Script Tool User's Guide

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Foreword

This User's Guide describes how to access and use the TSIS Script Tool. ITT Industries, Inc., Systems Division developed and is maintaining the Script Tool under the direction of the Federal Highway Administration (FHWA) on Contract Number DTFH61-95-C-00125.

Please refer to the TSIS User's Guide for information on obtaining TSIS and the TSIS Script Tool.

Abstract

The TSIS Script Tool is distributed as part of, and is designed to operate efficiently in conjunction with, FHWA's **T**raffic **S**oftware **I**ntegrated **S**ystem (TSIS). The Script Tool is used to create, edit, and execute Visual Basic™ scripts that automate processing tasks involving TSIS tools.

This guide:

- Introduces users to the capabilities and features of the TSIS Script Tool.

- Explains in detail how to use the Script Tool.

- Describes the scripts that are provided in the TSIS package.

Contents

1 About Script Tool

1.1 Welcome to the Script Tool

This User's Guide supports traffic engineers using the Traffic Software Integrated System (TSIS) Script Tool. It describes the Script Tool features that enable you to create, edit, and execute Visual Basic scripts within the TSIS environment. The guide describes neither the technical aspects of CORSIM, nor the types of analyses that can be performed using traffic simulations.

1.2 Introduction

The TSIS Script Tool uses Microsoft's Visual Basic script engine (VBScript) and rich edit control to provide an application that enables you to generate and execute scripts within the TSIS environment. TSIS also provides access to several interfaces that allow the scripts to interact with the TSIS user interface, TShell, and other tools within the TSIS environment. This document describes the features and use of the Script Tool.

Scripting enables you to automate frequently performed tasks by writing standard Visual Basic scripts. Although scripting is a very powerful tool, it does require some computer programming experience and knowledge of the VBScript language. This document does not provide a description of the VBScript engine nor the VBScript language. However, a good reference on the syntax of Visual Basic script can be found at http://msdn.microsoft.com/scripting.

As part of the TSIS package, we have provided two scripts. One allows you to execute the CORSIM simulation multiple times on the same input file, automatically changing the random number seed for each execution. The second script allows you to execute CORSIM in a batch mode on multiple input files.

2 Using the Script Tool

2.1 General Features

The TSIS Script Tool is an ActiveX control that operates within the TSIS graphical user interface, known as TShell. As such, TShell supports the Script Tool by supplying menus, toolbars, and a status bar. In this document, we will describe only those elements of the TShell interface that have a unique operation with regard to the Script Tool. For example, the View, Options, Tools, Window, and Help menus operate is a common fashion as they do for all TShell components, and will not be described here. Please refer to the TShell User's Guide for information regarding the operation of these common elements.

2.1.1 Creating a New Script

To create a new file using the Script Tool, select the **File|New** menu and then select the ScriptTool File menu command that appears in the sub-menu. This menu is illustrated in the following figure.
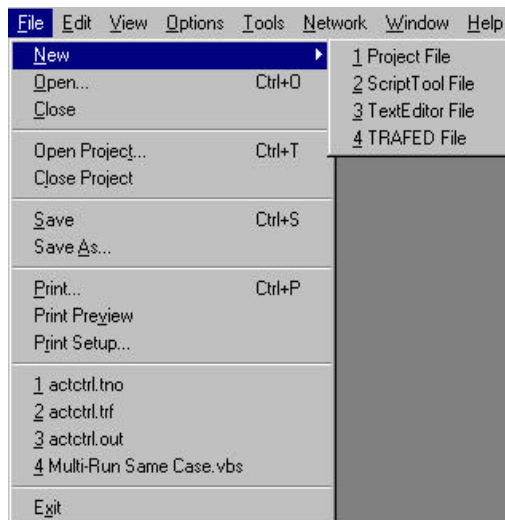
You can also press the New File button on TShell's Main toolbar and then select ScriptTool from the Choose Tool dialog. Either action will create a new Script Tool window in the TShell workspace. In the delivered TSIS configuration, the default file type for the Script Tool is VBS.

Alternatively, you can start by opening one of the scripts that are delivered with the TSIS package, modify it, and save it to a different file name.

2.1.2 Opening an Existing Script

You can open an existing file in the Script Tool by one of several methods. In general, you can open a file using a File Open dialog or open a file from the TShell Project View.

Selecting the **File|Open** menu item will display a standard Window's open dialog that allows you to choose a file to open. After choosing a file, TShell will display the Choose Tool dialog that allows you to select a tool to use. From this dialog, select the **ScriptTool** item.

To open an existing file from the TShell Project View, select (highlight) a file in the Project View. Then press the Open Selected File button on TShell's Main toolbar. This action will also display the Choose Tool dialog that allows you to select a tool to use. From this dialog, select the **ScriptTool** item.

Alternatively, after selecting a script file in the Project View, press the Script Tool button on TShell's Tools toolbar.

Clicking on a file in the Project View with the right mouse button displays a pop-up menu that allows you to open the file with the default tool or any tools associated with the file type. Choose the **Open With** item from the menu to display a sub-menu of tools and then choose the **ScriptTool** item from the sub-menu.

If the Script Tool has been set as the default tool for the file type you are trying to open, you can simply double-click the highlighted file to open it in the Script Tool. In the delivered configuration, the Script Tool is set as the default tool for VBS files.

Scripts that are provided in the TSIS installation are located in the Scripts folder under the directory to which TSIS was installed. You may save scripts you create to that folder as well. Scripts that are stored in that folder are accessible via the **Tools|Scripts** menu item.

Finally, if a VBS file has been open recently, you can double click the file in the recent file list that appears in the **File** menu.

2.1.3 Saving a Script

To save a script, select the **File|Save** menu command, **File|Save As…** menu command, or press Ctrl+S. If the file is new or if you choose the Save As command, you will need to supply a file name and folder location for the file in the Save As dialog that appears.

If you want your script file to appear in the **Tools|Scripts** sub-menu, save your script file to the Scripts folder under the directory to which TSIS was installed.

2.1.4 Editing Text

In the Script Tool, you can edit text using the mouse, keyboard, and the Edit menu and its associated accelerator keys. These text editing operations are the same as those that are available in the Microsoft Notepad application.

Undo / Redo Last Action

To undo the last action completed, select the **Edit|Undo** menu command or press Ctrl+Z. To redo the last action undone, select the **Edit|Redo** menu commands or press Ctrl+Y.

Selecting Text

There are several ways to select text .   You can select text by character, word, or the entire file with the following methods:

- Drag the mouse with its left button depressed over the desired text for selection.

- Press the Shift key and use the arrow keys to select characters.
- Press the Ctrl and Shift keys and use the arrow keys to select words.
- Select the Edit|Select All menu command or the Ctrl+A accelerator to select all of the text in the file.

You can cancel a selection by clicking anywhere in the document.

Cutting Text

Cutting text removes the selected text and places it into the Windows clipboard. To cut selected text, select the **Edit|Cut** command or press Ctrl+X. You can also press the Cut [✂] button on TShell's Main toolbar. Note, you can cut text only if text has been selected.

Copying Text

Copying text places selected text into the Windows clipboard. To copy selected text, select the **Edit|Copy** command or press Ctrl+C. You can also press the Copy [📋] button on TShell's Main toolbar. Note, you can copy text only if text has been selected.

Pasting Text

Pasting text retrieves text from the Windows clipboard and inserts the text at the location of the caret in the file. If text is already selected in the file, the pasting operation replaces the selected text with the contents of the Windows clipboard. To paste text, position the caret to the desired location (or select the text you want to replace), then select the **Edit|Paste** command or press Ctrl+V. You can also press the Paste [📋] button on TShell's Main toolbar.

Deleting Text

To delete text, first select the text you want to delete. Then select the **Edit|Delete** menu item or press the keyboard Delete key. If you do not select any text, this action will delete the first character after the caret.

Finding Text

To search for text in the file, select the **Edit|Find** menu command or press Ctrl+F. This will display the Find dialog, illustrated in the following figure.
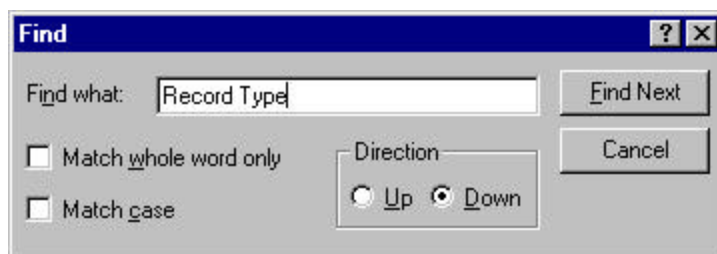
In the Find dialog, enter the text you want to search for, set the desired search preferences, and then click the Find Next button (or press the Enter key). To find additional instances of the same text, continue to click the Find Next button. Note, if you select the text you want to search for before you invoke the Find dialog, that selected text will appear in the "Find what" field when the dialog is opened.

2.1.5 Status Bar

The TShell status bar, illustrated in the following figure, forms the bottom edge of the main TShell window. The status bar consists of multiple display panes, each providing information about the active document.

The status bar displays a brief description of the command performed by a button or menu item when the mouse cursor is over the button or item. The description appears in the left-most part of the status bar. For the Script Tool, the next pane displays the line and column number for the current position of the caret in the script document.

The next three panes indicate the status of the Caps Lock, Num Lock, and Insert keys on the keyboard. If a pane is empty, it indicates the key is not active. Pressing a key toggles the state of its associated indicator in the status bar. The Insert key toggles the state of the overstrike mode in the Script Tool.

The last two panes of the status bar, if visible, indicate the current system date and time. The visibility of the date/time panes is a TShell preference.

2.2   Running Scripts

The following figure illustrates a example script as displayed in the Script Tool. The example script is provided to illustrate the interface and does not constitute a meaningful or useful application of the script tool.

When executed, the example script will display a message box with the text "Hello World". After dismissing the message box, the script will open the actctrl.bmp file in the Microsoft Paint application.

The window that contains the script also contains a toolbar with four buttons used to execute the script. The following text describes the function of each of the four buttons:

Start: This button executes the script.

Stop: This button stops a currently executing script.

Pause: This button pauses a currently executing script.

Resume: This button resumes execution of a currently paused script.

3 TSIS Script Interfaces

3.1   Script Interface Overview

TSIS provides three distinct interfaces that allow scripts to:

- access the TShell Output View,

- access other tools in the TSIS environment,

- access the TSIS services interface which provides several useful services.

These interfaces are described in the following sections.

3.2   TSIS Output View Control Interface

A script can access the TShell Output View via the **TSIS_OutputControl** object reference provided by TSIS. This reference is available to all scripts running within the TSIS environment. To use a function provided by this interface in your script, use the following format:

TSIS_OutputControl**.function**

where the available functions and function parameters are defined in the following table.

Method	Parameters	Defintion
Clear		Clears the output view tab associated with the Script Tool
DisplayText	theLine	Displays the text represented by theLine in the output view. Enclose explicit text strings in quotation marks.
DisplayColoredText	theLine, colorRef	Displays the text represented by theLine in the output view in the color represented by colorRef, a number in the range [0,5], where: 0 = Color represented by the "TSIS/DLL Interface Messages" setting 1 = Color represented by the "Main Library Messages" setting 2 = Color represented by the "CORSIM Run-Time Extension Messages" setting 3 = Color represented by the "TSIS Messages" setting 4 = Color represented by the "Error Messages" setting

Method	Parameters	Defintion
		5 = Color represented by the "Other Messages" setting
		Enclose explicit text strings in quotation marks.
SelectLineContainingText	theText	Highlights the line in the output view that contains the text represented by theText. Enclose explicit text strings in quotation marks.
StartLogging	theFileName, bAppendToFile	Starts output logging to the file specified by theFileName. The specified file will receive all text displayed in the output view. This function strips off the extension in the specified file name and replaces it with .log.
		The second argument, if TRUE, specifies that text will be appended to the end of the file if it already exists. If FALSE, a new file will be created.
StopLogging		Terminates logging to the current log file specified in the call to StartLogging.

3.3   TSIS Run Control Interface

A script can access and control other TSIS tools via the **TSIS_RunControl** object reference provided by TSIS. This reference is available to all scripts running within the TSIS environment. To use a function provided by this interface in your script, use the following format:

> TSIS_RunControl**.function**

where the available functions and function parameters are defined in the following table.

Method	Parameters	Defintion
CleanDirectory		Removes CORSIM run-time files (LU*.) from the directory that was set by a call to SetWorkingDirectory.
EnableTSDFileGeneration	bSetEnabled	Enables / disables the generation of the animation data files by the CORSIM tool. If bSetEnabled is TRUE the files will be generated.
SelectFile	bstrName	Displays a file selection dialog and returns the selected file in the bstrName argument. NOTE: the argument passed to this function must be a string.
SetToolName	bstrToolName	Sets the name of the tool to be used. The argument, bstrToolName, is the name of a tool that exists in the current TSIS tool configuration.
SetWorkingDirectory	bstrDirectory	Sets the working directory to the location given by bstrDirectory. This will be the working directory used by the tool.
RunTool	bstrFilePathAndFileName	Executes the tool, specified by the call to SetToolName, on the file specified by the bstrFilePathAndFileName argument.

3.4   TSIS Services Interface

A script can access special TSIS services via the **TSIS_Services** object reference provided by TSIS. This reference is available to all scripts running within the TSIS environment. To use a function provided by this interface in your script, use the following format:

TSIS_RunControl**.function**

where the available functions and function parameters are defined in the following table. There is currently only one service function available.

Method	Parameters	Defintion
SetRandomNumberSeeds	inputFileName, seed1, seed2, seed3	Sets the random number seeds in the CORSIM input file specified by inputFileName. seed1, seed2, seed3 are the values for the random number seeds. Refer to the CORSIM Reference Manual for details regarding the random number seeds.

3.5   Global Variables

TSIS provides (defines) the following global variable for use within a script:

| Variable	Defintion
executionHome	This string specifies the TSIS installation directory. That directory holds the TSIS executable files.

# 4 Pre-defined Scripts

4.1 Overview

Included with the TSIS installation are two pre-defined scripts that simplify repetitive execution of the CORSIM simulation. These sample scripts also serve as examples for writing scripts in the TSIS environment. You can use these scripts as is or tailor them to meet your needs. Both script files reside in the Scripts folder under the directory to which TSIS was installed. Also, you can open the example scripts from the sub-menu that appears when you select the **Tools|Scripts** menu item.

4.2 Multi-Run Same Case Script

This example script is used to simulate the same case using the CORSIM simulation multiple times, applying different random number seeds in each run of the simulation. Because CORSIM is a Monte Carlo type simulation, multiple runs with different random number seeds is required to achieve valid average values for the measures of effectiveness produced by the simulation model. When you execute this script, a dialog is displayed that allows you to select the case that you want to run. That dialog is illustrated in the following figure.
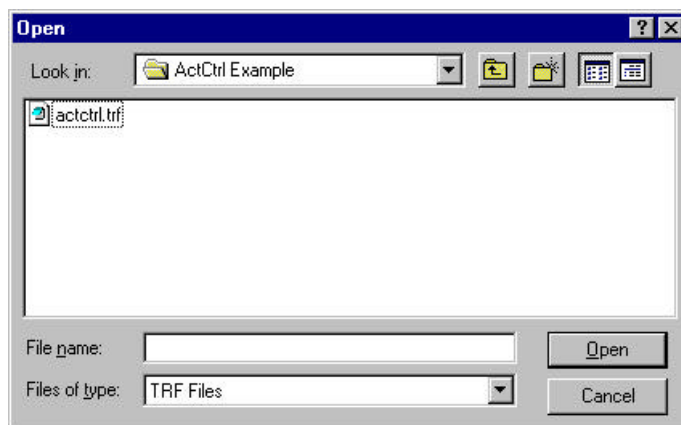
From this dialog, select the CORSIM input (TRF) file that you want to run and press the **Open** button. The script will then display a dialog, illustrated below, that requests the number of times you want to run the simulation.
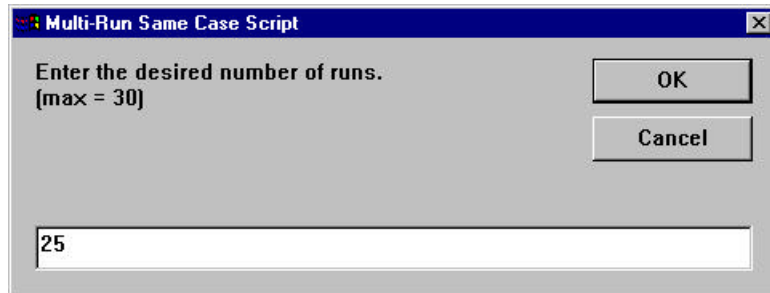
From this dialog, enter the number of runs that you want to execute. When you press the OK button, the script will begin executing CORSIM on the specified case, changing the random number seeds between each run. The TSIS setup program installs a file, random.rns, to the TSIS installation directory. That file contains 30 sets of random number seeds used by this script. If you need more than 30 runs, you can add seed sets to the random.rns file. Please refer to the CORSIM Reference manual for information regarding values for random number seeds.

During the script execution, simulation output messages will appear in the TShell Output View. For each run of the simulation, the script will create a new CORSIM input (TRF) file with the new random number seeds for that run. The name of the file will be the root name of the file you selected to run with the run number appended. For example, if the base case name was actctrl.trf, the new input files will be named actctrl#.trf where # indicates the number of the run. Even though considered one case, each run of the simulation will appear as a new case in the TShell Project View.

4.3   Multi-Run Many Cases Script

This example script is used to simulate multiple cases using the CORSIM simulation, providing a batch mode capability. To specify the case files to execute, use any text editor to create a file that contains the full path specifications and names for the CORSIM input (TRF) files you want to execute, one file specification per line. Then, save the file. Although you can name this file anything you want, the script defaults to looking for files with an INP extension.

When you execute this script, a dialog is displayed that allows you to select the file containing the list of cases to execute. That dialog is illustrated in the following figure.
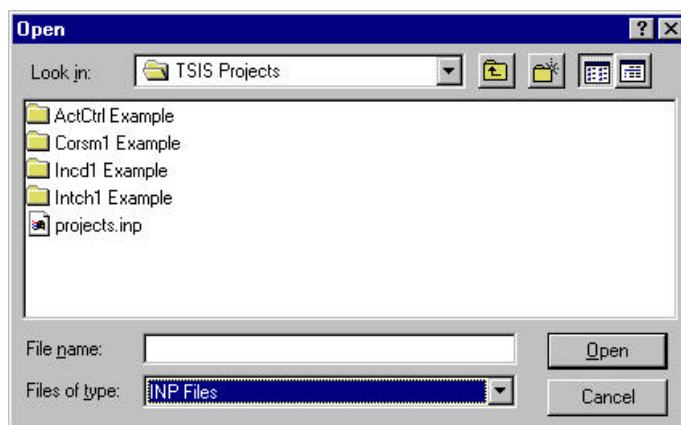
From this dialog, select the file that contains the list of cases that you want to execute and press the **Open** button. The script will then display a dialog, illustrated below, that asks if you want CORSIM to generate animation data files for the cases.

Multi-Run Many Cases Script

Do you want to generate animation data files?

[Yes] [No]
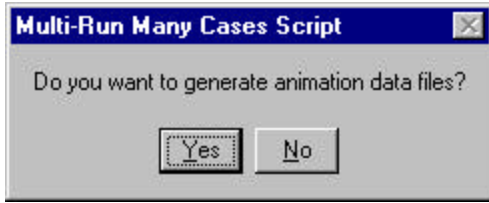
Press **Yes** if you want to generate animation data. After making your selection, the script will begin executing CORSIM on each case that is specified in the selected list file. Simulation output messages will appear in the TShell Output View.

5 Glossary of Terms

accelerator key

Accelerator keys (also known as shortcut keys) are used as keyboard shortcuts for program commands that are also available on a menu or toolbar.

ATMS

Advanced Traffic Management Systems

case

A single simulation for a specified traffic network as defined by its simulation input file. A case includes the simulation input file and all data files generated by the simulation during a run. Note, multiple runs of the simulation for gathering statistics is still considered part of a single case if the input has not changed.

copy

This operation copies the selected text or object from the active document and places the copied selection into the Windows clipboard. The Ctrl+X key is an accelerator key for this command.

CORSIM

CORridor SIMulation. This is a microscopic traffic simulation used to generate the vehicle information used by TRAFVU.

cut

This operation removes the selected text or object from the active document and places the selection into the Windows clipboard. The Ctrl+X key is an accelerator key for this command.

DOT

Department of Transportation

FHWA

Federal Highway Administration. Sponsor for the development of the TSIS suite of traffic analysis tools .

global variable

A variable, provided by TSIS, containing information about TSIS that is available for use in scripts designed to be executed by the TSIS Script Tool.

graphical user interface

A interface between a user and a software tool, consisting of graphical elements and controls, e.g., windows, dialogs, buttons.

GUI

Graphical User Interface

HTML

Hypertext Markup Language is a system of marking up or tagging a document so that it can be published on the World Wide Web. It is used to display Script Tool on-line help.

INP

A file that contains a list of cases to be executed in the TSIS-provided Multi-Run Many Cases script.

Output View

The Output View is a dockable control window in the TShell interface that displays the output generated by the traffic tools as they operate on files.

Output View Control Interface

A TSIS-provided interface that provides a script access to functions that control the TShell Output View.

overstrike mode

When this mode is active, text is replaced as you type in the text document. When inactive, the text you type is inserted at the location of the caret.

paste

This operation inserts the contents from the Windows clipboard into the active document at the location of the caret. If there is a current selection in the document, this command replaces the selection with the contents of clipboard. The Ctrl+V key is an accelerator key for this command.

Project View

The Project View is a dockable control window in the TShell interface that displays a hierarchical tree structure of projects, cases, and case files. Using this tree structure, you can efficiently manage your traffic analysis projects and execute tools on project files.

Run Control Interface

A TSIS-provided interface that provides a script access to other tools in the TSIS configuration.

tool

A program or component that is installed into the TSIS environment for use in conducting traffic operations analysis. A tool can be an application (EXE), Dynamic Link Library (DLL), COM object or ActiveX Control (OCX), or a batch program (BAT).

tool tip

A small rectangular pop-up window that displays a brief description of a command bar (toolbar) button's purpose.

TRF

A file that contains the input data, in record format, used to define a CORSIM network and to drive the CORSIM simulation for a single simulation case.

TShell

The graphical user interface for the TSIS integrated development environment. It provides a Project View that enables you to manage your TSIS projects. It is also the container for the pre-configured tools and any tools that you add to the suite.

TSIS

Traffic Software Integrated System. TSIS is the integrated development environment that hosts the CORSIM simulation and its support tools .

TSIS_OutputControl

A reference to the Output View Control Interface that provides access to the interface functions.

TSIS_RunControl

A reference to the Run Control Interface that provides access to the interface functions.

TSIS_Services

A reference to the TSIS Services Interface that provides access to the interface functions.

TSIS Services Interface

A TSIS-provided interface that provides a script access to service functions available in the TSIS environment.

TSIS Web Site

This web site, http://www.fhwa-tsis.com, contains the latest information about new tools , product updates, known problems, example projects, and usage tips.

VBS

A file that contains a Visual Basic script. The extension of script files is VBS.

VBScript

The Microsoft Visual Basic script engine used to execute Visual Basic scripts. VBScript is a lightweight and extremely fast language engine designed specifically for environments like the Internet, intranets, or the World Wide Web.

Visual Basic script

A file that contains Visual Basic scripting language to be executed using the VBScript engine.

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