

NTX Reader/Writer

FORMAT NOTES:

This format is not supported by FME Base Edition.

This chapter explains how the Feature Manipulation Engine (FME) reads CARIS Interchange format (NTX) files.

Overview

The CARIS NTX File Reader and Writer modules provide the FME with access to the CARIS interchange file format known as NTX. This format is a sequential binary format designed to hold hydrographic or topographic data. Its purpose is to enable data exchange for CARIS users and contractors.

NTX files may contain both two-dimensional (2D) and three-dimensional (3D) features. NTX files store feature geometries as well as a limited number of attributes. The files contain information giving the kind of feature as well as how to view or draw it; that is, both unsymbolized and symbolized forms. They also contain the information necessary to relate the X Y coordinates to latitude and longitude, and different groups of data can have different geographic references.

NTX files do not explicitly store arbitrary attribute values but instead use a feature coding approach in which unique feature codes are assigned to the different types of features stored within the dataset. The FME looks for an extension of `.ntx` for the input NTX files, but accepts any NTX file as input regardless of the filename or extension.

The NTX file format allows for both big-endian (UNIX) and little-endian (PC) files. The FME will read both types of files, determining the format automatically.

There are ten feature types stored in NTX files, as follows:

- compacted lines
- point-to-point lines (also containing dashed lines, circles, and arcs)
- names
- ASCII text
- text with position
- text blocks
- symbols (with labels)
- spot heights
- soundings
- header information

Note: FME supports both the reading or writing of **sounding** features, but these require the purchase of a special "plug-in" to the standard FME distribution.

The FME considers an NTX dataset to be a single CARIS NTX file.

NTX Quick Facts

Format Type Identifier	NTX
Reader/Writer	Both
Dataset Type	File
Feature Type	Geometry base name
Typical File Extensions	.ntx
Automated Translation Support	Yes
User-Defined Attributes	No
Coordinate System Support	Yes
Generic Color Support	No
Spatial Index	Never
Schema Required	No
Transaction Support	No
Geometry Type Attribute	ntx_type

Geometry Support

Geometry	Supported?	Geometry	Supported?
aggregate	no	polygon	yes
circles	yes	donut polygon	no
circular arc	yes	line	yes
elliptical arc	yes	point	yes
ellipses	yes	text	yes
none	no	3D	yes

Reader Overview

The NTX reader simply opens the input file, and immediately starts reading features and returning them to the rest of the FME for processing. The reader doesn't have any requirement for definition statements, as there are no user-defined attributes. Any features flagged with the deleted flag are ignored and not output. All line features flagged with the closed flag are output as polygons.

Each feature that is returned has its feature type set to the geometric type of the feature, as follows:

`ntx_compacted_line`, `ntx_ptp_line`, `ntx_circle`, `ntx_ascii_text`, `ntx_name`, `ntx_symbol`, `ntx_text`, `ntx_sounding`, `ntx_spot_height` or `ntx_header`.

Reader Directives

The directives that are processed by the NTX reader are listed below. The suffixes shown are prefixed by the current `<ReaderKeyword>` in a mapping file. By default, the `<ReaderKeyword>` for the NTX reader is `NTX`.

DATASET

Required/Optional: *Required*

The value for this keyword is the file containing the NTX dataset to be read. A typical mapping file fragment specifying an input NTX dataset looks like:

```
NTX_DATASET /usr/data/caris/test.ntx
```

BREAK_ON_MASK_CHANGE

Required/Optional: *Optional*

This setting determines whether linked features are merged together even though their masked flags are different. If this setting is **YES**, it will break linked features at the point where their masked flags change. If this setting is **NO**, it will merge features regardless of the mask flag settings. A typical mapping file fragment specifying that linked features should not be broken looks like:

```
NTX_BREAK_ON_MASK_CHANGE NO
```

AGGREGATE_DASHED_LINES

Required/Optional: *Optional*

This setting determines whether dashed lines (code 4) will have their geometry represented as a single linestring or as an aggregate of 2 point lines – each line being one of the dashes. If this setting is **YES**, it will form aggregate geometries on dashed line features. If this setting is **NO**, it will set the geometry to be a single line for dashed line features. Those wishing to read NTX files for cartographic reasons may prefer to read dashed lines as aggregates. Those wishing to read the lines most efficiently may prefer to read dashed lines as a single linestring. A typical mapping file fragment specifying that dashed line features should not be read as aggregates looks like:

```
NTX_AGGREGATE_DASHED_LINES NO
```

AGGREGATE_SOUNDINGS

Required/Optional: *Optional*

This setting determines whether consecutive sounding features are merged together into an aggregate feature. If this setting is **YES**, it will merge consecutive sounding features into aggregate features. If this setting is **NO**, it will treat each sounding feature as an individual feature. A typical mapping file fragment specifying that sounding features should not be aggregated looks like:

```
NTX_AGGREGATE_SOUNDINGS NO
```

Writer Overview

The NTX writer creates and writes feature data to the NTX file specified by the `DATASET` keyword. Any NTX file having the same name is overwritten with the new feature data.

Writer Directives

The directives that are processed by the NTX writer are listed below. The suffixes shown are prefixed by the current `<WriterKeyword>_` in a mapping file. By default, the `<WriterKeyword>` for the NTX writer is `NTX`.

DATASET

Required/Optional: *Required*

The value for this directive is the file containing the NTX dataset to write out. A typical mapping file fragment specifying an input NTX dataset looks like:

```
NTX_DATASET /usr/data/caris/output.ntx
```

YRES

Required/Optional: *Optional*

This setting determines the file's `X` and `Y` disk unit resolution based on ground units. For example, if the ground units are `METERS` and the value of `XYRES` is `0.001`, then the disk unit resolution is millimeters. This setting **overrides** any resolution settings if the input file is also NTX. The default resolution value used is `1.0` if `XYRES` is not set unless the input file type is NTX; the resolution from the input file is used. A typical mapping file fragment specifying the `X` and `Y` resolutions in this example looks like:

```
NTX_XYRES 0.001
```

ZRES

Required/Optional: *Optional*

This setting determines the file's `Z` disk unit resolution based on ground units, similar to the `XYRES` keyword. This setting **overrides** any resolution settings if the input file is also NTX. Here, too, the default resolution value used is `1.0` if `ZRES` is not set unless the input file type is NTX; the resolution from the input file is used. A typical mapping file fragment specifying the `Z` resolution looks like:

```
NTX_ZRES 0.001
```

TITLE_STRING

Required/Optional: *Optional*

This setting determines the Title String stored in the header of the NTX file. This Title String can be any character string with a maximum length of 80. This keyword **overrides** any Title String settings if the input file is also NTX. The default Title String value used is "This file was created by FME(c) program by Safe Software Inc. (www.safe.com)" if TITLE_STRING is not set unless the input file type is NTX; the Title String from the input file is used. A typical mapping file fragment specifying the Title String in the example above looks like:

```
NTX_TITLE_STRING "This file was created by FME(c) program by Safe  
Software Inc. (www.safe.com)"
```

FILE_ID_STRING

Required/Optional: *Optional*

This setting determines the File ID String stored in the header of the NTX file. This File ID String can be any character string with a maximum length of 12. This keyword **overrides** any File ID String settings if the input file is also NTX. The default File ID String value used is "SAFESOFTWARE" if FILE_ID_STRING is not set unless the input file type is NTX; the File ID String from the input file is used. A typical mapping file fragment specifying the File ID String in the example above looks like:

```
NTX_FILE_ID_STRING "SAFESOFTWARE"
```

SCALE

Required/Optional: *Optional*

This setting determines the file's scale. For example, if the scale is 1:50000, then this keyword should have the value 50000.0. This keyword **overrides** any scale settings if the input file is also NTX. The default scale value used is 1.0 if SCALE is not set unless the input file type is NTX; the scale from the input file is used. A typical mapping file fragment specifying the scale in the example above looks like:

```
NTX_SCALE 50000.0
```

WRITE_UNIX_FORMAT

Required/Optional: *Optional*

This keyword should be set to either YES or NO. It indicates whether the output NTX file should be in the UNIX (Big Endian) format or in the PC (Little Endian) format.

If this keyword is not present, the default value will be NO and the FME will produce an NTX file in the PC format.

NTX_WRITE_UNIX_FORMAT YES

CALCULATE_BOUNDING_BOX

Required/Optional: *Optional*

This keyword should be set to either YES or NO. It indicates whether the bounding box values are calculated or passed in through the header feature.

If this keyword is not present, the default value will be YES and the FME will calculate the bounding box values. In a mapping file, the line should look like this:

NTX_CALCULATE_BOUNDING_BOX YES

Feature Representation

In addition to the generic FME feature attributes that FME Workbench adds to all features (see *About Feature Attributes* on page 7), this format adds the format-specific attributes described in this section.

NTX features consist of geometry, flags, and feature code information. All NTX FME features contain the `ntx_type` attribute that identifies the geometric type. Depending on the geometric type, the feature will contain additional feature coding attributes that are specific to the geometric type. These are described in subsequent sections.

Attribute Name	Contents
<code>ntx_type</code>	The NTX geometric type of this entity. Range: ntx_compacted_line ntx_ptp_line ntx_circle ntx_ascii_text ntx_name ntx_symbol ntx_text ntx_sounding ntx_text ntx_spot_height ntx_header Default: No default

NTX Attributes on All Features

The following table lists the different NTX attributes that are returned by the FME reader, regardless of feature or geometry type. The FME writer will also look for these attributes when writing out NTX features. If the writer does not find some of these attributes on features it is directed to write out, it will use default values where appro-

priate. (The `ntx_header` feature is the only exception. It does not use these common attributes in either reading or writing.)

Field Name	Description
<code>ntx_feature_code</code>	The feature code of the object. Range: Maximum size is 12 characters. Default: SAFESOFTWARE
<code>ntx_theme_ID</code>	The theme ID string of the object. Range: Maximum size is 12 characters. Default: <blank>
<code>ntx_theme_number</code>	Number which indicates object theme. Range: signed 32-bit integer Default: 0
<code>ntx_index_key</code>	The index key string of the object. This key may be used as a link to attributes outside of the scope of the NTX definition. Note that some soundings, spot heights, and symbols have specific key values that are meant to override this key and be used instead. In this case, the value of the <code>ntx_index_key</code> will be the characters "Reset Key". Range: Maximum size is 12 characters. Default: <blank>
<code>ntx_source_ID</code>	Character string that indicates object's origin. Range: Maximum size is 12 characters. Default: SAFESOFTWARE
<code>ntx_user_number</code>	The user number of the object. Range: signed 32-bit integer Default: 0
<code>ntx_size</code>	If this value is positive, it represents the size of the feature in ground units. Only symbol features may use a negative value. In this case, negative values represent a magnification, relative to the size defined for the symbol in the external pattern file. External pattern files are beyond the scope of this software and therefore users are expected to interpret negative values in the way that they find most appropriate. Range: signed real number Default: 1
<code>ntx_combination</code>	This Boolean flag indicates if this object is a line resulting from a combination. Maximum size is 3 characters. Range: Yes No Default: No
<code>ntx_displacement</code>	The Boolean flag indicates if this object is a line resulting from a displacement. Maximum size is 3 characters. Range: Yes No Default: No
<code>ntx_exaggeration</code>	This Boolean flag indicates if this object is a line resulting from an exaggeration. Maximum size is 3 characters. Range: Yes No Default: No

Field Name	Description
ntx_link_label	Number that indicates a unique value for each group of linked objects. This is used to link features together when writing. (Linked features must be processed by the writer in consecutive order.) Range: 1 to 32767 Default: Automatically calculated and incremented from 1.
ntx_selected	This Boolean flag indicates if this object is selected. Maximum size is 3 characters. Range: Yes No Default: No
ntx_suppressed	This Boolean flag indicates if this object is suppressed. Maximum size is 3 characters. Range: Yes No Default: No
ntx_masked	This Boolean flag indicates if this object is masked. Maximum size is 3 characters. Range: Yes No Default: No
ntx_is_deleted	This Boolean flag indicates if this object is marked for deletion. Maximum size is 3 characters. Range: Yes No Default: No
ntx_is_closed	This Boolean flag indicates if this object is a closed line (loop). Maximum size is 3 characters. Range: Yes No Default: No
ntx_dominating	This Boolean flag indicates if this object is from a dominating DAD. Maximum size is 3 characters. Range: Yes No Default: No
ntx_is_explicit_node	This Boolean flag indicates if this object is an explicit node. Maximum size is 3 characters. Range: Yes No Default: No
ntx_is_arc	This Boolean flag indicates if this object is an arc. Maximum size is 3 characters. Range: Yes No Default: No
ntx_display_label	This Boolean flag indicates if this object is a display label. Maximum size is 3 characters. Range: Yes No Default: No
ntx_symbolized	This Boolean flag indicates if this object is symbolized. Maximum size is 3 characters. Range: Yes No Default: No

Field Name	Description
ntx_user_defined_1	This Boolean flag indicates if this object has the user-defined flag 1 set. Maximum size is 3 characters. Range: Yes No Default: No
ntx_user_defined_2	This Boolean flag indicates if this object has the user-defined flag 2 set. Maximum size is 3 characters. Range: Yes No Default: No
ntx_user_defined_3	This Boolean flag indicates if this object has the user-defined flag 3 set. Maximum size is 3 characters. Range: Yes No Default: No

Lines

ntx_type: ntx_compacted_line

NTX compacted line features represent linear features and may be either 2D or 3D. Compacted line features may have the following attributes:

Attribute Name	Contents
ntx_scale	The denominator of the largest scale for which the data is valid. A value of zero means the scale indicator is undefined. Range: signed 32-bit integer Default: 0
ntx_weight	The line weight of the object, in steps of 0.001 inches at map scale. A positive value indicates that a rectangular slit should be used to plot the line. A negative value indicates that a round dot should be used to plot the line. Range: signed 32-bit integer Default: 0
ntx_X_resolution ntx_Y_resolution ntx_Z_resolution	X, Y, and Z resolution factors may be specified, to be used instead of global XRES, YRES, and ZRES settings. If you wish to represent very precise survey data but you also wish to compact less precise line data, you would have to define a resolution factor to essentially degrade the resolution of the lines. Failing to do so could lead to poor data compaction. Range: signed 32-bit integer Default: 1
ntx_smooth	The smoothing factor is used to define the amount of smoothing that may be applied to the data if it is plotted. A value of zero means that the data would be plotted exactly as defined. Range: signed 32-bit integer Default: 0

ntx_type: ntx_ptp_line

NTX point-to-point line features represent linear features and may be either 2D or 3D. These features represent both code 3 (simple) and code 4 (dashed) lines. Code 3 lines

simply have their coordinates on the feature's geometry. Code 4 lines have each dash as a two-point line in an aggregate on the feature's geometry. When writing these features, an aggregate geometry will result in a code 4 record, otherwise it will output a code 3. Any pieces in the aggregate that are not two-point lines will be ignored. The order of the two-point segments in the aggregate reflect the order of the dashes in the record of the NTX file. Point-to-point line features may have the following attributes:

Attribute Name	Contents
ntx_scale	The denominator of the largest scale for which the data is valid. A value of zero means the scale indicator is undefined. Range: signed 32-bit integer Default: 0
ntx_weight	The line weight of the object, in steps of 0.001 inches at map scale. A positive value indicates that a rectangular slit should be used to plot the line. A negative value indicates that a round dot should be used to plot the line. Range: signed 32-bit integer Default: 0

Circles (Arcs)

ntx_type: ntx_circle

NTX circle features represent circular arc features and may be either 2D or 3D. These features store dual arc information. The geometry of the feature contain points along the edge of the arc, while the center, radius, and angles are stored in the attributes. When reading arcs, both are verified to match; if they do not match, the center, angle, etc., are recalculated from the border points.

When writing arcs, either the border points (geometry) or the center, rotation, angle, and axis (attributes) must be specified. (If only one point is specified on the geometry, this is assumed to be the center of the arc). If only one of these is specified, the other is calculated from it. If both are specified, they are verified to match; if they do not match, the border points are recalculated.

Circle features may have the following attributes:

Attribute Name	Contents
ntx_center_x ntx_center_y	These two attributes hold the coordinates of the center of the arc. Range: Any real number Default: Values are calculated from the border points if missing.
ntx_scale	The denominator of the largest scale for which the data is valid. A value of zero means the scale indicator is undefined. Range: signed 32-bit integer Default: 0

Attribute Name	Contents
ntx_weight	The line weight of the object, in steps of 0.001 inches at map scale. A positive value indicates that a rectangular slit should be used to plot the line. A negative value indicates that a round dot should be used to plot the line. Range: signed 32-bit integer Default: 0
ntx_rotation	The rotation of the arc, in degrees counterclockwise. Range: -360.0 to +360.0 Default: 0.0
ntx_primary_axis	The radius of the arc. Range: Any real number Default: 1.0
ntx_start_angle	Refer to the @Arc (function) in the <i>FME Functions and Factories manual</i> for a detailed definition of start_angle. Range: -360.0 to +360.0 Default: 0.0
ntx_sweep_angle	Refer to the @Arc (function) in the <i>FME Functions and Factories manual</i> for a detailed definition of sweep_angle. Range: Any real number Default: 360.0

Notes

ntx_type: ntx_ascii_text

NTX ASCII text features represent notes or comments with the NTX file and are never drawn or plotted. They contain no coordinates but may be linked to other features through the ntx_link_label attribute. ASCII text features may have the following attributes:

Attribute Name	Contents
ntx_scale	The denominator of the largest scale for which the data is valid. A value of zero means the scale indicator is undefined. Range: signed 32-bit integer Default: 0
ntx_text_string	The text string of the object. Range: Any character string Default: <blank>

Text

ntx_type: ntx_name

NTX name features represent the most general format for text strings. It gives full positioning control over individual characters within the strings.

The writer can write text in two ways:

- Each character is passed list attributes for its properties
`ntx_name_element{}.character ntx_name_element{}.x ntx_name_element{}.y`
`ntx_name_element{}.ntx_ rotation`
- Given `ntx_name_string` the writer will build the above list attributes.

The existence of `ntx_number_of_characters` determines which mode the writer will use. If `ntx_number_of_characters` exists, the writer will be expecting the above list attributes; if `ntx_number_of_characters` does not exist, the writer will build the text attributes from `ntx_name_string`.

Name features may have the following attributes:

Attribute Name	Contents
<code>ntx_scale</code>	The denominator of the largest scale for which the data is valid. A value of zero means the scale indicator is undefined. Range: signed 32-bit integer Default: 0
<code>ntx_weight</code>	The line weight of the object, in steps of 0.001 inches at map scale. A positive value indicates that a rectangular slit should be used to plot the line. A negative value indicates that a round dot should be used to plot the line. Range: signed 32-bit integer Default: 0
<code>ntx_font</code>	The font is specified with an integer value that refers to a pattern file which defines the shape of the text characters. The format of such a pattern file is outside of the scope of the NTX format definition, allowing users the freedom to design their own font formats. Range: signed 32-bit integer Default: 1
<code>ntx_name_string</code>	The text string of the object. Range: Any character string Default: <blank>
<code>ntx_spacing</code>	This is used during writing to specify the space given between each character of the string. The value in <code>ntx_size</code> is used as the default space between each character. The number given in <code>ntx_spacing</code> is used as a multiplication factor against the default spacing. Range: Any real number Default: 1.0

Attribute Name	Contents
<code>ntx_is_linear</code>	This Boolean flag set on reading that signifies if all characters in the text are placed along a line. This may be used when deciding if the <code>ntx_name_string</code> should be used instead of each separate character. In order for a name to be considered linear, the angle of the first character is taken as a reference and all other character angles are compared to it. As well, the angles of the lines that would connect each character position are compared to the reference angle. If the angles differ by no more than 5 degrees, this flag will be set to <code>Yes</code> . Range: Yes No Default: No
<code>ntx_number_of_characters</code>	The number of individual characters in the name object. Range: 0 to 32767 Default: 0
<code>ntx_name_element{}.character</code>	The individual characters for each name element. Range: Maximum size is 12 characters. Default: <blank>
<code>ntx_name_element{}.x</code> <code>ntx_name_element{}.y</code>	The optical centre of individual characters for each name element. Range: Any real number Default: 0.0
<code>ntx_name_element{}.ntx_rotation</code>	The angle of individual characters for each name element. The angle is specified in degrees of arc, counter-clockwise. Zero means upright. Range: -360.0 to +360.0 Default: 0.0

ntx_type: `ntx_text`

NTX text features hold text blocks. A single 2D or 3D position is associated with the text block. Text features may have the following attributes:

Attribute Name	Contents
<code>ntx_scale</code>	The denominator of the largest scale for which the data is valid. A value of zero means the scale indicator is undefined. Range: signed 32-bit integer Default: 0
<code>ntx_font_type</code>	Range: Valid values are: 1 = Text edited by <code>usl\$editor</code> These text blocks contain special formatting codes within the text block prefixed by a backslash. Default: 1
<code>ntx_rotation</code>	The angle of the string, in degrees. Range: -360.0 to +360.0 Default: 0.0

Attribute Name	Contents									
ntx_justification	<p>The justification of the text block. Valid values are between -4 and +4 inclusive. This represents the position on the cover of the block, or the centre, that was used to position the block.</p> <p>Range: -4 to 4</p> <p>The meaning of the justification values are as follows:</p> <table style="margin-left: 40px;"> <tr> <td>-2</td> <td>1</td> <td>4</td> </tr> <tr> <td>-3</td> <td>0</td> <td>3</td> </tr> <tr> <td>-4</td> <td>-1</td> <td>2</td> </tr> </table> <p>Default: 0</p>	-2	1	4	-3	0	3	-4	-1	2
-2	1	4								
-3	0	3								
-4	-1	2								
ntx_text_string	<p>The text string of the object.</p> <p>Range: Any character string</p> <p>Default: <blank></p>									

Symbols

ntx_type: ntx_symbol

NTX symbol features consist of a 2D or 3D position and a reference to a symbol as specified in an external pattern file. The format of the pattern file is outside the scope of the NTX format definition as users have the freedom to design their own formats. The position of the symbol is the optical centre. Symbol features may have the following attributes:

Attribute Name	Contents
ntx_scale	<p>The denominator of the largest scale for which the data is valid. A value of zero means the scale indicator is undefined.</p> <p>Range: signed 32-bit integer</p> <p>Default: 0</p>
ntx_weight	<p>The line weight of the object, in steps of 0.001 inches at map scale. A positive value indicates that a rectangular slit should be used to plot the line. A negative value indicates that a round dot should be used to plot the line.</p> <p>Range: signed 32-bit integer</p> <p>Default: 0</p>
ntx_cogo_weight_x ntx_cogo_weight_y ntx_cogo_weight_z	<p>The weight for each coordinate of COGO points. These are provided for interfacing to external COGO packages. The interpretation of the coordinate weights is left to the user.</p> <p>Range: signed 32-bit integer</p> <p>Default: 0</p>

Attribute Name	Contents
ntx_symbol_size	If this value is positive, it represents the size of the symbol in ground units. Negative values mean a magnification, relative to the size defined for the symbol in the external pattern file. External pattern files are beyond the scope of this software and therefore users are expected to interpret negative values in the way that they find most appropriate. Range: signed real number Default: 1
ntx_symbol_key	This is an alphanumeric string that may be used as a cross-reference to additional symbol attributes held elsewhere. The symbol key must be in uppercase, left-justified, and padded with blanks to the right. Range: Maximum size is 12 characters. Default: <blank>
ntx_symbol_rotation	The angle of the symbol, in degrees. Range: -360.0 to +360.0 Default: 0.0

Soundings

ntx_type: ntx_sounding

NTX sounding features consist of a depth that may also be associated with a symbol. Sounding features may have these attributes:

Attribute Name	Contents
ntx_scale	The denominator of the largest scale for which the data is valid. A value of zero means the scale indicator is undefined. Range: signed 32-bit integer Default: 0
ntx_depth	The numeric value of the sounding or depth. A negative value indicates height. Range: signed 32-bit integer Default: 0
ntx_sounding_flag	The sounding flag word may be used to define various attributes of a sounding. For a complete list of the meanings of the 32 individual bits in this flag, consult official NTX documentation. Range: signed 32-bit integer Default: 0
ntx_optical_center_x ntx_optical_center_y	This represents the plotted position of the sounding. If this differs from the true position in the geometry, the actual position is the geometry of this feature. Range: signed 32-bit integer Default: 0
ntx_rotation	The angle of the sounding, in degrees. Range: -360.0 to +360.0 Default: 0.0

Attribute Name	Contents
ntx_sounding_key	This is an alphanumeric string that may be used as a cross-reference to additional sounding attributes held elsewhere. The sounding key must be in uppercase, left-justified, and padded with blanks to the right. Range: Maximum size is 12 characters. Default: <blank>
ntx_tidal_reduction	The sounding's tidal reduction, in disk units. Range: Any real number Default: 0.0
ntx_collection_year	The year the sounding was collected. Range: Any 4-digit number Default: 0000
ntx_collection_time	The time the sounding was collected, in Julian centi-seconds, starting at 00:00 hours on January 1. As the number of centi-seconds in a year exceeds the maximum 32-bit number, 180 days are subtracted from the value. January 1st at 00:00 is stored as a time of -1546560000; December 31st 23:59:59.99 in a leap year is stored as +1615679999. If no time zone offset has been specified in the main header, time is assumed to refer to GMT. Range: signed 32-bit integer Default: 0
ntx_accuracy_factor	The raw accuracy factor of the sounding, defined for CHS internal use. Range: signed 32-bit integer Default: 0
ntx_horizontal_accuracy ntx_vertical_accuracy	The horizontal and vertical accuracy factors of this sounding, in ground units. Range: Any real number Default: 0.0
ntx_launch_ID	This is an alphanumeric string that specifies the Launch ID. Range: Maximum size is 4 characters. Default: <blank>
ntx_draft	The draft value for this sounding. Range: signed 32-bit integer Default: 0

Spot Heights

ntx_type: ntx_spot_height

NTX spot height features are either single point features or aggregates of point features. The reader keyword `AGGREGATE_SOUNDINGS` controls the creation of spot heights in this regard. The NTX writer accepts either aggregates or single point features. The

spot heights themselves consist of an elevation that may also be associated with a symbol. Spot height features may have these attributes:

Attribute Name	Contents
ntx_scale	The denominator of the largest scale for which the data is valid. A value of zero means the scale indicator is undefined. Range: signed 32-bit integer Default: 0
ntx_weight	The line weight of the object, in steps of 0.001 inches at map scale. A positive value indicates that a rectangular slit should be used to plot the line. A negative value indicates that a round dot should be used to plot the line. Range: signed 32-bit integer Default: 0
ntx_font	The font is specified with an integer value that refers to a pattern file which defines the shape of the text characters. The format of such a pattern file is outside the scope of the NTX format definition, allowing users the freedom to design their own font formats. Range: signed 32-bit integer Default: 1
ntx_height	The numeric value of the spot height or elevation. Range: signed 32-bit integer Default: 0
ntx_label	The label for the spot height. This is a text string containing the numeric height value. Range: Any character string Default: <blank>
ntx_label_x ntx_label_y	The position of the label. Range: Any real number Default: 0.0
ntx_label_size	This value represents the size of the label in ground units. Range: positive real number
ntx_symbol_size	If this value is positive, it represents the size of the symbol in ground units. Negative values mean a magnification, relative to the size defined for the symbol in the external pattern file. External pattern files are beyond the scope of this software and therefore users are expected to interpret negative values in the way that they find most appropriate. Range: signed real number Default: 1
ntx_spot_height_key	This is an alphanumeric string that may be used as a cross-reference to additional spot height attributes held elsewhere. The spot height key must be in uppercase, left-justified, and padded with blanks to the right. Range: Maximum size is 12 characters. Default: <blank>

Attribute Name	Contents
ntx_label_rotation	The angle of the string, in degrees. Range: -360.0 to +360.0 Default: 0.0
ntx_symbol_rotation	The angle of the symbol, in degrees. Range: -360.0 to +360.0 Default: 0.0
ntx_spacing	The character spacing of the label measured in disk units. Range: -360.0 to +360.0 Default: 1.0
ntx_agg_list{}	This attribute is only present on soundings that are read in as aggregates using the AGGREGATE_SOUNDINGS keyword. This attribute will hold one string value for each sounding present in the aggregate. The string value will be a comma-separated list of <attributeName>, <attributeValue> pairs. All the attributes listed above will be present in this list.

Headers

ntx_type: ntx_header

This is a special feature that is used to hold the NTX file header information. This is the first feature the NTX reader produces and must be the first feature processed by the NTX writer. If this is not the first feature processed by the NTX writer, the information in this feature is ignored, and instead default values for the main header will be used. (This feature is mainly used for NTX-to-NTX translations.) This feature type holds no geometry or graphical information. The supported attributes are as follows:

Field Name	Description
ntx_main_header_size	The size of the main header. Range: 198 (for NEMR) or 184 Default: 184
ntx_descriptor_size	The size of the descriptors (at least 13 words). Range: signed 32-bit integer Default: 16
ntx_format_id	The format ID, the version of NTX used. Range: signed 32-bit integer Default: 5
ntx_file_id	The file id. This value will be overridden if the writer directive FILE_ID_STRING is specified in the mapping file. Range: Maximum size is 12 characters. Default: SAFESOFTWARE
ntx_file_title	The file title. This value will be overridden if the writer directive TITLE_STRING is specified in the mapping file. Range: Maximum size is 80 characters. Default: This file was created by Safe Software's (www.safe.com) FME® program.

Field Name	Description
ntx_hcoordsys	The coordinate system for the horizontal positions. Range: Maximum size is 4 characters Default: NRM
ntx_height_units	The coordinate units for heights and depths. Range: signed 32-bit integer Default: MR (for metres)
ntx_trans_factx	The transformation x factor to convert from the internal integers to the coordinate system. This value will be overridden if the writer directive XYRES is specified in the mapping file. Range: signed 64-bit real Default: 1.0
ntx_trans_shiftx	The transformation x shift to convert from the internal integers to the coordinate system. Range: signed 64-bit real Default: 0.0
ntx_trans_facty	The transformation y factor to convert from the internal integers to the coordinate system. This value will be overridden if the writer directive XYRES is specified in the mapping file. Range: signed 64-bit real Default: 1.0
ntx_trans_shifty	The transformation y shift to convert from the internal integers to the coordinate system. Range: signed 64-bit real Default: 0.0
ntx_trans_factz	The transformation z factor to convert from the internal integers to the coordinate system. This value will be overridden if the writer directive ZRES is specified in the mapping file. Range: signed 64-bit real Default: 1.0
ntx_trans_shiftz	The transformation z shift to convert from the internal integers to the coordinate system. Range: signed 64-bit real Default: 0.0
ntx_proj	The map projection. Range: Maximum size is 4 characters. Default: LC (Lambert Conformal)
ntx_file_scale	The map scale. This value will be overridden if the writer directive SCALE is specified in the mapping file. Range: signed 64-bit real Default: 1.0
ntx_ctrl_meridian	The central meridian. Range: signed 64-bit real Default: 0.0

Field Name	Description
ntx_scale_lat1	The scaling latitude or central latitude. Range: signed 64-bit real Default: 0.0
ntx_scale_lat2	The second scaling latitude if needed. Range: signed 64-bit real Default: 0.0
ntx_ellipsoid	The ellipsoid type. Range: Maximum size is 4 characters. Default: CL66 (Clarke 1866)
ntx_vert_datum	The vertical datum. Range: Maximum size is 4 characters. Default: MSL (Mean Sea Level)
ntx_proj_scale	The scaling factor for the projection. Range: signed 64-bit real Default: 1.0
ntx_alignx0	The first x coordinate of alignment line in internal file units. (Only for CHMR files.) Range: signed 32-bit integer Default: 0
ntx_aligny0	The first y coordinate of alignment line in internal file units. (Only for CHMR files.) Range: signed 32-bit integer Default: 0
ntx_alignx1	The second x coordinate of alignment line in internal file units. (Only for CHMR files.) Range: signed 32-bit integer Default: 0
ntx_aligny1	The second y coordinate of alignment line in internal file units. (Only for CHMR files.) Range: signed 32-bit integer Default: 0
ntx_align_latlongx0	The first x latitude/longitude coordinate of the alignment line. Range: signed 64-bit real Default: 0.0
ntx_align_latlongy0	The first y latitude/longitude coordinate of the alignment line. Range: signed 64-bit real Default: 0.0
ntx_align_latlongx1	The second x latitude/longitude coordinate of the alignment line. Range: signed 64-bit real Default: 0.0

Field Name	Description
ntx_align_latlongy1	The second y latitude/longitude coordinate of the alignment line. Range: signed 64-bit real Default: 0.0
ntx_boxx_sw	The bounding box x southwest coordinate. A calculated value will be used instead if the writer directive CALCULATE_BOUNDING_BOX is specified in the mapping file. Range: signed 32-bit integer Default: 0
ntx_boxy_sw	The bounding box y southwest coordinate. A calculated value will be used instead if the writer directive CALCULATE_BOUNDING_BOX is specified in the mapping file. Range: signed 32-bit integer Default: 0
ntx_boxx_se	The bounding box x southeast coordinate. A calculated value will be used instead if the writer directive CALCULATE_BOUNDING_BOX is specified in the mapping file. Range: signed 32-bit integer Default: 0
ntx_boxy_se	The bounding box y southeast coordinate. A calculated value will be used instead if the writer directive CALCULATE_BOUNDING_BOX is specified in the mapping file. Range: signed 32-bit integer Default: 0
ntx_boxx_ne	The bounding box x northeast coordinate. A calculated value will be used instead if the writer directive CALCULATE_BOUNDING_BOX is specified in the mapping file. Range: signed 32-bit integer Default: 0
ntx_boxy_ne	The bounding box y northeast coordinate. A calculated value will be used instead if the writer directive CALCULATE_BOUNDING_BOX is specified in the mapping file. Range: signed 32-bit integer Default: 0
ntx_boxx_nw	The bounding box x northwest coordinate. A calculated value will be used instead if the writer directive CALCULATE_BOUNDING_BOX is specified in the mapping file. Range: signed 32-bit integer Default: 0

Field Name	Description
ntx_boxxy_nw	The bounding box y northwest coordinate. A calculated value will be used instead if the writer directive CALCULATE_BOUNDING_BOX is specified in the mapping file. Range: signed 32-bit integer Default: 0
ntx_boxlong_sw	The bounding box longitude southwest coordinate. (Only for CHMR files.) Range: signed 64-bit real Default: 0.0
ntx_boxlat_sw	The bounding box latitude southwest coordinate. (Only for CHMR files.) Range: signed 64-bit real Default: 0.0
ntx_boxlong_se	The bounding box longitude southeast coordinate. (Only for CHMR files.) Range: signed 64-bit real Default: 0.0
ntx_boxlat_se	The bounding box latitude southeast coordinate. (Only for CHMR files.) Range: signed 64-bit real Default: 0.0
ntx_boxlong_ne	The bounding box longitude northeast coordinate. (Only for CHMR files.) Range: signed 64-bit real Default: 0.0
ntx_boxlat_ne	The bounding box latitude northeast coordinate. (Only for CHMR files.) Range: signed 64-bit real Default: 0.0
ntx_boxlong_nw	The bounding box longitude northwest coordinate. (Only for CHMR files.) Range: signed 64-bit real Default: 0.0
ntx_boxlat_nw	The bounding box latitude northwest coordinate. (Only for CHMR files.) Range: signed 64-bit real Default: 0.0
ntx_sound_units	The units used for plotting the soundings. Range: Maximum size is 2 characters. Default: MR (meters and decimeters)
ntx_spot_height_units	The units used for plotting the spot heights. Range: Maximum size is 1 character. Default: M (meters)

Field Name	Description
ntx_spot_height_dec	The number of digits to be displayed to the right of the decimal. Range: signed 16-bit integer Default: 2
ntx_edit_year	The year the file was last edited. Range: signed 16-bit integer Default: the current year
ntx_edit_day	The Julian day the file was last edited. Range: signed 16-bit integer Default: the current Julian day
ntx_edit_time	The time of the day of the last edit using the 24-hour clock. Range: signed 16-bit integer Default: the current time
ntx_timezone_offset	The time zone. The offset in minutes from the GMT (+/-) for time measurements. Range: signed 32-bit integer Default: the local time zone
ntx_false_northing	The false northing. ($N' = N + \text{ntx_false_northing}$) Range: signed 64-bit real Default: 0.0
ntx_false_easting	The false easting. ($E' = E + \text{ntx_false_easting}$) Range: signed 64-bit real Default: 0.0

