

<b>ISDC</b>	<b>Installation Guide for the INTEGRAL Data Analysis System</b>	
30 Aug 2002	1.0	ISDC/IDA-INST-GUIDE

# *INTEGRAL* Science Data Centre

## INSTALLATION GUIDE FOR THE INTEGRAL DATA ANALYSIS SYSTEM

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# List of Reference Documents

[ISDC/IDA-INTRO]

INTRODUCTION TO THE INTEGRAL DATA ANALYSIS

Issue 0.9d

# 1 INTRODUCTION

The INTEGRAL Data Analysis System is composed of the following packages:

- Data Analysis Software (SW)
- Instrument Characteristics (IC)
- 'High-energy' Catalogue (CAT)
- Observation Data (DATA)
- Test Observations, for example to check the correct installation of the INTEGRAL Data Analysis System (TEST\_DATA)

In order to successfully repeat for example the results of the 'Standard Analysis' carried out by ISDC, you will have to download and install at least four packages: **SW, IC, CAT and TEST\_DATA**.

**Note:** In general, a given version of the SW package requires a specific version of the IC package etc. Those dependencies are listed in the 'Release Notes' of the individual packages. The 'Release Notes' are available with the packages at the following URL:

<http://isdc.unige.ch/index.cgi?Soft+download>

**Warning:** Make sure that you have a consistent set of the above packages before attempting to run any ISDC software.

**Warning:** Before installing especially the SW package(s) you should make sure that your system meets the requirements as indicated in the relevant 'Software Release Notes' at the following URL:

<http://isdc.unige.ch/index.cgi?Soft+download>

This document describes the procedures to install all relevant packages.

It provides neither the detailed information about the software itself nor the instructions on the set-up to run the software on observation data. It provides, however, the information on how to perform **Sanity Checks**.

For further information, please refer to the relevant user documentation at the following URL:  
<http://isdc.unige.ch/index.cgi?Soft+download>

If you have any problems installing a package please consult the 'Frequently Asked Questions' at <http://isdc.unige.ch/index.cgi?Soft+faq> to check for an answer to your question or send an E-mail to the INTEGRAL help-desk at [inthelp@rssd.esa.int](mailto:inthelp@rssd.esa.int)

## 2 SOFTWARE INSTALLATION

The following section describes all the steps necessary to install the relevant ISDC software package.

### 2.1 GETTING THE SOFTWARE

If you have not yet downloaded the relevant ISDC software package, you can find it at the following URL:

<http://isdc.unige.ch/index.cgi?Soft+download>

The ISDC software packages follow the naming convention

```
package_name-version.src.tar.gz
```

where `package_name` is e.g. `isdc_osa` for the 'ISDC Data Analysis' software.

Together with the software package you will find a documentation package including user manuals, test data packages and a list of known issues.

## 2.2 UNPACKING THE SOFTWARE

For the rest of this installation guide the software package will be referred to as `package_name-version`.

1. `cd` to a directory where you have write permission
2. `gzip -dc __path_to_downloaded_package__/package_name-version.src.tar.gz | tar xvc -`

The first command uncompresses the package file, the second unpacks it. The result will be a sub-directory with the name `package_name-version`. This sub-directory will be referred to as `__isdc_src_rep__` and contains at least the following files:

README:	The 'Release Note' for the ISDC software package
VERSION:	The detailed components list included in the package
makeisdc1.in	An input file to the <code>configure</code> command

and sub-directories:

analysis-sw:	source code for analysis libraries and executables
support-sw:	source code for support libraries and tools

**Note 1:** You will need at least some `nnn` MB of free disk space in `__isdc_src_rep__`. During the installation procedure the required disk space will grow to a maximum of some `mmm` MB – depending on, for example, OS and other details.

**Note 2:** You have to have write permissions in `__path_to_downloaded_package__`. If not you may first copy the package to the current working directory (`cp __path_to_downloaded_package__/package_name-version.src.tar.gz .`)

## 2.3 SETTING UP THE ENVIRONMENT

This section describes the setting of the installation relevant environment variables.

It is not intended to provide a description of the environment that is needed to run the software. The installation environment will not be sufficient to run the software. Please refer to relevant user manuals at the following URL:

<http://isdc.unige.ch/index.cgi?Soft+download>

for details on the environment needed to run the software.

### 2.3.1 COMPILER

You have to make sure that all COMPILER relevant environment variables are correctly set up.

Depending on the compiler and OS used, those variables are:

- SUN Solaris 5.8 and Forte 6.1

For C-shell flavours:

```
setenv CC cc
setenv CXX CC
setenv F90 f90
```

For Bourne shell flavours:

```
CC=cc ; export CC
CXX=CC ; export CXX
F90=f90 ; export F90
```

- Linux using GNU gcc version 2.95.2 and FUJITSU Fortran 95 Express 1.0 F90

For C-shell flavours:

```
setenv CC "gcc -Df2cFortran"
setenv CXX "g++ -Df2cFortran"
setenv F90 "f90 -static-flib"
```

For Bourne shell flavours:

```
CC="gcc -Df2cFortran" ; export CC
CXX="g++ -Df2cFortran" ; export CXX
F90="f90 -static-flib" ; export F90
```

**Note:** Make sure that your compiler's **bin** and **lib** directories are contained in environment variables **PATH** and **LD\_LIBRARY\_PATH** respectively.

### 2.3.2 ROOT

Make sure that environment variable **ROOTSYS** is set to where your ROOT installation is located.

Make sure that your ROOT's **bin** and **lib** directories are contained in environment variables **PATH** and **LD\_LIBRARY\_PATH** respectively. If not, type the following commands:

For C-shell flavours:

```
setenv PATH $ROOTSYS/bin:$PATH
setenv LD_LIBRARY_PATH $ROOTSYS/lib:$LD_LIBRARY_PATH
```

For Bourne shell flavours:

```
PATH=$ROOTSYS/bin:$PATH ; export PATH
LD_LIBRARY_PATH=$ROOTSYS/lib:$LD_LIBRARY_PATH ; export LD_LIBRARY_PATH
```

### 2.3.3 NAG

If the relevant software package depends on the NAG library you should read the following. See the 'Software Release Notes' (README) of the package to be installed.

For C-shell flavours execute the two commands:

```
setenv EXTERN_1_LIB_DIR __dir_where_NAG_library_is_located__
setenv EXTERN_1_INC_DIR __dir_where_NAG_include_files_are_located__
```

For Bourne shell flavours execute the two commands:

```
EXTERN_1_LIB_DIR=__dir_where_NAG_library_is_located__ ; export EXTERN_1_LIB_DIR
EXTERN_1_INC_DIR=__dir_where_NAG_include_files_are_located__ ; export EXTERN_1_INC_DIR
```

**Warning:** The ISDC default file name for the NAG library is libnag.a. If on your system the NAG library has a different file name (e.g. libnagff.a), you must execute the following command:

For C-shell flavours:

```
setenv NAGLIB __your_NAG_library_name__
(e.g. setenv NAGLIB nagff)
```

For Bourne shell flavours:

```
NAGLIB=__your_NAG_library_name__ ; export NAGLIB
(e.g. NAGLIB=nagff ; export NAGLIB)
```

**Note:** The NAG library is usually compiled with a FORTRAN77 compiler. If you link it with a FORTRAN90 compiler, you are likely to get unresolved symbol errors. To overcome this problem, you should either link additionally with `-lf77 -lm77` or re-compile the NAG library with a FORTRAN90 compiler.

### 2.3.4 ISDC\_ENV

Decide where the ISDC software package should be installed. This is controlled via the environment variable `ISDC_ENV`.

You may set the value of `ISDC_ENV` to any location where you have write permission. It is however recommended to set `ISDC_ENV` to the directory where the source code of the package is located (i.e. `__isdc_src_rep__`).

## 2.4 CONFIGURE, BUILD AND INSTALL

When the installation environment is successfully set up you may proceed to configure, build and install the software package. This is done by executing the following commands in the directory `__isdc_src_rep__`:

### 1. `support-sw/makefiles/ac_stuff/configure`

This command will create all system dependent Makefiles that are needed to build the software package.

Please type `support-sw/makefiles/ac_stuff/configure help` to learn about the configure options.

**Warning:** The setting of all environment variables mentioned in section **SETTING UP THE ENVIRONMENT** has to be done prior to executing the configure command. If, after executing the configure command, you change your mind about the value of an environment variable, you must first type `make distclean` and then redo the configuration step.

If the configure step terminated with an error and you cannot figure out the problem yourself, please consult the 'Frequently Asked Questions' at <http://isdc.unige.ch/index.cgi?Soft+faq> to check for a solution to your problem or send an E-mail to the INTEGRAL help-desk at [inthelp@rssd.esa.int](mailto:inthelp@rssd.esa.int).

For an efficient trouble-shooting, please include the following information to your E-mail:

- the name and version of the software package
- the name and version of the operating system. Type `uname -a` to retrieve this information. Linux users should in addition provide the contents of file `/proc/version`.
- the name and version of the compiler(s).  
For SUN's Forte compilers, type `cc -V`, `CC -V` and `f90 -v`.  
For the GNU compilers, type `gcc -v` and `g++ -V`
- the name and version of the NAG library.  
Type `strings $EXTERN_1_LIB_DIR/libnag.a | grep Product` or `strings $EXTERN_1_LIB_DIR/lib`
- in the terminal window where the configure was run, execute the `env` or `printenv` command and provide the output to the ISDC.
- the contents of file `$ISDC_ENV/config.log`

### 2. `make global_install`

This will compile all relevant source files, create the library files, the F90 modules and the C/C++ and F90 executables. The installation terminates by moving the library, the C/C++ header files, the F90 modules, the parameter files and the user manuals to the correct location. If everything went correctly, you should see the following message:

```
***** everything compiled and installed successfully *****  
  
executables are installed in           : $ISDC_ENV/bin  
parameter files are installed in       : $ISDC_ENV/pfiles  
F90 modules are installed in           : $ISDC_ENV/f90mod  
documentation, help, .txt files are installed in : $ISDC_ENV/help  
C/C++ include .h files are installed in : $ISDC_ENV/include
```

```
.a, .so library files are installed in      : $ISDC_ENV/lib
script files are installed in              : $ISDC_ENV/share/default_scripts
other shared files are installed in        : $ISDC_ENV/share
FITS file template files are installed in  : $ISDC_ENV/templates
```

**Warning:** You really have to type `make global_install`. A simple `make` or `make install` will fail.

**Note:** You may want to redirect the output of the `make global_install` command to a file.

For C-shell flavours, type:

```
make global_install >& make.log
```

For Bourne shell flavours, type:

```
make global_install 2>&1 > make.log
```

If `make global_install` terminated with an error and you cannot figure out the problem yourself, please consult the 'Frequently Asked Questions' at <http://isdc.unige.ch/index.cgi?Soft+faq> to check for a solution to your problem or send an E-mail to the INTEGRAL help-desk at [inthelp@rssd.esa.int](mailto:inthelp@rssd.esa.int).

For an efficient trouble-shooting, please include the following information to your E-mail:

- the name and version of the software package
- the name and version of the operating system. Type `uname -a` to retrieve this information. Linux users should in addition provide the contents of file `/proc/version`.
- the name and version of the compiler(s).  
For SUN's Forte compilers, type `cc -V`, `CC -V` and `f90 -V`.  
For the GNU compilers, type `gcc -v` and `g++ -v`
- the name and version of the make program.  
Type `make -v` or `gmake -v` depending on the name of the GNU make on your system.
- the version of the ROOT application.  
Type `root` to launch the ROOT application. The version number is prompted to the terminal window. Type `.q` to exit the ROOT application.
- the name and version of the NAG library.  
Type `strings $EXTERN_1_LIB_DIR/libnag.a | grep Product` or `strings $EXTERN_1_LIB_DIR/libnag.a | grep Product`
- in the terminal window where the `make global_install` was run, execute the `env` or `printenv` command and provide the output to the ISDC.
- the messages from the make command to the terminal window (the contents of file `make.log`, if the output of the `make global_install` command was redirected to a file `make.log`).

**Note:** Once the installation is successfully terminated you may recover some disk space by removing temporary compilation products. This is done by executing `make distclean`. You may even recover more disk space and remove the entire source code tree by executing `rm -rf support-sw analysis-sw` in `._isdc_src_rep_...`

### 3 INSTRUMENT CHARACTERISTICS INSTALLATION

This section describes the installation of the ISDC Instrument Characteristics (IC) packages.

### 3.1 GETTING THE INSTRUMENT CHARACTERISTICS

If you have not yet downloaded the required ISDC IC package, you can find it at the following URL:

<http://isdc.unige.ch/index.cgi?Soft+download>

### 3.2 UNPACKING THE INSTRUMENT CHARACTERISTICS

1. `cd` to the ISDC compliant data repository you have chosen for the INTEGRAL Data Analysis. This directory will be referred to as `REP_BASE_PROD` in the rest of this section.

**Note 1:** You have to have write permission in this directory

**Note 2:** This repository should be pointed to by environment variable `REP_BASE_PROD` when running the ISDC software.

**Note 3:** Check whether this directory contains partial or full Instrument Characteristics from a previous release. If this is the case remove them via `rm -rf README.ic VERSION.ic ic idx/ic`. This operation is considered safe, as IC releases do contain, in general, the IC data from previous IC releases.

2. `gzip -dc __path_to_downloaded_package__/isdc_ic_tree-version.tar.gz | tar xvf -`

The first command uncompresses the package file, the second unpacks it. The result will be that `REP_BASE_PROD` contains at least the following files:

`README.ic:` The 'Release Note' for the Instrument Characteristics  
`VERSION.ic:` Contains the version number of the Instrument Characteristics

and sub-directories:

`ic:` The IC data in form of FITS files  
`idx/ic:` The IC Master File and 'indices' of Instrument Characteristics.

**Warning:** The file names of the IC data are significant and must not be changed. Otherwise internal references in the IC data will be broken.

To learn more about 'ISDC compliant Data Repositories' and 'Instrument Characteristics', please refer to the User Manuals at the following URL:

<http://isdc.unige.ch/index.cgi?Soft+download>

## 4 CATALOGUE INSTALLATION

This section describes the installation of the ISDC Catalogue (CAT) packages.

### 4.1 GETTING THE CATALOGUE

If you have not yet downloaded the relevant ISDC CAT package, you can find it at the following URL:

<http://isdc.unige.ch/index.cgi?Soft+download>

## 4.2 UNPACKING THE CATALOGUE

1. `cd` to the ISDC compliant data repository you have chosen for the INTEGRAL data analysis. This directory will be referred to as `REP_BASE_PROD` in the rest of this section.

**Note 1:** You have to have write permission in this directory

**Note 2:** This repository should be pointed to by environment variable **REP\_BASE\_PROD** when running the ISDC software.

2. `gzip -dc __path_to_downloaded_package__/isdc_catalogue-version.tar.gz | tar xvf -`

The first command uncompresses the package file, the second unpacks it. The result will be that `REP_BASE_PROD` contains at least the following files:

`README.cat`: The 'Release Note' for the Catalogue

`VERSION.cat`: Contains the version number of the Catalogue

and sub-directories:

`cat/hec`: The 'high energy catalogues'

**Warning:** The `VERSION` keyword in the header of the FITS extension for the catalogue data (`GNRL-REFR-CAT`) contains the version number of the ISDC Catalogue. Its value can be viewed via the `ftools` 'fv' or 'fkeyprint'. The four digits in the file name of the ISDC Catalogue are used for ISDC internal book-keeping only and must not be confused with the version number.

**Note:** When running the ISDC software the environment variable `ISDC_REF_CAT` must point to the DOL of the ISDC Catalogue

To learn more about 'ISDC compliant Data Repositories', 'ISDC Catalogues' and DOLs, please refer to the User Manuals at the following URL:

<http://isdc.unige.ch/index.cgi?Soft+download>

## 5 DATA INSTALLATION

This section describes the installation of the ISDC Data packages.

### 5.1 GETTING THE DATA

TBW ...

### 5.2 UNPACKING THE DATA

TBW ...

## 6 TEST DATA INSTALLATION

ISDC is providing test observations

This section describes the installation of the ISDC TEST\_DATA packages and explains how to run the included test scripts.

### 6.1 GETTING THE TEST DATA

If you have not yet downloaded the relevant TEST\_DATA package, you can find it at the following URL: <http://isdc.unige.ch/index.cgi?Soft+download>

### 6.2 UNPACKING THE TEST DATA

1. cd to a directory that you have chosen for the test data installation.

**Note 1:**You have to have write permission in this directory

**Note 2:**The TEST\_DATA packages provided for the different instruments could contain data that are incompatible, like different attitude information for a similar period of time etc. Therefore, it is recommended that you choose a separate directory for each of the TEST\_DATA packages to be installed.

**Note 3:**The directory `__TEST_DATA_install_dir__/testdata` should be pointed to by environment variable **REP\_BASE\_PROD** when running the test script.

2. `gzip -dc __path_to_downloaded_package__/isdc_osa_instr_testdata_xxxxx-version.tar.gz | tar xvf -`

The first command uncompresses the package file, the second unpacks it. The result will be a sub-directory with the name `isdc_osa_instr_testdata_xxxxx-version`. This sub-directory will be referred to as `__TEST_DATA_install_dir` contains at least the following files:

README.testdata:	The 'Release Note' for the specific TEST_DATA package
VERSION.testdata:	Contains the version number of the specific TEST_DATA package
Makefile:	The make file
isdc_osa_instr_testscript.sh:	The actual test script

and sub-directories:

testdata:	Test input data
outref:	Reference output data

3. `cd __TEST_DATA_install_dir__/testdata`  
This directory will be referred to as `REP_BASE_PROD` for the rest of this section.
4. Install the relevant IC data package in the `REP_BASE_PROD` you choose for the test run.  
To do that, please follow the procedure in section [Instrument Characteristics Installation](#).

**Note:** If you have already installed the required IC package in a different `REP_BASE_PROD` for another `TEST_DATA` package or the Observation Data, you may do the following:

1. `ln -s __directory_of_ic_installation__/ic ic`
2. `mkdir idx`
3. `cd idx`
4. `ln -s __directory_of_ic_installation__/idx/ic ic`

**Note:** For a detailed description of the INTEGRAL data organisation, please refer to [ISDC/IDA-INTRO].

### 6.3 RUNNING THE TEST SCRIPTS

Once a consistent set of the SW, IC, CAT and TEST DATA packages has been successfully installed, the available test scripts can be used to verify the correct installation, set-up and functioning of the ISDC Off-line Scientific Analysis.

To do that, the following procedure should be followed for users of C-shell flavours:

1. `setenv ROOTSYS __directory_of_ROOT_installation__`
2. `setenv ISDC_ENV __directory_of_SW_installation__`
3. `setenv ISDC_REF_CAT __DOL_of_catalogue__`
4. `setenv REP_BASE_PROD __TEST_DATA_install_dir__/testdata`
5. `source $ISDC_ENV/bin/isdc_init_env.csh`
6. `cd __TEST_DATA_install_dir__`
7. `make test`
8. `make dircmp` – optional. See below for details

User of Bourne shell flavours should do:

1. `ROOTSYS=__directory_of_ROOT_installation__ ; export ROOTSYS`
2. `ISDC_ENV=__directory_of_SW_installation__ ; export ISDC_ENV`
3. `ISDC_REF_CAT=__DOL_of_catalogue__ ; export ISDC_REF_CAT`
4. `REP_BASE_PROD=__TEST_DATA_install_dir__/testdata ; export REP_BASE_PROD`
5. `. $ISDC_ENV/bin/isdc_init_env.sh`
6. `cd __TEST_DATA_install_dir__`
7. `make test`
8. `make dircmp` – optional. See below for details

The `make test` command will run the data analysis for the test observation. If you have the FTOOL `fdiff` available on your system, you may run as well the `make dircmp` command. A comparison of the output data of the current test run with the reference output data will be performed. The reference output data is included in the `TEST_DATA` package provided by ISDC in the directory `outref`.

The `make test` and `make dircmp` commands should exit with a return code of 0. Users of C-shell flavours may check the return code by typing `echo $status` immediately after the `make test` or `make dircmp` command. Users of Bourne shell flavours should type `echo $?` instead.

If `make test` or `make dircmp` terminated with an error and you cannot figure out the problem yourself, please consult the 'Frequently Asked Questions' at <http://isdc.unige.ch/index.cgi?Soft+faq> to check for a solution to your problem or send an E-mail to the INTEGRAL help-desk at [inthelp@rssd.esa.int](mailto:inthelp@rssd.esa.int).

For an efficient trouble-shooting, please include the following information to your E-mail:

- the name and version of the software package
- the name and version of the operating system. Type `uname -a` to retrieve this information. Linux users should in addition provide the contents of file `/proc/version`.
- the name and version of the compiler(s).  
For SUN's Forte compilers, type `cc -V`, `CC -V` and `f90 -V`.  
For the GNU compilers, type `gcc -v` and `g++ -V`
- the name and version of the make program.  
Type `make -v` or `gmake -v` depending on the name of the GNU make on your system.
- the version of the ROOT application.  
Type `root` to launch the ROOT application. The version number is prompted to the terminal window. Type `.q` to exit the ROOT application.
- the name and version of the NAG library.  
Type `strings $EXTERN_1_LIB_DIR/libnag.a | grep Product` or `strings $EXTERN_1_LIB_DIR/lib$NAG`
- the version of the IC package used
- the version of the CAT package used
- in the terminal window where the `make test` was run, execute the `env` or `printenv` command and provide the output to the ISDC.
- the contents of the following files `make_test_failed.log` or `make_dircmp_failed.log` depending on whether the `make test` or `make dircmp` failed.

## 7 SANITY CHECKS

The ISDC software packages do not contain dedicated sanity checks.

Instrument specific test observations are provided at the following URL: <http://isdc.unige.ch/index.cgi?Soft>

See the section on [Test Data Installation](#) for any details.