



SegY Detective – User Manual

SegY Detective software is dedicated for viewing, analyzing and editing SegY file header values.

The program is developed by *DECO Geophysical Software Company*, all rights reserved. The program is distributed for free.


Any questions and requests regarding the software functionality may be addressed to the developers:

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Menu items

File - contents the following options (they are repeated on the toolbar):

Open () – opens Seg-Y file

Analyze () – automatic analysis of Seg-Y file. Program scans all headers and makes reports the following information:

- recommended byte order
- user selected byte order for file headers and trace headers
- sample interval (dt in microseconds) according to file header
- number of samples according to file header
- number of traces in the file.

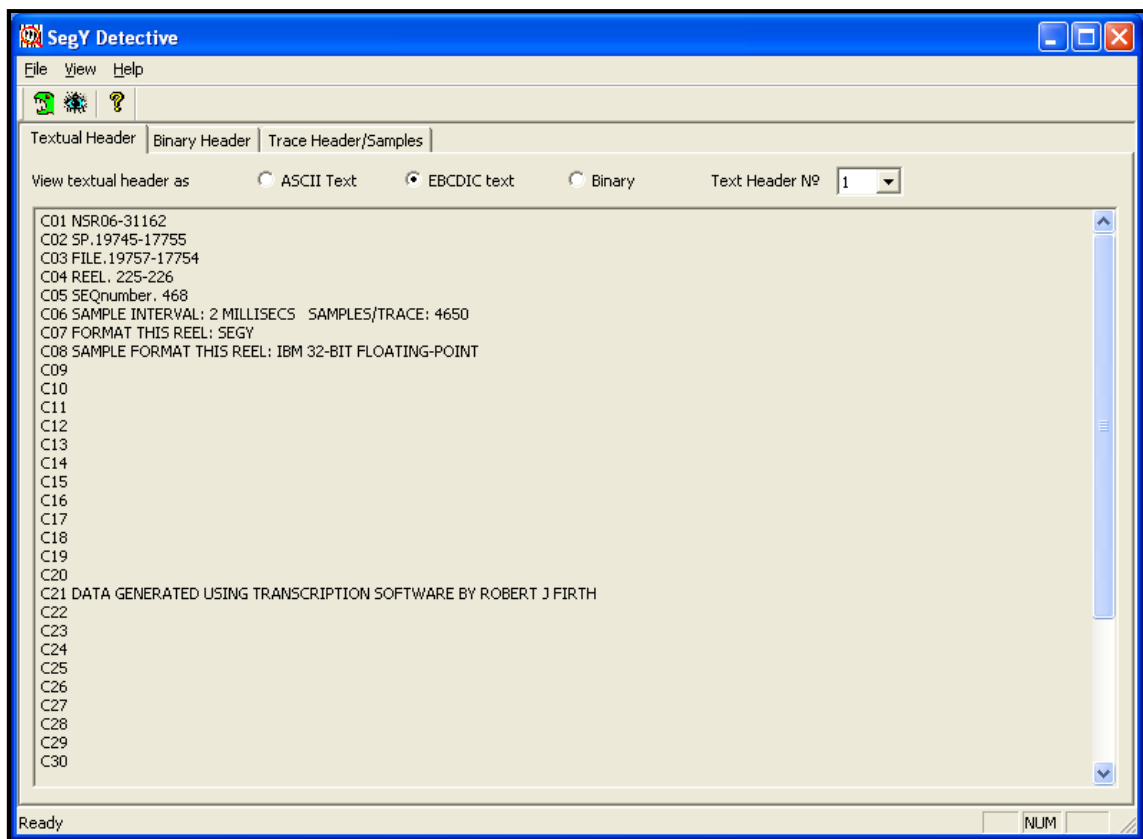
If there is an inconsistency in sampling rate and number of samples in trace headers and the file header, warning messages will appear in the report.

Textual Header, Binary Header, Trace Header/Samples panels

Main window of the program contains three tabs:

Textual header tab – displays textual headers of Seg-Y file.

The program supports SEG-Y revision 1 format, which allows more than one textual header in a file. If this is the case, you can select a textual header to display using *Text header №* drop-down list. Textual headers can be viewed as *ASCII Text*, *EBCDIC Text*, or in **Binary** form as an array of byte.

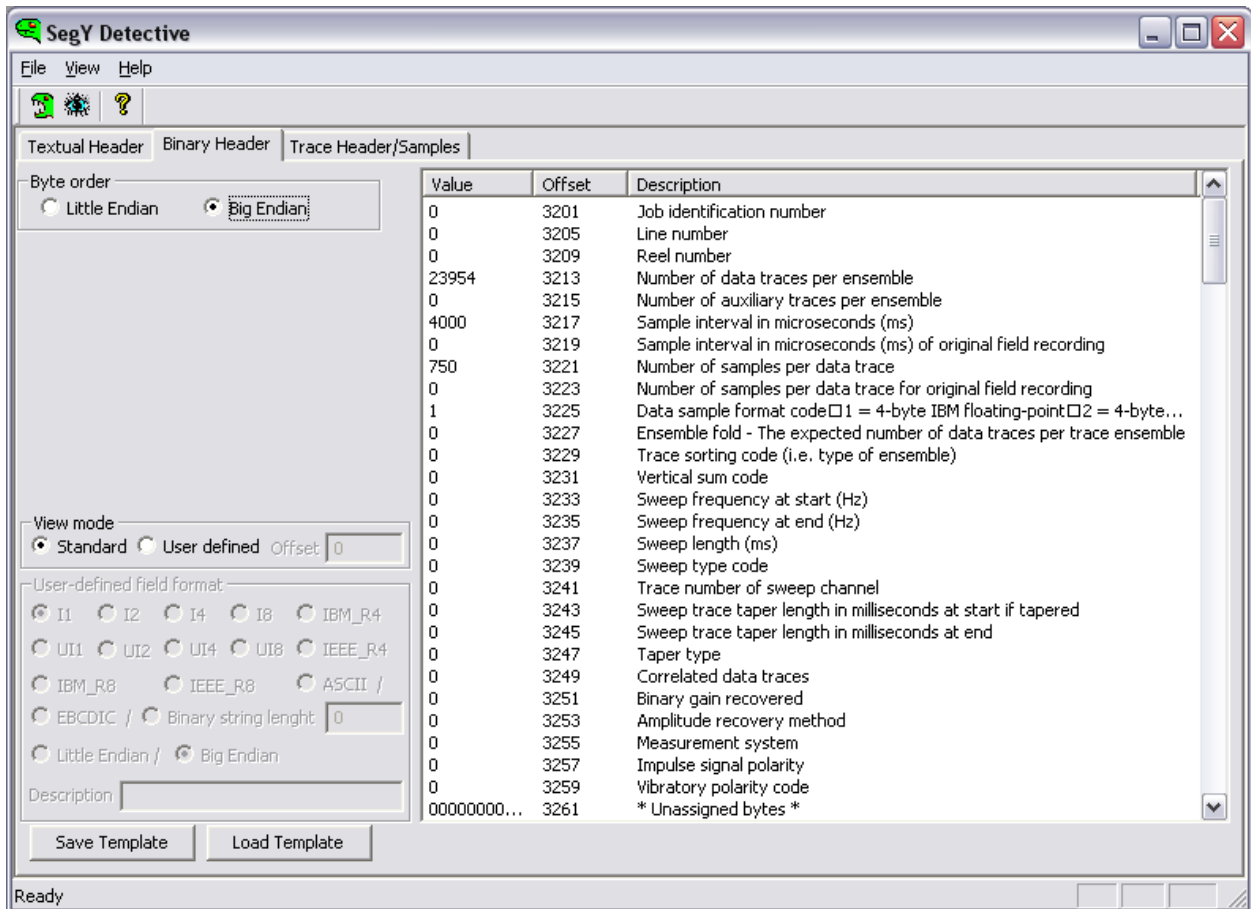
**Binary Header tab** – displays binary header of Seg-Y file.

Choose *Byte order* for displaying header values: *Big endian* (the default Seg-Y standard) or *Little endian* (standard for the CPU of x86 architecture).

Select a *View mode* which can be one of the following:

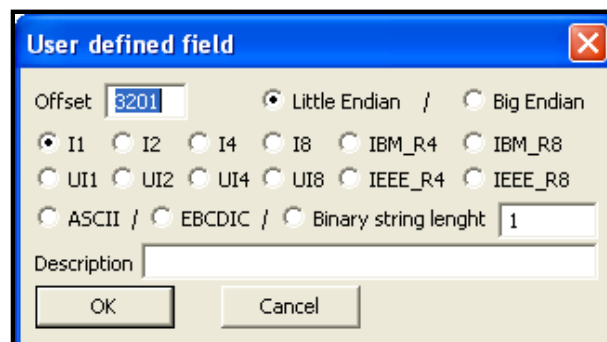
Standard

The header in this mode is displayed as a standard Seg-Y file binary header structure. There are 3 columns in the header field list: *Offset* measured in bytes from the start of the file (if the file corresponds to classical Seg-Y format with one textual header of 3200 bytes, the binary header starts at the offset 3201), *Value* of the header field, given the chosen byte order, and *Description* according to the Seg-Y standard.



Creating user-defined fields:

In the **Standard** mode additional header fields can be created: right-click on the field table and select **New field...** in the context menu. The following dialog appears then:



Define **Offset** of the new field in bytes from the start of the file (within the range of 3201-3600), choose byte order and number representation format (available formats are shown in the Appendix) and fill in the **Description**.

Editing header fields:

In the **Standard** mode select any header field with a left mouse click and then left-click on it once again – the selected field will be available for editing. Edited values will affect how the traces of the file are to be read. If a user defined field is being edited, any standard fields overlapping it will be affected by the change as well. When you exit the program you will be asked if the binary header changes are to be

applied to the original file or canceled.

User defined

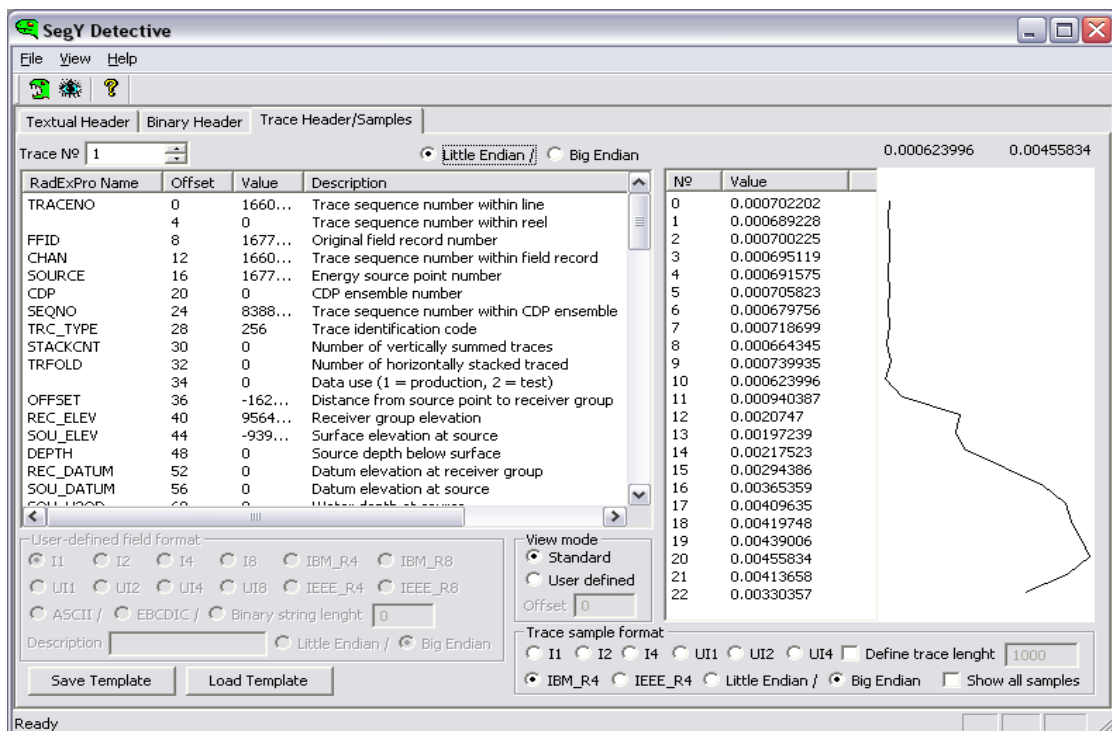
The header in this mode is displayed as a 400-byte table of values of one and the same user-specified number representation format. You can additionally specify an extra **Offset** (in bytes) of the starting address of the table from the beginning of the standard binary header (in this case the size of table will be equal 400-Offset bytes).

In this mode, the list of header fields contains 2 columns: **Offset** from the start of the file and **Value** corresponding to this offset. The number format of the values and their byte order can be set in the **User-defined field format** group of parameters (available number formats are shown in the Appendix).

This mode is convenient if you are searching for a value which was written into an unknown and unusual place of the header, possibly in an unusual number representation format. While this value is detected, it is convenient to switch to the **Standard** mode and create a new header field for it.

Trace Header / Samples tab – displays SEG-Y trace headers and traces

This tab contains two parts: (1) trace header field table on the left, and (2) a table of trace sample values together with the wiggle-trace plot on the right.



A current trace to be displayed can be selected by its sequential number in the file using the **Trace №** field on the top of the tab (trace navigation will be described in more detail below). To the right you can specify the trace header byte order: **Little Endian** or **Big Endian**.

Trace header view

Select a **View mode** for the trace header:

Standard

In this mode the header of the current trace is displayed as a standard SEG-Y trace header structure. The header field table contains the following columns:

RadExPro Name – name of the default header field in a RadExPro project that corresponds to this SEG-Y trace header field.

Offset – offset in bytes from the start of the current trace header (header starts with the offset 1).

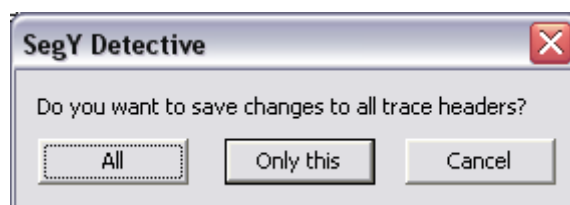
Value – header field value, given the chosen byte order

Description – field description according to Seg-Y standard.

In the **Standard** mode the trace header fields can be sorted either by offset or by their RadExPro field name (alphabetically). To set a specific sorting, click on the header line of the corresponding column. Another click on the same header line will change the sorting order from ascending to descending or another way around.

In the **Standard** mode of the trace header view you can create user-defined extra header fields of arbitrary offset and number representation format the same way as for the binary header (offset here is defined from the start of the header of the current trace).

You can also edit trace header field values here (extra left click on a selected field). Modified value can be applied for the current trace only or for all traces in the file. Saving request will appear immediately upon you finish with editing:



All – save changes in all trace headers;

Only this – save changes in the current trace header only;

Cancel – cancel editing.

User defined

The header in this mode is displayed as a 240-byte table of values of one and the same user-specified number representation format. This mode works the same way as for the **Binary header** tab, except that the offsets here are defined from the trace header start at the offset 1.

Trace samples view

A table of trace sample values and their wiggle-trace display are shown on the right part of the tab. When a sample is selected in the table, a blue point indicates the corresponding place on the wiggle-trace plot.

By default, only the beginning of the trace (that is, all values that fit the table) displays in the table and on the plot. This makes navigation between traces faster. If you select a sample value in the table and press the down arrow key, the program will read the current trace until the end and a vertical scroll bar between the table and the plot will appear. To ensure that all trace samples are read automatically while you navigate between the traces, switch on the **Show all samples** option at the bottom right of the tab.

Number representation format of the sample values is interpreted by default according to the file format code as indicated in the binary header (offset 3225). Sample values can be viewed in any other format defined in the **Trace sample format** group of parameters at the bottom (see Appendix for the list of supported number formats). Here you can also specify sample values byte order different from that of the trace header.

If samples are displayed in one of the floating point formats, it might happen that some samples cannot be interpreted correctly as numbers within the frame of the specified format. In this case, a warning message «NANs present!!!» appears on the top of the table (here NAN stands for Not A Number).

Trace navigation

A current trace to be displayed can be selected by its sequential number in the file using the **Trace №** field on the top of the tab. The number can be manually typed into the edit field, or selected with the control buttons to the right of the field or by clicking on the field and then using “up” and “down” arrow keys on the keyboard. For choosing the last trace, a value definitely bigger than the largest trace number in the file can be inserted.

When you navigate through the traces, by default the program follows the procedure described below:

1. Read the value of number of samples from the current trace header (NUMSMP field, offset 115);
2. Move through the file forward or backward to this number of samples given the sample format defined in the **Trace sample format** field;
3. Read the value of number of samples from the header of the next trace;
4. Move through the file forward or backward to this number of samples...

Steps 3 and 4 repeated until the program reaches the desired trace.

Thus, the process of navigation between traces is affected by both the number of samples specified in trace header and the current choice of trace sample format. If the number of samples or/and selected format are wrong, when the program attempts to scroll to the next trace it will move through the file to a wrong number of bytes. Then it will miss the trace header and will read some completely wrong value of the number of samples, making further navigation unpredictable.

If the true number of samples per trace or/and the true sample format are unknown and shall be identified, it can be useful to move through the file using some fixed trace length. To achieve this turn on the **Define trace length** option in the **Trace sample format** box and specify an assumed number of samples in the corresponding edit field. When this option is on, the program will use the specified number of samples per trace for navigation ignoring the values from the trace headers.

APPENDIX

Number representation formats used in the program:

I1 – signed integer number, 1 byte long

UI1 – unsigned integer number, 1 byte long

I2 - signed integer number, 2 byte long

UI2 - unsigned integer number, 2 byte long

I4 - signed integer number, 4 byte long

UI4 - unsigned integer number, 4 byte long

I8 - signed integer number, 8 byte long

UI8 - unsigned integer number, 8 byte long

IBM_R4 – real floating-point number in IBM format, 4 byte long

IEEE_R4 - real floating-point number in IEEE format, 4 byte long

IBM_R8 – real floating-point number in IBM format, 8 byte long

IEEE_R8 - real floating-point number in IEEE format, 8 byte long

ASCII/EBCDIC/Binary string – ASCII or EBCDIC string or (Binary) an array of 1-byte integer numbers of specified length (string/array length is defined manually).