1-4

B.2.6 First Break Pick Quality

The parameters are defined as for Table 18 **First break attributes** page 49. If the First Break Pick Quality Attribute follows a First Break Pick attribute, it is assumed that the First Break Pick Quality attribute applies to that preceding First Break Pick.

Table 19 First break pick attributes

Code	Name	Type/Subtype	Description
401	Quality Type	Numeric Integer	0=Other 1=Correlation Coefficient 2=Similarity to adjacent traces 3=Similarity to adjacent shots 4=Similarity to adjacent shot/traces 5=Signal to noise

B.2.7 First Break Pick Amplitude

The parameters are defined as for Table 18 **First break attributes** page 49. If the First Break Pick Amplitude Attribute follows a First Break Pick attribute, it is assumed that the First Break Pick Amplitude attribute applies to that preceding First Break Pick. Note that parameter 307 should be either ‘2’ (Peak), or ‘3’ (Trough), and can thus be different from the Wavelet Phase of the actual Pick time.

Table 20 First break Pick Amplitudes

Code	Name	Type/Subtype	Description
1	Search Gate type	Numeric Integer	-1=Whole Record 0=Other 1=constant time 2=linear with offset 3=hyperbolic with offset 4=linear with 'knee times' 5=linear with line number/station number 6=hyperbolic with line number/station number If Gate type is not '1', a Comment record should generally follow this parameter record describing time(offset)
2	Search Gate Start	Numeric	Zero Offset Search Gate Start time (in ms)
3	Search Gate Len.	Numeric	Zero Offset Search Gate Length (in ms)
201	Low Filter F1	Numeric	Low Cut Filter Frequency at D1
202	Low Filter D1	Numeric	Low Cut Filter dB down from peak at start of roll off
203	Low Filter F2	Numeric	Low Cut Filter Frequency at D2
204	Low Filter D2	Numeric	Low Cut Filter dB down from peak at end of roll off
205	Hi Filter F3	Numeric	Hi Cut Filter Frequency at D3
206	Hi Filter D3	Numeric	Hi Cut Filter dB down from peak at start of roll off
207	Hi Filter F4	Numeric	Hi Cut Filter Frequency at D4
208	Hi Filter D4	Numeric	Hi Cut Filter dB down from peak at end of roll off
209	Notch Filter F5	Numeric	Center Frequency of Notch Filter
210	Notch Width W5	Numeric	Width of Notch Filter in Hz
211	Notch Filter D5	Numeric	Notch Filter dB down at F5 +/- W5/2

Code	Name	Type/Subtype	Description
301	Recovery Scalar	Numeric Integer	Type of recovery scaling applied 0=Other 1=None 2=Linear with time 3=Linear with Offset 4=Linear with time/offset 5=True Amplitude Recovery If Recovery Scalar is >=2, a comment record should follow this parameter to fully define the applied scaling algorithm.
302	Min Offset	Numeric	Minimum Offset picked
303	Max Offset	Numeric	Max Offset picked
304	Min Azm	Numeric	Minimum Azimuth picked (degrees)
305	Max Azm	Numeric	Maximum Azimuth picked (degrees)
306	Algorithm Type	Numeric Integer	0=Other 1=Threshold detect 2=Noise Floor Ratio 3=Max Signal Slope Detection 4=Correlation 5=Neural Net 6=Manual 7=Non-seismic acoustic
307	Wavelet Phase	Numeric Integer	0=Other 2=Peak 3=Trough
308	Envelope Length	Numeric	Envelope Length (ms) for Algorithm Types 1-4
309	Envelope Taper	Numeric	Envelope Taper Length (ms) for Algorithm Types 1-4

B.2.8 Peak Frequency

Table 21 Peak frequency attributes

Code	Name	Type/Subtype	Description
1	Gate type	Numeric Integer	-1=Whole Record 0=Other 1=constant time 2=linear with offset 3=hyperbolic with offset 4=linear with 'knee times' 5=linear with line number/station number 6=hyperbolic with line number/station number If Gate type is not '1', a Comment record should generally follow this parameter record describing time(offset)
2	Gate Start	Numeric	Zero Offset Gate Start time (in ms)
3	Gate Length	Numeric	Zero Offset Gate Length (in ms)
201	Low Filter F1	Numeric	Low Cut Filter Frequency at D1
202	Low Filter D	Numeric	Low Cut Filter dB down from peak at start of roll off
203	Low Filter F	Numeric	Low Cut Filter Frequency at D2
204	Low Filter D	Numeric	Low Cut Filter dB down from peak at end of roll off
205	Hi Filter F3	Numeric	Hi Cut Filter Frequency at D3
206	Hi Filter D3	Numeric	Hi Cut Filter dB down from peak at start of roll off
207	Hi Filter F4	Numeric	Hi Cut Filter Frequency at D4
208	Hi Filter D4	Numeric	Hi Cut Filter dB down from peak at end of roll off
209	Notch Filter F5	Numeric	Center Frequency of Notch Filter

Code	Name	Type/Subtype	Description
210	Notch Width W5	Numeric	Width of Notch Filter in Hz
211	Notch Filter D5	Numeric	Notch Filter dB down at F5 +/- W5/2
301	Recovery Scalar	Numeric Integer	Type of recovery scaling applied 0=Other 1=None 2=Linear with time 3=Linear with Offset 4=Linear with time/offset 5=True Amplitude Recovery If Recovery Scalar is >=2, a comment record should follow this parameter to fully define the applied scaling algorithm.
401	Smoothing Len.	Numeric	Spectral Smoothing Filter Length in Hz

B.2.9 Minimum Frequency

See Section Peak Frequency page 54 for parameters 1-16 (Gate Definition, filters, scaling etc.)

Table 22 Minimum frequency attributes

Code	Name	Type/Subtype	Description
1	Gate type	Numeric Integer	-1=Whole Record 0=Other 1=constant time 2=linear with offset 3=hyperbolic with offset 4=linear with ‘knee times’ 5=linear with line number/station number 6=hyperbolic with line number/station number If Gate type is not ‘1’, a Comment record should generally follow this parameter record describing time(offset)
2	Gate Start	Numeric	Zero Offset Gate Start time (in ms)

Code	Name	Type/Subtype	Description
3	Gate Length	Numeric	Zero Offset Gate Length (in ms)
201	Low Filter F1	Numeric	Low Cut Filter Frequency at D1
202	Low Filter D	Numeric	Low Cut Filter dB down from peak at start of roll off
203	Low Filter F	Numeric	Low Cut Filter Frequency at D2
204	Low Filter D	Numeric	Low Cut Filter dB down from peak at end of roll off
205	Hi Filter F3	Numeric	Hi Cut Filter Frequency at D3
206	Hi Filter D3	Numeric	Hi Cut Filter dB down from peak at start of roll off
207	Hi Filter F4	Numeric	Hi Cut Filter Frequency at D4
208	Hi Filter D4	Numeric	Hi Cut Filter dB down from peak at end of roll off
209	Notch Filter F5	Numeric	Center Frequency of Notch Filter
210	Notch Width W5	Numeric	Width of Notch Filter in Hz
211	Notch Filter D5	Numeric	Notch Filter dB down at F5 +/- W5/2
301	Recovery Scalar	Numeric Integer	Type of recovery scaling applied 0=Other 1=None 2=Linear with time 3=Linear with Offset 4=Linear with time/offset 5=True Amplitude Recovery If Recovery Scalar is >=2, a comment record should follow this parameter to fully define the applied scaling algorithm.
401	Smoothing Len.	Numeric	Spectral Smoothing Filter Length in Hz

Code	Name	Type/Subtype	Description
501	Flatness	Numeric	Flatness of bandpass (dB)

B.2.10 Maximum Frequency

See Section Minimum Frequency page 55 for parameters.

B.2.11 Instantaneous Amplitude

Amplitude is instantaneous sample amplitude, either the closest sample to the specified time, or a value deskewed to an exact time, as defined by the time.

Table 23 Instantaneous sample amplitude

Code	Name	Type/Subtype	Description
1	Time type	Numeric Integer	0=Other 1=constant time 2=linear with offset 3=hyperbolic with offset 4=linear with 'knee times' 5=linear with line number/station number 6=hyperbolic with line number/station number If Gate type is not '1', a Comment record should generally follow this parameter record describing time(offset)
2	Time Start	Numeric	Zero Offset Gate Start time (in ms)
3	Time Deskew	Numeric Integer	0=Integer Sample 1=Linear Interpolated value 2=Spline interpolated value 3=sinc function interpolated value 4= other interpolated value
101	Low Filter F1	Numeric	Low Cut Filter Frequency at D1
102	Low Filter D1	Numeric	Low Cut Filter dB down from peak at start of roll off

Code	Name	Type/Subtype	Description
103	Low Filter F2	Numeric	Low Cut Filter Frequency at D2
104	Low Filter D2	Numeric	Low Cut Filter dB down from peak at end of roll off
105	Hi Filter F3	Numeric	Hi Cut Filter Frequency at D3
106	Hi Filter D3	Numeric	Hi Cut Filter dB down from peak at start of roll off
107	Hi Filter F4	Numeric	Hi Cut Filter Frequency at D4
108	Hi Filter D4	Numeric	Hi Cut Filter dB down from peak at end of roll off
109	Notch Filter F5	Numeric	Center Frequency of Notch Filter
110	Notch Width W5	Numeric	Width of Notch Filter in Hz
111	Notch Filter D5	Numeric	Notch Filter dB down at F5 +/- W5/2
201	Recovery Scalar	Numeric Integer	Type of recovery scaling applied 0=Other 1=None 2=Linear with time 3=Linear with Offset 4=Linear with time/offset 5=True Amplitude Recovery If Recovery Scalar is >=2, a comment record should follow this parameter to fully define the applied scaling algorithm.

B.2.12 Minimum Amplitude

See Section RMS page 47 for Gate Definition parameters, scaling etc.

B.2.13 Maximum Amplitude

See Section RMS page 47 for Gate Definition parameters, scaling etc.

B.2.14Average Amplitude

See Section RMS page 47 for Gate Definition parameters, scaling etc.

B.2.15Average Absolute Amplitude

See Section RMS page 47 for Gate Definition parameters, scaling etc.

B.2.16Spike Detection

See Section RMS page 47 for Gate Definition parameters, scaling etc.

Appendix C Vendor Codes

0	Undefined / Other
1	Public / Global MADS Definition
1001	3D Geophysical
1002	A&B Geoscience
1003	AGIP
1004	ARCO
1005	Amerada Hess
1006	Amoco
1007	Argus
1008	British Petroleum
1009	CGG
1010	CNOOC
1011	CNPC
1012	COGC
1013	Chevron
1014	Coastline Geophysical
1015	Cogniseis
1016	Colorado School of Mines
1017	Concept Systems
1018	Digicourse
1019	ELF
1020	Eastern Geophysical
1021	EnSoCo
1022	Energy Innovations
1023	Enertech
1024	Enterprise Oil
1025	Exploration Consultants Ltd.
1026	Exxon
1027	Exxon (EPR)
1028	Fairfield Industries
1029	Fugro
1030	Fugro (Geoteam)
1031	Fugro (John Chance)
1032	GEDCO
1033	GEO-X
1034	GEOCON
1035	GSI
1036	GX Technology
1037	Geo
1038	Geosignal
1039	Geotrace
1040	Grant Geophysical
1041	Green Mountain Geophysical
1042	Horizon Seismic
1043	Houston Geoscan
1044	Hydrosearch
1045	Input/Output
1046	JEBCO

1047 Japex Geoscience Institute

1048 KIGAM

1049 Landmark Graphics

1050 Macha International

1051 Mercury International Technology

1052 Mobil

1053 Newcastle University

1054 ONGC

1055 PGS-Exploration

1056 PGS-Reservoir

1057 PGS-Tensor

1058 Pan Canadian

1059 Pelagos

1060 PetroAlliance

1061 Polaris

1062 RACAL

1063 RACAL (NCS)

1064 SAGA Petroleum

1065 SMNG

1066 Schlumberger-GECO/Prakla

1067 Schlumberger-Geoquest

1068 Seismic Image Software

1069 Seitel

1070 Sercel

1071 Shell

1072 Shell (SIPM)

1073 Shell (SWEPI)

1074 Shell Offshore Inc

1075 Solid State

1076 Sonardyne

1077 Stanford University

1078 Statoil

1079 Syntron

1080 TGS Calibre

1081 TOTAL

1082 Texaco

1083 Trimble

1084 UNOCAL

1085 Universal Seismic (USA)

1086 Veritas-DGC

1087 Western Atlas International

1088 Western Geophysical

1089 Seamap