Zuzlewski Stéphane June 1998

NCEDC

UCB/USGS

instrument responses Schema

UC Berkeley Seismological Laboratory

Volume II Version 1.3

Table of Contents

1.- Introduction. 2

2.- Database structure. 3

3.- Database relations. 11

4.- Database attributes. 17

1.- Introduction :

This paper is about the design of the NCEDC schema for the instrument responses. This schema was designed to be able to generate all the SEED blockettes and the abbreviation dictionary needed for the program POD to create SEED volumes as well as a simplified instrument reponses useful for real-time purposes.

There are 19 relations in the schema. The information stored in these relations includes:

- Station and channel information.
- Response information (FIR filter, poles & zeros).
- Decimation information.
- Sensitivity information.
- Data dictionary.
- Simplified instrument responses.

The remainder of this volume consists of three chapters:

Chapter 2	*Database structure* Each relation is defined.
Chapter 3	*Database relations* Each relation is described to identify the key fields and the links among the relations.
Chapter 4	*Database attributes* Each attribute is described.

2.- Database structure :

This chapter defines the physical structure of each table, as it exists within the DBMS data dictionary. The name of the relation appears in **bold** print at the top left and a description of the table at the top right. **Bold** attributes represent primary keys, *italic* attributes represent foreign keys, and <u>underlined</u> attributes stand for CSS attributes.

Station_Data		Summary information on a station
Attribute	***Type***	***Description***
<u>**net**</u>	char(8)	Network code
<u>**sta**</u>	char(6)	Station code
<u>lat</u>	float	Latitude
<u>lon</u>	float	Longitude
<u>elev</u>	float	Elevation
<u>staname</u>	char(50)	Station description
net_id	int	Network identifier code
word_32	int	32 bit word order
word_16	int	16 bit word order
<u>**ondate**</u>	date	Start date
<u>offdate</u>	date	Off date
<u>lddate</u>	date	Load date

Station_Comment		Comments for a station
Attribute	***Type***	***Description***
<u>**net**</u>	char(8)	Network code
<u>**sta**</u>	char(6)	Station code
<u>**ondate**</u>	date	Start date
<u>offdate</u>	date	Off date
comment_id	int	Comment code key
comment_level	int	Comment level
<u>lddate</u>	date	Load date

Channel_Data		Summary information on a channel
Attribute	***Type***	***Description***
<u>net</u>	char(8)	Network code
<u>sta</u>	char(6)	Station code
seedchan	char(3)	SEED channel name
channel	char(3)	Channel name
channelsrc	char(8)	Domain of channel name
location	char(2)	SEED location
<u>inid</u>	int	Instrument identifier
remark	char(30)	Optional comment
unit_signal	int	Units of signal responses
unit_calib	int	Units of calibration input
<u>lat</u>	float	Latitude
<u>lon</u>	float	Longitude
<u>elev</u>	float	Elevation
<u>edepth</u>	float	Emplacement depth
azimuth	float	Azimuth
dip	float	Dip
format_id	int	Data format identifier code
record_length	int	Data record length
<u>samprate</u>	float	Sampling rate
clock_drift	float	Maximum clock drift
flags	char(27)	SEED channel flags
<u>ondate</u>	date	Start date
<u>offdate</u>	date	Off date
<u>lddate</u>	date	Load date

Channel_Comment		Comments for a channel
Attribute	***Type***	***Description***
<u>net</u>	char(8)	Network code
<u>sta</u>	char(6)	Station code
seedchan	char(3)	SEED channel name
channel	char(3)	Channel name
channelsrc	char(8)	Domain of channel name
location	char(2)	SEED location
<u>ondate</u>	date	Start date
<u>offdate</u>	date	Off date
comment_id	int	Comment code key
comment_level	float	Comment level
<u>lddate</u>	date	Load date

Coefficients		Data associating a channel with a response
Attribute	***Type***	***Description***
net	char(8)	Network code
sta	char(6)	Station code
seedchan	char(3)	SEED channel name
channel	char(3)	Channel name
channelsrc	char(8)	Domain of channel name
location	char(2)	SEED location
ondate	date	Start date
offdate	date	Off date
stage_seq	int	Stage sequence
dc_key	int	Response (Coefficients) key
lddate	date	Load date

DC		Summary information on a response (Coefficients)
Attribute	***Type***	***Description***
key	int	Response (coefficients) key
name	char(80)	Response (Coefficients) name
unit_in	int	Signal input units
unit_out	int	Signal output units
r_type	char(1)	Response type
symmetry	char(1)	Symmetry code
storage	char(1)	Storage flag (Half/Full)
lddate	date	Load date

DC_Data		Coefficients of a response
Attribute	***Type***	***Description***
key	int	Response (Coefficients) key
row_key	int	Row key
type	char(1)	Numerator/Denominator
coefficient	float	Numerator/denominator coefficient
error	float	Numerator/denominator error

Decimation		Data associating a channel with a decimation
Attribute	***Type***	***Description***
<u>**net**</u>	char(8)	Network code
<u>**sta**</u>	char(6)	Station code
seedchan	char(3)	SEED channel name
channel	char(3)	Channel name
channelsrc	char(8)	Domain of channel name
location	char(2)	SEED location
<u>**ondate**</u>	date	Start date
<u>offdate</u>	date	Off date
stage_seq	int	Stage sequence
dm_key	int	Decimation key
<u>lddate</u>	date	Load date

DM		Summary information on a decimation
Attribute	***Type***	***Description***
key	int	Decimation key
name	char(80)	Decimation name
<u>samprate</u>	float	Input sampling rate
factor	int	Decimation factor
offset	int	Decimation offset
delay	float	Estimated delay
correction	float	Correction applied
<u>lddate</u>	date	Load date

Poles_Zeros		Data associating a channel with poles & zeros
Attribute	***Type***	***Description***
net	char(8)	Network code
sta	char(6)	Station code
seedchan	char(3)	SEED channel name
channel	char(3)	Channel name
channelsrc	char(8)	Domain of channel name
location	char(2)	SEED location
ondate	date	Start date
offdate	date	Off date
stage_seq	int	Stage sequence
pz_key	int	Poles & zeros key
tf_type	char(1)	Transfer function type
unit_in	int	Stage signal input units
unit_out	int	Stage signal output units
AO	float	AO normalization factor (1.0 if none)
AF	float	Normalization frequency
lddate	date	Load date

PZ		Summary information on a response (Poles & Zeros)
Attribute	***Type***	***Description***
key	int	Poles & zeros key
name	char(80)	Poles & zeros name
lddate	date	Load date

PZ_Data		Poles & zeros of a response
Attribute	***Type***	***Description***
key	int	Poles & zeros key
row_key	int	Row key
type	char(1)	Pole/Zero
r_value	float	Real pole/zero
r_error	float	Real pole/zero error
i_value	float	Imaginary pole/zero
i_error	float	Imaginary pole/zero error

Sensitivity		Data associating a channel with a sensitivity
Attribute	***Type***	***Description***
net	char(8)	Network code
sta	char(6)	Station code
seedchan	char(3)	SEED channel name
channel	char(3)	Channel name
channelsrc	char(8)	Domain of channel name
location	char(2)	SEED location
ondate	date	Start date
offdate	date	Off date
stage_seq	int	Stage sequence
sensitivity	float	Sensitivity/gain (S_d)
frequency	float	Frequency (F_s)
lddate	date	Load date

D_Abbreviation		Abbreviation dictionary
Attribute	***Type***	***Description***
id	int	Abbreviation lookup code
description	char(70)	Abbreviation description

D_Unit		Unit dictionary
Attribute	***Type***	***Description***
id	int	Unit lookup code
name	char(80)	Unit name
description	char(70)	Unit description

D_Comment		Comment dictionary
Attribute	***Type***	***Description***
id	int	Comment code key
class	char(1)	Comment class code
description	char(70)	Description of comment
unit	int	Units of comment level

D_Format		Format dictionary
Attribute	***Type***	***Description***
id	int	Data format identifier code
name	char(80)	descriptive name
family	int	Unit family type

D_Format_Data		Format data
Attribute	***Type***	***Description***
id	int	Data format identifier code
row_id	int	Row identifier
key_d	char(80)	Decoder key

Simple_Response Summary information on a simplified response		
Attribute	***Type***	***Description***
net	char(8)	Network code
sta	char(6)	Station code
seedchan	char(3)	SEED channel name
channel	char(3)	Channel name
channelsrc	char(8)	Domain of channel name
location	char(2)	SEED location
inid	int	Instrument identifier
frequency	float	Frequency (F_s)
damping_value	float	Damping value
gen_const	float	Generator constant
dig_const	float	Digitizer constant
gain	float	Gain
pz_key	int	Poles & Zeros key
ml_corr	float	Correction for local magnitude
me_corr	float	Correction for energy magnitude
ondate	date	Start date
offdate	date	Off date
lddate	date	Load date

3.- Database relations :

This chapter describes the DBMS relations that comprise the version 1.3 schema. The information given here, along with that in Chapter 4, *Database attributes*, constitutes the data dictionary. There's an entry for each relation. Within the entry, the relation's name appears first, followed by a list of its attributes. A brief description completes the entry.

Name:	**Station_Data**	
Keys:		
	Primary:	*net*, *sta*, *ondate*
	Foreign:	*net_id*
Data:	*lat*, *lon*, *elev*, *staname*, *word_32*, *word_16*, *offdate*, *lddate*	
Description:	Station location information. This relation names and describes a point on the earth where seismic measurements are made (e.g. the location of a seismic instrument or array). It contains information that normally changes infrequently, such as location.	

Name:	**Station_Comment**	
Keys:		
	Primary:	*net*, *sta*, *ondate*, *comment_id*
	Foreign:	*comment_level*
Data:	*offdate*, *lddate*	
Description:	This table contains comments about stations.	

Name:	**Channel_Data**		
Keys:			
	Primary:	*net, sta, seedchan, location, ondate*	
	Foreign:	*inid, unit_signal, unit_calib, format_id*	
Data:	*channel, channelsrc, remark, lat, lon, elev, edepth, azimuth, dip, record_length, samprate, clock_drift, flags, offdate, lddate*		
Description:	Station-channel information. This relation provides information about the various channels that are available at a station and maintains a record of the physical channel configuration at a site.		

Name:	**Channel_Comment**		
Keys:			
	Primary:	*net, sta, seedchan, location, ondate, comment_id*	
	Foreign:	*comment_level*	
Data:	*channel, channelsrc, offdate, lddate*		
Description:	This table provides comments about channels.		

Name:	**Coefficients**		
Keys:			
	Primary:	*net, sta, seedchan, location, ondate, stage_seq*	
	Foreign:	*dc_key*	
Data:	*channel, channelsrc, offdate, lddate*		
Description:	This table provides information about the associations between channels and responses defined by digital coefficients.		

Name:	**DC**	
Keys:		
	Primary:	*key*
	Foreign:	*unit_in, unit_out*
Data:	*name, r_type, symmetry, storage, lddate*	
Description:	This table provides information about responses defined by digital coefficients.	

Name:	**DC_Data**	
Keys:		
	Primary:	*key, row_key*
	Foreign:	
Data:	*type, coefficient, error*	
Description:	This table contains the digital coefficients for the responses.	

Name:	**Decimation**	
Keys:		
	Primary:	*net, sta, seedchan, location, ondate, stage_seq*
	Foreign:	*dm_key*
Data:	*channel, channelsrc, offdate, lddate*	
Description:	This table provides information about the associations between channels and decimations.	

Name:	**DM**	
Keys:		
	Primary:	*key*
	Foreign:	
Data:	*name, samprate, factor, offset, delay, correction, lddate*	
Description:	This table provides information about decimations.	

Name: **Poles_Zeros**

Keys:

Primary: *net, sta, seedchan, location, ondate, stage_seq*
Foreign: *pz_key, unit_in, unit_out*

Data: *channel, channelsrc, offdate, tf_type, AO, AF, lddate*

Description: This table provides information about the associations between channels and responses defined by poles & zeros.

Name: **PZ**

Keys:

Primary: *key*
Foreign:

Data: *name, lddate*

Description: This table provides information about responses defined by poles & zeros.

Name: **PZ_Data**

Keys:

Primary: *key, row_key*
Foreign:

Data: *type, r_value, r_error, i_value, i_error*

Description: This table contains the poles & zeros for the responses.

Name: **Sensitivity**

Keys:

Primary: *net, sta, seedchan, location, ondate, stage_seq*
Foreign:

Data: *channel, channelsrc, offdate, sensitivity, frequency, lddate*

Description: This table provides information about the associations between channels and sensitivities.

Name:	**D_Abbreviation**	
Keys:		
	Primary:	*id*
	Foreign:	
Data:	*description*	
Description:	This table contains information about the generic abbreviation dictionary.	

Name:	**D_Unit**	
Keys:		
	Primary:	*id*
	Foreign:	
Data:	*name, description*	
Description:	This table contains information about the units abbreviation dictionary.	

Name:	**D_Comment**	
Keys:		
	Primary:	*id*
	Foreign:	*unit*
Data:	*class, description*	
Description:	This table contains information about the comment abbreviation dictionary.	

Name:	**D_Format**	
Keys:		
	Primary:	*id*
	Foreign:	*family*
Data:	*name*	
Description:	This table contains information about the data format abbreviation dictionary.	

Name:	**D_Format_Data**
Keys:	
	Primary: *id, row_id*
	Foreign:
Data:	*key*
Description:	This table provides the decoder keys for the data formats.

Name:	**Simple_Response**
Keys:	
	Primary: *net, sta, seedchan, location, ondate*
	Foreign: *inid, pz_key*
Data:	*channel, channelsrc, frequency, damping_value, gen_const, dig_const, gain, ml_corr, me_corr, offdate, lddate*
Description:	This table provides a simplified instrument reponse that can be used for a real-time system for example.

4.- Database attributes :

This chapter describes each of the attributes used in the version 1.3 schema. Descriptions of the relations are found in Chapter 3, *Database relations*.

Name:	*AF*
Relations:	**Poles_Zeros**
Description:	Frequency f_n, at which the value in field *AO* is normalized (if any).
Datatype:	***float***
NULL Value:	***Yes***
Range:	$AF \geq 0.0$
Units:	***Hertz***

Name:	*AO*
Relations:	**Poles_Zeros**
Description:	This field is mandatory and must be set such that when the polynomial is evaluated at the reference frequency the result will be 1.
Datatype:	***float***
NULL Value:	***No***

Name:	*azimuth*
Relations:	**Channel_Data**
Description:	The azimuth of the instrument from north, clockwise.
Datatype:	***float***
NULL Value:	***Yes***
Range:	$0.0 \leq azimuth \leq 360.0$
Units:	***Degrees***

Name:	*channel*
Relations:	**Channel_Data**, **Channel_Comment**, **Coefficients**, **Decimation**, **Poles_Zeros**, **Sensitivity**, **Simple_Response**
Description:	Channel name.
Datatype:	***char(3)***
NULL Value:	***Yes***
Range:	Any valid channel name, which may be network-specific. Networks using SEED channel names should use the same value for *channel* and *seedchan*

Name:	*channelsrc*
Relations:	**Channel_Data**, **Channel_Comment**, **Coefficients**, **Decimation**, **Poles_Zeros**, **Sensitivity**, **Simple_Response**
Description:	Domain for channel. This specifies what naming convention is used for the channel name (i.e. SEED, USGS, etc.).
Datatype:	***char(8)***
NULL Value:	***Yes***
Range:	Any free-format string up to 8 characters long

Name:	*class*
Relations:	**Comment**
Description:	A single letter that determines to what the code refers.
Datatype:	***char(1)***
NULL Value:	***No***
Range:	Any valid character.

Name:	*clock_drift*
Relations:	**Channel_Data**
Description:	A tolerance value, measured in seconds per sample, used as a thresold for time error detection in the data. The number of samples in a record are multiplied by this value to calculate a maximum drift allowed for the time in the next record. If the difference in time is less than this drift, consider them in the same time series.
Datatype:	***float***
NULL Value:	***Yes***
Range:	*clock_drift* $\geq$ 0.0
Units:	***Seconds***

Name:	*coefficient*
Relations:	**DC_Data**
Description:	The numerator/denominator coefficient value.
Datatype:	***float***
NULL Value:	***No***

Name:	*comment_id*
Relations:	**Station_Comment**, **Channel_Comment**
Description:	The comment code key of the associated Comment Description Dictionary.
Datatype:	***int***
NULL Value:	***No***

Name:	*comment_level*
Relations:	**Station_Comment**, **Channel_Comment**
Description:	The numeric value (if any) associated with the Units of comment level in the same Comment Description Dictionary. Together, this numeric value, its units, and the Description of comment of the associated Comment Description, all describe a comment for the station/channel.
Datatype:	***int***
NULL Value:	***Yes***

Name:	*correction*
Relations:	**DM**
Description:	The time shift applied to the time tag due to delay at this stage of the filter; a negative number indicating the amount of time added to the former time tag. The actual delay is difficult to estimate, and the correction applied neglects dispersion. This field allows to know how much correction was used, in case a more accurate correction is to be applied later. A zero here implies no correction was done.
Datatype:	***float***
NULL Value:	***No***

Name:	*damping_value*
Relations:	**Simple_Response**
Description:	This attribute denotes the damping value.
Datatype:	***float***
NULL Value:	***Yes***

Name:	*dc_key*
Relations:	**Coefficients**
Description:	Response (Coefficients) key.
Datatype:	***int***
NULL Value:	***No***

Name:	*delay*
Relations:	**DM**
Description:	The estimated pure delay for the stage.
Datatype:	***float***
NULL Value:	***Yes***
Units:	***Seconds***

Name:	*description*
Relations:	**Abbreviation**, **Unit**, **Comment**
Description:	This is a description of a comment, a unit or an abbreviation.
Datatype:	***char(70)***
NULL Value:	***Yes***
Range:	Any free-format string up to 70 characters long

Name:	*dig_const*
Relations:	**Simple_Response**
Description:	This attribute denotes the digitizer constant.
Datatype:	***float***
NULL Value:	***Yes***

Name:	*dip*
Relations:	**Channel_Data**
Description:	The dip of the instrument, down from horizontal.
Datatype:	***float***
NULL Value:	***Yes***
Range:	$-90.0 \le dip \le 90.0$
Units:	***Degrees***

Name:	*dm_key*
Relations:	**Decimation**
Description:	Decimation key.
Datatype:	***int***
NULL Value:	***No***

Name:	<u>*edepth*</u>
Relations:	**Channel_Data**
Description:	Emplacement depth. This attribute gives the depth at which the instrument is positioned, relative to the value of *elev*.
Datatype:	***float***
NULL Value:	***Yes***
Range:	*edepth* ≥ 0.0
Units:	***Kilometers***

Name:	<u>*elev*</u>
Relations:	**Station_Data**, **Channel_Data**
Description:	Elevation. This attribute is the elevation of a seismic station relative to mean sea level.
Datatype:	***float***
NULL Value:	***Yes***
Range:	-10.0 ≤ *elev* ≤ 10.0
Units:	***Kilometers***

Name:	*error*
Relations:	**DC_Data**
Description:	This attribute denotes the numerator/denominator error.
Datatype:	***float***
NULL Value:	***Yes***

Name:	*factor*
Relations:	**DM**
Description:	The decimation factor. When this number of samples are read in, one final sample comes out. The output sample rate can be calculated by dividing *samprate* by the decimation factor.
Datatype:	***int***
NULL Value:	***No***
Range:	*factor* > 0

Name:	*family*
Relations:	**Format**
Description:	This field is used by the data decoder to describe the data family type. It tells a potential program what general algorithm to use to decode the associated data. Each algorithm requires some number of decoder keys that contain special additional information, enabling the algorithm to decode the data.
Datatype:	***int***
NULL Value:	***No***

Name:	*flags*
Relations:	**Channel_Data**
Description:	Channel flags.
Datatype:	***char(27)***
NULL Value:	***Yes***
Range:	Any combination of {T | C | H | G | W | F | S | I | E | M | B} T = channel is trigered C = channel is recorded continuously H = state of health data G = geophysical data W = weather or environmental data F = flag information (nominal, not ordinal) S = synthesized data I = channel is a calibration input E = channel is experimental or temporary M = maintenance tests are underway on channel; possible abnormal data B = data are a beam synthesis

Name:	*format_id*
Relations:	**Channel_Data**
Description:	A data format lookup key that refers to the Data Format Dictionary that describes the format of the data in the data section for this channel.
Datatype:	***int***
NULL Value:	***No***

Name:	*frequency*
Relations:	**Sensitivity**, **Simple_Response**
Description:	The frequency (f_s) at which the value in *sensitivity* is correct.
Datatype:	***float***
NULL Value:	***Yes***
Range:	*frequency* > 0.0
Units:	***Hertz***

Name:	*gain*
Relations:	**Simple_Response**
Description:	This attribute denotes the gain.
Datatype:	***float***
NULL Value:	***Yes***

Name:	*gen_const*
Relations:	**Simple_Response**
Description:	This attribute denotes the generator constant.
Datatype:	***float***
NULL Value:	***Yes***

Name:	*i_error*
Relations:	**PZ_Data**
Description:	The error value for the imaginary portion of a complex pole/zero.
Datatype:	***float***
NULL Value:	***Yes***

Name:	*i_value*
Relations:	**PZ_Data**
Description:	The imaginary portion of a complex pole/zero.
Datatype:	***float***
NULL Value:	***No***

Name:	*id*
Relations:	**Abbreviation**, **Unit**, **Comment**, **Format**, **Format_Data**
Description:	A cross reference code to indicate this particular dictionary entry.
Datatype:	***int***
NULL Value:	***No***

Name:	*inid*
Relations:	**Channel_Data**, **Simple_Response**
Description:	Instrument identifier. It refers to the Generic Abbreviation Dictionary, that contains a name for this instrument.
Datatype:	***int***
NULL Value:	***Yes***

Name:	*key*
Relations:	**DC**, **DC_Data**, **DM**, **PZ**, **PZ_Data**
Description:	This attribute denotes a unique identifier for a decimation or a response (digital coefficients or poles & zeros).
Datatype:	***int***
NULL Value:	***No***
Range:	$key \geq 0$

Name:	*key_d*
Relations:	**Format_Data**
Description:	This attribute denotes the decoder keys used by the data family type.
Datatype:	***char(80)***
NULL Value:	***No***
Range:	Any free-format string up to 80 characters long

Name:	*lat*
Relations:	**Station_Data**, **Channel_Data**
Description:	Latitude. This attribute is the geographic latitude. Locations north of the equator have positive latitudes.
Datatype:	***float***
NULL Value:	***Yes***
Range:	$-90.0 \leq lat \leq 90.0$
Units:	***Degrees***

Name:	*lddate*
Relations:	**Station_Data**, **Station_Comment**, **Channel_Data**, **Channel_Comment**, **Coefficients**, **DC**, **Decimation**, **DM**, **Poles_Zeros**, **PZ**, **Sensitivity**, **Simple_Response**
Description:	Load date. Date and time that the record was created or last modified, in Oracle ***date*** datatype.
Datatype:	***date***
NULL Value:	***No***
Range:	Any valid date between **January 01, 4712 BC** and **January 01, 4712 AD**
Units:	***YYYY/MM/DD HH24:MI:SS***

Name:	*location*
Relations:	**Channel_Data**, **Channel_Comment**, **Coefficients**, **Decimation**, **Poles_Zeros**, **Sensitivity**, **Simple_Response**
Description:	Describes the individual sites on an array station, operated by the same network operator.
Datatype:	***char(2)***
NULL Value:	***Yes***
Range:	Any free-format string up to 2 characters long

Name:	*lon*
Relations:	**Station_Data**, **Channel_Data**
Description:	Longitude. This attribute is the geographic longitude. Longitudes are measured positive east of the Greenwich meridian.
Datatype:	***float***
NULL Value:	***Yes***
Range:	$-180.0 \leq lon \leq 180.0$
Units:	***Degrees***

Name:	*me_corr*
Relations:	**Simple_Response**
Description:	This attribute denotes the correction for energy magnitude.
Datatype:	***float***
NULL Value:	***Yes***

Name:	*ml_corr*
Relations:	**Simple_Response**
Description:	This attribute denotes the correction for local magnitude.
Datatype:	***float***
NULL Value:	***Yes***

Name:	*name*
Relations:	**DC**, **DM**, **PZ**, **Unit**, **Format**
Description:	Descriptive name.
Datatype:	***char(80)***
NULL Value:	***Yes***
Range:	Any free-format string up to 80 characters long

Name:	*net*
Relations:	**Station_Data**, **Station_Comment**, **Channel_Data**, **Channel_Comment**, **Coefficients**, **Decimation**, **Poles_Zeros**, **Sensitivity**, **Simple_Response**
Description:	Unique network identifier. This character string is the name of a seismic network.
Datatype:	***char(8)***
NULL Value:	***No***
Range:	Any free-format string up to 8 characters long

Name:	*net_id*
Relations:	**Station_Data**
Description:	The abbreviation lookup code from the Generic Abbreviation Dictionary, that refers to the network to which the station belongs.
Datatype:	***int***
NULL Value:	***Yes***

Name:	*offdate*
Relations:	**Station_Data**, **Station_Comment**, **Channel_Data**, **Channel_Comment**, **Coefficients**, **Decimation**, **Poles_Zeros**, **Sensitivity**, **Simple_Response**
Description:	This attribute denotes the end date.
Datatype:	***date***
NULL Value:	***Yes***
Range:	Any valid date between **January 01, 4712 BC** and **January 01, 4712 AD**
Units:	***YYYY/MM/DD HH24:MI:SS***

Name:	*offset*
Relations:	**DM**
Description:	This field determines which sample is chosen for use. The value of this field has to be greater than or equal to zero, but less than the decimation factor.
Datatype:	***int***
NULL Value:	***Yes***
Range:	*offset* ≥ 0

Name:	*ondate*
Relations:	**Station_Data**, **Station_Comment**, **Channel_Data**, **Channel_Comment**, **Coefficients**, **Decimation**, **Poles_Zeros**, **Sensitivity**, **Simple_Response**
Description:	This attribute denotes the start date.
Datatype:	***date***
NULL Value:	***Yes***
Range:	Any valid date between **January 01, 4712 BC** and **January 01, 4712 AD**
Units:	***YYYY/MM/DD HH24:MI:SS***

Name:	*pz_key*
Relations:	**Poles_Zeros**, **Simple_Response**
Description:	Response (Poles & zeros) key.
Datatype:	***int***
NULL Value:	***No***

Name:	*r_error*
Relations:	**PZ_Data**
Description:	The error value for the real portion of a complex pole/zero.
Datatype:	***float***
NULL Value:	***Yes***

Name:	*r_type*
Relations:	**DC**
Description:	A single character describing the type of stage.
Datatype:	***char(1)***
NULL Value:	***Yes***
Range:	*r_type* ∈ { A | B | C | D} A = Analog (rad/sec) B = Analog (Hz) C = Composite D = Digital

Name:	*r_value*
Relations:	**PZ_Data**
Description:	The real portion of a complex pole/zero.
Datatype:	***float***
NULL Value:	***No***

Name:	*record_length*
Relations:	**Channel_Data**
Description:	The exponent (as a power of two) of the record length for these data.
Datatype:	***int***
NULL Value:	***No***
Range:	$8 \leq record\_length \leq 12$

Name:	*remark*
Relations:	**Channel_Data**
Description:	An optional comment given to the instrument. It can be anything, including a serial number or a notation of special modifications.
Datatype:	***char(30)***
NULL Value:	***Yes***
Range:	Any free-format string up to 30 characters long

Name:	*row_id*
Relations:	**Format_Data**
Description:	Row identifier for the decoder keys.
Datatype:	***int***
NULL Value:	***No***
Range:	$row\_id \geq 0$

Name:	*row_key*
Relations:	**DC_Data**, **PZ_Data**
Description:	Row key for responses.
Datatype:	***int***
NULL Value:	***No***
Range:	*row_key* ≥ 0

Name:	*samprate*
Relations:	**Channel_Data**, **DM**
Description:	Sampling rate. This attribute is the sample rate in samples/second.
Datatype:	***float***
NULL Value:	***No***
Range:	*samprate* > 0.0
Units:	***1/seconds***

Name:	*seedchan*
Relations:	**Channel_Data**, **Channel_Comment**, **Coefficients**, **Decimation**, **Poles_Zeros**, **Sensitivity**, **Simple_Response**
Description:	SEED channel name. The first character denotes the band code, the second for the instrument code and the third represents the component code.
Datatype:	***char(3)***
NULL Value:	***No***

Range: *seedchan* ∈ {E | S | H | B | M | L | V | U | R} ∪
{A | B | D | F | G | H | I | K | L | M | P | R | S | V | T | W} ∪
{Z | N | E | A | B | C | T | R | 1 | 2 | 3 | U | V | W}

Band code:

	Sample rate (Hz)	Corner period (sec)
E = extremely short period	≥ 80	< 10
S = short period	≥ 10 to < 80	< 10
H = high broad band	≥ 80	≥ 10
B = broad band	≥ 10 to < 80	≥ 10
M = mid period	> 1 to < 10	
L = long period	~ 1	
V = very long period	~ 0.1	
U = ultra long period	~ 0.01	
R = extremely long period	~ 0.001	

Instrument code:

A = tiltmeter	B = creepmeter
D = pressure	F = magnetometer
G = gravimeter/accelerometer	H = high gain seismometer
I = humidity	K = temperature
L = low gain seismometer	M = mass position seismometer
P = geophone	R = rainfall
S = linear strainmeter	V = volumetric strain
T = tide meter	W = wind

Component code:

N = north-south	E = east-west
T = transverse	R = radial

Z = vertical
A, B, C = triaxial
1, 2, 3 = orthogonal components but non-traditional orientations
U, V, W = optional components

Name:	*sensitivity*
Relations:	**Sensitivity**
Description:	The gain (S_d) at this stage, or the sensitivity (S_d) for the channel.
Datatype:	***float***
NULL Value:	***No***

Name:	*sta*
Relations:	**Station_Data**, **Station_Comment**, **Channel_Data**, **Channel_Comment**, **Coefficients**, **Decimation**, **Poles_Zeros**, **Sensitivity**, **Simple_Response**
Description:	Station code. This is the common code-name of a seismic observatory. Generally only three or four characters are used.
Datatype:	***char(6)***
NULL Value:	***No***
Range:	Any free-format string up to 6 characters long

Name:	*stage_seq*
Relations:	**Coefficients**, **Decimation**, **Poles_Zeros**, **Sensitivity**
Description:	This attribute denotes the stage number.
Datatype:	***int***
NULL Value:	***No***
Range:	*stage_seq* ≥ 0

Name:	<u>*staname*</u>
Relations:	**Station_Data**
Description:	Station name/description. This is the full name of the station whose code-name is in *sta*.
Datatype:	***char(50)***
NULL Value:	***Yes***
Range:	Any free-format string up to 50 characters long

Name:	*storage*
Relations:	**DC**
Description:	This attribute denotes if half or all the coefficients are stored in the **DC_Data** table.
Datatype:	***char(1)***
NULL Value:	***No***
Range:	*storage* ∈ { H | F } H = half F = full

Name:	*symmetry*
Relations:	**DC**
Description:	This attribute denotes the eventual symmetry of a response.
Datatype:	***char(1)***
NULL Value:	***No***
Range:	*symmetry* ∈ { E | O | N } E = even O = odd N = none

Name:	*tf_type*
Relations:	**Poles_Zeros**
Description:	A single character describing the type of stage.
Datatype:	***char(1)***
NULL Value:	***Yes***
Range:	*tf_type* ∈ { A | B | C | D} A = Laplace transform analog response (rad/sec) B = Analog response (Hz) C = Composite D = Digital (Z – transform)

Name:	*type*
Relations:	**DC_Data**, **PZ_Data**
Description:	This attribute denotes whether a value is associated with a pole/zero or a numerator/denominator.
Datatype:	***char(1)***
NULL Value:	***No***
Range:	*type* ∈ { P | Z | N | D } P = pole Z = zero N = numerator D = denominator

Name:	*unit*
Relations:	**Comment**
Description:	Units of comment level.
Datatype:	***int***
NULL Value:	***No***

Name:	*unit_calib*
Relations:	**Channel_Data**
Description:	A unit lookup key that refers to the Units Abbreviation Dictionary for the units of calibration input, usually volts or amps.
Datatype:	***int***
NULL Value:	***Yes***

Name:	*unit_in*
Relations:	**DC**, **Poles_Zeros**
Description:	A unit lookup key that refers to the Units Abbreviation Dictionary for the units of the incoming to this stage of the filter. This signal will usually be ground motion, volts, or counts, depending on where it is in the filter system.
Datatype:	***int***
NULL Value:	***No***

Name:	*unit_out*
Relations:	**DC**, **Poles_Zeros**
Description:	A unit lookup key that refers to the Units Abbreviation Dictionary for the stage's output signal. Analog filters usually emit volts, and digital filters usually emit counts.
Datatype:	***int***
NULL Value:	***No***

Name:	*unit_signal*
Relations:	**Channel_Data**
Description:	A unit lookup key that refers to the Units Abbreviation Dictionary for the signal response of the instrument – usually the ground motion response, or something else for non-seismic devices.
Datatype:	***int***
NULL Value:	***No***

Name:	*word_16*
Relations:	**Station_Data**
Description:	16-bit quantity byte swapping order, for the data headers only.
Datatype:	***int***
NULL Value:	***No***

Name:	*word_32*
Relations:	**Station_Data**
Description:	The swap order in which 32-bit quantities are specified in the data headers.
Datatype:	***int***
NULL Value:	***No***

A

AF 17
AO 17
azimuth 17

C

channel 18
Channel_Comment 4, 12
Channel_Data 4, 12
channelsrc 18
class 18
clock_drift 19
coefficient 19
Coefficients 5, 12
comment_id 20
comment_level 20
correction 20

D

D_Abbreviation 9, 15
D_Comment 9, 15
D_Format 9, 15
D_Format_Data 9, 16
D_Unit 9, 15
damping_value 21
DC 5, 13
DC_Data 5, 13
dc_key 21
Decimation 6, 13
delay 21
description 21
dig_const 22
dip 22
DM 6, 13
dm_key 22

E

edepth 23
elev 23
error 23

F

factor 24
family 24
flags 25
format_id 25
frequency 26

G

gain 26
gen_const 26

I

i_error 26
i_value 27
id.. 27
inid 27

K

key 27
key_d 28

L

lat. 28
lddate 28
location 29
lon 29

M

me_corr 29
ml_corr 30

N

name 30
net 30
net_id 30

O

offdate 31
offset 31
ondate 31

P

Poles_Zeros 7, 14
PZ 7, 14
PZ_Data 7, 14
pz_key 32

R

r_error 32
r_type 32
r_value 32
record_length 33
remark 33
row_id 33
row_key 34

S

samprate 34
seedchan 35
sensitivity 36
Sensitivity 8, 14
Simple_Response 10, 16
sta. 36
stage_seq 36
staname 37
Station_Comment 3, 11
Station_Data 3, 11
storage 37
symmetry 37

T

tf_type 38
type 38

U

unit 38
unit_calib 39
unit_in 39
unit_out 39
unit_signal 40

W

word_16 40
word_32 40