



# GEOM

Fast 3D Dataset Geographical Analysis

Troika International Limited

## Geom-UserGuide

Version 2.1

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#### **Acknowledgements**

Troika gratefully acknowledges the use of Data and Information supplied for educational/demo purposes by the Rocky Mountain Oilfield Testing Center (US Department of Energy). <http://www.rmotc.doe.gov>

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# CHAPTER 1

## Introduction

Geom will calculate and output Inline/Crossline corner points, survey azimuth, bin dimensions, trace count, etc. and optionally an outline surface type image. Geom can be used to validate and gain assurance that your data meets your basic requirements.

Geom is a high speed Post-stack SEG-Y 3D Data Geographical Analysis tool which allows the user to collect fast information on

- Textual Headers
- Trace Headers
- Bin Spacing
- Inlines/Crossline and X/Y Coordinates
- Geometrical Corner Points
- Shapefiles
- Cornerpoint Plots
- Logfile including all of above
- Ability to export Header Definitions for integration into Macros or other text files

# What's New

Geom 2.1.0 includes the following changes....

## Enhancements to existing functionality

- Improved plotting and design of outputs
- Improved "detect" accuracy
- Improved error messages

## Bug Fixes

- Fixed issue with incorrect ordering of files between Linux and Windows

# Services

Please contact us at [info@troika-int.com](mailto:info@troika-int.com) for more information on training and services.

# Support

Please contact [support@troika-int.com](mailto:support@troika-int.com) for any support enquiries.

# Prerequisites

## Memory Requirements

If using the Analyze functionality to produce graphics/images and the system lacks memory to complete this task, Geom will skip this task if it knows it will fail due to a lack of memory.

A message will appear telling the user how much memory your system has and how much you require in order to complete an analysis of a file:

```
Analysing Geometry :
Memory required for analysis step : ~53 GBytes
System memory available, Physical/Virtual : 26/26 GBytes
Skipping analysis and image steps due to lack of system physical or virtual
memory
Images skipped due to previous error
Completion: Normal
```

**Geom requires 250MBytes + ~125Bytes per Bin or CDP to do a full analysis of a 3D dataset.**

So Systems Memory = **250Megabytes (250,000,000 Bytes)+ (125 \* binCount)**

**binCount = ( (maxInLine - minInLine+1)/Inline Increment ) x ( (maxCrossLine-minCrossLine+1)/Crossline Increment )**

As a general rule we obviously recommend that the more ram you have, the better. Especially in cases where you dealing with data that exceeds 500GB it is better to be working on a machine with a least 64GBs of Ram.

## Supported Operating Systems

Geom is supported on the following Operating Systems:

Operating System	Arch	Installer
Redhat® 7//Centos 7	64-bit	Geom-2.1.0-rhel7-x86_64
Microsoft® 10/ 11	64-bit	Geom-2.1.0-win64.exe

Other flavours of Linux may be supported; please contact your local support office to discuss.



# CHAPTER 2

Getting Started

## Installation

The distribution is obtained by creating an account on our website and logging into the Troika website and going to the download area. For licensing enquires please email [sales@troika-int.com](mailto:sales@troika-int.com).

Alternatively, you may be sent a link to an ftp download.

## Windows Installation

Run the installer executable and install it as any normal Windows application, following the installation wizard.

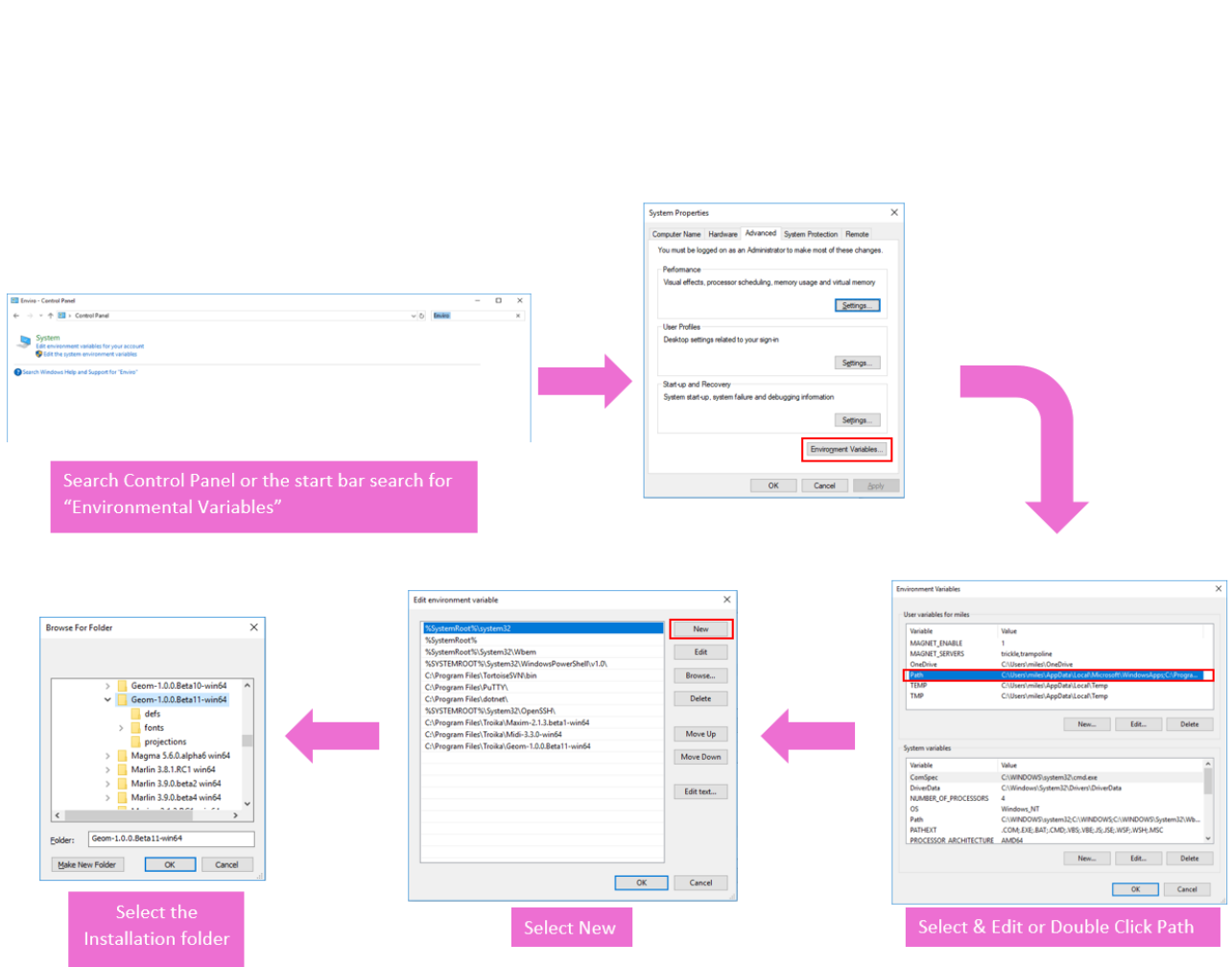
### Configuring the path

To use the magnet command on a client machine use the Advanced System Settings in Control Panel System to add Geom to your 'Path' environment.

Doing this will allow the user to use geom as a command within the Command Prompt window, such as:

```
geom -v
```

```
geom -c /home/configs/geomconfig.cfg
```



# CHAPTER 3

## Operations

This section includes the information you will need to create a config files or run Geom from the command line. All the information for setting up and running a full Geom job can be found within the Command Line Options, Internal Variables, and Config file Outline sections,.

## Command Line Options

By default when "Geom" is entered into the command line (after it has been set up within Environmental Variables) it will show the list below (-h). When using the long form within a config file the -- are not to be entered.

Long Form	Short Form	Arguments
--help	<b>-h</b>	Produce help message
--debug	<b>-d</b>	Turn debug on
--parse-only		Parse the configuration then exit
--progress		Send progress to standard out
--diagnostics	<b>-D</b>	Turn diagnostics on
--skip-error		Skips Errors
<b>--on arg</b>		<b>Execute and external or SQL command when one of : (start, parsing-error error, processing-error error, abort, completion, input-changed, input-processed occurs)</b>
--raw-version	<b>-r</b>	Display the version in a raw format i.e. 1.2.3, then exit
--version	<b>-v</b>	Display the version information for this program
--license-timeout arg (=0)		License time out time - Wait the specified number of seconds for a license to become available. <b>A license timeout of -1 will wait forever.</b>
--config	<b>-c</b>	Optional configuration file name
--set		set the value of a variable, for example set \$(my-name)=Brian\$(jobname)=job1
--include arg		Include configuration text from an external file, for example include /home/brian/setvars.cfg
--ifdef		conditional block at parse time. ifdef else endif
--ifndef		conditional block at parse time. ifndef else endif

Long Form	Short Form	Arguments
--connect		Connect to a database (odbc), for example connect MidiTest
--inline/crossline/easting/northing detect		This uses Geom's detect functionality to calculate the inline/crossline and X/Y trace locations. More information about using detect can be found in "Trace Header Detect" on page 12
--inline arg (=opt1) (inline opt1)	-I	Inline header
--crossline arg (=opt2) (crossline opt2)	-C	Crossline header
--easting arg (=opt3) (easting opt3)	-E	Easting header
--northing arg (=opt4) (northing opt4)	-N	Northing header
--logfile arg (=geom.lst)		Logfile name (User created variables for output file locations may conflict)
--input-directory arg		Optional base input data directory
--input-file	-i	Input files (Geom supports wild cards within the filename and path portion of the input-file name. For example, input-file /data*/TeaPot/*est*.sgy)
--header-definition	-H	Trace header definitions if the form name:offset:type (This feature is not recommended on the command line, but instead though in cofigs  It is important to note that Geom assumes the data is using the appropriate SEG Y standard definitions for Rev 0/1/2. If you try to define headers that are not standard then you must either set them in using the head-definition function (via a config file) or by editing the file within the "defs" folder. More information on this is found within "Config file Outline" on page 13.
<b>Geom automatically enables Analyse (-A) option when required by other specified options (gis/shapefile/-projection)</b>		
--box-image-file	-b	Create a Box Annotation - for more information see, " <a href="#">Command Line Options</a> "
--gis-image-file	-g	Create a GIS image file
--shape-file	-s	Create a shape file (It is recommended that this is done in a config file instead of on the command line)





```
geom --input-file=/qdata1/TESTHARNESS/DATA/SEGYP/filt_mig/filt_mig.sgy -A 1 -g
/qdata1/TESTHARNESS/Geom/Command_Line/Job1.png -X 1 -B 1 -I opt1 -C opt2 -E sht_x -N
sht_y -T 500
```

In the above job, we are producing a plot and outputting the textual, binary, and trace headers.

### Box Images

For box image outputs, the Easting and Northing values are projected onto the InLine and CrossLine directions respectively. For each InLine, where the CrossLine intersects the bounding InLines, and along each CrossLine, where the InLine intersects the bounding CrossLines, the Easting/Northing value is plotted at appropriate intervals along the bounding InLine/CrossLine 'box'. Please note that for 3D volumes the extents are at bin edges.

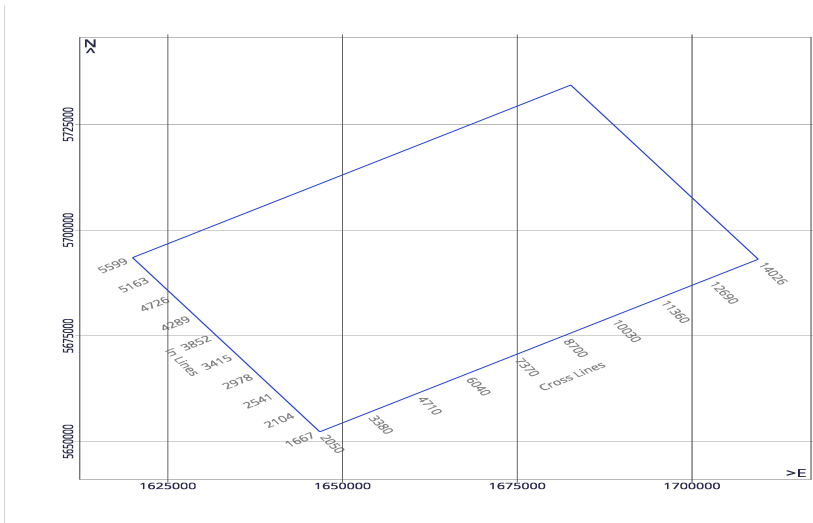


Figure 3-1 Box style annotation



## Trace Header Detect

Geom has the ability to detect the inline/crossline, X/Y trace headers. Geom reads the data and calculates which trace headers to use.

**Important** -please be aware that the detect functionality is an estimate and should be checked for accuracy after the job completes.

Below are some basic examples of a short and long version of the same command line jobs using the Detect functionality:

### Config Outline

```
version
set $(jobname)=TestDetect
set $(output)=Y:\Path\to\Output
set $(input)=Y:\Path\to\Input
input-directory $(input)
input-file *.sgy
inline detect
crossline detect
northing detect
easting detect
report-trace-headers 50
report-text-headers
report-binary-headers
analyse
logfile $(output)/test.lst
shape-file $(output)/shape-$$input-file-name$
gis-image-file $(output)/gis-$$input-file-name$
```

### Command Line

```
geom --input-file Y:\Path\to\Input.sgy --analyse true --gis-image-file Y:\Path\to\Output\Detect.png --inline detect --crossline detect --easting detect --northing detect --report-trace-headers 50 --logfile Y:\Path\to\logfile.lst
```

In the above job, we are producing a plot and outputting the textual, binary, and trace headers using the Geom detect functionality in order to calculate the trace headers.

# Config file Outline

## Analyse

If trace header names are not entered, Geom will use internal defaults according to the input data file SEG-Y revision. Analysis results are reported in the job log. All output files are optional. If shapefile or any other output is specified the `-A` function will be assumed and automatically added.

## SEG-Y REV Defaults

It is important to note that if you are reading Rev 1 data it will look for inline, xline, sht\_x and sht\_y when analysing. If for instance you are reading Rev 1 and you have defined opt1, opt2 etc, the job will fail.

## Comment

Comments can be multi-line. This will add any comments made to the `.config` file upon completion of the job. All comments made will be hashed out.

## Connect

Connect establishes an ODBC connection with a database.

## Macro

Macros can be used to control & present pre-defined work-flows to end-users. Users can be prompted for input of variables during the execution of a geom/midi job. You should consider pre-defining work-flows when your work is pre-dominantly fixed and repeatable. It can be useful in minimising user errors.

Macros are incorporated into Geom jobs via the 'include' command. Examples of macros that Geom can include are trace header definition macros which can be loaded into instead of having to manually enter them into the 'Trace Header' tab each time, as well as, the ability to send meta data collected to a text file.

More information and examples on how to structure your header definition file can found "Config file Outline" above.

## On

Geom allows for:

- start (is executed after parsing and before processing any input files, so the input \$\$ variables have not yet been set. If you want access to the \$\$input-directory before the input file is processed then you should use "on input-changed".)
- parsing-error|error
- processing-error|error
- abort
- completion
- input-changed
- input-processed

Some examples may include:

```
on parsingerror say-line $$input-path$
on processingerror say-line $$input-file-seq$ $$input-path
```

or...

```
on start echo 5
on start echo 4
on start echo 3
on start echo 2
on start echo 1
on start echo START
on inputchanged echo INPUT-CHANGED
on inputchanged say-line $$input-file-name$
on inputchanged say-line $$input-file-extension$
on inputchanged say-line $$input-path$
on inputchanged say-line $$input-file-seq$
on inputprocessed echo INPUT-PROCESSED
on inputprocessed say-line $$input-file$
on completion say-line $$input-directory$
on completion echo COMPLETE
```

```
on completion say-line >$(output)/$$input-file-name$-headers.mac define-macro $$input-file-name$-headers
```

```

on completion say-line >>$(output)/$$input-file-name$-headers.mac header-definition
$$geom_inline_header

on completion say-line >>$(output)/$$input-file-name$-headers.mac header-definition
$$geom_crossline_header

on completion say >>$(output)/$$input-file-name$-headers.mac header-definition
$$geom_northing_header

on completion say >>$(output)/$$input-file-name$-headers.mac header-definition
$$geom_easting_header

on completion say >>$(output)/$$input-file-name$-headers.mac end-macro

```

Geom allows the user to append or create a text file on completion. The previous example shows that using > will create a new file and >> will amend an already existing one.

If there is already a file in the chosen location then it will overwrite it. You must create (>) before you can amend. a file.

## Report

--report-text-headers	-X	Create a text header report, default is false
--report-binary-headers	-B	Create a binary header report, default is false
--report-trace-headers	-T	Number of trace headers at start and end of data to report (A number from 1-2000 must be entered at the end of this command. Geom will then give you the that number from the start, middle, and end of the trace headers).

The report functionality should come at the end of the configuration file.

## Shapefiles

Geom uses the environmental variable (MARVEL\_PROJECTIONS\_PATH). If you haven't set a variable for MARVEL\_PROJECTIONS\_PATH then Geom will search for your projection within the Projection file within the Geom installation directory.

The value of the environment variable MARVEL\_PROJECTIONS\_PATH which should be a directory/folder containing the projection files.

For example,

```

set $(MARVEL_PROJECTIONS_PATH)=Q:\projections
projection=NZGD2000-NZTM_2000-2193

```

## Set

The **Set** page allows the user to define variables that will be expanded elsewhere in the Geom arguments. Names defined here can be referenced on other pages

For example,

```
set $(jobname)=NzDataSet3D
```

or...

```
ifdef $(OS|USER)=Windows_NT
set $(output)=Q:\Tests\Geom\NzDataSet3D
set $(input)=Q:\data\NZPETROLEUM17\site\assets\data\Data by Basin\Taranaki
Region\Taranaki\3D Seismic SEGY\PARIHAKA-3D
else
set $(output)=/qdata1/Tests/Geom/NzDataSet3D
set $(input)="/qdata1/data/NZPETROLEUM17/site/assets/data/Data by Basin/Taranaki
Region/Taranaki/3D Seismic SEGY/PARIHAKA-3D"
endif
```

## Header Definitions

Geom gives you the ability to define your own trace headers. This can be done through a config file, marlin GUI, command line, or using the Geom Detect functionality.

If you decide to define or change certain trace headers, only those specified will be given in the output. However not recommended, if you require one tracer header to be changed but want all of the trace headers to be shown within your output then it is possible to edit the internal Geom header definition files found in the Geom installation folder (C:\Program Files\Troika\Geom-1.2.0-win64\defs).

### Standard default definitions

**Geom checks for the existence of co\_scal as a defined header, if found it is used to obtain the scaler value for easting and northing. If co\_scal is not defined then the standard SEG-Y definition 71:int2 is used.**

**SEG-Y Rev 1 default x and y should be CDP\_X and CDP\_Y - If no byte locations are set for eastings and northings then CDP\_X and CDP\_Y will be used as per the standard.**

### header-definition

header-definition will accept the following formats:

header-definition 190 The header will be named 190, with a data type of int4 (the default)

header-definition 190:int4 The header will be named 190:int4, with a data type of int4

header-definition 190:int2 Again the name is taken from the offset and type, this allows multiple definitions at the same offset but with different data type

header-definition var:190:int4 Standard definition, name is obviously var in this case.

inline, crossline, northing and easting will all accept a pre-defined name item, "190" or "190:int4" or "var" for example. If the predefine header is a standard named item as in the above var:190:int4 then only the name should be specified so in this example it would be "var".

inline, crossline, northing and easting will also accept and auto define headers, headers that have not yet been defined. This is done using the same rules as header-definition. Here's an example snippet from a configuration file.

```
header-definition 13
```

```
inline 13
crossline 17
easting x:191:int4
northing 181:coor4
```

In the above example, inline will use the predefined header named "13"

crossline will create and use a header item named 17 with a data type of int4

easting will create and use a header item named x with an offset of 191 and a data type of int4

northing will create and use a header item named 181::coor4 with an offset of 181 and a data type of coor4

The trace header report will report all defined headers, whether defined using header-definition or auto-defined by inline, crossline etc.

**Note:**

**An unnamed item "123:int2" will use the name "123:int2" in order to maintain uniqueness, whereas an unnamed item "123" will use the name "123", this allows for the following example:**

```
header-definition 123
header-definition 123:int2
header-definition 123:ieee32
```

Geom checks for the existence of co\_scal as a defined header, if found it is used to obtain the scaler value for easting and northing.

If co\_scal is not defined then the standard SEG-Y definition 71:int2 is used.

**When creating a header item using the syntax header-definition offset:type, the created item will be given the name offset:type not offset.**

So header-definition 77:coor4 will have the name 77:coor4 not 77. This is to allow the creation of multiple items for the same offset, eg 77:int4 and 77:coor4

An example of use would be:

```
header-definition 77:coor4
header-definition 88:88:coor4
northing 77:coor4
easting 88
```

For convenience the header-definition's can be omitted leaving the following as valid config

```
northing 77:coor4
easting 88:coor4
inline 17
crossline 22
```

## Internal Variables

Currently, if an internal variable is written incorrectly within a config; then all subsequent outputs will not work.

Current Input:	
<code>\$\$input-directory\$</code>	The directory name of the current input file
<code>\$\$input-path\$</code>	The full path of the current input file
<code>\$\$input-file\$</code>	The filename of the current input file - e.g. test0.sgy - Wildcards are allowed in name. Record selection parameters can also be appended to the file name (name[:shotseqtape ffid sourcepointnum=[from[- to],...])
<code>\$\$input-file-seq\$</code>	The sequence number of the file for the current trace
<code>\$\$input-file-name\$</code>	The name of the file without the extension -e.g. test0
<code>\$\$geom_tracecount\$</code>	The current trace's sequence count within whole job.
<code>\$\$input-file-extension\$</code>	Type of file extension - e.g. sgy
<code>\$\$geom_filesize\$</code>	The size of the file

Four corners: Four corners:	
<code>\$\$geom_x1,2,3,4\$</code>	This is written as <code>\$\$geom_x1\$</code> and will give you the specified x corner point.
<code>\$\$geom_y1,2,3,4\$</code>	This is written as <code>\$\$geom_y1\$</code> and will give you the specified y corner point.
<code>\$\$geom_inline1,2,3,4\$</code>	This will give you give you the inline chosen.
<code>\$\$geom_crossline1,2,3,4\$</code>	This will give you give you the crossline chosen.
<code>\$\$geom_bc_x1,2,3,4\$</code>	This is written as <code>\$\$geom_bc_y1\$</code> and will give you the first bin center for x corner point.
<code>\$\$geom_bc_y1,2,3,4\$</code>	This is written as <code>\$\$geom_bc_x1\$</code> and will give you the first bin center for y corner point.
<code>\$\$geom_azimuth\$</code>	This will give you give you the azimuth chosen.
<code>\$\$geom_azimuth_radians\$</code>	This will give you the radian of the azimuth
<code>\$\$geom_northsouthinline\$</code>	It indicates the inlines are running north to south when the value is true. 1 is True and 0 is False.
<code>\$\$geom_inline_increment\$</code>	The inline increment

<code>geom_crossline_increment</code>	The crossline increment
<code>geom_binheight</code>	The bin height
<code>geom_binwidth</code>	The bin width
<code>geom_sortorder</code>	This tells you whether the data is sorted by inlines or crosslines.
<code>geom_minx</code>	The minimum x value
<code>geom_maxx</code>	The maximum x value
<code>geom_miny</code>	The minimum y value
<code>geom_maxy</code>	The maximum x value
<code>geom_mininline</code>	The minimum inline
<code>geom_maxinline</code>	The maximum inline
<code>geom_mincrossline</code>	The minimum crossline
<code>geom_maxcrossline</code>	The maximum crossline
<code>geom_inline_header</code>	This provides the full byte point information for inline - forexample: <code>geom_inline_header opt1:181:int4:off</code>
<code>geom_crossline_header</code>	This provides the full byte point information for crossline - for example: <code>geom_crossline_header opt2:185:int4:off</code>
<code>geom_northing_header</code>	This provides the full byte point information for northing - for example: <code>geom_northing_header sht_y:77:coor4:off</code>
<code>geom_easting_header</code>	This provides the full byte point information for easting - for example: <code>geom_easting_header sht_x:73:coor4:off</code>
<code>geom_inline_header_name</code>	This provides the name your inline header
<code>geom_inline_header_definition</code>	This provides the inline header definition

Inline/Crossline Counts:	
<code>geom_inline_count</code>	This will give you your inline count
<code>geom_crossline_count</code>	This will give you your crossline count



## Examples

1.

```
version
set $(jobname)=GeomTest
ifdef $(OS|USER)=Windows_NT
set $(output)=Q:\TESTHARNESS\Geom_filt_mig
set $(input)=Q:\TESTHARNESS\DATA\SEGY\TPD\filt_mig
else
set $(output)=/qdata1/TESTHARNESS/Geom/Geom_filt_mig
set $(input)=/qdata1/TESTHARNESS/DATA/SEGY/TPD/filt_mig
endif
input-directory $(input)
input-file filt_mig.sgy
inline opt1
crossline opt2
easting sht_x
northing sht_y
report-trace-headers 500
```

2. This example is of a config producing the standard outputs, however also including a macro file listing predefined header definitions.

```
version
ifdef $(OS|USER)=Windows_NT
set $(output)=Y:\\Geom\TC00003-Include_Files
set $(macro)=Y:\\Geom\MACROS
set $(input)=Y:\\data\NZPETROLEUM17\Taranaki\3D Seismic SEGYPARIHAKA-3D
else
set $(output)=/qdata1/Geom/TC00003-Include_Files
set $(macro)=/qdata1/Geom/MACROS
set $(input)=/qdata1//NZPETROLEUM17/Taranaki/3D Seismic SEGYPARIHAKA-3D
endif
input-directory "$$(input)"
input-file BO_Parihaka3D.sgy
```

```

include $(macro)/seggy-header-def-template-rev0.mac
macro seggy-header-rev0
inline chan
crossline espnum
easting sht_x
northing sht_y
gis-image-file $(output)/geom-gis-image
box-image-file $(output)/geom-box-image
shape-file $(output)/shape-$$input-file-name$
projection=NZGD2000-NZTM_2000-2193
analyse

```

3. This creates a macro file from the Geom that can be used in other Geom jobs as well as within Midi to define headers.

```

version
set $(jobname)=TC00011
ifdef $(OS|USER)=Windows_NT
set $(output)=Y:\TESTHARNESS\Geom\TC00011-Output_Header_Definitions
set $(macro)=Y:\TESTHARNESS\Geom\MACROS
set $(input)=Y:\TESTHARNESS\DATA\SEGY\TPD\filt_mig
else
set $(output)=/qdata1/TESTHARNESS/Geom/TC00011-Output_Header_Definitions
set $(macro)=/qdata1/TESTHARNESS/Geom/MACROS
set $(input)=/qdata1/TESTHARNESS/DATA/SEGY/TPD/filt_mig
endif
input-directory $(input)
input-file filt_mig.sgy
include $(macro)/seggy-header-def-template-rev0.mac
macro seggy-header-rev0
inline opt1
crossline opt2
easting sht_x
northing sht_y
analyse
gis-image-file $(output)/gis-$$input-file-name$
on completion say-line >$(output)/$$input-file-name$-headers.mac define-macro $$input-file-name$-headers

```

```
on completion say-line >>$(output)/$$input-file-name$-headers.mac header-definition
$$geom_inline_header
on completion say-line >>$(output)/$$input-file-name$-headers.mac header-definition
$$geom_crossline_header
on completion say >>$(output)/$$input-file-name$-headers.mac header-definition
$$geom_northing_header
on completion say >>$(output)/$$input-file-name$-headers.mac header-definition
$$geom_easting_header
on completion say >>$(output)/$$input-file-name$-headers.mac end-macro
```

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# APPENDIX

## Appendices

The following sections may provide further useful information

## Appendix A: Common FlexNet Troubleshooting

Can't checkout licence popup:

Create .flexlmrc file

This will often not be created upon fresh set up of a Flex License server on Linux. You must create this by doing the following:

```
cd ~
```

Next...

```
touch .flexlmrc
```

```
nano .flexlmrc
```

Then do the following:

FLEXnet uses a "cache file" \$HOME/.flexlmrc which sometimes becomes stale if the license file or server moves. It is safe to remove this file completely, or one can edit the line entries within the file.

Make sure that this .flexlmrc file is created within the same user the software will be running from.

The relevant line should read such as this:

```
TROIKA_LICENSE_FILE=@license_server.
```

If this issue persists or you have access to LMTOOLS then refer to the "[Client Area](#)" on the Troika Website or speak with your license department.