



## TROLL to Modeleasy+ Conversion Utility

The following sections describe the TROLL to Modeleasy+ model conversion utility and how it can be used with Modeleasy+. This includes information about how to use the utility, how the utility works, and some usage notes on the conversion process. The sections covered are:

- ◆ Program Description
- ◆ How It Works
- ◆ Name Processing
- ◆ Endogenous Variable Assignment
- ◆ IF...THEN...ELSE Expressions

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## Program Description

The TROLL model conversion utility supplied with Modeeasy+ 5.1 is intended to convert a model file written in the TROLL model language to a model file written in the Modeeasy+ Model Description Language (**MDL**). Many large models (hundreds of equations) have been successfully converted with the help of this utility.

To understand how this utility functions, consider the model file, **test.tr1**, containing the model below which is written in one of the TROLL formats. This model does not represent a meaningful model, it is only intended to demonstrate the conversion process.

```
File test.tr1
endogenous:
  y.one  y.two  y.three
coefficient:
  c1  c3
equations:
// Equation ONE has y.one as an endogenous variable
// and x1 as an exogenous variable.
  1:one    y.one = c1*log(x1(-1))
// This equation is an identity with y.two, x2 as
variables.
  2:two    y.two = 2 + SQRT(x2(-2))
// This is the third equation.
  3:three  y.three = c3*x3(3)
```

The syntax for using the conversion utility is

```
convert  Troll_input_file_name
Modeeasy+_output_file_name
```

which can be issued at the command prompt in an MS\_DOS Window or at the shell prompt in the Unix environment. The input and output files appear in the order shown above. To use the utility to convert the sample model, **test.tr1**, above to the **MDL** format, **test.mdl**, the command syntax would be that shown below.

```
convert test.tr1 test.mdl
```

Using the conversion utility as shown above model, the result, **test.mdl**, written in MDL is shown below.



```
File test.mdl
MODEL
$ Equation ONE has y.one as an endogenous variable
$ and x1 as an exogenous variable.
BEHAVIORAL> ONE
EQ> Y_ONE=C1*LOG(LAG(X1,1))
ENDOGENOUS> Y_ONE
COEFF> C1
DEFINECOEFF> ANS_1
$ This equation is an identity with y.two, x2 as
variables.
IDENTITY> TWO
EQ> Y_TWO=2+SQRT(LAG(X2,2))
ENDOGENOUS> Y_TWO
$ This is the third equation.
BEHAVIORAL> THREE
EQ> Y_THREE=C3*LEAD(X3,3)
ENDOGENOUS> Y_THREE
COEFF> C3
DEFINECOEFF> ANS_3
END
```

The model written in the Modeleasy+ **MDL** can be brought into the Modeleasy+ workspace by entering the **GETDECK** command in a Modeleasy+ session as:

```
:_getdeck test suffix mdl dir "directory_name"
```

where "directory\_name" is the location of the file **test.mdl**. Once the model is in the Modeleasy+ workspace, the **CHECKMODEL** command should be entered to check the integrity of the converted model.

```
:_checkmodel test
```

Any errors reported by **CHECKMODEL** may be corrected by using the Modeleasy+ editor, the Visual Model Editor or any external editor. After all errors, if any, have been corrected, then the converted model is ready to be used with the **ESTIMATE** and **SIMULATE** commands.

## How It Works

The process of converting the model from the TROLL format to **MDL** starts with parsing the TROLL input model, removing any unnecessary information, and writing a new version of the model into an intermediate working file. The work file is then analyzed to determine what information has been specified in the TROLL model and what information needs to be determined by the conversion utility itself. After completion of this step, the model information, such as variable names, coefficient names, etc., is saved in internal structures in preparation for the conversion. The final step in the conversion process involves taking the information saved in the analysis step and writing the equivalent model in the Modeleasy+ **MDL** format.

During these steps, adjustments and assignments (see the following sections) are made to resolve differences between the TROLL and Modeleasy+ environments. These adjustments and assignments are sometimes accompanied by a message to the user providing information about some specific



aspect of this process. These messages should be carefully scrutinized by the user to determine if the program has made the correct decision.

A log file, **Convert.log**, containing messages about the conversion, is written during the conversion of the model file. This log file also contains the results of the model analysis as well as any modifications made to equations or variable names. The log file corresponding to the conversion of the models above is shown below.

```
File Convert.log
-----
TROLL => Modeleasy+ Converter. Version 12 (12/1/2000)
Copyright 2000, Econometric Modeling & Computing Corporation,
Palm Harbor, FL
-----
Converting TROLL model file : test.tr1
Modeleasy+ output model file: test.mdl
Processing test.tr1...
Analyzing test.tr1...
The model, test.tr1, specifies the following information.
  Number of equations : 3
  Number of endogenous variables: 3
  Number of exogenous variables : 0
  Number of coefficients : 2
  Number of parameters : 0
  Number of functions : 0
Saving model information...
The model, test.tr1, contains the following information.
  Number of equations : 3
  Number of endogenous variables: 3
  Number of exogenous variables : 3
  Number of coefficients : 2
  Number of parameters : 0
  Number of functions : 20
Checking for name conflicts...
Writing names file...
Assigning endogenous variables to equations...
  Endogenous Variable Assignment
After matching equation names to variables on the
left-hand-side of the equation, there are 3 equations
which have not been assigned an endogenous variable.
These equations are:
  Equation #1 (ONE) is not assigned.
  Equation #2 (TWO) is not assigned.
  Equation #3 (THREE) is not assigned.
Matching right-hand-side variables...
After matching equation names to variables on the
right-hand-side of the equation, there are 3 equations
which have not been assigned an endogenous variable.
These equations are:
  Equation #1 (ONE) is not assigned.
  Equation #2 (TWO) is not assigned.
  Equation #3 (THREE) is not assigned.
Attempting to use left-hand-side variable names...
Writing Modeleasy+ MDL file, test.mdl,...
Done! test.tr1 successfully converted to test.mdl.
```



The result of analyzing the TROLL form of the model, shown in the log file above, is that 3 equations, 3 endogenous variables and 2 coefficients were in the TROLL model specification. The conversion process then extracts the other model information necessary for writing the Modeleasy+ model and the result is that 3 equations, 3 endogenous variables, 3 exogenous variables, and 2 coefficients are contained in the model. The conversion process continues, names are converted from TROLL form to Modeleasy+ form (if necessary), endogenous variables are assigned to the equations, and the resulting model is written in the Modeleasy+ **MDL**. The following sections describe in some detail these processes.

## Name Processing

There is a significant difference between TROLL and Modeleasy+ in the variable names allowed. Since Modeleasy+ is not only a modeling tool, but also a powerful computational environment, some characters are not allowed in the Modeleasy+ names. For example, none of the arithmetic operators or a decimal point is allowed in a name. Consequently, TROLL names of the form **A.B** must be changed to an acceptable Modeleasy+ name. The convention taken is to change the "." character into a "\_" character when it appears in a name so that the **A.B** names occurring in TROLL are changed to **A\_B** names in Modeleasy+. This is done during the writing of the intermediate model.

Names longer than 8 characters are not presently supported in the Modeleasy+ environment. This is a restriction that is being removed and will not be a problem in future releases of Modeleasy+. During the conversion process, names longer than 8 characters are truncated to 8 characters and, if necessary, assigned a unique alias name. An alias name will be assigned only if there is a conflict between the truncated name and another name in the model. When an alias name is assigned, a message is issued to inform the user of the variable name change.

The alias names are assigned according to the scheme below.

Truncate the name to 8 characters and replace the last characters by the digits of a number.

Check to see that this name does not conflict with another name in the model. If there is no conflict, then this becomes the alias name.

If there is a conflict, then the number is incremented, the new digits substituted and the new name checked against other names.

The process above continues incrementing the number until there is no name conflict.

For example, the names **A\_LONG\_NAME1** and **A\_LONG\_NAME2** will conflict when truncated to 8 characters, so the name **A\_LONG\_NAME2** would be given the alias **A\_LONG\_1** in the final model.

The mapping of names from TROLL to Modeleasy+ has consequences beyond simply rewriting the model. Since the model refers to the names of data, this mapping must be preserved across the model format. In addition to rewriting the model, the conversion utility also writes a file, **MENames.txt**, which contains the mapping of the names from the TROLL format to the Modeleasy+ format. The names file corresponding to the conversion of the test model above is shown below.



```
Y_ONE   y.one
Y_TWO   y.two
Y_THREE y.three
X1      X1
X2      X2
X3      X3
C1      C1
C3      C3
```

The first 8 characters of each row correspond to the Modeleasy+ name, while the characters starting in position 9 correspond to the TROLL name.

## Endogenous Variable Assignment

In the Modeleasy+ **MDL**, endogenous variables must be assigned to a specific equation. In the TROLL model file there is no explicit assignment, so the conversion utility must perform this task. In the absence of knowledge of the internal workings of how the TROLL engine assigns the endogenous variables, the conversion utility tries to understand what the user intends by looking at the name of the equation and then comparing that name to the names of the variables in the equation.

The first attempt at assigning an endogenous variable to an equation is made by comparing the equation name to the left-hand-side variable names which are on the endogenous variable list. In case of a match, that variable is taken as the endogenous variable and its name removed from the list. The next attempt is to repeat the above procedure but using the right-hand-side variable names which are on the endogenous variable list. In case of a match, that variable is taken as the endogenous variable, its name is removed from the list, and the equation is reflected across the “=” in the Modeleasy+ model. The user is informed of this by a message from the conversion utility.

If the above procedure fails to assign an endogenous variable to an equation, then groups of equations with some of the same variables on the left-hand-side are taken and permutations of the endogenous variable assignment are made to see if unique assignments can be done. In case there are unassigned equations, the first left-hand-side variable which is on the endogenous variable list is taken as the endogenous variable for that equation and a message issued to the user explaining the difficulty. In this case, the user should examine the equation in question to manually make an acceptable assignment.

## IF...THEN...ELSE Expressions

Complex, nested **IF . . . THEN . . . ELSE** expressions in the TROLL model are not always handled correctly by this version of the conversion utility. At present, Modeleasy+ does not support **IF . . . THEN . . . ELSE** constructs. Modeleasy+ only supports conditional IF statements for related equations. Consequently, there is no one-to-one mapping from TROLL to Modeleasy+ for these constructs.

The user has to reformulate such statements manually according to the rules of the Modeleasy+ **MDL**.