

Natural Engineer

Version 4.3.1

Utilities

for Windows

Manual Order Number: NEE431-080WIN

This document applies to Natural Engineer version 4.3.1 and to all subsequent releases.

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:

document@gensystems.com

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ABOUT THIS MANUAL

Purpose of this manual

This manual contains the Utilities for Natural Engineer version 4.3.1.

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 the differences between objects from different Natural applications loaded into the Repository.
- Apply code presentation enhancements to improve the readability of objects using the Beautification 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 4.3.1 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 version 4.3.1 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 of machine and human resources.
2	Describes the Compare option, which provides the facility to review differences between objects residing within two separate applications within the Repository. The reporting of differences is customizable to provide specific targeted data as required. This can be from just reporting the objects that are different, right up to showing the differences present in the object source code.
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 Change Management Tracking (CMT) option, which provides the facility to review audit trail records of changes applied to individual objects within Natural Engineer.

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Terminology

It is assumed that you are familiar with general Natural and mainframe terminology, as well as the terms and concepts relating to MS-Windows environments. 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 (NEE431-006ALL)

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 (NEE431-008ALL)

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 4.3.1.

3. Natural Engineer Installation Guide (NEE431-010ALL)

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

4. Natural Engineer Administration Guide (NEE431-040WIN)

Natural Engineer Administration Guide (NEE431-040MFR)

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 (NEE431-020WIN)

Natural Engineer Application Management (NEE431-020MFR)

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

6. Natural Engineer Application Documentation (NEE431-022WIN)

Natural Engineer Application Documentation (NEE431-022MFR)

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.

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7. Natural Engineer Application Analysis and Modification (NEE431-023WIN)

Natural Engineer Application Analysis and Modification (NEE431-023MFR)

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.

8. Natural Engineer Application Restructuring (NEE431-024WIN)

Natural Engineer Application Restructuring (NEE431-024MFR)

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 (NEE431-080WIN)

Natural Engineer Utilities (NEE431-080MFR)

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

10. Natural Engineer Reporting (NEE431-025ALL)

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] (NEE431-026MFR)

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

TASK SCHEDULER

Chapter Overview

This chapter describes the Task Scheduler option within Natural Engineer, which 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 screen
3. Task Details screen
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.

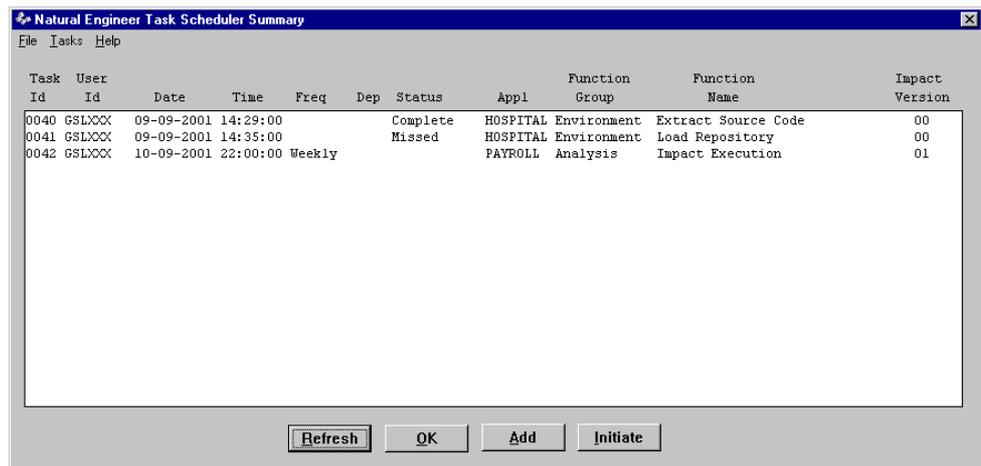


Figure 1-1 Task Scheduler Summary screen

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: <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.

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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 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	<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.

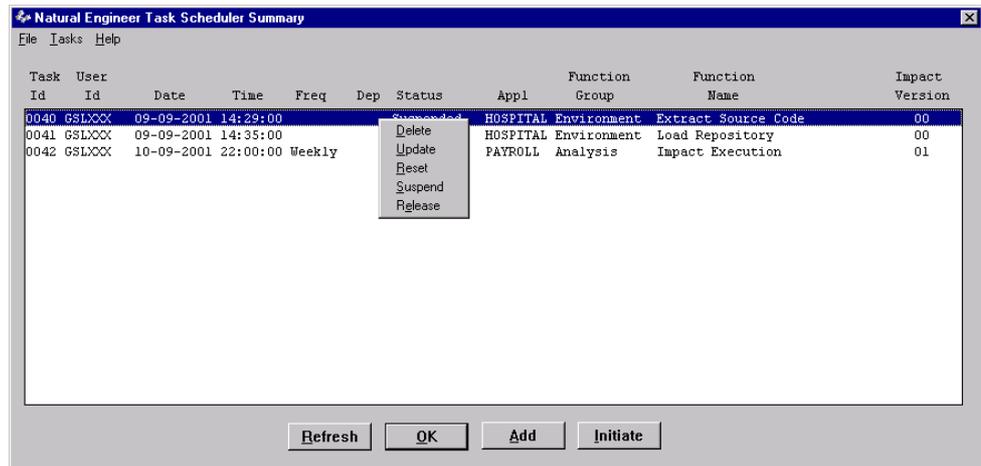


Figure 1-2 Task Scheduler Summary screen context menu

CONTEXT MENU ITEM	DESCRIPTION
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.

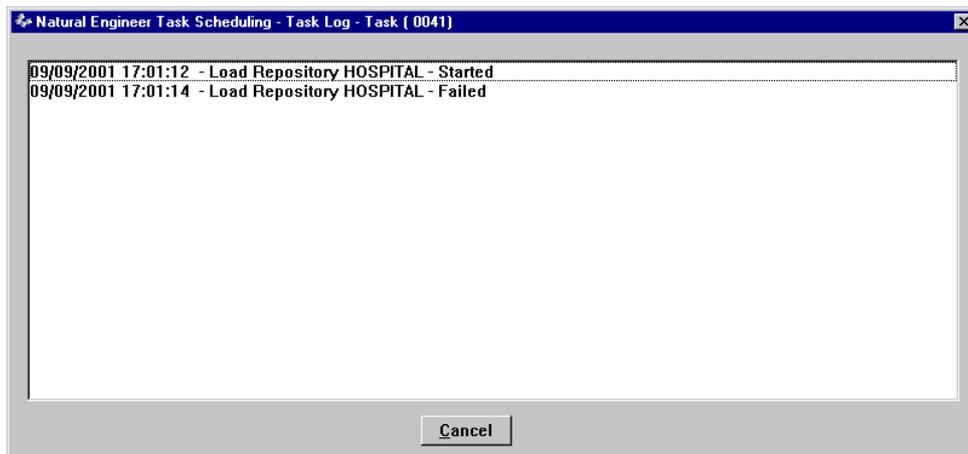


Figure 1-3 Task Scheduler Task log screen

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.

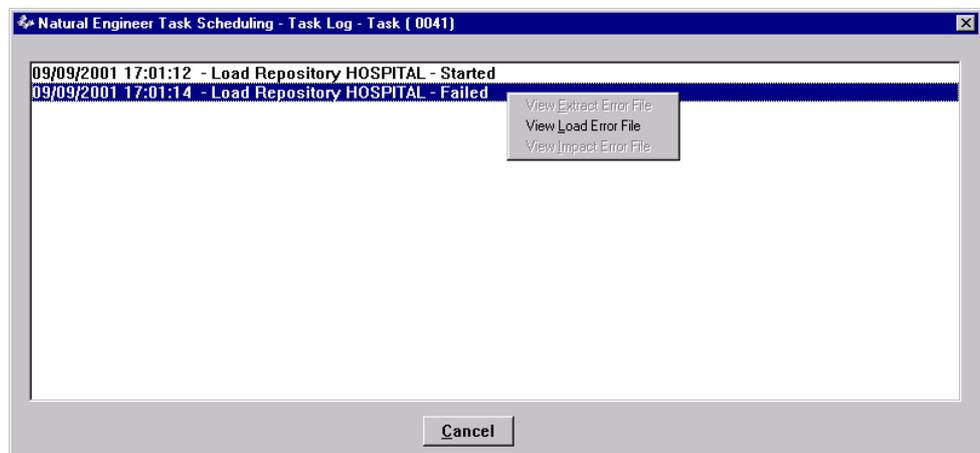


Figure 1-4 Task Log screen context menu

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.

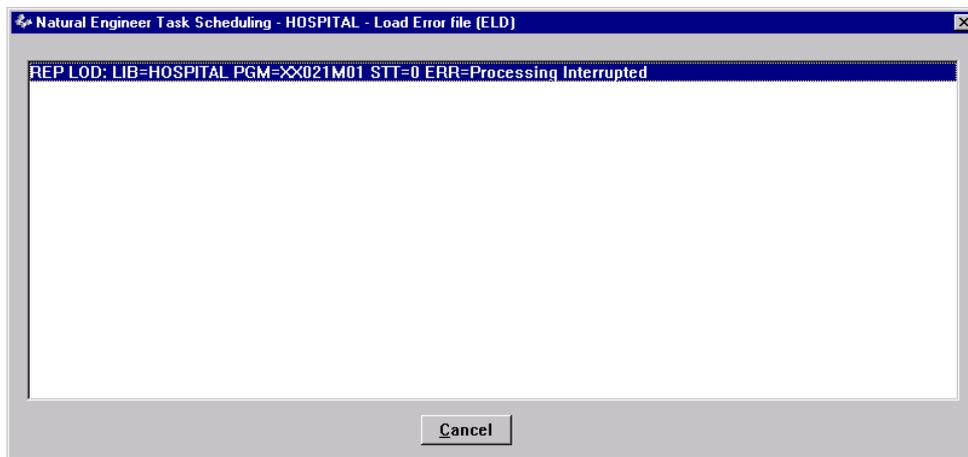


Figure 1-5 Load error log details

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.

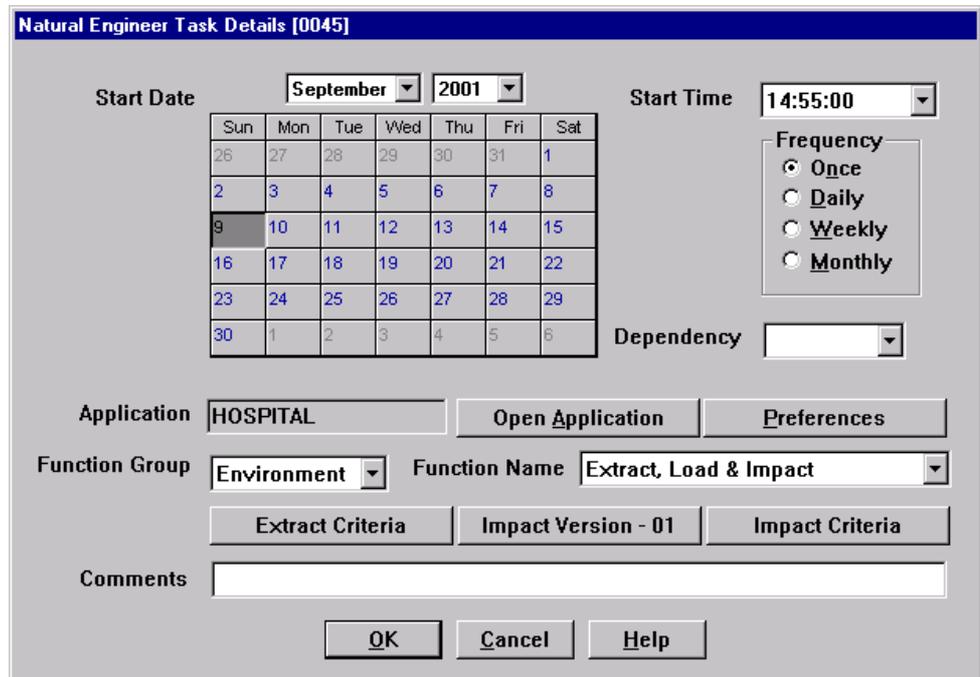


Figure 1-6 Task Scheduler Task Details screen

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 on. 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 returns back to the Task Scheduler Summary screen.
Cancel	Cancels any task details input and returns 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 greater 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.

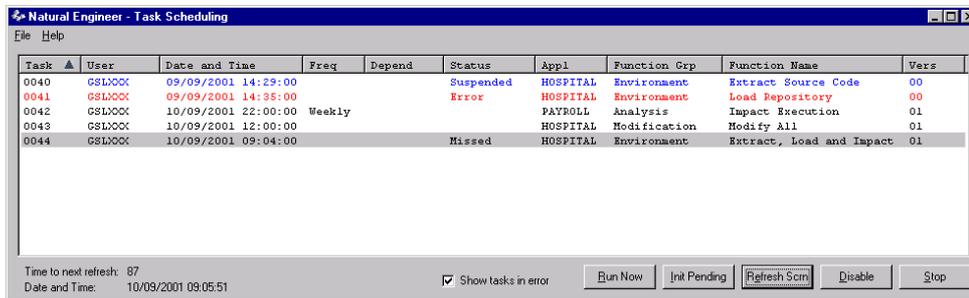


Figure 1-7 Task Scheduler Initiator screen

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
Each task is displayed in a single row on the Task Scheduler Initiator screen. Each task line consists of the following columns:	
Task	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

Will start any tasks that have a status of 'Missed'.

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](#).

Refresh Scrn

Refreshes the Task Scheduler Initiator screen updating the task status values.

Disable/Enable

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.

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.

Stop

Terminates the Task Scheduler Initiator. Any tasks that are currently executing will continue to completion.

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.

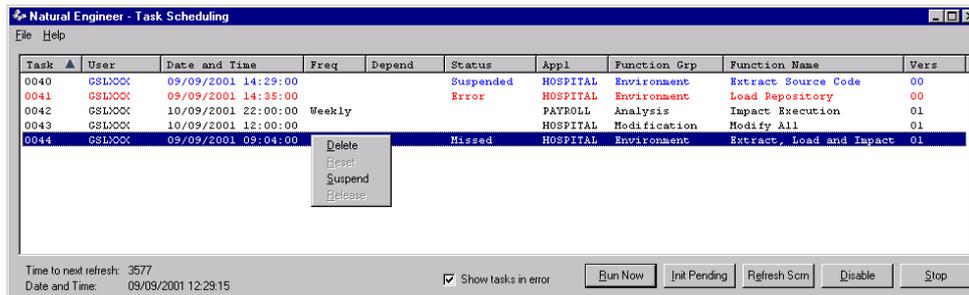


Figure 1-8 Task Scheduler Initiator screen context menu

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.

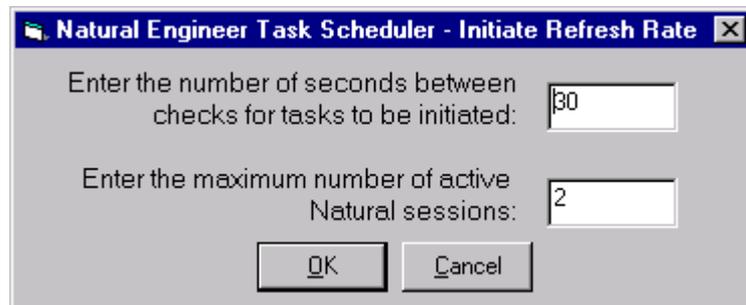


Figure 1-9 Initiate Refresh Rate screen

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>

1

Natural Engineer Utilities

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\NEE\V431\BIN\GENSCHED.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 two Natural libraries.

Compare Window

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

The following Figure 2-1 illustrates the Compare screen.

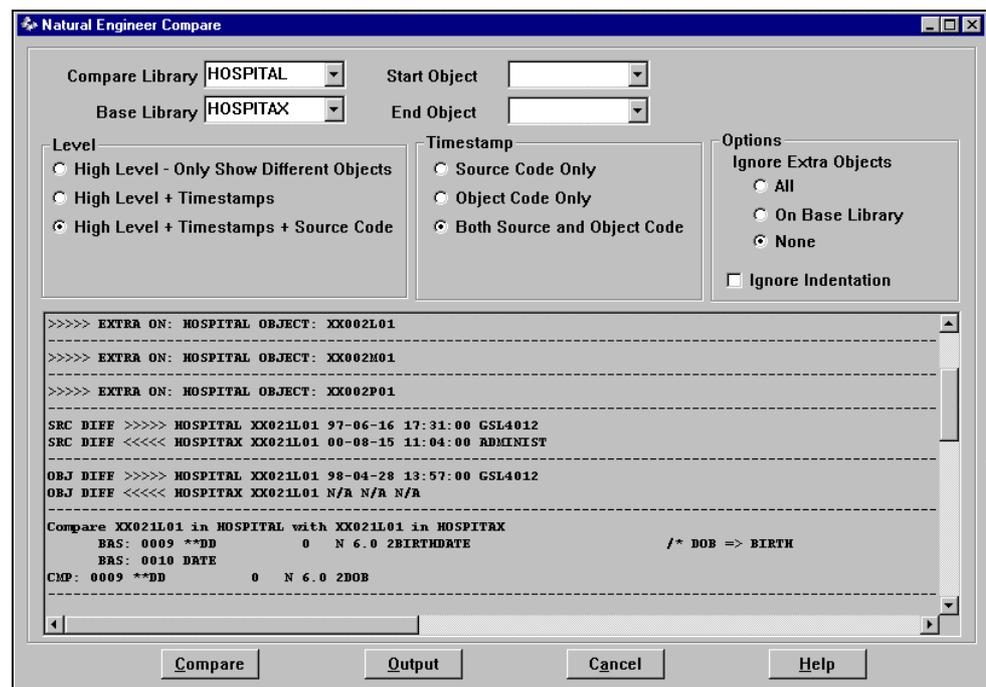


Figure 2-1 Compare screen

SCREEN ITEMS	DESCRIPTION	
Compare Library	The library you are comparing, looking for differences. This will default to the Modification library of the currently open application.	
Base Library	The library you want to compare to. This will default to the currently open application and a different application can be selected.	
Start Object	The first object from which to start the compare of objects.	
End Object	The last object to compare, after which the Compare process will stop.	
Level	High Level – Only Show Different Objects	The Compare results will only provide the names of the objects that are different.
	High Level + Timestamps	The Compare results will provide the names of the objects that are different, as well as differences in timestamps.
	High Level + Timestamps + Source Code	The Compare results will provide the names of the objects that are different, the differences in timestamps and the actual source code differences.
Timestamp	Source Code Only	This option causes the Compare to report only on differences in the Source Code timestamp.
	Object Code Only	This option causes the Compare to report only on differences in the Object Code timestamp.
	Both Source and Object Code	This option causes the Compare to report on both the differences in the Source Code timestamp and the differences in the Object Code timestamp.
Options	Ignore Extra Objects	If selected, this option will not report on additional objects that are not in the original application. Valid options are: <ul style="list-style-type: none"> ▪ All ▪ On Base Library ▪ None
	Ignore Indentation	If selected, this option will not ignore differences found due to indentation.

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BUTTON NAME	DESCRIPTION
Compare	Executes the compare process and shows differences on the screen.
Output	Shows the compare differences in a text file opened by NOTEPAD.
Cancel	Exits the Compare screen and returns back to the main Natural Engineer screen.
Help	Invokes the Compare help.

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
3. Execute Beautification

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.

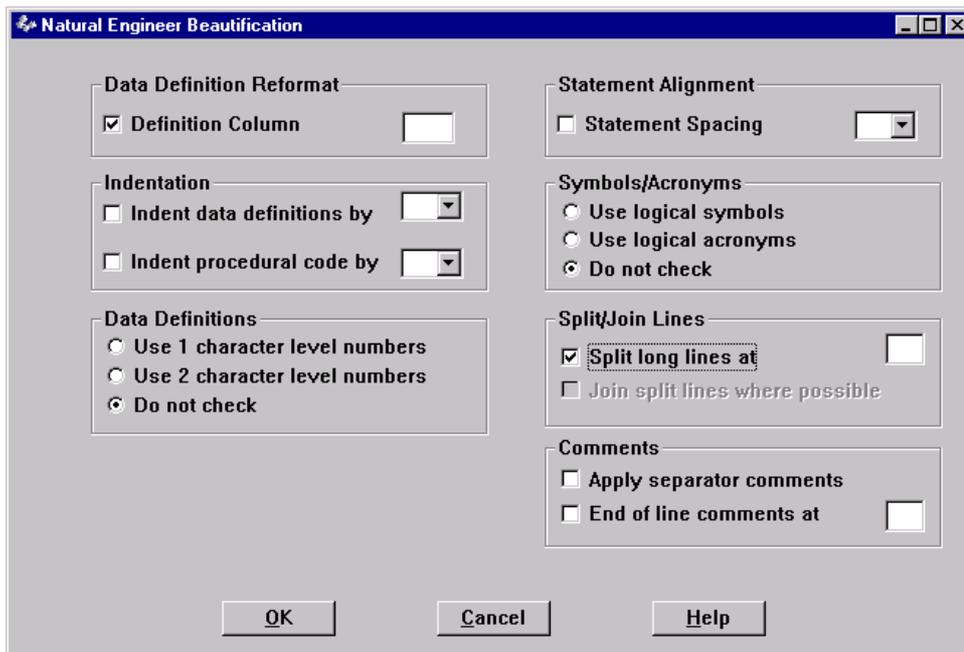


Figure 3-1 Beautification Preferences screen

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.

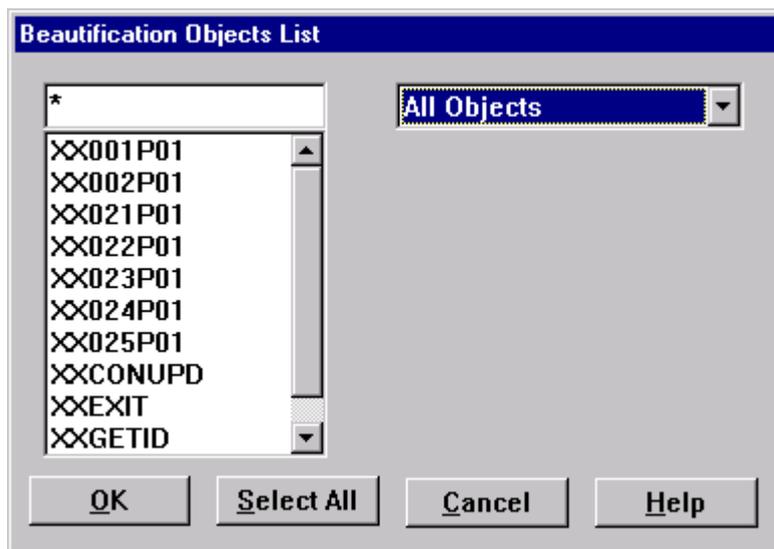


Figure 3-2 Beautification Objects List screen

3**Natural Engineer Utilities****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**
- **Helproutines**

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 a type of 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 | P 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.

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Natural Engineer Utilities

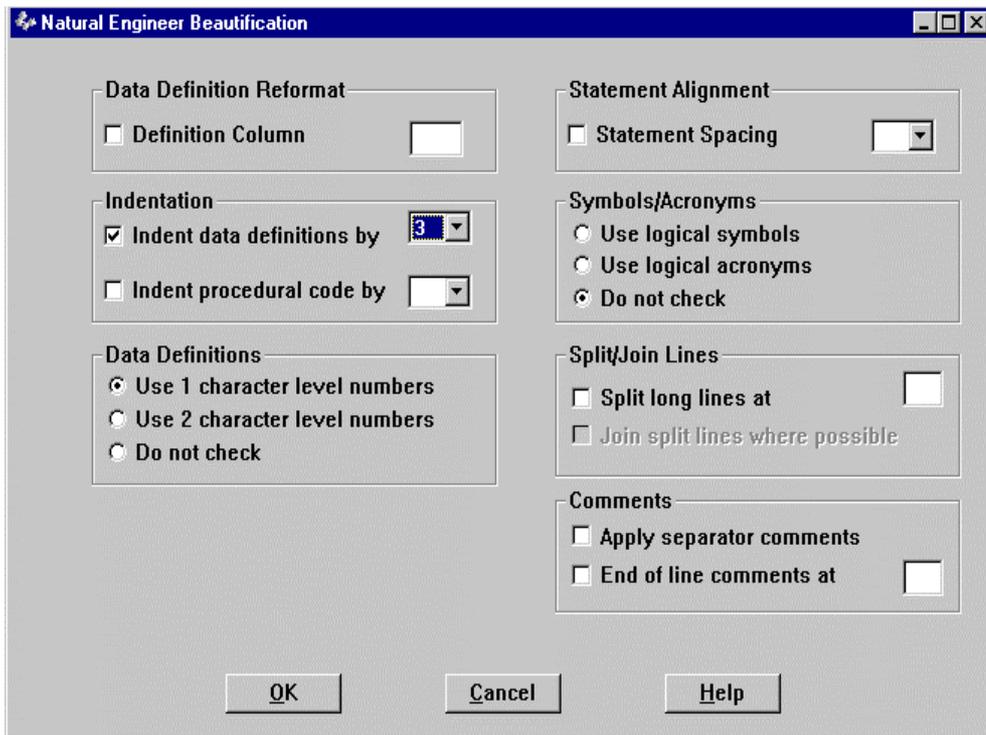


Figure 3-4 Beautification Example 1 Preferences

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Natural Engineer Utilities

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.

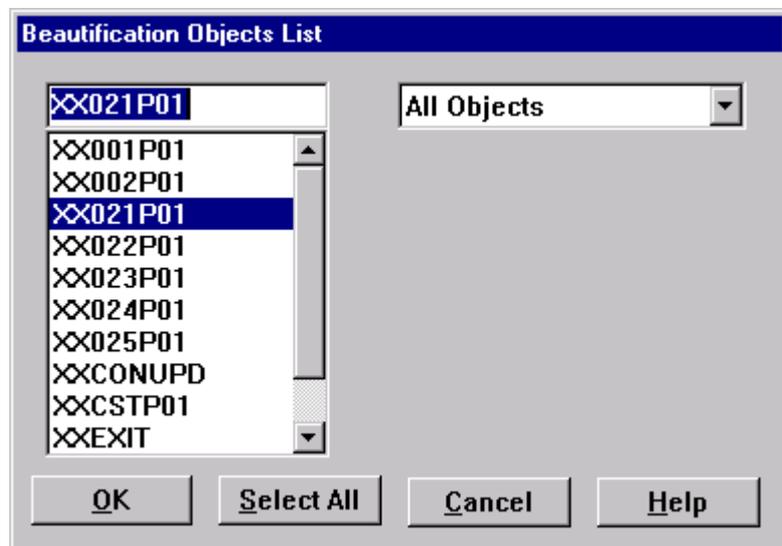


Figure 3-5 Beautification Objects List screen with XX021P01 selected

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.

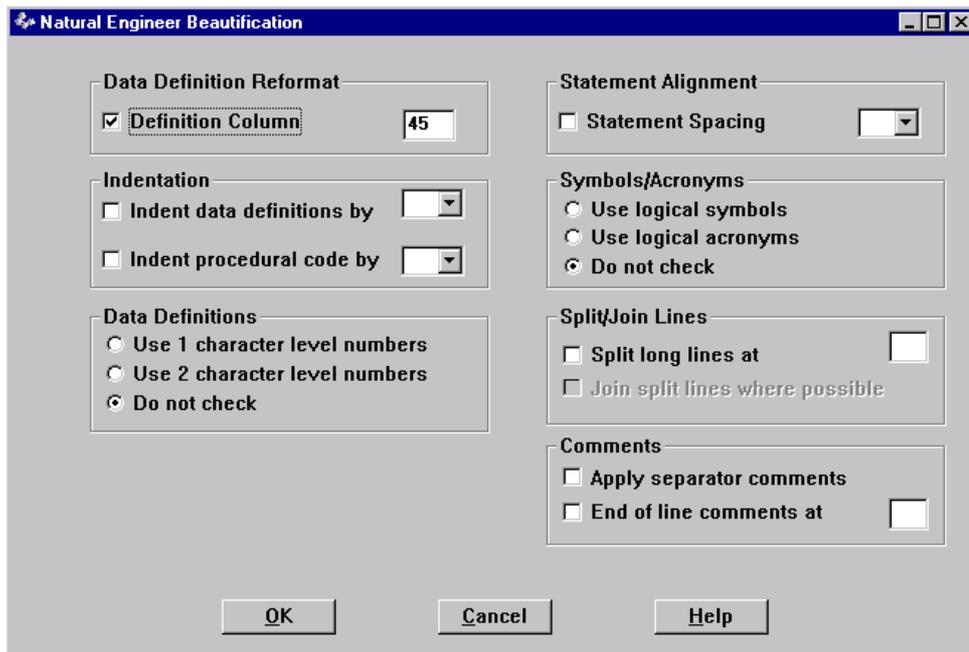


Figure 3-8 Beautification Example 2 Preferences

3

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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.

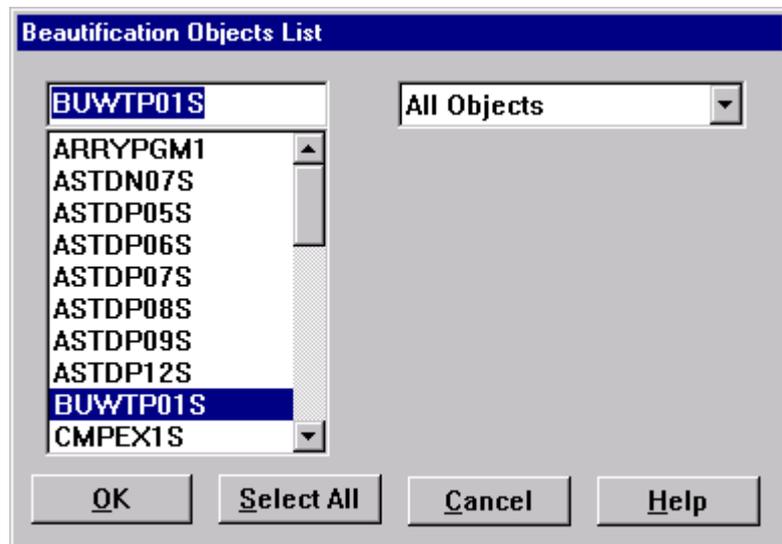


Figure 3-9 Beautification Objects List screen with BUWTP01S selected

Beautification

3

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

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

3

Natural Engineer Utilities

```

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

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

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 applications' 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 4-1 illustrates the CMT Object Viewer screen.

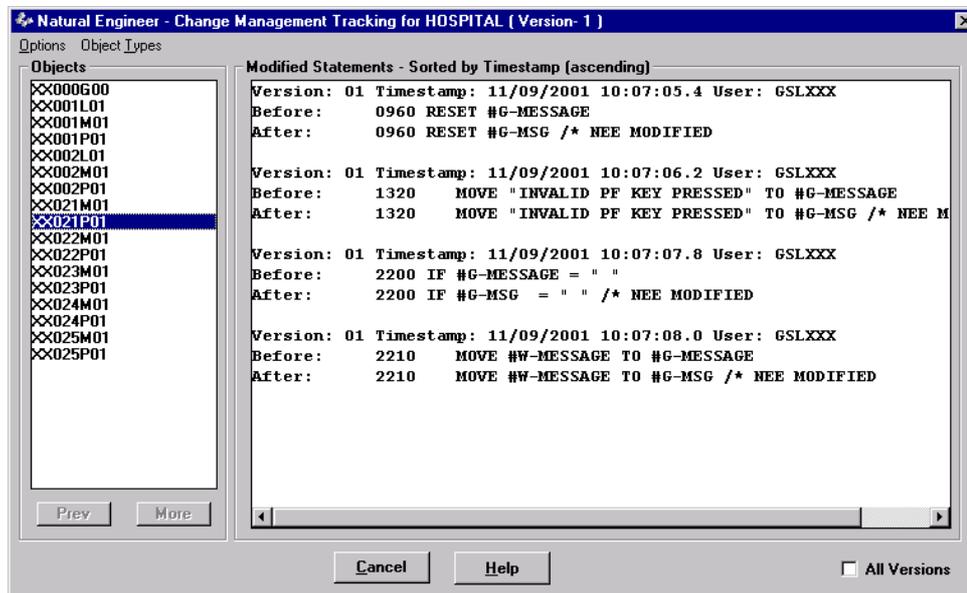


Figure 4-1 CMT Object Viewer screen

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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 4-2 illustrates the CMT Reports screen.

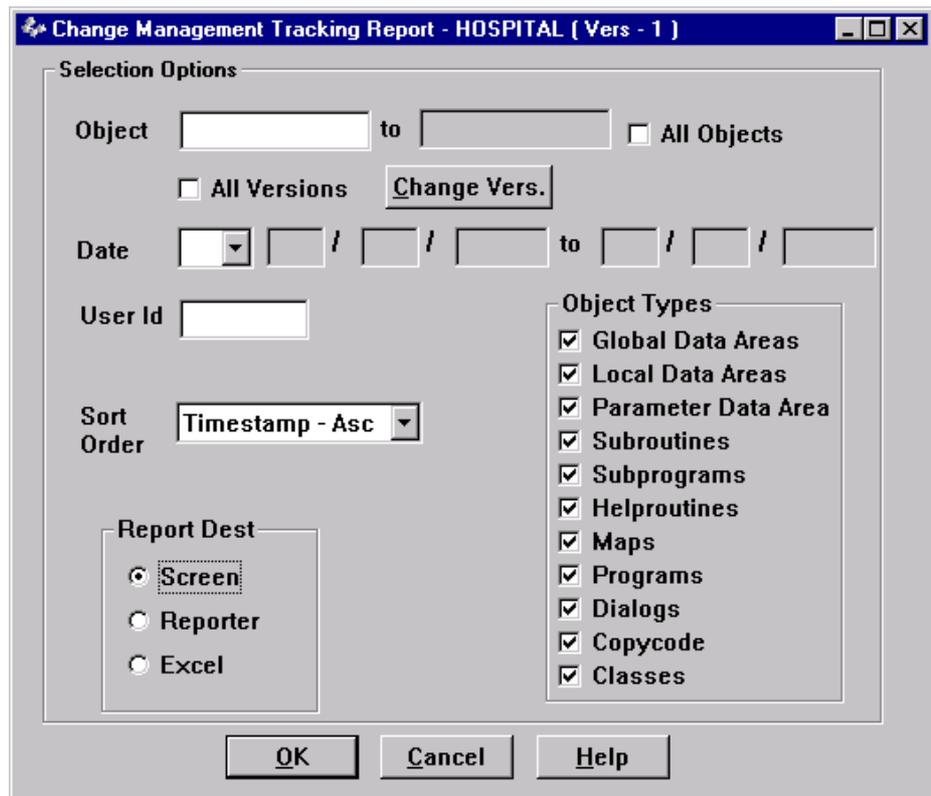


Figure 4-2 CMT Reports screen

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>

4**Natural Engineer Utilities****SCREEN ITEMS DESCRIPTION**

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 returns 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 4-3 illustrates the Impact Criteria Summary screen.

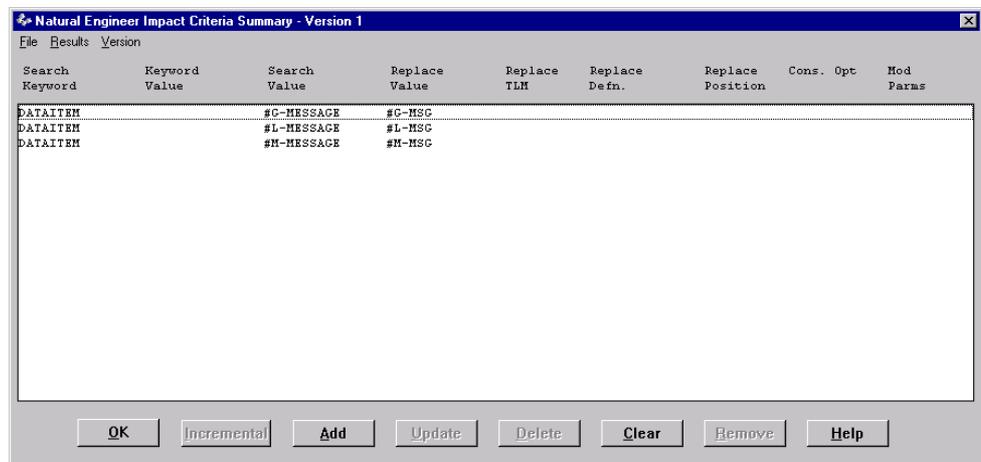


Figure 4-3 Impact Criteria Summary screen

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

The following Figure 4-4 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.

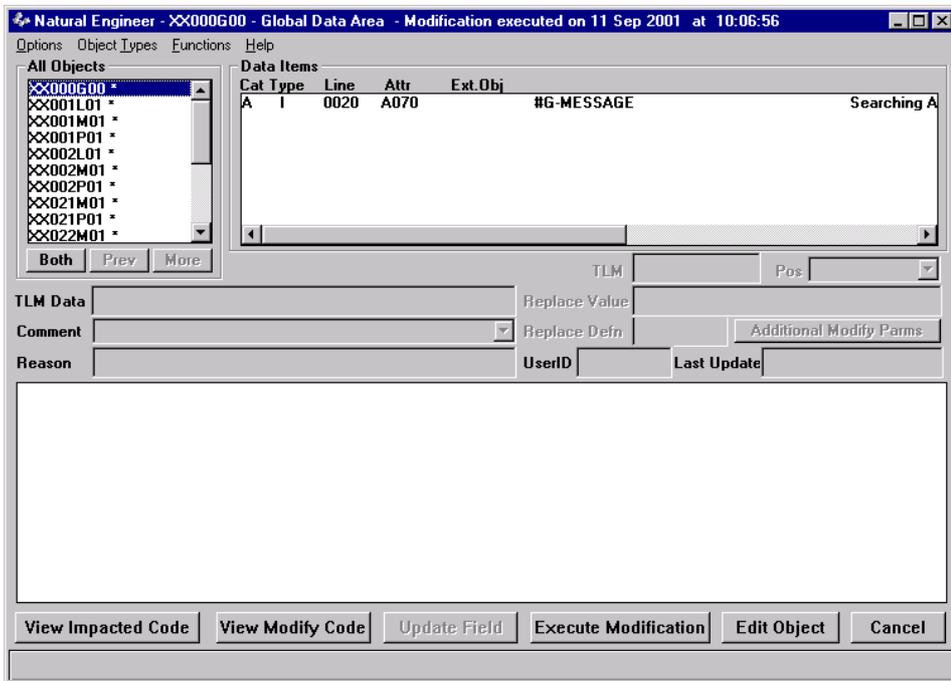


Figure 4-4 Modification Element Maintenance screen after all objects have been modified

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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 4-5 illustrates the CMT Object Viewer screen displaying object XX001P01 audit trail records.

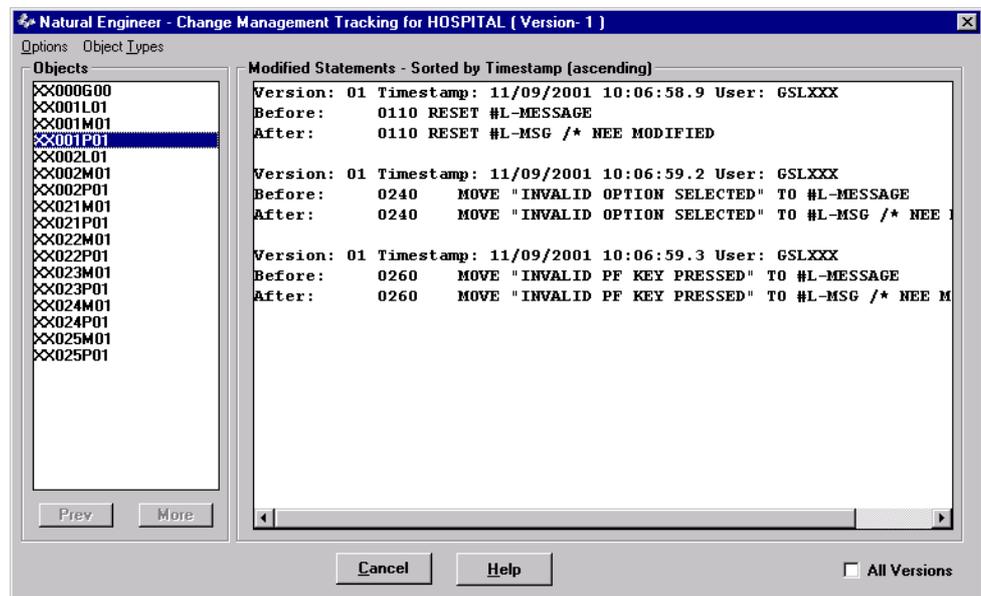


Figure 4-5 CMT Object Viewer screen displaying object XX001P01 audit trail records

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 follows 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 4-6 illustrates the CMT Reports screen showing the specified reporting options.

The screenshot shows a dialog box titled "Change Management Tracking Report - HOSPITAL (Vers - 1)". It contains several sections for configuring the report:

- Selection Options:**
 - Object: to
 - All Objects
 - All Versions
 - Date: / / to / /
 - User Id:
 - Sort Order:
- Report Dest:**
 - Screen
 - Reporter
 - Excel
- Object Types:**
 - 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: , , and .

Figure 4-6 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 4-7 illustrates the CMT audit trail records being displayed on the Natural screen.

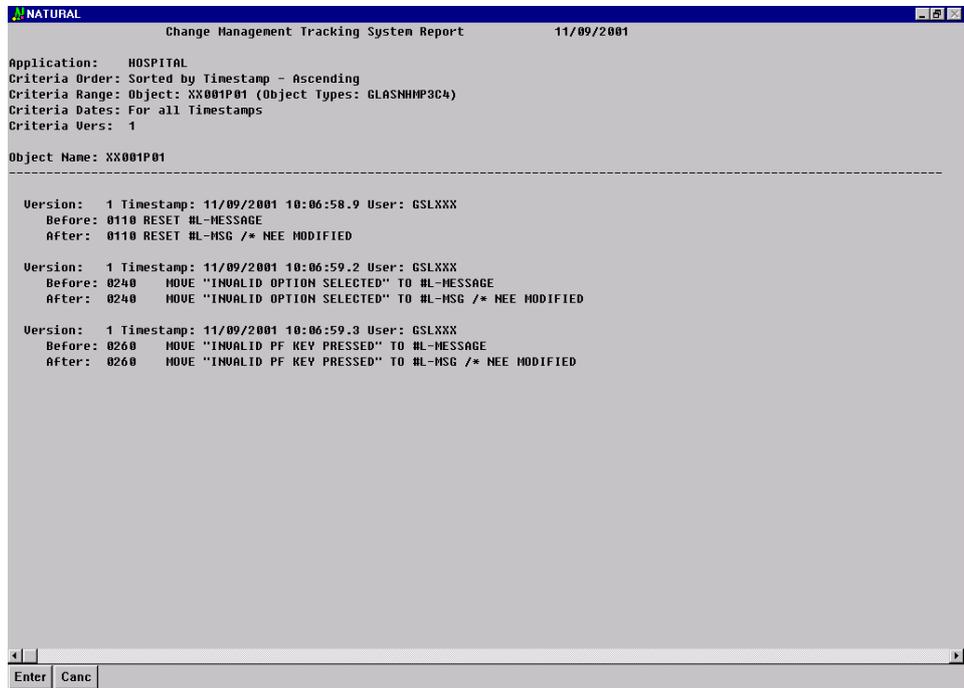


Figure 4-7 CMT audit trail records being displayed on the Natural screen

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 4-6) and checking the Reporter radio button. Then the **OK** button is used to launch the Natural Reporter version of the report.

The following Figure 4-8 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: XX001P01				
Criteria Dates: For all Timestamps				
Criteria Vers: 1				
Object Name: XX001P01				
Version	01	Timestamp	11/09/2001 10:06:58.9	User Id GSLXXX
Before	0110 RESET HL-MESSAGE			
After	0110 RESET HL-MSG /*NEE MODIFIED			
Version	01	Timestamp	11/09/2001 10:06:59.2	User Id GSLXXX
Before	0240 MOVE "INVALID OPTION SELECTED" TO HL-MESSAGE			
After	0240 MOVE "INVALID OPTION SELECTED" TO HL-MSG /*NEE MODIFIED			
Version	01	Timestamp	11/09/2001 10:06:59.3	User Id GSLXXX
Before	0260 MOVE "INVALID PF KEY PRESSED" TO HL-MESSAGE			
After	0260 MOVE "INVALID PF KEY PRESSED" TO HL-MSG /*NEE MODIFIED			
Natural Engineer				
Page: 1				
11-Sep-2001 13:27:53				

Figure 4-8 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 4-6) and checking the Excel radio button. Then the **OK** button is used to launch the Excel version of the report.

The following Figure 4-9 illustrates the CMT audit trail records being displayed in Excel.

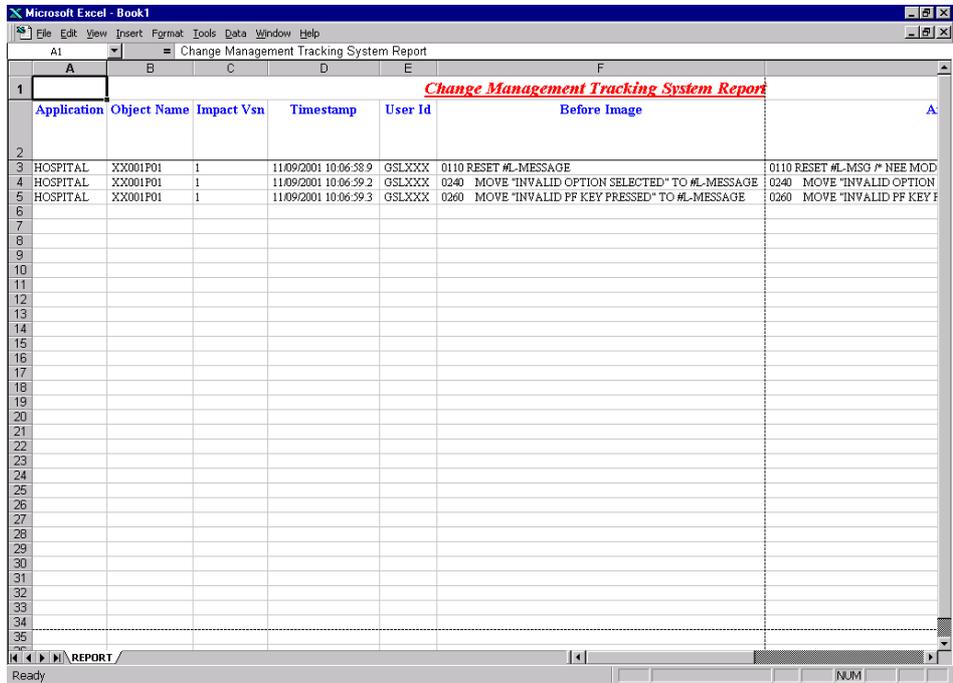


Figure 4-9 CMT audit trail records being displayed in Excel

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