

Natural Engineer

Version 4.4.2

Utilities

for Windows

Manual Order Number: NEE442-080WIN

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Specifications contained herein are subject to change, and these changes will be reported in subsequent revisions or editions.

Readers' comments are welcomed. Comments may be addressed to the Documentation Department at the address on the back cover. Internet users may send comments to the following e-mail address:

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ABOUT THIS MANUAL

Purpose of this manual

This manual contains the Utilities for Natural Engineer.

It describes the various utility options available within Natural Engineer, which include:

- Automating the execution of Natural Engineer processes using the Task Scheduler option.
- Examine differences between Natural objects across either two or three Natural libraries using the Compare option.
- Apply code presentation enhancements to improve the readability of objects using the Beautification option.
- Convert Natural Reporting mode objects into Natural Structured mode objects using the Mode Conversion option.
- Review maintenance changes within objects using the Change Management Tracking option.

Target Audience

The target audience for this manual is intended to be any User of Natural Engineer at any level of experience.

Typographical Conventions used in this manual

The following conventions are used throughout this manual:

UPPERCASE TIMES	Commands, statements, names of programs and utilities referred to in text paragraphs appear in normal (Times) uppercase.
UPPERCASE BOLD COURIER	In illustrations or examples of commands, items in uppercase bold courier must be typed in as they appear.
< >	Items in angled brackets are placeholders for user-supplied information. For example, if asked to enter <file number>, you must type the number of the required file.
<u>Underlined</u>	Underlined parts of text are hyperlinks to other parts within the online source manual. This manual was written in MS-Word 97 using the "hyperlink" feature.

The following symbols are used for instructions:

⇒	Marks the beginning of an instruction set.
□	Indicates that the instruction set consists of a single step.
1.	Indicates the first of a number of steps.

How this manual is organized

This manual is organized to reflect all the Utilities options of Natural Engineer in the following chapters:

Chapter	Contents
1	Describes the Task Scheduler option, which provides the facility to automate the execution of the various Environment, Analysis and Modification options. This provides the facility to execute long-running batch tasks in an unattended mode to minimize the impact on machine and human resources.
2	Describes the Compare option, which provides the facility to review differences between objects across two or three Natural libraries. The results are presented on a single screen utilizing customizable color code markings to distinguish between the differences. Changes can be applied to the Base object from Compare 1 and/or Compare 2 libraries and then saved to create a new Base version.
3	Describes the Beautification option, which provides the facility to enhance the presentation of object source code to aid the readability and maintainability of objects within an application. Some examples of the various Beautification options are: the alignment of end of statement line comments, structuring define data blocks and inserting comment separator lines within the procedural code.
4	Describes the Mode Conversion option, which provides the facility to convert Natural Reporting mode objects into Natural Structured mode objects.
5	Describes the Change Management Tracking (CMT) option, which provides the facility to review audit trail records of changes applied to individual objects within Natural Engineer.

Natural Engineer Utilities

Terminology

It is assumed that you are familiar with general Natural and mainframe terminology, as well as the terms and concepts relating to Microsoft Windows operating systems. This section explains some terms that are specific to the Natural Engineer product.

Analysis

The Analysis process of Natural Engineer searches application data within the Natural Engineer Repository, according to specified Search Criteria and generates reports on the search results.

Application

An Application is a library or group of related libraries, which define a complete Application. In Natural Engineer, the Application can have a one-to-one relationship with a single library of the same name, or a library of a different name, as well as related steplibs. The Application refers to all the source code from these libraries, which Natural Engineer loads into the Repository.

Browser

An Internet Browser such as Microsoft Internet Explorer or Netscape.

Category

Categories in Natural Engineer specify whether and how a Modification is applied to the Natural code. Valid categories are: Automatic change, Manual change, Reject the default Modification, No change to the data item, and the data item is in Generated Code.

A category is further broken down according to type of change (for example: Keyword, Literal, Data Item, Database Access, Definition).

Consistency

An option in the Analysis process that causes Natural Engineer to trace an Impact through the code, using left and right argument resolution to identify further code impacted by the code found.

Environment

The Environment process is the means by which Natural Engineer generates a structured view of the application code in the Natural Engineer Repository. This provides application analysis reports and inventory information on the application and is used as the basis for Impact Analysis.

Exception

An Exception is an Item identified as impacted that does not require a Modification. Where there are a few similar Exception Items, they can be treated as Exceptions, and rejected in the Modification review process. Where there are many similar (therefore not Exceptions), consideration should be given to changing the Search Criteria so they are not identified as impacted in the first place.

Generated Code

This is code which has been generated by a Natural code generator, such as Construct, and which is not normally modified directly in the Natural editor.

Impact

An Impact is an instance of a Natural code Item; e.g., data item or statement (a “hit” scored by the Analysis process) that matches the defined Search Criteria used in the Analysis process.

Iteration

An Iteration is one examination cycle of a field identified according to the specified Search Criteria. For example, one Iteration is reading the field right to left. Multiple Iterations are performed when the option of ‘Consistency’ or Multi Search is requested for Analysis, and Natural Engineer performs as many Iterations as necessary to exhaust all possibilities of expressing and tracing the field, and can be limited by a setting in the NATENG.INI file.

Library

A single library of source code, which exists in the Natural system file.

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Modification

A Modification is a change suggested or made to an object or data item resulting in the required compliance of that object or data item. Modifications in Natural Engineer are classified according to Category and Type.

Presentation Split Process

The Presentation Split Process is a sub-function of the Object Builder function that removes screen I/O statements from current application objects and places them in generated subprograms.

Soft Link

A Soft Link is where a link between two objects has been defined using an alphanumeric variable rather than a literal constant.

Technical Split Process

The Technical Split Process is a sub-function of the Object Builder function that results in the encapsulation of each database access within the application, into a sub-program so that the application is separated into 'presentation and logic' and 'database access'.

Type

The Type of Modification available, for example: Data Item, Keyword and Literal.

TLM

Text Logic Members are used to contain the code required to support inclusion of common code into the application. An example of this is the code to include into an application before updating a database.

Related Literature

The complete set of Natural Engineer manuals consists of:

1 Natural Engineer Concepts and Facilities (NEE442-006ALL)

The Concepts and Facilities manual describes the many application systems problems and solutions offered by Natural Engineer, providing some guidelines and usage that can be applied to Natural applications.

2 Natural Engineer Release Notes (NEE442-008ALL)

The Release Notes describe all the information relating to the new features, upgrades to existing functions and documentation updates that have been applied to Natural Engineer.

3 Natural Engineer Installation Guide (NEE442-010ALL)

The Installation Guide provides information on how to install Natural Engineer on both PC and mainframe platforms.

**4 Natural Engineer Administration Guide (NEE442-040WIN)
Natural Engineer Administration Guide (NEE442-040MFR)**

The Administration Guide provides information on all the various control settings available to control the usage of the different functions within Natural Engineer.

**5 Natural Engineer Application Management (NEE442-020WIN)
Natural Engineer Application Management (NEE442-020MFR)**

The Application Management manual describes all the functions required to add Natural applications into the Repository.

**6 Natural Engineer Application Documentation (NEE442-022WIN)
Natural Engineer Application Documentation (NEE442-022MFR)**

The Application Documentation manual describes all the available functions to document a Natural application within the Repository. These functions will help enhance / supplement any existing systems documentation such as BSD / CSD / Specifications etc.

**7 Natural Engineer Application Analysis and Modification (NEE442-023WIN)
Natural Engineer Application Analysis and Modification (NEE442-023MFR)**

The Application Analysis and Modification manual describes all the available functions to carry out analysis of Natural applications; including basic keyword searches. The modification process is described and detailed to show how it can be applied to modify single selected objects within a Natural application, or the entire Natural application in one single execution.

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**8 Natural Engineer Application Restructuring (NEE442-024WIN)
Natural Engineer Application Restructuring (NEE442-024MFR)**

The Application Restructuring manual describes the analysis and modification functionality required to carryout some of the more sophisticated functions such as Object Builder.

**9 Natural Engineer Utilities (NEE442-080WIN)
Natural Engineer Utilities (NEE442-080MFR)**

The Utilities manual describes all the available utilities found within Natural Engineer and, when and how they should be used.

10 Natural Engineer Reporting (NEE442-025ALL)

The Reporting manual describes each of the reports available in detail, providing report layouts, how to trigger the report and when the report data becomes available. The various report-producing mediums within Natural Engineer are also described.

11 Natural Engineer Batch Processing [Mainframes] (NEE442-026MFR)

The Batch Processing manual describes the various batch jobs (JCL) and their functionality.

12 Natural Engineer WebStar (NWS442-020ALL)

The WebStar manual describes the concepts and facilities, installation and configuration options, how to web enable a Natural application and how to create and execute Natural Short Transactions using the Natural Engineer add-on component WebStar.

13 Natural Engineer WebStar Release Notes (NWS442-008ALL)

The Release Notes describe all the information relating to the new features, upgrades to existing functions and documentation updates that have been applied to the Natural Engineer add-on component WebStar.

14 Natural Engineer Messages and Codes (NEE442-060ALL)

The Messages and Codes manual describes the various messages and codes produced by Natural Engineer.

TASK SCHEDULER

Chapter Overview

This chapter describes the Task Scheduler option available from the Utilities menu. The Task Scheduler option is used to manage and execute automatically Natural Engineer Environment, Impact and Modification tasks. These tasks will execute in unattended batch mode.

The topics covered in this chapter are:

1. [Task Scheduler overview](#)
2. [Task Scheduler Summary window](#)
3. [Task Details window](#)
4. [Task Scheduler Initiator window](#)

Task Scheduler Overview

The Task Scheduler option allows you to specify tasks to be executed at a specified date and time. These tasks may be scheduled to run with a frequency of once, daily, weekly or monthly and may also have dependencies on other defined tasks to allow a series of tasks to run in a controlled sequence.

Once the task or tasks have been specified, they are ready for execution and will be triggered by the Task Scheduler Initiator. This must be invoked in order for the tasks to be released for execution (if their individual specifications have been attained).

Each task execution will have a history log entry available showing the execution events for that task. Any tasks that have experienced problems during execution will be highlighted with a status of 'Error' in the Task Scheduler Summary screen.

Using the Task Scheduler

The Task Scheduler allows long executing tasks for individual applications to be scheduled to run overnight or at weekends, in order that the normal working day is less disrupted waiting on these tasks to complete.

For example: If an extract and load of a very large application is required, where the extract and load processes are likely to take several hours each to complete, then a task can be scheduled to start executing at the end of the normal working day (i.e., overnight). The task can then be reviewed the next working day.

Using the Frequency Task option

A frequency can be set for any tasks that are to be repeated many times. This means a task need only be specified the once, but with the appropriate frequency set, it will execute each time it is initiated via the Task Scheduler.

For example: Natural Engineer is being used to maintain an application where various modifications are being applied using the modification options of Natural Engineer. The application has been specified within Natural Engineer to apply all the modifications to the base application library. To maintain integrity of the modified application on the Repository, the Extract Source Code function with Synchronize Source Code option activated requires running once a week. A task would be set up with the correct details specified to run Extract Source Code with a frequency of 'Weekly' set.

Using the Dependency Task option

Task dependencies can be specified, so that tasks are only initiated provided the previous task has completed.

For example: Task 0001 is specified to run an Extract Source Code function for an application. A second task, 0002, is specified to run the Load Repository function for the same application with a dependency of task 0001 set. When the initiator is run, task 0002 will not execute until task 0001 has completed.

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Task Scheduler Summary Window

The Task Scheduler option is accessed using the following menu navigation: Options → Task Scheduler. When this option is selected, the Task Scheduler Summary screen is displayed.

The following Figure 1-1 illustrates the Task Scheduler Summary screen.

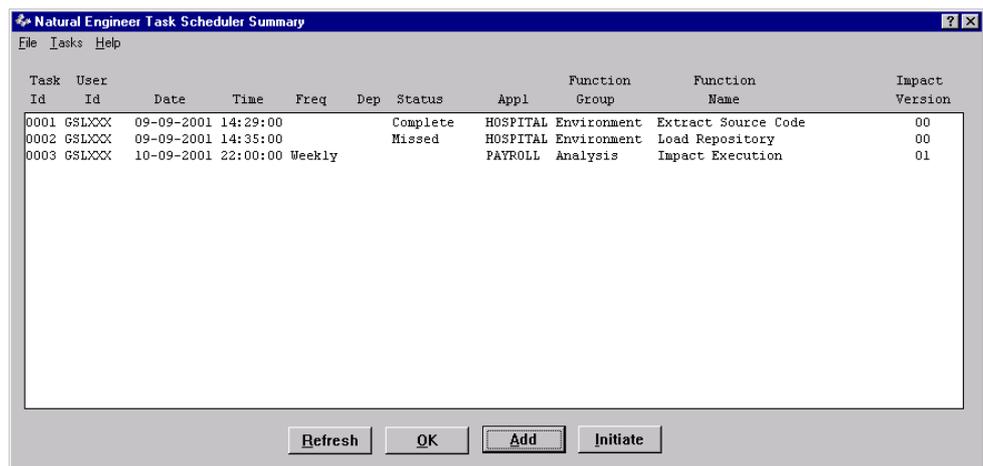


Figure 1-1 Task Scheduler Summary screen

MENU ITEMS	OPTIONS	DESCRIPTION
File	View Log	This option will invoke the Task Scheduler Task Log window, which details a history of activity for the selected task. <i>Note: For more information on this option refer to the section Task Scheduler Task Log window.</i>
	Exit	Exits the Task Scheduler Summary screen and returns back to the main Natural Engineer screen.
Tasks	Delete	Deletes the selected task.
	Update	Invokes the Task Detail screen where the details can be modified as required for the selected task.
	Reset	Resets the task status for the selected task, back ready for re-execution. <i>Note: The Refresh button needs to be used to see the result of this action.</i>
Help		Invokes the Task Scheduler help.

SCREEN ITEMS	DESCRIPTION
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Each task is displayed in a single row on the Task Scheduler Summary screen. A task can be selected for update by using the left hand mouse button with a double click. Each task line consists of the following columns:

Task Id	The task id that has been assigned for the task. This is an internally generated sequential number starting from 0001. Deleted task numbers are reused.
User Id	The user id of the person that added the task.
Date	The task execution start date specified in the Task Details screen.
Time	The task execution start time specified in the Task Details screen.
Freq	The task frequency. This controls the amount of executions for the task. The following frequencies are available:
Once	Task will execute once only.
Daily	Task will execute daily at the same time based on the original date and time specified.

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SCREEN ITEMS	DESCRIPTION
	<p>Weekly Task will execute weekly at the same time based on the original date and time specified.</p> <p>Monthly Task will execute monthly at the same time based on the original date and time specified.</p>
Dep	The task's dependency on other scheduled tasks. This will contain the task id of the task that needs to complete before this task will execute.
Status	<p>The task status. The following are available:</p> <p>“ “ Task is waiting for the specified start date and time, i.e., a date and time have been set in the future.</p> <p>Missed Task has missed the specified date and time and is ready for execution the next time the Initiator is invoked.</p> <p>Error Task has experienced an error during execution.</p> <p>Complete Task has completed successfully.</p> <p>In Progress Task is currently executing.</p> <p>Suspended Task has been suspended and will not be released for execution until the Release option is used from the context menu.</p>
Appl	The name of the application being used by the task.
Function Group	<p>The main function area being used by the task. The function groups available are:</p> <ul style="list-style-type: none"> ▪ Environment ▪ Analysis ▪ Modification

SCREEN ITEMS	DESCRIPTION
Function Name	<p>The name of the sub-function within the main function. The sub-functions available are:</p> <p>For the function group Environment:</p> <ul style="list-style-type: none"> ▪ Extract Source Code ▪ Load Repository ▪ Extract & Load ▪ Extract, Load & Impact ▪ Environment Bulk Reports <p>For the function group Analysis:</p> <ul style="list-style-type: none"> ▪ Impact Execution ▪ Impact Bulk Reports <p>For the function group Modification:</p> <ul style="list-style-type: none"> ▪ Modify All ▪ Modification Bulk Reports
Impact Version	<p>The impact version number being used by the task. This is only applicable to function names: Impact Execution and Modify All. All other tasks will show '00'.</p>

BUTTON NAME	DESCRIPTION
Refresh	Refreshes the Task Scheduler Summary screen updating the task status values.
OK	Will close the Task Scheduler Summary screen and returns back to the main Natural Engineer screen.
Add	Invokes the Task Details screen.
Initiate	Invokes the Task Scheduler Initiator screen.

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Task Scheduler Summary Context Menu

Each task line on the Task Scheduler Summary screen can be selected and a context menu of options is available by using the right hand mouse button with a single click.

The following Figure 1-2 illustrates the Task Scheduler Summary screen context menu.

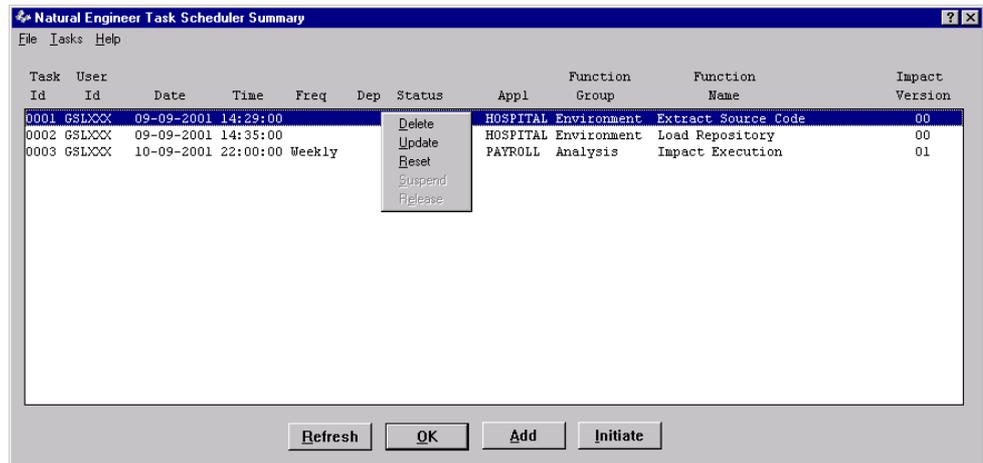


Figure 1-2 Task Scheduler Summary screen context menu

CONTEXT MENU ITEM	DESCRIPTION
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Delete	Delete the selected task.
Update	Invoke the Task Details screen to update the selected task details.
Reset	Reset the status of the selected task ready for re-execution.
Suspend	Suspend the selected task from any execution.
Release	Release the suspended task.

Task Scheduler Task Log Window

The Task Log window is displayed when the menu option File→View Log is selected from the Task Scheduler Summary screen.

The Task Log screen will show history details of activity for the selected task.

If a task is shown as failed then it is possible to view error logs which can be chosen from a context menu by using the right hand mouse button with a single click on any of the entries within the Task Log screen.

The following Figure 1-3 illustrates the Task Scheduler Task Log screen.

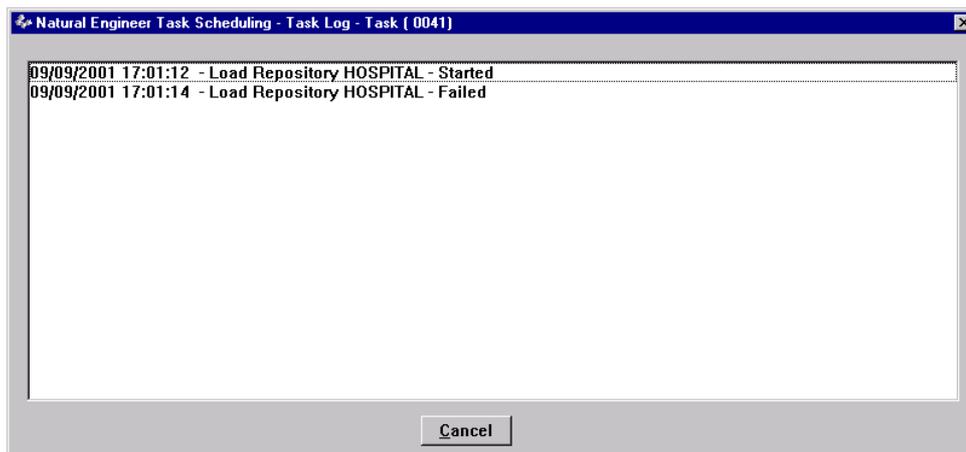


Figure 1-3 Task Scheduler Task log screen

SCREEN ITEMS	DESCRIPTION
Task Log Entries	Each line details a task event. A Task Log context menu is available by using the right hand mouse button with a single click on any entry.
BUTTON NAME	DESCRIPTION
Cancel	Exits the Task Log screen and returns back to the Task Scheduler Summary screen.

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Task Log Context Menu

Each line on the Task Log screen can be selected and a context menu of options to view error log details is available by using the right hand mouse button with a single click.

The following Figure 1-4 illustrates the Task Log screen context menu.

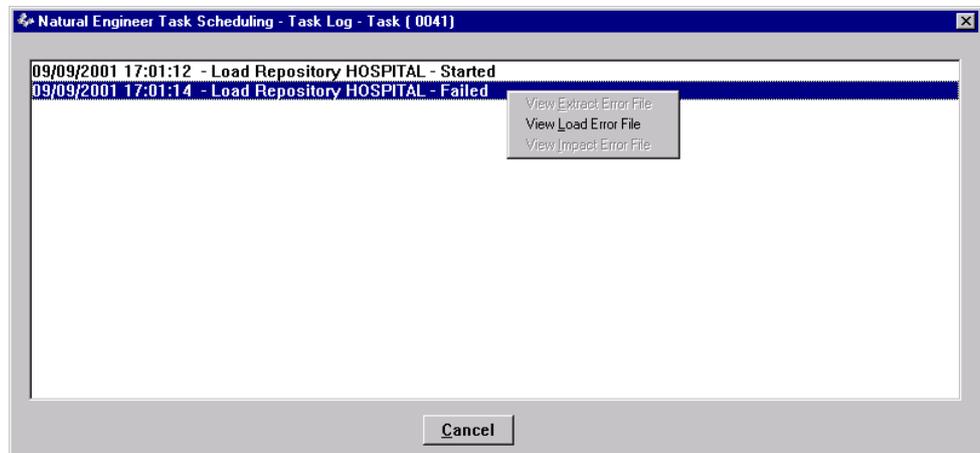


Figure 1-4 Task Log screen context menu

CONTEXT MENU ITEM	DESCRIPTION
View Extract Error File	Will display the Extract error log details. These details are from the work file 'application-name'.EEX file. <i>Note: This option is only available in the context menu if any Extract errors have occurred.</i>
View Load Error File	Will display the Load error log details. These details are from the work file 'application-name'.ELD file. <i>Note: This option is only available in the context menu if any Load errors have occurred.</i>
View Impact Error File	Will display the Impact error log details. These details are from the work file 'application-name'.EIM file. <i>Note: This option is only available in the context menu if any Impact errors have occurred.</i>

Selecting any of these options (when they are available) will result in an error log window being opened with the error details displayed.

The following Figure 1-5 illustrates the Load error log details being displayed.

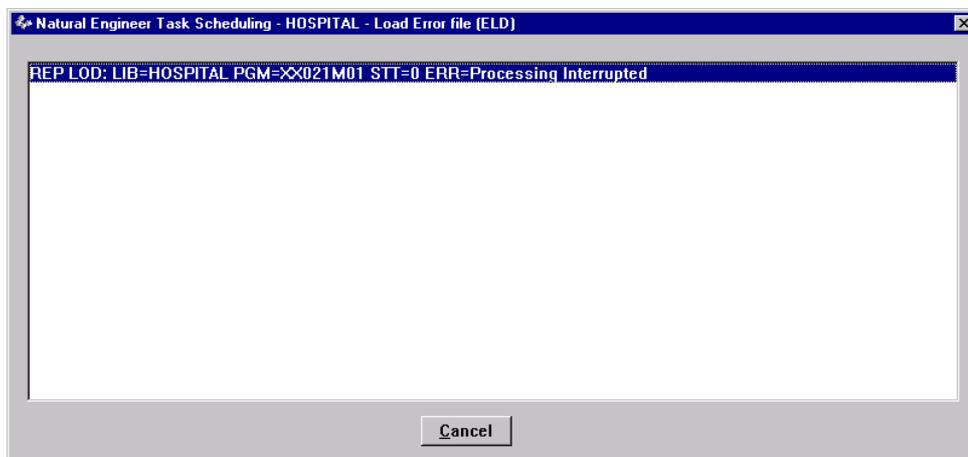


Figure 1-5 Load error log details

Each record found in the 'application-name'.ELD file is displayed on this screen. The 'Cancel' button will return you to the Task Log screen.

Note: The same log screen is used for the Extract and Impact error log details.

Task Details Window

The Task Details window is where each task can be specified and added to the Task Scheduler. This screen is also used to update the details for a task.

The Task Details screen can be invoked by using the 'Add' button on the Task Scheduler Summary screen, by selecting a task and then using the Task Scheduler Summary context menu update option or by selecting a task and using the left hand mouse button with a double click.

The following Figure 1-6 illustrates the Task Scheduler Task Details screen.

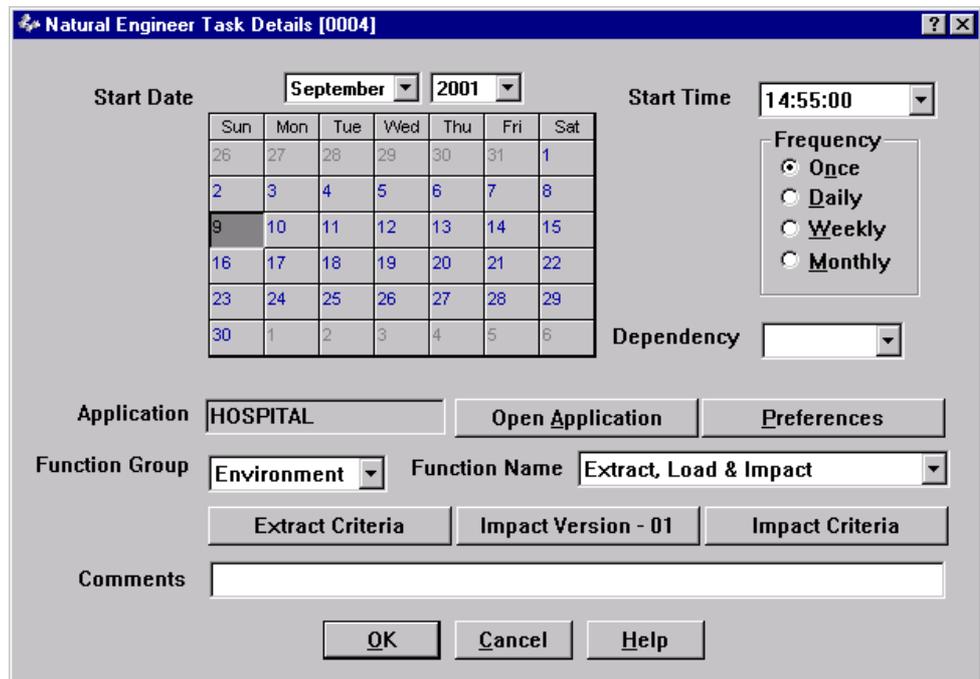


Figure 1-6 Task Scheduler Task Details screen

SCREEN ITEMS	DESCRIPTION
Start Date	The date the task is to execute. Use the selection boxes to select a month and year. The days are selected from the calendar. Changing the month and/or year will result in the calendar changing to the new settings. The default date will be the current date when the Task Details screen was invoked.
Start Time	The time the task is to execute. Use the selection box to select the time required. The default time will be the current time when the Task Details screen was invoked.
Dependency	Select a task id on which this task is to be dependent. Task ids available will be the current tasks available in the Task Scheduler Summary screen.
Application	The name of the application that this task is to reference.
Function Group	The main function area being used by the task. The function groups available are: <ul style="list-style-type: none"> ▪ Environment ▪ Analysis ▪ Modification
Function Name	The name of the sub-function within the main function. The sub-functions available are: <p>For the function group Environment:</p> <ul style="list-style-type: none"> ▪ Extract Source Code ▪ Load Repository ▪ Extract & Load ▪ Extract, Load & Impact ▪ Environment Bulk Reports <p>For the function group Analysis:</p> <ul style="list-style-type: none"> ▪ Impact Execution ▪ Impact Bulk Reports <p>For the function group Modification:</p> <ul style="list-style-type: none"> ▪ Modify All ▪ Modification Bulk Reports
Comments	Up to 80 characters of text can be entered to serve as a comment for the task. These are treated as information only.

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BUTTON NAME	DESCRIPTION
Frequency	<p>The frequency that is to be applied to the task. This controls the amount of executions for the task. The following frequencies are available:</p> <p>Once Task will execute once only.</p> <p>Daily Task will execute daily at the same time based on the original date and time specified.</p> <p>Weekly Task will execute weekly at the same time based on the original date and time specified.</p> <p>Monthly Task will execute monthly at the same time based on the original date and time specified.</p>
Open Application	<p>Invokes the Open Application window. An existing application can be selected or a new application name input. Upon returning to the Task Details screen, the selected application will appear in the application output box (left of this button).</p>
Preferences	<p>Invokes the Application Preferences window. Application Preferences can be specified and saved for the selected application.</p>
Extract Criteria	<p>Invokes the Extract Selection Criteria window. Extract selection criteria can be specified and saved.</p> <p><i>Note: The criteria specified here are only relevant to the task for which they have been defined. The task criteria are independent of the main application extract selection criteria defined using the Environment → Extract Selection Criteria option.</i></p>
Impact Version - nn	<p>Invokes the Impact Version window. A new version can be created or an existing version selected. After selection, the button text will be updated to show the version selected. This button is only available for the following function names:</p> <ul style="list-style-type: none"> ▪ Extract, Load & Impact ▪ Impact Execution ▪ Impact Bulk Reports ▪ Modify All ▪ Modification Bulk Reports <p><i>Note: The impact versions available are the same as for the application when using the Analysis → Impact Version option.</i></p>

BUTTON NAME	DESCRIPTION
Impact Criteria	Invokes the Impact Search Criteria Summary window. Search criteria can be specified here and saved for the current version. <i>Note: The impact search criteria available are the same as for the application when using the Analysis → Impact Search Criteria option.</i>
OK	Saves the Task details specified and return back to the Task Scheduler Summary screen.
Cancel	Cancels any task details input and return back to the Task Scheduler screen.
Help	Invokes the Task Scheduler help.

Task Scheduler Initiator Window

The Task Scheduler tasks are initiated using the Task Scheduler Initiator window. This needs to be invoked before any scheduled tasks will be executed.

The Task Scheduler Initiator makes use of the executable: GenSched. Once invoked, GenSched will interrogate the Repository looking for any tasks that are ready for execution, i.e., any tasks that have a date and time stamp which is less than or equal to the date and time when GenSched is executing.

GenSched is controlled by two settings:

1. **Refresh rate**

GenSched will interrogate the Repository every 30 seconds (default) looking for executable tasks. The refresh rate can be customized to operate in the range 2 – 3600 seconds (2 seconds to 1 hour).

2. **Number of Natural sessions permitted**

Once a task becomes executable, GenSched checks that the number of allowed Natural sessions is not already in use, if all the natural sessions are in use then the task will not be executed until a session becomes available. The default setting is 2 Natural sessions. The number of Natural sessions can be customized to operate in the range 1-4.

Note: These two settings can be customized when the menu option File → Initiate Refresh Rate is selected from the Task Scheduler Initiator screen. For more information refer to the section [Task Scheduler Initiate Refresh Rate window](#).

The Task Scheduler Initiator screen is invoked by using the ‘Initiate’ button on the Task Scheduler Summary screen.

The following Figure 1-7 illustrates the Task Scheduler Initiator screen.

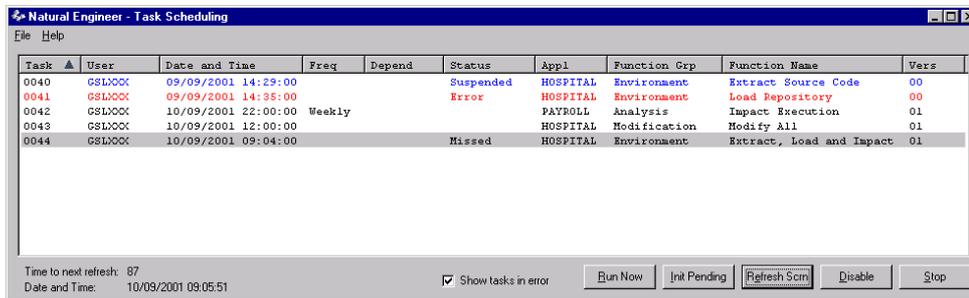


Figure 1-7 Task Scheduler Initiator screen

MENU ITEMS	OPTIONS	DESCRIPTION
File	Initiate Refresh Rate	This option will invoke the Task Scheduler Initiate Refresh Rate window. This window allows the customization of the control settings for GenSched to use. <i>Note: For more information on this option refer to the section Task Scheduler Initiate Refresh Rate window.</i>
	Exit	Exits the Task Scheduling screen and returns back to the Task Scheduler Summary screen.
Help	Help	Invokes the Task Scheduler help.
	About	Displays the GenSched version information.

SCREEN ITEMS	DESCRIPTION
Task	Each task is displayed in a single row on the Task Scheduler Initiator screen. Each task line consists of the following columns: The task id that has been assigned for the task. This is an internally generated sequential number starting from 0001. Deleted task numbers are reused.

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SCREEN ITEMS	DESCRIPTION
User	The user id of the person that added the task.
Date and Time	The task execution start date and time specified in the Task Details screen.
Freq	The task frequency. This controls the amount of executions for the task. The following frequencies are available: <ul style="list-style-type: none"> Once Task will execute once only. Daily Task will execute daily at the same time based on the original date and time specified. Weekly Task will execute weekly at the same time based on the original date and time specified. Monthly Task will execute monthly at the same time based on the original date and time specified.
Depend	The tasks' dependency on other scheduled tasks. This will contain the task id of the task that needs to complete before this task will execute.
Status	The task status. The following statuses are available: <ul style="list-style-type: none"> ‘ ‘ Task is waiting for the specified start date and time, i.e., a date and time have been set in the future. Missed Task has missed the specified date and time and is ready for execution the next time the Initiator is invoked. Error Task has experienced an error during execution. This entry will appear in red. In Progress Task is currently executing. Suspended Task has been suspended and will not be released for execution until the Release option is used from the context menu. This entry will appear in blue. <p><i>Note: When a task has completed successfully, i.e., status set to 'Completed', it will be removed from the task entries on the Task Scheduler Initiator screen. It can be viewed on the Task Scheduler Summary screen.</i></p>
Appl	The name of the application being used by the task.

SCREEN ITEMS	DESCRIPTION
Function Grp	The main function area being used by the task. The function groups available are: <ul style="list-style-type: none"> ▪ Environment ▪ Analysis ▪ Modification
Function Name	The name of the sub-function within the main function. The sub-functions available are: <p>For the function group Environment:</p> <ul style="list-style-type: none"> ▪ Extract Source Code ▪ Load Repository ▪ Extract & Load ▪ Extract, Load & Impact ▪ Environment Bulk Reports <p>For the function group Analysis:</p> <ul style="list-style-type: none"> ▪ Impact Execution ▪ Impact Bulk Reports <p>For the function group Modification:</p> <ul style="list-style-type: none"> ▪ Modify All ▪ Modification Bulk Reports
Vers	The impact version number being used by the task. This is only applicable to function names: Impact Execution and Modify All. All other tasks will show '00'.

Note: Each column can be sorted in ascending or descending order by using a single mouse click on the column heading. The sort order is indicated in the column heading using the symbols ▲ for ascending and ▼ for descending.

BUTTON NAME	DESCRIPTION
Run Now	Will start the selected task. This button is only available for tasks with a status of 'Missed' or ' ' (blank). <p><i>Note: The execution of tasks will depend on the setting for the number of active Natural sessions allowed. For more information refer to the section Task Scheduler Initiate Refresh Rate window.</i></p>

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Init Pending	<p>Will start any tasks that have a status of 'Missed'.</p> <p><i>Note: The number of tasks initiated will depend on the setting for the number of active Natural sessions allowed. For more information refer to the section Task Scheduler Initiate Refresh Rate window.</i></p>
Refresh Scrn	<p>Refreshes the Task Scheduler Initiator screen updating the task status values.</p>
Disable/Enable	<p>Will temporarily stop and close the Task Scheduler Initiator down to the system tray. No new tasks will be initiated and any tasks currently executing will continue to completion.</p> <p>To enable the Task Scheduler Initiator, select the Task Scheduler Initiator icon in the system tray with a single click and then use the Enable button.</p>
Stop	<p>Terminates the Task Scheduler Initiator. Any tasks that are currently executing will continue to completion.</p>

Task Scheduler Initiator Context Menu

Each task line on the Task Scheduler Summary screen can be selected and a context menu of options is available by using the right hand mouse button with a single click.

The following Figure 1-8 illustrates the Task Scheduler Initiator screen context menu.

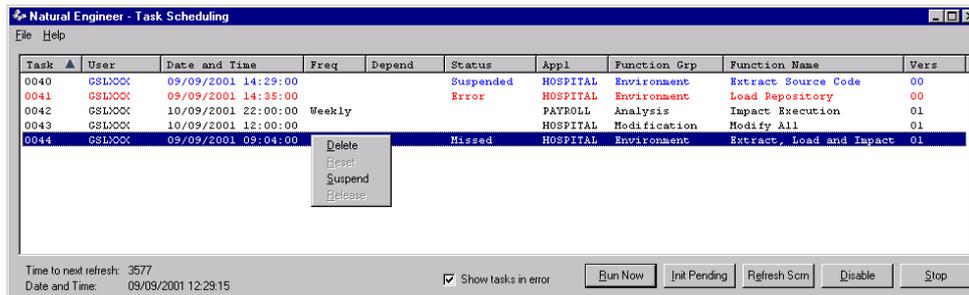


Figure 1-8 Task Scheduler Initiator screen context menu

CONTEXT MENU ITEM	DESCRIPTION
Delete	Delete the selected task. This option is available to all task statuses.
Reset	Reset the status of the selected task ready for re-execution. This option is only available for tasks with status 'Error'.
Suspend	Suspend the selected task from any execution. This option is only available for tasks with status 'Missed'.
Release	Release the suspended task. This option is only available for tasks with status 'Suspended'.

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Task Scheduler Initiate Refresh Rate Window

The Initiate Refresh Rate window allows you to specify the time interval for GenSched to check the tasks for execution.

It is also possible to specify the number of Natural sessions permitted to run individual tasks. One Natural session is used for each task.

Both these settings are available to best utilize the resources available on the machine being used.

The Initiate Refresh Rate screen is invoked by selecting the menu option File→Initiate Refresh Rate from the Task Scheduler Summary screen.

The following Figure 1-9 illustrates the Initiate Refresh rate screen.

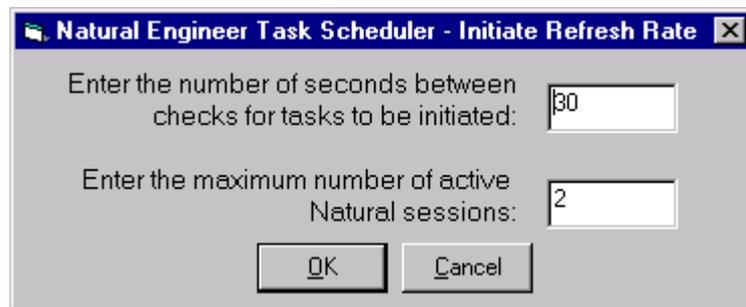


Figure 1-9 Initiate Refresh Rate screen

SCREEN ITEMS	DESCRIPTION
Enter the number of seconds between checks for the tasks to be initiated:	<p>This setting is used to control the time interval between task checks by GenSched. The value is in seconds and must be in the range 2-3600 seconds (2 seconds – 1 hour).</p> <p>The default value is 30 seconds.</p> <p>GenSched will wait for the specified time interval, before checking to see if any new tasks are ready for execution.</p>
Enter the maximum number of active Natural sessions:	<p>This setting is used to control the number of Natural sessions that are permitted to run the tasks. One Natural session is activated per task. The value range is between 1 and 4. This allows a range of 1 to 4 tasks to be running concurrently at any one time.</p> <p>The default value is 2.</p> <p>This setting is used by GenSched every time a new task is identified for execution. GenSched will check to see if all the available sessions are already in use, if so, then the task will not execute until one of these sessions ends.</p>

BUTTON NAME	DESCRIPTION
OK	<p>Accepts the values specified and returns to the Task Scheduler Initiator screen.</p> <p><i>Note: The new settings will only apply to the current session of the Initiator. If the Initiator is closed and then restarted, the default settings will be in use.</i></p>
Cancel	<p>Cancel out of the Initiate Refresh Rate screen and return back to the Task Scheduler Initiator screen.</p>

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How to invoke the Task Scheduler Initiator

The Task Scheduler Initiator executable GenSched can be invoked in one of two ways:

1. By using the '**Initiate**' button on the Task Scheduler Summary screen.

This will invoke GenSched and let it run in the background whilst Natural Engineer is still available for normal use. The Task Scheduler Initiator screen will be opened and the Natural Engineer Icon will be placed in the system tray.

2. By using executing GenSched itself from the Natural Engineer bin folder.

It is not necessary to have Natural Engineer opened in order to use GenSched. It is possible to invoke GenSched directly from the BIN folder, e.g., X:\PROGRAM FILES\SOFTWARE AG\NATURAL ENGINEER\4.4.2\BIN\GENSCHEX.EXE, where X: is the drive on which Natural Engineer has been installed.

This will invoke GenSched opening the Task Scheduler Initiator screen and place the Natural Engineer icon into the system tray.

COMPARE

Chapter Overview

This chapter describes the Compare option available from the Utilities menu. The Compare option provides the facility to compare Natural objects between either two or three Natural libraries.

The following topics are covered:

1. [Compare Overview](#)
2. [Compare Selection window](#)
3. [Compare Results window](#)

Compare Overview

The Compare option will compare a Natural object between a base library and up to two other libraries.

The Compare process is initiated by specifying the libraries and objects to be used. If two libraries are specified then a two-way compare will be initiated. This will compare the objects on the base library against the objects in the Compare 1 library. If three libraries are specified then a three-way compare will be initiated. This will compare the objects on the base library against the objects in the Compare 1 library and the objects in the Compare 2 library.

Note: The three-way compare does not compare the Compare 1 and Compare 2 objects against each other.

The Base library and its objects are used to determine which objects are compared from the Compare 1 and Compare 2 libraries. Object names can be specified using full name, part name with wildcard (for a range of object names with the same prefix) or a wildcard range specified using '*' (asterisk) to compare all objects found in the Base library.

The Compare results are displayed in a single window, with the object code from each library listed side by side for easier reference. Each of the differences are highlighted using fully customizable color schemes. Reviewing all the differences between the objects can be quickly achieved using the Scroll buttons, which step through difference by difference.

The Base object can be modified from the Compare Results screen, to incorporate any of the code from the Compare 1 and/or Compare 2 objects by using standard copy and paste functionality. Additionally user changes can also be applied to edit existing code lines and/or insert new lines in the Base object.

These modifications to the Base object can then be saved to a Natural library.

Compare Selection Window

The Compare Selection window allows you to specify the various criteria that are to be used for the Compare process. These include the Compare Options and Object Selection details.

The Compare Selection window is accessed using the following menu navigation: Utilities → Compare.

The following Figure 2-1 illustrates the Compare Selection screen.

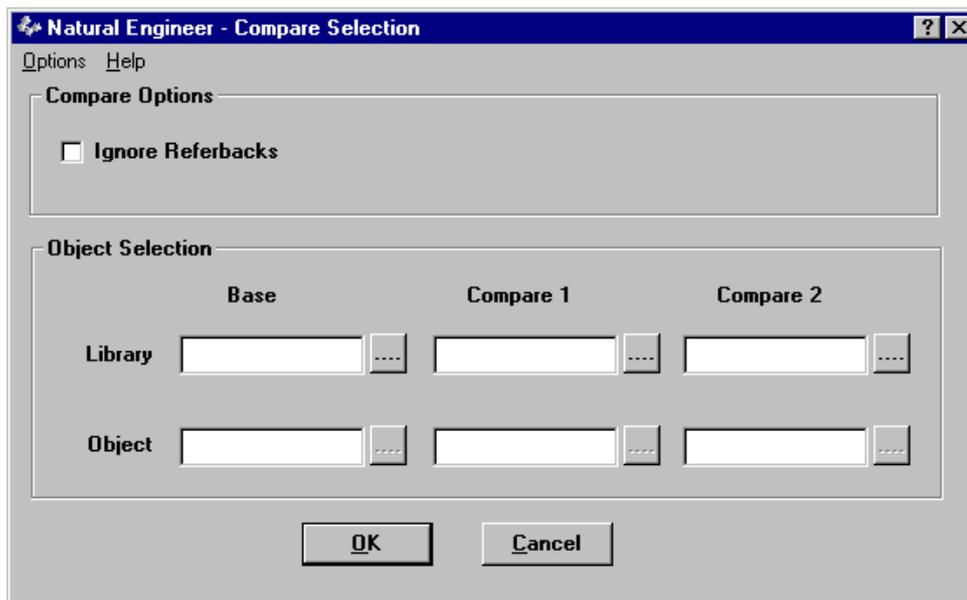


Figure 2-1 Compare Selection screen

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MENU ITEMS	OPTIONS	DESCRIPTION
Options		Provides various sub-options:
	Close	Will close the Compare Selection screen and return back to the main Natural Engineer screen.
Help		Invokes the Compare Selection help.

SCREEN ITEMS	DESCRIPTION
Compare Options	Any Compare options that are to be specified for the Compare results.
	<p>Ignore Referbacks If any refer backs using line numbers are present within the object code and this option is selected, then any differences are ignored. The Compare will replace any line numbers with '????'. The default for this option is off.</p>
Object Selection	The library and object names to be compared are specified here.
	<p>Base Library The name of the library you want to compare to. The library name can be typed in or selected by using the Base Library Selection button [...].</p>
	<p>Compare 1 Library The name of the first library you are comparing against the Base. The library name can be typed in or selected by using the Compare 1 Library Selection button [...].</p>
	<p>Compare 2 Library The name of the second library you are comparing against the Base. The library name can be typed in or selected by using the Compare 2 Library Selection button [...]. If not specified, then a two-way compare will be invoked.</p>

SCREEN ITEMS	DESCRIPTION
Base Object	<p>The name of the object on the Base library to be compared.</p> <p>This can be typed in using full name, part name with wildcard or a wildcard range to include all objects. The wildcard is an '*' (asterisk).</p> <p>The object name can be typed in or selected by using the Base Object Selection button [...].</p> <p>If part name with wildcard or wildcard range is specified, then there is no requirement to specify either the Compare 1 or Compare 2 object names. Examples based on the HOSPITAL application:</p> <p>XX001P01 Will compare object XX001P01 only.</p> <p>XX022* Will compare any object that matches the prefix specified.</p> <p>For the HOSPITAL application this would be XX022M01 and XX022P01 only.</p> <p>*</p> <p>Will compare all objects found on the Base library.</p>
Compare 1 Object	<p>The name of the object on the Compare 1 library to be compared against the Base object.</p> <p>This can be typed in using full name only. If omitted, then the object name specified in the Base object will be used.</p> <p>The object name can be typed in or selected by using the Compare 1 Object Selection button [...].</p>
Compare 2 Object	<p>The name of the object on the Compare 2 library to be compared against the Base object.</p> <p>This can be typed in using full name only. If omitted, then the object name specified in the Base object will be used.</p> <p>The object name can be typed in or selected by using the Compare 2 Object Selection button [...].</p>

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BUTTON NAME	DESCRIPTION
Base Library Selection [...]	Invokes the General Selection screen, listing all the FUSER Natural Libraries.
Compare 1 Library Selection [...]	Invokes the General Selection screen, listing all the FUSER Natural Libraries.
Compare 2 Library Selection [...]	Invokes the General Selection screen, listing all the FUSER Natural Libraries.
Base Object Selection [...]	Invokes the General Selection screen, listing all the Objects within an FUSER Natural Library.
Compare 1 Object Selection [...]	Invokes the General Selection screen, listing all the Objects within an FUSER Natural Library.
Compare 2 Object Selection [...]	Invokes the General Selection screen, listing all the Objects within an FUSER Natural Library.
OK	Validates the input and then if no errors, invokes the Compare Results screen.
Cancel	Exits the Compare Selection screen and returns back to the main Natural Engineer screen.

Note: For more information on the General Selection screen refer to Chapter 2 in the Concepts and Facilities manual.

Compare Selection Examples

The following table illustrates the various Compare Selections that can be made and the type of Compare that will be invoked. All objects are based on the sample application HOSPITAL.

	Base	Compare 1	Compare 2	Results
Library	HOSPITAL	HOSPITAX		Two-way compare for all objects found in Base library HOSPITAL.
Object	*			
Library	HOSPITAL	HOSPITAX		Two-way compare for all objects prefixed by 'XX001'.
Object	XX001*			
Library	HOSPITAL	HOSPITAX		Two-way compare for object XX021P01 only.
Object	XX021P01			
Library	HOSPITAL	HOSPITAX		Two-way compare for object XX021P01 only.
Object	XX021P01	XX021P01		
Library	HOSPITAL	HOSPITAX	HOSPITAZ	Three-way compare for all objects found in Base library HOSPITAL.
Object	*			
Library	HOSPITAL	HOSPITAX	HOSPITAZ	Three-way compare for all objects prefixed by 'XX001'.
Object	XX001*			
Library	HOSPITAL	HOSPITAX	HOSPITAZ	Three-way compare for object XX021P01 only.
Object	XX021P01			
Library	HOSPITAL	HOSPITAX	HOSPITAZ	Three-way compare for object XX021P01 only.
Object	XX021P01	XX021P01	XX021P01	

Compare Results Window

The Compare Results window displays the differences between two or three Natural objects. The differences are marked using customizable color schemes.

The Base object can have the differences from either or both of the compared objects applied to it, by using copy and paste functionality. It is also possible to make user changes to the Base object using basic edit, insert and delete functions.

These changes can then be saved to a Natural library.

The Compare Results makes use of the executable: GenCompare, which is invoked from the Compare Selection screen.

Note: The code displayed in the object details list boxes does not show any line numbers.

The following Figure 2-2 illustrates the Compare Results screen for a three-way compare.

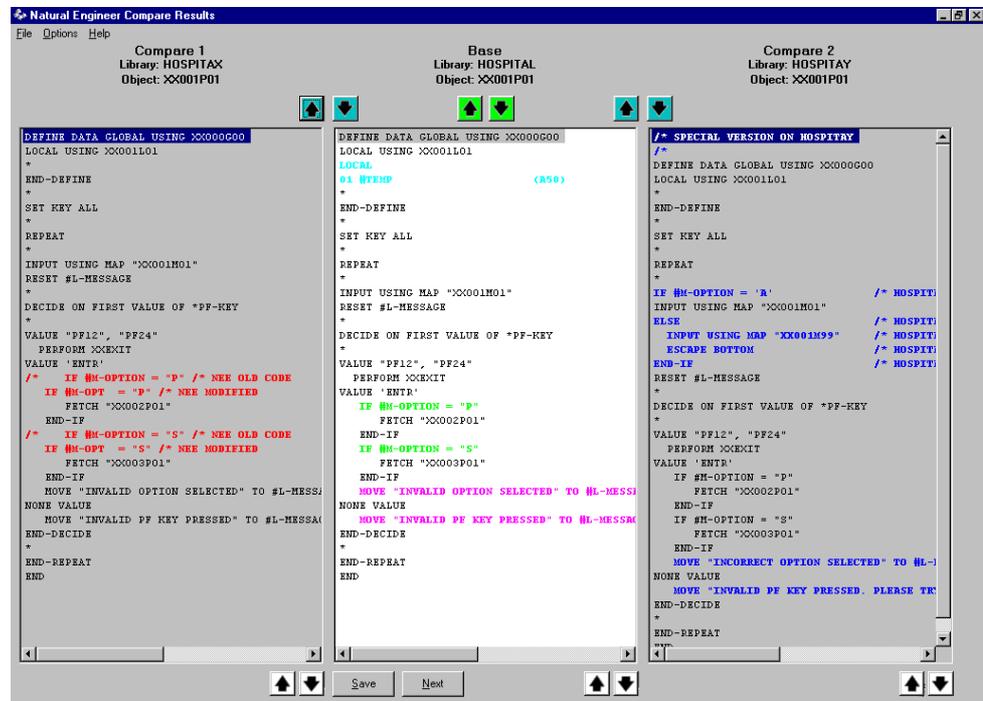


Figure 2-2 Compare Results screen for a three-way compare

The following Figure 2-3 illustrates the Compare Results screen for a two-way compare.

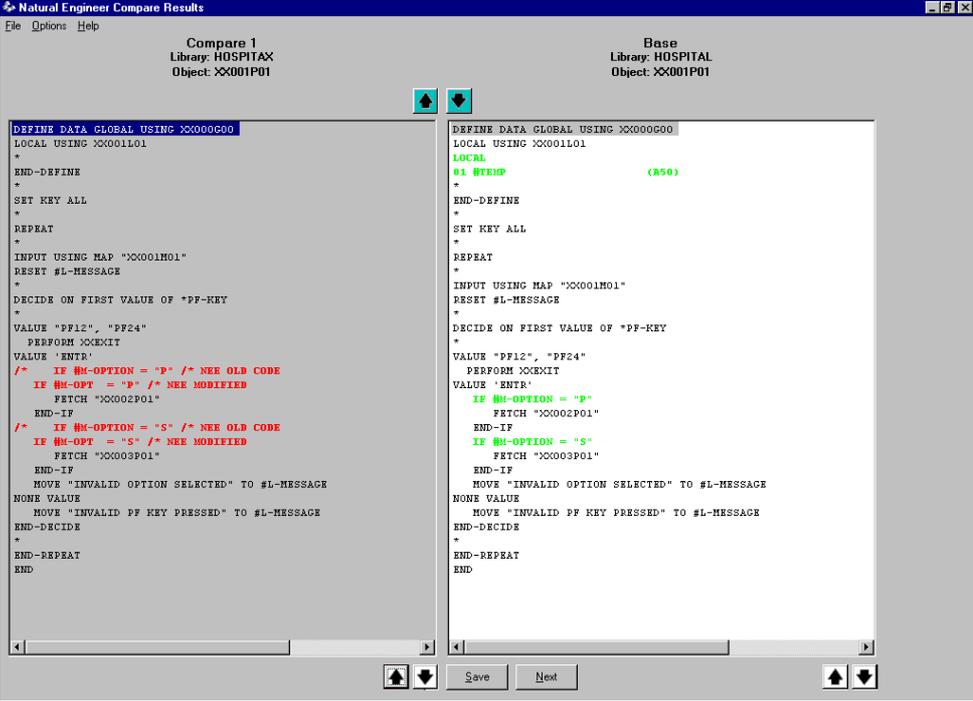


Figure 2-3 Compare Results screen for a two-way compare

MENU ITEMS	OPTIONS	DESCRIPTION
File	Next Object	<p>This option will select the next object from the Base library and display the compare results.</p> <p>This option is only available if a part name with wildcard or wildcard range has been specified on the Compare Selection screen.</p> <p><i>Note: This option is disabled when the last object in a range has been compared.</i></p>

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MENU ITEMS	OPTIONS	DESCRIPTION
	Select Object	This option invokes the Compare Object Selection screen showing the list of objects available for selection. This option is only available if a part name with wildcard or wildcard range has been specified on the Compare Selection screen.
Options	Exit	Exits the Compare Results screen.
	Color Schemes	This option will display the Compare Color Schemes screen.
	Refresh	Refresh the current object compare details on the Compare Results screen. <i>Note: This will re-run the Compare process.</i>
	Ignore Referbacks	This option can be used to select or de-select the comparison of refer backs. If selected a tick appears to the left of the text. If any refer backs using line numbers are present within the object code and this option is selected, then any differences are ignored. The Compare will replace any line numbers with '????'. After a selection has been made, a confirmation message is displayed. If the 'Yes' button is used then the current object compare will be refreshed. If the 'No' button is used then the selection will be ignored and the previous compare details will be retained.
Help	About	Displays the GenCompare version information.

SCREEN ITEMS	DESCRIPTION
--------------	-------------

Compare 1 Library	The name of the Compare 1 library being used.
Compare 1 Object	The name of the object currently being compared.

SCREEN ITEMS	DESCRIPTION
Compare 1 Object details	<p>The Compare 1 object source code is listed with any differences between Compare 1 and Base color coded to highlight any differences. The color code is controlled by the Color Schemes option.</p> <p>If the Compare 1 object is not found on the Compare 1 library, then a single message line will be displayed: "Compare 1 Object not found.</p> <p>If the Compare 1 object is identical to the Base version, i.e., there are no differences, then a single message line will be displayed: "Compare 1 Object and Base Object match.</p>
Base Library	The name of the Base library being used.
Base Object	The name of the object currently being compared.
Base Object details	<p>The Base object source code is listed with any differences between Base and Compare 1 and/or Base and Compare 2, color coded to highlight any differences. The color code is controlled by the Color Schemes option.</p> <p>The object details can be modified using copy, paste, edit, insert and delete functionality. These are highlighted as User Changes.</p> <p><i>Note: For more information on modifying the Base object refer to section Object Details Context Menus.</i></p>
Compare 2 Library	The name of the Compare 2 library being used.
Compare 2 Object	The name of the object currently being compared.
Compare 2 Object details	<p>The Compare 2 object source code is listed with any differences between Compare 2 and Base color coded to highlight any differences. The color code is controlled by the Color Schemes option.</p> <p>If the Compare 2 object is not found on the Compare 2 library, then a single message line will be displayed: "Compare 2 Object not found.</p> <p>If the Compare 2 object is identical to the Base version, i.e., there are no differences, then a single message line will be displayed: "Compare 2 Object and Base Object match.</p>

BUTTON NAME	DESCRIPTION
Scroll Buttons	<p>There are three sets of scroll buttons available. Each set of buttons allows you to scroll through the differences within the objects being displayed.</p> <p>The scroll button sets are color coded to help distinguish each set. The color code is controlled by the Color Schemes option.</p>

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BUTTON NAME	DESCRIPTION
	<p>Scroll through all differences between Compare 1 and Base or Compare 2 and Base.</p> <p>The default color is blue/green.</p>
	<p>Scroll through all differences in Base, Compare 1 and Compare 2.</p> <p>The default color is bright green.</p> <p><i>Note: This button set is not available when running a two-way compare.</i></p>
	<p>Scroll through all differences within an individual object.</p> <p>The default color is white.</p>
Save	<p>Save the Base object to a Natural library. This button is disabled for the following object types:</p> <ul style="list-style-type: none"> • Global Data Areas • Local Data Areas • Parameter Data Areas • Maps <p>It will also be disabled if the Ignore Referbacks option is set on and an object contains refer backs.</p>
Next	<p>Select the next object from the Base library and display the compare results.</p> <p>This button is only available if a part name with wildcard or wildcard range has been specified on the Compare Selection screen.</p> <p><i>Note: This button is disabled when the last object in a range has been compared.</i></p>

Compare Object Selection Window

The Compare Object Selection window provides a list of objects based on the object name specified on the Compare Selection screen. It is only available if a part name with wildcard or wildcard range have been specified.

The Compare Object Selection screen is invoked by selecting the menu option **File** → **Object Selection** from the Compare Results screen.

The following Figure 2-4 illustrates the Compare Object Selection screen.

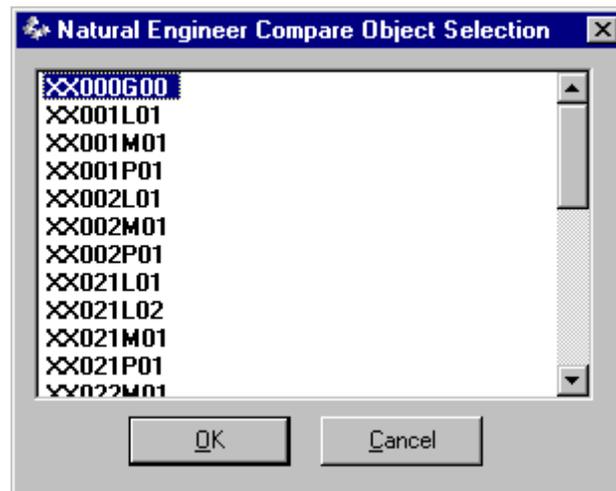


Figure 2-4 Compare Object Selection screen

SCREEN ITEMS	DESCRIPTION
Object List	<p>The list of object names based on the part name with wildcard or wildcard range specified on the Compare Selection screen.</p> <p>Objects are selected by placing the cursor on the object name and then using the 'OK' button.</p>
BUTTON NAME	DESCRIPTION
OK	Will refresh the Compare Results screen with the new selected object details.
Cancel	Closes the Compare Object Selection screen ignoring any object selection that may have been made. The Compare Results screen will be unchanged.

Compare Color Schemes Window

The Compare Color Schemes window controls the color codes for the Scroll buttons and Compare differences. All the color codes are customizable.

To change a color code, use the left mouse button with a single click on the colored square of the option you wish to change. This will invoke the Color palette screen where colors can be selected. After selecting a new color, both the Color Schemes screen and the Compare Results screen are refreshed to reflect the new color selection.

The Compare Color Schemes screen is invoked by selecting the menu option Options → Color Schemes from the Compare Results screen.

The following Figure 2-5 illustrates the Compare Color Schemes screen for three-way compare.

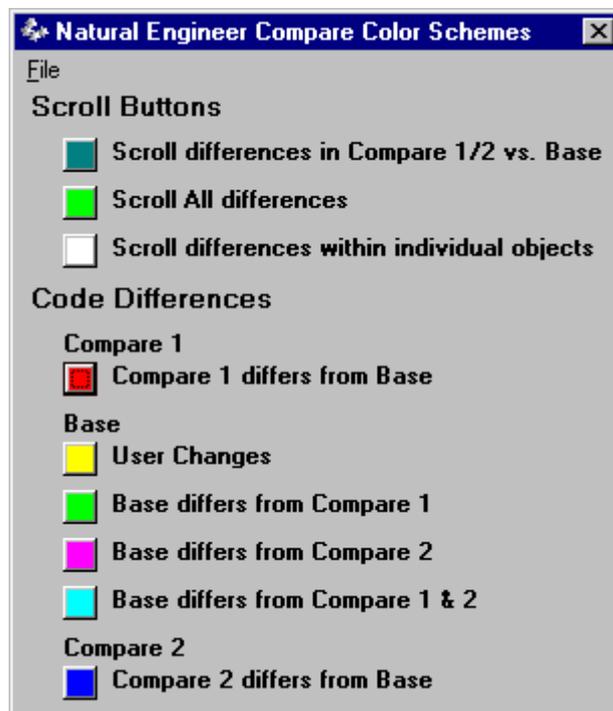


Figure 2-5 Compare Color Schemes screen for three-way compare

The following Figure 2-6 illustrates the Compare Color Schemes screen for two-way compare.

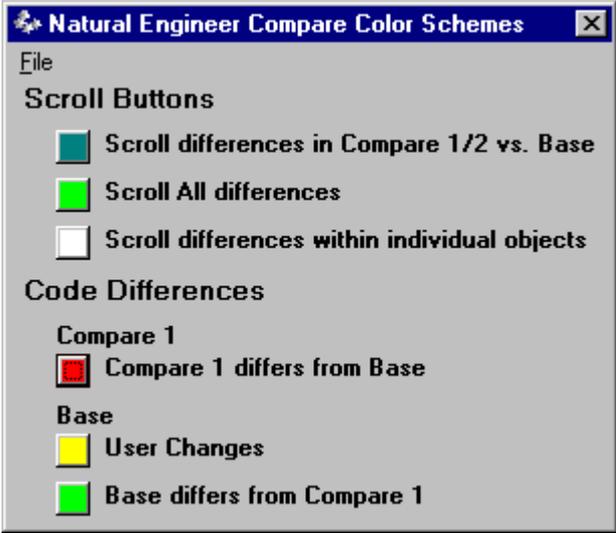


Figure 2-6 Compare Color Schemes screen for two-way compare

MENU ITEMS	OPTIONS	DESCRIPTION
File	Always on Top	This option allows you to control the display position of the Color Schemes screen. If selected (indicated by a tick to the left of the text) it will always keep the Color Schemes screen in the foreground. If de-selected (no tick) then the Color Schemes screen can be moved to the background. <i>Note: The default setting when the Compare Results screen is first invoked is Always on Top.</i>
	Exit	Exits the Compare Color Schemes screen.

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SCREEN ITEMS	DESCRIPTION
Scroll Buttons	<p>The Scroll Buttons allow you to scroll through the differences within the objects being displayed.</p> <p> Scroll through all differences between Compare 1 and Base or Compare 2 and Base. The default color is blue/green.</p> <p> Scroll through all differences in Base, Compare 1 and Compare 2. The default color is bright green.</p> <p> Scroll through all differences within an individual object. The default color is white.</p>
Code Differences	Any differences that exist between the objects being compared are color coded for easier viewing.
Compare 1	<p> Compare 1 object differs from Base object. The default color is red.</p>
Base	<p> User changes applied to Base object. The default color is yellow.</p> <p> Base object differs from Compare 1 object. The default color is bright green.</p> <p> Base object differs from Compare 2 object. The default color is bright pink.</p> <p> Base object differs from both Compare 1 object and Compare 2 object. The default color is turquoise.</p>
Compare 2	<p> Compare 2 object differs from Base object. The default color is blue.</p>

Object Detail Context Menus

The Object Details context menus provide basic editing functionality and are invoked by placing the cursor on any code line and using the right hand mouse button with a single click.

Editing can only be applied to the Base Object details and allows you to incorporate differences from Compare 1 and/or Compare 2 objects, as well as adding or deleting code lines in the Base object.

Note: Editing is not available for either Compare 1 Object details or Compare 2 Object details.

The following editing tasks can be performed:

- Copy code lines from Compare 1 Object.
- Copy code lines from Compare 2 Object.
- Edit existing code lines within Base Object.
- Insert new blank lines within Base Object and type in new code or comments.
- Delete a code line within Base Object.
- Undo the last deletion in Base Object.

There are two types of Object detail context menu available:

1. Compare 1 and Compare 2 Object details context menu for copying code lines.
2. Base Object details context menu for all the editing functions to add or amend code lines in the Base object.

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The following Figure 2-7 illustrates the Compare 1 Object Details context menu.

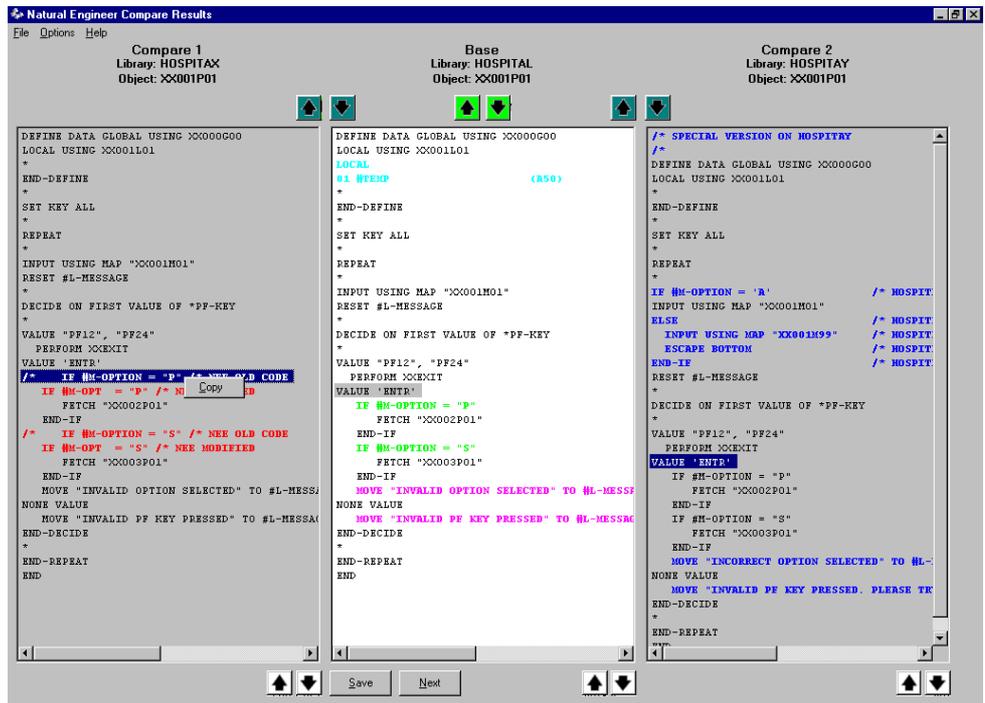


Figure 2-7 Compare 1 Object details context menu

Note: The same context menu is invoked for code lines selected in Compare 2 Object details.

CONTEXT MENU ITEM	DESCRIPTION
Copy	Copies the selected code lines to the clipboard.

The following Figure 2-8 illustrates the Base Object Details context menu.

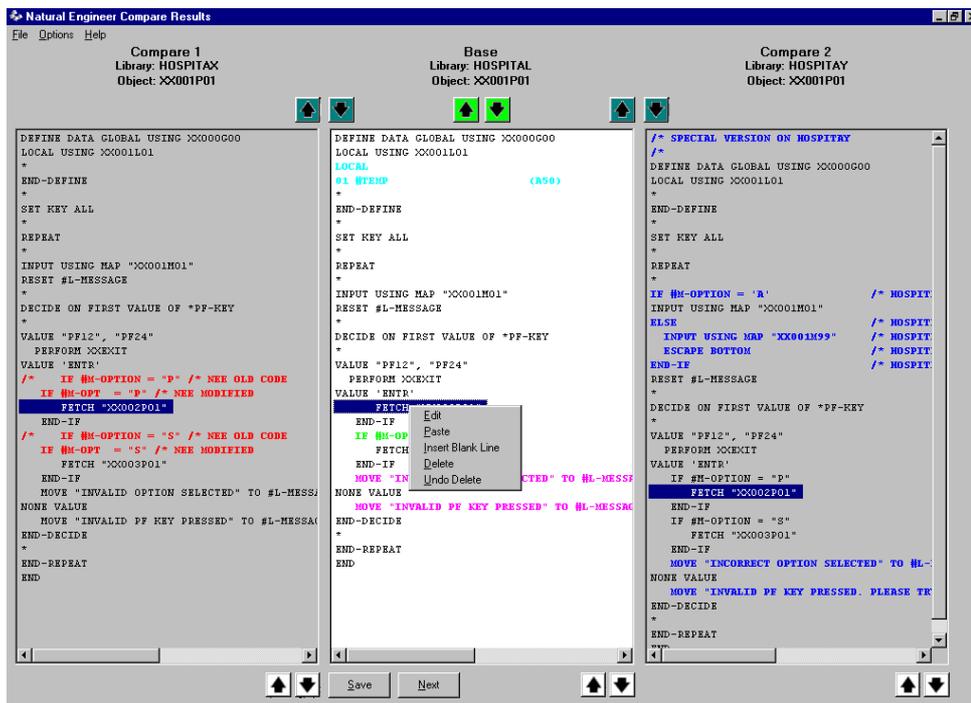


Figure 2-8 Base Object details context menu

CONTEXT MENU ITEM	DESCRIPTION
Edit	Opens the selected line for editing.
Paste	Paste any copied code lines that have been placed in the clipboard by a previous copy. This will paste the lines after the current selected line.
Insert Blank Line	Insert a blank line after the current selected line.
Delete	Delete the current selected line.
Undo Delete	Reinstate the last deletion. This option is only available after a previous line deletion has been executed.

Using the Save Function

The Save function allows you to save a new copy of the Base object to an FUSER Natural library.

The Save function is invoked by using the **'Save'** button on the Compare Results screen. This will invoke the Compare Library Selection screen where the FUSER Natural library can be specified in one of two ways:

1. Using the modification library specified in the Application Preferences. This method requires an Application to be opened within Natural Engineer before the Compare function is invoked.
2. Specifying the FUSER Natural library using the Compare Library Selection screen. This method does not require an Application to be opened before the Compare function is invoked.

After the library name has been specified and the **'OK'** button used from the Compare Library Selection screen, the object will be saved. A confirmation message is produced after the object has been saved.

If the object already exists on the destination library, an overwrite warning message is displayed. You can accept or decline the save. If accepted then the existing object will be overwritten.

Note: No syntax checking is performed during the save. The saved objects will need to be checked manually using the Natural Editor.

With Natural Engineer Application Open

With a Natural Engineer Application open, the Compare Save function will save the object to the Natural library specified in the Modification Library within Application Preferences.

Note: For more information on the Application Preferences refer to Chapter 1 in the Application Management manual.

Audit trail records are generated for objects saved by the Compare when a Natural Engineer Application is open. These can be viewed using the Change Management Tracking option from the Utilities menu.

Note: For more information on audit trail records refer to Chapter 5.

The following Figure 2-9 illustrates the Compare Library Selection screen with Application open.

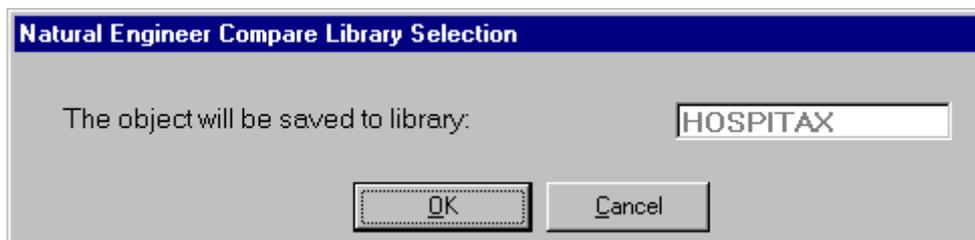


Figure 2-9 Compare Library Selection screen with Application open

SCREEN ITEMS	DESCRIPTION
The object will be saved to library:	This will contain the name of the modification library specified in the Application Preferences. This can only be changed using the Application Preferences screen.
BUTTON NAME	DESCRIPTION
OK	Accept the library selection details and save the object.
Cancel	Cancel the library selection details and return back to the Compare Results screen. The object will not be saved.

With No Natural Engineer Application Open

With no Natural Engineer Application open, the Compare Save function will save the object to the Natural library specified in the Compare Library Selection screen.

No Audit trail records are generated for objects saved by the Compare when No Natural Engineer Application is open.

The following Figure 2-10 illustrates the Compare Library Selection screen with no Application open.

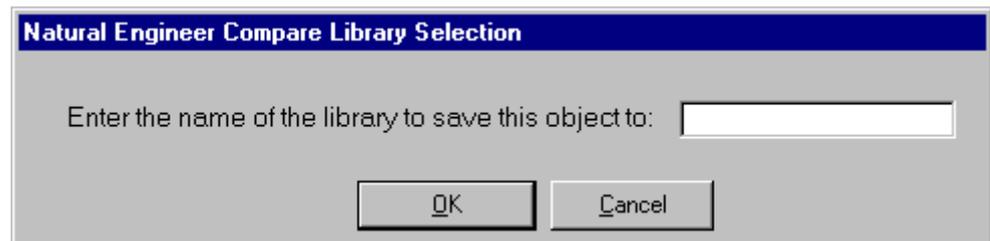


Figure 2-10 Compare Library Selection screen with no Application open

SCREEN ITEMS	DESCRIPTION
Enter the name of the library to save this object to:	Specify the name of the library to be used. This must be 1-8 characters and conform to Natural standards. <i>Note: It is recommended that the library name is different to the Base library to avoid overwriting the original object.</i>

BUTTON NAME	DESCRIPTION
OK	Accept the library selection details and save the object.
Cancel	Cancel the library selection details and return back to the Compare Results screen. The object will not be saved.

BEAUTIFICATION

Chapter Overview

This chapter describes the Beautification option available from the Utilities menu. The Beautification option provides the facility to improve the layout of Natural source code within objects, increasing their readability and maintainability.

The following topics are covered:

1. [Beautification Overview](#)
2. [Beautification Preferences window](#)
3. [Execute Beautification](#)
4. [Beautification Process Examples](#)

Beautification Overview

The Beautification option will apply various options to improve the readability of Natural Source Code for objects within an application.

To be able to use the Beautification option, an application needs to be opened using the menu option Application → Open. The application does not need to have the Extract and Load processes executed.

The Natural application needs to have the application preference: Modification library specified in order that the Beautified objects are placed in the correct Natural library.

When Beautification is executed, it will apply the Beautification Preferences to each object found in the specified modification library.

The execution of beautification will modify the application code based on the following process.

1. Check if object exists in Modification library.
2. If object does not exist in Modification library then check the application library.
3. Beautify object and place in the Modification library.

Beautification Preferences Window

The Beautification Preferences window is accessed by the following menu navigation: Utilities → Beautification → Preferences.

The Preferences specify the changes that will take place to the Natural code during the Beautification execution.

The following Figure 3-1 illustrates the Beautification Preferences screen.

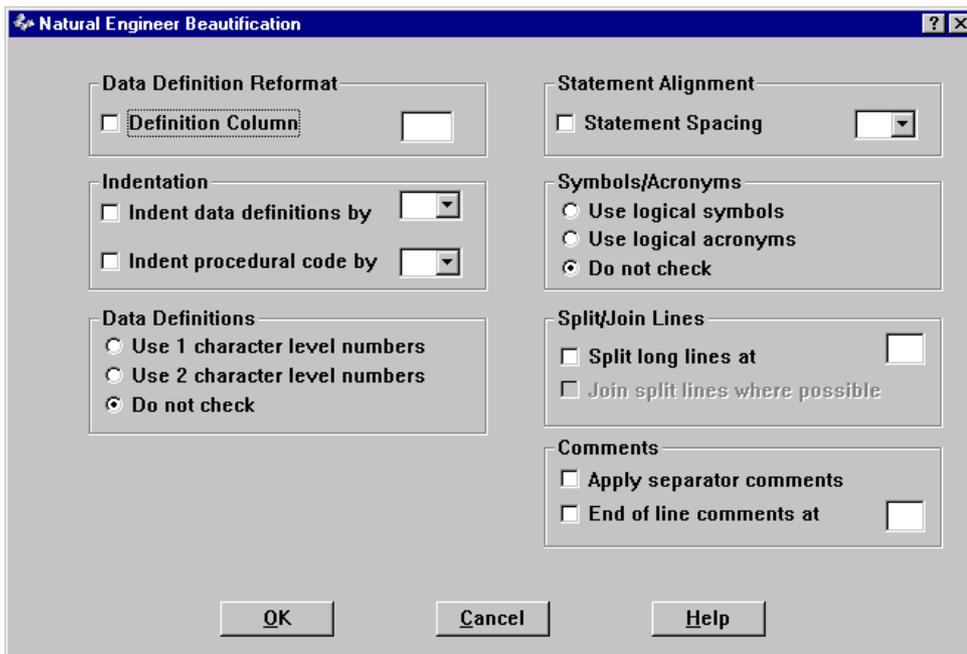


Figure 3-1 Beautification Preferences screen

SCREEN ITEMS	DESCRIPTION
--------------	-------------

Data Definition Reformat	For statements within the DEFINE DATA section of the object.
---------------------------------	--

Option	Description
--------	-------------

Definition Column	Specify the starting column to be used for all the definitions (Format/Length).
--------------------------	---

This option will reformat the complete Data Definition section to a pre-defined format. This format is:

- Level number will be set to 2 characters.
- Level numbers will have a 2-byte indentation.
- Definitions will be aligned based on a User specified column. Valid column positions are between 35 and 60 inclusive.
- Any INIT and CONSTANT clauses will be carried forward to the next line.

Note: The use of Data Definition Reformat is mutually exclusive to the 'Indentation: Indent data definitions by' and 'Data Definitions: Use 1 or 2 character level numbers' preferences.

Indentation	Allows for the definition of the level of indentation of code within the object.
--------------------	--

Option	Description
--------	-------------

Indent Data Definitions by	Enter the number of bytes that related code in data areas will be indented by.
-----------------------------------	--

Note: This option is mutually exclusive to the 'Data Definition Reformat: Definition Column' preference.

Indent procedural code by	Enter the number of bytes that related processing code will be indented by.
----------------------------------	---

SCREEN ITEMS	DESCRIPTION								
Data Definitions	<p>For statements within the DEFINE DATA section of the object.</p> <table border="1"> <thead> <tr> <th>Option</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>Use 1 character level numbers</td> <td>Will remove the leading zero from the level number definitions.</td> </tr> <tr> <td>Use 2 character level numbers</td> <td>Will insert a leading zero if required to make the level number two bytes in length.</td> </tr> <tr> <td>Do not check</td> <td>Will not perform any processing for level numbers.</td> </tr> </tbody> </table> <p><i>Note: These options are mutually exclusive to the 'Data Definition Reformat: Definition Column' preference.</i></p>	Option	Description	Use 1 character level numbers	Will remove the leading zero from the level number definitions.	Use 2 character level numbers	Will insert a leading zero if required to make the level number two bytes in length.	Do not check	Will not perform any processing for level numbers.
Option	Description								
Use 1 character level numbers	Will remove the leading zero from the level number definitions.								
Use 2 character level numbers	Will insert a leading zero if required to make the level number two bytes in length.								
Do not check	Will not perform any processing for level numbers.								
Statement Alignment	<p>For statements within the Procedural section of the object.</p> <table border="1"> <thead> <tr> <th>Option</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>Statement Spacing</td> <td> <p>Specify the number of spaces between each individual element of the statement. Valid value is 1 only.</p> <p>This option will reformat each statement within the procedural section of an object and permit only a single space between each element in each statement. Example: -</p> <p>Original statement line: -</p> <pre>0020 MOVE xx'ABCDE'xxxxxTOxxx#FIELD-ALPHAxxx/* a comment</pre> <p>After beautification using the Statement Alignment option :-</p> <pre>0020 MOVEx'ABCDE'xTOx#FIELD-ALPHAx/* a comment</pre> <p><i>Note: The use of 'x' is to illustrate spaces.</i></p> </td> </tr> </tbody> </table>	Option	Description	Statement Spacing	<p>Specify the number of spaces between each individual element of the statement. Valid value is 1 only.</p> <p>This option will reformat each statement within the procedural section of an object and permit only a single space between each element in each statement. Example: -</p> <p>Original statement line: -</p> <pre>0020 MOVE xx'ABCDE'xxxxxTOxxx#FIELD-ALPHAxxx/* a comment</pre> <p>After beautification using the Statement Alignment option :-</p> <pre>0020 MOVEx'ABCDE'xTOx#FIELD-ALPHAx/* a comment</pre> <p><i>Note: The use of 'x' is to illustrate spaces.</i></p>				
Option	Description								
Statement Spacing	<p>Specify the number of spaces between each individual element of the statement. Valid value is 1 only.</p> <p>This option will reformat each statement within the procedural section of an object and permit only a single space between each element in each statement. Example: -</p> <p>Original statement line: -</p> <pre>0020 MOVE xx'ABCDE'xxxxxTOxxx#FIELD-ALPHAxxx/* a comment</pre> <p>After beautification using the Statement Alignment option :-</p> <pre>0020 MOVEx'ABCDE'xTOx#FIELD-ALPHAx/* a comment</pre> <p><i>Note: The use of 'x' is to illustrate spaces.</i></p>								
Symbols/Acronyms	<p>Relates to the terminology within conditional statements.</p> <table border="1"> <thead> <tr> <th>Option</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>Use logical symbols.</td> <td>Use the recognized symbols within decision statements e.g., > < =.</td> </tr> <tr> <td>Use logical acronyms.</td> <td>Use the equivalent acronyms for symbols within decision statements e.g., GT, LT, EQ.</td> </tr> <tr> <td>Do not check.</td> <td>Will not perform any checks for Symbols/Acronyms.</td> </tr> </tbody> </table>	Option	Description	Use logical symbols.	Use the recognized symbols within decision statements e.g., > < =.	Use logical acronyms.	Use the equivalent acronyms for symbols within decision statements e.g., GT, LT, EQ.	Do not check.	Will not perform any checks for Symbols/Acronyms.
Option	Description								
Use logical symbols.	Use the recognized symbols within decision statements e.g., > < =.								
Use logical acronyms.	Use the equivalent acronyms for symbols within decision statements e.g., GT, LT, EQ.								
Do not check.	Will not perform any checks for Symbols/Acronyms.								

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SCREEN ITEMS	DESCRIPTION						
Split/Join Lines	Processing that determines the length of the source line.						
	<table border="1"> <thead> <tr> <th>Option</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>Split long lines at:</td> <td>Specify the column at which statements are to be split e.g., if column 60 specified, then statements would not be allowed to exceed 60 characters per statement line.</td> </tr> <tr> <td>Join split lines where possible.</td> <td>This option will determine if currently split lines can be amalgamated without creating long lines or placing more than one statement on a line.</td> </tr> </tbody> </table>	Option	Description	Split long lines at:	Specify the column at which statements are to be split e.g., if column 60 specified, then statements would not be allowed to exceed 60 characters per statement line.	Join split lines where possible.	This option will determine if currently split lines can be amalgamated without creating long lines or placing more than one statement on a line.
	Option	Description					
Split long lines at:	Specify the column at which statements are to be split e.g., if column 60 specified, then statements would not be allowed to exceed 60 characters per statement line.						
Join split lines where possible.	This option will determine if currently split lines can be amalgamated without creating long lines or placing more than one statement on a line.						
Comments	This section applies to comments within the object.						
	<table border="1"> <thead> <tr> <th>Option</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>Apply separator comments.</td> <td>Will apply comments ‘/*’ before and after statement groups if required. E.g., If statements, DECIDE and REPEAT statements.</td> </tr> <tr> <td>End of line comments at:</td> <td>Specifying a starting column for the placing of comments that are at the end of a line.</td> </tr> </tbody> </table>	Option	Description	Apply separator comments.	Will apply comments ‘/*’ before and after statement groups if required. E.g., If statements, DECIDE and REPEAT statements.	End of line comments at:	Specifying a starting column for the placing of comments that are at the end of a line.
	Option	Description					
	Apply separator comments.	Will apply comments ‘/*’ before and after statement groups if required. E.g., If statements, DECIDE and REPEAT statements.					
End of line comments at:	Specifying a starting column for the placing of comments that are at the end of a line.						

BUTTON NAME	DESCRIPTION
OK	Accepts and saves the specified preferences.
Cancel	Cancels out of the Preferences screen and returns back to the main Natural Engineer screen.
Help	Invokes the Beautification help.

Execute Beautification

The Execute Beautification option is accessed by the following menu navigation: Utilities → Beautification → Execute Beautification.

When this option is selected, the Beautification Objects List screen is displayed where the objects to be beautified can be selected.

The following Figure 3-2 illustrates the Beautification Objects List screen.

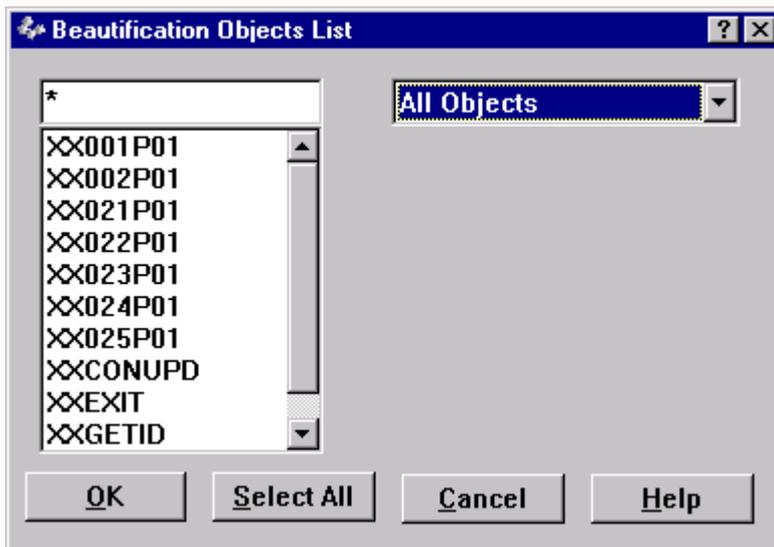


Figure 3-2 Beautification Objects List screen

SCREEN ITEMS	DESCRIPTION
--------------	-------------

Object name	The name of the object to be selected if only a single object is to be beautified.
--------------------	--

Object Types	This controls the list of objects available in the object list. Available selections are:
---------------------	---

- **All Objects**
- **Programs**
- **Subprograms**
- **Subroutines**
- **Help routines**

Object List	Scrollable list of all the objects available within the application.
--------------------	--

Note: The list of objects is controlled by the Object Types selection. For Example: if the Object Types is set to Programs, then the Object List will only show the objects which have the type Program within the application.

BUTTON NAME	DESCRIPTION
-------------	-------------

OK	The object selection will be accepted and the Beautification process will be invoked.
-----------	---

Select All	Selects all the objects listed in the object list box.
-------------------	--

Cancel	Will cancel out of the Beautification Objects List screen and return back to the main Natural Engineer screen.
---------------	--

Help	Invokes the Beautification help.
-------------	----------------------------------

Beautification Process Examples

To illustrate the Beautification process, two examples are shown using the sample Natural applications HOSPITAL and NEEEXPG.

The two examples are:

1. Change data definitions to use 1-character level numbers and indent data definition code by 3 bytes.
2. Use of the Data Definition Reformat option to layout the inline data definitions with the format and length being positioned in column 45.

Example 1 - Change data definitions to use one character level numbers and indent data definition code by 3 bytes

This example will apply Beautification to object XX021P01 from the sample Natural application HOSPITAL. The Beautification preferences will be set to indent data definitions by 3 bytes and all data definition level numbers to use 1 character (i.e., no leading 0).

Step 1 Review the source code in object XX021P01 before Beautification is applied.

The following Figure 3-3 illustrates the code before Beautification.

```

0010  * THIS IS THE MAIN VALIDATION PROGRAM USED FOR INSERTS/DELETES/MODIFIES!
0020  *
0030  DEFINE DATA GLOBAL USING XX000G00
0040  LOCAL USING XX021L01
0050  LOCAL USING XX021L02
0060  LOCAL USING XXMTHVAL
0070  LOCAL
0080  01 #C-GROUP (C/1:10)
0090  01 REDEFINE #C-GROUP
0100     02 #C-PATIENT-ID (C)
0110     02 #C-FIRST-NAME (C)
0120     02 #C-SURNAME (C)
0130     02 #C-DOB (C)
0140     02 #C-RELEASED (C)
0150     02 #C-ADDRESS (C)
0160     02 #C-ARRIVED (C)
0170     02 #C-DUE-FOR-SURGERY (C)
0180  01 #P-PATIENT-ID (N7)
0190  *
0200  01 #W-OK (L)
0210  01 #W-DD (A2)
0220  01 REDEFINE #W-DD
0230     02 #W-DD1 (A1)
0240     02 #W-DD2 (A1)
0250  01 REDEFINE #W-DD
0260     02 #W-DD-N (N2)
0270  01 #W-MM (A12)
0280  01 REDEFINE #W-MM
0290     02 #W-MM-PART (A1/1:12)
0300  *
0310  01 #W-LOOP (P3)
0320  01 #W-SAVE-LOOP (P3)
0330  01 #W-FOUND (L)
0340  *
0350  01 #W-MESSAGE (A70)
0360  *

```

Figure 3-3 Code before Beautification

Step 2 Using Beautification Preferences select ‘Use 1 character level numbers’ under Data Definitions.

Step 3 Using Beautification Preferences select ‘indent data definitions by’ and select a value of 3.

The following Figure 3-4 illustrates the Beautification screen with example 1 preferences specified.

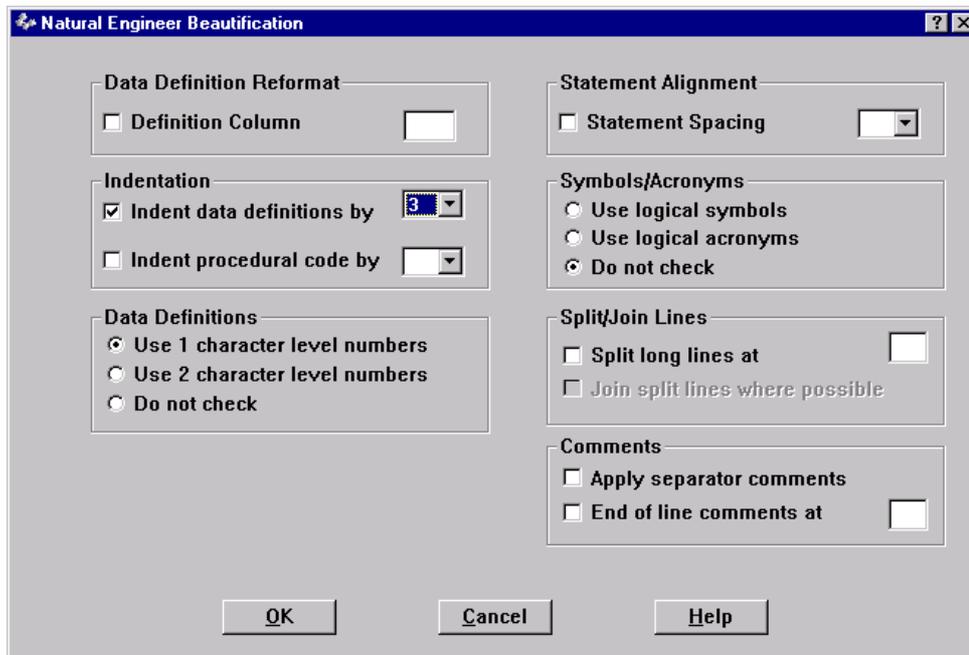


Figure 3-4 Beautification Example 1 Preferences

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Step 4 Select the Execute Beautification option, select object XX021P01 and click the OK button.

The following Figure 3-5 illustrates the Beautification Objects List screen with object XX021P01 selected.

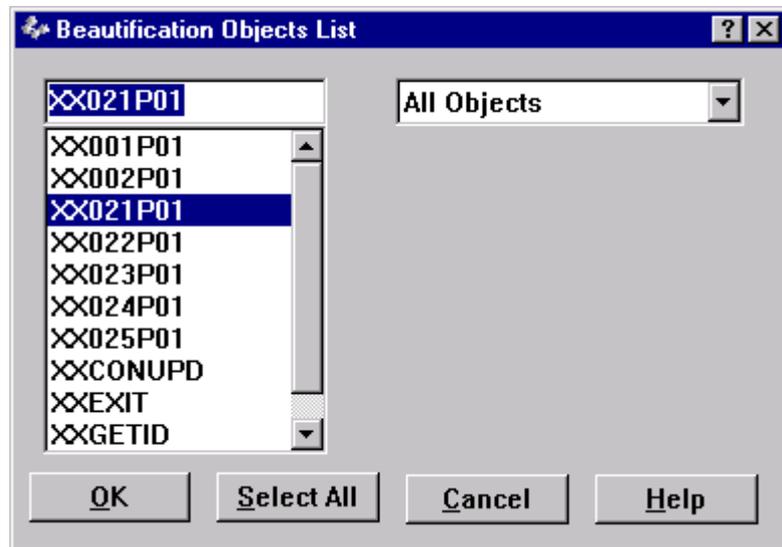


Figure 3-5 Beautification Objects List screen with XX021P01 selected

Step 5 Review the source code in object XX021P01 after Beautification has been applied.

The following Figure 3-6 illustrates the code after Beautification.

```

0010 * THIS IS THE MAIN VALIDATION PROGRAM USED FOR INSERTS/DELETES/MODIFIES!
0020 *
0030 /* Beautified by Natural Engineer 2001/09/10 18:10:38 by GSLXXX
0040 DEFINE DATA GLOBAL USING XX000G00
0050 LOCAL USING XX021L01
0060 LOCAL USING XX021L02
0070 LOCAL USING XXMTHVAL
0080 LOCAL
0090 1 #C-GROUP (C/1:10)
0100 1 REDEFINE #C-GROUP
0110     2 #C-PATIENT-ID (C)
0120     2 #C-FIRST-NAME (C)
0130     2 #C-SURNAME (C)
0140     2 #C-DOB (C)
0150     2 #C-RELEASED (C)
0160     2 #C-ADDRESS (C)
0170     2 #C-ARRIVED (C)
0180     2 #C-DUE-FOR-SURGERY (C)
0190 1 #P-PATIENT-ID (N7)
0200 *
0210 1 #W-OK (L)
0220 1 #W-DD (A2)
0230 1 REDEFINE #W-DD
0240     2 #W-DD1 (A1)
0250     2 #W-DD2 (A1)
0260 1 REDEFINE #W-DD
0270     2 #W-DD-N (N2)
0280 1 #W-MM (A12)
0290 1 REDEFINE #W-MM
0300     2 #W-MM-PART (A1/1:12)
0310 *
0320 1 #W-LOOP (P3)
0330 1 #W-SAVE-LOOP (P3)
0340 1 #W-FOUND (L)
0350 *
0360 1 #W-MESSAGE (A70)

```

Figure 3-6 Code after Beautification

Example 2 – Use of Data Definition Reformat option to layout the inline data definitions with the format and length being positioned in column 45.

This example will apply Beautification to object BUWTP01S from the sample Natural application NEEEXP. The Beautification preferences will be set to all the data definition format and lengths to be positioned at column 45.

Step 1 Review the source code in object BUWTP01S before Beautification is applied.

The following Figure 3-7 illustrates the code before Beautification.

```

0010 /* EXAMPLE BUWTP01S : PROGRAM USED FOR BEAUTIFICATION TESTING
0020 /*                               DATA DEFINITION LEVEL NUMBERS
0030 /*                               STRUCTURED MODE
0040 DEFINE DATA LOCAL
0050 1 VEH1 VIEW VEHICLES
0060 2 CAR-DETAILS
0070 3 MAKE
0080 3 MODEL
0090 3 COLOR
0100 3 YEAR
0110 /*
0120 1 #TOT-REC-COUNT      (I2)
0130 1 #COLOR-COUNTS
0140 2 #RED-COUNT         (I2)
0150 2 #GREEN-COUNT      (I2)
0160 2 #BLUE-COUNT       (I2)
0170 2 #WHITE-COUNT      (I2)
0180 1 #DRIVERS-NAME    (A100)
0190 1 REDEFINE #DRIVERS-NAME
0200 2 #FIRST-NAME       (A50)
0210 2 REDEFINE #FIRST-NAME
0220 3 #CHRISTIAN-NAME   (A25)
0230 3 #MIDDLE-NAME     (A25)
0240 2 #LAST-NAME       (A50)
0250 END-DEFINE
0260 READ VEH1
0270 IF COLOR EQ 'RED'
0280 ADD 1 TO #RED-COUNT
0290 END-IF
0300 IF COLOR EQ 'GREEN'
0310 ADD 1 TO #GREEN-COUNT
0320 END-IF
0330 IF COLOR EQ 'BLUE'
0340 ADD 1 TO #BLUE-COUNT
0350 END-IF
0360 IF COLOR EQ 'WHITE'

```

Figure 3-7 Code before Beautification

Step 2 Using Beautification preferences select ‘Definition Column’ under Data Definition Reformat. Set the column position value to 45.

The following Figure 3-8 illustrates the Beautification screen with example 2 preferences specified.

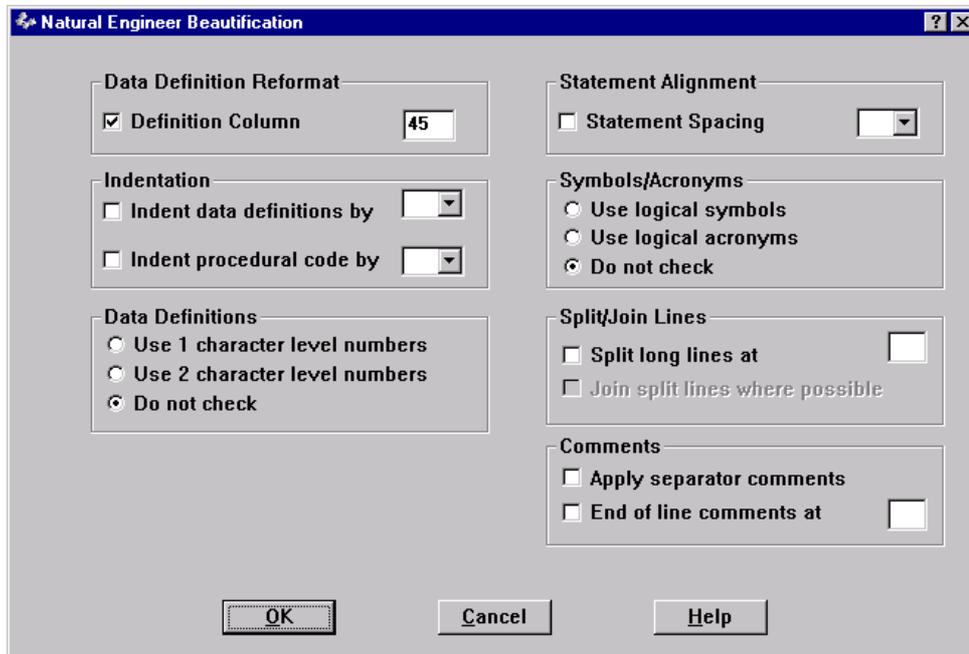


Figure 3-8 Beautification Example 2 Preferences

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Step 3 Execute beautification for program object BUWTP01S

Step 4 Select the Execute Beautification option, select object BUWTP01S and click the OK button.

The following Figure 3-9 illustrates the Beautification Objects List screen with object BUWTP01S selected.

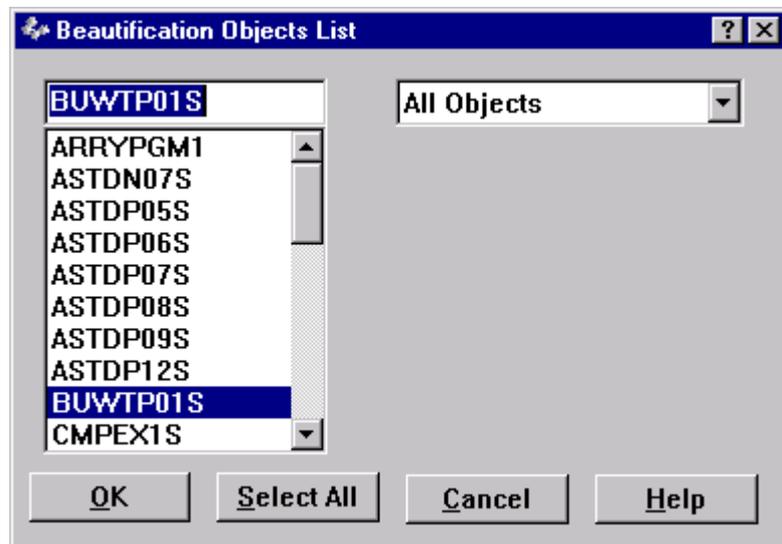


Figure 3-9 Beautification Objects List screen with BUWTP01S selected

Step 5 Review the source code in object BUWTP01S after Beautification has been applied.

The following Figure 3-10 illustrates the code after Beautification.

```

0010 /* EXAMPLE BUWTP01S : PROGRAM USED FOR BEAUTIFICATION TESTING
0020 /*          DATA DEFINITION LEVEL NUMBERS
0030 /*          STRUCTURED MODE
0040 /* Beautified by Natural Engineer 2001/09/10 18:24:25 by GSLXXX
0050 DEFINE DATA LOCAL
0060 01 VEH1 VIEW VEHICLES
0070     02 CAR-DETAILS
0080         03 MAKE
0090         03 MODEL
0100         03 COLOR
0110         03 YEAR
0120 /*
0130 01 #TOT-REC-COUNT                (I2)
0140 01 #COLOR-COUNTS
0150     02 #RED-COUNT                (I2)
0160     02 #GREEN-COUNT              (I2)
0170     02 #BLUE-COUNT               (I2)
0180     02 #WHITE-COUNT              (I2)
0190 01 #DRIVERS-NAME                (A100)
0200 01 REDEFINE #DRIVERS-NAME
0210     02 #FIRST-NAME                (A50)
0220     02 REDEFINE #FIRST-NAME
0230         03 #CHRISTIAN-NAME        (A25)
0240         03 #MIDDLE-NAME           (A25)
0250     02 #LAST-NAME                 (A50)
0260 END-DEFINE
0270 READ VEH1
0280 IF COLOR EQ 'RED'
0290 ADD 1 TO #RED-COUNT
0300 END-IF
0310 IF COLOR EQ 'GREEN'
0320 ADD 1 TO #GREEN-COUNT
0330 END-IF
0340 IF COLOR EQ 'BLUE'
0350 ADD 1 TO #BLUE-COUNT
0360 END-IF

```

Figure 3-10 Code after Beautification

MODE CONVERSION

Chapter Overview

This chapter describes the Mode Conversion option available from the Utilities menu. The Mode Conversion option provides the facility to convert Natural Reporting mode objects into Natural Structured mode objects.

The following topics are covered:

1. [Mode Conversion Overview](#)
2. [Mode Conversion Techniques](#)
3. [Mode Conversion GDA Processing](#)
4. [Mode Conversion Object Processing](#)

Mode Conversion Overview

Applications that utilize Natural Reporting mode can become more difficult to maintain, as they become more complex through continual expansion and development.

Key issues with Natural Reporting mode are:

- User defined variables can be defined anywhere, making it difficult to identify what variables are in use.
- Database fields do not need to be defined anywhere, making it difficult to identify the database data that is being referenced.
- Loop constructs are closed using the LOOP statement, making it difficult to identify where loop processing ends. For example READ, FIND, REPEAT and FOR blocks.
- Logical constructs are bound using the DO/DOEND statements, making it difficult to identify what conditional statements will be executed within complex logical blocks (nested IF statements).

Applications written in Natural Structured mode provide clear and well-defined program structure for complex application solutions.

Key benefits with Natural Structured mode are:

- All user defined variables are contained in the DEFINE DATA statement at the top of each object, making it easier to identify what variables are in use.
- All database fields must be defined using a view of the database file and are contained in the DEFINE DATA statement at the top of each object, making it easier to identify the database data being referenced.
- Loop constructs must be explicitly closed using corresponding 'END' constructs, making it easier to identify where each individual loop construct ends. For example END-READ, END-FIND, END-REPEAT and END-FOR.
- Logical constructs must be bound by using END-IF statements, making it easier to identify what conditional statements will be executed within complex logical blocks.

The Mode Conversion option provides the facility to convert Natural Reporting mode objects into Natural Structured mode objects.

Applications that are to be converted are extracted and loaded into the Repository using the Extract and Load processes. The modification library (where the converted objects will reside) is controlled within the Application Preferences screen. The Mode Conversion option can be used once the application has been loaded into the Repository.

Note: For more information on the Application Preferences, Extract and Load processes refer to the Application Management for Windows manual.

The Mode Conversion process is split into two sub-processes:

1. Global Data

The Global data requirements within an application are specified first and if required, a new GDA object can be generated. Once generated, it will contain all the Global data referenced within the application.

2. Object Conversion

Objects to be converted can be selected individually, in groups, or all objects within the application. The GDA option specified will be taken into account and the correct references added to the converted objects.

Mode Conversion can only be applied to the following Natural object types:

- Programs
- Subprograms
- Subroutines
- Help routines
- Copycodes

After the Mode Conversion process has completed, the conversion details are displayed on the Mode Conversion Log window.

Audit trail records are generated for each object converted (including new GDA objects) and can be viewed using the Change Management Tracking (CMT) option.

Note: The audit trail records are only available using the CMT Object Viewer option. For more information on CMT refer to Chapter 5.

Mode Conversion Techniques

This section describes the main conversion techniques applied during the Mode Conversion process.

Global Data Definitions

There are 2 conversion techniques available for Global data definitions:

1. Generate a new GDA.

- Will rationalize all existing GDA objects and/or in-line Global data definitions into one single new GDA object.
- Existing DEFINE DATA GLOBAL USING statements will be modified to reference the new GDA object name.
- A DEFINE DATA GLOBAL USING statement will be added to any objects that reference in-line Global data definitions only.
- Format and length attributes will be removed from in-line Global data definitions.

Example:

Before Conversion:

```
GDA1
0010 DEFINE DATA GLOBAL
0020 1 +ALPHA (A5)
0030 END-DEFINE

PROGRAM1
0010 DEFINE DATA
0020 GLOBAL USING GDA1
0030 END-DEFINE
0040 MOVE 'ABCDE' TO +ALPHA
0050 FETCH 'PROGRAM2'
0060 END
```

```
GDA2
0010 DEFINE DATA GLOBAL
0020 1 +NUMBER (N3)
0030 END-DEFINE

PROGRAM2
0010 DEFINE DATA
0020 GLOBAL USING GDA2
0030 END-DEFINE
0040 MOVE 123 TO +NUMBER
0050 MOVE 'HELLO WORLD'
0060 TO +TEXT-GLOBAL (A20)
0070 END
```

After Conversion:**NEWGDA**

```
0010 DEFINE DATA GLOBAL
0020 1 +ALPHA (A5)
0030 1 +NUMBER (N3)
0040 1 +TEXT-GLOBAL (A20)
0050 END-DEFINE
```

PROGRAM1

```
::::
0050 DEFINE DATA
0060 GLOBAL USING NEWGDA
0070 END-DEFINE
0080 MOVE 'ABCDE' TO +ALPHA
0090 FETCH 'PROGRAM2'
0100 END
```

PROGRAM2

```
::::
0050 DEFINE DATA
0060 GLOBAL USING NEWGDA
0070 END-DEFINE
0080 MOVE 123 TO +NUMBER
0090 MOVE 'HELLO WORLD'
0100 TO +TEXT-GLOBAL
0110 END
```

2. Use existing GDA object structure.

- No new GDA objects will be generated.
- Existing DEFINE DATA GLOBAL USING statements will not be modified.

Example:

Before Conversion:**OLDGDA**

```
0010 DEFINE DATA GLOBAL
0020 1 +LAST-PGM (A8)
0030 1 +NEXT-PGM (A8)
0040 END-DEFINE
```

PROGRAM1

```
0010 DEFINE DATA
0020 GLOBAL USING OLDGDA
0030 END-DEFINE
0040 MOVE 'PROGRAM1' TO +LAST-PGM
0050 MOVE 'PROGRAM2' TO +NEXT-PGM
0060 FETCH +NEXT-PGM
0070 END
```

After Conversion:**OLDGDA**

```
0010 DEFINE DATA GLOBAL
0020 1 +LAST-PGM (A8)
0030 1 +NEXT-PGM (A8)
0040 END-DEFINE
```

PROGRAM1

```
::::
0050 DEFINE DATA
0060 GLOBAL USING OLDGDA
0070 END-DEFINE
0080 MOVE 'PROGRAM1' TO +LAST-PGM
0090 MOVE 'PROGRAM2' TO +NEXT-PGM
0100 FETCH +NEXT-PGM
0110 END
```

User Defined Variables

- A DEFINE DATA LOCAL statement is added to the object and all user defined variables used within the object are defined here.
- Format and length attributes will be removed from the in-line user defined variables.
- RESET statements are added immediately after the END-DEFINE statement for any in-line user defined variables that have been defined using the RESET statement. For example: RESET #FIELD(A10).

Example:

Before Conversion:

```
PROGRAM1
0010 RESET #NAME (A20) #ADDRESS (A50)
0020 REDEFINE #ADDRESS (#ADDRESS-1 (A25) #ADDRESS-2 (A25))
0030 MOVE 'SMITH' TO #NAME
0040 MOVE '101 THE AVENUE' TO #ADDRESS-1
0050 MOVE 'UNITED KINGDOM' TO #ADDRESS-2
0060 MOVE 1234567890 TO #TELEPHONE-NUMBER (N10)
0070 END
```

After Conversion:

```
PROGRAM1
::::
0050 DEFINE DATA LOCAL
0060 1 #NAME (A20)
0070 1 #ADDRESS (A50)
0080 1 REDEFINE #ADDRESS
0090 2 #ADDRESS-1 (A25)
0100 2 #ADDRESS-2 (A25)
0110 1 #TELEPHONE-NUMBER (N10)
0120 END-DEFINE
0130 RESET #NAME #ADDRESS
0140 MOVE 'SMITH' TO #NAME
0150 MOVE '101 THE AVENUE' TO #ADDRESS-1
0160 MOVE 'UNITED KINGDOM' TO #ADDRESS-2
0170 MOVE 1234567890 TO #TELEPHONE-NUMBER
0180 END
```

Database Fields

- A DEFINE DATA LOCAL statement is added to the object and view definitions are added here.
- A separate view definition will be created for each database access statement referencing the same database file.
- The view definitions will contain the definitions found for each database field referenced within the object.

Example:

Before Conversion:

```
PROGRAM1
0010 READ EMPLOYEES
0020 DISPLAY PERSONNEL-ID NAME
0030 END
```

```
PROGRAM2
0010 FIND VEHICLES WITH MAKE = 'FORD'
0020   DISPLAY MAKE MODEL
0030 LOOP
0040 FIND VEHICLES WITH MAKE = 'TVR'
0050   DISPLAY MAKE MODEL
0060 LOOP
0070 END
```

After Conversion:

```
PROGRAM1
::::
0050 DEFINE DATA LOCAL
0060 1 EMPLOYEES VIEW OF EMPLOYEES
0070 2 PERSONNEL-ID
0080 2 FULL-NAME
0090 3 NAME
0100 /*
0110 END-DEFINE
0120 READ-0010.
0130 READ EMPLOYEES
0140 DISPLAY PERSONNEL-ID NAME
0150 END-READ
0160 END
```

```
PROGRAM2
::::
0050 DEFINE DATA LOCAL
0060 1 VEHICLES VIEW OF VEHICLES
0070 2 CAR-DETAILS
0080 3 MAKE
0090 3 MODEL
0100 /*
0110 1 VEHICLES-1 VIEW OF VEHICLES
0120 2 CAR-DETAILS
0130 3 MAKE
0140 3 MODEL
0150 /*
0160 END-DEFINE
0170 FIND-0010.
0180 FIND VEHICLES WITH MAKE = 'FORD'
0190 DISPLAY MAKE MODEL
0200 END-FIND
0210 FIND-0040.
0220 FIND VEHICLES-1 WITH MAKE = 'TVR'
0230 DISPLAY MAKE MODEL
0240 END-FIND
0250 END
```

Loop Constructs

- LOOP processing statements are replaced with corresponding END constructs.
- Applies to the following Natural statements:

Statement	Corresponding END Construct
CALL FILE	END-FILE
CALL LOOP	END-LOOP
FIND	END-FIND
FOR	END-FOR
HISTOGRAM	END-HISTOGRAM
READ	END-READ
READ WORK FILE	END-WORK
REPEAT	END-REPEAT
SORT	END-SORT

Example:

Before Conversion:

```
PROGRAM1
0010 READ EMPLOYEES
0020 DISPLAY PERSONNEL-ID NAME
0030 LOOP
::::
```

After Conversion:

```
PROGRAM1
::::
0120 READ-0010.
0130 READ EMPLOYEES
0140 DISPLAY PERSONNEL-ID NAME
0150 END-READ
::::
```

Conditional Logic Blocks

- Conditional statements will have the corresponding END constructs added.
- Any DO/DOEND statements will be removed.
- Applies to the following Natural statements:

Statement	Corresponding END Construct
IF	END-IF
IF NO RECORDS FOUND	END-NOREC
AT BREAK	END-BREAK
AT START OF DATA	END-START
AT END OF DATA	END-ENDDDATA
AT TOP OF PAGE	END-TOPPAGE
AT END OF PAGE	END-ENDPAGE
ON ERROR	END-ERROR

Example:

Before Conversion:

```

PROGRAM1
::::
0030 REPEAT
0040 ADD 1 TO #LOOP-CONTROL
0050 IF #LOOP-CONTROL LE 10
0060 DO
0070 WRITE 'STILL SOME PROCESSING TO DO'
0080 ESCAPE TOP
0090 DOEND
0100 ELSE
0110 DO
0120 WRITE 'PROCESSING COMPLETED'
0130 ESCAPE
0140 DOEND
0150 LOOP
::::

```

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After Conversion:

PROGRAM1

```
::::  
0100 REPEAT-0030.  
0110 REPEAT  
0120 ADD 1 TO #LOOP-CONTROL  
0130 IF #LOOP-CONTROL LE 10  
0140 WRITE 'STILL SOME PROCESSING TO DO'  
0150 ESCAPE TOP  
0160 ELSE  
0170 WRITE 'PROCESSING COMPLETED'  
0180 ESCAPE BOTTOM  
0190 END-IF  
0200 END-REPEAT  
::::
```

Subroutine Blocks

- Internal and external subroutines will have the RETURN statement replaced by the corresponding END-SUBROUTINE construct.

Example:

Before Conversion:

```
PROGRAM1
::::
0060 PERFORM ##CALCULATE-COST
0070 /*
0080 WRITE 'TOTAL COST WITH TAX =' #TOTAL-COST
0090 /*
0100 DEFINE SUBROUTINE ##CALCULATE-COST
0110 RESET #TEMP-COST #TOTAL-COST
0120 COMPUTE #TEMP-COST = #COST * #TAX
0130 #TOTAL-COST = #COST + #TEMP-COST
0140 RETURN
0150 END
```

After Conversion:

```
PROGRAM1
::::
0160 PERFORM ##CALCULATE-COST
0170 /*
0180 WRITE 'TOTAL COST WITH TAX =' #TOTAL-COST
0190 /*
0200 DEFINE SUBROUTINE ##CALCULATE-COST
0210 RESET #TEMP-COST #TOTAL-COST
0220 COMPUTE #TEMP-COST = #COST * #TAX
0230 COMPUTE #TOTAL-COST := #COST + #TEMP-COST
0240 END-SUBROUTINE
0250 END
```

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Open-ended ESCAPE Statements

- Any ESCAPE statements that do not specify a destination will have a destination of BOTTOM added.

Example:

Before Conversion:

```
PROGRAM1
::::
0030 REPEAT
0040 ADD 1 TO #LOOP-CONTROL
0050 IF #LOOP-CONTROL GE 10
0060 DO
0070 WRITE 'LOOP WILL NOW STOP'
0080 ESCAPE
0090 DOEND
0100 LOOP
::::
```

After Conversion:

```
PROGRAM1
::::
0100 REPEAT-0030.
0110 REPEAT
0120 ADD +1 TO #LOOP-CONTROL
0130 IF #LOOP-CONTROL GE 10
0140 WRITE 'LOOP WILL NOW STOP'
0150 ESCAPE BOTTOM
0160 END-IF
0170 END-REPEAT
::::
```

Short Form ASSIGN and COMPUTE Statements

- Short form ASSIGN and COMPUTE statements (i.e. statements with the ASSIGN/COMPUTE keyword omitted) will have the ASSIGN/COMPUTE keyword added.

Example:

Before Conversion:

```
PROGRAM1
::::
0030 #TAX = 0.0010
0040 ASSIGN #COST = 15000
::::
0120 COMPUTE #TEMP-COST = #COST * #TAX
0130 #TOTAL-COST = #COST + #TEMP-COST
::::
```

After Conversion:

```
PROGRAM1
::::
0130 ASSIGN #TAX = 0.0010
0140 ASSIGN #COST = 15000
::::
0220 COMPUTE #TEMP-COST = #COST * #TAX
0230 COMPUTE #TOTAL-COST = #COST + #TEMP-COST
::::
```

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Multiple Statements per Statement Line

- Any single statement line containing more than one statement will be split so that each statement is on a separate line.

Example:

Before Conversion:

PROGRAM1

```
::::  
0140 READ (10) PERSONNEL  
0150 IF NAME EQ 'ADKINSON' DO WRITE PERSONNEL-NUMBER NAME DOEND  
0160 LOOP  
::::
```

After Conversion:

PROGRAM1

```
::::  
0430 READ-0140.  
0440 READ (10) PERSONNEL  
0450 IF NAME EQ 'ADKINSON'  
0460 WRITE PERSONNEL-NUMBER NAME  
0470 END-IF  
0480 END-READ  
::::
```

MOVE INDEXED Statements

- MOVE INDEXED statements are replaced with standard MOVE statements.
- Suitable array definitions will be added for any MOVE INDEXED source variables that are not defined as arrays.

Example:

Before Conversion:

PROGRAM1

```

:::
0010 RESET #BLOCK-MULTIPLE (A26) #FIRST (A1) #LAST (A1)
0020 REDEFINE #BLOCK-MULTIPLE (#BLOCK-SINGLE (A1))
0030 RESET #CURRENCY-CODES (A3/4) #INDEX (I02)
0040 /*
0050 FORMAT LS=250
0060 /*
0070 MOVE 'ABCDEFGHJKLMNOPQRSTUVWXYZ' TO #BLOCK-MULTIPLE
0080 MOVE INDEXED #BLOCK-SINGLE <1> TO #FIRST
0090 MOVE INDEXED #BLOCK-SINGLE <26> TO #LAST
0100 WRITE '=' #FIRST '=' #LAST
0110 /*
0120 FORMAT LS=250
0130 MOVE 3 TO #ISN
0140 FIND EMPLOYEES WITH PERSONNEL-ID EQ '11100106'
0150 OBTAIN CURR-CODE (1-4)
0160 WRITE '=' PERSONNEL-ID / '=' NAME
0170 FOR #INDEX EQ 1 TO 4
0180 MOVE INDEXED CURR-CODE<#INDEX> TO #CURRENCY-CODES (#INDEX)
0190 WRITE #INDEX '=' #CURRENCY-CODES (#INDEX)
0200 LOOP
0210 LOOP
0220 /*
0230 END

```

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After Conversion:PROGRAM1

```

:::
0050 DEFINE DATA LOCAL
0060 1 #BLOCK-MULTIPLE (A026)
0070 1 REDEFINE #BLOCK-MULTIPLE
0080 2 #BLOCK-SINGLE (A001)
0090 1 REDEFINE #BLOCK-MULTIPLE
0100 2 #NEE@MI-#BLOCK-SINGLE (A001/1:26)
0110 1 #FIRST (A001)
0120 1 #LAST (A001)
0130 1 #CURRENCY-CODES (A003/1:4)
0140 1 #INDEX (I002)
0150 1 #ISN (N007)
0160 1 EMPLOYEES VIEW OF EMPLOYEES
0170 2 PERSONNEL-ID
0180 2 FULL-NAME
0190 3 NAME
0200 2 INCOME
0210 3 CURR-CODE(0000001:0000004)
0220 /*
0230 END-DEFINE
0240 RESET #BLOCK-MULTIPLE #FIRST #LAST
0250 RESET #CURRENCY-CODES (1:4) #INDEX
0260 /*
0270 FORMAT LS=250
0280 /*
0290 MOVE 'ABCDEFGHJKLMNOPQRSTUVWXYZ' TO #BLOCK-MULTIPLE
0300 MOVE #NEE@MI-#BLOCK-SINGLE (1) TO #FIRST
0310 MOVE #NEE@MI-#BLOCK-SINGLE (26) TO #LAST
0320 WRITE '=' #FIRST '=' #LAST
0330 /*
0340 FORMAT LS=250
0350 MOVE 3 TO #ISN
0360 FIND-0140.
0370 FIND EMPLOYEES WITH PERSONNEL-ID EQ '11100106'
0380 WRITE '=' PERSONNEL-ID / '=' NAME
0390 FOR-0170.
0400 FOR #INDEX EQ 1 TO 4
0410 MOVE CURR-CODE (#INDEX) TO #CURRENCY-CODES (#INDEX)
0420 WRITE #INDEX '=' #CURRENCY-CODES (#INDEX)
0430 END-FOR
0440 END-FIND
0450 /*
0460 END

```

Statement Reference Notation

- Statement labels are added to all loop processing statements and also to GET and STORE statements. The format used is:
KEYWORD-NNNN
where:
KEYWORD is the Natural keyword used in the statement. For example READ or FIND.
NNNN is the line number for the start of the statement in the original object.
- Any existing statement reference notation using source-code line numbers will be modified to use the new statement labels.
- Any existing statement labels will remain unchanged.
- Any database access view names will be modified to reflect the new view definitions.
- Any view name qualifiers on database fields will be modified to reflect the new view definitions.

Example:

Before Conversion:

PROGRAM1

```
0010 LIMIT 5
0020 READ EMPLOYEES
0030   DISPLAY PERSONNEL-ID NAME
0040 LOOP
0050 /*
0060 R2.
0070 READ EMPLOYEES
0080   DISPLAY PERSONNEL-ID(R2.) NAME(R2.)
0090 LOOP(R2.)
0100 /*
0110 READ EMPLOYEES
0120   DISPLAY PERSONNEL-ID(0110) NAME(0110)
0130 LOOP(0110)
0140 /*
0150 READ EMPLOYEES
0160   DISPLAY EMPLOYEES.PERSONNEL-ID EMPLOYEES.NAME
0170 LOOP
0180 /*
0190 END
```

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After Conversion:

PROGRAM1

```
::::
0050 DEFINE DATA LOCAL
0060 1 EMPLOYEES VIEW OF EMPLOYEES
0070 2 PERSONNEL-ID
0080 2 FULL-NAME
0090 3 NAME
0100 /*
0110 1 EMPLOYEES-1 VIEW OF EMPLOYEES
0120 2 PERSONNEL-ID
0130 2 FULL-NAME
0140 3 NAME
0150 /*
0160 1 EMPLOYEES-2 VIEW OF EMPLOYEES
0170 2 PERSONNEL-ID
0180 2 FULL-NAME
0190 3 NAME
0200 /*
0210 1 EMPLOYEES-3 VIEW OF EMPLOYEES
0220 2 PERSONNEL-ID
0230 2 FULL-NAME
0240 3 NAME
0250 /*
0260 END-DEFINE
0270 LIMIT 5
0280 READ-0020.
0290 READ EMPLOYEES
0300 DISPLAY PERSONNEL-ID NAME
0310 END-READ
0320 /*
0330 R2.
0340 READ EMPLOYEES-1
0350 DISPLAY PERSONNEL-ID (R2.) NAME (R2.)
0360 END-READ
0370 /*
0380 READ-0110.
0390 READ EMPLOYEES-2
0400 DISPLAY PERSONNEL-ID (READ-0110.) NAME (READ-0110.)
0410 END-READ
0420 /*
0430 READ-0150.
0440 READ EMPLOYEES-3
0450 DISPLAY EMPLOYEES-3.PERSONNEL-ID EMPLOYEES-3.NAME
0460 END-READ
0470 /*
0480 END
```

OBTAIN Statements

- OBTAIN statements are removed and are replaced with index values specified in the view definition for each database field referenced in the old OBTAIN statements.

Example:

Before Conversion:

```
PROGRAM1
0010 FIND EMPLOYEES WITH PERSONNEL-ID EQ '88888888'
0020   OBTAIN CURR-CODE (1:4)
0030   OBTAIN BONUS (1:4,1:4)
0040   DISPLAY PERSONNEL-ID BONUS (*,*) CURR-CODE (*)
0050 LOOP
0060 END
```

After Conversion:

```
PROGRAM1
:::
0050 DEFINE DATA LOCAL
0060 1 EMPLOYEES VIEW OF EMPLOYEES
0070 2 PERSONNEL-ID
0080 2 INCOME
0090 3 CURR-CODE (0000001:0000004)
0100 3 BONUS (0000001:0000004,0000001:0000004)
0110 /*
0120 END-DEFINE
0130 FIND-0010.
0140 FIND EMPLOYEES WITH PERSONNEL-ID EQ '88888888'
0150 DISPLAY PERSONNEL-ID BONUS (*,*) CURR-CODE (*)
0160 END-FIND
0170 END
```

SORT Statements

- The END-ALL statement will be inserted prior to the SORT statement.
- A statement notation label will be added using the format SORT-NNNN, where NNNN is the statement line number for the SORT statement in the original object.
- Corresponding END-SORT added.

Example:

Before Conversion:

PROGRAM1

```

:::
0190 FIND EMPLOYEES WITH CITY = 'DERBY'
0200 OBTAIN SALARY(1:2)
0210 /*
0220 COMPUTE #TOTAL-SALARY (P11) = SALARY (1) + SALARY (2)
0230 ACCEPT IF #TOTAL-SALARY GT 0
0240 /*
0250 SORT BY PERSONNEL-ID USING #TOTAL-SALARY SALARY(*) CURR-CODE
0260 GIVE AVER(#TOTAL-SALARY)
0270 /*
0280 AT START OF DATA
0290 DO
0300 WRITE NOTITLE '*' (40)
0310 'AVERAGE CUMULATIVE SALARY:' *AVER(#TOTAL-SALARY)
0320 MOVE *AVER (#TOTAL-SALARY) TO #AVERAGE (P11)
0330 DOEND
0340 /*
0350 COMPUTE #AVERAGE-PERCENT (N3.2) = #TOTAL-SALARY / #AVERAGE * 100
0360 ADD #TOTAL-SALARY TO #TOTAL-TOTAL (P11)
0370 /*
0380 DISPLAY NOTITLE PERSONNEL-ID SALARY (1) SALARY (2)
0390 #TOTAL-SALARY CURR-CODE (1)
0400 'PERCENT/OF/AVER' #AVERAGE-PERCENT
0410 /*
0420 AT END OF DATA
0430 WRITE / '*' (40) 'TOTAL SALARIES PAID: ' #TOTAL-TOTAL
0440 /*
0450 END

```

After Conversion:**PROGRAM1**

```
::::
0370 FIND-0190.
0380 FIND EMPLOYEES WITH CITY = 'DERBY'
0390 /*
0400 COMPUTE #TOTAL-SALARY = SALARY (1) + SALARY (2)
0410 ACCEPT
0420 IF #TOTAL-SALARY GT 0
0430 /*
0440 END-ALL
0450 SORT-0250.
0460 SORT BY PERSONNEL-ID USING #TOTAL-SALARY SALARY (*) CURR-CODE (1:1)
0470 GIVE AVER (#TOTAL-SALARY)
0480 /*
0490 AT START OF DATA
0500 WRITE NOTITLE '*' (40)
0510 'AVERAGE CUMULATIVE SALARY:' *AVER (#TOTAL-SALARY)
0520 MOVE *AVER (#TOTAL-SALARY) TO #AVERAGE
0530 END-START
0540 /*
0550 COMPUTE #AVERAGE-PERCENT = #TOTAL-SALARY / #AVERAGE * 100
0560 ADD #TOTAL-SALARY TO #TOTAL-TOTAL
0570 /*
0580 DISPLAY NOTITLE PERSONNEL-ID SALARY (1) SALARY (2)
0590 #TOTAL-SALARY CURR-CODE (1)
0600 'PERCENT/OF/AVER' #AVERAGE-PERCENT
0610 /*
0620 AT END OF DATA
0630 WRITE / '*' (40) 'TOTAL SALARIES PAID: ' #TOTAL-TOTAL
0640 /*
0650 END-ENDDATA
0660 END-SORT
0670 END
```

FIND FIRST/NUMBER/UNIQUE Statements

- FIND FIRST statements are converted to FIND (1) statements and a GET statement is added to reference any data. FIND FIRST is not valid in Structured mode.
- FIND NUMBER statements are converted to FIND (1) statements. The WHERE clause for FIND NUMBER is not valid in Structured mode.
- FIND UNIQUE statements are converted to FIND (1) statements and a GET statement is added to reference any data. FIND UNIQUE is not valid in Structured mode.

Example:

Before Conversion:

```

PROGRAM1
::::
0040 FIND FIRST EMPLOYEES WITH NAME = 'ADKINSON'
0050 WHERE SEX EQ 'F'
0060 WRITE '=' (70)
0070 WRITE 'THE NUMBER OF ADKINSON'S ON FILE =' *NUMBER
0080 WRITE 'THE NUMBER OF FEMALE ADKINSON'S =' *COUNTER
0090 WRITE 'THE FIRST RECORD LOCATED IS:'
0100 / 5T 'P-id:' PERSONNEL-ID (CD=RE)
0110 / 5T 'Name:' NAME (CD=RE)
0120 / 5T 'Sex :' SEX (CD=RE)
::::
0160 FIND NUMBER VEHICLES WITH MAKE = 'BMW'
0170 WHERE COLOR EQ 'BLACK'
0180 WRITE 'THE NUMBER OF BMW'S FOUND =' *NUMBER
0190 WRITE 'THE NUMBER OF BLACK BMW'S =' *COUNTER
::::
0230 FIND UNIQUE PERSONNEL WITH NAME = 'BAYER'
0240 WRITE 'PERSONNEL INFORMATION FOUND :'
0250 / 'Last Name:' NAME (CD=GR)
0260 / 'First Name:' FIRST-NAME (CD=GR)
0270 / 'Job Title :' JOB (CD=GR)
::::

```

After Conversion:**PROGRAM1**

```
::::
0280 FIND-0040.
0290 FIND (1) EMPLOYEES WITH NAME = 'ADKINSON'
0300 WHERE SEX EQ 'F'
0310 END-FIND
0320 GET-FIND-0040.
0330 GET EMPLOYEES *ISN ( FIND-0040. )
0340 WRITE '=' (70)
0350 WRITE 'THE NUMBER OF ADKINSON'S ON FILE =' *NUMBER (FIND-0040.)
0360 WRITE 'THE NUMBER OF FEMALE ADKINSON'S =' *COUNTER (FIND-0040.)
0370 WRITE 'THE FIRST RECORD LOCATED IS:'
0380 / 5T 'P-id:' PERSONNEL-ID (CD=RE)
0390 / 5T 'Name:' NAME (CD=RE)
0400 / 5T 'Sex :' SEX (CD=RE)
::::
0440 FIND-0160.
0450 FIND (1) VEHICLES WITH MAKE = 'BMW'
0460 WHERE COLOR EQ 'BLACK'
0470 END-FIND
0480 WRITE 'THE NUMBER OF BMW'S FOUND =' *NUMBER (FIND-0160.)
0490 WRITE 'THE NUMBER OF BLACK BMW'S =' *COUNTER (FIND-0160.)
::::
0530 FIND-0230.
0540 FIND (1) PERSONNEL WITH NAME = 'BAYER'
0550 END-FIND
0560 GET-FIND-0230.
0570 GET PERSONNEL *ISN ( FIND-0230. )
0580 WRITE 'PERSONNEL INFORMATION FOUND :'
0590 / 'Last Name:' NAME (CD=GR)
0600 / 'First Name:' FIRST-NAME (CD=GR)
0610 / 'Job Title :' JOB (CD=GR)
::::
```

Mode Conversion GDA Processing

The first stage of the Mode Conversion process is to address the Global data requirements within the application.

GDA Options Overview

When the Mode Conversion option is invoked, the Mode Conversion GDA Information window is displayed showing the GDA usage for the current application and the default GDA Options that will be set on the Mode Conversion GDA Options screen.

For each application being converted, there are three possible GDA options available:

1. Use new GDA

This will generate a new GDA object which will contain all the Global data used within the application. This may include all Global data from one or more existing GDA objects already used by the application and/or any in-line Global data definitions found within individual objects. The Mode Conversion process will use the new GDA object name as part of the 'DEFINE DATA GLOBAL USING' statement within each newly converted object that references Global data.

It is recommended that this option is used to ensure all Global data used by the application, is encapsulated within one GDA object. For applications using multiple GDA objects, this option will rationalize the GDA objects into one single GDA object.

2. Use converted GDA

This will use a previously generated GDA object, from a previous Mode Conversion execution using option 1 above. The Mode Conversion process will use the previously converted GDA object name as part of the 'DEFINE DATA GLOBAL USING' statement within each newly converted object that references Global data.

This option may be used if an application is being converted in phases using object ranges, or when additional single objects are being converted.

Note: This option is only available if the Mode Conversion process has been previously executed using the 'Use new GDA' option and the modification library contains the GDA object specified.

3. Use existing GDA

This will use the existing application GDA objects and the Mode Conversion process will not change the 'DEFINE DATA GLOBAL USING' statements within each newly converted object that references the GDA data.

If the application uses any in-line Global data definitions in addition to GDA objects, then the Mode Conversion In-line Global Variables option is invoked. This option allows you to specify the GDA object name, which will be generated to encapsulate all in-line Global data definitions used by the application. The Mode Conversion process will then add the 'DEFINE DATA GLOBAL USING' statements within each newly converted object that only references in-line Global data definitions.

Note: The Mode Conversion In-line Global Variables option is mandatory for any application that uses a mix of GDA objects and in-line Global data definitions when using the 'Use existing GDA' option. This is to ensure that the application Global data usage integrity is maintained after conversion.

GDA Processing Considerations

1. Duplicate Global data definitions.

Any Global data definitions that have the same name, format and length will be rationalized as one variable in the generated GDA.

Any Global data definitions that have the same name but different format and/or length will not be added to the generated GDA object. These will be reported in the Mode Conversion Log. For example:

```
Duplicate Global variable name with different format detected in Object: G02
- Global variable: +DUPLICATE-NAME-DIFF-FORMAT (A020)
- Global variable already included from Object: G01
```

2. Global data definitions used by subprograms.

Any Global data definitions found within GDA objects only used by subprograms will not be added to the generated GDA object. These will be reported in the Mode Conversion Log. For example:

```
GDA object only used by Subprograms detected - Object: SPGMGDA1
- This GDA is not included in the new GDA
```

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Any in-line Global data definitions found within subprograms will not be added to the generated GDA object. These will be reported in the Mode Conversion Log. For example:

```
In-line Global variable only used by Subprograms detected - Object: SUBPGM1
- Global variable: +SUBPGM-INLINE-GLOBAL
- This Global variable is not included in the new GDA
```

Note: Any subprograms containing in-line Global data definitions will not be converted. These will have to be manually rationalized before conversion is allowed. Subprograms using GDA objects will be converted.

3. Applications using multiple GDA objects.

Applications using multiple GDA objects can be addressed in any one of three ways:

1. Manually rationalize the multiple GDA objects into a new single GDA object. Any in-line Global data definitions would need to be identified and added to the new single GDA object. The application objects referencing Global data need to be changed to reference the new single GDA. Once this has been completed, the application needs to be extracted and loaded into the Repository, then the Mode Conversion process executed using the 'Use new GDA' option.

Note: This is the recommended method of dealing with multiple GDA objects as it will ensure the stability of the Global data usage within the application.

2. Automatically rationalize the multiple GDA objects into a new single GDA object using the Mode Conversion 'Use new GDA' option. This will generate a new single GDA object based on the GDA objects and any in-line Global data definitions found within the application.

3. Use the existing GDA objects. The existing GDA object usage within the application will be retained and any in-line Global data definitions will be encapsulated within a new single GDA object.

Mode Conversion GDA Information Window

The Mode Conversion GDA Information window displays the Global data usage information for the application along with the default options that will be displayed on the Mode Conversion GDA Options screen.

The Mode Conversion GDA Information window will be displayed after selecting the option Utilities → Mode Conversion.

The following Figure 4-1 illustrates an example of the Mode Conversion GDA Information window.



Figure 4-1 Example of the Mode Conversion GDA Information window

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The information displayed will be based on the following cases:

1. Application uses no Global data.

The application uses no Global data, either as GDA objects or in-line Global variable definitions.

SCREEN ITEMS	DESCRIPTION
GDA Information	For all GDA process executions: "Your application has no Global variables"
Default Options	Not applicable for this case.
OK button	Invokes the Mode Conversion Object Selection screen.

2. Application uses in-line Global variables only.

The application uses Global variables that have been defined in-line. The application does not use any GDA objects.

SCREEN ITEMS	DESCRIPTION
GDA Information	For all GDA process executions: "Your application has no Global Data Area in use" "Your application uses in-line global variables"
Default Options	For first time GDA process execution: "Default GDA name set to COMMON" "Default option 'Use new GDA' has been selected" For subsequent GDA process execution: "Default option 'Use converted GDA' has been selected"
OK button	Invokes the Mode Conversion GDA Options screen.

3. Application uses a single GDA object only.

The application uses Global variables that have been defined in a single GDA object. The application does not use any Global variables that have been defined in-line.

SCREEN ITEMS	DESCRIPTION
GDA Information	For all GDA process executions: "Your application has one Global Data Area in use" - 'GDA-name'
Default Options	For all GDA process executions: "Default option 'Use existing GDA' has been selected"
OK button	Invokes the Mode Conversion GDA Options screen.

Note: 'GDA-name' will be the GDA object name within the application.

4. Application uses a single GDA object and in-line Global variables.

The application uses Global variables that have been defined using a single GDA object and in-line definitions.

SCREEN ITEMS	DESCRIPTION
GDA Information	For all GDA process executions: "Your application has one Global Data Area in use" - 'GDA-name' "Your application uses in-line global variables"
Default Options	For first time GDA process execution: "Default GDA name set to 'GDA-name'" "Default option 'Use new GDA' has been selected" For subsequent GDA process execution: "Default option 'Use converted GDA' has been selected"
OK button	Invokes the Mode Conversion GDA Options screen.

Note: 'GDA-name' will be the GDA object name within the application.

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5. Application uses multiple GDA objects and no in-line Global variables.

The application uses Global variables that have been defined in more than one GDA object. The application does not use any Global variables that have been defined in-line.

SCREEN ITEMS	DESCRIPTION
GDA Information	<p>For all GDA process executions:</p> <p>"Your application has more than one Global Data Area in use"</p> <ul style="list-style-type: none"> - 'GDA-name' - 'GDA-name' <p><i>Note: A maximum of four GDA object names will be displayed. If there are more than four GDA objects are used, then the text '<MORE>' will be shown. For example:</i></p> <ul style="list-style-type: none"> - 'GDA-name' - 'GDA-name' - 'GDA-name' - 'GDA-name' - <MORE>
Default Options	<p>For all GDA process executions:</p> <p>"Default option 'Use existing GDAs' has been selected"</p>
OK button	<p>Invokes the Mode Conversion GDA Options screen.</p>

Note: 'GDA-name' will be the GDA object name within the application.

6. Application uses a mix of multiple GDA objects and in-line Global variables.

The application uses Global variables that have been defined using both GDA objects and in-line definitions.

SCREEN ITEMS	DESCRIPTION
GDA Information	<p>For all GDA process executions:</p> <p>"Your application has more than one Global Data Area in use"</p> <ul style="list-style-type: none"> - 'GDA-name' - 'GDA-name' <p>"Your application uses in-line global variables"</p> <p><i>Note: A maximum of four GDA object names will be displayed. If there are more than four GDA objects are used, then the text '<MORE>' will be shown. For example:</i></p> <ul style="list-style-type: none"> - 'GDA-name' - 'GDA-name' - 'GDA-name' - 'GDA-name' - <MORE>
Default Options	<p>For all GDA process executions:</p> <p>"Default option 'Use existing GDAs' has been selected"</p>
OK button	Invokes the Mode Conversion GDA Options screen.

Note: 'GDA-name' will be the GDA object name within the application.

Mode Conversion GDA Options Window

The Mode Conversion GDA Options window allows you to specify what GDA processing is to be applied to the converted application.

Note: If the application uses no Global data (either as GDA objects or in-line Global variable definitions) then the Mode Conversion GDA Options window will not be displayed.

The Mode Conversion GDA Options window is invoked by using the 'OK' button on the Mode Conversion GDA Information screen.

The following Figure 4-2 illustrates the Mode Conversion GDA Options screen.

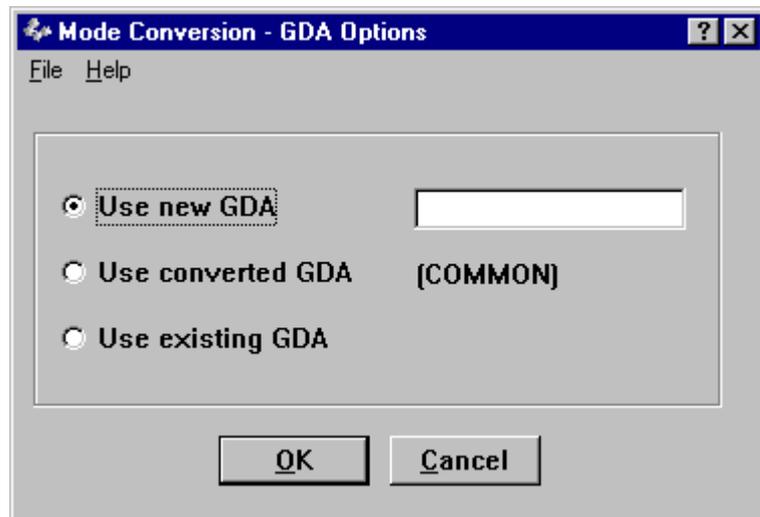


Figure 4-2 Mode Conversion GDA Options screen

MENU ITEMS	OPTIONS	DESCRIPTION
File	Exit	Exit the Mode Conversion GDA Options screen and return back to the main Natural Engineer screen.
Help		Invokes the Mode Conversion GDA Options help.

SCREEN ITEMS	DESCRIPTION
Use new GDA	Specify this option to create a new GDA object to be used by the converted application.
GDA Name	<p>Specify the GDA object name to be used. The GDA name is mandatory if the 'Use new GDA' option has been selected.</p> <p>The GDA name will normally appear 'blank' except under the following conditions:</p> <ol style="list-style-type: none"> 1. Will be set to COMMON if the application only uses in-line Global definitions and has no GDA objects. 2. Will be set to the 'GDA-name' used by the application if the application uses in-line Global definitions and a single GDA object. <p><i>Note: These default values may be overwritten as required.</i></p>
Use converted GDA	<p>Specify this option if you wish to use a previously converted GDA object.</p> <p>The name of the previously converted GDA object will appear enclosed in brackets. For example [COMMON].</p> <p><i>Note: This option is only available if the Mode Conversion process has been previously executed using the 'Use new GDA' option and the modification library contains the GDA object specified.</i></p>
Use existing GDA	<p>Specify this option if you wish to use the application's existing GDA objects.</p> <p><i>Note: If the application uses any in-line Global definitions, then the Mode Conversion In-line Global Variables screen will be displayed.</i></p>

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BUTTON NAME	DESCRIPTION
OK	<p>Validates the selection made and invokes one of the following processes depending on the option selected:</p> <ol style="list-style-type: none">'Use new GDA' Mode Conversion process will be invoked to generate the new GDA object. Depending on the volume of Global data present, the GDA generation may take some time to complete. The Mode Conversion Object Selection screen will not be displayed until this process has completed.'Use converted GDA' Mode Conversion Object Selection screen displayed.'Use existing GDA' If the application uses no in-line Global definitions then the Mode Conversion Object Selection screen will be displayed. If the application does use in-line Global definitions, then the Mode Conversion In-line Global Variables screen will be displayed.
Cancel	<p>Exit the Mode Conversion GDA Options screen and return back to the main Natural Engineer screen.</p>

Mode Conversion In-line Global Variables Window

The Mode Conversion In-line Global Variables window allows you to specify the GDA object name to be used for any in-line Global variable definitions found within the application.

This option is mandatory if the application uses both GDA objects and in-line Global variable definitions.

Note: The Mode Conversion In-line Global Variables window is only displayed if the 'Use existing GDA' option has been selected on the Mode Conversion GDA Options screen and the application contains in-line Global variable definitions.

The Mode Conversion In-line Global Variables window is invoked by selecting option 'Use existing GDA' on the Mode Conversion GDA Options screen and using the 'OK' button.

The following Figure 4-3 illustrates the Mode Conversion In-line Global Variables screen.

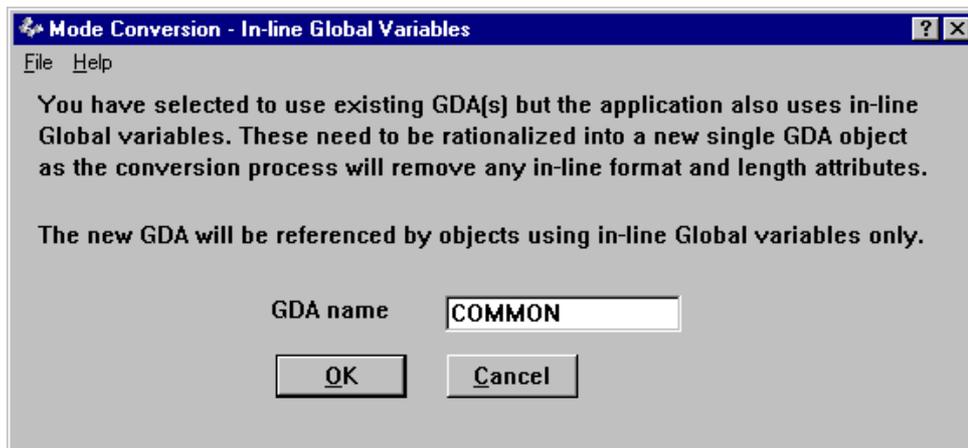


Figure 4-3 Mode Conversion In-line Global Variables screen

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MENU ITEMS	OPTIONS	DESCRIPTION
File	Exit	Exit the Mode Conversion In-line Global Variables screen and return back to the Mode Conversion GDA Options screen.
Help		Invokes the Mode Conversion In-line Global Variables help.

SCREEN ITEMS	DESCRIPTION
Explanation text	Provides an explanation for the Mode Conversion In-line Global Variables option.
GDA name	Specify the GDA object name to be used. The GDA name is mandatory and the GDA object name must not already exist on the modification library. The default GDA name will be set to 'COMMON'. This may be overwritten as required.

BUTTON NAME	DESCRIPTION
OK	Validates the selection made and invokes the Mode Conversion process to generate the new GDA object. Once completed, the Mode Conversion Object Selection screen will be displayed. <i>Note: If the GDA name specified already exists on the modification library an error message will be displayed. The GDA name will need to be changed before you can continue.</i>
Cancel	Exit the Mode Conversion In-line Global Variables screen and return back to the Mode Conversion GDA Options screen.

Mode Conversion Object Processing

The second stage of the Mode Conversion process is to select the objects to be converted and then invoke the Mode Conversion Object processing.

Mode Conversion Object Selection Window

The Mode Conversion Object Selection window allows you to select the objects that are to be converted for the application.

The Mode Conversion Object Selection window is invoked by using the 'OK' button on the Mode Conversion GDA Options screen.

The following Figure 4-4 illustrates the Mode Conversion Object Selection screen.

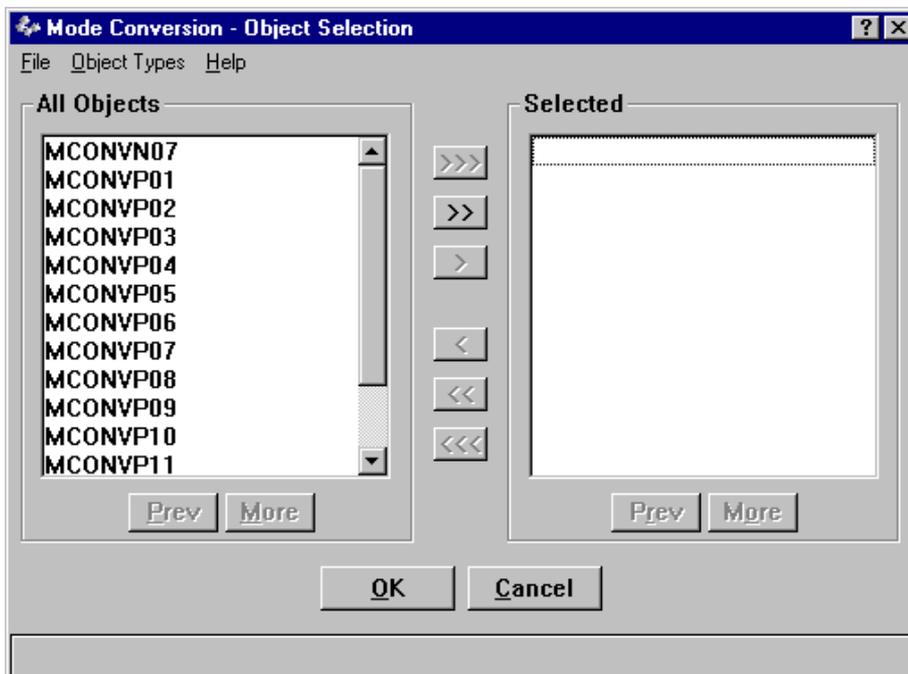


Figure 4-4 Mode Conversion Object Selection screen

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MENU ITEMS	OPTIONS	DESCRIPTION
File	Change Start Position of Object List	Allows the Object List to be restarted from a particular object.
	Exit	Exit the Mode Conversion Object Selection screen and return back to the main Natural Engineer screen.
Object Types	Allows you to select the Object Types to be listed. Available selections are: <ul style="list-style-type: none"> ▪ All Objects ▪ Programs ▪ Subprograms ▪ Subroutines ▪ Help routines ▪ Copycodes 	
Help		Invokes the Mode Conversion Object Selection help.

SCREEN ITEMS	DESCRIPTION
Object List	List of Reporting mode objects loaded in the Repository for the current application. No Structured mode objects will be listed.
Selected Object List	List of all the objects selected for which Mode Conversion will be applied. At least one object must be selected to run the conversion process.

BUTTON NAME	DESCRIPTION
Prev	Scrolls the object list to previous page. This button will be available/unavailable depending on the value specified in the LISTBOXMAX parameter in the NATENG.INI file.
More	Scrolls the object list forward one page. This button will be available/unavailable depending on the value specified in the LISTBOXMAX parameter in the NATENG.INI file.

BUTTON NAME	DESCRIPTION
>>>	Select all objects in the Object list (when more than one page is available, as set by the LISTBOXMAX parameter in the NATENG.INI file).
>>	Select all objects on the current page in the Object list.
>	Select all selected objects in the Object list.
<	De-select all selected objects in the 'Selected' list.
<<	De-select all objects on the current page in the 'Selected' list.
<<<	De-select all objects in the 'Selected' list (when more than one page is available, as set by the LISTBOXMAX parameter in the NATENG.INI file).
<i>Note: Objects can also be selected or de-selected by using the left mouse button and double clicking.</i>	
OK	Invoke the Mode Conversion process for the objects selected.
Cancel	Cancels any object selection and return back to the Mode Conversion GDA Options screen.
<i>Note: If your application uses no Global data (either as GDA objects or in-line Global variable definitions) then you will be returned to the main Natural Engineer screen.</i>	

Note: For more information on the NATENG.INI file parameter LISTBOXMAX refer to Chapter 1 in the Natural Engineer Administration Guide for Windows manual.

Mode Conversion Information Window

The Mode Conversion Information window summarizes the GDA options to be applied during the conversion process. It is possible at this stage to cancel the conversion process and make new object selection and/or change the GDA options to be used.

Note: If the application uses no Global data (either as GDA objects or in-line Global variable definitions) then the Mode Conversion Information window will not be displayed.

The following Figure 4-5 illustrates an example of the Mode Conversion Information screen.

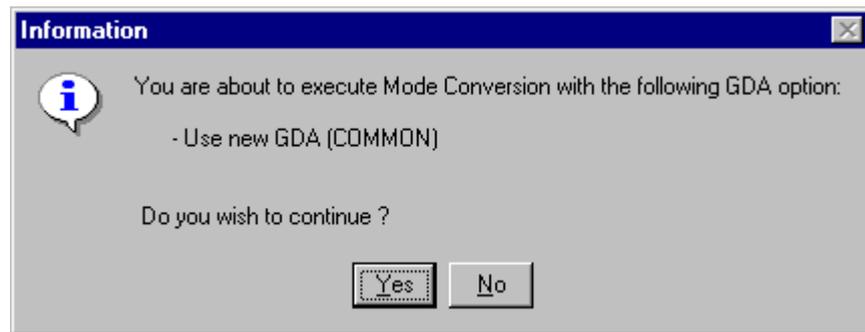


Figure 4-5 Example of the Mode Conversion Information screen

SCREEN ITEMS	DESCRIPTION
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You are about to execute Mode Conversion with the following GDA option:

List the GDA option that will be used during the conversion process. The GDA options available are:

- Use new GDA ['GDA-name']

Conversion will use the new GDA 'GDA-name' when converting objects.

- Use converted GDA ['GDA-name']

Conversion will use the previously converted GDA 'GDA-name' when converting objects.

- Use existing GDA

Conversion will use the existing application GDA when converting objects.

Note: 'GDA-name' will contain the name of the GDA that has been specified on the Mode Conversion GDA Options screen.

BUTTON NAME	DESCRIPTION
-------------	-------------

Yes

Invoke the Mode Conversion process.

No

Cancel the Mode Conversion process and return back to the Mode Conversion Object Selection screen.

Canceling Active Mode Conversion Tasks

Once the Mode Conversion process has been invoked, it is possible to cancel the conversion by using the 'Cancel' button on the Mode Conversion progress window.

This will cancel the mode conversion process after the current object has been converted. A log entry will then be displayed in the Mode Conversion Log. For example:

PGM1 converted to Structured mode
PGM2 - Process interrupted by user

Note: For more information on the Mode Conversion Log refer to section [Mode Conversion Log Window](#).

Overwrite Warning Window

In the event that Mode Conversion is being re-run for an application, any objects that already exist in the modification library will result in the Overwrite Warning window being displayed.

The following Figure 4-6 illustrates the Overwrite Warning window.

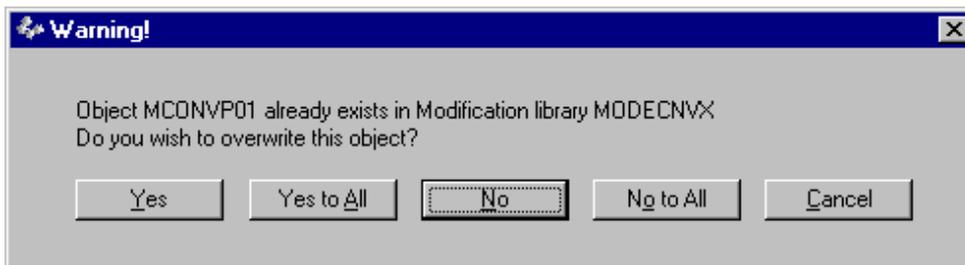


Figure 4-6 Overwrite Warning window

BUTTON NAME	DESCRIPTION
Yes	Allow the current object to be overwritten in the modification library. The Overwrite Warning window will re-display for the next object found in the modification library.

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BUTTON NAME	DESCRIPTION
Yes to All	<p>Allow the current object to be overwritten in the modification library and also overwrite any subsequent objects.</p> <p>The Overwrite Warning window will not be displayed for any subsequent objects found in the modification library.</p>
No	<p>Do not allow the current object to be overwritten in the modification library. The object will not be converted.</p> <p>The Overwrite Warning window will re-display for the next object found in the modification library.</p> <p>A log entry for each object will be displayed in the Mode Conversion Log. For Example:</p> <p>PGM1 not replaced - user specified</p>
No to All	<p>Do not allow the current object to be overwritten in the modification library and also do not overwrite any subsequent objects. These objects will not be converted.</p> <p>The Overwrite Warning window will not be displayed for any subsequent objects found in the modification library.</p> <p>A log entry for each object will be displayed in the Mode Conversion Log. For Example:</p> <p>PGM1 not replaced - user specified PGM2 not replaced - user specified</p>
Cancel	<p>Will stop the Mode Conversion Process and display the Mode Conversion Log screen with the following log entry:</p> <p>Process cancelled</p>

Mode Conversion Log Window

The Mode Conversion Log window is displayed at the end of a conversion process. The Mode conversion log window will contain a list of entries showing the conversion process activity.

The following Figure 4-7 illustrates the Mode Conversion Log screen showing GDA conversion details.

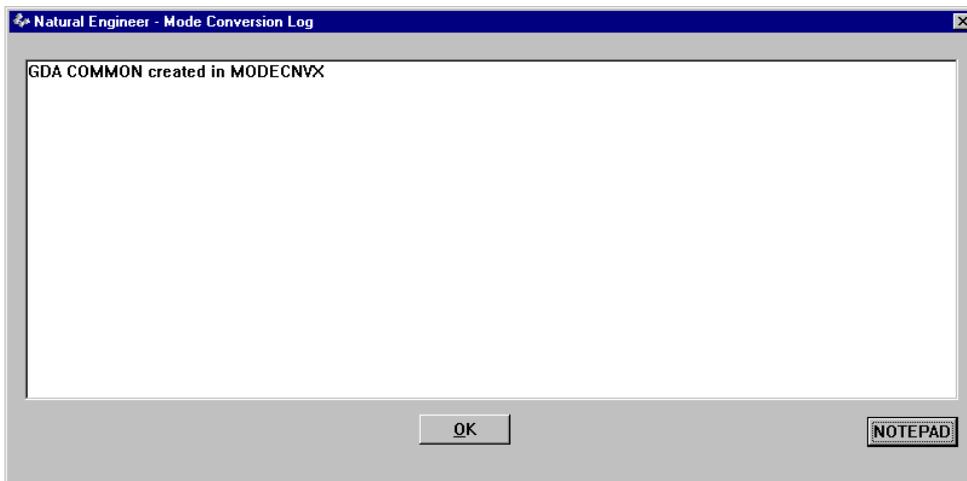


Figure 4-7 Mode Conversion Log screen showing GDA conversion details

The following Figure 4-8 illustrates the Mode Conversion Log screen showing object conversion details.

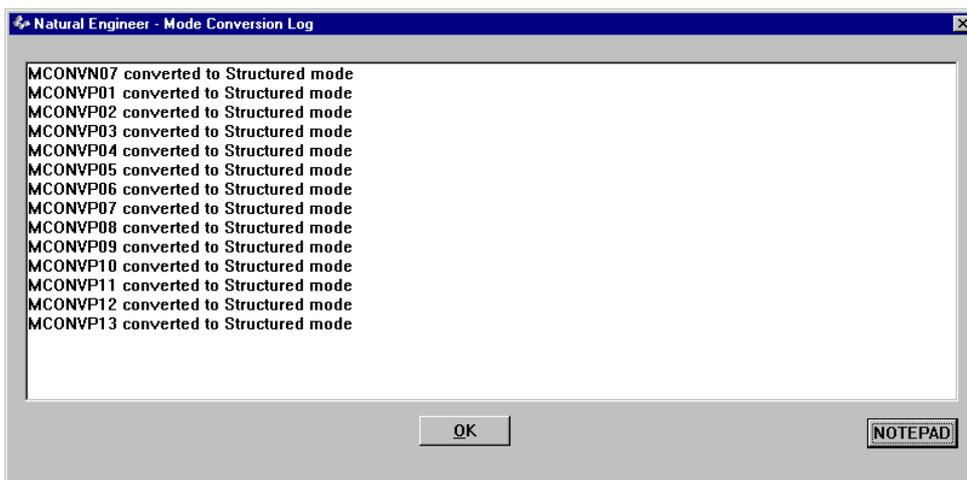


Figure 4-8 Mode Conversion Log screen showing object conversion details

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SCREEN ITEMS	DESCRIPTION
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Details

A separate entry for each object and/or process action will be displayed here. Example entries:

GDA COMMON created in MODECNVX

PGM1 converted to Structured mode

PGM1 not replaced - user specified

PGM1 - Process interrupted by user

Process cancelled

SUBPGM1 cannot be converted. SubProgram contains in-line globals

Note: Entries for duplicate Global data definitions and Global data definitions used by subprograms are also displayed. For examples of these refer to section [GDA Processing Considerations](#).

BUTTON NAME	DESCRIPTION
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OK

Close the Mode Conversion Log screen and return back to the main Natural Engineer screen.

Note: If the last function was 'Use new GDA', the Mode Conversion Object Selection screen will be displayed.

Notepad

Opens the text editor Notepad using the Mode Conversion files:

- 'Convghda.txt' - for GDA conversion details.
- 'Convobj.txt' - for object conversion details.

From here it is possible to print the log details and/or save them.

Note: The Mode Conversion files are located in X:\PROGRAM FILES\SOFTWARE AG\NATURAL ENGINEER\4.4.2\DATA directory (where X: is the drive on which Natural Engineer has been installed).

CHANGE MANAGEMENT TRACKING (CMT)

Chapter Overview

This chapter describes the Change Management Tracking (CMT) option available from the Utilities menu. The CMT option provides the facility to track changes that have been applied to objects within an application using Natural Engineer.

The following topics are covered:

1. [Change Management Tracking Overview](#)
2. [Change Management Tracking Object Viewer](#)
3. [Change Management Tracking Reports](#)
4. [Change Management Tracking Examples](#)

Change Management Tracking Overview

The CMT option provides audit trail data per object within an application that has used Natural Engineer to administer maintenance changes.

Any updates applied by Natural Engineer to an application's objects generate audit trail records for the application on the Repository. These audit trail records contain the before and after images of updated code, a date and time stamp of when the updates were made and the User Id of the person making the update.

The audit trail records are accumulated per object, and are only deleted when the application is deleted from the Repository. This allows for complete tracking of updates for an application during its maintenance life cycle within Natural Engineer.

The audit trail records can be viewed online or as hardcopy reports using Reporter or Excel spreadsheet format.

CMT Object Viewer Window

The CMT Object Viewer window allows you to select and review online audit trail records for individual objects. These audit trail records can be seen for a single version or for all versions for that object.

The list of objects that have been loaded in the Repository and have had modification within Natural Engineer applied to them, are listed in a selection box. When an object is selected the relevant audit trail records will be displayed.

The CMT Object Viewer screen is accessed by the following menu navigation: Utilities → Change Tracking → Object Viewer.

The following Figure 5-1 illustrates the CMT Object Viewer screen.

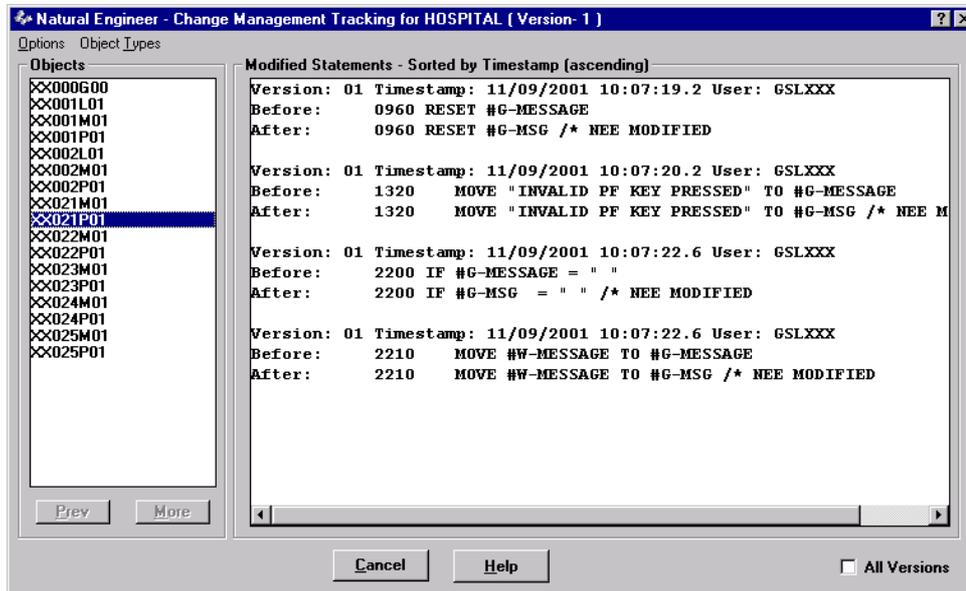


Figure 5-1 CMT Object Viewer screen

MENU ITEMS	OPTIONS	DESCRIPTION
Options		Provides various sub-options:
	Audit Record Sort Order	Sort the data to show the audit trail records in one of the following orders: <ul style="list-style-type: none"> ▪ Timestamp – Ascending. ▪ Timestamp – Descending. ▪ User Id – Ascending. ▪ User Id – Descending. ▪ Line Number – Ascending. ▪ Line Number – Descending.
	Change Start Position of Object List	Allows the list of Objects to be restarted from a particular object.
	Version	Allows you to select an alternate version.
	Close	Will close the CMT Object Viewer screen and return back to the main Natural Engineer screen.
Object Types	Allows you to select the Object Types to be listed. Available selections are: <ul style="list-style-type: none"> ▪ All objects ▪ Programs ▪ Maps ▪ Parameter Data Areas ▪ Global Data Areas ▪ Local Data Areas ▪ Copycodes ▪ Subprograms ▪ Subroutines ▪ Help routines ▪ Dialogs ▪ Classes 	

SCREEN ITEMS	DESCRIPTION
Objects	Lists all the objects in the application that have had modifications applied within Natural Engineer. This list can be tailored to your requirements using the options in the Object Types menu.
Modified Statements	This will show the audit trail records for the selected object.
All Versions	If this box is checked, then all the versions of audit trail records for the selected object will be displayed.

BUTTON NAME	DESCRIPTION
Prev	Scrolls the object list to previous page. This button will be available/unavailable depending on the value specified in the LISTBOXMAX parameter in the NATENG.INI file.
More	Scrolls the object list forward one page. This button will be available/unavailable depending on the value specified in the LISTBOXMAX parameter in the NATENG.INI file.
Cancel	Will close the CMT Object Viewer screen and return back to the main Natural Engineer screen.
Help	Invokes the CMT help.

Note: For more information on the NATENG.INI file parameter LISTBOXMAX refer to Chapter 1 in the Natural Engineer Administration Guide for Windows manual.

CMT Reports Window

The CMT Reports window allows you to review audit trail records for individual or a range of objects within an application using any one of three reporting options.

The CMT Reports screen is accessed by the following menu navigation: Utilities → Change Tracking → Reports.

The following Figure 5-2 illustrates the CMT Reports screen.

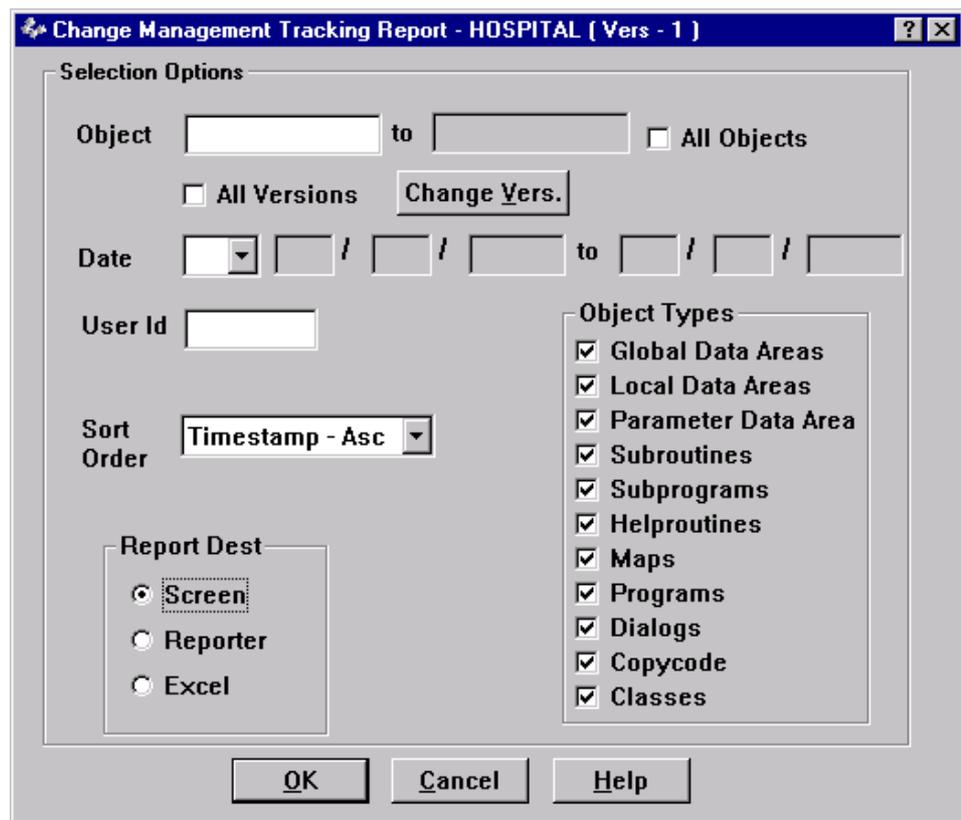


Figure 5-2 CMT Reports screen

SCREEN ITEMS	DESCRIPTION
Objects	Allows you to select an individual or range of objects to report on. For Example: if XX021P01 is entered, then only audit trail records for XX021P01 will be reported.
All Objects	If checked, then all the objects with audit trail records within the current application will be reported.
All Versions	If checked, will report on all the versions for each object within the application.
Date	Allows you to specify date ranges resulting in audit trail records matching the date range being reported only. <p>Date Operator The operator used to qualify the date range specified. Valid operators are: GT – greater than. LT – less than. EQ – equal to.</p> <p>From Date Start from date using format DDMMYYYY.</p> <p>To Date End at date using format DDMMYYYY.</p>
User Id	Allows you to specify a User Id, which will result in audit trail records for the specified user being reported only. This input is case dependent. For Example: ‘xx209’ will only report a User Id of ‘xx209’ and not ‘XX209’.
Sort Order	Allows you to specify the Sort order that the audit trail records will be reported in. Available sort orders are: <ul style="list-style-type: none"> ▪ Timestamp – Ascending. ▪ Timestamp – Descending. ▪ User Id – Ascending. ▪ User Id – Descending. ▪ Line Number – Ascending. ▪ Line Number – Descending.
Report Dest	Select the type of Report medium to be used to display the audit trail records. Available options are: <p>Screen Will display the report using Natural screen.</p> <p>Reporter Will display the report using Natural Reporter.</p> <p>Excel Will display the report using Excel spreadsheet.</p>

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Object Types	Allows you to select the Object Types to be reported. Available selections are: <ul style="list-style-type: none">▪ Programs▪ Maps▪ Parameter Data Areas▪ Global Data Areas▪ Local Data Areas▪ Copycodes▪ Subprograms▪ Subroutines▪ Helproutines▪ Dialogs▪ Classes
---------------------	---

BUTTON NAME DESCRIPTION

Change Vers.	Allows you to select an alternate version.
OK	Accept the CMT Reports criteria and produce the report.
Cancel	Cancels any CMT Reports criteria specified and return back to the main Natural Engineer screen.
Help	Invokes the CMT Reports help.

CMT Examples

To illustrate the Change Management Tracking process, two examples are shown using the sample Natural application HOSPITAL.

The two examples are:

1. To demonstrate the CMT Object Viewer option for a simple modification applied to the sample application HOSPITAL.
2. To demonstrate the CMT Reports option for a simple modification applied to the sample application HOSPITAL.

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Example 1 – Use of CMT Object Viewer option.

This example will demonstrate the CMT Object Viewer option showing a simple set of audit trail records for objects that have been modified using the sample application HOSPITAL.

All the objects from the HOSPITAL application have been extracted and loaded into the Repository and the steps in this example start from the Impact Analysis process.

Step 1 Version 1 impact search criteria have been specified to search for keyword DATAITEM with search values of #G-MESSAGE, #L-MESSAGE and #M-MESSAGE. Replace values for each of these criteria have been specified as #G-MSG, #L-MSG and #M-MSG respectively.

The following Figure 5-3 illustrates the Impact Criteria Summary screen.

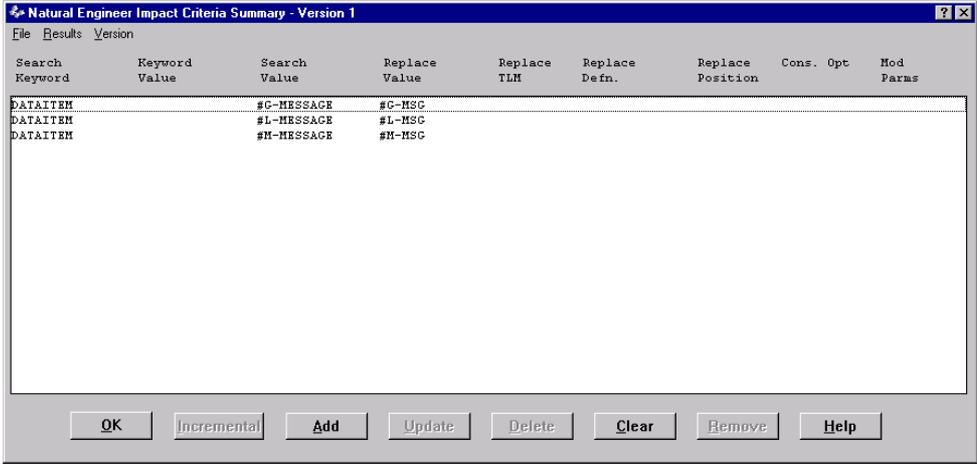


Figure 5-3 Impact Criteria Summary screen

Step 2 After Impact Analysis has been executed; modification has been applied to all the impacted objects.

The following Figure 5-4 illustrates the Modification Element Maintenance screen after all the objects have been modified. Object XX000G00 has been selected and also data item #G-MESSAGE, just to show the modification parameters that have been applied.

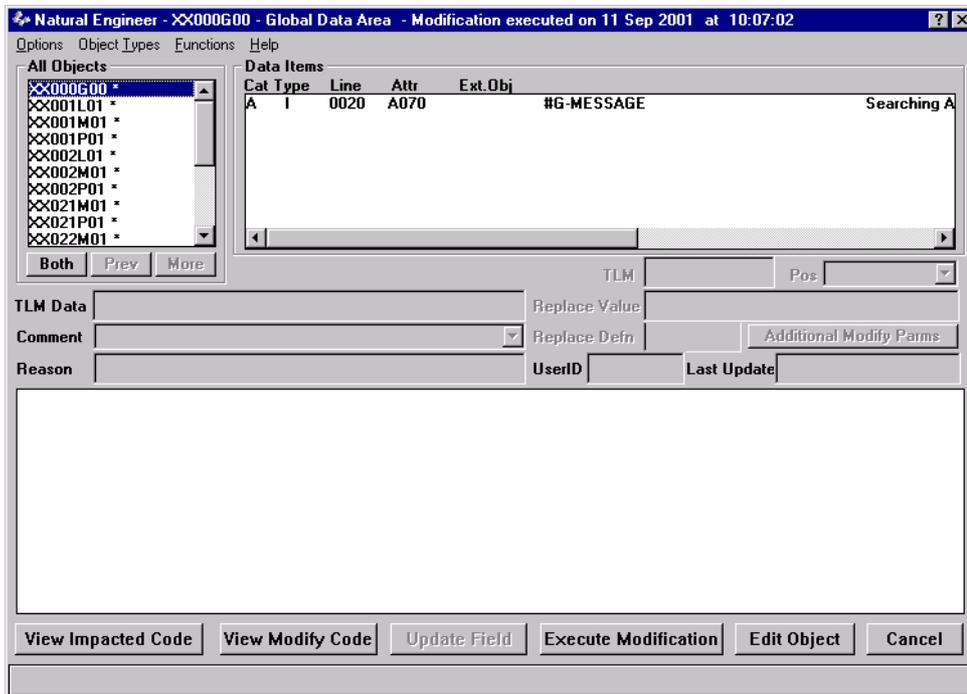


Figure 5-4 Modification Element Maintenance screen after all objects have been modified

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Step 3 The CMT Object Viewer option is selected using the menu navigation Utilities→Change Tracking→Object Viewer. On the Object Viewer screen, object XX001P01 has been selected from the Modified Objects List to produce the relevant audit trail records for that object.

In the Modified statements box all the audit trail records are displayed. For each modification applied to object XX001P01 there is a before and after image of the statements. For this object, it shows the modification of #L-MESSAGE to #L-MSG. For each set of before and after images there is information to show the version applicable to that change, the timestamp of when the change was applied and the User Id that applied the change.

The following Figure 5-5 illustrates the CMT Object Viewer screen displaying object XX001P01 audit trail records.

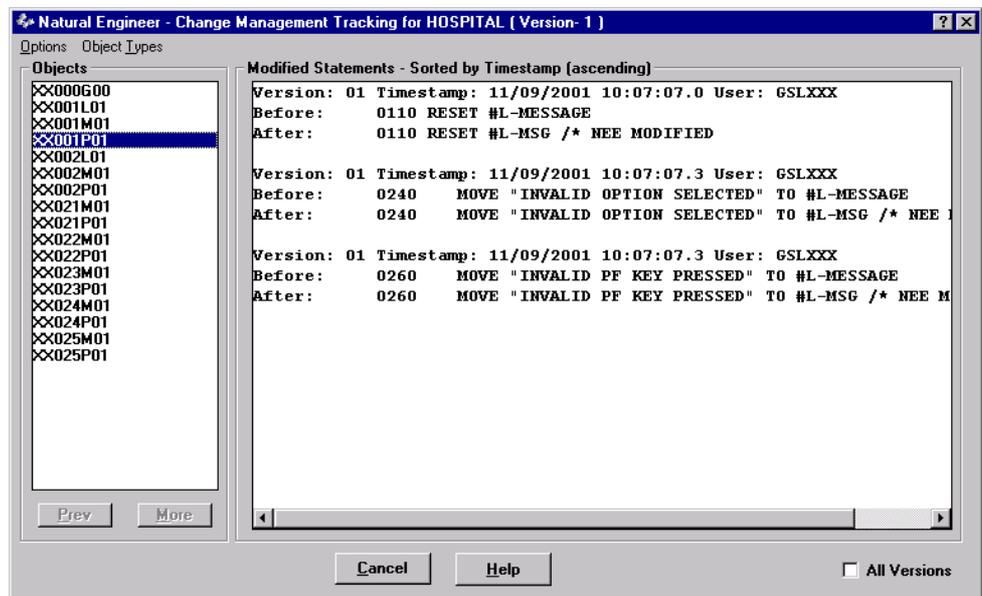


Figure 5-5 CMT Object Viewer screen displaying object XX001P01 audit trail records

Example 2 – Use of CMT Reports option.

This example will demonstrate the CMT Reports option showing a simple set of audit trail records for objects using each of the reporting display options.

This example uses the same objects from the application HOSPITAL, as used in example 1.

Step 1 The same set of Version 1 impact search criteria have been applied as in Example 1 above. Also, the same modifications have been executed.

Step 2 The CMT Reports option is selected using the menu navigation Utilities→Change Tracking→Reports. On the CMT Reports selection screen; module XX001P01 has been selected and the Screen reporting destination has been checked.

The following Figure 5-6 illustrates the CMT Reports screen showing the specified reporting options.

The screenshot shows a dialog box titled "Change Management Tracking Report - HOSPITAL (Vers - 1)". The "Selection Options" section contains the following fields and controls:

- Object:** A text box containing "XX001P01" followed by "to" and an empty text box. There is an unchecked checkbox labeled "All Objects".
- All Versions:** An unchecked checkbox with a "Change Vers." button next to it.
- Date:** A date selection field with a dropdown arrow, followed by two empty boxes separated by a slash, then "to" and another two empty boxes separated by a slash.
- User Id:** An empty text box.
- Sort Order:** A dropdown menu currently showing "Timestamp - Asc".
- Report Dest:** A group box containing three radio buttons: "Screen" (selected), "Reporter", and "Excel".
- Object Types:** A list of object types with checkboxes, all of which are checked:
 - Global Data Areas
 - Local Data Areas
 - Parameter Data Area
 - Subroutines
 - Subprograms
 - Help routines
 - Maps
 - Programs
 - Dialogs
 - Copycode
 - Classes

At the bottom of the dialog are three buttons: "OK", "Cancel", and "Help".

Figure 5-6 CMTS Reports selection screen showing the specified reporting options

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Step 3 By clicking the **OK** button on the CMT Reports selection screen; the audit trail records are displayed on the Natural screen.

The following Figure 5-7 illustrates the CMT audit trail records being displayed on the Natural screen.

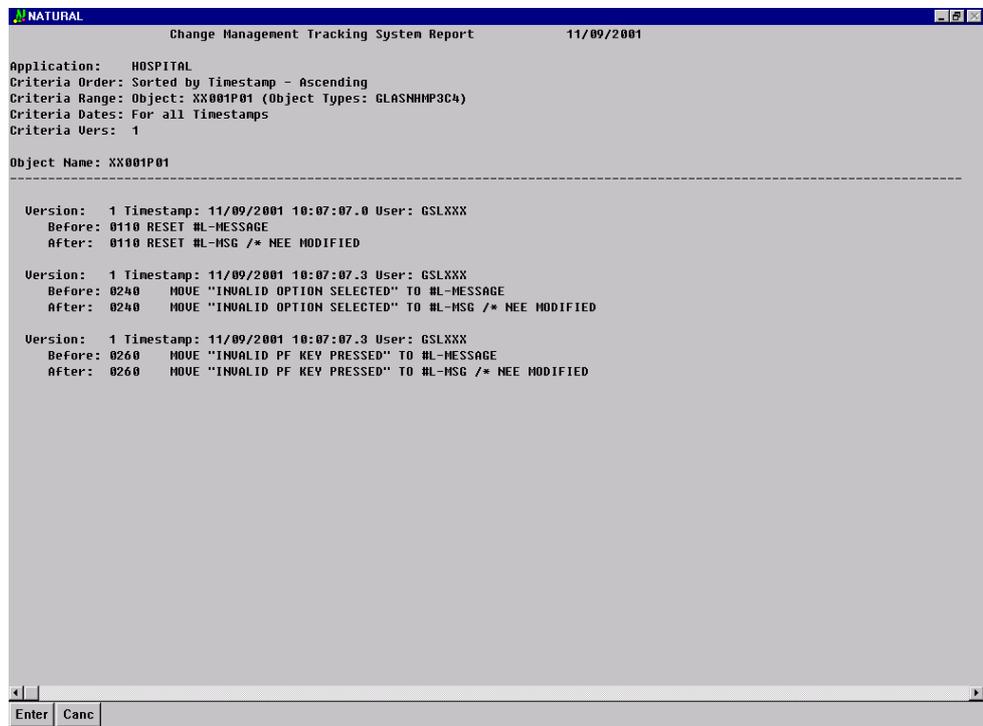


Figure 5-7 CMT audit trail records being displayed on the Natural screen

Step 4 We will now look at the same data but using the Reporter option for the Report destination. This is achieved by returning to the CMT Reports selection screen (see Figure 5-6) and checking the Reporter radio button. Then the **OK** button is used to launch the Natural Reporter version of the report.

The following Figure 5-8 illustrates the CMT audit trail records being displayed in Natural Reporter.

<i>Change Management Tracking System Report</i>				
Application: HOSPITAL				
Criteria Order: Sorted by Timestamp - Ascending				
Criteria Range: Object: XXX001P01				
Criteria Dates: For all Timestamps				
Criteria Vers: 1				
Object Name: XXX001P01				
Version	01	Timestamp	11/09/2001 10:07:07.0	User Id GSLXXX
Before	0110 RESET #L-MESSAGE			
After	0110 RESET #L-MSG /*NEE MODIFIED			
Version	01	Timestamp	11/09/2001 10:07:07.3	User Id GSLXXX
Before	0240 MOVE "INVALID OPTION SELECTED" TO #L-MESSAGE			
After	0240 MOVE "INVALID OPTION SELECTED" TO #L-MSG /*NEE MODIFIED			
Version	01	Timestamp	11/09/2001 10:07:07.3	User Id GSLXXX
Before	0260 MOVE "INVALID PF KEY PRESSED" TO #L-MESSAGE			
After	0260 MOVE "INVALID PF KEY PRESSED" TO #L-MSG /*NEE MODIFIED			
Natural Engineer				
Page: 1				
11-Sep-2001 12:44:35				

Figure 5-8 CMT audit trail records being displayed in Natural Reporter

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Step 5 Finally; we will now look at the same data but using the Excel option for the Report destination. This is achieved by returning to the CMT Reports selection screen (see Figure 5-6) and checking the Excel radio button. Then the **OK** button is used to launch the Excel version of the report.

The following Figure 5-9 illustrates the CMT audit trail records being displayed in Excel.

<i>Change Management Tracking System Report</i>						
Application	Object Name	Impact Vsn	Timestamp	User Id	Before Image	
HOSPITAL	XX001P01	1	11/09/2001 10:07:07.0	GSLXXX	0110	RESET #L-MESSAGE
HOSPITAL	XX001P01	1	11/09/2001 10:07:07.3	GSLXXX	0240	MOVE "INVALID OPTION SELECTED" TO #L-MESSAGE
HOSPITAL	XX001P01	1	11/09/2001 10:07:07.3	GSLXXX	0260	MOVE "INVALID PF KEY PRESSED" TO #L-MESSAGE

Figure 5-9 CMT audit trail records being displayed in Excel

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