STSDAS Site Manager’s Installation Guide and Reference

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# Table of Contents

**Preface** ...........................................................................................................v

If You Have Problems... ..................................................................................vi

**Example Installation** ......................................................................................vii

**CHAPTER 1: Installing TABLES** .................................................................1

- The Installation Process ..................................................................................1
- Selecting the Top Level Directory .................................................................2
- Pre-Installation Site Modifications .................................................................3
- Installing the Source Code ............................................................................4
- Installing the Binaries ....................................................................................4
- The Help Database ........................................................................................5
- Testing the TABLES Installation .................................................................5
- Multi-architecture Support for TABLES .......................................................6
- Building TABLES from Scratch .................................................................6
- FITS Table Support .......................................................................................8

**CHAPTER 2: Installing STSDAS** ..............................................................11

- Before You Begin..........................................................................................12
- Installation Process .......................................................................................12
- Selecting the Top Directory ........................................................................13
- Pre-Installation Site Modifications ..............................................................14
- Installing Source Code ...............................................................................15
- Installing the Binaries ................................................................................15
- Compiling the Python code .......................................................................16
- The Help Database .....................................................................................17
- The Apropos Task .......................................................................................17
- Psikern Installation ...................................................................................18
- Testing STSDAS .........................................................................................19
Contents

Reading Exported Data Files ............................................ 20
Multi-architecture Support for STSDAS ......................... 20
Building STSDAS from Scratch .................................... 21

CHAPTER 3: STSDAS Site
Manager’s Reference ................. 25

User Account Privileges and Quotas ....................... 25
STSDAS Directory Structure ................................. 25

Applications Software Directories ...................... 27
Support Software Directories ............................. 30
Exported Data Directories .............................. 31
STSDAS and IRAF System Directory .................... 32

Rebuilding STSDAS Applications .................... 32

Saving Space .................................................. 33

Appendix 1 .................................................... 37

Synphot Data Set .............................................. 37

Setting the Top Directory .................................. 37
When Disaster Strikes ........................................ 39
The Space Telescope Science Data Analysis System (STSDAS) is a set of application programs designed for the calibration and analysis of data from the Hubble Space Telescope. Applications include general image processing as well as tasks specific to HST. STSDAS also has its own graphics package and a FITS I/O package specifically designed to read HST format image data.

The STSDAS web site is:

http://www.stsci.edu/resources/software_hardware/stsdas

Binaries for STSDAS/TABLES version 3.3 are now available for Solaris, RedHat and MacOS X. Binaries were compiled on Solaris 5.8, RedHat 7.3 and MacOS X 10.3.5. Generally they will work with later versions of the operating system, but not with earlier versions.

STSDAS is fully layered upon IRAF, the Image Reduction and Analysis Facility, which is developed and supported by NOAO. If you attempt to install STSDAS without IRAF you will get nowhere—the STSDAS installation procedures use IRAF utilities.

Note: Binaries were built using IRAF 2.12.2a. If you intend to do a binary installation, you need to install this version of IRAF.

STSDAS uses the TABLES external package, also available from STScI, which is a table I/O system that supports the transfer of tabular data from one application to another. There is a table manipulation tool kit that allows one to use tables as small relational databases. Note that you must already have installed TABLES in order to compile STSDAS. STSDAS links against some of the TABLES system libraries, causing unresolved
references if you try installing STSDAS without already having installed TABLES.

Changes to the TABLES libraries can also affect STSDAS compilation. We suggest that you match the version numbers of TABLES and STSDAS to maximize compatibility.

This release of STSDAS has been extensively tested at STScI. We encourage off-site users to try as much of the system as possible and send us comments and criticisms.

If You Have Problems...

If you have any problems *installing or using* STSDAS or TABLES contact the Help Desk staff by sending e-mail to: help@stsci.edu, or by calling (410) 338-1082.
Example Installation

STSDAS and TABLES are available from the STSDAS web site:

http://www.stsci.edu/resources/software_hardware/stsdas

or via anonymous ftp from ftp.stsci.edu in the directories

/pub/software/stsdas/stsdas_v3.3
/pub/software/stsdas/tables_v3.3

Below is a concise example of building TABLES and STSDAS from source on RedHat in /usr/local/tables and /usr/local/stsdas. The full paths to their location should be made known to IRAF in the $iraf/unix/hlib/extern.pkg file before attempting to build them. Figure 1.1 shows an example of this file.

The commands below are executed at the host level.

% cd /usr/local
% mkdir tables
% mkdir stsdas
% cd tables
% tar -xvf /tmp/tables33.tar
% mkpkg redhat
% cd ../stsdas
% tar -xvf /tmp/stsdas33.tar
% mkpkg redhat
Start **iraf** and build the packages from the `cl` command line:

```
% cl
cl> softools
so> tables
ta> cd tables
ta> mkpkg -p tables update >& spool 
   ta> mkpkg summary > tables.summ
   ta> stsdas
   st> cd stsdas
   st> mkpkg -p tables -p stsdas update >& spool &
   st> mkpkg summary > stsdas.summ
   st> logout
% cd /usr/local/stsdas/python
% python compileall.py ./*
```
External (non core-system) packages. To install a new package, add the
# two statements to define the package root directory and package task,
# then add the package helpdb to the ‘helpdb’ list.

reset noao = iraf$noao/
task noao.pkg = noao$noao.cl
reset tables = /usr/local/tables/
task tables.pkg = tables$tables.cl
reset stsdas = /usr/local/stsdas/
task stsdas.pkg = stsdas$stsdas.cl
task apropos = stsdas$apropos.cl
reset helpdb = "lib$helpdb.mip\n, noao$lib/helpdb.mip\n, tables$lib/helpdb.mip\n, stsdas$lib/helpdb.mip\n"

keep

Figure 1.1: Example extern.pkg file
Preface
Installation of TABLES 3.3 is fairly easy and straightforward. It is done within the IRAF environment. This chapter is intended as a cookbook to help you do a TABLES installation.

It should be noted that there already exists a task in the lists package of IRAF named table which may cause a conflict with the package name tables. When loading this package, the whole name should be typed out to ensure that the correct task is being run.

The Installation Process

TABLES 3.3 is a new release of TABLES. You will need both the source code tar file and the binary tar file for a binary installation, or just the source code tar file if you will be compiling your own binaries.
To install TABLES, you must:

1. Create the top-level directory for TABLES (below).
2. Edit the file `hlib$extern.pkg` to define the top-level directory and package definition.
3. Install the TABLES source code from the tar files. (See “Installing the Source Code” on page 4.) The latest versions of the tar files are available on the STSDAS web site or via anonymous ftp:

   http://www.stsci.edu/resources/software_hardware/stsdas/

   ftp.stsci.edu://pub/software/stsdas/tables_v3.3/source

4. Install the TABLES binaries for your architecture (*Solaris, RedHat and MacOS X only*). (See “Installing the Binaries” on page 4.) The latest versions of the tar files are available on the STSDAS web site or via anonymous ftp from:

   http://www.stsci.edu/resources/software_hardware/stsdas/

   ftp.stsci.edu://pub/software/stsdas/tables_v3.3/binaries

5. Modify the help database. (See “The Help Database” on page 5.)
6. Test the system. (See “Testing the TABLES Installation” on page 5.)
7. Install additional binaries, if multi-architecture support is needed. (See “Multi-architecture Support for TABLES” on page 6.)

   You may also choose to compile TABLES yourself. (See “Building TABLES from Scratch” on page 6.)

---

**Selecting the Top Level Directory**

TABLES is based on the structure of IRAF. We suggest installing TABLES as a separate directory structure and recommend naming the top directory `tables`. This will enable you to more easily make updates to the respective systems and allow you to easily add other packages. This is the method used in the examples in this guide.
Pre-Installation Site Modifications

Installation of TABLES is done within the IRAF cl. IRAF must know where TABLES is located. The IRAF file $hlib$extern.pkg contains the locations of all external packages.

TABLES 3.3 must be installed using IRAF. All of the binaries in the TABLES 3.3 release were created under IRAF 2.12.2a. If you do not have IRAF 2.12.2a installed and intend to do a binary installation, you must install it before proceeding with the TABLES 3.3 installation. You can get IRAF from the iraf web site http://iraf.noao.edu.

To edit the $hlib$extern.pkg file, change your current directory to $hlib$:

```
cl> cd hlib$
cl> edit extern.pkg
```

Two modifications need to be made to the file $hlib$extern.pkg:

- The TABLES package and its location must be defined.
- The path to the TABLES help database must be included.

To tell IRAF where the TABLES system will be located, add the package definition lines before the ‘reset helpdb ...’ line in $hlib$extern.pkg:

```
reset tables = /path/tables/
task tables.pkg = tables$tables.cl
```

To include TABLES in the help search path, add the string ‘tables$lib/helpdb.mip’ to the list of help database locations.
Chapter 1: Installing TABLES

An example of the modified `extern.pkg` file is shown in Figure 1.1 on page ix.

---

**Installing the Source Code**

The TABLES source tar files are available from the anonymous ftp site `ftp.stsci.edu` in the directory

```
/pub/software/stsdas/tables_v3.3/source
```

in the tar file `tables33.tar.gz`.

The source tar file is compressed. You will need to unpack it in the `tables` directory.

```
% cd tables
% gunzip tables33.tar.gz
% tar -xvf tables33.tar
```

---

**Installing the Binaries**

After you installed the source from the FTP tar file then you will need to get an additional tar file from the anonymous ftp site `ftp.stsci.edu` from the directory ` /pub/software/stsdas/tables_v3.3/binaries`. Here you will find files for each supported architecture.

<table>
<thead>
<tr>
<th><strong>Architecture</strong></th>
<th><strong>Directory name</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Sun Solaris 5.8</td>
<td>ssun</td>
</tr>
<tr>
<td>Red Hat 7.3</td>
<td>redhat</td>
</tr>
<tr>
<td>MacOS X 10.3.5</td>
<td>macosx</td>
</tr>
</tbody>
</table>

**Table 1: Currently Supported Binary Distributions**

The binaries are in a compressed tar file, with the name

```
tables33.bin.arch.tar.gz
```
Note: Binaries were compiled on the operating system specified in Table 1. Generally they will work with later versions of the operating system but not with earlier versions.

You will need to unpack the binaries in tables/bin.arch. For example, on a Redhat machine, the commands are:

```
%cd tables/bin.redhat
%gunzip tables33.bin.rh.tar.gz
%tar -xvf tables33.bin.rh.tar
```

---

The Help Database

The help database is provided in a machine independent form and need not be rebuilt. If you wish to rebuild it, you may do so by running the `mkhelpdb` task within the `softools` package of IRAF.

```
cl> softools
so> mkhelpdb helpdir=tables$lib/root.hd \ 
>>>helpdb=tables$lib/helpdb.mip
```

---

Testing the TABLES Installation

Once TABLES has been rebuilt, some of the basic tasks of TABLES should be exercised.
Multi-architecture Support for TABLES

It is possible to support multiple architectures using a single source tree. If you wish to support, for example, both Solaris and Linux architectures with a single source tree, you would follow these steps:

• Create a top-level directory for TABLES
• Edit the hlib$extern.pkg file. (See “Pre-Installation Site Modifications” on page 3.)
• Install the TABLES source code. (See “Installing the Source Code” on page 4.)
• Install the binaries for the Solaris architecture. (See “Installing the Binaries” on page 4.)
• Install the binaries for the Linux architecture. (See “Installing the Binaries” on page 4.)
• Modify the help database. (See “The Help Database” on page 5.)

Building TABLES from Scratch

If binaries for your computer’s architecture are not available, then you will need to compile TABLES from scratch.

Earlier versions of TABLES for some architectures can be obtained from http://stsdas.stsci.edu/old_versions.html

The system build can be done with a batch procedure submitted while within the IRAF cli. Load the tables and softools packages, set the current directory to the top TABLES directory, and execute the mkpkg task.

The first step is to ensure that some system variables are set. Type the following command at the system level before proceeding:
% setenv IRAFARCH arch

where *arch* is your specific architecture, e.g., *redhat* for a RedHat machine. A list of IRAF supported architectures is given in Table 1 on page 4.

% setenv iraf /path/iraf/

where *path* is the directory path to the top-level IRAF directory.

% source $iraf/unix/hlib/irafuser.csh

This sets up some other environment variables needed to compile under IRAF. You may set these up in your .login file so that they will be available.

Also, ensure that the directory that contains the local Unix commands (usually \texttt{/usr/local/bin}) is included in your PATH environment variable. If it is not, you can add it to your path by typing the following:

% setenv PATH /usr/local/bin:{$PATH}

Before attempting the total system rebuild, you should check the soft link for the \texttt{bin} directory. TABLES is shipped with a link for bin pointing to \texttt{bin.generic}. This should be changed so that it points to the appropriate \texttt{bin} for your architecture. To do this simply type the following command from the TABLES top-level directory:

% mkpkg arch

where *arch* is your specific architecture. A list of available architectures is provided in Table 1. For example, for a RedHat machine, you would type:

% mkpkg redhat

You will get a warning message about a full “sysgen” needing to be done, but that is normal.
The Unix system relink can be done with a batch procedure submitted while within the IRAF cl. Load the tables and softools packages, set the current directory to the top TABLES directory, and execute the mkpkg task:

```
cl> tables
ta> softools
so> cd tables
so> mkpkg -p tables update >& log &
```

This will run the mkpkg task as a background process and put all output and errors into the tables$spool file.

The mkpkg program generates a long output file describing all steps taken. To reduce this log to the pertinent information about the success of your installation, re-run the mkpkg task with the summary option.

```
cl> softools
so> cd tables
so> mkpkg summary >& tables.summ
```

Check tables.summ for errors.

---

**FITS Table Support**

For tables in FITS files, the tables library routines call subroutines in the HEASARC FITSIO package, so IRAF tasks that are linked with the tables library can transparently access FITS tables as well as ASCII or STSDAS format binary tables. Two versions of FITSIO are included in the tables distribution, one version written in Fortran and SPP, and one written in C.

The C version (CFITSIO) is currently supported by HEASARC, and it is faster than the Fortran version. The Fortran version has an SPP layer for the I/O routines, so that it is fully compatible with IRAF I/O; in particular, IRAF networking is supported. The C version, on the other hand, uses host system I/O to read and write the FITS files; IRAF virtual file names are supported by converting to host system names, but IRAF networking is not available.
CFITSIO is used by default. If the SPP and Fortran version is required instead, the following steps should be followed.

```
so> cd tables
so> delete tables$bin/libtbtables.a # if it already exists
so> mkpkg -p tables update sppfitsio=yes >& spool &
```

The only difference from a normal build is that sppfitsio=yes is specified when running mkpkg. *(Note: mkpkg does not check the value assigned to sppfitsio, it just checks whether sppfitsio is defined, so it has the same effect regardless of the value.)* Regardless of the sppfitsio switch, the CFITSIO source files will be compiled and included in the tables library, since they are used directly by some tasks in STSDAS.
Installing STSDAS version 3.3 is fairly easy and straightforward and is done within the IRAF 2.12.2a environment. This chapter briefly explains how to do an STSDAS installation. We recommend that you at least look at Figure 3.1 on page 26 and Figure 3.2 on page 27 before doing an installation so that you understand how the software is organized and where it expects its directories and files to be located.
Before You Begin...

Before installing STSDAS, you should be aware that:

- STSDAS is linked against libraries in the TABLES package. If you do not already have TABLES installed, you must install and compile TABLES first. TABLES is available at the same site—ftp.stsci.edu in the directory /pub/software/tables.

- The version number of TABLES must be the same as the version number of STSDAS. If you are upgrading STSDAS, you should upgrade TABLES first. See Chapter 1 for details on installing TABLES.

STSDAS will not compile without TABLES being installed first!

- The calibration routines in the hst_calib packages nicmos, stis and acs require a large amount of static memory to run. An average estimate of the required RAM is 500 Mb and at least twice as much swap space.

- If you are interested in reading data such as the Guide Star Catalog from CD-ROM, you may use the gasp package and system-mounted CD-ROMS.

Installation Process

STSDAS 3.3 is a new release of STSDAS. You will need to get the source code tar file and a binaries tar file if you would like to do a binary installation, or just the source code tar file if you are going to compile your own binaries.

To install STSDAS, you must:

1. Create the top-level directory for STSDAS (below).
2. Edit the file `hlib$extern.pkg` to define the top-level directory and package definition.

3. Install the STSDAS source code from the tar files. (See “Installing Source Code” on page 15). The latest versions of the tar files are available on the STSDAS web site or via anonymous ftp:

   http://www.stsci.edu/resources/software_hardware/stsdas/

   ftp.stsci.edu:/pub/software/stsdas/stsdas_v3.3/source

4. Install the STSDAS binaries for your architecture - Solaris, RedHat and MacOSX only. The latest versions of the tar files are available from the STSDAS web site or via anonymous ftp:

   http://www.stsci.edu/resources/software_hardware/stsdas/


   (See “Installing the Binaries” on page 15.)

5. Modify the help and apropos databases. See (“The Help Database” on page 17. and See “The Apropos Task” on page 17.)

6. Test the system. (See “Testing STSDAS” on page 19.)

7. Install additional binaries, if multi-architecture support is needed. (“Multi-architecture Support for STSDAS” on page 20)

You may also choose to compile STSDAS yourself.

---

Selecting the Top Directory

STSDAS is based on the structure of IRAF. We suggest installing STSDAS as a separate directory structure and recommend naming the top directory `stsdas`. This will enable you to more easily make updates to the respective systems and allow you to easily add other packages. This is the method used in the examples in this guide.

If for some reason this procedure cannot be followed, it is still straightforward to install STSDAS. All package directories are specified relative to the top level `stsdas` directory. There is one IRAF
environment variable, called \texttt{stsdas}, that is used as the basis for all package definitions.

**Pre-Installation Site Modifications**

Installation of STSDAS is done from within the IRAF cl. IRAF must know where you intend to put STSDAS. The IRAF file \texttt{hlib$extern.pkg} contains the locations of all external packages.

Binaries for STSDAS 3.3 were compiled using IRAF 2.12.2a. If you do not have IRAF 2.12.2a installed and intend to do a binary installation, you must install it before proceeding with the STSDAS 3.3 installation. You can get IRAF at the anonymous ftp site, \texttt{iraf.noao.edu}.

To edit the \texttt{hlib$extern.pkg} file, change your default directory to \texttt{hlib} and edit the file \texttt{extern.pkg}:

```
cl> cd hlib
cl> edit extern.pkg
```

Two modifications need to be made to the file \texttt{hlib$extern.pkg}:

- The STSDAS package and its location must be defined.
- The path to the STSDAS help database must be included.

To tell IRAF where the STSDAS system will be located, add the package definition lines before the ‘\texttt{reset helpdb ...}’ line in \texttt{hlib$extern.pkg}:

```
reset stsdas = /path/stsdas/
task stsdas.pkg = stsdas$stsdas.cl
```

To include STSDAS in the help search path, add the string ‘\texttt{stsdas$lib/helpdb.mip}’ to the list of help database locations.

An example of the modified \texttt{extern.pkg} file is shown in Figure 1.1 on page ix.
Installing Source Code

The STSDAS source tar files are available from the anonymous ftp site ftp.stsci.edu in the directory

/pub/software/stsdas/stsdas_v3.3/source

The STSDAS source tar files are placed on the anonymous ftp site as a compressed tar file (stsdas33.tar.gz). You will need to unpack the source file in the stsdas directory:

%cd stsdas
%gunzip stsdas33.tar.gz
%tar -xvf stsdas33.tar

Installing the Binaries

*Note:* Binaries for this release were built using IRAF 2.12.2a.

After you install the source from the FTP tar you will need to get an additional tar file from the anonymous ftp site ftp.stsci.edu from the directory /pub/software/stsdas/stsdas_v3.3/binaries. Here you will find a compressed tar file for each supported architecture (stsdas33.bin.arch.tar.gz). See Table 2.1 on page 22.
Chapter 2: Installing STSDAS

**Note:** Binaries were compiled on the operating system specified in Table 1. Generally they will work with later versions of the operating system but not with earlier versions.

You will have to unpack the file in `stsdas/bin.arch`. For example, on a Redhat machine, the commands are:

```
% cd stsdas/bin.redhat
% gunzip stsdas33.bin.rh.tar.gz
% tar -xvf stsdas33.bin.rh.tar
```

---

### Compiling the Python code

To run the Python tasks effectively the Python code has to be compiled by the user “iraf”. You will need the python interpreter to run and compile the code. Check whether you have python installed on your system by running the command:

```
% which python
```

**Note:** If you intend to use MultiDrizzle, you will need Python v2.3 or later. If you intend to use only PyRAF, Python 2.2 or later is sufficient. If you are not using any of the Python tasks, you don’t need to compile the Python code.

To compile the STSDAS python code:

- log out of iraf
- go to the `stsdas/python` directory
- run the `compileall.py` script

```
cl> logout
% cd <stsdas>/python
```
where `<stsdas>` is the directory where stsdas was unpacked.

```bash
% python compileall.py ./*
```

*Note: Figure 3.2 on page 27 shows part of the stsdas tree structure with the links in the python directory.*

---

The Help Database

The help database is provided in a machine independent form and need not be rebuilt. If you wish to rebuild it, you may do so by running the `mkhelpdb` task within the `softools` package of IRAF.

```bash
cl> softools
so> mkhelpdb helpdir=stsdas$lib/root.hd \\
    >>> helpdb=stsdas$lib/helpdb.mip
```

---

The Apropos Task

The `apropos` task searches an apropos database for any input string and outputs descriptions of any tasks in its database that match the search string. This task is a powerful tool for those who are not familiar with the package structure of the IRAF, NOAO, STSDAS, or TABLES packages. For convenience, we placed this task at the top level of the IRAF `cl` so that it is available without loading any packages. The script for the `apropos` task is in the top level directory of STSDAS. To include this task in your system add the following line to your `hlib$EXTERN.pkg` below the task statement for STSDAS:

```bash
task apropos = stsdas$apropos.cl
```
Chapter 2: Installing STSDAS

So, your hlib$extern.pkg might look like Figure 1.1 on page ix.

The apropos database, stsdas$lib/apropos.db, is provided in a machine independent form and need not be rebuilt. If you wish to rebuild it, you may do so by running the mkapropos task within the toolbox.tools package of STSDAS.

cli> stsdas
st> toolbox
to> tools
to> mkapropos pkglist=iraf,noao,stsdas,tables \ 
>>> helpdir=lib/root.hd aproposdb=stsdas$lib/apropos.db

Psikern Installation

STSDAS is distributed with an IRAF graphics kernel called psikern that produces output in Encapsulated PostScript. psikern provides a direct connection between the IRAF graphics system and PostScript. The kernel can use colors, fill areas, and has imaging capabilities. Many tasks in STSDAS, in particular those in the stplot package, take advantage of these capabilities. Installation of psikern is optional.

To use psikern, you must define graphics devices that invoke the kernel. To define new or different graphics devices, the file dev$graphcap must be modified. The file

stsdas$pkg/graphics/stplot/psikern.template

contains the basic entries necessary and some examples of how to use the basic entries to get output to a specific printer. To add psikern graphics devices to the graphcap file, follow these steps:

1. Make a backup copy of dev$graphcap, so you can recover if mistakes are made. Prepend to dev$graphcap the two entries in the file stsdas$pkg/graphics/stplot/psikern.template marked “REQUIRED ENTRIES”. These entries define two psikern graphics devices, psi_land and psi_port, for output on 8-1/2 x 11 inch paper. These entries create files with the names “tmp$pskxxxx” where “xxxx” are random numbers.

2. Prepend to dev$graphcap, before the required entries specified above, graphics entries for specific printers. The entries marked “EXAMPLES” in stsdas$graphics/stplot/psikern.template, demonstrate some example devices used at STScI..
To create an entry for a specific printer, basically all that needs to be changed is the DD parameter of an entry. For an example in Unix, to create an IRAF graphics device that will produce plots in landscape mode on the printer attached to queue lw, the entry you would add to the beginning of dev$graphcap would be:

```
lw|PostScript In Landscape mode on queue lw:\
   :DD=lw,tmp$psk,!(lpr -Plw $F; rm $F ;):tc=psi_land:
```

Once dev$graphcap has been modified, you can use the newly defined graphics devices as you would any other IRAF graphics device. For example, to make the device defined in the above example the default output device for plots, make the following definition in your loginuser.cl file:

```
set stdplot = lw
```

Also, for any graphics task that uses the device parameter to set the output printer, you can specify the newly defined devices. For example:

```
plot
pl> prow dev$pix 256 device=lw
```

For more information on the IRAF graphics system, type the following command:

```
help gio$doc/gio.hlp file+
```

For help about psikern, use the following command:

```
help psikern
```

Once STSDAS has been rebuilt, some of the basic functions of STSDAS as well as a few of the device-dependent tasks (e.g., plotting) should be exercised. When testing device-dependent functions such as plotting and
image display, be sure that the IRAF environment variables that point to the device(s) are correct (e.g., stdgraph and stdimage).

---

### Reading Exported Data Files

A few sample HST data files are provided in the directory `stsdas$data/fits`. These are in FITS disk format (with 512 byte records), and need to be expanded into IRAF or STSDAS disk format files before they can be accessed by STSDAS applications programs. You can use the STSDAS `fitsio` package to read these files. The expanded version of the files should be placed into the directory `stsdas$data/scidata` using the commands shown below:

```
cl> stsdas
st> fitsio
fi> cd stsdas$data/fits
fi> cl < read_fits.cl
```

If your users want to use the `synphot` package, you will need to install the STDATA files described here.

Additional sample data files and throughput tables for the HST components are needed by the `synphot` package; these files are provided separately and can be retrieved using anonymous ftp. The installation instructions for these files are in Appendix 1.

---

### Multi-architecture Support for STSDAS

It is possible to support multiple architectures using a single source tree. If you wish to support, for example, both Solaris and Redhat architectures with a single source tree, you would follow these steps:

- Create a top-level directory for STSDAS.
- Edit the `hlib$extern.pkg` file. (See “Pre-Installation Site Modifications” on page 14.)
Building STSDAS from Scratch

If binaries for your computer’s architecture are not available, then you will need to compile STSDAS from scratch.

Binaries for earlier versions of STSDAS for some architectures can be obtained from http://stsdas.stsci.edu/old_versions.html.

The first step in a system build is to ensure that some system variables are set. The following should be typed at the system level before proceeding:

```
% setenv IRAFARCH arch
```

where arch is your specific architecture, e.g., “macosx” for a MacOS X machine (see Table 2.1).

```
% setenv iraf /path/iraf/
```

where path is the directory path to the top-level IRAF directory.

```
% source $iraf/unix/hlib/irafuser.csh
```

This sets up some other environment variables needed to compile under IRAF. You may set these up in your .login file so that they will be available.
Also, ensure that the directory that contains the local Unix commands (usually `/usr/local/bin`) is included in your PATH environment variable. If it is not, you can add it to your path by typing the following:

```bash
% setenv PATH /usr/local/bin:{$PATH}
```

Before attempting the total system rebuild, you should check the soft link for the bin directory. STSDAS is shipped with a link for bin pointing to `bin.generic`. This should be changed, so that it points to the appropriate bin for your architecture. To do this simply type the following command from the STSDAS top-level directory:

```bash
% cd stsdas
% mkpkg arch
```

where `arch` is your specific architecture. (A list of architectures is provided in Table 2.1). For example, for a RedHat machine, you would type:

```bash
% mkpkg redhat
```

You will get a warning message about a full “sysgen” needing to be done, but that is normal.

<table>
<thead>
<tr>
<th>Architecture</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sun Solaris</td>
<td>mkpkg ssun</td>
</tr>
<tr>
<td>Linux Red Hat</td>
<td>mkpkg redhat</td>
</tr>
<tr>
<td>MacOS X</td>
<td>mkpkg macosx</td>
</tr>
</tbody>
</table>

**Table 2.1: Supported Architectures**

The Unix system rebuild can be done with a batch procedure submitted while within the IRAF cl. Load the `stsdas` and `softools` packages, set the current directory to the top STSDAS directory, and execute the `mkpkg` task:

```bash
cl> stsdas
st> softools
so> cd stsdas
so> mkpkg -p tables -p stsdas update >& spool &
```
This will run the `mkpkg` task as a background process and put all output and errors into the `stsdas$spool` file.

The `mkpkg` program generates a long output file describing all steps taken. To reduce this log to the pertinent information about the success of your installation, re-run the `mkpkg` task with the summary option.

```bash
cl> softools
so> cd stsdas
so> mkpkg summary > stsdas.summ
```

Check `stsdas.summ` for errors.
This chapter explains information needed to maintain and troubleshoot the STSDAS package.

User Account Privileges and Quotas

STSDAS does not require any special privileges or quotas when operated in a Unix environment. However, some of the calibration tasks (e.g. `acs`, `nicmos`, `stis`), require about 500Mb of RAM on the average and at least twice as much swap space.

STSDAS Directory Structure

STSDAS is organized in a hierarchical directory structure (see Figure 3.1) that reflects the organization seen by users of the system. Since STSDAS is a part of IRAF, we have adopted the `package` structure of IRAF to organize the application functions available to users. When STSDAS is installed, the system manager controls the name of the directory in which
the structure is rooted; typically, this is STSDAS, and we will assume this in the discussions that follow. All directory path names in STSDAS are relative to this top level directory. All STSDAS directories have names assigned as IRAF environment variables. To go to any STSDAS application package directory, just use the `cd` command in IRAF and specify the name of the package (e.g., `cd fourier`).

![STSDAS Directory Structure Diagram](image)

**Figure 3.1:** Overall STSDAS Directory Structure
Applications Software Directories

Each STSDAS package has a corresponding directory in the host file system that is a subdirectory of the pkg directory; the name of the
subdirectory is the same as the name of the applications package. These package-level directories contain all the run-time files that may be needed by tasks within that package, including parameter files, help files, and a \texttt{mkpkg} file (used for recompiling and relinking the package). For example, suppose there were an STSDAS applications package called \texttt{applpkg}.

The files listed in Table 3.1 are stored in the package level directory (\texttt{applpkg} in this example):

<table>
<thead>
<tr>
<th>File</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>*.cl</td>
<td>CL scripts. There is one that defines the package, and one for each of the logical tasks within the package.</td>
</tr>
<tr>
<td>*.par</td>
<td>Parameter files for the logical programs in the package. Generally, there will be one for each source-level subdirectory.</td>
</tr>
<tr>
<td>*.hd</td>
<td>The help data base index for this package (one per package).</td>
</tr>
<tr>
<td>*.men</td>
<td>The help menu file for this package (one per package).</td>
</tr>
<tr>
<td>*.hlp</td>
<td>Help text file for this package as a whole.</td>
</tr>
</tbody>
</table>

Table 3.1: Files in Package Level Directory of an Application

File names given here are in the syntax of IRAF’s virtual filename mapping. To avoid confusion, we recommend that you always view the contents of the STSDAS system while running the IRAF CL and using the \texttt{cd} command to change directories.

Beneath most applications package directories are subdirectories that contain the source code for the various tasks within that package. Each major task resides in its own directory. Once STSDAS has been installed (recompiled and relinked), the source code can be removed to conserve disk space (see “Saving Space” on page 33 for instructions).
Help text files for each of the logical tasks in the package are contained in the doc subdirectory of the package.

The executable images of the packages are located in `stsdas$bin` as `x_pkg.e`.

A complete directory tree for STSDAS is shown in Figure 3.3.
Support Software Directories

The applications directories described above contain the run-time connections to IRAF and the source code for the STSDAS applications. There are a number of other directories needed to support STSDAS. Most important is the subdirectory structure in which all STSDAS I/O and utility software is stored; this structure is rooted in the `lib` subdirectory of STSDAS (`stsdas$lib/`). This subdirectory contains several libraries, and for each of these there is a related subdirectory in which the corresponding source code resides.

* - Available at STScI
- - Implicitly Loaded

Figure 3.3: STSDAS Version 3.3 Organization
### Directory Structure

<table>
<thead>
<tr>
<th>Directory</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>applib</td>
<td>Applications subroutines</td>
</tr>
<tr>
<td>cvos</td>
<td>C programming interface</td>
</tr>
<tr>
<td>f77util</td>
<td>F77VOS utilities</td>
</tr>
<tr>
<td>hstio</td>
<td>HST data file I/O C interface</td>
</tr>
<tr>
<td>iraf77</td>
<td>F77VOS interface</td>
</tr>
<tr>
<td>stalone</td>
<td>F77 stand-alone interface</td>
</tr>
<tr>
<td>synphot</td>
<td>Synthetic photometry interface</td>
</tr>
</tbody>
</table>

*Table 3.3: STSDAS I/O and Utility Libraries*

In addition, several utility libraries for tables I/O are used by STSDAS that are in the TABLES package, these are listed in Table 3.4.

<table>
<thead>
<tr>
<th>Library</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>display</td>
<td>Terminal display routines</td>
</tr>
<tr>
<td>gflib</td>
<td>Front end to gilib</td>
</tr>
<tr>
<td>gilib</td>
<td>STSDAS IEEE and GEIS format subroutines</td>
</tr>
<tr>
<td>tbtables</td>
<td>STSDAS tables I/O subroutines</td>
</tr>
<tr>
<td>uttables</td>
<td>STSDAS table utilities</td>
</tr>
<tr>
<td>stxtools</td>
<td>STSDAS special applications tools</td>
</tr>
</tbody>
</table>

*Table 3.4: TABLES I/O and Utility Libraries*

### Exported Data Directories

A few data files have been sent along with the STSDAS installation, and these are found in the `stsdas$data/` directory tree. The directory `stsdas$data/fits` contains these files with the extension `.fits`. Chapter 2 describes how this data is to be read and installed into the `scidata` directory. After the STSDAS package has been loaded, this area can be referred to with IRAF environment variable `scidata`.
Sample calibration and image files for each of the major instruments on HST can be retrieved from the archive (http://archive.stsci.edu).

STSDAS and IRAF System Directory

The STSDAS directory contains files that establish the entire STSDAS package structure in the IRAF environment (Table 3.5).

<table>
<thead>
<tr>
<th>File</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>stsdas.cl</td>
<td>Primary CL script that defines all STSDAS packages</td>
</tr>
<tr>
<td>stsdas.hd</td>
<td>Primary help data base index for all STSDAS help files</td>
</tr>
<tr>
<td>stsdas.men</td>
<td>The help menu file for the STSDAS package itself</td>
</tr>
<tr>
<td>stsdas.hlp</td>
<td>Highest-level help file for STSDAS (as a whole)</td>
</tr>
</tbody>
</table>

Table 3.5: Files Establishing STSDAS Package Structure

In addition, the directory stsdas$lib contains the file mkpkg.inc. This file contains the macro definitions for the IRAF mkpkg facility and is used when mkpkg compiles or links STSDAS programs.

Rebuilding STSDAS Applications

STSDAS applications are structured so that they can be rebuilt piecewise or as a whole using the mkpkg utility provided with IRAF. Users who wish to rebuild IRAF/STSDAS applications should familiarize themselves with specifics about the use of mkpkg as described in the IRAF help documentation for mkpkg. There are mkpkg files in various directories at three levels within the STSDAS applications hierarchy: Each applications program directory contains a mkpkg file that will rebuild that particular library and relink the package executable image. These directories are fourth-level nodes, i.e., stsdas$pkg/*/*/*.

Each STSDAS package directory has a mkpkg file that will rebuild all the libraries in the package and relink the package executable image. Package directories are third-level nodes, i.e., stsdas$pkg/*/*.

- There is a mkpkg file in the directory stsdas that will rebuild the entire STSDAS system. This is a first-level node, i.e., stsdas/.
When rebuilding an STSDAS task or package, \texttt{mkpkg} must be told to use the appropriate environment variables and libraries. Therefore it is necessary to run the task \texttt{mkpkg} with the command:

```
click> mkpkg -p stsdas
```
when making the entire STSDAS system from the \texttt{stsdas/} directory; or the command

```
click> mkpkg -p stsdas update
```
when making a single package or application program.

Package executables are rebuilt on a time scale that is typically several minutes, although this can vary widely. STSDAS \texttt{mkpkg} files can either perform compilation and linking or just a relink (by typing \texttt{linkonly} at the end of the \texttt{mkpkg} command). Some programs contain a large number of subroutines; others contain few.

Recompilation and relink of the entire system is a lengthy process. It is strongly recommended that an entire system recompilation and relink be done as a batch job running over the weekend.

---

**Saving Space**

As with IRAF, a mechanism exists to remove the source files and other files not needed to actually run STSDAS. This procedure should only be used if disk space is a problem, you will not be doing any development using STSDAS, and you have an alternative method for getting revised object libraries and executables when system patches are made.

To remove all but the essential files, you need to run the \texttt{mkpkg strip} command from the top level of \texttt{stsdas}.

```
click> cd stsdas
click> mkpkg strip -p stsdas
```
Index

A
AIX 22
apropos 17

C
CD-ROM
gasp 12

D
data
exported in STSDAS 31
directory
structure of STSDAS 25
stsdas 13
TABLES 2
disk space
saving 33

E
errors
memory 12
extern.pkg file 14

F
file names
common 29
syntax 28
files
in packages 28
removing source 33
FITS files
reading 20

G
graphics kernel
psikern 18

H
help
user support vi
help database 3, 14, 17
hlib$extern.pkg 14
hlib$extern.pkg file 14
HotSeat vi

I
I/O and utility libraries
STSDAS 31
TABLES 31
installation
Psikern 18
STSDAS 12
TABLES package 1

L
libraries
I/O and utilities, STSDAS 31

M
Macintosh 22
memory
minimums for calibration
routines 12
mkpkg 32

P
packages 27
PostScript
psikern 18
psikern installation 18

R
rebuild
package 32
rebuilding system 20

S
source code
   STSDAS 15
source files
   removing 33
STSDAS
   Administrator, contacting vi
   installation 12
   rebuilding 21, 32
   structure 25, 30
   testing 19
synphot
   throughput tables 20
synthetic photometry files 37

T
TABLES
   I/O and utility libraries 31
   installation 1
TABLES package
   STSDAS links 12
testing
   STSDAS installation 19

U
user support vi
utility and I/O libraries
   STSDAS 31
utility and I/O libraries
   TABLES 31

V
virtual file names 28
Appendix 1

Synphot Data Set

Setting the Top Directory

The synphot tasks assume that all the synphot reference files are stored under a single top level directory. This directory is referred to inside STSDAS by the logical name `crrefer`. This directory may be anywhere you have sufficient space to install the reference files (approximately 400 megabytes is required for the full installation), but we recommend that it not be placed as subdirectory of the STSDAS or TABLES source code. This will make it easier to update STSDAS without needing to reinstall the Synphot data. Once the top directory is created, the environment variable `crrefer` should be set in your `hlib$extern.pkg` file. To set `crrefer` add a command similar to the following to the file:

```
set crrefer = "/your/path/name/to/refer/
```

The trailing slash is important, so do not omit it.

The Synphot data can be downloaded from our anonymous ftp at:

```
http://www.stsci.edu/ftp/software/stsdas/refdata/synphot/
```

If you do not have access to anonymous ftp, you can contact us at help@stsci.edu, and ask for the necessary files. There are four compressed tar files containing the data and this installation guide. The first tar file contains the Synphot component throughput tables, the second contains various observed and modelled spectral catalogs, the third
contains the 1993 Kurucz model stellar spectra, and the fourth contains the HST calibration standard spectra.

First, place the compressed tar files in the top level directory you created in the first section. Then, uncompress and untar the tar files. On a Unix system, the following commands will accomplish this.

```
% uncompress synphot1.tar.Z
% tar -xvf synphot1.tar

% uncompress synphot2.tar.Z
% tar -xvf synphot2.tar

% uncompress synphot3.tar.Z
% tar -xvf synphot3.tar

% uncompress synphot4.tar.Z
% tar -xvf synphot4.tar
```

The tar file `synphotpsf.tar.Z` contains the psf images used with the simulators package of synphot. If you are not planning to use this package, you do not need to install it. The tar file should be copied to the `stsdas$data/scidata` directory of stsdas, uncompressed, and untarred.

Type the following commands when in stsdas:

```
cl> copy /your/path/to/synphotpsf.tar.Z scidata$
cl> cd scidata$
cl> !uncompress synphotpsf.tar.Z
cl> rtar -xvf synphotpsf.tar
```
When Disaster Strikes

If you encounter problems installing the Synphot data files, we encourage you to contact us via the STSDAS help desk

help@stsci.edu