

Natural Engineer
Version 4.4.2
Application Analysis &
Modification
for Mainframes

Manual Order Number: NEE442-023MFR

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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 Application Analysis and Modification for Natural Engineer.

It describes the Analysis and Modification processes available to interrogate and maintain your Natural applications within Natural Engineer.

The topics cover the Analysis options found under the Analysis menu, which include:

- How to create multiple Impact versions of Impact search criteria for an application, which allow multiple analysis of applications by more than one user.
- How to specify the Impact search criteria, what Natural keywords are supported, additional combination and miscellaneous keywords.
- Additional data preparation options to create Impact Sets, Object Builder line range criteria and Application Standards.
- The Impact execution process and how to review the Impact results using the Impact Element Maintenance screen or the Impact reporting options.

The topics cover the Modification options found under the Modification menu, which include:

- Specifying Modification Preferences to reference Text Logic Members (TLM) during Modification execution to include in-house written processes into the modified objects.
- Reviewing and re-specifying Modification parameters and settings prior to applying the actual Modification.
- The Modification execution process and how to review the Modification results.

Natural Engineer Application Analysis & Modification

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 the Application Analysis and Modification options of Natural Engineer in the following chapters:

Chapter	Contents
1	Describes the various Impact options available to create Impact versions of search criteria, the search criteria, the various search keywords available, the Impact execution process and how to review the Impact results.
2	Describes the various Modification options available to review and re-specify the Modification parameters and settings, execute Modification to modify the object source code within an application and how to review the Modified objects.
3	Describes the combination keywords that are available when specifying Impact search criteria. These keywords allow various multiple sub-criteria to be specified and are used to handle more complex analysis within objects. An example of this would be the search keyword MVSNAT22TO31 that checks for Natural 2.2 to 3.1 migration compliance of applications.

Natural Engineer Application Analysis & Modification

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.

Natural Engineer Application Analysis & Modification

**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.

IMPACT ANALYSIS PROCESSES

Chapter Overview

The Impact Analysis processes provide all the facilities to run analytical interrogation of each application held on the Repository. The results from these interrogations provide the basis for any desired modifications to the objects within an application.

Once Impact Analysis has been executed, there are various reporting options to view the results either online or using textual reports.

All the Impact Analysis processes are available from the Impact Analysis menu.

The topics covered in this chapter:

1. [Impact Version](#)
2. [Impact Search Criteria](#)
3. [Impact Data Preparation](#)
4. [Impact Execution](#)
5. [Impact Element Maintenance](#)
6. [Impact Analysis Inventory](#)

Impact Version

The Impact Version option allows you to save multiple sets of Impact Search Criteria for an application and provides a management facility to administer these search criteria for all options found in the Analysis and Modification menus.

The Impact Version screen allows you to add new versions, delete or modify existing versions and create Impact sets.

When deleting an Impact Version, then all the associated Impact search criteria and any Impact data that may have been generated during any previous Impact execution for this version, will all be deleted.

The Impact Version option supports up to a maximum of 99 versions per application.

Impact Version Screen

The Impact Version screen is accessed by selecting option 'V' (Impact Version) from the Impact Analysis Menu screen.

The following Figure 1-1 illustrates the Impact Version screen.

```

                                     Impact Versions          Application: HOSPITAL
                                                                Version: 01
Ver Date      Time  User ID  Description
_ 01 13/09/2001 12:08 XGSLXX  CHANGE ALL INSTANCES OF MESSAGE TO MSG
_ 02 13/09/2001 12:10 XGSLXX  SEARCH APPLICATION HOSPITAL FOR DB FILES

Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help      Exit      Add  Prev  Next      Main

```

Figure 1-1 Impact Version screen

SCREEN ITEMS	DESCRIPTION
Select	This is the selection column where existing impact versions can be selected for use, deleted or have the description modified. Valid selections are: ‘S’ Select impact version for immediate use. ‘D’ Delete impact version. ‘M’ Modify the impact version description.
Ver	The impact version number for the application. A maximum of 99 versions of Impact Analysis is available for each application.
Date	The date the impact version was modified.
Time	The time the impact version was modified.
User-id	The user identifier of the person who modified the impact version.
Description	Comment to describe the purpose of the impact version.

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PFKEYS	DESCRIPTION
PF1	Activates the help function.
PF3	Exit from the current function and return to previous screen.
PF6	Add new impact version. This invokes a pop-up window for the impact version description to be entered.
PF7	Displays previous page.
PF8	Displays next page.
PF12	Returns to the Natural Engineer Main Menu.

The following Figure 1-2 illustrates the Addition of a new Impact Version.

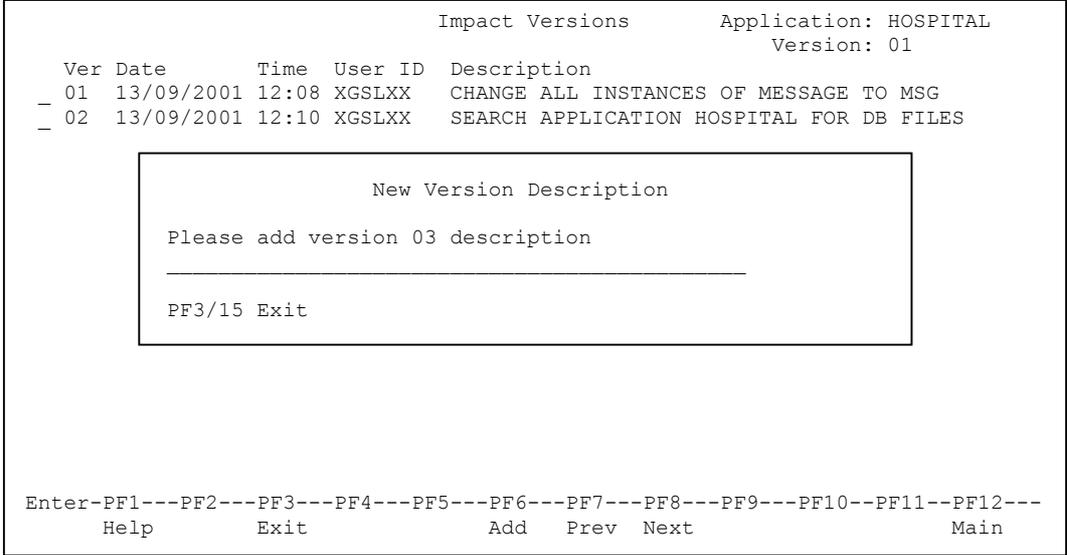


Figure 1-2 Add new Impact Version

Note: The same pop-up window is presented when selection 'M' – modify existing Impact Version description is used.

Impact Search Criteria

Impact Search Criteria are used to identify instances of specified keywords and/or keyword values within object source code. The Impact Search Criteria can also be specified to hold replacement values, which are used by the Modification process.

The Impact Search Criteria can be added, deleted, updated and reviewed using the Impact Search Criteria Summary screen. Each set of criteria will apply to a single Impact version, allowing for multiple sets of criteria to be specified for a single application.

The Impact Search Criteria can be saved to the Repository, allowing them to be re-used across applications.

Impact Search Criteria Summary Screen

The Impact Search Criteria Summary screen is accessed by selecting option 'C' (Impact Search Criteria) from the Impact Analysis Menu screen.

When this option is selected, the Impact Search Criteria Summary screen is displayed. This screen will show a summary of the criteria that have been specified for an Impact Version.

The Impact Search Criteria Summary screen utilizes left and right screen scrolling to show the complete information for each criteria. This is controlled by using 'PF10' (W<) to scroll left and 'PF11' (W>) to scroll right.

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The following Figure 1-3 illustrates the Impact Search Criteria Summary screen positioned left.

```
Impact Criteria Summary  Application: HOSPITAL
                          Version: 01
Search Keyword          Search          Replace          Replace
Keyword Value          Value          Value          Value          TLM

Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
Help  DeleC Exit  GetSa SaveA Add  Prev Next  Incrm W<  W>  Main
```

Figure 1-3 Impact Search Criteria Summary screen positioned left.

The following Figure 1-4 illustrates the Impact Search Criteria Summary screen positioned right.

```
Impact Criteria Summary      Application: HOSPITAL
                               Version: 01
Search      Replace      Replace Cons Opt Modification
Keyword     Defn.        Position          Parameters

Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  DeleC Exit  GetSa SaveA Add  Prev  Next  Incrm W<  W>  Main
```

Figure 1-4 Impact Search Criteria Summary screen positioned right.

SCREEN ITEMS	DESCRIPTION
Select	This is the selection column where existing criteria can be selected to be modified, deleted or removed. Valid selections are: ‘S’ Select the criteria item. This will invoke the Impact Criteria screen where the criteria can be modified if required. ‘D’ Delete criteria item. <i>Note: The delete process will only remove the criteria, any previously impacted data will still be available until the next impact execution.</i> ‘R’ Delete the criteria and associated impact data from the previous Impact execution.
Search Keyword	The keyword to be searched for.
Keyword Value	The associated value with the keyword, such as an object name.
Search Value	The value specified for searching, such as the text in a literal.
Replace Value	The value to replace the value found.
Replace TLM	The TLM to be inserted into the code.
Replace Defn.	The format and length to replace the definition found e.g. replace N8 with A8, where N8 is the Search Value (Definition) and A8 is the Replace Definition.
Replace Position	The physical replacement location for the TLM: Replace, After or Before.
Cons	Consistency - Causes the Analysis to trace impacts through the code. There are 3 types of Consistency available: Y Standard Consistency when using search keywords ADJUST, DATAITEM, DBFILE and DEFINITION. S Single Iteration when using Multi Search criteria. M Multiple Iteration when using Multi Search criteria.
Opt	This shows the type of search criteria applicable. Valid types are : Blank Standard Impact criteria. IN1 Incremental, “Apply to whole application”. IN2 Incremental, “Only previously impacted objects”. IN3 Incremental, “Only previously impacted statements”. OEM Object Builder or manual source code update. <i>Note: For more information on the Incremental types refer to the section Incremental Impact Criteria Preferences.</i> <i>Note: For more information on the Object Builder types refer to the section Object Builder Processing.</i>

SCREEN ITEMS	DESCRIPTION
Select	<p>This is the selection column where existing criteria can be selected to be modified, deleted or removed. Valid selections are:</p> <p>‘S’ Select the criteria item. This will invoke the Impact Criteria screen where the criteria can be modified if required.</p> <p>‘D’ Delete criteria item.</p> <p><i>Note: The delete process will only remove the criteria, any previously impacted data will still be available until the next impact execution.</i></p> <p>‘R’ Delete the criteria and associated impact data from the previous Impact execution.</p>
Modification Parameters	This shows specific modification parameters for specific search keywords.
PFKEYS	DESCRIPTION
PF1	Activates the help function.
PF2	<p>Delete all the criteria for the current selected version.</p> <p><i>Note: The clear process will only remove the criteria, any previously impacted data will still be available until the next impact execution.</i></p>
PF3	Exit from the current function and return to previous screen.
PF4	Get saved criteria from the Repository. This will invoke a pop-up window displaying all the saved criteria. After selecting a saved criteria set, the criteria will be read into the Impact Search Criteria Summary screen.
PF5	Save the defined criteria set to the Repository. Saves all the criteria specified for a version for re-use. This option invokes the same pop-up window used by the get saved option.
PF6	<p>Invokes the Impact Criteria screen where the new criteria can be specified.</p> <p><i>Note: For more information on the Impact Criteria screen refer to the section Impact Criteria screen.</i></p>
PF7	Displays previous page.
PF8	Displays next page.

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PFKEYS	DESCRIPTION
PF9	<p>Invokes the Impact Criteria screen, where the criteria can be specified and then the Incremental Impact Criteria Preferences set. This option is only available when impact data exists (created by one or more criteria).</p> <p><i>Note: For more information on the Impact Criteria screen refer to the section Impact Criteria screen.</i></p> <p><i>Note: For more information on the Incremental Impact Criteria Preferences refer to the section Incremental Impact Criteria Preferences.</i></p>
PF10	Scrolls screen display to the left.
PF11	Scrolls screen display to the right.
PF12	Returns to the Natural Engineer Main Menu.

Incremental Impact Criteria Preferences

Incremental Impact Criteria Preferences allow you to perform an Analysis over the results of a previous Analysis, i.e., only newly added search criteria will be used during the impact execution. The previous search criteria must not be modified; only new entries should be added.

This is called Incremental Impact.

The Incremental Impact Criteria Preferences can be set when adding Impact search criteria using 'PF9' (Incrm) on the Impact Search Criteria Summary screen.

This will allow you to add new criteria, specifying the details in the same way as standard criteria. The difference is that when confirming the criteria using the 'PF5' (Save), the Incremental Impact Criteria Preferences pop-up window is presented.

The following Figure 1-5 illustrates the Incremental Impact Criteria Preferences pop-up window.

```

                                     Impact Criteria           Application: HOSPITAL
                                                                Version: 01
Search Keyword...: DATAITEM_____
Object Name.....: _____

Search Value (Non D #L-MESSAGE_____
  Y Data Item

Replace Value.....: _____

                                     Impact Incremental Preferences

Apply criteria to:
Y The whole application
_ Only previously impacted objects
_ Only previously impacted statements

PF5 to Save

Replace Defn.....: _____

Replace TLM.....: _____ Position: _____ Consistency: _

Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10---PF11---PF12---
  Help  Types Exit           Add                               Main

```

Figure 1-5 Incremental Impact Criteria Preferences pop-up window

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The Incremental Impact Criteria Preferences screen allows the specification of how the Incremental Criteria are to be applied.

- **“The Whole Application”**

Impact Execution will apply the incremental criteria against all the objects in the current application, adding the incremental criteria impacts to the existing criteria.

This can prove to be useful if the application contains a large number of objects and re-running all the impact criteria in addition to the newly added criteria may take a long time to complete.

These incremental criteria will have a criteria option set to “IN1”.

- **“Only Previously Impacted Objects”**

Impact execution will apply the incremental criteria only against the objects that have been previously impacted during the last impact execution. All objects within the application that have not been previously impacted will not be impacted for the new incremental criteria.

This is a useful way of refining the impact results to help identify more specifically impact data of interest.

These incremental criteria will have a criteria option set to “IN2”.

- **“Only Previously Impacted Statements”**

Impact execution will apply the incremental criteria only against the statements that have been previously impacted during the last impact execution. All previously non-impacted statements in all objects within an application will not be impacted for the new incremental criteria.

This is another useful way of refining the impact results to help identify more specifically impact data of interest.

These incremental criteria will have a criteria option set to “IN3”.

After incremental impact has been executed, there are three options that can be taken:

1. Add a new non- incremental criteria to the impact criteria in the current version

This will result in the next impact execution disregarding any previous impact results and will apply ALL the criteria in the current version against all the objects in the application.

2. Add a new Incremental criteria.

This will restart the Incremental impact process depending on the criteria option selected for the incremental criteria. When adding new incremental criteria it is not possible to go backwards in the incremental chain, i.e., it is only possible to add an incremental criteria at the same level as the previous incremental or the next level down.

Examples:

(1) If the previous impact execution was for an incremental “IN1”, then new incremental criteria can be added as IN1, IN2 or IN3.

(2) If the previous impact execution was for an incremental “IN2”, then new incremental criteria can be added as IN2 or IN3 only.

(3) If the previous impact execution was for an incremental “IN3”, then new incremental criteria can be added as IN3 only.

3. Update the Incremental criteria

As there has been extensive post-processing to the results of all the criteria, it is not possible to update any criteria previous to the last incremental one. Therefore, the only criteria you can update is the last incremental one. The incremental criteria can only be changed as to how the incremental criteria is to be applied during impact execution (IN1; IN2; IN3).

Impact Criteria Screen

Impact Search Criteria can be added or updated using the Impact Criteria screen. This can be invoked in one of two ways:

1. To add a new criteria by using ‘**PF6**’ (Add) from the Impact Search Criteria Summary screen. With this method, the Search Keyword Selection pop-up window will also be presented providing easy selection of the required search keyword.

Note: For more information refer to the section [Search Keyword Selection pop-up window](#).

2. To view or modify an existing criteria by selecting the criteria using ‘**S**’ from the Impact Search Criteria Summary screen.

The following Figure 1-6 illustrates the Impact Criteria screen with the Search Keyword CALLNAT selected.

```

                                     Impact Criteria           Application: HOSPITAL
                                                                Version: 01
Search Keyword...: CALLNAT_____
Object Name.....: _____

Keyword Value (Call Name)
_____
Search Value (Data Item/Literal/Definition)
_____
  _ Data Item _ Literal _ Definition _ Parameter
  _ Word _ Case
Replace Value....: _____

  _ Data Item _ Literal _ Mask
Replace Keyword..: _____

Replace Defn.....: _____

Replace TLM.....: _____      Position: _____

Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Types Exit      Add  Optns RepKW                          Main
```

Figure 1-6 Impact Criteria screen with Search Keyword CALLNAT selected

Note: The available options displayed on the Impact Criteria screen will vary depending on the Search Keyword selected, i.e., options that are not applicable to a Search Keyword will not appear on the screen.

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SCREEN ITEMS	DESCRIPTION
Search Keyword	<p>This option allows you to select a keyword from a list of valid search keywords.</p> <p><i>Note: For more information on the available search keywords refer to the section Search Keywords.</i></p>
Object Name	<p>The name of the object to be searched, this can be used with the Object Type options to limit what impact analysis will search.</p> <p>Object names can be entered in full or use wild card '*' to specify a range of object names. For example:</p> <p>XX001P01 This will search the object XX001P01 only. XX0* This will search all objects with names prefixed by XX0.</p>
Keyword Value	<p>The call name value, usually an object name, directly associated with the keyword. For example:</p> <p>FETCH has an associated program object name. CALLNAT has an associated subprogram object name. INPUT MAP has an associated map object name. HISTOGRAM has an associated DDM name.</p> <p>The Keyword Value can be specified using a full or partial call name. Partial values can be input using wild card '?'. For example:</p> <p>XX? Will search for all call names starting with XX. ?XX Will search for all call names ending with XX. ?XX? Will search for all call names containing XX.</p> <p>The Keyword Value can also be specified using a mask value for the call name. This can only be used for non-DDM related keywords, for example: CALLNAT, FETCH and INPUT MAP.</p> <p><i>Note: For more information on using call name masks refer to the section Keyword Options pop-up window.</i></p>
Search Value	<p>The value being searched, such as the text in a literal. You must specify for what type of value you are searching, using 'Y' to select any of the following:</p> <p>Data Item</p> <p>This searches for the full or partial value of the data item name specified. Partial values can be input using wildcards '?'. For example:</p> <p>#ABC? Will search for all data items starting with #ABC. ?#ABC Will search for all data items ending with #ABC. ?#ABC? Will search for all data items containing #ABC.</p>

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

Literal

The literal search locates all text and numeric constants in objects, as well as edit mask definitions. Partial values can be input using wildcards '?'. For example:

- Hello?** Will search for all literal strings starting with Hello.
- ?Hello** Will search for all literal strings ending with Hello.
- ?Hello?** Will search for all literal strings containing Hello.

Definition

This option allows for the searching of a format and length or a range of format and lengths within the objects. The data is entered as a format type and length and with a range this is repeated with a '-' in between the two values. For example:

- A001** Will locate all one-byte alphanumeric data items.
- A001-A010** Will locate all alphanumeric data items with a length greater than or equal to one and less than or equal to ten.

Parameter

This option allows for the searching for the number of parameters that exist with statements that pass data items, e.g., CALLNAT, FETCH. With the parameter option you enter the number of parameters that are required. For example:

Specifying a value of 3 with the CALLNAT keyword will locate all CALLNATs that have three data items specified for the parameter reference.

Word

This treats the literal text string as individual words and the search value is validated against each word. For Example: 'ADABAS and Natural', with 'Word' specified will validate the three values as separate entries against the search value.

Therefore, if the search value was ADABAS and there were two literal text strings 'ADABAS and Natural' and 'An ADABAS Database', if WORD was specified then the two literal text strings would be impacted. If WORD was not specified then neither would be impacted.

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

	Case
--	-------------

	The Case option determines whether the search value entered is to be searched using the same upper and lower case format as used in literal text strings within the objects.
--	--

	Therefore, if the search value was 'Hello' and there were two literal text strings 'Hello' and 'HELLO', if CASE was specified then only 'Hello' would be impacted. If CASE was not specified then both would be impacted.
--	---

	Comments
--	-----------------

	These options provide the handling options for literal strings within comment lines. Available selections are:
--	--

	‘Y’ Will report any impacts found within comment lines.
--	---

	‘N’ Will ignore any impacts found within comment lines.
--	---

	‘O’ Will only report impacts found within comment lines.
--	--

Replace Value	
----------------------	--

	Replaces the value found by the Search Value, this can be an object name, DDM, data item or literal. Depending on what has been entered in the search value, the screen changes to identify what will be replaced. In addition you have the following buttons available.
--	--

	Data item
--	------------------

	This option identifies that the Replace Value is to be used as a data item, for example if you are searching for a literal and want to replace it with a data item this option is required to replace the literal correctly.
--	--

	Literal
--	----------------

	This is used to specify the opposite of the data item, if you are searching for a data item and want to replace it with a literal then this option is required.
--	---

	Mask
--	-------------

	This option provides the facility to modify applications to support language code processing.
--	---

	This option is used to identify the Replace Value as a mask value, which will be used against the search value. This option is only available for search keywords utilizing language code processing for example: CALLNAT, FETCH, INPUT MAP.
--	--

	The Replace Value must be specified using the following convention:
--	---

. (period)	Ignore the character position.
------------	--------------------------------

SCREEN ITEMS	DESCRIPTION															
	* (asterisk) Wildcard used to indicate that the replacement applies to the last character position.															
	& (ampersand) The replacement character.															
	Examples:															
	<table border="1"> <thead> <tr> <th>Old Name</th> <th>Mask Value</th> <th>New Name</th> </tr> </thead> <tbody> <tr> <td>MAP001M</td> <td>.....&</td> <td>MAP00&M</td> </tr> <tr> <td>MAP001</td> <td>.....&</td> <td>MAP00&</td> </tr> <tr> <td>SUBPGM01</td> <td>*&</td> <td>SUBPGM0&</td> </tr> <tr> <td>SPGM1</td> <td>*&</td> <td>SPGM&</td> </tr> </tbody> </table>	Old Name	Mask Value	New Name	MAP001M&	MAP00&M	MAP001&	MAP00&	SUBPGM01	*&	SUBPGM0&	SPGM1	*&	SPGM&
Old Name	Mask Value	New Name														
MAP001M&	MAP00&M														
MAP001&	MAP00&														
SUBPGM01	*&	SUBPGM0&														
SPGM1	*&	SPGM&														
Replace Keyword	<p>This option allows you to select a keyword that will replace the Search Keyword. This option is only available for keywords that execute other objects, e.g., CALLNAT and you can replace this with, for example a CALL or FETCH statement.</p> <p>This option is only available for the following Search Keywords:</p> <ul style="list-style-type: none"> ▪ CALL ▪ CALL FILE ▪ CALL INTERFACE4 ▪ CALL LOOP ▪ CALLNAT ▪ FETCH ▪ FETCH REPEAT ▪ FETCH RETURN ▪ INVESTIGATE ▪ PERFORM ▪ RUN ▪ RUN REPEAT ▪ RUN RETURN <p><i>Note: The replacement value can be selected by using 'PF7' (Repkw) which becomes active for this Search Keyword.</i></p>															
Replace Definition	Replaces the data item definition with the new format or length.															
Mark Definitions only	<p>Only used for search keyword DATAITEM. Causes the analysis to mark definitions only, not all occurrences. This can be set for Consistency. Valid selections are:</p> <p>'Y' Select this option.</p> <p>' ' Option not selected.</p>															
Replace TLM	The name of the Text Logic Member(TLM) that will be inserted in the application code.															

SCREEN ITEMS	DESCRIPTION
Position	<p>Determines the actual placement of the Replace TLM. Available options are:</p> <ul style="list-style-type: none"> ▪ REPLACE ▪ AFTER ▪ BEFORE
Consistency	<p>Causes the Analysis to trace code identified, for further impact on other code. For example:</p> <p>MOVE #A TO #B.</p> <p>Using the search keyword DATAITEM and search value #A the above statement will be impacted as follows:</p> <p>With Consistency set off: #A will be impacted as it is the specified item.</p> <p>With Consistency set on: #A will be impacted as the specified item and #B will be impacted as it is being propagated by #A.</p> <p><i>Note: This option is only available for Search Keywords ADJUST, DATAITEM, DBFILE and DEFINITION.</i></p> <p>Valid selections are:</p> <p>'Y' Select this option. ' ' Option not selected.</p>
Modification Parameters	<p>This is used for specific modification parameters for specific search keywords. The following search keywords currently use this option:</p> <p>OBJECT BUILDER</p> <p><i>Note: For more information on Object Builder refer to the section Object Builder Processing.</i></p>

PFKEYS	DESCRIPTION
PF1	Activates the help function.
PF2	<p>Invoke the Object Type Selection pop-up window. Available selections are:</p> <ul style="list-style-type: none"> '4' Classes 'C' Copycode 'D' Data Definition Modules '3' Dialogs 'G' Global Data Areas 'H' Help routines 'L' Local Data Areas 'M' Maps 'A' Parameter Data Areas 'P' Programs 'N' Subprograms 'S' Subroutines
PF3	Exit from the current function and return to previous screen.
PF5	<p>Saves new criteria or updates existing criteria.</p> <p><i>Note: If the adding new criteria the PFkey text will show 'Add', if updating existing criteria the PFkey text will show 'Updt'.</i></p>
PF6	<p>This option provides further refinement options for a Search Keyword. The PFKey text will always show 'Optns'.</p> <p>The following Search Keywords use this facility:</p> <p><u>Combination Search Keywords:</u></p> <p>CODE OPTIMIZATION</p> <p>This will invoke the Code Optimization Preferences screen where further refinement options can be selected.</p> <p>MULTI SEARCH</p> <p>This will invoke the Multi Search Criteria screen where more advanced search criteria can be specified.</p> <p>MVSNAT22TO31</p> <p>This will invoke the MVSNAT22TO31 Preferences screen where further refinement options can be selected.</p>

PFKEYS	DESCRIPTION
	<p>PORTING</p> <p>This will invoke the PORTING Preferences screen where further refinement options can be selected.</p> <p><i>Note: For more information on these Combination Search Keywords and their refinement options refer to Chapter 3 Combination Search Keywords</i></p> <p><u>Natural Keywords that utilize optional clauses:</u></p> <p>COMPOSE, FIND, SEND and STACK</p> <p>This will invoke the Keyword Options pop-up window where further refinement options can be selected.</p> <p><u>Natural Keywords that utilize call names:</u></p> <p>These are Natural Keywords that make reference to an external object, for example: CALLNAT, FETCH and INPUT MAP.</p> <p>This will invoke the Keyword Options pop-up window where further refinement options can be selected.</p> <p><i>Note: For more information on using call name masks refer to the section Keyword Options pop-up window.</i></p>
PF7	<p>This PFkey is only available for the following Search Keywords:</p> <ul style="list-style-type: none"> ▪ CALL ▪ CALL FILE ▪ CALL INTERFACE4 ▪ CALL LOOP ▪ CALLNAT ▪ FETCH ▪ FETCH REPEAT ▪ FETCH RETURN ▪ INVESTIGATE ▪ PERFORM ▪ RUN ▪ RUN REPEAT ▪ RUN RETURN <p>The PFkey text will show 'Repkw'.</p>
PF12	Returns to the Natural Engineer Main Menu.

Search Keyword Selection Pop-up Window

The Search Keyword Selection pop-up window allows Search Keywords to be selected for the criteria specification.

It is presented by default when a new criteria is being added, but can also be invoked by typing '?' in the first character position of the Search Keyword screen field on the Impact Criteria screen.

The following Figure 1-7 illustrates the Impact Criteria screen with the Search Keyword Selection pop-up window.

```

          ***** Natural En
                    Impact C

Search Keyword...: _____
Object Name.....: _____

          Search Keyword Selection
          _ ADJUST
          _ APPLICATION STANDARDS
          _ CODE OPTIMIZATION
          _ CODE RESTRUCTURING
          _ OBJECT BUILDER
          _ INTERNATIONALIZATION
          _ NATRPC
          _ MULTI SEARCH
          _ MVS NAT22 TO31
          _ DATAITEM
          _ DBFILE
          _ DEFINITION
          _____
          PF3 Exit  PF7 Prev  PF8 Next

Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10---PF11---PF12---
      Help  Types Exit          Add                               Main

```

Figure 1-7 Impact Criteria screen with Search Keyword Selection pop-up window

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

Select	This is the selection column where the required Search Keyword can be selected. Valid selections are: 'S' Select the Search Keyword.
Search Keyword	The list of available Search Keywords. <i>Note: For more information on the available search keywords refer to the section Search Keywords.</i>
Reposition	Reposition the list of Search Keywords starting from the new value entered.

PFKEYS	DESCRIPTION
---------------	--------------------

PF3	Close the Search Keyword Selection pop-up window.
PF7	Displays previous page.
PF8	Displays next page.

Search Keywords

The Analysis process allows the selection of a Search Keyword in the Criteria. These may be [Natural Keywords](#), [Combination Keywords](#) or [Miscellaneous Keywords](#).

Natural Keywords

The following table lists the Natural Keywords available for the Impact Search Criteria.

ACCEPT	END-ENDPAGE	MULTIPLY
ADD	END-ERROR	NEWPAGE
ASSIGN	END-FILE	NEWPAGE TITLE
AT BREAK OF	END-FIND	OBTAIN
AT END OF DATA	END-FOR	ON ERROR
AT END OF FILE	END-HISTOGRAM	OPEN CONVERSATION
AT END OF PAGE	END-IF	OPEN DIALOG
AT START OF DATA	END-INTERFACE	OPTIMIZE
AT TOP OF PAGE	END-LOOP	OPTIONS
BACKOUT	END-METHOD	ORDER BY
BEFORE BREAK	END-NOREC	PASSW
BROWSE	END-PROCESS	PERFORM
BROWSE BY	END-PROPERTY	PLOT
BROWSE WITH	END-READ	PRINT
BROWSE WHERE	END-REPEAT	PROCESS
CALL	END-SELECT	PROCESS COMMAND
CALL FILE	END-SORT	PROCESS GUI ACTION
CALL INTERFACE4	END-START	PROCESS SQL
CALL LOOP	END-TOPPAGE	PROCESS REPORT
CALLNAT	END-SUBROUTINE	PROCESS REPORTER

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CLOSE CONVERSATION	END-WORK	PROPERTY
CLOSE DIALOG	ENTER	READ
CLOSE PC	ESCAPE	READ BY
CLOSE PRINTER	ESCAPE BOTTOM	READ PC
CLOSE WORK	ESCAPE ROUTINE	READ WITH
CREATE OBJECT	ESCAPE TOP	READ WHERE
COMMIT	EXAMINE	READ WORK
COMPOSE	EXAMINE TRANSLATE	REDEFINE
COMPOSE ASSIGNING	EXPAND	REDUCE
COMPOSE EXTRACTING	FETCH	REINPUT
COMPOSE FORMATTING	FETCH REPEAT	REINPUT MARK
COMPOSE MOVING	FETCH RETURN	REJECT
COMPOSE RESETTING	FIND	RELEASE SETS
COMPRESS	FIND WITH	RELEASE STACK
COMPUTE	FIND WHERE	RELEASE VARIABLES
DECIDE	FIND COUPLED	REPEAT
DECIDE VALUE ALL	FIND FIRST	REPEAT UNTIL
DECIDE VALUE ANY	FIND NUMBER	REPEAT WHILE
DECIDE VALUE NONE	FIND UNIQUE	RESET
DECIDE VALUE	FIND RETAIN	RETRY
DECIDE WHEN ALL	FIND SORTED	RETURN
DECIDE WHEN ANY	FOR	ROLLBACK
DECIDE WHEN NONE	FORM	RULEVAR
DECIDE WHEN	FORMAT	RUN
DEFINE DATA CONTEXT	GET	RUN REPEAT
DEFINE DATA GLOBAL	GET SAME	RUN RETURN
DEFINE DATA INDEPENDENT	GET TRANSACTION	SELECT

DEFINE DATA LOCAL	GROUP BY	SEND
DEFINE DATA OBJECT	HAVING	SEND EVENT
DEFINE DATA PARAMETER	HISTOGRAM	SEND METHOD
DEFINE CLASS	HISTOGRAM VALUE	SEPARATE
DEFINE INITIAL	HISTOGRAM WHERE	SET CONTROL
DEFINE PRINTER	IF	SET GLOBALS
DEFINE REPORT	IF NO RECORDS	SET KEY
DEFINE SUBROUTINE	IF SELECTION	SETTIME
DEFINE WINDOW	IGNORE	SET WINDOW
DEFINE WORK	IMPORT	SETTIME
DELETE	INCLUDE	SHOW
DELETE FROM	INPUT	SKIP
DISPLAY	INPUT MARK	SORT
DIVIDE	INPUT MAP	STACK
DLOGON	INPUT TEXT	STACK COMMAND
DLOGOFF	INPUT WINDOW	STACK DATA
DO	INSERT	STOP
DOEND	INTERFACE	STORE
DOWNLOAD	INVESTIGATE	SUBTRACT
DRAW	LABEL	SUSPEND
EJECT	LIMIT	TERMINATE
ELSE	LOOP	TRANSFER
END	MAP	UPDATE
END TRANSACTION	METHOD	UPLOAD
END-ALL	MOVE	WHILE
END-BEFORE	MOVE ALL	WRITE
END-BREAK	MOVE BY NAME	WRITE PC

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END-BROWSE	MOVE BY POSITION	WRITE TITLE
END-CLASS	MOVE EDITED	WRITE TRAILER
END-DECIDE	MOVE INDEXED	WRITE WORK
END-DEFINE	MOVE LEFT	
END-ENDDATA	MOVE RIGHT	
END-ENDFILE	MOVE ROUNDED	

There are some generic level Search Keywords available that can be specified, which allow you to include related keywords. This allows you to specify a range of related keywords as one single criteria and Impact Analysis will then identify all related keywords.

These Search Keywords can be identified by a '?' at the end of the keyword. For example:

1. A Search Keyword of 'DEFINE ?' will identify the following keywords:

- DEFINE DATA CONTEXT
- DEFINE DATA GLOBAL
- DEFINE DATA INDEPENDENT
- DEFINE DATA LOCAL
- DEFINE DATA OBJECT
- DEFINE DATA PARAMETER
- DEFINE CLASS
- DEFINE INITIAL
- DEFINE PRINTER
- DEFINE REPORT
- DEFINE SUBROUTINE
- DEFINE WINDOW
- DEFINE WORK

2. A Search Keyword of 'DEFINE DATA ?' will identify the following keywords:

- DEFINE DATA CONTEXT
- DEFINE DATA GLOBAL
- DEFINE DATA INDEPENDENT
- DEFINE DATA LOCAL
- DEFINE DATA OBJECT
- DEFINE DATA PARAMETER

3. A Search Keyword of DEFINE DATA GLOBAL will only identify DEFINE DATA GLOBAL keywords.

Special Search Value for Search Keyword IF

For the Search Keyword **IF**, a special Search Value of 'IS(format)' can be specified. This search value will impact any usage of the IS option within an IF statement.

Note: The IS option can be used to check whether the content of an alphanumeric field can be converted to a specific other format. For example, the IS option can be used to check the content of a field before the mathematical function VAL (extract numeric value from an alphanumeric field) is used to ensure that it will not result in a runtime error.

The search value IS(format) is specified in the search value field on the Impact Criteria screen and is only valid with the search keyword IF, where '(format)' is the desired format and length. Examples of possible search values are:

IS(N7)
IS(I002)
IS(D)

For Example:

```
::::  
0090 DEFINE DATA LOCAL  
0100 01 #ALPHA (A7)  
0110 01 #NUMERIC (N7)  
0120 END-DEFINE  
::::  
0250 IF #ALPHA IS(N5)  
0260 COMPUTE #NUMERIC := VAL(#ALPHA) * 1  
0270 WRITE #NUMERIC  
0280 END-IF  
::::
```

Using Impact criteria of search keyword 'IF' and search value 'IS(N5)' would provide Impact results for statement line number 0250.

Combination Keywords

These are special keywords that perform predefined functions.

- ADJUST
- APPLICATION STANDARDS
- CODE OPTIMIZATION
- CODE RESTRUCTURING
- INTERNATIONALIZATION
- MULTI SEARCH
- MVS NAT22 TO31
- NATRPC
- OBJECT BUILDER
- PORTING

Note: For more information on each of the combination keywords refer to Chapter 3 [Combination Search Keywords](#).

Miscellaneous Keywords

These are additional Search Keywords that will identify all instances of non database data items (fields), Database data items (fields), DDMs, data item definitions (format and length), labels used for processing loops and literal strings within objects.

The miscellaneous keywords are:

1. [DATAITEM](#)
2. [DBFILE](#)
3. [DEFINITION](#)
4. [LABEL](#)
5. [LITERAL](#)

DATAITEM

This allows the user to search for any non-database field. The full value or a partial value, of the data item to be searched for, is specified in the Search Value field. Partial values can be input using wildcards '?'. For example:

- #ABC Will search for data items named #ABC
- #ABC? Will search for all data items starting with #ABC
- ?#ABC? Will search for all data items containing #ABC
- ?#ABC Will search for all data items ending with #ABC

DBFILE

This allows the user to search for any DDM and database field. The full value or a partial value, of the DDM to be searched for is specified in the Keyword Value field. Partial values can be input using wildcards '?'. For example:

- FILE1 Will search for all DDMs named FILE1
- FILE? Will search for all DDMs starting with FILE
- ?FILE? Will search for all DDMs containing FILE
- ?FILE Will search for all DDMs ending with FILE

Note: Specifying '?' on its own in the Keyword Value field, will result in all DDMs being searched for.

The full value or a partial value of the database field to be searched for is specified in the Search Value field. Partial values can be input using wildcards '?'. For example:

For example:

- NAME Will search for all database fields named NAME
- NAME? Will search for all database fields starting with NAME
- ?NAME? Will search for all database fields containing NAME
- ?NAME Will search for all database fields ending with NAME

Note: Specifying '?' on its own in the Search Value field, will result in all database fields being searched for.

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Note: The DBFILE process does not identify any database fields that are used on a Map. This is because they are actually defined as Parameter Data within the map itself. These can be identified by using the DATAITEM search keyword.

The following Figure 1-8 illustrates the database fields defined within a map.

```
0001 * MAP2: PROTOTYPE
0002 * INPUT USING MAP 'XXXXXXXX'
0003 *      #C-ADDRESS #C-ARRIVED #C-DOB #C-DUE-FOR-SURGERY #C-FIRST-NAME
0004 *      #C-PATIENT-ID #C-RELEASED #C-SURNAME #G-MESSAGE #M-MAP-HEADING
0005 *      #M-UNDERLINE PATIENT.ADDRESS(*) PATIENT.ARRIVED PATIENT.DOB
0006 *      PATIENT.DUE-FOR-SURGERY PATIENT.FIRST-NAME PATIENT.PATIENT-ID
0007 *      PATIENT.RELEASED PATIENT.SURNAME
0008 DEFINE DATA PARAMETER
0009 1 #C-ADDRESS (C)
0010 1 #C-ARRIVED (C)
0011 1 #C-DOB (C)
0012 1 #C-DUE-FOR-SURGERY (C)
0013 1 #C-FIRST-NAME (C)
0014 1 #C-PATIENT-ID (C)
0015 1 #C-RELEASED (C)
0016 1 #C-SURNAME (C)
0017 1 #G-MESSAGE (A070)
0018 1 #M-MAP-HEADING (A040)
0019 1 #M-UNDERLINE (A040)
0020 1 PATIENT.ADDRESS (A030/00001:00004)
0021 1 PATIENT.ARRIVED (A020)
0022 1 PATIENT.DOB (N06.0)
0023 1 PATIENT.DUE-FOR-SURGERY (A006)
0024 1 PATIENT.FIRST-NAME (A020)
0025 1 PATIENT.PATIENT-ID (N07.0)
0026 1 PATIENT.RELEASED (D)
0027 1 PATIENT.SURNAME (A020)
0028 END-DEFINE
```

Figure 1-8 Database fields defined within a map

DEFINITION

This option allows for the searching of a format and length or a range of format and lengths within the objects. The data is entered as a format type and length and with a range this is repeated with a '-' (hyphen) between the values.

For example:

- A001 Will locate all one-byte alphanumeric data items.
- A001-A010 Will locate all alphanumeric data items with a length greater than or equal to one and less than or equal to ten.

LABEL

The label search is used to locate references to all labels defined in objects.

LITERAL

The literal search locates all text and numeric constants in objects, as well as edit mask definitions. The literal can be specified in full or a partial value can be used. Partial values can be input using wildcards '?'.

For example:

- Hello? Will search for all literal strings starting with Hello
- ?Hello Will search for all literal strings ending with Hello
- ?Hello? Will search for all literal strings containing Hello
- Hello Will search for all literal strings named Hello

Forward/Backward Tracking

Forward/Backward tracking can be used to control the tracking direction for a variable, when using search keyword MULTISEARCH or the search keywords DATAITEM, DBFILE or DEFINITION (which make use of the consistency option).

Forward/Backward tracking is controlled by the TRACKING parameter in the NATENG.INI file.

Note: For more information on NATENG.INI file parameter TRACKING refer to Chapter 2 in the Natural Engineer Administration Guide for Mainframes manual.

Forward tracking will track the forward direction of a variable showing all the derivatives being populated from the variable.

Backward tracking will track the backward direction of a variable showing all the derivatives that have populated the variable.

Forward/Backward tracking affects any statements using the following Natural Keywords:

- MOVE
- ASSIGN
- MOVE BY NAME
- ASSIGN ROUNDED
- MOVE LEFT
- MOVE RIGHT
- MOVE ROUNDED

Example of Forward/Backward Tracking

The following example uses a search keyword of DATAITEM, with a search value of #A and Consistency switched on. Results for each of the tracking options is then described.

Sample Source Code:

```
::::  
0110 MOVE #A TO #B  
0120 IF #A > #C  
0130   WRITE 'HELLO'  
0140 END-IF  
0150 MOVE #D TO #A  
0160 END
```

1. Forward tracking will result in:

- #A at statement lines 0110, 0120 and 0150 being marked as 'Specified' matches.
- #B at statement line 0110 would be marked as 'Derived'.

2. Backward tracking will result in:

- #A at statement lines 0110, 0120 and 0150 being marked as 'Specified' matches.
- #D at statement line 0150 would be marked as 'Derived'.

3. Normal tracking will result in:

- #A at statement lines 0110, 0120 and 0150 being marked as 'Specified' matches.
- #B at statement line 0110 would be marked as 'Derived'.
- #C at statement line 0120 would be marked as 'Derived'.
- #D at statement line 0150 would be marked as 'Derived'.

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Keyword Options Pop-up Window

The Keyword Options pop-up window is invoked using 'PF6' (Optns) from the Impact Criteria screen. It provides the facility to add further refinement options for select Search Keywords. There are two main levels of refinement options available:

1. Specify Sub Keywords.

Sub Keywords represent the optional clauses that can be used with a Natural Keyword. The following Natural Keywords are supported:

COMPOSE	FIND	SEND
STACK		

2. Allow the use of call name mask values specified in Keyword Value.

Call names can be specified as a Keyword Value using a full or partial call name, or, as a mask value. If a mask value is used then the refinement option needs to be specified to indicate that the call name is a mask value.

Note: Impact will only match call names that are coded as literal strings when using mask values.

The following Search Keywords are supported:

CALL ?	CALL	CALL FILE
CALL INTERFACE4	CALL LOOP	CALLNAT
FETCH ?	FETCH	FETCH REPEAT
FETCH RETURN	INPUT MAP	INVESTIGATE
OPEN DIALOG	RUN ?	RUN
RUN REPEAT	RUN RETURN	

The Keyword Options pop-up window is a common screen, which is used for all the Search Keywords listed above, the only variation is the list of Sub Keywords. The Sub Keywords represent the optional clauses that can be added to a Search Keyword, and will only list the relevant optional clauses for the selected Search Keyword.

The following Figure 1-9 illustrates the Keyword Options pop-up window.

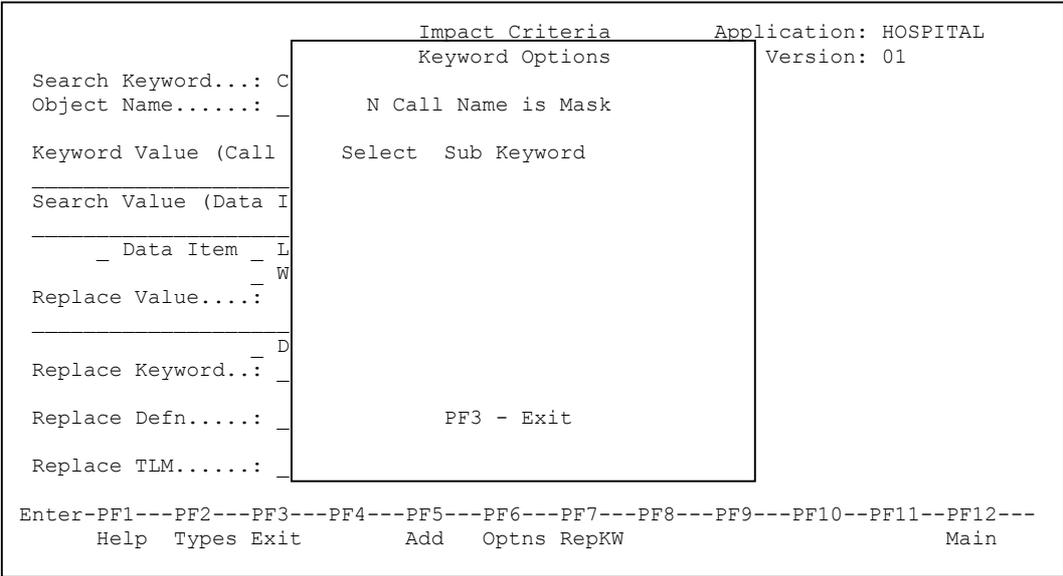


Figure 1-9 Keyword Options pop-up window

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SCREEN ITEMS	DESCRIPTION
Call Name is Mask	<p>This option identifies the call name used for the Keyword Value as a mask value.</p> <p>This option is only available for any Search Keywords that utilize call names, for example CALLNAT, FETCH and INPUT MAP.</p> <p>Possible values are:</p> <p>'Y' Call name is using mask value. 'N' Call name is not using mask value.</p> <p>The mask value used must be specified using the following convention:</p> <p>. (period) Indicates a single position that is not to be checked. * (asterisk) Wildcard used to indicate that the last character position is to be checked by the following mask character.</p> <p>For example: *N will check the last character in a call name for a numeric digit.</p> <p>N The position is to be checked for a numeric digit. A The position is to be checked for an alphabetical character (upper or lower case). C The position is to be checked for an alphabetical character (upper or lower case), numeric digit or a blank. 'c' One or more positions to be checked for the characters bound by apostrophes.</p> <p>For example: 'ABC' will check the call name to contain 'ABC'.</p> <p><i>Note: The maximum length for a mask value is 8 bytes.</i></p> <p>Examples:</p> <p>For the following code statements:</p> <pre>0220 CALLNAT 'XX001P01' #PARM 0350 CALLNAT 'XXN01' #FIELD-A #FIELD-B #RESPONSE 1000 CALLNAT 'XXP01A' 1550 CALNAT 'XXABCP1A' 1600 CALLNAT 'ABCMAP&'</pre> <p>A Search Keyword of CALLNAT is used with the following mask values used as Keyword Values:</p>

SCREEN ITEMS DESCRIPTION

Mask Value	Statement	Description
AANNNANN	0220	Checks for alphabetic characters in positions 1, 2 and 6. Checks for numeric digits in positions 3, 4, 5, 7 and 8.
.....N	0220	Ignore positions 1 to 7 and check for numeric digit in position 8.
*N	0220 0350	Check last position for numeric digit.
.....A	1550	Ignore positions 1 to 7 and check for alphabetic character in position 8.
*A	1000 1550	Check last position for alphabetic character.
..'ABC'...	1550	Check for the characters 'ABC' in positions 3, 4 and 5.
..'ABC'	1550	Check for the characters 'ABC' in positions 3, 4 and 5.
*'&'	1600	Check last position for '&'.

Sub Keywords

This will list the appropriate optional clauses for the Natural Keyword selected. The optional clauses available for each supported Natural Keyword are:

Natural Keyword	Optional Clauses
------------------------	-------------------------

COMPOSE	ASSIGNING EXTRACTING FORMATTING MOVING RESETTING
FIND	FIRST NUMBER UNIQUE RETAIN SORTED
SEND	EVENT METHOD
STACK	COMMAND DATA

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PFKEYS	DESCRIPTION
PF3	Close the Keyword Options pop-up window.

Impact Data Preparation

The Impact Data Preparation options provide the facility to prepare further pre-analysis data, which is referenced during the Impact execution. The Impact Data Preparation data is used in conjunction with any Impact Search Criteria that may have already been specified.

Any specifications made using the Impact Data Preparation options is applicable to the currently selected Impact Version.

The Impact Data Preparation option is accessed by selecting option ‘P’ (Impact Data Preparation) from the Impact Analysis Menu screen.

This provides a sub-menu with the following options:

1. [Impact Sets](#)
2. [Object Builder Processing](#)
3. [Application Standards](#)

Impact Sets

Impact Sets are a means of creating a sub-set of objects within an Application for a given Impact Version, which will allow impact to be executed against the specified Impact Set only. This means that impact can be executed against sets of objects within an Application without the need for creating individual applications containing the sub-sets of objects required.

Objects can be selected individually using 'S' in the selection column against each required object or by using 'PF11' (S All) to select all the objects.

Once all selections have been made, the objects now form the Impact set, which will be used during any subsequent Impact Executions for this version. Only objects within the Impact Set will be impacted. All other objects in the Application, but outside the Impact Set, will not be impacted.

If no Impact Set exists for an Impact version within an Application, then all the objects in the Application will be impacted.

Impact Sets Screen

The Impact Sets screen is accessed by selecting option 'S' (Impact Sets) from the Impact Data Preparation sub menu screen.

The following Figure 1-10 illustrates the Impact Sets screen.

```

                                     Impact Set Selection      Application: HOSPITAL
                                                                Version: 01
Sel   Object Name
-     XXCONPDA
-     XXCONUPD
-     XXEXIT
-     XXGETID
-     XXMTHVAL
-     XXTIDYUP
-     XXVALCC
-     * XX000G00
-     * XX001L01
-     * XX001M01
-     * XX001P01
-     XX002L01
-     XX002M01
-     XX002P01
Reposition -> _____

Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10---PF11--PF12---
Help  Types Exit                Prev  Next          S All D All Main
    
```

Figure 1-10 Impact Sets screen

SCREEN ITEMS	DESCRIPTION
Sel	This is the selection column where individual data items can be selected. Valid selections are: 'S' Select object. 'D' De-select object
Object Name	List of objects loaded in the Repository for the current application. Objects that have been selected for Impact Sets will have an asterisk (*) to the left of the object name.
Reposition	Reposition the list of objects starting from the new value entered. This value can be a complete object name or part name using '**' wildcard. For Example:
Value	Result
*	Will reposition at the start of the Object list. For the HOSPITAL system, this would start the object list from object XXCONPDA.

SCREEN ITEMS	DESCRIPTION
XXE*	Will reposition at the first object name that matches the mask XXE or is greater than the mask input. For the HOSPITAL system, this would start the object list from object XXEXIT.
XX000G01	Will reposition at the first object name that matches the mask exactly or is greater than the object name input. For the HOSPITAL system, this would start the object list from object XX001L01 as object XX000G01 does not exist.

PFKEYS	DESCRIPTION
PF1	Activates the help function.
PF2	Invoke the Object Type Selection pop-up window. Available selections are: <ul style="list-style-type: none"> '4' Classes 'C' Copycode '3' Dialogs 'G' Global Data Areas 'H' Help routines 'L' Local Data Areas 'M' Maps 'A' Parameter Data Areas 'P' Programs 'N' Subprograms 'S' Subroutines
PF3	Exit from the current function and return to previous screen.
PF7	Displays previous page.
PF8	Displays next page.
PF10	Selects all objects.
PF11	De-select all selected objects.
PF12	Returns to the Natural Engineer Main Menu.

Object Builder Processing

The Object Builder Processing option provides the facility to set up Object Builder line range criteria, which are used during Impact execution. These criteria will appear in the Impact Search Criteria Summary screen and will have a type of 'OEM' denoted.

The setting up of Object Builder line range criteria using the Object Builder Processing option, is the same as using the Impact Criteria screen to add the Search Keyword 'OBJECT BUILDER' and specifying the line range in the Modification Parameters field. Impact execution treats both sets of criteria identically.

The Object Builder Processing method of specifying Object Builder line range criteria is easier to use, in that the object source code is displayed on the screen. The Impact Criteria method requires prior knowledge of the line ranges to be available, either from hardcopy listings or using the Natural editor.

Note: For more information on the Impact Search Criteria and the criteria type 'OEM', refer to the section [Impact Search Criteria](#).

Note: For more information on the Object Builder process refer to the Natural Engineer Application Restructuring manual.

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Object Builder Objects Selection Screen

The Object Builder Processing option is accessed by selecting option 'O' (Object Builder Processing) from the Impact Data Preparation sub menu screen. This will display the Object Builder Objects Selection screen with a list of the available objects within an application.

The following Figure 1-11 illustrates the Object Builder Objects Selection screen.

```
-Object Builder Objects Selection - Application: HOSPITAL

Select  Object
  -      XX021L01
  -      XX021L02
  -      XX021M01
  -      XX021P01 *
  -      XX022M01
  -      XX022P01
  -      XX023M01
  -      XX023P01
  -      XX024M01
  -      XX024P01
  -      XX025M01
  -      XX025P01

Reposition: _____
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
Help  Types Exit                               Prev Next                               Main
```

Figure 1-11 Object Builder Objects Selection screen

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

Select	This is the selection column where individual objects can be selected. Valid selections are: 'S' Select object.								
Object	List of objects containing Soft Links within an application. Objects that have had line ranges specified and saved to the Repository, will have an asterisk (*) to the right of the object name. For example: XX021P01 *								
Reposition	Reposition the list of objects starting from the new value entered. This value can be a complete object name or part name using '**' wildcard. For Example:								
	<table border="1"> <thead> <tr> <th>Value</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>*</td> <td>Will reposition at the start of the Object list. For the HOSPITAL system, this would start the object list from object XXCONPDA.</td> </tr> <tr> <td>XXE*</td> <td>Will reposition at the first object name that matches the mask XXE or is greater than the mask input. For the HOSPITAL system, this would start the object list from object XXEXIT.</td> </tr> <tr> <td>XX000G01</td> <td>Will reposition at the first object name that matches the mask exactly or is greater than the object name input. For the HOSPITAL system, this would start the object list from object XX001L01 as object XX000G01 does not exist.</td> </tr> </tbody> </table>	Value	Result	*	Will reposition at the start of the Object list. For the HOSPITAL system, this would start the object list from object XXCONPDA.	XXE*	Will reposition at the first object name that matches the mask XXE or is greater than the mask input. For the HOSPITAL system, this would start the object list from object XXEXIT.	XX000G01	Will reposition at the first object name that matches the mask exactly or is greater than the object name input. For the HOSPITAL system, this would start the object list from object XX001L01 as object XX000G01 does not exist.
Value	Result								
*	Will reposition at the start of the Object list. For the HOSPITAL system, this would start the object list from object XXCONPDA.								
XXE*	Will reposition at the first object name that matches the mask XXE or is greater than the mask input. For the HOSPITAL system, this would start the object list from object XXEXIT.								
XX000G01	Will reposition at the first object name that matches the mask exactly or is greater than the object name input. For the HOSPITAL system, this would start the object list from object XX001L01 as object XX000G01 does not exist.								

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PFKEYS	DESCRIPTION
PF1	Activates the help function.
PF2	Invoke the Object Type Selection pop-up window. Available selections are: 'C' Copycode 'G' Global Data Areas 'H' Helproutines 'L' Local Data Areas 'M' Maps 'A' Parameter Data Areas 'P' Programs 'N' Subprograms 'S' Subroutines
PF3	Exit from the current function and return to previous screen.
PF7	Displays previous page.
PF8	Displays next page.
PF12	Returns to the Natural Engineer Main Menu.

Object Builder Processing Screen

The Object Builder Processing screen is accessed by selecting an object from the Object Builder Selection screen.

The following Figure 1-12 illustrates the Object Builder Processing screen.

```

- Object Builder Processing - Application: HOSPITAL
Object Name: XX021P01 Line Number....: 0610 Version: 01
Set Start Point: _____
Source Code Set End Point...: _____ Objects: _____
-----
0610 01 #M-UNDERLINE(A40)
0620 END-DEFINE
0630 *
0640 SET KEY ALL
0650 MOVE *DATN TO #L-TEMP-DATE
0660 DECIDE ON FIRST VALUE OF #G-SELECTED-OPTION
0670 VALUE "A"
S 0680 MOVE *DATX TO PATIENT.RELEASED
0690 CALLNAT "XXGETID" PATIENT.PATIENT-ID #L-TEMP-DATE-N6
0700 MOVE " ADD A PATIENT" TO #M-MAP-HEADING
0710 MOVE " *****" TO #M-UNDERLINE
0720 MOVE (AD=D) TO #C-GROUP(*)
E 0730 MOVE (AD=P) TO #C-PATIENT-ID
0740 VALUE "D"
0750 PERFORM GET-RECORD
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10---PF11---PF12---
Help Exit Range Save Prev Next Top Bot Main

```

Figure 1-12 Object Builder Processing screen

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SCREEN ITEMS	DESCRIPTION
Objects Name	The name of the selected object.
Line Number	Will display the first line number of the source code being displayed. It is possible to reposition to any source code line by typing in a value (N4) and using the 'ENTER' key.
Set Start Point	To Set Start Point enter line number in the space provided (N4). This will define the start line for the component, marking it as S (Component Start) in the source code.
Set End Point	To Set End Point enter line number in the space provided (N4). This will define the end line for the component, marking it as E (Component End) in the source code.
Objects	The generated PDA and Subprogram name overrides are input here. The format is pppppppp,ooooooo where: pppppppp is the name of the generated PDA. For example PDA01 and ooooooo is the name of the generated sub-program, for example SUB01. <i>Note: For more information refer to the section Modification Parameters.</i>
Source Code	Will display the selected objects source code. Any source code lines that are part of a saved line range will have the following in the first 2 bytes of the line: S Indicates that the line is the start of a range. E Indicates that the line is the end of a range. <i>Note: If a single line has been selected for start and end ranges, e.g., 0100-0100, then the indicator will show only S.</i>

PFKEYS	DESCRIPTION
PF1	Activates the help function.
PF3	Exit from the current function and return to previous screen.
PF4	Invokes a pop-up window displaying all the line ranges and generated object name overrides that have been saved for the object. <i>Note: For more information refer to section Saved Ranges pop-up window.</i>
PF5	Saves the specified line ranges.
PF7	Displays previous page.
PF8	Displays next page.
PF9	Displays the first page of the source code listing.
PF10	Displays the last page of the source code listing.
PF12	Returns to the Natural Engineer Main Menu.

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Saved Ranges Pop-up Window

The Saved Ranges pop-up window is accessed by selecting 'PF4' (Range) from the Object Builder Processing screen.

The following Figure 1-13 illustrates the Saved Ranges pop-up window.

<p>Object Name: XX0</p> <p>Source Code</p> <p>-----</p> <p>0610 01 #M-UN</p> <p>0620 END-DEFI</p> <p>0630 *</p> <p>0640 SET KEY</p> <p>0650 MOVE *DA</p> <p>0660 DECIDE O</p> <p>0670 VALUE "A</p> <p>S 0680 MOVE *</p> <p>0690 CALLNA</p> <p>0700 MOVE "</p> <p>0710 MOVE "</p> <p>0720 MOVE (</p> <p>E 0730 MOVE (</p> <p>0740 VALUE "D</p> <p>0750 PERFOR</p>	<p>Saved Ranges</p> <table border="1"> <thead> <tr> <th>Sel</th> <th>Range</th> <th>Objects</th> </tr> <tr> <th>-----</th> <th>-----</th> <th>-----</th> </tr> </thead> <tbody> <tr> <td>-</td> <td>0680-0730</td> <td>XX021A01,XX021N01</td> </tr> </tbody> </table> <p>PF3 Exit</p> <p>PF6 Delete All Ranges</p> <p>PF7 Prev PF8 Next</p>	Sel	Range	Objects	-----	-----	-----	-	0680-0730	XX021A01,XX021N01	<p>on: HOSPITAL</p> <p>on: 01</p>
Sel	Range	Objects									
-----	-----	-----									
-	0680-0730	XX021A01,XX021N01									
<p>Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---</p> <p>Help Exit Range Save Prev Next Top Bot Main</p>											

Figure 1-13 Saved Ranges pop-up window

SCREEN ITEMS DESCRIPTION

Select	This is the selection column where line ranges can be deleted. Valid selections are: ‘D’ Delete line range.
Range	Lists each start and end line range that has been specified and saved for the selected object.
Objects	Lists any generated PDA and Subprogram name overrides that have been specified and saved for the selected object.

PFKEYS DESCRIPTION

PF3	Exit from the current function and return to previous screen.
PF6	Deletes all specified line ranges for the selected object.
PF7	Displays previous page.
PF8	Displays next page.

Application Standards

The Application Standards option allows for the specification of application standards that are to be used to override the default settings defined using the Global Standards option.

Application Standards are used as a criteria subset of Impact Analysis when using the search keyword APPLICATION STANDARDS and will report on how an application complies with acceptable Natural application standards.

The Application Standards option can be used to specify standards that may differ from the Global Standards for certain individual applications. A simple example of this may be legacy applications that were developed prior to any site coding standards being used, or, where existing site standards have been updated and the updated standards not applied to an application. In this situation the deviance can be catered for using the Application Standards option.

Once the Application Standards have been specified they are saved in the Repository for the current Impact Version, for the current application.

For more information on the Global Standards option refer to the Natural Engineer Administration Guide for Mainframes manual.

Application Standards Definition Screen

All the specifications for Application Standards are defined using the Application Standards Definition screen.

This is accessed by selecting option 'A' (Application Standards) from the Impact Data Preparation sub menu screen.

A 'Y' in the selection column next to each option indicates each standard is acceptable. If a selection column is blank then that standard is not acceptable.

The following Figure 1-14 illustrates the Application Standards Definition screen.

```

- Application Standards -   Application: HOSPITAL

Data Type Usage           Data Item Specification and Usage
Y  Alphanumeric           ___ Data Item Name Length
Y  Binary                 ___ Local Data Item Start Character
Y  Attribute Control      ___ Use Database Qualifiers
   Date                   ___ Use Labels
   ___ Floating Point     ___ Allow Dynamic Variables
   ___ Integer            ___ Allow AIVs
   ___ Logical            ___ Use Reserved Words as Data Items
   ___ Numeric (Unpacked) ___ Use of Hexidecimal
   ___ Packed Numeric
   ___ Time

Environment              Copycode
   Use Full Statement Syntax ___ Allow Copycode
   Use Message File       ___ Minimum Usage
   ___ Allow Rules in Maps
   Y  Structured Mode      Object comments
   ___ Reporting Mode     ___ Description
                           ___ to ___ Percentage of Lines
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10---PF11---PF12---
      Help  Types Exit           Save           Pref           Opts  Main

```

Figure 1-14 Application Standards Definition screen

SCREEN ITEMS	DESCRIPTION
Data Type Usage	<p>Identifies Data Type usage. If data items are not checked then they will be reported as non-standard. Data Types available are:</p> <ul style="list-style-type: none"> ▪ Alphanumeric ▪ Binary ▪ Attribute Control ▪ Date ▪ Floating Point ▪ Integer ▪ Logical ▪ Numeric (Unpacked) ▪ Packed Numeric ▪ Time
Environment	<p>Identifies various environmental type options. Environment options are:</p> <p>Use Full Statement Syntax Standards allow for full syntax statements to be used, rather than partial syntax. (Not currently available.)</p> <p>Use Message File Standards allow for specifying the use of a message file for messages, rather than messages embedded in the objects.</p> <p>Allow Rules in Maps Standards allow for the use of rules in maps.</p> <p>Structured Mode If Structured Mode is selected, then the Application standard is to allow Structured Mode objects.</p> <p>Reporting Mode If Reporting Mode is selected, then the Application standard is to allow Reporting Mode objects.</p>
Data Item Specification and Usage	<p>Identifies standards specific to Data Items. Data Item Specification and Usage options are:</p> <p>Data Item Name Length A number from 1 to 32 can be selected. Natural Engineer will identify data items that exceed this number.</p> <p>Local Data Item Start Character The first character required for locally defined data items.</p> <p>Use Database Qualifiers Database data items must have the associated database qualifier name.</p> <p>Use Labels Statements that can have labels, must use labels.</p>

SCREEN ITEMS	DESCRIPTION
Copycode	<p>Allow Dynamic Variables Dynamic variables, such as &variables are permitted by standards.</p>
	<p>Allow AIVs Application Independent Variables are permitted by the standards.</p>
	<p>Use Reserved Words as Data Items If selected, data item names may also be reserved words.</p>
	<p>Use of Hexadecimal If selected, hexadecimal code is permitted by standards.</p>
	<p>Identifies standards for usage of copycode. Copycode options are:</p> <p>Allow Copycode If selected, applications may use Copycode objects.</p> <p>Minimum Usage This can be set between 0 and 99 and standards will report any copycodes that are not referenced that number of times.</p>
Object Comments	<p>Identifies standards for comments within an object. Object Comments options are:</p>
	<p>Description This can be 0 to 100 and requires at least that many comment lines at the start of the object.</p>
	<p>Percentage of Lines This is a percentage range from 1 to 100, which specifies the comment number standard as required to fall within that range.</p>

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PFKEYS	DESCRIPTION
PF1	Activates the help function.
PF2	Invoke the Object Type Selection pop-up window. <i>Note: For more information on Object Type Selection refer to the section Application Standards Object Types.</i>
PF3	Exit from the current function and return to previous screen.
PF5	Saves the specified Application Standards details.
PF9	Invokes the Application Standards Preferences screen.
PF11	Invokes the Standards options screen.
PF12	Returns to the Natural Engineer Main Menu.

Application Standards Preferences

The Application Standards Preferences option allows the user to limit which standards are actually checked for during Impact execution.

This is accessed by selecting 'PF9' (Pref) from the Application Standards Definition screen.

The Following Figure 1-15 illustrates the Application Standards Preferences screen.

```
- Application Standards Preferences - Application: HOSPITAL

Y Data Type Usage                Y AIVs
Y Full Statement Syntax          Y Reserved Words as Data Item
Y Message File                   Y Hexadecimal
Y Rules in Maps                  Y Copycode Usage
Y Object Mode                    Y CopyCode Minimum Usage
Y Data Item Name Length          Y Comments Description
Y Local Data Item Start Character Y Comments Percentage
Y Data Qualifiers                Y Use ASSIGN/MOVE
Y Missing DB Labels              Y Use COMPUTE
Y Missing None DB Labels         Y Use End not {.}
Y Dynamic Variables              Y Local Data Qualifiers

Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help           Exit
```

Figure 1-15 Application Standards Preferences screen

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

Standards	<p>Each standard is listed. A 'Y' in the selection column next to each standard indicates that the standard will be checked for. If a selection column is blank then that standard will not be referenced during Impact execution. The standards list shows:</p> <ul style="list-style-type: none"> ▪ Data Type Usage ▪ Full Statement Syntax ▪ Message File ▪ Rules in Maps ▪ Object Mode ▪ Data Item Name Length ▪ Local Data Item Start Character ▪ Database Qualifiers ▪ Missing DB Labels ▪ Missing Non DB Labels ▪ Dynamic Variables ▪ AIVs ▪ Reserved Words as Data Items ▪ Hexadecimal ▪ Copycode Usage ▪ Copycode Minimum Usage ▪ Comments Description ▪ Comments Percentage ▪ Use ASSIGN/MOVE ▪ Use COMPUTE ▪ Use END not {} ▪ Local Data Qualifiers
------------------	--

PFKEYS	DESCRIPTION
--------	-------------

PF1	Activates the help function.
PF3	Exit from the current function and return to previous screen.

Application Standards Object Types

The Application Standards Object Types option allows the user to limit which objects are actually checked for during Impact execution.

This is accessed by selecting 'PF2' (Type) from the Application Standards Definition screen.

The Following Figure 1-16 illustrates the Object Type Selection pop-up window.

- Application Sta		Object Type Selection
Data Type Usage	Data	Sel Object Types
Y Alphanumeric	___ D	Y (C) Copycode
Y Binary	___ L	Y (D) Data Defn. Modules
Y Attribute Control	___ U	Y (3) Dialogs
Date	___ U	Y (G) Global Data Areas
Floating Point	___ A	Y (H) Helproutines
Integer	___ A	Y (L) Local Data Areas
Logical	___ U	Y (M) Maps
Numeric (Unpacked)	___ U	Y (A) Parameter Data Area
Packed Numeric	___ U	Y (P) Programs
Time	Copyc	Y (N) Subprograms
	___ A	Y (S) Subroutines
Environment	___ M	
Use Full Statement Syntax		
Use Message File	Objec	
Allow Rules in Maps	___	PF3 - Exit
Y Structured Mode	___	
Reporting Mode	___	
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10---PF11---PF12---		
Help Types Exit	Save	Pref Opts Main

Figure 1-16 Application Standards Object Type Selection pop-up window

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

Sel	This is the selection column where Object Types can be selected. Valid selections are: 'Y' Select the Object Type. ' ' De-select the Object Type.
Object Types	List of valid Object Types available: 'C' Copycode 'D' Data Definition Modules '3' Dialogs 'G' Global Data Areas 'H' Help routines 'L' Local Data Areas 'M' Maps 'A' Parameter Data Areas 'P' Programs 'N' Subprograms 'S' Subroutines

PFKEYS	DESCRIPTION
---------------	--------------------

PF3	Exit from the current function and return to previous screen.
------------	---

Application Standards Labels and Data Manipulation Options

The Application Standards Labels and Data Manipulation options allow further standards to be checked for during Impact execution.

This is accessed by selecting 'PF11' (Opts) from the Application Standards Definition screen.

To select an option, use 'Y' in the selection column next to each option. Leave blank to ignore an option.

The Following Figure 1-17 illustrates the Standards Labels and Data Manipulation options screen.

```

- Application Standards Options -      Application: HOSPITAL

Labels
  _ Convert Back References to Labels
  _ Generate missing DB labels
  _ Generate missing non-DB labels

Assign/Move
  _ Always use Assign
  _ Always use Move
  Y None

  _ Always use Compute
  _ Always use End not '.'
  _ Qualify local variables with group name

Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help           Exit

```

Figure 1-17 Standards Label and Data Manipulation options screen

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SCREEN ITEMS	DESCRIPTION
Labels	<p>Identifies various label options. These options will generate modification details after impact execution, i.e., the modification option can be executed to add labels and/or convert back references. Label options are:</p> <p>Convert back references to labels Identifies back references, which can be converted to labels. <i>Note: When this option is selected, the Generate missing DB labels and Generate missing non-DB labels options are automatically selected. The Convert back references to labels option relies on these to create the labels first.</i></p> <p>Generate missing DB labels Identifies any Database access statements, which have no labels, associated with them. For Example: READ, FIND or HISTOGRAM. <i>Note: This option is mutually exclusive to both the Convert back references to labels and Generate missing non-DB labels options.</i></p> <p>Generate missing non-DB labels Identifies any non-Database access statements which have no labels associated with them. For Example: FOR and REPEAT loops. <i>Note: This option is mutually exclusive to both the Convert back references to labels and Generate missing DB labels options.</i></p>
ASSIGN/MOVE	<p>Identifies the use of ASSIGN or MOVE statements. ASSIGN/MOVE options are:</p> <p>Always use ASSIGN Any MOVE statements are located and reported.</p> <p>Always use MOVE Any ASSIGN statements are located and reported.</p>

SCREEN ITEMS	DESCRIPTION
Miscellaneous	<p>Identifies standards for miscellaneous options. Miscellaneous options are:</p> <p>Always use COMPUTE Any ASSIGN statements containing arithmetic constructs are located and reported. For Example: ASSIGN #TOTAL = #NET-TOTAL + 1</p> <p>Always use END not {,} Any use of ‘.’ as the END statement is located and reported.</p> <p>Qualify local variables with group name Any local variables that are defined within a group and have no group name qualifier are located and reported. For Example: 0100 01 #TAX-GROUP 0110 02 #TAX-RATE (N1.5) 0120 02 #TAX-RATE2 (N3) ::: 0300 COMPUTE #TOTAL-PAY = #ITEM-COST * #TAX-RATE #TAX-RATE at line number 0300 would be reported as it should have the group high level qualifier #TAX-GROUP prefix, i.e., #TAX-GROUP.#TAX-RATE.</p>
PFKEYS	DESCRIPTION
PF1	Activates the help function.
PF3	Exit from the current function and return to previous screen.

Impact Execution

The Impact Execution option invokes the Impact process, which will execute the Impact Search Criteria against the application code held in the Repository.

Each search criteria is checked against every element of the Repository. If 'Consistency' has been selected for the criterion, every impact found is then re-processed against the code in order to find the impacts of the impacts, using every left-right argument. This tracing process continues through the code until no further impacts or related impacts are found.

The number of times these Iterations occur can be limited by using the Maximum Iterations setting found in the Impact Search Criteria Summary screen.

This is accessed by selecting option 'E' (Impact Execution) from the Impact Analysis Menu screen. This will open the NATRJE Job Submission screen.

The following Figure 1-18 illustrates the NATRJE submission screen for the Impact Execution option.

```

- Job Submission -           Application: HOSPITAL

Job Selection details
-----
      Job Selected   : (IMPUPD) IMPACT EXECUTION
      Impact Version : 01
Job Card details
-----
      Job Name      : XGSLXX__
      Job Class     : _

Job Control Record details
-----
                        Control Status :
Last Job Submitted - Job Name :
                        - Opid        :
                        - Step        :
                        - Return Code :

Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help      Exit      Sub  Ref              Rel              Main
```

Figure 1-18 NATRJE Job Submission screen

Note: For more information on the NATRJE Job Submission screen refer to the Natural Engineer Batch Processing (Mainframes) manual.

Impact Element Maintenance

The Impact Element Maintenance option provides the facility to review the results of the last executed Impact Analysis for the currently selected version. All impacted objects within an application are available for selection, once selected the impacted data items within the object are listed.

The impacted data items can be selected to reveal the source code context within the object and the impact match reason showing why the data item has been impacted. The context of the data item within the data definitions of the selected object are also shown.

The Impact Element Maintenance option is accessed by selecting option 'M' (Impact Element Maintenance) from the Impact Analysis Menu screen.

Impact Object Selection Screen

All the impacted objects for the previous Impact Execution for the current selected Impact Version are listed on the Impact Object Selection screen. Each object can be selected to show a list of the individual impacted data items within the selected object.

The following Figure 1-19 illustrates the Impact Object Selection screen.

```

- Impact Object Selection -      Application: HOSPITAL
Select      Object Name          Version: 01
-          XXGETID
-          XX000G00
-          XX001L01
-          XX001M01
-          XX001P01
-          XX002L01
-          XX002M01
-          XX002P01
-          XX021M01
-          XX021P01
-          XX022M01
-          XX022P01
-          XX023M01
-          XX023P01
-          XX024M01
Reposition -> _____

Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Types Exit          Prev  Next          Main
```

Figure 1-19 Impact Object Selection screen

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SCREEN ITEMS	DESCRIPTION
Select	This is the selection column where individual objects can be selected. Valid selections are: ‘S’ Select object.
Object Name	Lists all the objects that have been impacted by the previous Impact Execution
Reposition	Reposition the list of objects starting from the new value entered. This value can be a complete object name or part name using ‘*’ wildcard. For Example: * Will reposition at the start of the Object list. For the HOSPITAL system, this would start the object list from object XXCONPDA. XXE* Will reposition at the first object name that matches the mask XXE or is greater than the mask input. For the HOSPITAL system, this would start the object list from object XXEXIT. XX000G01 Will reposition at the first object name that matches the mask exactly or is greater than the object name input. For the HOSPITAL system, this would start the object list from object XX001L01 as object XX000G01 does not exist.

PFKEYS	DESCRIPTION
PF1	Activates the help function.
PF2	Invoke the Object Type Selection pop-up window. Available selections are: '4' Classes 'C' Copycode 'D' Data Definition Modules '3' Dialogs 'G' Global Data Areas 'H' Help routines 'L' Local Data Areas 'M' Maps 'A' Parameter Data Areas 'P' Programs 'N' Subprograms 'S' Subroutines
PF3	Exit from the current function and return to previous screen.
PF7	Displays previous page.
PF8	Displays next page.
PF12	Returns to the Natural Engineer Main Menu.

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Impact Object Categorization Screen

After selecting an object using option 'S' from the Impact Object Selection screen, the Impact Object Categorization screen is displayed, showing all the individual impacted data items within the selected object.

The following Figure 1-20 illustrates the Impact Object Categorization screen.

```

- Impact Object Categorization - Application: HOSPITAL
                                Version: 01
Object: XX021P01 - Program
  T Line Attr Ext.Obj Element Name
  - I 0020 A070 XX000G00 #G-MESSAGE
  - A 0020 N007 XX021L01 PATIENT.PATIENT-ID
  - A 0030      XX021L01 PATIENT.PATIENT-ID
  - A 0040 A002 XX021L01 PATIENT.#V-YY
  - A 0050 N005 XX021L01 PATIENT.#V-NUMBER
  - A 0060 A020 XX021L01 PATIENT.FIRST-NAME
  - A 0070 A020 XX021L01 PATIENT.SURNAME
  - A 0080 N006 XX021L01 PATIENT.DOB
  - A 0090      XX021L01 PATIENT.DOB
  - A 0100 A006 XX021L01 PATIENT.#V-DOB
  - A 0110 A030 XX021L01 PATIENT.ADDRESS
  - A 0120 A020 XX021L01 PATIENT.ARRIVED
  - A 0130      XX021L01 PATIENT.ARRIVED
  - A 0140 A001 XX021L01 PATIENT.#V-VAL
  - A 0150 A006 XX021L01 PATIENT.DUE-FOR-SURGERY

Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help           Exit                       Prev Next                               Main
```

Figure 1-20 Impact Object Categorization screen

SCREEN ITEMS	DESCRIPTION
Object	The selected object name followed by the type of object applicable.
Sel	This is the selection column where individual data items can be selected. Valid selections are: 'S' Select object.
T	This is a 2-byte value, which denotes the type of impact. <i>Note: For more information on type of impact refer to the section Impact Types.</i>
Line	Line number in the object where the Impact was identified.
Attr	The definition of the item, if appropriate.
Ext.Obj	The name of the object that contains the item as impacted e.g., external Local Data Area with a Data Item definition.
Element Name	Lists all the data items impacted within the selected object.

PFKEYS	DESCRIPTION
PF1	Activates the help function.
PF3	Exit from the current function and return to previous screen.
PF7	Displays previous page.
PF8	Displays next page.
PF12	Returns to the Natural Engineer Main Menu.

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Natural Engineer Application Analysis & Modification

Impact Element Categorization Screen

After selecting a data item using option 'S' from the Impact Object Categorization screen, the Impact Element Categorization screen is displayed, showing all the usage information for the selected impacted data item, within the selected object.

The following Figure 1-21 illustrates the Impact Element Categorization screen.

```

- Impact Element Categorization - Application: HOSPITAL
                                Version: 01
                                Page: 1
Object: XX021P01
Field : PATIENT.DOB
Attr  : N006   Impact Type: Database File and Field Ext. Object: XX021L01

Search Criteria: Searching All Objects for DBFILE ? with value '?'

Stmt Source Line
0080  2 DOB                               N  6.0
0090 R 2 DOB                               /* BEGIN REDEFINE: DOB
1570 WHEN PATIENT.DOB = 0 OR #V-DOB NOT = MASK(MMDDYY)
2030          MOVE BY NAME PATIENT TO PATIENT-UPDATE

Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help           Exit           Prev Next           Ctxt           Main
```

Figure 1-21 Impact Element Categorization screen

SCREEN ITEMS	DESCRIPTION
Object	The name of the selected object.
Field	The name of the selected data item.
Attr	The Format and Length of the selected data item.
Impact Type	The type of impact description based on the 2-byte code found on the Object Categorization screen. <i>Note: For more information on type of impact refer to the section Impact Types.</i>
Ext. Object	The name of the object that contains the item as impacted e.g., external Local Data Area with a Data Item definition.
Search Criteria	The reason for this data item impact based on the criteria specified.
Stmnt	The statement line number of the code that is identified as impacted.
Source Line	The statement code which is impacted.
PFKEYS	DESCRIPTION
PF1	Activates the help function.
PF3	Exit from the current function and return to previous screen.
PF7	Displays previous page.
PF8	Displays next page.
PF10	Invokes the Field Context List screen, which shows the context of the selected data item within the data definitions of the selected object.
PF12	Returns to the Natural Engineer Main Menu.

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Natural Engineer Application Analysis & Modification

Field Context List Screen

The context of any selected data item can be seen using the Field Context List screen, which displays the relationship of the selected data item within the data definitions of an object.

The Field Context List screen is invoked by using 'PF10' (Ctxt) from the Element Categorization screen.

The following Figure 1-22 illustrates the Field Context List screen.

- Field Context List -				Application: HOSPITAL
				Version: 01
				Page: 1
Object: XX021P01				
Field: PATIENT.DOB				
STTNO	Level	Field Name	Attr	
0010	01	PATIENT-UPDATE	G	
0020	02	PATIENT-ID	N7	
0030	02	FIRST-NAME	A20	
0040	02	SURNAME	A20	
0050	02	DOB	N6	
0060	02	ADDRESS	A30	
0070	02	ARRIVED	A20	
0080	02	DUE-FOR-SURGERY	A6	
0090	02	RELEASED	P11	

Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
Exit Prevl Next Top Main

Figure 1-22 Field Context List screen

SCREEN ITEMS	DESCRIPTION
Object	The name of the selected object.
Field	The name of the selected data item.
STTNO	The Natural statement line number within the data definitions of an object.
Level	The level number for each data item.
Field Name	The data item name.
Attr	The Format and Length of each data item.

PFKEYS	DESCRIPTION
PF3	Exit from the current function and return to previous screen.
PF7	Displays previous page.
PF8	Displays next page.
PF10	Reposition to the top of the list.
PF12	Returns to the Natural Engineer Main Menu.

Impact Types

The following table shows all of the available impact types by criteria group:

Type	Description
Standard	
I	Data Item.
ID	Data Item - Derived fields.
M	Database Access.
A	Database File and Field.
AD	Database File and Field - Derived fields.
K	Keyword.
T	Literal.
TC	Literal comments.
R	Code Restructuring.
Q	Definition.
QD	Definition - Derived fields.
S	Source code change.
Object Builder	
G	Object Builder Line Range.
P	Object Builder Field Element.
V	Object Builder View Used.
C	Object Builder Initial/Temporary Impact.
X	Object Builder field external to line range referencing a line within the line range.
Y	Object Builder Escape Routine.
GK	Object Builder Presentation Line Range.
PK	Object Builder Presentation Field.
GT	Object Builder Technical Line Range.

Type	Description
------	-------------

Code Optimization

OL	Literal Move Length Mismatch.
OD	DECIDE ON statements using system variables.
OW	READ WORK FILE statement requiring RECORD clause.
OP	PE Group occurrences at group level.
OM	MOVE INDEXED statements.
OF	REPEAT/FOR loops using literal strings.
OU	Unused dataitems.
OS	STACK COMMAND statements with embedded data.
OG	Unused Global Variables.

Internationalization

Z	Double bytes on Maps.
----------	-----------------------

Application Standards

HA	Percentage of Object Comment Lines.
HB	Incorrect Object Mode.
HC	Copycode use not allowed.
HD	Local Data Item Start Character.
HE	Data Type Usage.
HF	Hexadecimal use not allowed.
HG	Data Item Name Length.
HH	AIV use not allowed.
HI	Dynamic Variable use not allowed.
HJ	Reserved Words as Data Items not allowed.
HK	Object Comment Description.
HL	Message File use not allowed.
HM	Processing Rules in Maps not allowed.
HN	Minimum Copycode use.
HO	Convert Back References to Labels.
HP	Data Item Name GT 32 characters.

Type	Description
HQ	Missing non-DB Labels.
HR	Always Use ASSIGN.
HS	Always Use MOVE.
HT	Always Use COMPUTE.
HU	Copycode usage LT minimum.
HV	Qualify Local Variables with Group Name.
HW	Copycode not in library.
HX	Always use END.
HY	Missing DB Labels.
Adjust	
J	Adjust.
Natural version 2.2-3.1 Conversion	
3a	Redefinition of DB Arrays.
3b	DEFINE WINDOW Minimum Size.
3c	DIVIDE and Decimal Positions. The actual DIVIDE statement.
3h	DIVIDE and Decimal Positions. The Data Definition affected.
3d	Comparison Logic for Mu's in FIND..WITH.
3e	Empty Statement Blocks. IGNORE inserted into empty statement block.
3@	Empty Statement Blocks. Empty Statement block commented out and maximum variable value inserted.
3g	No uppercase translation for *COM.
3I	Results of SIN, COS and TAN functions.
3j	More precise SQRT Function Results.
3k	Assignments of Numbers with Decimals to Time Fields.
3l	MOVE RIGHT JUSTIFIED where target field is smaller than source field.
3m	Negative Values to Date Fields.
3n	More precise results for Floating Point Conversions and computation of floating point exponentiation.

Type	Description
3o	Comparison and Assignment of Variable Array Ranges.
3p	NAT1117 and NAT0924 replaced by NAT0082.
3q	Obsolete Error Messages.
3r	Changed System Variable *TPSYS under BS2000.
3s	Priority of PRINT/WORK FILE Statements.
3t	Usage of User Exit Modules Copies from SYSEXT.
3u	Internal Handling of AD=O.
3v	EJECT Statement Required Operand LESS.
3w	ESCAPE not Valid AT START OF DATA. ESCAPE TOP and ESCAPE BOTTOM not allowed in ON ERROR blocks.
3x	Decimal Digits of Constant Values.
3y	NEWPAGE Statement Required Operands LESS/TOP.
3z	PRINT Statement LS Parameter invalid.
31	BEFORE BREAK within IF condition invalid.
32	SUBSTRING clause, where the offset plus the length of the substring must not exceed the length of the field.
33	MOVE BY NAME statement where redefinition of alpha fields to numerics exist and both source and target numeric field are same length.
Natural RPC	
4A	Natural keyword FETCH prohibited.
4B	Natural keyword RUN prohibited.
4C	Natural keyword INPUT prohibited.
4D	Natural keyword STOP works the same as ESCAPE ROUTINE.
4E	Natural keyword TERMINATE works the same as ESCAPE ROUTINE.
Porting	
6A	Alpha variables with redefinition variables defined using formats Binary, Integer or Packed.
6B	Numeric variables that are moved to Alpha variables.

Impact Analysis Inventory

The Analysis Inventory consists of a set of Impact Reports, which provide various types of information concerning the Impact Analysis, including a view of used Search Criteria. Reports are available at the summary, object and detailed data item levels.

The information provided by the Impact reports complements the information found in the Impact Element Maintenance screen.

The Impact Reports can be accessed by selecting option 'I' (Impact Reports) from the Impact Analysis Menu screen.

The following list illustrates the Impact Reports that are available:

- Search Criteria
- Application Impact Summary
- Object Impact Summary
- Impacted External: Objects
- Impacted External: Interfaces
- Impacted Construct Models
- Impacted Predict Case Components
- Data Item Impact Inventory
- Data Item Impact Steplib Inventory
- Data Item Impact Usage Inventory

Note: For more information on the Impact Reports refer to Chapter 3 in the Natural Engineer Reporting manual.

MODIFICATION PROCESSES

Chapter Overview

This chapter describes the Modification options available from the Modification menu.

The Modification processes provide all the facilities to modify object source code for the objects within an application held on the Repository. The Modification process relies on the Analysis information generated by the Impact execution and is controlled by the Impact Version process.

Once Modification has been executed, there are various reporting options to view the results either online or using textual reports.

All the Modification processes are available from the Modification menu.

The topics covered in this chapter:

1. [Modification Preferences](#)
2. [Modification Element Maintenance](#)
3. [Execute Modification for All Objects](#)
4. [Modification Inventory](#)

Modification Preferences

The Modification Preferences option is used to specify override TLMs for an application and is accessed from the Modification menu.

TLMs are Natural objects with an object type of Text, containing the required processing code to be used during modification. They need to exist on either the modification library specified in the application preferences or, can be held on the Natural SYSTEM library.

After the override TLMs have been saved, they need to be defined using the Modification Preferences option in order that Natural Engineer can recognize them and use them during the modification process.

When override TLMs are specified for an application, they will override any site wide TLM settings that are in place, across all versions for the currently selected application.

Note: Site wide TLMs are specified using the Default Text Logic Members option found by selecting option 'T' (Default Text Logic Members) from the Options Menu screen.

For more information on the Default Text Logic Members option refer Chapter 1 in the Natural Engineer Administration Guide for Mainframes manual.

Supplied Sample Text Logic Members

Natural Engineer comes supplied with three Text Logic Member (TLM) objects that can be adapted and used for the Modification Preferences option.

The sample TLMs supplied are:

1. TLMSTART
2. TLMCOM
3. TLMAFTER
4. TLMDYNAM

Note: These objects can be found on the Natural Engineer SYSNEE library and will need to be moved to either SYSTEM or modification libraries as required. If moved to the SYSTEM library, they will be available to all modification libraries.

New TLMs can be generated and added to the required Natural library and their usage must correspond to the TLM types that are available.

TLMSTART

This is an example 'Start' TLM. It may be used for Structured Mode or Reporting Mode objects.

```

0010 * -----
0020 * TLMSTART - START
0030 * -----
0040 FORMAT PS=24 LS=132
0050 * -----
0060 * TLMSTART - END
0070 * -----

```

This will get inserted before the first line of procedural code in an object e.g., after the definitions in a Structured Mode program.

TLMCOM

This is an example 'Comment' TLM. It will get inserted at the start of an object for object types: Program, Subprogram and Subroutine.

```

0010 /* -----
0020 /* TLMCOM-START
0030 /* -----
0040 /* Updated by: XX-USER Dated: XX-DATE Time: XX-TIME using NEE
0050 /* -----
0060 /* TLMCOM -END
0070 /* -----

```

The XX-USER will be translated to *USER contents

The XX-DATE will be translated to DD/MM/YYYY from *DATX

The XX-TIME will be translated to HH:II:SS from *TIMX

The user can add additional code to their own specifications.

TLMAFTER

This is an example 'After Field' TLM for a field that would get inserted after a particular keyword or data item if specified in the Impact Search criteria or on the Modification Element Maintenance screen.

```
0010 * -----  
0020 * TLMAFTER - START  
0030 * -----  
0040 PERFORM ##VALIDATION  
0050 * -----  
0060 * TLMAFTER - END  
0070 * -----
```

TLMDYNAM

This is an example 'Dynamic operand replacement' TLM. It is used when a TLM that has been used to modify a statement and retain the original statement operands.

For more information refer to the section [Dynamic Operand replacement in Text Logic Members](#).

```
0010 /* -----
0020 /*
0030 /* Sample TLM to show dynamic replacement of operands.
0040 /* This example shows how to use dynamic operand replacement to
0050 /* convert all MOVE statements to ASSIGNS
0060 /*
0070 /* Impact Criteria = MOVE with replacement TLM set of TLMDYNAM
0080 /*
0090 /* Up to 10 dynamic operands per statement may be specified.
0100 /* Conditional logic is specified via **NEE XX-OPERn and closed via
0110 /* **NEE BLOCK-END
0120 /*
0130 /* START OF TLMDYNAM
0140 /*
0150 /* -----
0160 ASSIGN XX-OPER2 = XX-OPER1
0170 **NEE XX-OPER3
0180 ASSIGN XX-OPER3 = XX-OPER1
0190 **NEE BLOCK-END
0200 **NEE XX-OPER4
0210 ASSIGN XX-OPER4 = XX-OPER1
0220 **NEE BLOCK-END
0230 **NEE XX-OPER5
0240 ASSIGN XX-OPER5 = XX-OPER1
0250 **NEE BLOCK-END
0260 **NEE XX-OPER6
0270 ASSIGN XX-OPER6 = XX-OPER1
0280 **NEE BLOCK-END
0290 /* -----
0300 /* END OF TLMDYNAM
0310 /* -----
```

Dynamic Operand replacement in Text Logic Members

If a TLM is used to modify a statement, it is possible to retain the use of the operands from the original statement within the TLM.

For example, if all MOVE statements are to be replaced by ASSIGN statements, the following search criteria could be specified:

Search Keyword = MOVE,
Replace TLM value = 'TLMDYNAM'
Replace Position set to REPLACE.

Note: For details on the sample TLM: TLMDYNAM refer to the section [Supplied Sample Text Logic Members](#).

Points to note using Dynamic Operand replacement TLMs:

1. Operands in the original statement are referenced in the TLM by using XX-OPERn. A maximum of 10 operands can be replaced this way, i.e., XX-OPER1 to XX-OPER10.
2. The replace TLM will only be activated with position set to REPLACE (search criteria specification). If position AFTER or BEFORE is used, then the dynamic operand replacement will not occur.
3. Conditional logic can be used within the TLM, by using the '**NEE' notation at the start of the statement line.

In the sample TLM above at line 0170, the statement '**NEE XX-OPER3' is an IF condition checking to see if XX-OPER3 exists in the original statement. If it does then the statement ASSIGN XX-OPER3 = XX-OPER1 will be included in the modified object. The '**NEE BLOCK-END' statement acts as an END-IF.

Example of Dynamic Operand replacement in a TLM

The following example illustrates a simple object which will have a modification applied changing the MOVE statement to ASSIGN using the example TLM illustrated above.

Sample object before modification:

```
0010 DEFINE DATA LOCAL
0020 01 #A          (A10)
0030 01 #B          (A10)
0040 01 #C          (A10)
0050 01 #D          (A10)
0060 01 #E          (A10)
0070 END-DEFINE
0080 /*
0090 MOVE #A TO #B #C #D #E
0100 /*
0110 END
```

The operands for dynamic replacement are:

```
#A for XX-OPER1
#B for XX-OPER2
#C for XX-OPER3
#D for XX-OPER4
#E for XX-OPER5
```

After modification the object code will look like this:

```
0010 DEFINE DATA LOCAL
0020 01 #A          (A10)
0030 01 #B          (A10)
0040 01 #C          (A10)
0050 01 #D          (A10)
0060 01 #E          (A10)
0070 END-DEFINE
0080 /*
0090 /* MOVE #A TO #B #C #D #E /* NEE OLD CODE
0100 /*
0110 /* -----
0120 /* START OF TLMDYNAM
0130 /* -----
0140 ASSIGN #B = #A
0150 ASSIGN #C = #A
0160 ASSIGN #D = #A
0170 ASSIGN #E = #A
0180 /* -----
0190 /* END OF TLMDYNAM
0200 /* -----
0210 END
```

Note: The leading comments from the supplied sample TLM: TLMDYNAM have been removed for the purpose of this example.

2

Natural Engineer Application Analysis & Modification

Modification Preferences Screen

All the specifications for the override TLMs are defined using the Modification Preferences screen.

This is accessed by selecting option 'P' (Modification Preferences) from the Modification Menu screen.

The following Figure 2-1 illustrates the Modification Preferences screen.

```

                                     - Modification Preferences - Application: NEEDOCN
Text Logic Members: Application NEEDOCN Override TLM's
Opt TLM Type      Format Length  Mode      Edit Mask      Logic
_  COMMENT_____ -          STRUCTURED  _____  Member
                                     TLMCOM__

Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  TLM  Exit      Save      Prev  Next      Opts      Main

```

Figure 2-1 Modification Preferences screen

SCREEN ITEMS	DESCRIPTION
Opt	Line command options. Valid options are: 'T' Insert a new line. 'D' Delete the current line.
TLM Type	Specify what type of TLM is defined. Valid values are: START A TLM to be inserted at the Start of an Object. This is after the definition of the data items in the object. DATA A TLM that provides data items to be included in an object. MISC A TLM that is placed at the end of the object that can contain processing, for example including common routines. COMMENT To be inserted at the start of the object to explain another TLM inserted in the object. The following variables can be specified and will be replaced at remedy execution. <ul style="list-style-type: none"> • XX-DATE, which will be translated into DD/MM/YYYY • XX-TIME, which will be translated into HH:MM:SS • XX-USER, which will contain the user-id of the person who executed modification for the object. CMPT COMMENT The Component comment inserted at the start of the new component subprogram that has been created. CMPT DATA Component parameter data inserted as the last parameter passed in the subprogram. The TLM data must be specifically coded in this routine and must contain the following definition first. 01 #EXTRA-PDA If a component TLM is required to pass a data item #RESPONSE between the new subprogram and the object calling it then the following is the structure for this TLM: 01 #EXTRA-PDA 02 #RESPONSE (A1)

SCREEN ITEMS	DESCRIPTION
SAG05 R1	<p>This is the default modification for empty FOR and REPEAT statement blocks. The TLM will insert the keyword IGNORE into the empty block. For Example:</p> <pre>1020 REPEAT 1030 IGNORE 1040 END-REPEAT</pre> <p><i>Note: Used in Nat 2.2 to Nat 3.1 conversion.</i></p>
SAG05 R2	<p>This TLM type can be used as an alternative to the default SAG05R1. This will comment out the empty statement block but then insert a line of code to set the applicable variable to the maximum value. For Example:</p> <p>FOR #A = 1 TO 10, will insert MOVE 10 TO #A.</p> <p>This will only be applied to a FOR loop block, a REPEAT loop block will only get commented out.</p> <p>Additionally, if this TLM type is selected in the preference screen, then prior to modification the update field button will need to be used on the Modification Element Maintenance screen to ensure the correct TLM is applied during modification.</p> <p><i>Note: Used in Nat 2.2 to Nat 3.1 conversion.</i></p>
Format	The format of the data item the TLM relates to. (Not used at present.)
Length	The length of the data item the TLM relates to. (Not used at present.)
Mode	Programming mode to which the TLM applies. Valid values are: <ul style="list-style-type: none"> Structured Structured mode Reporting Reporting mode
Edit Mask	The specific edit mask for the data item that the TLM relates to. (Not used at present.)
Logic Member	Name of the TLM to be used.

PFKEYS	DESCRIPTION
PF1	Activates the help function.
PF2	Displays a selection list of valid TLM Types. <i>Note: For more information on TLM Types refer to the screen item TLM Type</i>
PF3	Exit from the current function and return to previous screen.
PF5	Saves the specified default TLM details.
PF7	Displays previous page.
PF8	Displays next page.
PF10	Displays the options available to view alternate TLM settings. <i>Note: For the Default TLM option only SiteWide TLM's are viewable.</i>
PF12	Returns to the Natural Engineer Main Menu.

Modification Element Maintenance

The Modification Element Maintenance option provides the facility to review and modify interactively, the default modifications to be applied to objects from the last Impact execution for the currently selected version within an application. All impacted objects within an application are available for selection, once selected a list of the impacted data items within the object are listed.

The Modification Element Maintenance option allows each modification to be updated to change the modification types, categories and replacement values as desired. The Modification changes to be applied can be reviewed before they are implemented, using the Browser.

The Modification Element Maintenance option also provides the facility to review the Impact results in the Browser.

Modifications to single objects can be implemented from this option.

The Modification Element Maintenance option is accessed by selecting option 'M' (Modification Element Maintenance) from the Modification Menu screen.

Modification Object Selection Screen

All the impacted objects for the previous Impact Execution for the current selected Impact Version are listed on the Modification Object Selection screen. Each object can be selected to show a list of the individual impacted data items within the selected object.

The following Figure 2-2 illustrates the Modification Object Selection screen.

```

- Modification Object Selection - Application: HOSPITAL
                               Version: 01
Select  Object Name           Date of Modification
-      XXGETID                N/A
-      XXTIDYUP                N/A
-      XX000G00               23 Sep 2001 at 14:18:28
-      XX001L01               23 Sep 2001 at 14:18:28
-      XX001M01               23 Sep 2001 at 14:18:28
-      XX001P01               23 Sep 2001 at 14:18:29
-      XX002L01               23 Sep 2001 at 14:18:29
-      XX002M01               23 Sep 2001 at 14:18:30
-      XX002P01               23 Sep 2001 at 14:18:30
-      XX021L01               N/A
-      XX021L02               N/A
-      XX021M01               23 Sep 2001 at 14:18:31
-      XX021P01               23 Sep 2001 at 14:18:32
-      XX022M01               23 Sep 2001 at 14:18:32
-      XX022P01               23 Sep 2001 at 14:18:33
Reposition -> _____
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Types Exit           Prev  Next                               Main

```

Figure 2-2 Modification Object Selection screen

SCREEN ITEMS	DESCRIPTION
Select	This is the selection column where individual objects can be selected. Valid selections are: ‘S’ Select object.
Object Name	Lists all the objects that have been impacted by the previous Impact Execution
Date of Modification	The date and time Modification was applied to an object. If the object has not yet been modified, then this will default to ‘N/A’.
Reposition	Reposition the list of objects starting from the new value entered. This value can be a complete object name or part name using ‘*’ wildcard. For Example: * Will reposition at the start of the Object list. For the HOSPITAL system, this would start the object list from object XXCONPDA. XXE* Will reposition at the first object name that matches the mask XXE or is greater than the mask input. For the HOSPITAL system, this would start the object list from object XXEXIT. XX000G01 Will reposition at the first object name that matches the mask exactly or is greater than the object name input. For the HOSPITAL system, this would start the object list from object XX001L01 as object XX000G01 does not exist.

PFKEYS	DESCRIPTION
PF1	Activates the help function.
PF2	Invoke the Object Type Selection pop-up window. Available selections are: '4' Classes 'C' Copycode 'D' Data Definition Modules '3' Dialogs 'G' Global Data Areas 'H' Help routines 'L' Local Data Areas 'M' Maps 'A' Parameter Data Areas 'P' Programs 'N' Subprograms 'S' Subroutines
PF3	Exit from the current function and return to previous screen.
PF7	Displays previous page.
PF8	Displays next page.
PF12	Returns to the Natural Engineer Main Menu.

Modification Object Categorization Screen

After selecting an object using option 'S' from the Modification Object Selection screen, the Modification Object Categorization screen is displayed, showing all the individual impacted data items within the selected object.

The following Figure 2-3 illustrates the Modification Object Categorization screen.

```

- Modification Object Categorization - Application: HOSPITAL
                                     Version: 01
XX001P01 - Program remedy executed on 23 Sep 2001 AT 14:18:29
  C T Line Attr  Ext.Obj  Element Name
-  N I 0020 A070  XX000G00 #G-MESSAGE
-  N I 0020 A070  XX001L01 #L-MESSAGE
-  A I 0110                #L-MESSAGE
-  A I 0240                #L-MESSAGE
-  A I 0260                #L-MESSAGE

Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help           Exit           Mod           Prev Next           Edit Main

```

Figure 2-3 Modification Object Categorization screen

SCREEN ITEMS	DESCRIPTION
Object	The selected object name followed by the type of object applicable. The date and time Modification was applied to an object is appended to the end. If the object has not yet been modified, then this will default to ' not yet modified '.
Sel	This is the selection column where individual data items can be selected. Valid selections are: 'S' Select object.
C	This is a 1-byte value, which denotes the Category of Modification to be applied for the data item. <i>Note: For more information on these categories refer to the section Modification Categories.</i>
T	This is a 2-byte value, which denotes the type of impact. <i>Note: For more information on type of impact refer to the section Impact Types.</i>
Line	Line number in the object where the Impact was identified.
Attr	The definition of the item, if appropriate.
Ext.Obj	The name of the object that contains the item as impacted e.g., external Local Data Area with a Data Item definition.
Element Name	Lists all the data items impacted within the selected object.

PFKEYS	DESCRIPTION
PF1	Activates the help function.
PF3	Exit from the current function and return to previous screen.
PF5	Executes any automatic Modification changes, by copying the code into the defined Modification library and changing the code as required. <i>Note: This will only apply Modification changes to the currently selected object.</i>
PF7	Displays previous page.
PF8	Displays next page.
PF11	Invokes the Natural editor for the object that has been selected. Natural Engineer will be closed down. The Natural editor that is invoked will depend on the object type of the selected object, e.g., if a program object has been selected, then the program editor will be invoked. The library will be the Modification library specified in the application preferences. <i>Note: It is possible to return back to Natural Engineer by typing in 'NATENG' in the Natural command line. This will return you back to the Object Categorization screen.</i>
PF12	Returns to the Natural Engineer Main Menu.

Modification Element Categorization Screen

After selecting a data item using option 'S' from the Modification Object Categorization screen, the Modification Element Categorization screen is displayed, showing all the usage information for the selected impacted data item, within the selected object.

The following Figure 2-4 illustrates the Modification Element Categorization screen.

```

- Modification Element Categorization - Application: HOSPITAL
                                         Version: 01
                                         Page: 1
Object: XX001P01
Field : #L-MESSAGE
Attr  :      External Object Name:
Category : A   Automatic           Replace Defn: _____ TLM: _____
Type    : I_  Data Item             Pos: _____
Replace Value: #L-MSG
User Comment : _____
TLM Data    : _____
Reason : Data item can be automatically changed
User ID:      Last Update      :
              Execution Date : 23 Sep 2001 at 14:18:29

Stmt Source Line
0020 1 #L-MESSAGE                A 70 /* Message at bottom of Scre
0110 RESET #L-MESSAGE
0240 MOVE "INVALID OPTION SELECTED" TO #L-MESSAGE
0260 MOVE "INVALID PF KEY PRESSED" TO #L-MESSAGE

Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help      Exit      Updt SCrit Prev Next +Parm Ctxt      Main

```

Figure 2-4 Modification Element Categorization screen

SCREEN ITEMS	DESCRIPTION
Page	The page number for the Source Lines being displayed. Up to 6 lines of source code are displayed at a time.
Object	The name of the selected object.
Field	The name of the selected data item.
Attr	The Format and Length of the selected data item, if appropriate.
External Object Name	The name of the object that contains the item identified as impacted e.g., external Local Data Area with a Data Item definition.
Category	The default Modification Category provided by Impact execution. This can be overwritten with a different value and updated using 'PF5' (Updt). <i>Note: For more information on these categories refer to the section Modification Categories.</i>
Type	The default Impact Type provided by Impact execution. This can be overwritten with a different value and updated using 'PF5' (Updt). <i>Note: For more information on type of impact refer to the section Impact Types in Chapter 1.</i>
Replace Defn	The definition to replace the original definition of the Item.
TLM	The name of the TLM to be used. This will display the name of the TLM that was specified with the Search Criteria, otherwise will be blank. A new TLM name can be input here.
Pos	The position the TLM will be inserted relative to the Item. Available values are: <ul style="list-style-type: none"> ▪ After ▪ Before ▪ Replace.
Replace Value	The value with which to replace the Item.
User Comment	A user-entered comment usually used to explain any change made to the defaults.
TLM Data	Data for passing to the TLM. The modification process will move the value into the TLM Data field. TLM data field is XX-TLM.
Reason	Natural Engineer's reason for assigning the Category and Type.
User ID	The User ID of the last change made to that Item.
Last Update	The date and time of the last update to the Modification options.

SCREEN ITEMS	DESCRIPTION				
Execution Date	The date and time Modification was applied to an object. If the object has not yet been modified, then this will default to ' not yet modified '.				
Object Details	This section will display all the references of the selected data item for the selected object. Up to 6 lines are displayed per page. These details are organized in the following columns: <table border="0"> <tr> <td>Stmt</td> <td>The statement line number of the code that is identified as impacted.</td> </tr> <tr> <td>Source Line</td> <td>The statement code which is impacted.</td> </tr> </table>	Stmt	The statement line number of the code that is identified as impacted.	Source Line	The statement code which is impacted.
Stmt	The statement line number of the code that is identified as impacted.				
Source Line	The statement code which is impacted.				

PFKEYS	DESCRIPTION						
PF1	Activates the help function.						
PF3	Exit from the current function and return to previous screen.						
PF5	Applies any changes made to the Modification settings, to the Item.						
PF6	Displays the Impact reason for the selected data item, based on the criteria specified.						
PF7	Displays previous page.						
PF8	Displays next page.						
PF9	Additional Modification parameters. These parameters are available for maps so that the user can additionally specify entries for the following values: <table border="0"> <tr> <td>AL</td> <td>Display length for alphanumeric data item.</td> </tr> <tr> <td>NL</td> <td>Display length for a numeric data item.</td> </tr> <tr> <td>EM</td> <td>Edit mask for the data item.</td> </tr> </table>	AL	Display length for alphanumeric data item.	NL	Display length for a numeric data item.	EM	Edit mask for the data item.
AL	Display length for alphanumeric data item.						
NL	Display length for a numeric data item.						
EM	Edit mask for the data item.						
PF10	Invokes the Field Context List screen, which shows the context of the selected data item within the data definitions of the selected object.						
PF12	Returns to the Natural Engineer Main Menu.						

Field Context List Screen

The context of any selected data item can be seen using the Field Context List screen, which displays the relationship of the selected data item within the data definitions of an object.

The Field Context List screen is invoked by using 'PF10' (Ctxt) from the Element Categorization screen.

The following Figure 2-5 illustrates the Field Context List screen.

- Field Context List -				Application: HOSPITAL
				Version: 01
Object: XX001P01				Page: 1
Field: #L-MESSAGE				
STTNO	Level	Field Name	Attr	

0020	01	#L-MESSAGE	A70	

Enter	PF1	PF2	PF3	PF4	PF5	PF6	PF7	PF8	PF9	PF10	PF11	PF12
		Exit				Prev	Next			Top		Main

Figure 2-5 Field Context List screen

SCREEN ITEMS	DESCRIPTION
Object	The name of the selected object.
Field	The name of the selected data item.
STTNO	The Natural statement line number within the data definitions of an object.
Level	The level number for each data item.
Field Name	The data item name.
Attr	The Format and Length of each data item.

PFKEYS	DESCRIPTION
PF3	Exit from the current function and return to previous screen.
PF7	Displays previous page.
PF8	Displays next page.
PF10	Reposition to the top of the list.
PF12	Returns to the Natural Engineer Main Menu.

Modification Categories

The following table shows all of the available modification categories:

Cat	Description
A	Automatic These are changes that can be made automatically by the Natural Engineer Modification process.
M	Manual These are changes that must be made manually by a user.
N	Not Applicable These are Items that are not relevant for change.
R	Reject These are Items that have been Rejected for change by a user.

Execute Modification for All Objects

The Execute Modification for All Objects option invokes the Modification process, which will apply the specified Modifications to the object source code for all the objects within an application, held on the Repository in one single operation.

This option is usually executed after review and confirmation that all Modification Categories, Types and other settings are as required, using the Modification Element Maintenance screen and Modification Reports.

Each object is modified as follows:

- The object is found in the application Natural library (i.e., the Natural library from which the Extract process extracted the objects).
- The object is then copied over to the Modification library (i.e., as specified in the Application Preferences).
- During the copy phase, the Modification process checks the Impact and Modification data held in the Repository for the object being modified and applies it to the modified version.

This is accessed by selecting option 'A' (Execute Modification for All Objects) from the Modification Menu screen. This will open the NATRJE Job Submission screen.

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The following Figure 2-6 illustrates the NATRJE submission screen for the Execute Modification for All Objects option.

```

- Job Submission -           Application: HOSPITAL

Job Selection details
-----
Job Selected   : (REMEXE) EXECUTE REMEDY FOR ALL OBJECTS

Job Card details
-----
Job Name      : XGSLXX__
Job Class     : _

Job Control Record details
-----
Control Status :
Last Job Submitted - Job Name :
                  - Opid      :
                  - Step      :
                  - Return Code :

Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help      Exit      Sub   Ref              Rel              Main

```

Figure 2-6 NATRJE Job Submission screen

Note: For more information on the NATRJE Job Submission screen refer to the Natural Engineer Batch Processing (Mainframes) manual.

Warning: For any objects being modified, if the same object already exists in the Modification library, then it will be over written by the new version created during the Modification process.

Modification Inventory

The Modification Inventory consists of a set of Modification Reports, which provide various types of information concerning the Modification process. Reports are available at the summary, object and detailed data item levels.

The Modification Reports can be accessed by selecting option 'R' (Modification Reports) from the Modification Menu screen.

The following list illustrates the Modification Reports that are available:

- Application Modification Summary
- Object Modification Summary
- Category / Type Summary
- PREDICT Changes
- Data Item Inventory Modification
- Data Item Inventory for Automatic Modification
- Data Item Inventory for Manual Modification
- Impacted Objects Not directly Modified
- Construct Models Not directly Modified
- Database Data Requirements Modification

Note: For more information on the Modification Reports refer to Chapter 3 in the Natural Engineer Reporting manual.

In addition to the Modification Reports, all modification changes generate audit trail records of the before and after images of the changed source code. These audit trail records can be reviewed using the Change Management Tracking option from the Utilities menu.

Note: For more information on the Change Management Tracking option refer to Chapter 2 in the Natural Engineer Utilities for Mainframes manual.

COMBINATION SEARCH KEYWORDS

Chapter Overview

This chapter describes the combination search keywords that can be used when specifying Search Criteria for the Impact Analysis option.

These search keywords are not Natural statements in themselves, but are used to qualify a group of Impact search criteria, which may encompass several Natural statements in the process.

The topics in this chapter are:

1. [ADJUST](#)
2. [APPLICATION STANDARDS](#)
3. [CODE OPTIMIZATION](#)
4. [CODE RESTRUCTURING](#)
5. [INTERNATIONALIZATION](#)
6. [MULTI SEARCH](#)
7. [MVS NAT22 TO 31](#)
8. [NATRPC](#)
9. [OBJECT BUILDER](#)
10. [PORTING](#)

ADJUST

The search keyword ADJUST can be used to change the name of an object within an application.

Impact will identify the object that has been specified within an application and using the consistency option with this search keyword, will result in all references to the object being identified within the other objects in the application.

Modification will copy and rename the specified object to the modification library and then change all impacted references within objects to use the new object name.

Example to illustrate the use of Adjust

This example will use the search keyword ADJUST to change the name of object XX021P01 to be SAG21P01. Consistency will be activated so that all references within the sample application HOSPITAL for object XX021P01 are found and changed to be SAG21P01.

Step 1 Create a new version of the impact search criteria and using a Keyword of ADJUST, a Keyword value of 'XX021P01', a Replace Value' of 'SAG21P01' and Consistency activated.

The following Figure 3-1 illustrates the specification of search keyword ADJUST in the Impact Criteria screen.

Impact Criteria	Application: HOSPITAL Version: 01
Search Keyword...: ADJUST _____	
Object Name.....: _____	
Keyword Value (Object Name) XX021P01 _____	
Replace Value....: SAG21P01 _____	
_ Data Item Y Literal	
Modification Parm	Consistency: Y
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10---PF11---PF12---	
Help Types Exit Add Main	

Figure 3-1 The specification of search keyword ADJUST

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Step 2 Execute Impact analysis.

Step 3 Review the Impact results using the Impact Element Maintenance option. Impact Analysis will find impacts for three objects: XX002P01, XX021P01 and XX025P01.

The following Figure 3-2 illustrates the Object Impact Selection screen displaying the impacted objects for search keyword: ADJUST.

```

- Impact Object Selection -      Application: HOSPITAL
Option      Object Name              Version: 01
  -         XX002P01
  -         XX021P01
  -         XX025P01

Reposition -> _____

Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
Help  Types Exit                               Prev Next                                     Main
```

Figure 3-2 Object Impact Selection screen with impact results for ADJUST

Object XX021P01 has been impacted for the object rename. Objects XX002P01 and XX025P01 have been impacted because they make reference to object XX021P01.

Object XX002P01 will be selected using option 'S', to review the impacted data items using the Object Categorization screen.

The following Figure 3-3 illustrates the Object Categorization screen displaying the impacted data items within object XX002P01 for search keyword: ADJUST.

```
                - Impact Object Categorization - Application: HOSPITAL
                                      Version: 01
Object: XX002P01 - Program
  C Line Attr  Ext.Obj  Element Name
  _ T  0250                XX021P01

Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help      Exit              Prev Next              Main
```

Figure 3-3 Object Categorization screen with impact results for ADJUST

One single data item has been impacted within object XX002P01. For more detailed impact information, we need to select the data item using 'S' to display the Element Categorization screen.

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The following Figure 3-4 illustrates the Element Categorization screen displaying the usage of the impacted data items within object XX002P01 for search keyword: ADJUST.

```

- Impact Element Categorization - Application: HOSPITAL
                                  Version: 01
                                  Page: 1
Object: XX002P01
Field : XX021P01
Attr  :          Impact Type: Literal          Ext. Object:

Search Criteria: Searching All Objects for ADJUST , replace with 'SAG21P01'

Stmt Source Line
0250          FETCH "XX021P01" /* ADD NEW PATIENT

Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help      Exit          Prev Next      Ctxt      Main
```

Figure 3-4 Element Categorization screen with impact results for ADJUST

The Element Categorization screen shows us that the data item impacted is the literal 'XX021P01'.

The other impacted objects in this example can be reviewed using the same selection options to display the Object Categorization and Element Categorization screens.

Step 4 Review modification information by selecting objects using the Modification Element Maintenance option. Select each object to view the modification strategy. All object changes with a category of ‘A’ will be automatically completed by Natural Engineer. All others must be reviewed.

The following Figure 3-5 illustrates the Modification Object Selection screen displaying the modification details for search keyword: ADJUST.

```

- Modification Object Selection - Application: HOSPITAL
                                Version: 01
Option   Object Name             Date of Modification
-        XX002P01              N/A
-        XX021P01              N/A
-        XX025P01              N/A

Reposition -> _____

Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10---PF11---PF12---
      Help  Types Exit                Prev Next                            Main
    
```

Figure 3-5 Modification Object Selection screen with modification details for ADJUST

Object XX002P01 will be selected using option ‘S’, to review the impacted data items using the Object Categorization screen.

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The following Figure 3-6 illustrates the Modification Object Categorization screen displaying the impacted data items within object XX002P01 for search keyword: ADJUST.

```

- Modification Object Categorization - Application: HOSPITAL
                                      Version: 01
XX002P01 - Program - not yet modified
  C T Line Attr  Ext.Obj  Element Name
-  A T 0250                XX021P01

Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help           Exit           Mod           Prev Next           Edit Main
```

Figure 3-6 Modification Object Categorization screen with modification details for ADJUST

One single data item has been impacted within object XX002P01. For more detailed impact information, we need to select the data item using 'S' to display the Element Categorization screen.

The following Figure 3-7 illustrates the Modification Element Categorization screen displaying the modification details for object XX002P01 for search keyword: ADJUST.

```

- Modification Element Categorization - Application: HOSPITAL
                                         Version: 01
                                         Page: 1
Object: XX002P01
Field : XX021P01
Attr  :      External Object Name:
Category   : A   Automatic           Replace Defn: _____ TLM: _____
Type       : T_  Literal              Pos: _____
Replace Value: SAG21P01
User Comment : _____
TLM Data    : _____
Reason : Data item can be automatically changed
User ID:      Last Update      :
              Execution Date : Not yet modified

Stmt Source Line
0250          FETCH "XX021P01" /* ADD NEW PATIENT

Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help      Exit      Updt  SCrit Prev Next  +Parm Ctxt      Main

```

Figure 3-7 Modification Element Categorization screen with modification details for ADJUST

The other impacted objects in this example can be reviewed using the same selection options to display the Object Categorization and Element Categorization screens.

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Step 5 Execute modification using the Execute Modification for All Objects option from the Modification menu to apply all modifications in one single operation.

This will copy each object to the Modification library HOSPITAX, and apply the changes that have been specified. The changes applied are:

1. Rename object XX021P01 to SAG21P01,
2. In object XX002P01, change statement at line number 0250:
From: FETCH "XX021P01"
To FETCH "SAG21P01".
3. In object XX025P01, change statement at line number 1080 :
From: FETCH RETURN "XX021P01" #M-PATIENT-ID (#W-LOOP)
To: FETCH RETURN "SAG21P01" #M-PATIENT-ID (#W-LOOP).

Step 6 Review the modifications applied by opening the modification library HOSPITAX in Natural.

The following Figure 3-8 illustrates the modified objects in the modification library HOSPITAX.

```

User XGSLXX                - LIST Objects in a Library -                Library HOSPITAX

Cmd  Name          Type          S/C  SM Version  User ID  Date          Time
---  *             *             *    *  *         *           *           *
___  SAG21P01       Program       S    R  1.2.GS   21P01     19
___  XX002P01       Program       S    S  3.1.04   XGSLXX    2001-09-23  17:01:23
___  XX025P01       Program       S    S  3.1.04   XGSLXX    2001-09-23  17:01:24

                                                    3 Objects found

Top of List.
Command ==>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10---PF11--PF12---
      Help  Print Exit          --    -    +    ++          >    Canc
    
```

Figure 3-8 Modified objects in modification library HOSPITAX

From the object list it can be seen that object XX021P01 has been renamed to SAG12P01.

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The following Figure 3-9 illustrates the modified source code within object XX002P01.

```

>
> + Program      XX002P01 Lib HOSPITAX
Top  .....1.....2.....3.....4.....5.....6.....7..
0010 DEFINE DATA
0020 GLOBAL
0030 USING XX000G00
0040 LOCAL
0050 USING XX002L01
0060 END-DEFINE
0070 *
0080 SET KEY ALL
0090 *
0100 REPEAT
0110 *
0120 INPUT USING MAP "XX002M01"
0130 RESET #M-MESSAGE
0140 *
0150 DECIDE ON FIRST VALUE OF *PF-KEY
0160 *
0170 VALUE "PF3", "PF15"
0180     FETCH "XX001P01"
0190 VALUE "PF12", "PF24"
0200     PERFORM XXEXIT
0210 VALUE "ENTR"
0220     DECIDE ON FIRST VALUE OF #M-OPTION
0230     VALUE "A"
0240     MOVE "A" TO #G-SELECTED-OPTION
0250 /*     FETCH "XX021P01" /* ADD NEW PATIENT /* NEE OLD CODE
0260     FETCH "SAG21P01" /* ADD NEW PATIENT /* NEE MODIFIED AUTO

```

Figure 3-9 Modified source code within object XX002P01

The following Figure 3-10 illustrates the modified source code within object XX025P01.

```

>
> + Program      XX025P01 Lib HOSPITAX
....+....1....+....2....+....3....+....4....+....5....+....6....+....7..
1030 DEFINE SUBROUTINE PROCESS-SELECTED
1040 *
1050 FOR #W-LOOP = 1 TO 15
1060   DECIDE FOR FIRST CONDITION
1070     WHEN #M-SELECTED(#W-LOOP) = " "
1080       ESCAPE TOP
1090     WHEN #M-SELECTED(#W-LOOP) NOT = " " AND
1100       #M-PATIENT-ID(#W-LOOP) = 0
1110       MOVE "YOU SELECTED A BLANK LINE - TRY AGAIN!" TO #G-MESSAGE
1120       ESCAPE ROUTINE
1130     WHEN #M-SELECTED(#W-LOOP) = "D" OR = "M"
1140       MOVE #M-SELECTED(#W-LOOP) TO #G-SELECTED-OPTION
1150 /*       FETCH RETURN "XX021P01" #M-PATIENT-ID(#W-LOOP) /* NEE OLD CODE
L 1160       FETCH RETURN "SAG21P01" #M-PATIENT-ID(#W-LOOP) /* NEE MODIFIED AUT
1170       MOVE " " TO #M-SELECTED(#W-LOOP)
1180     WHEN NONE
1190       MOVE "INVALID CHARACTER FOUND IN SELECTION ARRAY" TO #G-MESSAGE
1200     ESCAPE ROUTINE
1210   END-DECIDE
1220 END-FOR
1230 PERFORM READ-DATA
1240 END-SUBROUTINE
1250 END

```

Figure 3-10 Modified source code within object XX025P01

Step 7 Copy the rest of the application HOSPITAL objects, taking care that the objects XX002P01 and XX025P01 do not get over written. Apply a CATALL to the HOSPITAX library and then execute the HOSPITAL system using the modified objects.

APPLICATION STANDARDS

The search keyword APPLICATION STANDARDS is used to measure how an application complies with acceptable Natural application standards.

This keyword makes use of a criteria sub-set, which is specified using either:

1. The Global Standards option, which is accessed by selecting option ‘S’ (Global Standards) from the Options Menu screen.
2. The Application Standards option, which is accessed by selecting option ‘A’ (Application Standards) from the Impact Data Preparation sub menu screen.

Each of these options allows you to specify the Natural application standards to be measured against either site wide (Global Standards) or application specific (Application Standards).

Note: For more information on Global Standards refer to Chapter 1 in the Natural Engineer Administration Guide manual.

Impact execution will review each object within an application against the specified standards, reporting any that do not comply.

Note: Automatic Modification is only available for the Labels and Data Manipulation options. For more information on Application Standards refer to the section [Impact Data Preparation](#).

CODE OPTIMIZATION

The search keyword CODE OPTIMIZATION can be used to locate certain Natural statements that may cause performance considerations within Natural Applications.

This search keyword uses a sub-set of criteria, which are specified using the options provided by the PFkey 'PF6' (Optns) from the Impact Criteria screen.

Note: For more information on the PFkey 'PF6' (Optns) refer to the section [Impact Criteria screen](#).

Once impacted, it will then be possible to modify the code to correct the inefficiencies found, using the modification function.

Specifying Code Optimization Preferences

To use code optimization criteria, you must first select the search keyword 'Code Optimization' from the Search Keyword Selection pop-up window on the Impact Criteria screen. This will enable the PFkey 'PF6' (Optns) on the Impact Criteria screen.

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The following Figure 3-11 illustrates the specification of search keyword CODE OPTIMIZATION on the Impact Criteria screen.

```

                                     Impact Criteria           Application: HOSPITAL
                                                                Version: 01
Search Keyword...: CODE OPTIMIZATION_____
Object Name.....: _____

Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Types Exit           Add   Optns                                     Main
```

Figure 3-11 The specification of search keyword CODE OPTIMIZATION

Using 'PF6' (Optns) will invoke the Code Optimization Preferences screen where all the Code Optimization options can be selected / de-selected.

The following Figure 3-12 illustrates the Code Optimization Preferences screen.

```

                                     Impact Criteria           Application: HOSPITAL
                                                                Version: 01
Search Keyword...: CODE OPTIMIZATION_____
Obj
      Code Optimization Preferences

      Y Alpha literal values and variables
      Y DECIDE ON using system variables
      Y Insert RECORD option for READ WORK FILE (work file processing)
      Y Move Occurrence number to each PE member, rather than group
      Y Replace MOVE INDEXED statement with appropriate MOVE
      Y Change FOR and REPEAT loops to use named constants
      Y Find unused dataitems in programs
      Y Split STACK COMMAND commands with embedded data
      Y Find Unused Global Variables

      PF5 to Save

Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Types Exit           Add  Optns                               Main

```

Figure 3-12 Code Optimization Preferences screen

There are nine Code Optimization options supported. The default setting is for all nine options to be selected. These can be selected or de-selected as required. The available Code Optimization options are:

1) Alpha literal values and variables.

Impact will look for any literal string being moved to alpha variables that are defined with a length greater than the length of the literal string.

Modification will pad the literal string value with spaces to match the length of the alpha variable.

2) DECIDE ON using system variables.

Impact will look for any DECIDE ON statements that reference system variables, for example *PF-KEY, *DATE.

Modification will generate a temporary variable and move the system variable to this temporary variable. The DECIDE ON statement will then be changed to reference the temporary variable rather than the system variable.

3) Insert RECORD option for READ WORK FILE (work file processing).

Impact will look for any READ WORK FILE statements that only use one user-defined variable.

Modification will add the RECORD clause to these READ WORK FILE statements.

4) Move occurrence number to each PE member, rather than group.

Impact will look for any logical view data definitions where the occurrences for a PE group are defined at the group level rather than for each child level within that group.

Modification will change the PE group definition so that the number of occurrences is at each child level within the group and remove the number of occurrences from the PE group variable.

5) Replace MOVE INDEXED statement with appropriate MOVE.

Impact will look for any MOVE INDEXED statements.

Modification will perform one of the following:

- Standard MOVE INDEXED statements will be replaced with the correct MOVE statement.
- MOVE INDEXED statements utilizing contiguous storage will produce a message "Object 'object-name' contains a contiguous MOVE INDEXED statement. This is marked for manual change." The MOVE INDEXED statement will be marked for manual change and have a comment of "REASON: CONTIGUOUS MOVE INDEXED" appended.

Example of contiguous MOVE INDEXED statement:

```
0010 RESET #FIELD-1 (A10) #FIELD-2 (A10) #DISPLAY (A10)
0020 MOVE 'CORRECT' TO #FIELD-1
0030 MOVE 'WRONG' TO #FIELD-2
0040 MOVE INDEXED #FIELD-1<2> TO #DISPLAY
0050 WRITE #DISPLAY
```

- MOVE INDEXED statements for DDM fields will produce a message "Object 'object-name' contains a view with a MOVE INDEXED statement. This is marked for manual change." The MOVE INDEXED statement will be marked for manual change and have a comment of "REASON: FIELD IS FROM A VIEW" appended.

Example of MOVE INDEXED statement for DDM fields:

```
0010 RESET #DISPLAY-ADDRESS (A20)
0020 READ EMPLOYEES BY NAME
0030   OBTAIN ADDRESS-LINE (1:4)
0040   MOVE INDEXED ADDRESS-LINE<1> TO #DISPLAY-ADDRESS
0050 LOOP
```

6) Change FOR and REPEAT loops to use named constants.

Impact will look for any FOR and REPEAT statements that make use of numeric literal values.

Modification will change the impacted FOR and REPEAT statements to use variables defined with CONSTANT values.

7) Find unused dataitems in programs.

Impact will look for any unused dataitems. These can be user-defined variables or logical view variables.

Modification will comment out any unused dataitems.

Note: LDA and PDA objects with unused dataitems will not be modified.

8) Split STACK COMMAND commands with embedded data.

Impact will look for any STACK COMMAND statements and check if both data and commands have been stacked with the same statement.

Modification will split the STACK COMMAND statements impacted into STACK DATA and STACK COMMAND statements.

9) Find unused Global Variables.

Impact will look for any unused Global variables defined in a GDA, across a whole application. Impacts are only marked within the GDA objects and not individual objects.

No Modification is available for this option.

CODE RESTRUCTURING

The search keyword CODE RESTRUCTURING can be used to locate any IF/ELSE Natural statement blocks. These can then be reviewed and converted to DECIDE statements to improve the readability of the statement code within an object.

This search keyword will use a keyword value of IF.

Note: No automatic modification is available for this search keyword.

INTERNATIONALIZATION

The search keyword INTERNATIONALIZATION can be used to prepare applications for Internationalization, which will allow applications to cater for multi-lingual support, for example message texts.

This search keyword will use a keyword value of INPUT and an additional search keyword of DEFINITION with a search value of A1.

Impact will use these criteria to locate all INPUT statements with references to any data item with a format and length of alpha one.

Note: No automatic modification is available for this search keyword.

Natural Engineer comes supplied with search criteria set 'CODEINT', which contains the required search criteria for the search keyword INTERNATIONALIZATION.

This file can be accessed by using 'PF4' (GetSa) from the Impact Search Criteria Summary screen.

Note: For more information on opening the search criteria file refer to the section [Impact Search Criteria Summary screen](#).

MULTI SEARCH

The search keyword MULTI SEARCH allows for more advanced search criteria to be specified, including, conditions that are to be included in the analysis, or excluded from the analysis.

The search keyword MULTI SEARCH allows up to 500 search conditions to be combined. These may be DATAITEM searches, DBFILE searches, LITERAL searches and/or attribute searches.

This search keyword uses a sub-set of criteria, which are specified using the options provided by the PFkey 'PF6' (Optns) from the Impact Criteria screen.

Note: For more information on the PFkey 'PF6' (Optns) refer to the section [Impact Criteria screen](#).

The MULTI SEARCH criteria can be saved to the Repository, allowing them to be re-used across applications.

Note: Natural Engineer comes supplied with a default MULTI SEARCH criteria set '###DEF01'. For more information refer to Chapter 2 in the Natural Engineer Administration Guide for Mainframes manual.

Multi Search Criteria Screen

The Multi Search Criteria screen is accessed by first selecting the search keyword 'Multi Search' from the Search Keyword Selection pop-up window on the Impact Criteria screen. This will enable the PFkey '**PF6**' (Optns) on the Impact Criteria screen.

The following Figure 3-13 illustrates the specification of search keyword MULTI SEARCH on the Impact Criteria screen.

```

                                     Impact Criteria           Application: HOSPITAL
                                                                Version: 01
Search Keyword...: MULTI SEARCH_____
Object Name.....: _____

Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Types Exit           Add   Optns                               Main

```

Figure 3-13 The specification of search keyword MULTI SEARCH

Using '**PF6**' (Optns) will invoke the Multi Search Criteria screen where the additional search conditions can be specified.

The following Figure 3-14 illustrates the Multi Search Criteria screen.

```

- Multi Search Criteria -      Application: HOSPITAL
                               Version: 01
Sel  Seq  Type  Criteria
-   1    *    Multi Search Options
-   2    *
-   3    *    A  Absolute Exclude
-   4    *    X  Exclude
-   5    *    I  Include
-   6    *    XA Exclude Attribute
-   7    *    IA Include Attribute
-   8    *    XD Exclude Decimals
-   9    *    XL Exclude Literal
-  10    *    IL Include Literal
-  11    *    *  Comment
-  12    *

      Y  Multiple Iterations
      _  Single Iteration

Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10---PF11---PF12---
      Help  Dflt  Exit          Save          Prev  Next          Top  Sort  Main
    
```

Figure 3-14 Multi Search Criteria screen

SCREEN ITEMS	DESCRIPTION
Sel	Line command selections. Valid selections are: ‘I’ Insert a new line. ‘D’ Delete the current line.
Seq	Sequential number for each criteria starting from 1.
Type	The Multi Search Criteria Type. It is possible to input a criteria type directly, or by using '?' in the first byte and using the 'ENTER' key. This will invoke the Criteria Type Selection pop-up window. <i>Note: For more information refer to section Multi Search Criteria Types.</i>
Criteria	The criteria that are to be applied. These can be full or partial field names. They can also be full or partial values of literal strings and numerics. If partial names or values are used, they must be entered using wild card '?' <i>Note: For more information refer to section Criteria Values.</i>
Multiple Iterations	Impact will match the specified search criteria and any derivatives will be identified. <i>Note: The tracking information can be further controlled by the NATENG.INI file parameter TRACKING. For more information refer to section Forward/Backward Tracking.</i>
Single Iteration	Impact will only match for the specified search criteria. No derivative tracking will be performed.

PFKEYS	DESCRIPTION
PF1	Activates the help function.
PF2	Open and read in the default Multi Search criteria set '###DEF01'.
PF3	Exit from the current function and return to previous screen.
PF5	Save the defined criteria set to the Repository. Saves all the criteria specified for a version for re-use.
PF7	Displays previous page.
PF8	Displays next page.
PF10	Reposition to the top of the list.
PF11	<p>Will perform a sort of all the Multi Search criteria into the following criteria type order:</p> <ul style="list-style-type: none"> ▪ Absolute Excludes (A) ▪ Exclude Field (X) ▪ Include Field (I) ▪ Exclude Format (XA) ▪ Include Format (IA) ▪ Exclude Decimals (XD) ▪ Exclude Literal (XL) ▪ Include Literal (IL) <p><i>Note: Comments (*) maintain position for the criteria type that they precede. For example:</i> <i>* Exclude MESSAGE fields</i> <i>X ?MESSAGE?</i></p> <p><i>Would always be kept together as a pair.</i></p> <p><i>Any comments found in line 1 will always be retained at line 1 and can be used as a description line for the criteria set.</i></p>
PF12	Returns to the Natural Engineer Main Menu.

Multi Search Criteria Types

There are nine criteria types that can be used:

1. '**' – Comment Line

- These criteria types allow for comments to be placed anywhere within the criteria list for any documentation notes or as separators between the criteria.
- They are ignored by the Impact process.

2. 'A' – Absolute Exclude Field

- These criteria types will result in the Impact process excluding any fields that are an exact match for the value specified. These fields will be permanently excluded from the Impact process.
- These criteria types must be at the top of the criteria list, before any other criteria types.

3. 'X' – Exclude Field

- These criteria types will result in the Impact process excluding parts of a field name, while the remainder of the field name is still searched for inclusion.
- These criteria types make use of the 'Byte-Lockout' process.
Note: For more information refer to the section [Byte-Lockout Process](#).
- These criteria types must be located before the 'I' – Include Field criteria types in order to benefit from the 'Byte-Lockout' process.

4. 'I' – Include Field

- These criteria types will result in the Impact process including any fields that match the value specified.
- If a criteria value is specified without the use of wildcards '?', then it is an absolute include. For example: 'I DATE'.
- These criteria types must be located after the 'X' – Exclude Field criteria types.

5. 'XA' – Exclude Format

- These criteria types will result in the Impact process excluding any field that matches the format value. For example: 'XA A001' would exclude all fields with a format of A001.
- These criteria types can have format ranges specified. For example:
 - 'XA N1-N20' will exclude any fields that have a format of N and a length between 1 and 20. This would include any fields that have decimal places, e.g., N6.2.
 - 'XA P5.2-P9.2' will exclude any fields with format N and length between 5.2 and 9.2.
Note: If a comma is used to reference a decimal place, then Natural Engineer will convert them to decimal points for Impact to use (i.e., 5,3 becomes 5.3). For Modification they will be converted back to a comma.
 - 'XA N-N999' will exclude any numeric type field.
- These criteria types must be located before the 'IA' – Include Format criteria types.

6. 'IA' – Include Format

- These criteria types will result in the Impact process including any field that matches the format value. For example: 'XA A001' would include all fields with a format of A001.
- These criteria types can have format ranges specified. For example:
 - 'IA N1-N20' will include any fields that have a format of N and a length between 1 and 20. This would include any fields that have decimal places, e.g., N6.2.
 - 'IA P5.2-P9.2' will include any fields with format N and length between 5.2 and 9.2.
Note: If a comma is used to reference a decimal place, then Natural Engineer will convert them to decimal points for Impact to use (i.e., 5,3 becomes 5.3). For Modification they will be converted back to a comma.
 - 'IA N-N999' will include any numeric type field.
- These criteria types must be located after the 'XA' – Exclude Format criteria types.

7. 'XL' – Exclude Literal

- These criteria types will result in the Impact process excluding any literal string that matches the criteria value. For example: 'XL ABCDEF' would exclude all literal strings that match the value 'ABCDEF'.

Note: If a partial value is used, then the literal string, may still be included by any subsequent 'IL' - Include Literal criteria. For example:

using the literal string 'ABCDEF'

Criteria 'XL ?ABC?' and 'IL ?DEF?' would result in the literal string being included in the Impact Analysis.

Criteria 'XL ABCDEF' and 'IL ?DEF?' would result in the literal string being excluded in the Impact Analysis.

- These criteria types must be located before the 'IL' – Include Literal criteria types.

8. 'IL' – Include Literal

- These criteria types will result in the Impact process including any literal string that matches the criteria value. For example: 'IL ABCDEF' would include all literal strings that match the value 'ABCDEF'.

- These criteria types must be located after the 'XL' – Exclude Literal criteria types.

9. 'XD' – Exclude Decimal

These criteria types will result in the Impact process excluding any fields that have been defined to hold decimals. For example: N3.1, N1.4 etc.

Criteria Values

Criteria Values specify the search value for the criteria type being used. These can be entered using full or partial values.

Full Value Criteria

If full values are used then the Impact process will only match if the exact value specified matches the item. These types of criteria value are known as absolute values, i.e., an exact match must be made. For example:

0010 01 #ALPHA (A10)
0020 01 #ALPHA-BET (A26)
0030 MOVE 'ABCDEF' TO #ALPHA-BET
0040 MOVE 'ABC' TO #ALPHA

Criteria 'I #ALPHA' will impact line 0010 AND 0040 only.

Criteria 'IL ABC' will impact line 0040 only.

Partial Value Criteria

Partial Value criteria can be specified by using the wildcard '?' as part of the value specification. These types of criteria value allow a range to be specified for field names or literal strings.

There are three positions the wildcard can be placed:

1. At the beginning of the value.

Impact will look for a match for any field or literal that ends with the specified value. The format is ?value.

2. At the end of the value.

Impact will look for a match for any field or literal that starts with the specified value. The format is value?.

3. At both the beginning and the end of the value.

Impact will look for a match for any field or literal that contains the specified value. The format is ?value?.

Examples:

0010 01 #INDEX-ONE (I02)
0020 01 #ONE-INDEX (I02)

Criteria 'I ?ONE' will impact line 0010 only.

Criteria 'I ONE?' will impact line 0020 only.

Criteria 'I ?ONE?' will impact line 0010 and 0020.

Additional option

For the criteria types Include (I) and Exclude (X), it is also possible to include or exclude by name and length by adding a format and length to the criteria value. This can be specified as an absolute format or a range.

For example:

'**X ?FRED? (A10)**' will exclude any field with a name that includes FRED and with a format and length of A10.

'**I #TOTAL (N2-N9)**' will include any field with a name of #TOTAL and a format and length that falls between the range N2 to N9.

Byte Lockout Process

This is a unique technique to handle parts of field names that may be included or excluded in the impact reports, depending on the defined search criteria.

For example, if you define UPDATE to be excluded but DATE to be included in the search, the UPDATE part of the field UPDATE-DATE will be excluded, but the DATE part will be included for further processing. Conversely, the field UPDATE will be excluded as defined, and not be included merely on the basis of the inclusion of DATE. This process works for literal values as well as fields.

MVSNAT22TO31

The search keyword MVSNAT22TO31 can be used to identify and modify incompatibilities between the syntax for Natural 2.2 and 3.1.

Note: The incompatibilities that exist between Natural 2.2.8 and Natural 3.1 are the same as those between Natural 2.2.8 and Natural 2.3.

This search keyword uses a sub-set of criteria, which are specified using the options provided by the PFkey '**PF6**' (Optns) from the Impact Criteria screen.

*Note: For more information on the PFkey '**PF6**' (Optns) refer to the section [Impact Criteria screen](#).*

MVSNAT22TO31 Preferences Screen

The MVSNAT22TO31 Preferences screen is accessed by first selecting the search keyword 'MVSNAT22TO31' from the Search Keyword Selection pop-up window on the Impact Criteria screen. This will enable the PFkey 'PF6' (Optns) on the Impact Criteria screen.

The following Figure 3-15 illustrates the specification of search keyword MVSNAT22TO31 on the Impact Criteria screen.

Impact Criteria	Application: HOSPITAL Version: 01
Search Keyword...: MVSNAT22TO31_____	
Object Name.....: _____	
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12--- Help Types Exit Add Optns Main	

Figure 3-15 The specification of search keyword MVSNAT22TO31

Using 'PF6' (Optns) will invoke the MVSNAT22TO31 Preferences screen where each of the options can be selected / de-selected.

The following Figure 3-16 illustrates the MVS NAT22TO31 Preferences screen showing the first page of the available options.

```
          - Natural 22 to 31 Criteria -

Y Redefinition of Database Arrays
Y DEFINE WINDOW minimum sizes
Y DIVIDE stmt and decimal positions
Y Comparison logic for MU's in FIND..WITH
Y Incomplete Statement Blocks
Y No uppercase translation for *COM
Y Computation of floating point exponentiation
Y Results for SIN, COS and TAN functions
Y More precise SQRT function results
Y Assignment of decimals to time fields
Y Negative values to date fields
Y Variable arrays comparison & assignment
Y NAT1117 & NAT0924 replaced by NAT0082
Y NAT9nnn messages obsolete

Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help       Exit           Prev Next           SelA ADel Main
```

Figure 3-16 MVS NAT22TO31 Preferences screen showing first page of options

Using 'PF8' (Next) will display the second and last page of the available options.

3

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The following Figure 3-17 illustrates the MVSNAT22TO31 Preferences screen showing the second page of the available options.

```
- Natural 22 to 31 Criteria -

Y *TPSYS changed under BS2000
Y Priority of PRINT/WORK FILE statements
Y Usage of exit modules copied from SYSEXT
Y Internal handling of AD=0
Y EJECT requires LESS
Y Invalid usage of ESCAPE
Y Decimal digits of constant values
Y NEWPAGE requires LESS/TOP
Y PRINT statement LS parm now invalid
Y MOVE RIGHT JUSTIFIED shorter target field
Y BEFORE BREAK in IF
Y SUBSTRING Option
Y Numeric redefinition in MOVE BY NAME

Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help           Exit                Prev Next           SelA ADel Main
```

Figure 3-17 MVSNAT22TO31 Preferences screen showing second page of options

SCREEN ITEMS	DESCRIPTION
MVSNAT22TO31 sub-criteria	<p>Each available MVSNAT22TO31 sub-criteria is listed and if selected will be used during Impact execution. Each sub-criteria can be selected or deselected individually. Valid selections are:</p> <p>‘Y’ Select the option. ‘ ‘ De-select the option.</p> <p>Available sub-criteria and their respective modification types are:</p> <ul style="list-style-type: none"> ▪ Redefinition of Database Arrays (SAG01) ▪ DEFINE WINDOW minimum sizes (SAG02) ▪ DIVIDE stmt and decimal positions (SAG03/SAG3) ▪ Comparison logic for MU’s in FIND..WITH (SAG04) ▪ Incomplete Statement Blocks (SAG05 R1 /SAG05 R2) ▪ No uppercase translation for *COM (SAG07) ▪ Computation for floating point exponentiation (SAG08/SAG13) ▪ Results for SIN, COS and TAN functions (SAG09) ▪ More precise SQRT function results (SAG10) ▪ Assignment of decimals to time fields (SAG11) ▪ Negative values to date fields (SAG12) ▪ Variable arrays comparison & assignment (SAG14) ▪ NAT1117 & NAT0924 replaced by NAT0082 (SAG15) ▪ NAT9nnn messages obsolete (SAG16) ▪ *TPSYS changed under BS2000 (SAG17) ▪ Priority of PRINT/WORK FILE statements (SAG18) ▪ Usage of exit modules copied from SYSEXT (SAG19) ▪ Internal handling of AD=O (GSL01) ▪ EJECT requires LESS (GSL02) ▪ Invalid usage of ESCAPE (GSL03) ▪ Decimal digits of constant values (GSL04) ▪ NEWPAGE requires LESS/TOP (GSL05) ▪ PRINT statement LS parm now invalid (GSL06) ▪ MOVE RIGHT JUSTIFIED shorter target field (GSL07) ▪ BEFORE BREAK in IF (GSL08) ▪ SUBSTRING Option (GSL09) ▪ Numeric redefinition in MOVE BY NAME (GSL10) <p><i>Note: For more information on each of these options refer to the section Natural 2.2 / 3.1 Incompatibilities.</i></p>

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PFKEYS	DESCRIPTION
PF1	Activates the help function.
PF3	Exit from the current function and return to previous screen.
PF7	Displays previous page.
PF8	Displays next page.
PF10	Selects all the MVSNAT22TO31 sub-criteria.
PF11	Deselects all the MVSNAT22TO31 sub-criteria.
PF12	Returns to the Natural Engineer Main Menu.

Natural 2.2 / 3.1 Incompatibilities

Natural Engineer identifies the following incompatibilities between Natural 2.2 and Natural 3.1.

Some of the incompatibilities can be modified using the Modification process, others will only have the Impact process available and manual modifications may need to be applied to each of these.

Note: The NEE Modification Type relates to the modification types and codes that are available from the Modification Element Maintenance screen. For more information refer to the section [Modification Element Maintenance](#).

1. Redefinition of Database Arrays

Description	It is no longer possible to specify a variable index range in the redefinition of a periodic-group or multiple value fields.
NEE Impact	NEE will identify any variable index range specified where the field is a redefinition of a periodic-group or multiple value field.
NEE Modification Type	3a SAG01
NEE Modification	Automatic. NEE will replace the variable index range with a 1 by default. A different replacement value may be specified by setting the appropriate value required in the 'Replace Value' section on the Modification Element Maintenance screen.

2. DEFINE WINDOW Minimum Window Size

Description	The minimum size of a window definition in the SIZE clause of the DEFINE WINDOW statement is 2 lines by 10 columns without a frame and 4 lines by 13 columns with a frame. In Natural 2.2 a size smaller than the minimum may be specified. In Natural 3.1 a NAT1167 compilation error will occur if the lines are wrong, NAT1166 if columns.
NEE Impact	Natural Engineer will identify DEFINE WINDOW statements where the line or column values are less than the minimum allowed.
NEE Modification Type	3b SAG02
NEE Modification	Automatic. Natural Engineer will replace the invalid line or column value with the minimum defined values.

3. DIVIDE statement with GIVING and REMAINDER Clauses

Description	In Natural 3.1, if a DIVIDE statement has both GIVING and REMAINDER options then if the dividend (Operand 2) has more or fewer decimal positions than the result field, then different results will be shown for the REMAINDER field.
NEE Impact	Natural Engineer will identify all DIVIDE statements containing GIVING and REMAINDER where the number of decimals of the dividend is greater or fewer than that of the result. It will also identify the data definition of the relevant result field.
NEE Modification Type	3c SAG03 3h SAG3
NEE Modification	Automatic. The DIVIDE statement is identified by the SAG03 type. There is however no modification to be applied to the actual DIVIDE statement so the modification category is set to Not Applicable. The data definition for the result field is identified by the SAG3 type. This is automatically changed so that the decimal places of the data definition for the result field is the same as that of the dividend.

4. Comparison Logic for MU's in FIND..WITH

Description	<p>The comparison logic for multiple value fields in the WITH clause of the FIND statement has been changed to be in line with other comparison logic in other statements, for example IF.</p> <p>1. FIND XYZ-VIEW WITH MU = 'A'</p> <p>With Natural 2.2 and 3.1, this statement returns records in which at least one occurrence of MU has the value 'A'.</p> <p>2. FIND XYZ-VIEW WITH MU NOT EQUAL 'A'</p> <p>With Natural 2.2, this statement returns records in which no occurrence of MU has the value 'A' (same as 4.).</p> <p>With Natural 3.1, this statement returns records in which at least one occurrence of MU does not have the value 'A'.</p> <p>3. FIND XYZ-VIEW WITH NOT MU NOT EQUAL 'A'</p> <p>With Natural 2.2, this statement returns records in which at least one occurrence of MU has the value 'A' (same as 1).</p> <p>With Natural 3.1, this statement returns records in which every occurrence of MU has the value 'A'.</p> <p>4. FIND XYZ-VIEW WITH NOT MU = 'A'</p> <p>With Natural 2.2 and 3.1, this statement returns records in which no occurrence of MU has the value 'A'.</p> <p>This means that if you newly compile under Natural 3.1 existing Natural 2.2 programs containing FIND statements of the type 2 and 3., they will return different results.</p>
NEE Impact	<p>Natural Engineer will identify all FIND statements using an MU field in the WITH clause like:</p> <ol style="list-style-type: none"> 1) MU NOT EQUAL Value 2) NOT MU NOT EQUAL Value
NEE Modification Type	3d SAG04
NEE Modification	<p>Automatic.</p> <p>The modification will be applied as follows:</p> <ol style="list-style-type: none"> 1) MU NOT EQUAL Value to NOT MU = value 2) NOT MU NOT EQUAL Value to MU = Value

5. Empty Statement Blocks for FOR and REPEAT

Description	<p>In Natural 2.2 an empty statement block e.g. FOR or REPEAT may not lead to compilation errors.</p> <p>In Natural 3.1, this is removed.</p>
NEE Impact	
NEE Modification Type	<p>3e SAG05R1</p> <p>3@ SAG05R2</p>
NEE Modification	<p>Automatic.</p> <p>The default modification for this problem is SAG05R1. This will insert into the empty statement block an IGNORE statement based on the TLM N31R05T1.</p> <p>An alternative modification is SAG05R2. This will comment out the empty statement block but then insert a line of code to set the applicable variable to the maximum value. For Example:</p> <p>FOR #A = 1 TO 10, will insert MOVE 10 TO #A.</p> <p>This is based on the TLM N31R05T2. The insertion of this TLM will only apply to FOR loops. REPEAT loops will only be commented out and NO TLM will be inserted.</p> <p>Before applying this modification, the TLM's N31R05T1 and N31R05T2 need to be copied from the SYSNEE library to SYSTEM or the modification library of the Natural Engineer Application. In addition Modification Preferences will need to be defined for the specific Modification Type to assign the TLM's to the type.</p>

6. No Upper-case translation for *COM

Description	In Natural 2.2 *COM may be specified with an AD=T attribute. This is ignored at runtime but not rejected at compile. In Natural 3.1 this will lead to a compile error NAT0335.
NEE Impact	Natural Engineer will identify all occurrences of *COM with an AD=T attribute.
NEE Modification Type	3g SAG07
NEE Modification	Automatic. The AD=T attribute is removed from the *COM data item.

7. Computation of Floating-Point Exponentiation Corrected

Description	With Natural 2.2, if, in an exponentiation, both the base and the exponent are of floating-point format, the length of the exponent is used for the computation of the result. With Natural 3.1, if, in an exponentiation, both the base and the exponent are of floating-point format, the length of the base is used for the computation of the result. With Natural 2.2, if, in an exponentiation, the exponent is of floating-point format and the base is not, the base is internally converted to format/length F4 or F8, depending on the length of the base. With Natural 3.1, if, in an exponentiation, the exponent is of floating-point format and the base is not, the base is internally always converted to format/length F8 so as to get the greatest possible precision. Both the above corrections may in some cases lead to different results; however, these results will be of a greater precision.
NEE Impact	Natural Engineer will identify all relevant occurrences.
NEE Modification Type	3n SAG13/SAG08
NEE Modification	Manual.

8. Results for SIN, COS and TAN functions

Description	<p>With Natural 2.2, when the mathematical functions SIN, COS and TAN (sine, cosine and tangent) are applied to very large numbers (equal to or greater than 10^{++17}), they may in some cases return incorrect results.</p> <p>With Natural 3.1, for numbers equal to or greater than 10^{++17} the sine will be 0, the cosine will be 1 and the tangent will be 0.</p> <p>This may in some cases lead to different results.</p>
NEE Impact	Natural Engineer will identify all SIN, COS and TAN references.
NEE Modification Type	3i SAG09
NEE Modification	Manual.

9. More precise SQRT function results

Description	<p>With Natural 3.1, the computation of the mathematical function SQRT (square root) has been improved for floating-point operands.</p> <p>This may in some cases lead to different results. However, these results will be of a greater precision.</p>
NEE Impact	Natural Engineer will identify all relevant SQRT references and all data items used in these statements.
NEE Modification Type	3j SAG10
NEE Modification	Manual.

10. Assignments of Numbers with Decimal Digits to Time Fields

Description	<p>With Natural 2.2, if numbers (format N or P) decimal positions are assigned/moved to a time field (format T), the entire number is assigned/moved as an integer; that is, the decimal point is ignored.</p> <p>With Natural 3.1, this error has been corrected: The positions after the decimal point will be truncated, or rounded (if the ROUNDED option is used in the corresponding COMPUTE or MOVE statement). This may lead to different results, which will, however, be correct.</p>
NEE Impact	Natural Engineer will identify all COMPUTE , MOVE statements moving a P, N variable or a value with decimal digits to a time field.
NEE Modification Type	3k SAG11
NEE Modification	Manual.

11. Negative Values to Date Fields

Description	<p>It is not allowed to assign a negative value to a date field (format D) or a time field (format T).</p> <p>With Natural 2.2, however, such invalid assignment at runtime may in some cases not be intercepted.</p> <p>With Natural 3.1, this has been corrected: The assignment of a negative value to a date or time field will always lead to an error (NAT1319).</p>
NEE Impact	All negative assignments to Date or Time fields are identified.
NEE Modification Type	3m SAG12
NEE Modification	Manual.

12. More precise Results for Floating Point Conversions

Description	The format conversion for the transfer of data from floating-point fields (format F) to packed numeric fields (format P) and vice versa, as well as from floating-point fields to alphanumeric fields (format A) and vice versa, has been improved. This may in some cases lead to different results. However, these results will be of a greater precision than with Natural 2.2.
NEE Impact	Natural Engineer will identify all relevant occurrences.
NEE Modification Category	3n SAG13/SAG08
NEE Modification	Manual.

13. Comparison and Assignment of Variable Array Ranges

Description	<p>With Natural 3.1, a comparison or assignment involving arrays with variable indexes will lead to an error at runtime (NAT1317) if an array range turns out to be actually a scalar once the actual values are assigned to the index variables.</p> <p>With Natural 2.2, such a comparison or assignment is allowed, but it is not consistent with the handling of constant scalars (as shown in the following example).</p> <p>Example (assuming $j = i + 1$):</p> <p>Natural 2.2:</p> <ol style="list-style-type: none"> 1. IF #A(i:j) = #B(m) is resolved as: IF #A(i) = #B(m) OR #A(j) = #B(m) 2. IF #A(i:j) = #B(m:n) is resolved as: IF #A(i) = #B(m) AND #A(j) = #B(n) <p>This means that if the values of 'm' and 'n' are equal, comparison 2 is resolved inconsistently.</p> <p>Natural 3.1:</p> <p>If the values of 'm' and 'n' are equal, comparison 2. Will cause a runtime error.</p>
NEE Impact	Natural Engineer will identify all comparisons or assignments using variable indexed arrays.
NEE Modification Type	3o SAG14
NEE Modification	Not Applicable

14. Error Messages NAT1117 and NAT0924 replaced by NAT0082

Description	In situations where Natural 2.2 displays error message NAT1117 (requested map not available) or NAT0924 (subroutine, GDA or external report not found), Natural 3.1 displays message NAT0082. This will lead to different results if you interrogate these message numbers in your applications.
NEE Impact	Natural Engineer will identify all references of NAT1117 and NAT0924.
NEE Modification Type	3p SAG15
NEE Modification	Automatic. All references to NAT1117 and NAT0924 will be modified to be NAT0082.

15. Obsolete Error Messages

Description	The following error messages have become obsolete; they no longer exist with Natural 3.1: NAT9000, NAT9100, NAT9101 and NAT9200.
NEE Impact	Natural Engineer will identify all references of NAT9000, NAT9100, NAT9101 and NAT9200.
NEE Modification Type	3q SAG16.
NEE Modification	Manual.

16. Changed System Variable *TPSYS

Description	Under TIAM (BS2000) *TPSYS contains 'TIAM' instead of 'RTIO'
NEE Impact	Natural Engineer will identify all references of 'RTIO'.
NEE Modification Category	3r SAG17.
NEE Modification	Automatic. All references of 'RTIO' will be modified to 'TIAM'.

17. Priority of PRINT/WORK FILE statements

Description	The NATPARAM definitions of Print/Load files have over the JCL definitions. Special purpose ZAP NA32116 puts back Natural 2.2 functionality.
NEE Impact	Natural Engineer will identify all PRINT/WRITE WORK FILE statements. <i>Note: This may produce a lot of impacts. If you wish to remove this search from Natural Engineer then please modify the impact search criteria to remove READ WORK FILE and WRITE WORK FILE as search keywords.</i>
NEE Modification Category	3s SAG18
NEE Modification	Manual.

18. User Exit Modules copied from SYSEXT

Description	In general, the user exits (USR****N) located on FUSER (Natural 2.2) have to be replaced with the corresponding module from library SYSEXT on the FNAT of Natural 3.1.
NEE Impact	Natural Engineer will identify all USR..... (CALLNAT) references.
NEE Modification Type	3t SAG19
NEE Modification	Manual.

19. Internal Handling of AD=O

Description	With Natural 3.1, the internal handling of AD=O has changed. A CALLNAT/PERFORM parameter marked with AD=O is no longer passed to the subprogram/subroutine 'by reference' (that is, via its address) but 'by value'.
NEE Impact	Natural Engineer will identify all CALLNAT/PERFORM statements with parameter AD=O Specified.
NEE Modification Type	3u GSL01
NEE Modification	Manual.

20. LESS clause of EJECT Statement

Description	To enhance the clarity of programs and avoid possible ambiguities in the source code, the keyword LESS in Syntax 2 of the EJECT statement is no longer optional, but required. With Natural 2.2, the shortest possible form is: EJECT operand1 With Natural 3.1, it is: EJECT LESS operand1
NEE Impact	Natural Engineer will identify all EJECT statements without the LESS clause.
NEE Modification Type	3v GSL02
NEE Modification	Automatic. The LESS clause will be added to the EJECT statement.

21. ESCAPE TOP within AT START OF DATA

ESCAPE TOP and ESCAPE BOTTOM not allowed in ON ERROR blocks

Description	In Natural 3.1, you are no longer allowed to place an ESCAPE TOP statement within an AT START OF DATA statement block. It is also not permitted to place either an ESCAPE TOP or an ESCAPE BOTTOM within an ON ERROR BLOCK.
NEE Impact	Natural Engineer will identify all ESCAPE TOP statements in AT START OF DATA Blocks. Also, ESCAPE TOP and ESCAPE BOTTOM statements within ON ERROR blocks are identified.
NEE Modification Type	3w GSL03
NEE Modification	Manual.

22. Decimal Digits of Constant Values

Description	If the constant value specified after CONSTANT or INIT has more digits after the decimal point than the corresponding field, this does not lead to an error with Natural 2.2. With Natural 3.1, such inconsistency leads to error NAT0094 at compilation.
NEE Impact	Natural Engineer will identify all statements where the constant/initial value has more digits after the decimal point than the corresponding field.
NEE Modification Type	3x GSL04
NEE Modification	Manual.

23. TOP and LESS clauses of NEWPAGE statement

Description	To enhance the clarity of programs and avoid possible ambiguities in the source code, the keywords TOP and LESS OF the NEWPAGE statement are no longer optional, but required. With Natural 2.2, the shortest possible forms are: NEWPAGE EVEN NEWPAGE operand1 With Natural 3.1, they are: NEWPAGE EVEN TOP NEWPAGE LESS operand1
NEE Impact	Natural Engineer will identify all NEWPAGE statements without a TOP or LESS clause.
NEE Modification Type	3y GSL05
NEE Modification	Automatic. The TOP or LESS clause will get inserted into the NEWPAGE statement.

24. LS parameter and PRINT statement

Description	It is no longer possible to specify the LS parameter with the PRINT statement (as it has no effect anyway). With Natural 2.2, this does not lead to an error. With Natural 3.1, it leads to error NAT0934.
NEE Impact	Natural Engineer will identify all PRINT statements with the LS parameter specified.
NEE Modification Type	3z GSL06
NEE Modification	Automatic. The LS parameter will be removed from the PRINT statement.

25. MOVE RIGHT JUSTIFIED where target field is shorter than source field

Description	If the target field in a MOVE RIGHT JUSTIFIED statement is smaller than the sending field length, the resulting #value in the target field is truncated from the start of the sending field data. Example : 01 #A(A10) INIT <'ABCDEHIJKL'> 01 #B(A05) * MOVE RIGHT JUSTIFIED #A TO #B * Result under Natural 2.2, #B = ABCDE Result under Natural 3.1, #B = HIJKL
NEE Impact	Natural Engineer will identify all MOVE RIGHT JUSTIFIED statements where the target field is shorter than the source.
NEE Modification Type	3l GSL07
NEE Modification	Manual.

26. BEFORE BREAK within IF condition

Description	At compile time, it is no longer possible to code a BEFORE BREAK statement within an IF condition. This syntax compiles under OS390 for Natural 2.2, 2.3 and 3.1. However, there is a ZAP (NA44082) to make Natural 3.1.4 compatible with PC Natural 4.1.2. Compilation error NAT0309 – Invalid positioning of AT BREAK/END condition, will be returned during compilation.
NEE Impact	Natural Engineer will identify all BEFORE BREAK statements within an IF condition.
NEE Modification Type	31 GSL08
NEE Modification	Manual.

27. Invalid settings for SUBSTRING

Description	Since Natural 3.1, Natural checks at compile time that the SUBSTRING options are valid. The value of the offset plus the length of the sub-string must be less than or equal to string length. If this is not the case, then compilation error 'NAT0471 Invalid operands in SUBSTRING option' will be returned during compilation. Under Natural 2.2, the user would receive a runtime error.
NEE Impact	Natural Engineer will identify where the offset plus the length used in a SUBSTRING clause, exceed the length of the field. This is applicable to EXAMINE, MOVE, EXAMINE TRANSLATE, COMPRESS, COMPUTE, ASSIGN and SEPARATE statements. <i>Note: If the offset is a variable, no checking is carried out. Also, if the length is a variable, then the check is the offset against the field length.</i>
NEE Modification Type	32 GSL09
NEE Modification	Manual

28. MOVE BY NAME with numeric redefinition

Description	<p>If a MOVE BY NAME statement references fields which have been redefined from alpha to numeric and both the source and target fields are the same length, then you will receive different results under Natural 3.1.</p> <p>Example:</p> <pre> DEFINE DATA LOCAL 01 #GROUP1 02 #ALPHA (A10) 02 REDEFINE #ALPHA 03 #ALPHA1 (A1) 03 #NUMERIC (N9) 01 #GROUP2 02 #ALPHA (A10) 02 REDEFINE #ALPHA 03 #ALPHA1 (A1) 03 #NUMERIC (N9) END-DEFINE MOVE BY NAME #GROUP1 TO #GROUP2 WRITE 'RESULT:' #GROUP1 #GROUP2 END </pre> <p>Result under Natural 2.2, RESULT:</p> <p>Result under Natural 3.1, RESULT: 000000000</p> <p><i>(Note: the numeric redefinition now contains zeros.)</i></p>
NEE Impact	<p>Natural Engineer will identify any MOVE BY NAME statements if the source and target fields are:</p> <ul style="list-style-type: none"> ▪ Both part of a redefine of an alpha field. ▪ Both have a format of 'N' (numeric). ▪ Both have the same length.
NEE Modification Type	33 GSL10
NEE Modification	Manual

NATRPC

The search keyword NATRPC can be used to locate statements that may be affected by future versions of Natural, in particular with the Natural Remote Procedure Call (RPC). The impacted statements for Natural RPC are detailed below showing their respective current and future functionality:

Current State

Statement	Description
TERMINATE	Using this statement causes the server to be terminated, regardless of conversations that may still be open.
FETCH,	Using these statements causes the CALLNAT context to get lost.
RUN,	Upon a FETCH, RUN or STOP statement, the server detects that it has lost its CALLNAT context and returns a corresponding Natural error message to the client; at that time, however, the statement has already been executed by the server.
STOP	Exception: This does not apply to FETCH RETURN.
INPUT	Input values are unpredictable when the input data are read from a file (and not from the stack).

Future State

Statement	Description
FETCH, RUN, INPUT	Not Permitted.
STOP, TERMINATE	Same as ESCAPE ROUTINE.

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Natural Engineer Application Analysis & Modification

Natural Engineer Analysis and Modification

Using the search keyword NATRPC, Natural Engineer will identify those statements that may be affected with future versions of Natural.

Automatic modification will also be performed for instances of STOP and TERMINATE where the statement will be replaced with ESCAPE ROUTINE.

OBJECT BUILDER

The search keyword OBJECT BUILDER is used to specify line ranges within an object, which will then be used to create a new subprogram object containing the specified lines and a Parameter Data Area object containing any parameter data that is required. The original object is then modified to call the new subprogram.

This process is part of the Application Restructuring processes available within Natural Engineer.

Note: For more information on the Object Builder process refer to the Natural Engineer Application Restructuring for Mainframes manual.

PORTING

The search keyword PORTING is used to identify any statements that may affect an application being migrated to alternate platforms.

This search keyword uses a sub-set of criteria, which are specified using the options provided by the PFkey '**PF6**' (Optns) from the Impact Criteria screen.

*Note: For more information on the PFkey '**PF6**' (Optns) refer to the section [Impact Criteria screen](#)*

No automatic modification is available for this search keyword.

Porting Preferences Screen

The Porting Preferences screen is accessed by first selecting the search keyword 'PORTING' from the Search Keyword Selection pop-up window on the Impact Criteria screen. This will enable the PFkey 'PF6' (Optns) on the Impact Criteria screen.

The following Figure 3-18 illustrates the Porting Preferences screen.

```
          - Porting Preferences -  
  
Y Array Redefinitions with Binary, Integer or Packed Fields  
Y Numeric Fields being moved to Alpha  
  
  
  
  
  
  
  
  
  
  
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---  
      Help           Exit                               SelA  ADel  Main
```

Figure 3-18 Porting Preferences screen

SCREEN ITEMS	DESCRIPTION
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Porting sub-criteria	<p>Each available Porting sub-criteria is listed and if selected will be used during Impact execution. Each sub-criteria can be selected or deselected individually. Valid selections are:</p> <p>‘Y’ Select the option. ‘ ‘ De-select the option.</p> <p>Available sub-criteria are:</p> <p>Alpha Redefinitions with Binary, Integer or Packed Format Fields</p> <p>Impact will look for any alpha variables that have redefinition variables defined using format of Binary, Integer or Packed.</p> <p>No automatic modification is available.</p> <p>Numeric Fields being moved to Alpha</p> <p>Impact will look for any numeric variables that are being moved to alpha variables.</p> <p>No automatic modification is available.</p>
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PFKEYS	DESCRIPTION
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PF1	Activates the help function.
PF3	Exit from the current function and return to previous screen.
PF10	Selects all the PORTING sub-criteria.
PF11	Deselects all the PORTING sub-criteria.
PF12	Returns to the Natural Engineer Main Menu.

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