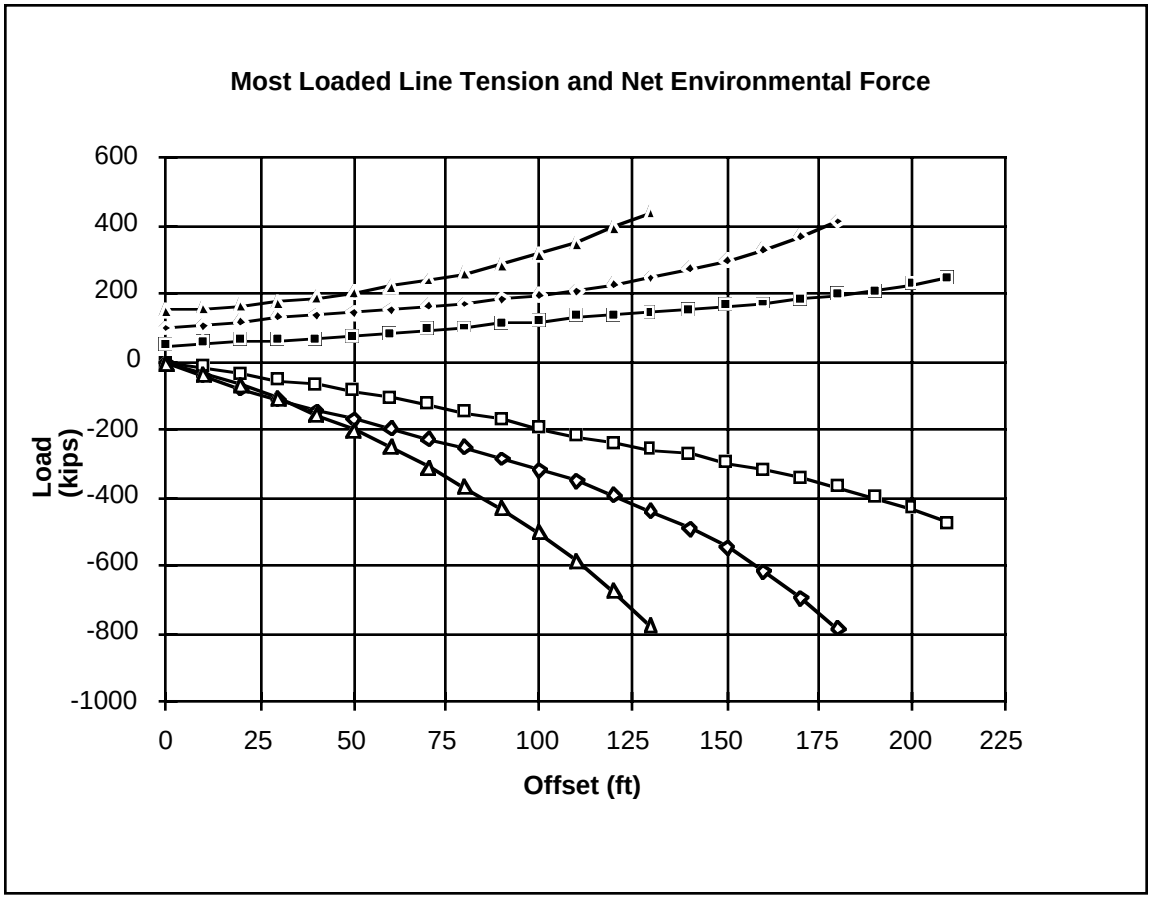
SeaSoft®
MoorMacros™ Documentation

Static Mooring Analysis Macros
from SeaSoft Systems



User Manual

January, 1997

SeaSoft™
MoorMacros Documentation

Static Mooring Analysis Macros
from SeaSoft Systems

User Manual
January, 1997

Phone: (805) 683-3002 E-mail: seasoft@west.net Fax: (805) 683-0440

Notice

The contents of this manual and the accompanying computer programs are provided on an "as is" basis without warranties of any kind, specific or implied. **SeaSoft Systems** and Richard J. Hartman, Ph.D., shall have no responsibility or liability for any loss or damage caused or alleged to be caused directly or indirectly by the use of this manual, the accompanying computer programs or any other materials or information provided by them in connection with the manual and programs.

Phone: (805) 683-3002 E-mail: seasoft@west.net Fax: (805) 683-0440

Description of "MoorMacros"

This Appendix demonstrates the integration of **QUED-M** macro capability with standard **SeaSoft** output files in order to obtain a reasonably complex graphical depiction of the data. The goal of this particular sample macro is to automate implementation of mooring-industry standard "Line Tension vs. Vessel Offset vs. Environmental Load" plots of the type shown. Input comprises a collection of "OFFSETDAT" data files produced by **Statmoor**, corresponding to SMORDAT data files differing *only* in line pretension values. The macros work as well with "OFFSETS" data files produced by **Catsim**, but we will use **Statmoor** for our demonstration and documentation.

Overview:

The **QUED-M** macro **MoorMacro**, contained in the macro file named "**MoorMacros**" and documented further in the file "MoorMacros.txt", extracts relevant tabular information from the OFFSETDAT files and creates a tab-delimited table containing only that information which is necessary for processing; this processing will normally be done using a standard graphics routine (most simply by copying the processed data from **QUED-M** and pasting it into a spreadsheet or graphics packages such as Microsoft Excel, Cricket Graph or Delta Graph). Other macros included in the "**MoorMacros**" file are support macros called by **MoorMacro** but not accessed individually under normal circumstances.

MoorMacros.txt:

The file "MoorMacros.txt" contains in a single file the set of macros supporting **MoorMacro** which are resident in the **MoorMacro** file, although the supporting macros can also be retrieved directly from the **MoorMacro** macros file. ***MoorMacros.txt*** may have value as a model for implementing additional useful macros. Consult **QUED-M** documentation for further details on the working of macros. The **Nisus** documentation also contains useful information on the macro language common to both **QUED-M** and **Nisus**.

Macro Installation:

The macro file provided is self-contained and has been tested on **QUED-M** version 2.07 and later. It need only be loaded using the "Load Macro File" under the **QUED-M** "File" menu. It can be incorporated into existing macro files using standard **QUED-M** macro creation and maintenance procedures.

Statmoor File Preparation:

MoorMacro assumes that a collection of "OFFSETDAT" files produced by **Statmoor** have been renamed and placed collectively into an otherwise empty folder of their own (the "data folder") whose name and location is unimportant. The contents of this "data folder" must be visible in the **QUED-M** "Open" dialog window (also called the "Catalog" window in **QUED-M** version 2.09 and later) prior to execution of **MoorMacro**. The OFFSETDAT files in the "data folder" should be renamed so that the file corresponding to the *largest* pretension occurs at the *top* of the **QUED-M** "Open/Catalog" window and that files corresponding to sequentially smaller pretensions follow sequentially beneath. For example, OFFSETDAT files corresponding to pretensions of 250, 200, 150 and 100 might be renamed, respectively, OFF1, OFF2, OFF3 and OFF4. In this way, OFF1 (corresponding to the largest pretension value) will occur at the top of the "Open/Catalog" window, followed sequentially by OFF2, OFF3 and OFF4 (i.e., the **QUED-M** "Open/Catalog" window uses an alphabetical/numerical hierarchy to establish its list

order).
Note: Data files in the "data folder" are modified (and, possibly, *emptied* of numerical data) by the macro; if they are to be used elsewhere or to be archived, they should be copied to another folder *before* executing **MoorMacro**.

"More than you really wanted to know": The pretension, file name correspondence and ordering is important for the proper functioning of the macro because the offset table for the *minimum* pretension value will always have the *largest* number of rows, other mooring variables being the same. Further, **MoorMacro** requires that the *first*-processed file have the largest number of rows and, because of the way in which **QUED-M** opens files, the last listed file in the "Open/Catalog" window (OFF4 in our example) is processed first. Hence, the file associated with the smallest pretension value must be listed last.

Execution:

With *only* the **QUED-M** "Open/Catalog" window open under **QUED-M**, and with this window displaying *only* the renamed OFFSETDAT files, "**MoorMacro**" should be executed. Execution time will depend on the number of data files to be processed and the amount of data in each, but will normally take lesst than a minute on a 68040 CPU Macintosh. When the macro is completed, a window called "SCRATCH1" will be displayed whose contents comprise a tab-delimited table suitable for pasting directly into a spreadsheet or graphics program for plotting. The format of this table is as follows:

Column 1 = The specified offset array

Column 2 = Most exposed line tension for the *minimum pretension* data file

Column 3 = Net restoring force for the *minimum pretension* data file

Columns 2 and 3 are repeated for each of the OFFSETDAT files, each pair comprising data from a higher value of mooring line pretension in the zero-offset condition. Thus, for a total number "n" of supplied data files (e.g., OFF1, OFF2, ..., OFFn), there are (2n + 1) columns in the SCRATCH1 window.

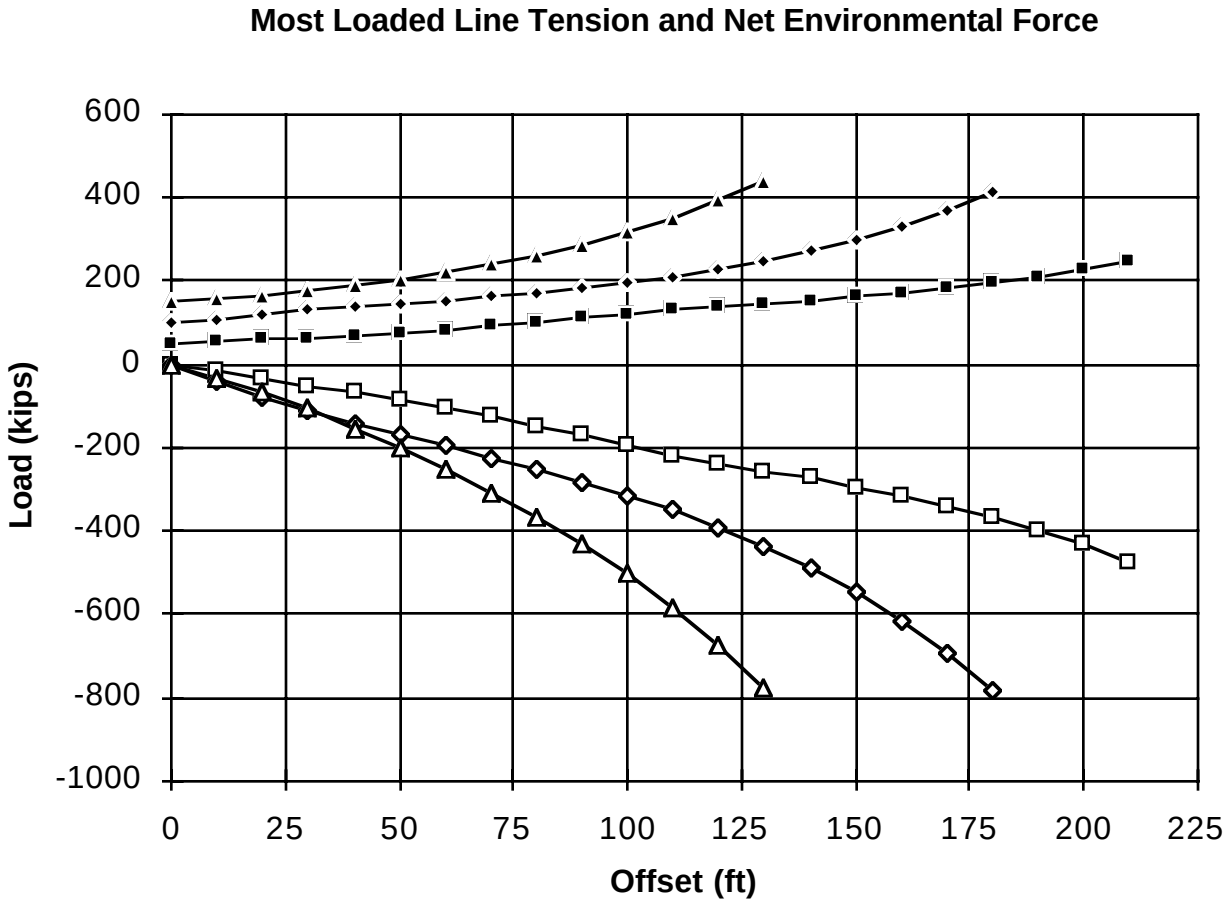
Processing Multiple Offset Directions:

If only a *single* offset direction is of interest, the "OFFSETDAT" output files need not be produced with any particular set of user-selected data options set on Screen 15; the data used by the macro is present in *every* OFFSETDAT file (it is the first tabular block of data). However, if more than one offset direction is to be processed, the simplest procedure is to turn all user-controllable output *off* from within **Statmoor**; this means that all output options on Screen 15 of the **Statmoor** user interface should be set to "No". In this way "**MoorMacro**" can be repeatedly executed on the same collection of OFFSETDAT files to process sequentially the various offset directions. Once all offset directions present in the data files have been processed, the macro will quit with an empty "SCRATCH1" window. At this point, all the original data files will be void of tabular data, the original data having been stripped out by the repeated **MoorMacro** executions.

Example

The following plot is an example of graphical output obtained using **MoorMacros** with a set of **Statmoor** data files corresponding to the sample problem given in the **Statmoor** User Manual. Offset characteristics of the deep water semi in that problem were studied using initial pretensions of 50, 100 and 150 kips in all lines. The **MoorMacros** procedures discussed above produced a tab-delimited block of text that was Copied from **QUED-M** and pasted directly into Excel, which was then used to prepare the plot below using the

internal plotting capacities of Excel.



Discussion

The legend is indicated at right. The value (50, 100, 150) associated with each curve is the initial (zero-offset) pretension in all lines. The "Net Restoring" curves, comprising negative values, represent mooring system restoring forces producing a force balance with the environmental loading at the indicated vessel offset. The most loaded line tensions are presented as positive values in the plot.

The **+RAOprep** *Macro*

One supporting macro in the **MoorMacros** file is useful in a stand-alone capacity. **+RAOprep** can be used to prepare any of the **SeaSoft** tabular output pages for plotting using a spreadsheet-based plotting routine such as Excel, DeltaGraph, KaleidaGraph, etc. To use this macro, simply bring the desired **SeaSoft** tabular output file (such as the OFFSETDAT file from **MoorMacros**) into **QUED-M** and execute **+RAOprep**. The tabular data will be converted to a tab-delimited matrix suitable for importation (by a Copy/Paste operation) into the plotting routine. Even RAO output files produced by the

SeaSoft simulations, which contain imbedded "/" characters to separate RAO amplitude and phase information, can be processed with this macro, which recognizes the "/" character and removes them, along with their associated phase angles, from the file. As an example of the use of this macro, the following plot was constructed from the accompanying excerpted page from SHIPRAO by a single application of **+RAOprep**, a Copy/Paste into Excel to produce the plot. The entire process from the loading of SHIPRAO into **QUED-M** can be completed within a minute.

```
**                                                                    **
***************  II.  UNMOORED VESSEL MOTION CHARACTERISTICS  **************
**                                                                    **

  ----  REGULAR WAVE DATA:  WAVE HEADING  = 149.4 DEG
                            WAVE HEIGHT   =   4.5 M.
                            FORWARD SPEED =    .0 M./SEC

                          +++  QUASI-LINEAR RESPONSE RAOS (S.A./S.A.)  +++

                                    SURGE          SWAY          HEAVE
                                 ( M./ M.)      ( M./ M.)     ( M./ M.)
 WAVE      WAVE     WAVE
PERIOD    LENGTH   SLOPE          AM/PHASE       AM/PHASE      AM/PHASE
(SEC)      (M.)    (DEG)

  7.00      76.1   10.55        .02/ -90.0      .01/  87.8    0.00/  99.9
  7.50      86.9    9.23        .02/ -90.0      .01/  83.5    0.00/ 103.4
  8.00      98.1    8.18        .03/  90.0      .02/ -99.2    0.00/ -77.0
  8.50     109.6    7.33        .06/  90.0      .03/-100.7     .01/ -79.6
  9.00     121.1    6.63        .05/  89.9      .03/-101.1     .01/ -83.4
  9.50     132.7    6.05        .02/  88.5      .01/-100.9    0.00/ -87.3
 10.00     144.3    5.56        .03/ -88.0      .02/  79.9     .01/  89.4
 10.50     155.7    5.15        .08/ -88.8      .05/  81.0     .03/  87.2
 11.00     167.1    4.80        .12/ -89.1      .07/  82.3     .06/  86.5
 11.50     178.4    4.50        .15/ -89.4      .09/  83.8     .10/  87.8
 12.00     189.6    4.24        .16/ -89.9      .10/  85.3     .14/  91.5
 12.50     200.6    4.00        .17/ -90.6      .10/  87.0     .18/  97.7
 13.00     211.6    3.79        .16/ -91.8      .10/  88.6     .21/ 106.5
 13.50     222.5    3.61        .15/ -93.4      .09/  90.2     .22/ 117.3
 14.00     233.3    3.44        .13/ -96.1      .08/  91.8     .20/ 128.6
 14.50     244.0    3.29        .10/-100.5      .06/  93.4     .16/ 139.0
 15.00     254.6    3.15        .07/-109.1      .04/  94.8     .10/ 147.6
 15.50     265.2    3.03        .05/-130.8      .02/  96.2     .05/ 154.3
 16.00     275.7    2.91        .04/ 173.0     0.00/ -82.5     .01/ -20.5
 16.50     286.2    2.81        .06/ 131.6      .03/ -81.3     .06/ -16.5
 17.00     296.6    2.71        .10/ 117.1      .05/ -80.2     .11/ -13.5
 17.50     306.9    2.62        .14/ 110.5      .08/ -79.3     .15/ -11.2
 18.00     317.2    2.53        .19/ 106.8      .11/ -78.4     .19/  -9.4
 18.50     327.5    2.45        .24/ 104.4      .13/ -77.6     .23/  -7.9
```

7.0	76.1	10.55	0.02	0.01	0.00
7.5	86.9	9.23	0.02	0.01	0.00
8.0	98.1	8.18	0.03	0.02	0.00
8.5	109.6	7.33	0.06	0.03	0.01
9.0	121.1	6.63	0.05	0.03	0.01
9.5	132.7	6.05	0.02	0.01	0.00
10.0	144.3	5.56	0.03	0.02	0.01
10.5	155.7	5.15	0.08	0.05	0.03
11.0	167.1	4.80	0.12	0.07	0.06
11.5	178.4	4.50	0.15	0.09	0.10
12.0	189.6	4.24	0.16	0.10	0.14
12.5	200.6	4.00	0.17	0.10	0.18
13.0	211.6	3.79	0.16	0.10	0.21
13.5	222.5	3.61	0.15	0.09	0.22
14.0	233.3	3.44	0.13	0.08	0.20
14.5	244.0	3.29	0.10	0.06	0.16
15.0	254.6	3.15	0.07	0.04	0.10
15.5	265.2	3.03	0.05	0.02	0.05
16.0	275.7	2.91	0.04	0.00	0.01
16.5	286.2	2.81	0.06	0.03	0.06
17.0	296.6	2.71	0.10	0.05	0.11
17.5	306.9	2.62	0.14	0.08	0.15
18.0	317.2	2.53	0.19	0.11	0.19
18.5	327.5	2.45	0.24	0.13	0.23

Explanation

The phase information from the displayed SHIPRAO file page has been stripped from the SHIPRAO data file by the **QUED-M +RAOprep** macro. The resulting numbered data was Copied (from within **QUED-M**) and Pasted into an empty Excel worksheet, producing the displayed Excel spreadsheet block. The unwanted columns (comprising wave frequency and wave length) are deleted or ignored in the selection of columns for plotting. The resulting plot is shown below.