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hardware tracking schema

Volume III Version 1.5.1

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<u>1.- Introduction :</u>

This paper is about the design of the NCEDC schema for the hardware tracking. This schema was designed to be able to track any station from the sensor to the datalogger by their serial numbers. It can also generate automatically the instrument responses schema.

There are 28 relations in the schema. The information stored in these relations includes:

- Responses description (high-pass, low-pass, FIR filters; Poles & zeros; Polynomial).
- Sensors and components information.
- Analog filters, amplifiers information.
- Dataloggers, digitizers information.
- Dataloggers logical channels information.
- Tracking information.

The remainder of this volume consists of four 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.

Response		Summary information on a sequence of responses
Attribute	***Type***	***Description***
seqresp_id	int	Sequence of responses identifier
resp_nb	int	Response number
resp_type	char(1)	Response type
resp_id	int	Response identifier
unit_in	int	Signal input units
unit_out	int	Signal output units
r_type	char(1)	SEED response type
<u>lddate</u>	date	Load date

Response_HP		Summary information on a high-pass filter
Attribute	***Type***	***Description***
hp_id	int	Filter identifier
filter_type	char(2)	Filter type
nb_pole	int	Number of poles
corner_freq	float	Corner frequency of filter
damping_value	float	Fraction of critical damping
<u>lddate</u>	date	Load date

Response_LP		Summary information on a low-pass filter
Attribute	***Type***	***Description***
lp_id	int	Filter identifier
filter_type	char(2)	Filter type
nb_pole	int	Number of poles
corner_freq	float	Corner frequency of filter
damping_value	float	Fraction of critical damping
<u>lddate</u>	date	Load date

Response_PZ		Summary information on poles & zeros
Attribute	***Type***	***Description***
pz_id	int	Poles & zeros identifier
pz_nb	int	Pole/zero number
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
<u>lddate</u>	date	Load date

Response_PN		Summary information on a polynomial
Attribute	***Type***	***Description***
pn_id	int	Polynomial identifier
name	char(80)	Polynomial name
poly_type	char(1)	Type of polynomial approximation
lower_bound	float	Polynomial lower bound
upper_bound	float	Polynomial upper bound
max_error	float	Maximum error of polynomial approx.
nb_coeff	int	Number of polynomial coefficients
<u>lddate</u>	date	Load date

Response_PN_Data		Coefficients of a polynomial
Attribute	***Type***	***Description***
pn_id	int	Polynomial identifier
pn_nb	int	Coefficient number
pn_value	float	Coefficient value

Sensor		Summary information on a sensor
Attribute	***Type***	***Description***
sensor_id	int	Sensor identifier
name	char(80)	Sensor name
serial_nb	char(80)	Sensor serial number
<u>ondate</u>	date	Start date
<u>offdate</u>	date	Off date
nb_component	int	Number of components
<u>lddate</u>	date	Load date

Sensor_Component		Component of a sensor
Attribute	***Type***	***Description***
sensor_id	int	Sensor identifier
component_nb	int	Component number
channel_comp	char(2)	Channel
component_type	char(1)	Type
sensitivity	float	Sensitivity
frequency	float	Frequency
seqresp_id	int	Sequence of responses identifier
lddate	date	Load date

Filamp		Summary information on a filter-amplifier
Attribute	***Type***	***Description***
filamp_id	int	Filter-amplifier identifier
name	char(80)	Filter-amplifier name
serial_nb	char(80)	Filter-amplifier serial number
ondate	date	Start date
offdate	date	Off date
nb_pchannel	int	Number of physical channels
lddate	date	Load date

Filamp_PChannel		Physical channel of a filter-amplifier
Attribute	***Type***	***Description***
filamp_id	int	Filter-amplifier identifier
pchannel_nb	int	Physical channel number
gain	float	Gain
frequency	float	Calibration frequency
seqresp_id	int	Sequence of responses identifier
lddate	date	Load date

Datalogger		Summary information on a datalogger
Attribute	***Type***	***Description***
data_id	int	Datalogger identifier
data_type	char(80)	Datalogger type
serial_nb	char(80)	Datalogger serial number
firmware_nb	char(80)	Datalogger firmware number
software	char(80)	Software (ushear, mshear, …)
software_nb	char(80)	Software version number
ondate	date	Start date
offdate	date	Off date
nb_board	int	Number of boards
word_32	int	32 bit word order
word_16	int	16 bit word order
lddate	date	Load date

Datalogger_Board		Board of a datalogger
Attribute	***Type***	***Description***
data_id	int	Datalogger identifier
board_nb	int	Board number
serial_nb	char(80)	Board serial number
nb_module	int	Number of modules
lddate	date	Load date

Datalogger_Module		Module of a datalogger's board
Attribute	***Type***	***Description***
data_id	int	Datalogger identifier
board_nb	int	Board number
module_nb	int	Module number
serial_nb	char(80)	Module serial number
sensitivity	float	Sensitivity
lddate	date	Load date

Filter_FIR		Summary information on a FIR filter
Attribute	***Type***	***Description***
fir_id	int	FIR filter identifier
name	char(80)	Filter name
symmetry	char(1)	Filter symmetry
gain	float	Filter gain
lddate	date	Load date

Filter_FIR_Data		Coefficients of a FIR filter
Attribute	***Type***	***Description***
fir_id	int	FIR filter identifier
coeff_nb	int	Numerator/denominator number
type	char(1)	Numerator/Denominator
coefficient	float	Numerator/denominator coefficient
error	float	Numerator/denominator error

Filter		Summary information on a filter
Attribute	***Type***	***Description***
filter_id	int	Filter identifier
gain	float	Filter gain
frequency	float	Frequency for filter gain
in_sp_rate	float	Input sample rate
out_sp_rate	float	Output sample rate
offset	int	Decimation offset
delay	float	Estimated delay
correction	float	Correction applied
seqresp_id	int	Sequence of responses identifier
lddate	date	Load date

Filter_Sequence		Summary information on a sequence of filters
Attribute	***Type***	***Description***
seqfil_id	int	Sequence of filters identifier
name	char(32)	Sequence of filters name
nb_filter	int	Number of filters
gain	float	Overall gain
frequency	float	Frequency
lddate	date	Load date

Filter_Sequence_Data		Filter of a sequence
Attribute	***Type***	***Description***
seqfil_id	int	Sequence of filters identifier
filter_nb	int	Filter number
filter_id	int	Filter identifier

Station		Summary information on a station
Attribute	***Type***	***Description***
<u>sta</u>	char(6)	Station code
<u>net</u>	char(8)	Network code
<u>lat</u>	float	Latitude
<u>lon</u>	float	Longitude
<u>elev</u>	float	Elevation
<u>staname</u>	char(50)	Station description
nb_sensor	int	Number of sensors
nb_filamp	int	Number of filter-amplifiers
nb_digi	int	Number of digitizers
nb_data	int	Number of dataloggers
datumhor	char(8)	Datum type for latitude and longitude
datumver	char(8)	Datum type for vertical
<u>ondate</u>	date	Start date
<u>offdate</u>	date	Off date
<u>lddate</u>	date	Load date

Station_Sensor		Data associating a station with a sensor
Attribute	***Type***	***Description***
<u>sta</u>	char(6)	Station code
<u>net</u>	char(8)	Network code
sensor_nb	int	Sensor number
sensor_id	int	Sensor identifier
<u>lat</u>	float	Latitude
<u>lon</u>	float	Longitude
<u>elev</u>	float	Elevation
<u>edepth</u>	float	Emplacement depth
nb_component	int	Number of components
datumhor	char(8)	Datum type for latitude and longitude
datumver	char(8)	Datum type for vertical
<u>ondate</u>	date	Start date
<u>offdate</u>	date	Off date
<u>lddate</u>	date	Load date

Station_Sensor_Component	Data associating physical channels	
Attribute	***Type***	***Description***
<u>sta</u>	char(6)	Station code
<u>net</u>	char(8)	Network code
sensor_nb	int	Sensor number
component_nb	int	Component number
next_hard_type	char(1)	Next hardware type
next_hard_nb	int	Next hardware number
next_hard_pchannel	int	Next hardware physical channel
azimuth	float	Azimuth
dip	float	Dip
<u>ondate</u>	date	Start date
<u>offdate</u>	date	Off date
<u>lddate</u>	date	Load date

Station_Filamp	Data associating a station with a filter-amplifier	
Attribute	***Type***	***Description***
<u>sta</u>	char(6)	Station code
<u>net</u>	char(8)	Network code
filamp_nb	int	Filter-amplifier number
filamp_id	int	Filter-amplifier identifier
nb_pchannel	int	Number of physical channels
<u>ondate</u>	date	Start date
<u>offdate</u>	date	Off date
<u>lddate</u>	date	Load date

Station_Filamp_PChannel	Data associating physical channels	
Attribute	***Type***	***Description***
<u>sta</u>	char(6)	Station code
<u>net</u>	char(8)	Network code
filamp_nb	int	Filter-amplifier number
pchannel_nb	int	Physical channel number
next_hard_type	char(1)	Next hardware type
next_hard_nb	int	Next hardware number
next_hard_pchannel	int	Next hardware physical channel
<u>ondate</u>	date	Start date
<u>offdate</u>	date	Off date
<u>lddate</u>	date	Load date

Station_Digitizer		Data associating a station with a digitizer
Attribute	***Type***	***Description***
sta	char(6)	Station code
net	char(8)	Network code
digi_nb	int	Digitizer number
serial_nb	char(80)	Digitizer serial number
nb_pri_pchannel	int	Number of primary physical channels
nb_aux_pchannel	int	Number of auxiliary physical channels
ondate	date	Start date
offdate	date	Off date
lddate	date	Load date

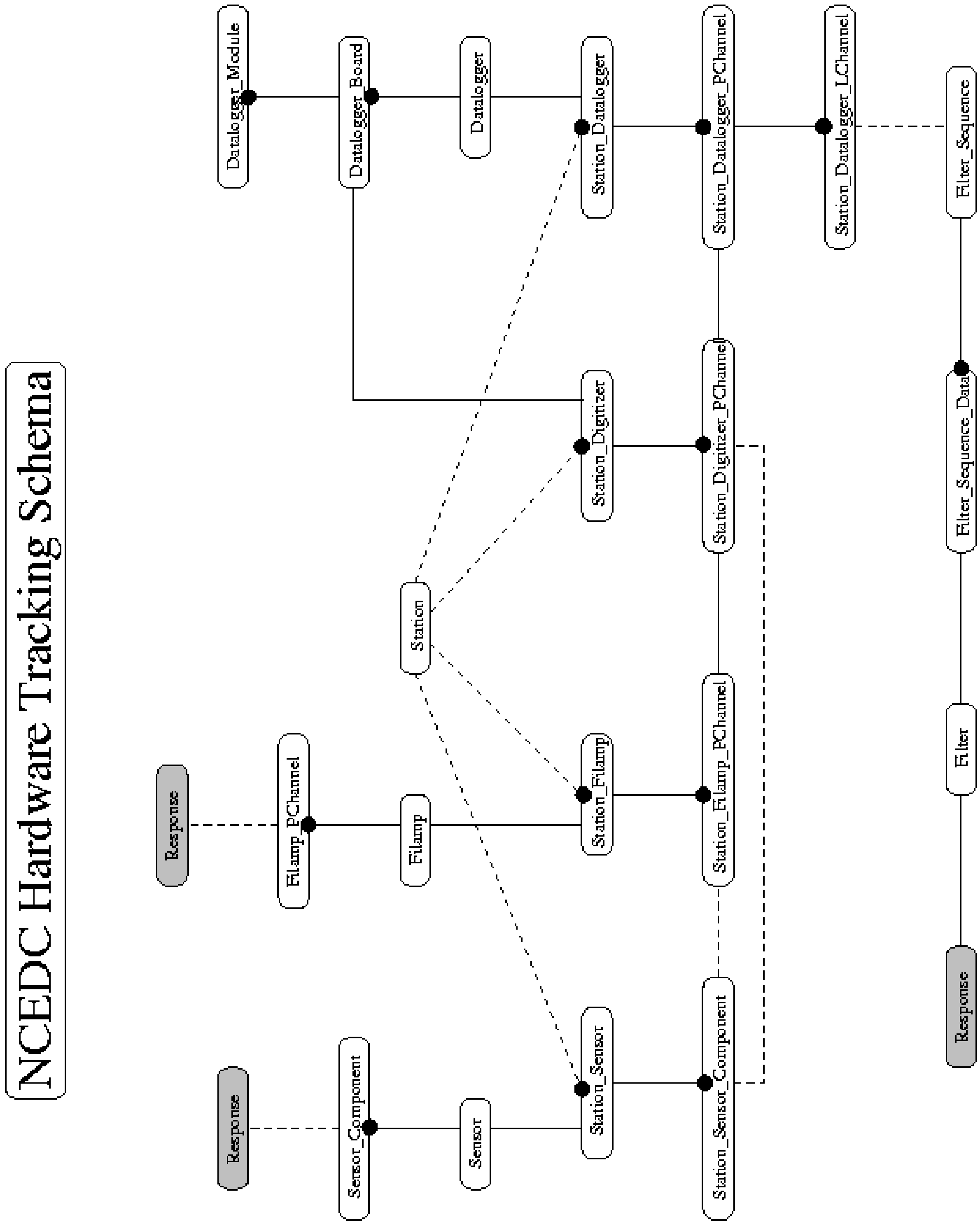
Station_Digitizer_PChannel		Data associating physical channels
Attribute	***Type***	***Description***
sta	char(6)	Station code
net	char(8)	Network code
digi_nb	int	Digitizer number
pchannel_nb	int	Physical channel number
data_nb	int	Datalogger number
data_pchannel	int	Datalogger physical channel
digi_type	char(3)	Digitizer type
digi_polarity	char(1)	Digitizer polarity
digi_channel	int	Digitizer channel
ondate	date	Start date
offdate	date	Off date
lddate	date	Load date

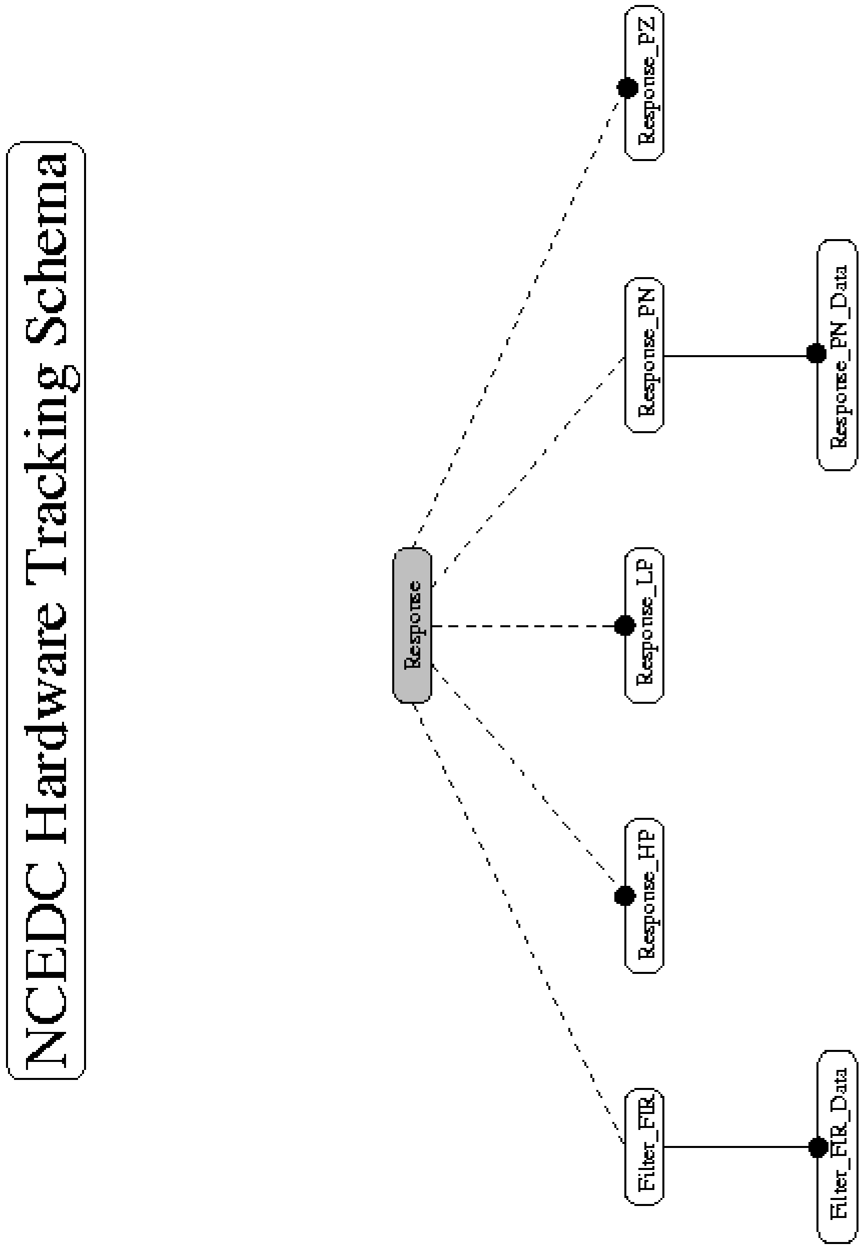
Station_Datalogger		Data associating a station with a datalogger
Attribute	***Type***	***Description***
sta	char(6)	Station code
net	char(8)	Network code
data_nb	int	Datalogger number
data_id	int	Datalogger identifier
nb_pchannel	int	Number of physical channels
ondate	date	Start date
offdate	date	Off date
lddate	date	Load date

Station_Datalogger_PChannel		Data associating channels
Attribute	***Type***	***Description***
sta	char(6)	Station code
net	char(8)	Network code
data_nb	int	Datalogger number
pchannel_nb	int	Physical channel number
board_type	char(1)	Board type
channel_type	char(1)	Channel type
seed_io	char(2)	SEED instrument and orientation
nb_lchannel	int	Number of logical channels
ondate	date	Start date
offdate	date	Off date
lddate	date	Load date

Station_Datalogger_LChannel		Summary information on a channel
Attribute	***Type***	***Description***
sta	char(6)	Station code
net	char(8)	Network code
data_nb	int	Datalogger number
pchannel_nb	int	Physical channel number
lchannel_nb	char(2)	Logical channel number
seqfil_id	int	Sequence of filters identifier
seedchan	char(3)	SEED channel name
channel	char(3)	Channel name
channelsrc	char(8)	Domain of channel name
location	char(2)	SEED location
rgain	float	Gain at the response frequency
rfrequency	float	Frequency for response
samprate	float	Sampling rate
clock_drift	float	Maximum clock drift
flags	char(27)	SEED channel flags
data_format	char(80)	Data format
comp_type	int	Compression type
unit_signal	int	Units of signal responses
unit_calib	int	Units of calibration
block_size	int	Block size
ondate	date	Start date
offdate	date	Off date
remark	char(30)	Optional comment
lddate	date	Load date

3.- Database relations :




NCEDC Hardware Tracking Schema
Response
Filter_FIR
Filter_FIR_Data
Response_HP
Response_LP
Response_PN
Response_PN_Data
Response_PZ

This chapter describes the DBMS relations that comprise the version 1.5.1 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:	**Response**	
Keys:		
	Primary:	*seqresp_id, resp_nb*
	Foreign:	*resp_id, unit_in, unit_out*
Data:	*resp_type, r_type,* <u>*lddate*</u>	
Description:	This relation provides information about a sequence of responses.	

Name:	**Response_HP**	
Keys:		
	Primary:	*hp_id*
	Foreign:	
Data:	*filter_type, nb_pole, corner_freq, damping_value,* <u>*lddate*</u>	
Description:	This relation describes a response defined by a high-pass filter.	

Name:	**Response_LP**	
Keys:		
	Primary:	*lp_id*
	Foreign:	
Data:	*filter_type, nb_pole, corner_freq, damping_value,* <u>*lddate*</u>	
Description:	This relation describes a response defined by a low-pass filter.	

Name:	**Response_PZ**
Keys:	
	Primary: *pz_id, pz_nb, type*
	Foreign:
Data:	*r_value, r_error, i_value, i_error, <u>lddate</u>*
Description:	This relation describes a response defined by poles and zeros.

Name:	**Response_PN**
Keys:	
	Primary: *pn_id*
	Foreign:
Data:	*name, poly_type, lower_bound, upper_bound, max_error, nb_coeff, <u>lddate</u>*
Description:	This relation describes a response defined by a polynomial.

Name:	**Response_PN_Data**
Keys:	
	Primary: *pn_id, pn_nb*
	Foreign:
Data:	*pn_value*
Description:	This relation provides information about the coefficients of a polynomial.

Name:	**Sensor**
Keys:	
	Primary: *sensor_id*
	Foreign:
Data:	*name, serial_nb, <u>ondate</u> , <u>offdate</u>, nb_component, <u>lddate</u>*
Description:	This relation describes a sensor.

Name:	**Sensor_Component**	
Keys:		
	Primary:	*sensor_id, component_nb*
	Foreign:	*seqresp_id*
Data:	*channel_comp, component_type, sensitivity, frequency,* <u>*lddate*</u>	
Description:	This relation describes a component of a sensor.	

Name:	**Filamp**	
Keys:		
	Primary:	*filamp_id*
	Foreign:	
Data:	*name, serial_nb,* <u>*ondate*</u> , <u>*offdate*</u>*, nb_pchannel,* <u>*lddate*</u>	
Description:	This relation describes a filter-amplifier.	

Name:	**Filamp_PChannel**	
Keys:		
	Primary:	*filamp_id, pchannel_nb*, *frequency*
	Foreign:	*seqresp_id*
Data:	*gain,* <u>*lddate*</u>	
Description:	This relation describes a physical channel of a filter-amplifier.	

Name:	**Datalogger**	
Keys:		
	Primary:	*data_id*
	Foreign:	
Data:	*data_type, serial_nb, firmware_nb, software, software_nb,* <u>*ondate*</u>, <u>*offdate*</u>*, nb_board, word_32, word_16,* <u>*lddate*</u>	
Description:	This relation describes a datalogger.	

Name:	**Datalogger_Board**	
Keys:		
	Primary:	*data_id, board_nb*
	Foreign:	
Data:	*serial_nb, nb_module, <u>lddate</u>*	
Description:	This relation describes a board of a datalogger.	

Name:	**Datalogger_Module**	
Keys:		
	Primary:	*data_id, board_nb, module_nb*
	Foreign:	
Data:	*serial_nb, sensitivity, <u>lddate</u>*	
Description:	This relation describes a module of a datalogger's board.	

Name:	**Filter_FIR**	
Keys:		
	Primary:	*fir_id*
	Foreign:	
Data:	*name, symmetry, gain, <u>lddate</u>*	
Description:	This relation describes a FIR filter.	

Name:	**Filter_FIR_Data**	
Keys:		
	Primary:	*fir_id, coeff_nb*
	Foreign:	
Data:	*type, coefficient, error*	
Description:	This relation provides information about the coefficients of a FIR filter.	

Name:	**Filter**
Keys:	
	Primary: *filter_id*
	Foreign: *seqresp_id*
Data:	*gain, frequency, in_sp_rate, out_sp_rate, offset, delay, correction, lddate*
Description:	This relation describes a filter.

Name:	**Filter_Sequence**
Keys:	
	Primary: *seqfil_id*
	Foreign:
Data:	*name, nb_filter, gain, frequency, lddate*
Description:	This relation describes a sequence of filters.

Name:	**Filter_Sequence_Data**
Keys:	
	Primary: *seqfil_id, filter_nb*
	Foreign: *filter_id*
Data:	
Description:	This relation provides information about the filters of a sequence.

Name:	**Station**
Keys:	
	Primary: *sta, net, ondate*
	Foreign:
Data:	*lat, lon, elev, staname, nb_sensor, nb_filamp, nb_digi, nb_data, datumhor, datumver, offdate, lddate*
Description:	This relation describes and names a point of the earth where seismic measurements are made (e.g. the location of a seismic instrument or array).

Name:	**Station_Sensor**
Keys:	
	Primary: *sta, net, sensor_nb, ondate*
	Foreign: *sensor_id*
Data:	*lat, lon, elev, edepth, nb_component, datumhor, datumver, offdate, lddate*
Description:	This relation describes a sensor for a particular station.

Name:	**Station_Sensor_Component**
Keys:	
	Primary: *sta, net, sensor_nb, component_nb, ondate*
	Foreign:
Data:	*next_hard_type, next_hard_nb, next_hard_pchannel, azimuth, dip, offdate, lddate*
Description:	This relation describes a component of a sensor for a particular station.

Name:	**Station_Filamp**
Keys:	
	Primary: *sta, net, filamp_nb, ondate*
	Foreign: *filamp_id*
Data:	*nb_pchannel, offdate, lddate*
Description:	This relation describes a filter-amplifier for a particular station.

Name:	**Station_Filamp_PChannel**
Keys:	
	Primary: *sta, net, filamp_nb, pchannel_nb, ondate*
	Foreign:
Data:	*next_hard_type, next_hard_nb, next_hard_pchannel, offdate, lddate*
Description:	This relation describes a physical channel of a filter-amplifier for a particular station.

Name:	**Station_Digitizer**
Keys:	
	Primary: *<u>sta</u>, <u>net</u>, digi_nb, <u>ondate</u>*
	Foreign:
Data:	*serial_nb, nb_pri_channel, nb_aux_channel, <u>offdate</u>, <u>lddate</u>*
Description:	This relation describes a digitizer for a particular station.

Name:	**Station_Digitizer_PChannel**
Keys:	
	Primary: *<u>sta</u>, <u>net</u>, digi_nb, pchannel_nb, <u>ondate</u>*
	Foreign:
Data:	*data_nb, data_pchannel, digi_type, digi_polarity, digi_channel, <u>offdate</u>, <u>lddate</u>*
Description:	This relation describes a physical channel of a digitizer for a particular station.

Name:	**Station_Datalogger**
Keys:	
	Primary: *<u>sta</u>, <u>net</u>, data_nb, <u>ondate</u>*
	Foreign: *data_id*
Data:	*nb_pchannel, <u>offdate</u>, <u>lddate</u>*
Description:	This relation describes a datalogger for a particular station.

Name:	**Station_Datalogger_PChannel**
Keys:	
	Primary: *<u>sta</u>, <u>net</u>, data_nb, pchannel_nb, <u>ondate</u>*
	Foreign:
Data:	*board_type, channel_type, seed_io, nb_lchannel, <u>offdate</u>, <u>lddate</u>*
Description:	This relation describes a physical channel of a datalogger for a particular station.

Name:	**Station_Datalogger_LChannel**	
Keys:		
	Primary:	*sta, net, data_nb, pchannel_nb, lchannel_nb, ondate*
	Foreign:	*seqfil_id, comp_type, unit_signal, unit_calib*
Data:	*seedchan, channel, channelsrc, location, rgain, rfrequency, samprate, clock_drift, flags, data_format, block_size, offdate, remark, lddate*	
Description:	This relation describes and names a particular channel for a particular station.	

4.- Database attributes :

This chapter describes each of the attributes used in the version 1.5.1 schema. Descriptions of the relations are found in Chapter 3, *Database relations*.

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

Name:	*block_size*
Relations:	**Station_Datalogger_LChannel**
Description:	The record length of the data.
Datatype:	***int***
NULL Value:	***No***
Range:	$256 \le block\_size \le 4096$

Name:	*board_nb*
Relations:	**Datalogger_Board**, **Datalogger_Module**
Description:	This attribute represents the board number of a datalogger.
Datatype:	***int***
NULL Value:	***No***
Range:	$board\_nb \ge 1$

Name:	*board_type*
Relations:	**Station_Datalogger_PChannel**
Description:	This attribute describes the board type on the datalogger where the physical channel resides. Regular seismic channels are usually on a primary board. Auxiliary channels (internal temperature, external power, …) are usually on an auxiliary board. A value of external is used to represent a digitizer that is not part of the datalogger (for example an embedded digitizer in a digital pressure sensor). A digital board is used to represent truly digital sensors which don't actually have any digitizing stage from Volts to Counts (for example a rainfall sensor that uses a digital counter).
Datatype:	***char(1)***
NULL Value:	***No***
Range:	*board_type* ∈ { P, A, E, D } P = primary A = auxiliary E = external D = digital

Name:	*channel*
Relations:	**Station_Datalogger_LChannel**
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:	*channel_comp*
Relations:	**Sensor_Component**
Description:	Component channel.
Datatype:	***char(2)***
NULL Value:	***Yes***

Name:	*channel_type*
Relations:	**Station_Datalogger_PChannel**
Description:	This attribute describes the type of the input channel. An input channel is usually classified as physical when the data is digitized (velocity, acceleration, …). An input channel is defined as synthetic when the data is not derived directly from a sensor (clock frequency, available telemetry buffer channel, clock quality, …).
Datatype:	***char(1)***
NULL Value:	***No***
Range:	*channel_type* ∈ { P, S } P = physical S = synthetic

Name:	*channelsrc*
Relations:	**Station_Datalogger_LChannel**
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:	*clock_drift*
Relations:	**Station_Datalogger_LChannel**
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* ≥ 0.0
Units:	***Seconds***

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

Name:	*coeff_nb*
Relations:	**Filter_FIR_Data**
Description:	The numerator/denominator number.
Datatype:	***int***
NULL Value:	***No***
Range:	*coeff_nb* ≥ 1

Name:	*comp_type*
Relations:	**Station_Datalogger_LChannel**
Description:	Compression type. A lookup key that refers to the Format Dictionary.
Datatype:	***int***
NULL Value:	***No***

Name:	*component_nb*
Relations:	**Sensor_Component**, **Station_Sensor_Component**
Description:	This attribute represents the component number.
Datatype:	***int***
NULL Value:	***No***
Range:	$component\_nb \geq 1$

Name:	*component_type*
Relations:	**Sensor_Component**
Description:	This attribute denotes the component type.
Datatype:	***char(1)***
NULL Value:	***Yes***

Name:	*corner_freq*
Relations:	**Response_HP**, **Response_LP**
Description:	This attribute represents the corner frequency of a high/low-pass filter.
Datatype:	***float***
NULL Value:	***No***
Range:	*corner_freq* > 0.0
Units:	***Hertz***

Name:	*correction*
Relations:	**Filter**
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:	**Response_HP**, **Response_LP**
Description:	This attribute represents the fraction of critical damping of a high/low-pass filter.
Datatype:	***float***
NULL Value:	***No***

Name:	*data_format*
Relations:	**Station_Datalogger_LChannel**
Description:	This attribute represents the data format.
Datatype:	***char(80)***
NULL Value:	***No***
Range:	*data_format* ∈ { SEED | …} SEED = SEED format

Name:	*data_id*
Relations:	**Datalogger**, **Datalogger_Board**, **Datalogger_Module**, **Station_Datalogger**
Description:	Datalogger identifier. Each datalogger is assigned a unique integer which identifies it in a database.
Datatype:	***int***
NULL Value:	***No***

Name:	*data_nb*
Relations:	**Station_Digitizer_PChannel**, **Station_Datalogger**, **Station_Datalogger_PChannel**, **Station_Datalogger_LChannel**
Description:	This attribute represents the datalogger number.
Datatype:	***int***
NULL Value:	***No***
Range:	$data\_nb \geq 1$

Name:	*data_pchannel*
Relations:	**Station_Digitizer_PChannel**
Description:	This attribute represents a datalogger physical channel.
Datatype:	***int***
NULL Value:	***No***
Range:	*data_pchannel* ≥ 1

Name:	*data_type*
Relations:	**Datalogger**
Description:	This attribute represents a datalogger type.
Datatype:	***char(80)***
NULL Value:	***Yes***
Range:	Any free-format string up to 80 characters long

Name:	*datumhor*
Relations:	**Station**, **Station_Sensor**
Description:	Datum type for horizontal (latitude and longitude) coordinates.
Datatype:	***char(8)***
NULL Value:	***Yes***
Range:	*datumhor* $\in$ { NAD27 | WGS84}

Name:	*datumver*
Relations:	**Station**, **Station_Sensor**
Description:	Datum type for depth or elevation.
Datatype:	***char(8)***
NULL Value:	***Yes***
Range:	*datumver* ∈ { NAD27 | WGS84 | AVERAGE } AVERAGE = average of stations

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

Name:	*digi_channel*
Relations:	**Station_Digitizer_PChannel**
Description:	This attribute represents a digitizer module on a board.
Datatype:	***int***
NULL Value:	***No***
Range:	*digi_channel* ≥ 1

Name:	*digi_nb*
Relations:	**Station_Digitizer**, **Station_Digitizer_PChannel**
Description:	This attribute represents the digitizer number.
Datatype:	***int***
NULL Value:	***No***
Range:	$digi\_nb \geq 1$

Name:	*digi_polarity*
Relations:	**Station_Digitizer_PChannel**
Description:	This attribute represents the digitizer polarity.
Datatype:	***char(1)***
Null Value:	***No***
Range:	*digi_polarity* ∈ { N | … }

Name:	*digi_type*
Relations:	**Station_Digitizer_PChannel**
Description:	This attribute represents the digitizer type.
Datatype:	***char(3)***
NULL Value:	***No***
Range:	*digi_type* ∈ { DSP | AUX }

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

Name:	*edepth*
Relations:	**Station_Sensor**
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:	*elev*
Relations:	**Station**, **Station_Sensor**
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:	**Filter_FIR_Data**
Description:	This attributes denotes the numerator/denominator error.
Datatype:	***float***
NULL Value:	***Yes***

Name:	*filamp_id*
Relations:	**Filamp**, **Filamp_PChannel**, **Station_Filamp**
Description:	Filter-amplifier identifier. Each filter-amplifier is assigned a unique integer which identifies it in a database.
Datatype:	***int***
NULL Value:	***No***

Name:	*filamp_nb*
Relations:	**Station_Filamp**, **Station_Filamp_PChannel**
Description:	This attribute represents the filter-amplifier number.
Datatype:	***int***
NULL Value:	***No***
Range:	$filamp\_nb \geq 1$

Name:	*filter_id*
Relations:	**Filter**, **Filter_Sequence_Data**
Description:	Filter identifier. Each filter is assigned a unique integer which identifies it in a database.
Datatype:	***int***
NULL Value:	***No***

Name:	*filter_nb*
Relations:	**Filter_Sequence_Data**
Description:	This attribute represents the filter number in a sequence.
Datatype:	***int***
NULL Value:	***No***
Range:	*filter_nb* ≥ 1

Name:	*filter_type*
Relations:	**Response_HP**, **Response_LP**
Description:	This attribute denotes the type of a high/low-pass filter.
Datatype:	***char(2)***
NULL Value:	***No***
Range:	*filter_type* ∈ { BW | DG | ND } BW = butterworth DG = damping given ND = no damping

Name:	*fir_id*
Relations:	**Filter_FIR**, **Filter_FIR_Data**
Description:	FIR Filter identifier. Each FIR filter is assigned a unique integer which identifies it in a database.
Datatype:	***int***
NULL Value:	***No***

Name:	*firmware_nb*
Relations:	**Datalogger**
Description:	This attribute describes the firmware number of a datalogger.
Datatype:	***char(80)***
NULL Value:	***Yes***
Range:	Any free-format string up to 80 characters long

Name:	*flags*
Relations:	**Station_Datalogger_LChannel**
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:	*frequency*
Relations:	**Sensor_Component**, **Filter**, **Filter_Sequence**, **Filamp_PChannel**
Description:	The frequency (f_s) at which the value in *sensitivity*/*gain* is correct.
Datatype:	***float***
NULL Value:	***Yes***
Range:	*frequency* > 0.0
Units:	***Hertz***

Name:	*gain*
Relations:	**Filamp_PChannel**, **Filter**, **Filter_Sequence**, **Filter_FIR**
Description:	This attribute denotes the gain.
Datatype:	***float***
NULL Value:	***Yes***

Name:	*hp_id*
Relations:	**Response_HP**
Description:	High-pass filter identifier. Each high-pass filter is assigned a unique integer which identifies it in a database.
Datatype:	***int***
NULL Value:	***No***

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

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

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

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

Name:	*lchannel_nb*
Relations:	**Station_Datalogger_LChannel**
Description:	This attribute denotes a logical channel of a datalogger.
Datatype:	***int***
NULL Value:	***No***
Range:	*lchannel_nb* ≥ 1

Name:	<u>*lddate*</u>
Relations:	**Response, Response_HP, Response_LP, Response_PZ, Response_PN, Sensor, Sensor_Component, Filamp, Filamp_PChannel, Datalogger, Datalogger_Board, Datalogger_Module, Filter_FIR, Filter, Filter_Sequence, Station, Station_Sensor, Station_Sensor_Component, Station_Filamp, Station_Filamp_PChannel, Station_Digitizer, Station_Digitizer_PChannel, Station_Datalogger, Station_Datalogger_PChannel, Station_Datalogger_LChannel**
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:	**Station_Datalogger_LChannel**
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:	<u>*lon*</u>
Relations:	**Station**, **Station_Sensor**
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:	*lower_bound*
Relations:	**Response_PN**
Description:	This attribute denotes the polynomial lower bound
Datatype:	***float***
NULL Value:	***Yes***

Name:	*lp_id*
Relations:	**Response_LP**
Description:	Low-pass filter identifier. Each low-pass filter is assigned a unique integer which identifies it in a database.
Datatype:	***int***
NULL Value:	***No***

Name:	*max_error*
Relations:	**Response_PN**
Description:	This attribute represents the maximum error of polynomial approximation.
Datatype:	***float***
NULL Value:	***Yes***

Name:	*module_nb*
Relations:	**Datalogger_Module**
Description:	This attribute represents the module number of a datalogger's board.
Datatype:	***int***
NULL Value:	***No***
Range:	*module_nb* ≥ 1

Name:	*name*
Relations:	**Response_PN**, **Sensor**, **Filamp**, **Filter_FIR**, **Filter_Sequence**
Description:	This attribute denotes a descriptive name for a sensor, a filter-amplifier, a FIR filter, a chain of filters or a polynomial.
Datatype:	***char(80)***
NULL Value:	***Yes***
Range:	Any free-format string up to 80 characters

Name:	*nb_aux_pchannel*
Relations:	**Station_Digitizer**
Description:	This attribute denotes the number of auxiliary physical channels of a digitizer.
Datatype:	***int***
NULL Value:	***No***
Range:	*nb_aux_pchannel* ≥ 0

Name:	*nb_board*
Relations:	**Datalogger**
Description:	This attribute denotes the number of boards of a datalogger.
Datatype:	***int***
NULL Value:	***No***
Range:	*nb_board* ≥ 0

Name:	*nb_coeff*
Relations:	**Response_PN**
Description:	This attribute denotes the number of polynomial coefficients.
Datatype:	***int***
NULL Value:	***No***
Range:	*nb_coeff* ≥ 0

Name:	*nb_component*
Relations:	**Sensor**, **Station_Sensor**
Description:	This attribute denotes the number of components of a sensor.
Datatype:	***int***
NULL Value:	***No***
Range:	*nb_component* ≥ 0

Name:	*nb_data*
Relations:	**Station**
Description:	This attribute denotes the number of dataloggers of a station.
Datatype:	***int***
NULL Value:	***No***
Range:	*nb_data* ≥ 0

Name:	*nb_digi*
Relations:	**Station**
Description:	This attribute denotes the number of digitizers of a station.
Datatype:	***int***
NULL Value:	***No***
Range:	*nb_digi* ≥ 0

Name:	*nb_filamp*
Relations:	**Station**
Description:	This attribute denotes the number of filter-amplifiers of a station.
Datatype:	***int***
NULL Value:	***No***
Range:	$nb\_filamp \geq 0$

Name:	*nb_filter*
Relations:	**Filter_Sequence**
Description:	This attribute denotes the number of filters of a sequence.
Datatype:	***int***
NULL Value:	***No***
Range:	$nb\_filter \geq 0$

Name:	*nb_lchannel*
Relations:	**Station_Datalogger_PChannel**
Description:	This attribute denotes the number of logical channels of a datalogger.
Datatype:	***int***
NULL Value:	***No***
Range:	$nb\_lchannel \geq 0$

Name:	*nb_module*
Relations:	**Datalogger_Board**
Description:	This attribute denotes the number of modules of a datalogger's board.
Datatype:	***int***
NULL Value:	***No***
Range:	$nb\_module \geq 0$

Name:	*nb_pchannel*
Relations:	**Filamp**, **Station_Filamp**, **Station_Datalogger**
Description:	This attribute denotes the number of physical channels of a datalogger.
Datatype:	***int***
NULL Value:	***No***
Range:	$nb\_pchannel \geq 0$

Name:	*nb_pole*
Relations:	**Response_HP**, **Response_LP**
Description:	This attribute denotes the number of poles of a high/low-pass filter.
Datatype:	***int***
NULL Value:	***No***
Range:	$nb\_pole \geq 0$

Name:	*nb_pri_pchannel*
Relations:	**Station_Digitizer**
Description:	This attribute denotes the number of primary physical channels of a digitizer.
Datatype:	***int***
NULL Value:	***No***
Range:	*nb_pri_pchannel* ≥ 0

Name:	*nb_sensor*
Relations:	**Station**
Description:	This attribute denotes the number of sensors of a station.
Datatype:	***int***
NULL Value:	***No***
Range:	*nb_sensor* ≥ 0

Name:	<u>*net*</u>
Relations:	**Station, Station_Sensor, Station_Sensor_Component, Station_Filamp, Station_Filamp_PChannel, Station_Digitizer, Station_Digitizer_PChannel, Station_Datalogger, Station_Datalogger_PChannel, Station_Datalogger_LChannel**
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:	*next_hard_nb*
Relations:	**Station_Sensor_Component**, **Station_Filamp_PChannel**
Description:	This attribute denotes the next hardware number.
Datatype:	***int***
NULL Value:	***No***
Range:	*next_hard_nb* ≥ 1

Name:	*next_hard_pchannel*
Relations:	**Station_Sensor_Component**, **Station_Filamp_PChannel**
Description:	This attribute denotes the next hardware physical channel.
Datatype:	***int***
NULL Value:	***No***
Range:	*next_hard_pchannel* ≥ 1

Name:	*next_hard_type*
Relations:	**Station_Sensor_Component**, **Station_Filamp_PChannel**
Description:	This attribute denotes the next hardware type.
Datatype:	***char(1)***
NULL Value:	***No***
Range:	*next_hard_type* ∈ { F | D } F = filter-amplifier D = digitizer

Name:	<u>*offdate*</u>
Relations:	**Sensor, Filamp, Datalogger, Station, Station_Sensor, Station_Sensor_Component, Station_Filamp, Station_Filamp_PChannel, Station_Digitizer, Station_Digitizer_PChannel, Station_Datalogger, Station_Datalogger_PChannel, Station_Datalogger_LChannel**
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:	**Filter**
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:	**Sensor, Filamp, Datalogger, Station, Station_Sensor, Station_Sensor_Component, Station_Filamp, Station_Filamp_PChannel, Station_Digitizer, Station_Digitizer_PChannel, Station_Datalogger, Station_Datalogger_PChannel, Station_Datalogger_LChannel**
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:	*out_sp_rate*
Relations:	**Filter**
Description:	Sampling rate. This attribute is the output sample rate in samples/second.
Datatype:	***float***
NULL Value:	***No***
Range:	*out_sp_rate* > 0.0
Units:	***1/seconds***

Name:	*pchannel_nb*
Relations:	**Filamp_PChannel, Station_Filamp_PChannel, Station_Digitizer_PChannel, Station_Datalogger_PChannel, Station_Datalogger_LChannel**
Description:	This attribute denotes a physical channel.
Datatype:	***int***
NULL Value:	***No***
Range:	*pchannel_nb* ≥ 1

Name:	*pn_id*
Relations:	**Response_PN**, **Response_PN_Data**
Description:	Polynomial identifier. Each polynomial is assigned a unique integer which identifies it in a database.
Datatype:	***int***
NULL Value:	***No***

Name:	*pn_nb*
Relations:	**Response_PN_Data**
Description:	This attribute denotes the coefficient number of a polynomial.
Datatype:	***int***
NULL Value:	***No***
Range:	$pn\_nb \geq 1$

Name:	*pn_value*
Relations:	**Response_PN_Data**
Description:	This attribute denotes the coefficient value of a polynomial.
Datatype:	***float***
NULL Value:	***No***

Name:	*poly_type*
Relations:	**Response_PN**
Description:	This attribute represents the type of polynomial approximation.
Datatype:	***char(1)***
NULL Value:	***No***
Range:	*poly_type* ∈ { C | L | M } C = Chebychev L = Legendre M = MacLaurin

Name:	*pz_id*
Relations:	**Response_PZ**
Description:	Poles & zeros set identifier. Each poles & zeros set is assigned a unique integer which identifies it in a database.
Datatype:	***int***
NULL Value:	***No***

Name:	*pz_nb*
Relations:	**Response_PZ**
Description:	This attribute denotes the pole/zero number of a response.
Datatype:	***int***
NULL Value:	***No***
Range:	$pz\_nb \geq 1$

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

Name:	*r_type*
Relations:	**Response**
Description:	A single character describing the type of response.
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:	**Response_PZ**
Description:	The real portion of a complex pole/zero.
Datatype:	***float***
NULL Value:	***No***

Name:	*remark*
Relations:	**Station_Datalogger_LChannel**
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:	*resp_id*
Relations:	**Response**
Description:	Response identifier. Each response is assigned a unique integer which identifies it in a database.
Datatype:	***int***
NULL Value:	***No***

Name:	*resp_nb*
Relations:	**Response**
Description:	This attribute denotes the response number of a sequence.
Datatype:	***int***
NULL Value:	***No***
Range:	*resp_nb* ≥ 1

Name:	*resp_type*
Relations:	**Response**
Description:	This attribute denotes the response type.
Datatype:	***char(1)***
NULL Value:	***No***
Range:	*resp_type* ∈ { H | L | P | Z | F | N } H = high-pass filter L = low-pass filter P = polynomial Z = poles and zeros F = FIR filter N = none

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

Name:	r*gain*
Relations:	**Station_Datalogger_LChannel**
Description:	This attribute denotes the gain at the response frequency.
Datatype:	***float***
NULL Value:	***Yes***

Name:	*samprate*
Relations:	**Station_Datalogger_LChannel**
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:	**Station_Datalogger_LChannel**
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:	*seed_io*
Relations:	**Station_Datalogger_PChannel**
Description:	This attribute represents the SEED instrument and orientation.
Datatype:	***char(2)***
NULL Value:	***No***
Range:	*seed_io* $\in$ {A | B | D | F | G | H | I | K | L | M | P | R | S | V | T | W} $\cup$ {Z | N | E | A | B | C | T | R | 1 | 2 | 3 | U | V | W}

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:	**Sensor**, **Datalogger_Module**
Description:	This attribute denotes the sensitivity (S_d) for a sensor or a digitizer.
Datatype:	***float***
NULL Value:	***No***
Units:	***Counts/Volt***

Name:	*sensor_id*
Relations:	**Sensor**, **Sensor_Component**, **Station_Sensor**
Description:	Sensor identifier. Each sensor is assigned a unique integer which identifies it in a database.
Datatype:	***int***
NULL Value:	***No***

Name:	*sensor_nb*
Relations:	**Station_Sensor**, **Station_Sensor_Component**
Description:	This attribute represents the sensor number.
Datatype:	***int***
NULL Value:	***No***
Range:	*sensor_nb* ≥ 1

Name:	*seqfil_id*
Relations:	**Filter_Sequence**, **Filter_Sequence_Data**, **Station_Datalogger_LChannel**
Description:	Sequence of filters identifier. Each sequence of filters is assigned a unique integer which identifies it in a database.
Datatype:	***int***
NULL Value:	***No***

Name:	*seqresp_id*
Relations:	**Response**, **Sensor_Component**, **Filamp_PChannel**, **Filter**
Description:	Sequence of responses identifier. Each sequence of responses is assigned a unique integer which identifies it in a database.
Datatype:	***int***
NULL Value:	***No***

Name:	*serial_nb*
Relations:	**Sensor, Filamp, Datalogger, Datalogger_Board, Datalogger_Module, Station_Digitizer**
Description:	This attribute denotes a serial number of a sensor, datalogger, filter-amplifier, board or module.
Datatype:	***char(80)***
NULL Value:	***Yes***
Range:	Any free-format string up to 80 characters long

Name:	*software*
Relations	**Datalogger**
Description:	Datalogger’s software (mshear, ushear, …).
Datatype:	***char(80)***
NULL Value:	***Yes***
Range:	Any free-format string up to 80 characters long

Name:	*software_nb*
Relations	**Datalogger**
Description:	Datalogger’s software version number.
Datatype:	***char(80)***
NULL Value:	***Yes***
Range:	Any free-format string up to 80 characters long

Name:	<u>*sta*</u>
Relations:	**Station, Station_Sensor, Station_Sensor_Component, Station_Filamp, Station_Filamp_PChannel, Station_Digitizer, Station_Digitizer_PChannel, Station_Datalogger, Station_Datalogger_PChannel, Station_Datalogger_LChannel**
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:	<u>*staname*</u>
Relations:	**Station**
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:	*symmetry*
Relations:	**Filter_FIR**
Description:	This attribute denotes the eventual symmetry of a response.
Datatype:	***char(1)***
NULL Value:	***No***
Range:	*symmetry* $\in$ { E | O | N } E = even O = odd N = none

Name:	*type*
Relations:	**Response_PZ**, **Filter_FIR_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_calib*
Relations:	**Station_Datalogger_LChannel**
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:	**Response**
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:	**Response**
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:	**Station_Datalogger_LChannel**
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:	*upper_bound*
Relations:	**Response_PN**
Description:	This attribute denotes the polynomial upper bound
Datatype:	***float***
NULL Value:	***Yes***

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

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

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