NATURAL

Natural Connection

Version 3.1.6

software AG

This document applies to Natural Connection Version 3.1.6 and to all subsequent releases. Specifications contained herein are subject to change and these changes will be reported in subsequent release notes or new editions.

Table of Contents

Natural Connection - Overview

This documentation contains all information required to install and use Natural Connection.

What is Natural Connection?	Provides a brief overview of Natural Connection and lists the major features that are relevant for the mainframe.
Installing Natural Connection	Describes how to install Natural Connection on a mainframe.
Preparing to Use Natural Connection	Describes the tasks that must be accomplished to allow download and upload.
Natural Statements	Describes the Natural statements that are relevant for processing information between the mainframe and the PC using Natural Connection.
NTCPC Utility	Describes the NTCPC utility with which you can download and upload objects between the mainframe and the PC.
Download and Upload Modules	Describes the Natural Connection modules available for downloading and uploading data.

It is intended for the following target groups:

- **Administrators**
  designated to install and maintain Natural Connection. It is assumed that the administrator has detailed knowledge of the platform on which the product is installed.
- **Programmers**
  who wish to transfer data, reports, Natural objects and sources from and to the PC. It is assumed that the programmer has detailed knowledge of Natural.

For information on the PC component of Natural Connection, refer to the Entire Connection documentation.

What is Natural Connection?

Natural Connection extends the power and productivity benefits of Natural, Software AG's fourth generation interactive application development system, to the personal computer user by interacting with Entire Connection.

Entire Connection runs on IBM personal computers and compatibles as well as on Macintosh computers and interacts with Natural in a mainframe environment. Thus, full integration of mainframe and personal computer data processing is possible.

This section describes the major features of Natural Connection that are relevant for the mainframe:

- Interactive Data Transfer
- Integration
- Security

For details regarding the features of the PC component, see the Entire Connection documentation.

Interactive Data Transfer

Data can be downloaded to and uploaded from the PC directly to/from an online program.

Data transfer and conversion to many formats (for example, Lotus 1-2-3, Symphony, dBASE, Multiplan, ASCII, Basic, DIF, Binary) is performed in one step. Sophisticated compression techniques are used.

Integration

Using Natural Connection, you can create integrated applications that use both mainframe and PC resources.

For example, Super Natural creates files that you can then further process on the PC. Con-nect uses Natural Connection to exchange documents with the PC. In this way, graphics, spreadsheets, or binary data can be distributed to other users.

Mainframe applications can use PC printers.

Security

A key consideration for any information network is effective security and control. Natural Security on the mainframe provides comprehensive control facilities.

Detailed security profiles are assigned on a user-by-user basis to control access to data and programs.

Other significant objects secured are the individual keywords in the Natural syntax. This can restrict some users, for example, to retrieving data from mainframe databases, while others have the full capability for retrieval and update of mainframe data.

Natural Security also protects against excessive use of system resources by individual users. This is vital when PC users may be employing powerful mainframe features for the first time.

As an additional safeguard, Natural Connection can also encrypt all data downloaded from the mainframe for local storage on the PC.

Installing Natural Connection

This section describes how to install Natural Connection under the operating systems OS/390, VSE/ESA, BS2000/OSD and VM/CMS:

- General Information
- Installation Tape - OS/390
- Installation Tape - VSE/ESA
- Installation Tape - BS2000/OSD
- Installation Tape - VM/CMS
- Installation Procedure
- Installation Verification

General Information

The section below covers the following topics:

- Prerequisites
- Installation Jobs
- Using System Maintenance Aid

Prerequisites

Products and versions are specified under Natural and Other Software AG Products and Operating/Teleprocessing Systems Required in the current Natural Release Notes for Mainframes.

Installation Jobs

The installation of Software AG products is performed by installation jobs. These jobs are either created manually or generated by System Maintenance Aid (SMA).

For each step of the installation procedure described below, the job number of a job performing the respective task is indicated. This job number refers to an installation job generated by SMA. If you are not using SMA, an example installation job of the same number is provided in the job library on the Natural installation tape; you must adapt this example job to your requirements. The job numbers on the tape are preceded by a product code (for example, NTCI061).

Using System Maintenance Aid

For information on using Software AG’s System Maintenance Aid (SMA) for the installation process, refer to the System Maintenance Aid documentation.

Installation Tape - OS/390

The installation tape contains the datasets listed in the table below. The sequence of the datasets is shown in the Report of Tape Creation which accompanies the installation tape.

Dataset Name	Contents
NTC*nnn*.LOAD	Natural Connection load modules.
NTC*nnn*.INPL	Natural Connection example programs in INPL format.

The notation *nnn* in dataset names represents the version number of the product.

Copying the Tape Contents to Disk

If you are using System Maintenance Aid (SMA), refer to the SMA documentation (included on the current edition of the Natural documentation CD).

If you are **not** using SMA, follow the instructions below.

This section explains how to:

- Copy data set COPY.JOB from tape to disk.
- Modify this data set to conform with your local naming conventions.

The JCL in this data set is then used to copy all data sets from tape to disk.

If the datasets for more than one product are delivered on the tape, the dataset COPY.JOB contains the JCL to unload the datasets for all delivered products from the tape to your disk.

After that, you will have to perform the individual install procedure for each component.

Step 1 - Copy data set COPY.JOB from tape to disk

The data set COPY.JOB (label 2) contains the JCL to unload all other existing data sets from tape to disk. To unload COPY.JOB, use the following sample JCL:

```
//SAGTAPE JOB SAG,CLASS=1,MSGCLASS=X
//* --------------------------------
//COPY EXEC PGM=IEBGENER
//SYSUT1 DD DSN=COPY.JOB,
// DISP=(OLD,PASS),
// UNIT=(CASS,,DEFER),
// VOL=(,RETAIN,SER=<Tnnnnn>),
// LABEL=(2,SL)
//SYSUT2 DD DSN=<hilev>.COPY.JOB,
// DISP=(NEW,CATLG,DELETE),
// UNIT=3390,VOL=SER=<vvvvvv>,
// SPACE=(TRK,(1,1),RLSE),
// DCB=*.SYSUT1
//SYSPRINT DD SYSOUT=*
//SYSIN DD DUMMY
//
```

Where:

<*hilev*> is a valid high level qualifier

<*Tnnnnn*> is the tape number

<*vvvvvv*> is the desired volser

Step 2 - Modify COPY.JOB to conform with your local naming conventions

There are three parameters you have to set before you can submit this job:

- Set HILEV to a valid high level qualifier.
- Set LOCATION to a storage location.
- Set EXPDT to a valid expiration date.

Step 3 - Submit COPY.JOB

Submit COPY.JOB to unload all other data sets from the tape to your disk.

Installation Tape - VSE/ESA

The installation tape contains the datasets listed in the table below. The sequence of the datasets is shown in the Report of Tape Creation which accompanies the installation tape.

Dataset Name	Contents
NTC*nnn*.LIBR	LIBR backup file.
NTC*nnn*.INPL	Natural Connection example programs in INPL format.

The notation *nnn* in dataset names represents the version number of the product.

Copying the Tape Contents to Disk

If you are not using System Maintenance Aid, adapt and run job NTCTAPE to restore the Natural Connection sublibrary from tape and make it known to MSPH.

NTCTAPE is contained in sublibrary NAT*nnn*J on the Natural installation tape. For further information, see the Natural Installation Guide for Mainframes.

The space each dataset requires on disk is shown in the Report of Tape Creation.

Installation Tape - BS2000/OSD

The installation tape contains the datasets listed in the table below. The sequence of the datasets is shown in the Report of Tape Creation which accompanies the installation tape.

Dataset Name	Contents
NTC*nnn*.PAMS	Natural Connection module library.
NTC*nnn*.INPL	Natural Connection example programs in INPL format.

The notation *nnn* in dataset names represents the version number of the product.

Copying the Tape Contents to Disk

If you are not using SMA, copy the datasets from tape to disk using the procedure described below. In this procedure the following values must be supplied:

- In the dataset names, replace *nnn* with the current version number of the datasets.
- Replace all *xxxxxx* with the volume serial number of the tape.

Step 1

Copy the job dataset NTC*nnn*.JOBS from tape to disk using the BS2000/OSD utility EDT.

Issue the following commands in EDT.

```
/FILE NTCnnn.JOBS,VOL=xxxxxx,DEV=T9G -
/     ,STATE=FOREIGN,FSEQ=UNK,LINK=EDTSAM
/EXEC EDT
@ READ '/'
@ SY '/REL EDTSAM'
@ WRITE 'P.NTCnnn'
@ HALT
```

Step 2

Then issue the following command:

```
/CALL P.NTCnnn,PRODUCT=NTCnnn
```

An example job library LIB.NTC*nnn* will be created from the procedure dataset.

Step 3

Adapt job E.NTCTAPE from the example job library.

Then issue the following command to run the job which copies all datasets from tape to disk:

```
/E LIB.NTCnnn.JOBS(E.NTCTAPE)
```


Installation Tape - VM/CMS

The installation tape contains the datasets listed in the table below. The sequence of the datasets is shown in the Report of Tape Creation which accompanies the installation tape.

Dataset Name	Contents
NTC*nnn*.TAPE	Natural Connection load module.
NTC*nnn*.INPL	Natural Connection example programs in INPL format.

The notation *nnn* in dataset names represents the version number of the product.

Copying the Tape Contents to Disk

1. To position the tape for the TAPE LOAD command, calculate the number of tape marks as follows:
   If the sequence number of NTC*nnn*.TAPE, as shown by the Report of Tape Creation, is *n*, you must position over 3*n* - 2 tape marks (that is, FSF 1 for the first dataset, FSF 4 for the second, etc.)
2. Access the disk that is to contain the Natural installation files as disk "A".
3. Ask the system operator to attach a tape drive to your virtual machine at the address X’181’ and mount the Natural Connection installation tape.
4. When the tape has been attached, enter the CMS command:
   `TAPE REW`
   Position the tape by entering the CMS command:
   `TAPE FSF` *n*
   where *n* is the number of tape marks and is calculated as described above (3*n* - 2) .
5. Load the Natural Connection/CMS installation material by entering the CMS command:
   `TAPE LOAD * * A`
   Keep the tape drive attached to your virtual machine, because the tape is still needed during the installation procedure.

Installation Procedure

This section describes step by step how to install Natural Connection under the operating systems OS/390, VSE/ESA, BS2000/OSD and VM/CMS.

Step 1: Load Natural - Job I061, Step 0700

Use the Natural system command INPL to load the Natural objects (dataset NTC*nnn*.INPL) into the Natural system file.

Step 2: Adjust Natural Parameter Modules - Job I080

Specify the keyword parameter AM=PC for all printer files and work files you want to use for data transfer between the host and the PC. For example:

```
NTPRINT (7),AM=PC
NTWORK  (7),AM=PC
```

Specify the parameter PC=ON either dynamically or in your Natural parameter module.

For information on using the parameters, refer to Profile Parameter Usage (in the Natural Operations for Mainframes documentation).

For details of the parameters or macros, see the Parameter Reference overview page or the Parameter Modules overview page (in the Natural Parameter Reference documentation).

Step 3: Adapt Link Steps - Job I080

Adapt the link steps for online Natural.

- **OS/390:**

  Add the following INCLUDE instruction and the corresponding DD-statements in the link instructions for the linkage editor:

  ```
  INCLUDE NTCLIB(NTCPCAM3)
  ```
  mandatory

- **VSE/ESA:**

  Add the following INCLUDE instruction and the corresponding sublibrary for Natural Connection in the search chain for the linkage-editor:

  ```
  INCLUDE NTCPCAM3
  ```
  mandatory

- **BS2000/OSD:**

  Add the following INCLUDE instruction to the element LNATSHAR in LIB.NAT*nnn*:

  ```
  INCLUDE NTCPCAM3,NTCnnn.MOD
  ```

  Relink your Natural shared nucleus with the procedure P.LINKMOD in LIB.NAT*nnn*.

- **VM/CMS:**

  The list of text files to be included in the Natural module or DCSS is contained in REXX program NAT$LOAD EXEC (variable LOADLIST). To customize your Natural system, modify this EXEC with XEDIT by changing the LOADLIST as required.

  Add the following INCLUDE instruction to the program NAT$LOAD EXEC

  ```
  LOADLIST = LOADLIST 'NTCPCAM3'
  ```

  Relink your Natural nucleus with the procedure NATBLDM.

Installation Verification

To verify the successful installation of Natural Connection

1. Start Entire Connection on the PC and invoke terminal emulation.
2. Invoke Natural on the mainframe.
3. Enter the terminal command %+ to activate the PC connection.
4. Invoke the NTCPC utility and download a Natural program to the PC.
5. Verify that the downloaded program is now on your PC.

Preparing to Use Natural Connection

This section describes the tasks that must be accomplished to allow download and upload:

- Displaying Work File and Printer Settings
- Defining Work Files and Printers
- Activating the PC Connection
- Deactivating the PC Connection

In order to download and upload data, a work file must be designated as a PC file.
To download reports, a printer must be designated as a PC printer.

Displaying Work File and Printer Settings

To display your current work file and printer settings, enter the Natural system command SYSFILE at the NEXT prompt.

This invokes the SYSTP utility and a screen similar to the following appears:

```
11:07:18              ***** NATURAL SYSTP UTILITY *****             1999-09-21
User KOL                   - Work File Information -             TID DAEFTCI7

M No.   Type      Name   Recfm  Lrecl  Blksz  Status
-------------------------------------------------------------------------------
   1  COMPLETE  CMWKF01   VB            4628  Available for Input/Output
   2  COMPLETE  CMWKF02   VB            4628  Available for Input/Output
   3  COMPLETE  CMWKF03   VB            4628  Available for Input/Output
   4  COMPLETE  CMWKF04   VB            4628  Available for Input/Output
   5  PC                  VB            4628  Available for Input/Output
   6  PC                  VB            4628  Available for Input/Output
   7  PC                  VB            4628  Available for Input/Output









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

The standard procedure is for files 5, 6 and 7 to be the PC file (labelled PC).

For more information, see SYSTP Utility the section Debugging and Monitoring.

Defining Work Files and Printers

You can define work files and printers statically in your Natural parameter module, or dynamically when invoking Natural.

Remember, however, that the download and upload modules provided by Natural Connection use work file 7. If you wish to use another work file number, you must also edit the source code of the download and upload modules.

- Use the NTWORK macro or WORK parameter for work file definitions.
- Use the NTPRINT macro or PRINT parameter for printer definitions.

For detailed information on these macros and parameters, see the Natural Reference documentation.

Activating the PC Connection

To upload and download data to/from a PC, the PC connection must be active. You activate the PC connection from the mainframe.

To activate the PC connection

- Use the Natural terminal command %+.
  Or invoke Natural with the dynamic parameter PC=ON.
  Or use the `SET CONTROL '+'` statement in a Natural program.

With the terminal command %+ you can additionally set one or both of the following options:

Option	Description
%+N	The PC connection is activated. In addition, no field names are sent when downloading or uploading data.
%+O	The PC connection is activated. However, the new features of Natural Version 2.3 are not supported. For date and time variables, a runtime error will occur. Screens greater than 24x80 will not use the full size of the terminal buffer; 24x80 will still be used. Use this terminal command to avoid conflicts when working with older versions of Entire Connection.

If you attempt to upload or download data without the PC connection being activated, the following message appears:

```
NAT1173 PC CONNECTION NOT ACTIVE
```

If you enter %+ and the PC connection is already active, the following message appears:

```
NAT1172 PC CONNECTION ALREADY ACTIVE
```


Deactivating the PC Connection

To deactivate the PC connection

- Use the Natural terminal command %-.
  Or use the `SET CONTROL '-'` statement in a Natural program.

Natural Statements

This section describes the Natural statements required to process information between the mainframe and the PC using Natural Connection.

These statements can be divided into the following groups:

Transfer Data

- DOWNLOAD PC FILE (synonym for WRITE WORK FILE)
- UPLOAD PC FILE (synonym for READ WORK FILE)

Download Reports

- DISPLAY
- PRINT
- WRITE

Close a PC File

- CLOSE PC FILE (synonym for CLOSE WORK FILE)

The above statements are listed in alphabetical order below. For detailed information, see the Natural Statements documentation.

CLOSE PC FILE

Function

This statement is used to close a specific PC work file. It allows you to explicitly specify in a program that a PC work file is to be closed.

A work file is also closed automatically when command mode is reached.

The settings in the NTWORK macro apply.

work-file-number

The work-file-number is the number of the PC work file to be closed. This number must correspond to one of the work file numbers for the PC as defined to Natural.

Related Statements

DOWNLOAD PC FILE, UPLOAD PC FILE.

Example

The following program demonstrates the use of the CLOSE PC FILE statement.

```
/* CLOSEEX: Example for CLOSE PC FILE
/*
DEFINE DATA LOCAL
  01 W-DAT   (A40)
  01 REC-NUM (N3)
  01 I       (P3)
END-DEFINE
*
REPEAT
  UPLOAD PC FILE 7 ONCE W-DAT                /* Data upload
  AT END OF FILE
    ESCAPE BOTTOM
  END-ENDFILE
  INPUT 'Processing file' W-DAT (AD=O)
    /   'Enter record number to display' REC-NUM
  IF REC-NUM = 0
    STOP
  END-IF
  FOR I = 1 TO REC-NUM
    UPLOAD PC FILE 7 ONCE W-DAT
    AT END OF FILE
      WRITE 'Max. record number reached, last record is'
      ESCAPE BOTTOM
    END-ENDFILE
  END-FOR
  I := I - 1
  WRITE 'Record' I ':' W-DAT
  CLOSE PC FILE 7                             /* Close PC file 7
END-REPEAT
END
```

When you run the program, a window appears in which you specify the name of the PC file from which the data are to be uploaded. The data are then uploaded from the PC. At the end of each loop, the PC file is closed.

DISPLAY

This statement is used to specify the fields to be output on a report in column format. A column is created for each field and a field header is placed over the column.

The notation (*rep*) may be used to define the number of the printer file where the report is to be output. If this printer file is defined to Natural as PC, the report will be downloaded to the PC.

For detailed information on this statement, see the Natural Statements documentation.

Example

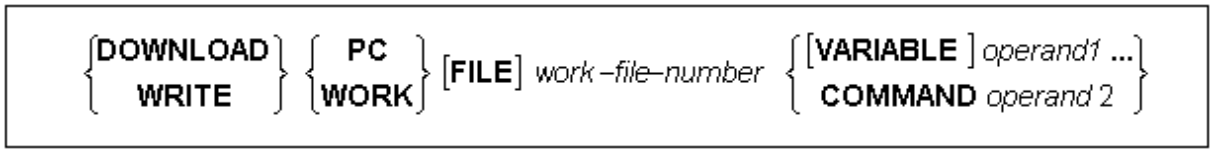
The following program demonstrates the use of the WRITE and DISPLAY statements for downloading reports to the PC.

```
/* DISPLEX: Example for DISPLAY to PC
/*
DEFINE DATA LOCAL
  01 PERS VIEW OF EMPLOYEES
     02 PERSONNEL-ID
     02 NAME
     02 CITY
END-DEFINE
*
FIND PERS WITH CITY = 'NEW YORK'              /* Data selection
   WRITE (7) TITLE LEFT 'List of employees in New York' /
   DISPLAY (7)          /* (7) designate the output file (here the PC).
     'Location'  CITY
     'Surname'   NAME
     'ID'        PERSONNEL-ID
END-FIND
END
```

When you run the program, a window appears in which you specify the name of the PC file into which the report is to be downloaded. The report is then downloaded to the PC.

```
  List of employees in New York

        Location             Surname           ID
  -------------------- -------------------- ---------

  NEW YORK             RUBIN                20007100
  NEW YORK             WALLACE              20025400
```


DOWNLOAD PC FILE



Operand	Possible Structure					Possible Formats										Referencing Permitted	Dynamic Definition
Operand1	C	S	A	G		A	N	P	I	F	B	D	T	L	C	yes	no
Operand2	C	S				A										yes	yes

Note:
Format C is not valid for Natural Connection. It will be rejected at runtime.

Function

This statement is used to transfer data from the mainframe to the PC.

work-file-number

The work file number to be used. This number must correspond to one of the work file numbers for the PC as defined to Natural.

VARIABLE

The records in the PC file will be written in variable format. Note that variable records cannot be converted to PC spreadsheet formats.

Field Specification - operand1

With operand1 you specify the fields to be downloaded to the PC.

COMMAND

With the COMMAND clause you can send PC commands (i.e any command that can be entered in the command line of Entire Connection on the PC) from the mainframe to the PC.

Entire Connection checks whether the command sent is valid or not. A command that cannot be recognized by the PC is rejected. In this case, Natural issues the error message that the downloaded command was rejected by the PC.

You can use the COMMAND clause, for example, to execute Entire Connection tasks from the mainframe. If you have the task DIR which lists PC directory information, you can initiate this directly out of your Natural program on the mainframe with the following statement:

```
DOWNLOAD PC FILE 7 COMMAND 'DIR'
```

In example 2 below, the COMMAND clause is used to define the name of the PC file that is to receive the downloaded data. In this way, you can avoid prompting for the name of the file.

Command Specification - operand2

With operand2 you specify the DOS command or Entire Connection task that is to be executed on the PC.

Operand2 must be an alphanumeric constant or variable.

Related Statements

CLOSE PC FILE, UPLOAD PC FILE.

Example 1

The following program demonstrates the use of the DOWNLOAD PC FILE statement. The data are first selected and then downloaded to the PC using work file 7.

```
/* DOWNLEX1: Example for DOWNLOAD PC FILE
/*
DEFINE DATA LOCAL
  01 PERS VIEW OF EMPLOYEES
     02 PERSONNEL-ID
     02 NAME
     02 CITY
END-DEFINE
*
FIND PERS WITH CITY = 'NEW YORK'               /* Data selection
   DOWNLOAD PC FILE 7 CITY NAME PERSONNEL-ID   /* Data download
END-FIND
END
```

When you run the program, a window appears in which you specify the name of the PC file into which the data are to be downloaded. The data are then downloaded to the PC.

```
        CITY                 NAME          PERSONNEL
                                              ID
  -------------------- -------------------- ---------

  NEW YORK             RUBIN                 20007100
  NEW YORK             WALLACE               20025400
```


Example 2

The following program demonstrates the use of the COMMAND clause in the DOWNLOAD PC FILE statement. The name of the receiving PC file is first defined. Then the data are selected and downloaded to this file.

```
/* DOWNLEX2: Example for DOWNLOAD PC FILE
/*
DEFINE DATA LOCAL
  01 PERS VIEW OF EMPLOYEES
     02 PERSONNEL-ID
     02 NAME
     02 CITY
  01 CMD (A80)                                  /* Variable for transfer
END-DEFINE                                      /* of the PC command
*
MOVE 'SET PCFILE 7 DOWN DATA PERS.NCD' TO CMD  /* PC command to define
*
DOWNLOAD PC FILE 6 COMMAND CMD                  /* Command download
*
FIND PERS WITH CITY = 'NEW YORK'                /* Data selection
   DOWNLOAD PC FILE 7 CITY NAME PERSONNEL-ID    /* Data download
END-FIND
END
```

Note:
The PC file number in two successive DOWNLOAD PC FILE statements must be different.

When you run the program, the data are downloaded to the PC file that was specified in the program. A window does not appear.

```
        CITY                 NAME          PERSONNEL
                                              ID
  -------------------- -------------------- ---------

  NEW YORK             RUBIN                 20007100
  NEW YORK             WALLACE               20025400
```


PRINT

This statement is used to produce output in free format.

The notation (*rep*) may be used to define the number of the printer file where the report is to be output. If this printer file is defined to Natural as PC, the report will be downloaded to the PC.

For detailed information on this statement, see the Natural Statements documentation.

Example

The following program demonstrates the use of the PRINT statement for downloading reports to the PC.

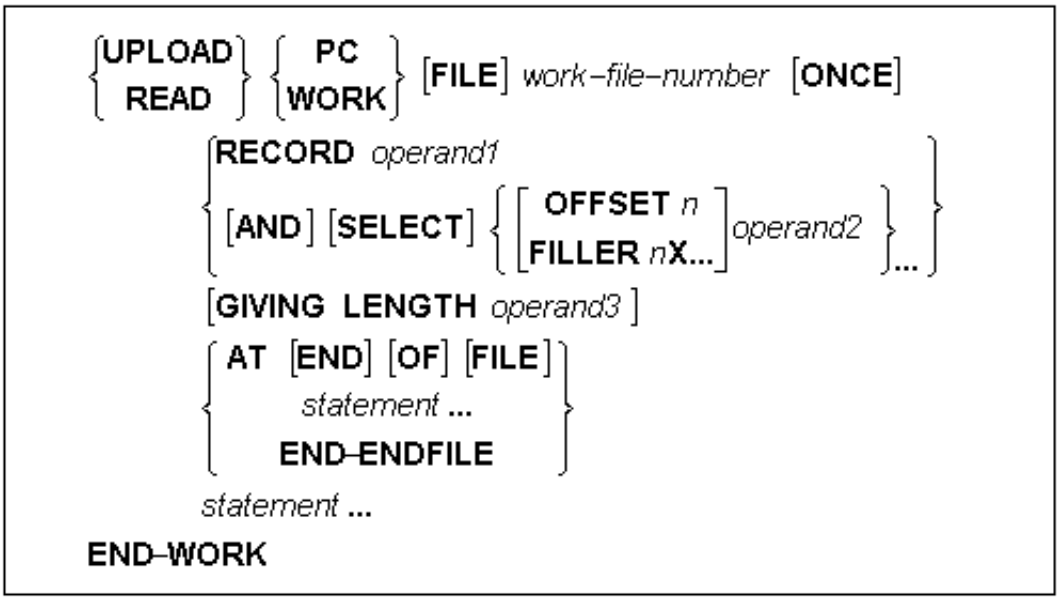
```
/* PRINTEX: Example for PRINT to PC
/*
DEFINE DATA LOCAL
  01 PERS VIEW OF EMPLOYEES
     02 PERSONNEL-ID
     02 NAME
     02 CITY
END-DEFINE
*
FIND PERS WITH CITY = 'NEW YORK'                 /* Data selection
   PRINT (7) 5T CITY 20T NAME 40T PERSONNEL-ID   /* (7) designate
                                                 /* the output file
                                                 /* (here the PC).
END-FIND
END
```

When you run the program, a window appears in which you specify the name of the PC file into which the report is to be downloaded. The report is then downloaded to the PC.

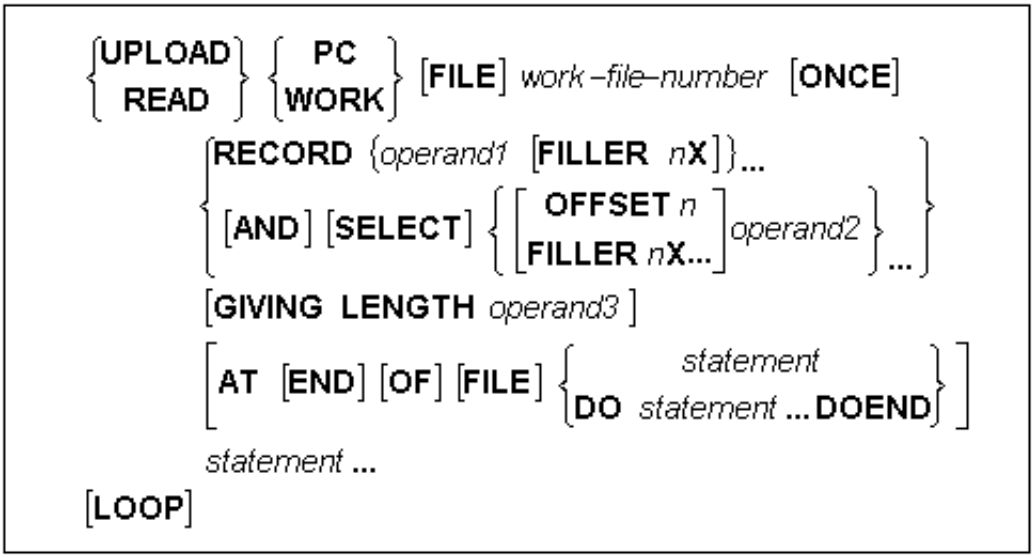
```
  NEW YORK             RUBIN                20007100
  NEW YORK             WALLACE              20025400
```


UPLOAD PC FILE

Structured Mode Syntax



Reporting Mode Syntax



Operand	Possible Structure					Possible Formats										Referencing Permitted	Dynamic Definition
Operand1		S	A	G		A	N	P	I	F	B	D	T	L	C	yes	yes
Operand2		S	A	G		A	N	P	I	F	B	D	T	L	C	yes	yes
Operand3		S							I							yes	yes

Note:
Format C is not valid for Natural Connection. It will be rejected at runtime.

Function

This statement is used to transfer data from the PC to the mainframe.

Note:
No I/O statement may be placed with the UPLOAD PC FILE processing.

work-file-number

The number of the work file to be used. This number must correspond to one of the work file numbers for the PC as defined to Natural.

Field Specification - operand1-2

With operand1 and operand2 you specify the fields to be uploaded from the PC. The fields may be database fields or user-defined variables.

Options

See the READ WORK FILE statement in the Natural Statements documentation for a description of the ONCE, SELECT, GIVING LENGTH options.

The RECORD option is not permitted for PC work files. It will be rejected at runtime.

When uploading data, if you wish to define a filler, you must use a dummy variable instead of the standard filler notation.

Related Statements

CLOSE PC FILE, DOWNLOAD PC FILE.

Example

The following program demonstrates the use of the UPLOAD PC statement. The data are first uploaded from the PC and then processed on the mainframe.

```
/* UPLDEX: Example for UPLOAD PC FILE
/*
DEFINE DATA LOCAL
  01 EMPL VIEW OF EMPLOYEES
     02  PERSONNEL-ID
     02  INCOME
         03  SALARY (1)
  01 #PID (A8)                                /* Personnel ID on PC
  01 #NEW-INCREASE (N4)                       /* Increase for salary
END-DEFINE
*
UPLOAD PC FILE 7 #PID #NEW-INCREASE           /* Data upload
*
  FIND EMPL WITH PERSONNEL-ID = #PID          /* Data selection
     ADD #NEW-INCREASE TO SALARY (1)          /* Data update on host
     UPDATE
     END TRANSACTION
     ESCAPE BOTTOM
  END-FIND
*
END-WORK
END
```

When you run the program, a window appears in which you specify the name of the PC file from which the data are to be uploaded. The data are then uploaded from the PC.

WRITE

This statement is used to produce output in free format.

The notation (*rep*) may be used to define the number of the printer file where the report is to be output. If this printer file is defined to Natural as PC, the report will be downloaded to the PC.

For detailed information on this statement, see the Natural Statements documentation.

Example

The following program demonstrates the use of the WRITE and DISPLAY statements for downloading reports to the PC.

```
/* WRITEEX: Example for WRITE to PC
/*
DEFINE DATA LOCAL
  01 PERS VIEW OF EMPLOYEES
     02 PERSONNEL-ID
     02 NAME
     02 CITY
END-DEFINE
*
FIND PERS WITH CITY = 'NEW YORK'              /* Data selection
   WRITE (7) TITLE LEFT 'List of employees in New York' /
   DISPLAY (7)          /* (7) designate the output file (here the PC).
     'Location'  CITY
     'Surname'   NAME
     'ID'        PERSONNEL-ID
END-FIND
END
```

When you run the program, a window appears in which you specify the name of the PC file into which the report is to be downloaded. The report is then downloaded to the PC.

```
  List of employees in New York

        Location             Surname           ID
  -------------------- -------------------- ---------

  NEW YORK             RUBIN                20007100
  NEW YORK             WALLACE              20025400
```


NTCPC Utility

This section describes the NTCPC utility with which you can download and upload objects between the mainframe and a PC:

- Invoking the NTCPC Utility
- Source Code
- Object Code
- Data Definition Module
- Data Area

Note:
To download to or upload from a PC, you must be using the NTCPC utility from a PC and the PC connection must be active.

Invoking the NTCPC Utility

To invoke the NTCPC utility, enter the following command at the NEXT prompt in Natural:

NTCPC

The following main menu appears:

```
 14:38:30              ***** NATURAL NTCPC UTILITY *****              1999-09-21
 User KOL                        - Main Menu -


                        Code  Function

                         S    Source Code
                         O    Object Code
                         D    Data Definition Module
                         A    Data Area
                         ?    Help
                         .    Exit

                Code .. _









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

Within the NTCPC utility, online help is available

- at the general level: place the cursor anywhere on the screen and press PF1, and
- at field level: place the cursor on a field and press PF1, or enter a question mark (?) in a field and press ENTER.

On this main menu, you can select one of the object types you wish to download/upload by entering the corresponding code in the Code field. On the following pages, the various possibilities are explained in detail.

Source Code

If you enter S on the main menu, the following submenu appears:

```
14:41:36              ***** NATURAL NTCPC UTILITY *****              1999-09-21
User KOL                        - Source Code -


                        Code  Function

                         D    Download to PC
                         B    Download binary to PC
                         M    Download Map with Free Rules to PC
                         U    Upload from PC
                         Y    Upload binary from PC
                         R    Upload from PC and RUN
                         ?    Help
                         .    Exit

                Code .. _

       Source code .... _________    Library ................... KOL_____
       Replace (Y/N) .. N            Type (P/N/S/H/C/K/T/M/4) .. P


Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit                                                    Canc
```

This menu offers the following possibilities:

Code	Function
D	Download the source code of an object to the PC.
B	Download the source code of an object in binary format to the PC.
M	Download the source code of a map to the PC. If the map uses free rules, they are included in the source code that is downloaded. The prerequisite is that Predict is installed.
U	Upload the source code of an object from the PC.
Y	Upload the source code of an object in binary format from the PC.
R	Upload (but not save) the source code of an object from the PC and execute (run) the object.

Parameter	Explanation
Source code	The name of the source code you wish to download/upload.
Library	The Natural library that contains the source code you wish to download, or the library into which you wish to upload the code.
Replace (Y/N)	This field is only required when uploading. Y means that if a program of the same name is already in the target library, it will be overwritten. N means that a program of the same name will not be overwritten. If duplicate names are detected, the corresponding message appears.
Type	This field is only required when uploading. You can select one of the following source code types: P Program N Subprogram S Subroutine H Helproutine C Copycode K Server T Text M Map 4 Class

Example - Downloading Source Code to the PC:

To download source code to the PC, fill in the menu as in the example below and press ENTER.

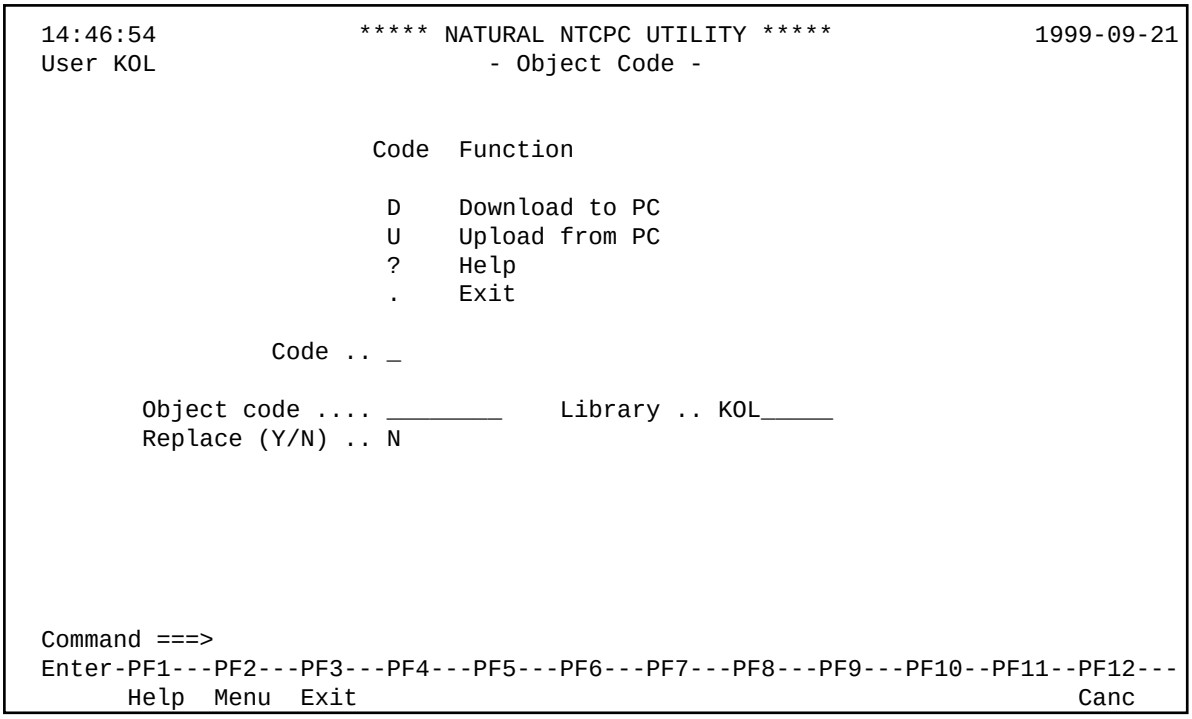
```
14:41:36              ***** NATURAL NTCPC UTILITY *****              1999-09-21
User KOL                        - Source Code -


                        Code  Function

                          D    Download to PC
                          B    Download binary to PC
                          M    Download Map with Free Rules to PC
                          U    Upload from PC
                          Y    Upload binary from PC
                          R    Upload from PC and RUN
                          ?    Help
                          .    Exit

                Code .. d

       Source code .... downlfil    Library ..................... KOL_____
       Replace (Y/N) .. N           Type (P/N/S/H/C/K/T/M/4) .. P


Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit                                                    Canc
```

A window appears in which you enter the name of the PC file to which you wish to download the source code. It is not necessary to define an extension for the PC file, as the extension .NCD is automatically inserted.

When you press ENTER, a message appears indicating that your data are being downloaded. If the name of the PC file you specified already exists on your PC, you are asked whether you want to overwrite the file. When download is complete, the source code is stored on your PC and can be manipulated using a PC editor.

Object Code

If you enter O on the main menu, the following submenu appears:



This menu offers the following possibilities:

Code	Function
D	Download the object code of an object to the PC.
U	Upload the object code of an object from the PC.

Parameter	Explanation
Object code	The name of the object code you wish to download/upload.
Library	The Natural library that contains the object code you wish to download, or the library into which you wish to upload the code.
Replace (Y/N)	This field is only required when uploading. Y means that if a program of the same name is already in the target library, it will be overwritten. N means that a program of the same name will not be overwritten. If duplicate names are detected, the corresponding message appears.

Example - Uploading Object Code from the PC

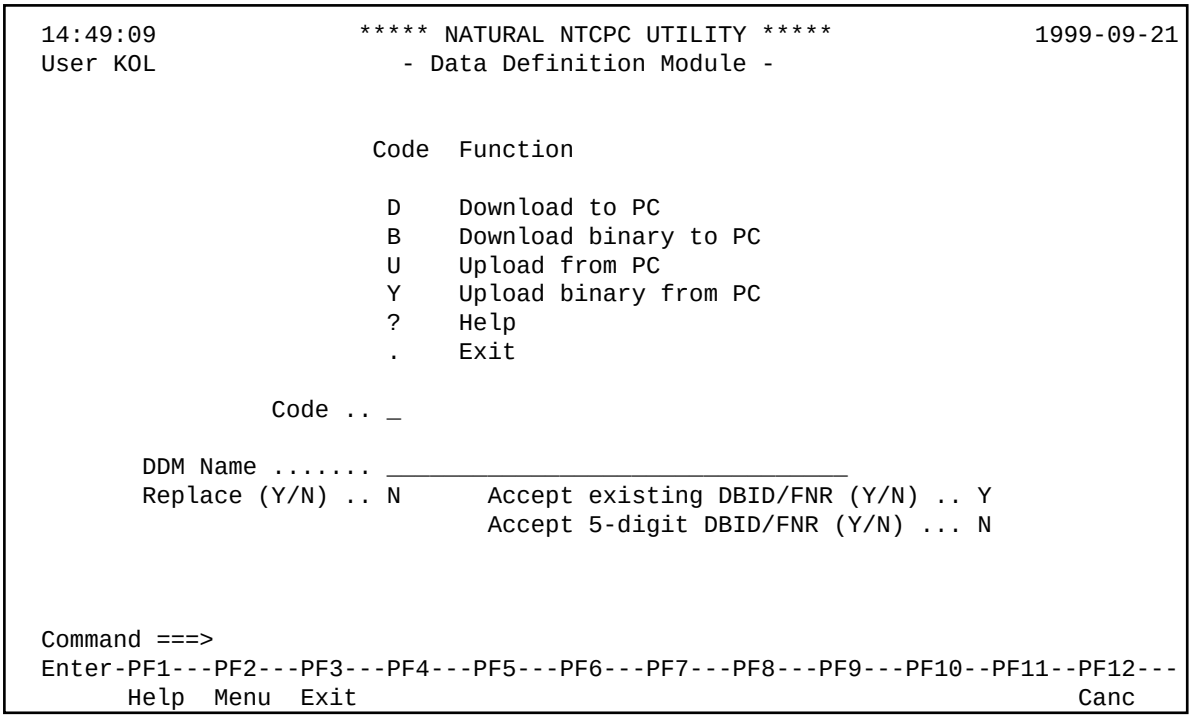
To upload object code from the PC, fill in the menu as in the example below and press ENTER.

```
14:46:54              ***** NATURAL NTCPC UTILITY *****              1999-09-21
User KOL                        - Object Code -


                        Code  Function

                         D    Download to PC
                         U    Upload from PC
                         ?    Help
                         .    Exit

                Code .. u

       Object code .... obj_____    Library .. KOL_____
       Replace (Y/N) .. N









Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Menu  Exit                                                    Canc
```

When you press ENTER, a message appears indicating that your data are being uploaded. When upload is complete, the object code can be executed on the mainframe.

Data Definition Module

If you enter D on the main menu, the following submenu appears:



This menu offers the following possibilities:

Code	Function
D	Download the source code of a DDM to the PC.
B	Download the DDM in binary format to the PC.
U	Upload the source code of a DDM from the PC.
Y	Upload a DDM in binary format from the PC.

Parameter	Explanation
DDM Name	The name of the DDM you wish to download/upload.
Replace (Y/N)	This field is only required when uploading. Y means that if a DDM of the same name already exists, it will be overwritten. N means that a DDM of the same name will not be overwritten. If duplicate names are detected, the corresponding message appears.
Accept existing DBID/FNR (Y/N)	Y means that the DBID/FNR already defined for the DDM will be used. N means that the DBID/FNR already defined for the DDM are not to be used automatically. In this case, a window showing the DBID/FNR appears. You can modify the DBID/FNR in this window, considering your specification for the "Accept 5-digit DBID/FNR" parameter.
Accept 5-digit DBID/FNR (Y/N)	With Natural Version 2.3, DBID and FNR can be greater than 255 and can be up to five digits long. If the receiving platform is of an earlier Natural version, set this parameter to N. Y means that a DBID/FNR greater than 255 is allowed. N means that a DBID/FNR greater than 255 is not allowed. If a DBID/FNR greater than 255 is detected, a window appears (independent of your specification for the "Accept existing DBID/FNR" parameter), showing the DBID/FNR. You must modify the DBID/FNR.

Example 1 - Downloading a DDM to the PC:

The same DBID/FNR are to be used on the receiving platform. However, you want to make sure that a DDM with DBID/FNR greater than 255 will not be transferred.

You specify the following:

```
Accept existing DBID/FNR (Y/N) .. Y
Accept 5-digit DBID/FNR (Y/N) ... N
```

If the downloaded DDM gets a DBID/FNR greater than 255, a window appears in which you have to specify an appropriate DBID/FNR.

Example 2 - Downloading a DDM to the PC:

You want to modify the DBID/FNR of the DDM and want to make sure that a DBID/FNR greater than 255 will not be accepted.

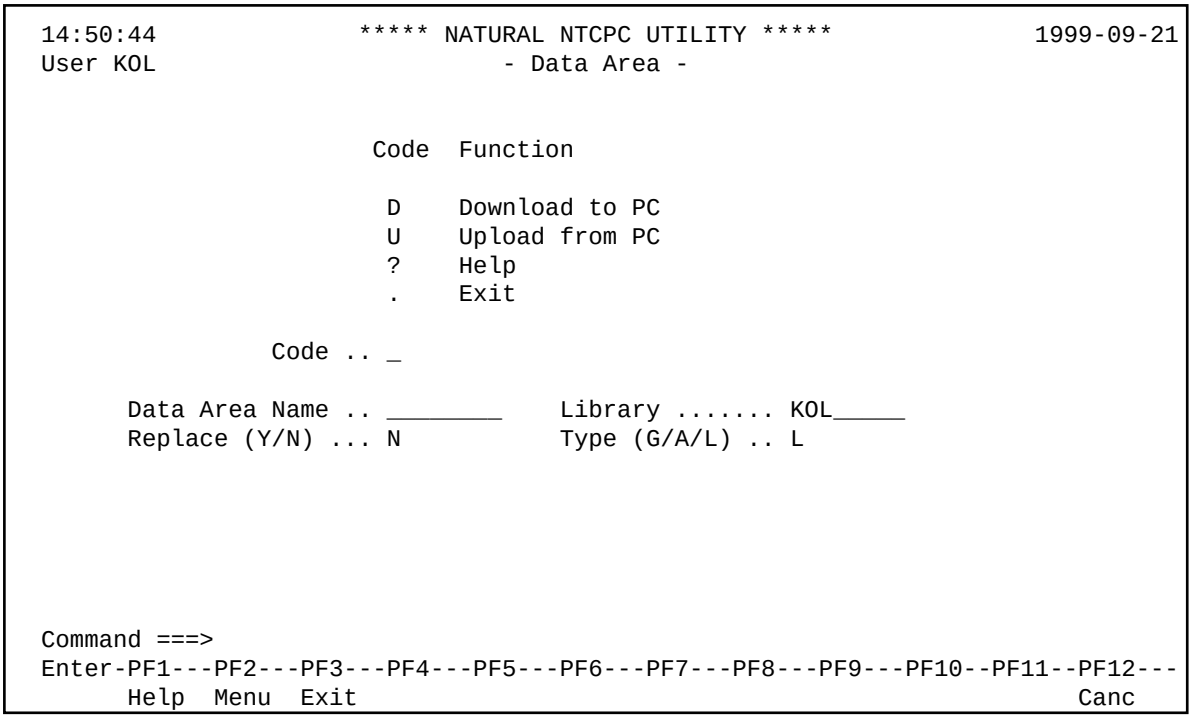
You specify the following:

```
Accept existing DBID/FNR (Y/N) .. N
Accept 5-digit DBID/FNR (Y/N) ... N
```

A window appears, showing the DBID/FNR. You can only specify a value up to 255.

Data Area

If you enter A on the main menu, the following submenu appears:



This menu offers the following possibilities:

Code	Function
D	Download the source code of the data area to the PC.
U	Upload the source code of the data area from the PC. The fields "Replace (Y/N)" and "Type (G/A/L)" must be filled in when uploading.

Parameter	Explanation
Data Area Name	The name of the data area you wish to download/upload.
Library	The Natural library that contains the data area you wish to download, or the library into which you wish to upload the data area.
Replace (Y/N)	This field is only required when uploading. Y means that if a data area of the same name already exists, it will be overwritten. N means that a data area of the same name will not be overwritten. If duplicate names are detected, the corresponding message appears.
Type (G/A/L)	This field is only required when uploading. You can select one of the following types of data area: G Global data area A Parameter data area L Local data area The data area is uploaded from the PC directly into the data area editor of the specified type, where you can review/modify the data area.

Download and Upload Modules

This section describes the Natural Connection modules available for downloading and uploading data:

- Modules for Downloading and Uploading Data
- Modifying Work File Numbers in Subprograms

Modules for Downloading and Uploading Data

The following table lists the Natural Connection modules that are available for downloading and uploading data.

Module Name	Function
NC-PCWS	Download source.
NC-PCWSB	Download source binary.
NC-PCWO	Download object.
NC-DDM	Download DDM.
NC-DDMWB	Download DDM binary.
NC-MAP	Download map with free rules.
NC-DDATA	Download data area.
NC-PCRST	Upload source.
NC-SAR	Upload source and run it.
NC-PCRSB	Upload source binary.
NC-PCRO	Upload object.
NC-DDMR	Upload DDM.
NC-DDMRB	Upload DDM binary.
NC-UDATA	Upload data area.

Note:
It is still possible to use the old module names starting with NTC. The old modules now call the above listed new modules. Therefore, existing program sequences etc. need not be changed.

You can access these functions on the mainframe, with the NTCPC utility.

All these modules use Natural Security, if it is installed.

The modules call subprograms to read from and write to the PC. These subprograms are provided in source and object form, so that you can modify the work file numbers that are used (see below).

Note:
When working with Entire Connection on the PC, transfer tasks for downloading and uploading - with task names different to those listed above - are also available. See the Entire Connection documentation for further information.

Modifying Work File Numbers in Subprograms

The download/upload modules use the following subprograms:

Subprogram	Used by Modules
NC-WS	NC-PCWS, NC-DDM, NC-MAP, NC-DDATA
NC-RS	NC-PCRS, NC-PCRST, NC-SAR, NC-DDMR, NC-UDATA
NC-WSB	NC-PCWSB
NC-RSB	NC-PCRSB
NC-WO	NC-PCWO, NC-DDMWB
NC-RO	NC-PCRO, NC-DDMRB

All subprograms use work file number 7.

The above subprograms are provided in source form so that you can make modifications to suit your requirements. If you use work file numbers other than 7, you can modify the work file number in one of the following statements in the subprograms:

```
WRITE PC number ...
```

```
READ PC number ...
```

Remember also to change the initial value for NUMBER accordingly:

```
NUMBER (N2) INIT <number>
```


Example - Subprogram NC-RS:

```
************************************************************************
*
*   NC-RS        SUBPROGRAM TO READ ONE ALPHA RECORD LENGTH 100
*                RETURN EOF = TRUE ON END OF FILE
*                ALSO USED FOR DATA AREAS
*
************************************************************************
*
DEFINE DATA PARAMETER
1 LINE  (A100)
1 EOF   (L)
1 FIRST (L)
           LOCAL                              /* FOR 'NC-CHECK'
1 FUNCTION (A8) INIT <'WORK'>
1 NUMBER   (N2) INIT <7>                      /* MUST BE THE SAME
                                              /* AS IN READ STATEMENT
1 METHOD   (A8)                               /* RETURNED METHOD NAME
END-DEFINE
*
IF FIRST                                      /* DO IT ONLY ONCE
   DO
      CALLNAT 'NC-CHECK' FUNCTION NUMBER METHOD
*
   IF METHOD NE 'PC' AND METHOD NE 'PCNEW'
      DO
      MOVE 1179 TO *ERROR-NR
      STOP
   DOEND
DOEND
*
EOF = FALSE
READ  PC 7 ONCE LINE       /* CHANGE WORKFILE NUMBER IF DESIRED
AT END OF FILE EOF = TRUE
END
```

