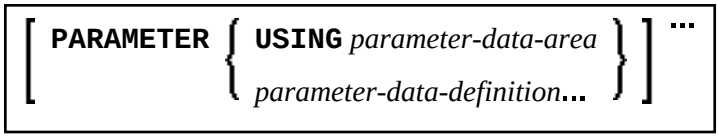
Defining Parameter Data

General syntax of DEFINE DATA PARAMETER:



This chapter covers the following topics:

- Function
- Restrictions
- Syntax Description

For an explanation of the symbols used in the syntax diagram, see *Syntax Symbols*.

Function

The DEFINE DATA PARAMETER statement is used to define the data elements that are to be used as incoming parameters in a Natural subprogram, external subroutine, helproutine, function or dialog. These parameters can be defined within the statement itself (see *Parameter Data Definition* below); or they can be defined outside the program in a parameter data area (PDA), with the statement referencing that data area.

Restrictions

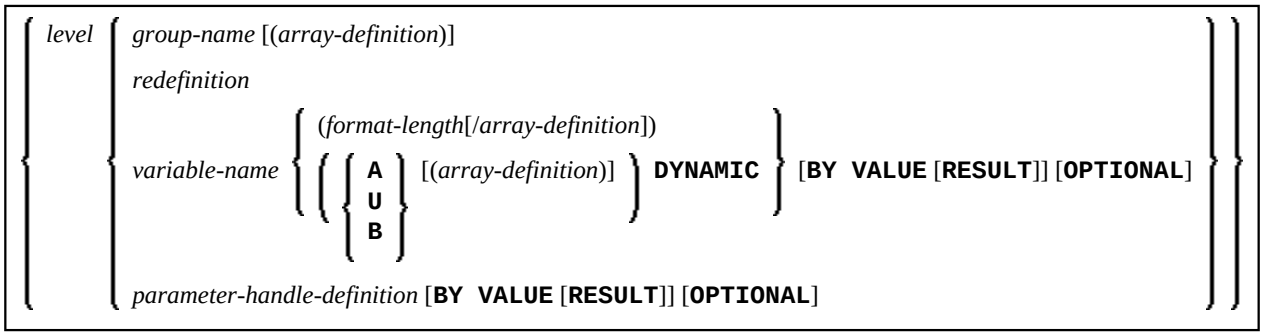
- Parameter data elements must not be assigned initial or constant values, and they must not have edit mask (EM), header (HD) or print mode (PM) definitions; see also *EM, HD, PM Parameters for Field/Variable*.
- The parameter data area and the objects which reference it must be contained in the same library (or in a steplib).

Syntax Description

Syntax Element	Description
`USING` *`parameter-data-area`*	**PDA Name:** The name of the *`parameter-data-area`* that contains data elements which are used as parameters in a subprogram, external subroutine or dialog.
`parameter-data-definition`	**Direct Parameter Data Definition:** Instead of defining a parameter data area, parameter data can also be defined directly within a program or routine. See *Direct Parameter Data Definition* below.
`END-DEFINE`	**End of DEFINE DATA Statement:** The Natural reserved word `END-DEFINE` must be used to end the `DEFINE DATA` statement.

Direct Parameter Data Definition

For direct parameter data definition, the following syntax applies:



Syntax Element Description:

Syntax Element	Description
level	**Level Number:** Level number is a 1- or 2-digit number in the range from 01 to 99 (the leading zero is optional) used in conjunction with field grouping. Fields assigned a level number of 02 or greater are considered to be a part of the immediately preceding group which has been assigned a lower level number. The definition of a group enables reference to a series of fields (may also be only 1 field) by using the group name. With certain statements (`CALL`, `CALLNAT`, `RESET`, `WRITE`, etc.), you may specify the group name as a shortcut to reference the fields contained in the group. A group may consist of other groups. When assigning the level numbers for a group, no level numbers may be skipped.
group-name	**Group Name:** The name of a group. The name must adhere to the rules for defining a Natural variable name. See also the following sections: - *Naming Conventions for User-Defined Variables* in *Using Natural Studio*. - *Qualifying Data Structures* in the *Programming Guide*.
array-definition	**Array Dimension Definition:** With an *array-definition*, you define the lower and upper bounds of dimensions in an array-definition. For further information, see *Array Dimension Definition* and *Variable Arrays in a Parameter Data Area*.
redefinition	**Redefinition:** A *redefinition* may be used to redefine a group or a single field/variable (that is a scalar or an array). See *Redefinition*. **Note:** In a *parameter-data-definition*, a redefinition of groups is only permitted within a `REDEFINE` block.

Syntax Element	Description
variable-name	**Variable Name:** The name to be assigned to the variable. Rules for Natural variable names apply. For information on naming conventions for user-defined variables. For further information, see *Naming Conventions for User-Defined Variables* in *Using Natural Studio*.
format-length	**Format/Length Definition:** The format and length of the field. For information on format/length definition of user-defined variables. For further information, see *Format and Length of User-Defined Variables* in the *Programming Guide*.
A, U or B	**Data Type:** Alphanumeric (A), Unicode (U) or binary (B) for dynamic variable.
DYNAMIC	**DYNAMIC Option:** A parameter may be defined as DYNAMIC. For further information on processing dynamic variables, see *Introduction to Dynamic Variables and Fields* in the *Programming Guide*.
	Call Mode: Depending on whether call-by-reference, call-by-value or call-by-value-result is used, the appropriate transfer mechanism is applicable. For further information, see the CALLNAT statement.
(without BY VALUE)	**Call-by-Reference:** Call-by-reference is active by default when you omit the BY VALUE keywords. In this case, a parameter is passed to a subprogram/subroutine by reference (that is, via its address); therefore a field specified as parameter in a CALLNAT/PERFORM statement must have the same format/length as the corresponding field in the invoked subprogram/subroutine.

<table>
<tr><th>Syntax Element</th><th>Description</th></tr>
<tr><td>BY VALUE</td><td>
Call-by-Value:

When you specify BY VALUE, a parameter is passed to a subprogram/subroutine by value; that is, the actual parameter value (instead of its address) is passed. Consequently, the field in the subprogram/subroutine need not have the same format/length as the CALLNAT/PERFORM parameter. The formats/lengths must only be data transfer compatible. For data transfer compatibility, the Rules for Arithmetic Assignment and Data Transfer apply (see Programming Guide).

BY VALUE allows you, for example, to increase the length of a field in a subprogram/subroutine (if this should become necessary due to an enhancement of the subprogram/subroutine) without having to adjust any of the objects that invoke the subprogram/subroutine.

For parameter definitions for dialogs, the following applies:

● Without BY VALUE, a parameter, as specified in the inline definition of a dialog’s parameter data area, is transferred via its address (by reference); the format and length of the parameter in an OPEN DIALOG or SEND EVENT statement, for example, must match the format and length of the parameter in the inline parameter data definition of the dialog. You can use a parameter by reference in the before open and after open event handlers and in all other events if the used parameters are transferred in the SEND EVENT statement triggering this event.

● With BY VALUE, a parameter is transferred via its value; format and length do not have to match; the parameter in the OPEN DIALOG or SEND EVENT statement must be data transfer compatible with the parameter of the dialog.

Example of BY VALUE:
<table>
<tr><td><pre>
* Program
DEFINE DATA LOCAL
1 #FIELDA (P5)
...
END-DEFINE
...
CALLNAT ’SUBR01’ #FIELDA
...
</pre></td><td><pre>
* Subroutine SUBR01
DEFINE DATA PARAMETER
1 #FIELDB (P9) BY VALUE
END-DEFINE
...
</pre></td></tr>
</table>
</td></tr>
</table>

Syntax Element	Description
BY VALUE RESULT	**Call-by-Value-Result:** While BY VALUE applies to a parameter passed to a subprogram/subroutine, BY VALUE RESULT causes the parameter to be passed by value in both directions; that is, the actual parameter value is passed from the invoking object to the subprogram/subroutine and, on return to the invoking object, the actual parameter value is passed from the subprogram/subroutine back to the invoking object. With BY VALUE RESULT, the formats/lengths of the fields concerned must be data transfer compatible in both directions. **Note:** BY VALUE RESULT cannot be used in dialogs.
OPTIONAL	**Optional Parameters:** For a parameter defined without OPTIONAL (default), a value *must* be passed from the invoking object. For a parameter defined with OPTIONAL, a value can, but need not be passed from the invoking object to this parameter. In the invoking object, the notation *n*X is used to indicate parameters which are skipped, that is, for which no values are passed. With the SPECIFIED option you can find out at run time whether an optional parameter has been defined or not.
parameter-handle-definition	**Parameter Handle Definition:** See the section *Parameter Handle Definition* below.

Parameter Handle Definition

Syntax of *parameter-handle-definition*:

handle-name [(*array-definition*)] **HANDLE OF** { *dialog-element-type* | **OBJECT** }

Syntax Element Description:

Syntax Element	Description
handle-name	**Handle Name:** The name to be assigned to the handle; the naming conventions for user-defined variables apply. For further information, see *Naming Conventions for User-Defined Variables* in *Using Natural Studio*.
HANDLE OF *dialog-element-type*	**Dialog Element Type:** The type of dialog element. Its possible values are the values of the TYPE attribute. For further information, see the sections *Dialog Elements* and *Attributes* in the *Dialog Component Reference*.
HANDLE OF OBJECT	**Handle of Object:** Is used in conjunction with NaturalX as described in the section *NaturalX* of the *Programming Guide*.
array-definition	**Array Dimension Definition:** With an *array-definition*, you define the lower and upper bounds of dimensions in an array-definition. For further information, sse *Array Dimension Definition*.