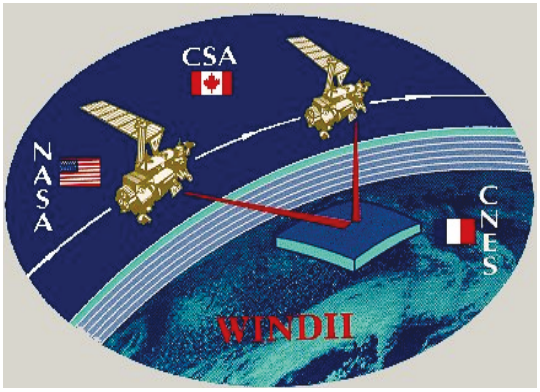
WINDII Unix Processing Software

User's Guide



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1. INTRODUCTION

1.1 Purpose

This User's Guide is intended to give a prospective user a general overview of how to run the various programs and utilities involved in processing WINDII Level 0 data through to Level 2 outputs in a stand-alone Unix environment. Previously, the WINDII SDPPS (Science Data Production Processing Software) was run at York University in a RAC (Remote Analysis Computer)-simulated mode on VAX/VMS mainframe computers. In order to facilitate faster data turn-around using more modern systems, the elements of the SDPPS have been ported to operate in a desktop UNIX workstation environment.

1.2 Scope

This document will provide examples of operating procedures for the new UNIX-based software. However, the vast bulk of the overall software architecture, data formatting, and scientific analysis rationale remains unchanged, and is described in detail in other documents. Only aspects which have been changed to accommodate the shift to UNIX will be dealt with in detail in this document.

The UNIX implementation of the SDPPS software exists in 3 segments:

1. WOADEP: "**W**indii **O**rbit/**A**ttitude **D**ata **E**xtraction **P**rogram"
   - An IDL program which converts raw UARS orbit/attitude data files to a file format compatible with subequent processing steps. The IDL program spawns jobs to execute the FORTRAN program "OA_EXTRACT" on the VAX mainframe, and then invokes a local FORTRAN program to convert the results to a preferred indexed binary format in the Unix environment.

2. JOBIT: "**JOB**stream **I**ni**T**ialisation Software"
   - An IDL program which allows the user to tailor the jobstream file for Level 1 and Level 2 data processing. The program provides a GUI interface to allow the user to specify the many different program and file parameter inputs to the processing job. JOBIT also provides some simple data file conversion utilities, and has the capability of invoking the SDPPS programs to run completed jobstreams.

3. WINSLIN: "**WIN**dii **S**dpps for **LIN**ux"
   - The FORTRAN programs and associated libraries derived from the original WINDII SDPPS for Level 1 and Level 2 data processing.

2 WOADEP: WINDII Orbit/Attitude Data Extraction Program

2.1 Introduction

Because the raw UARS/WINDII orbit/attitude data files were originally stored in a binary format exclusive to the VAX environment at spacecraft intervals, an auxiliary utility called "OA_EXTRACT" had been written previously in VAX FORTRAN to translate the raw orbit/attitude data into a single platform-independent file format for specified WINDII image times.

WOADEP was written using IDL, but it actually operates mostly as a front-end for spawning processes which are performed using other programs. There are 3 main processing elements involved in WOADEP:

1. WOADEP user interface – allows selection of UARS raw data files to process, and allows interactive specification of file paths and inspection of output files.

2. OA_EXTRACT – FORTRAN program implemented on VAX machine. The WOADEP interface spawns jobs on the VAX machine which execute the OA_EXTRACT program to extract orbit/attitude data.

3. OA_EXTRACT_ASC2BIN – FORTRAN utility implemented on Unix machine. The WOADEP interface automatically invokes this program to convert the ascii output of OA_EXTRACT into a special binary orbit/attitude data file for use in further WINDII Level 1 and Level 2 processing.

2.2 WOADEP Execution Summary

The basic operations of the WOADEP program can be summarised as follows:

STEP 1: WOADEP selects WINDII_L0_Dnnnn level 0 data file from .zip archive on CD/DVD-ROM and extracts the image times from the data set into an IMAGE_TIMES_Dnnnn ascii file.**

STEP 2: For each selected day with image times, WOADEP copies the files IMAGE_TIMES_Dnnnn, ATTITUDE_SEXTRSC_Dnnnn, and ORBIT_SDEFINITIVE_Dnnnn and the ephemeris file SLPEPHEM_D0001 to a specified VAX working directory.

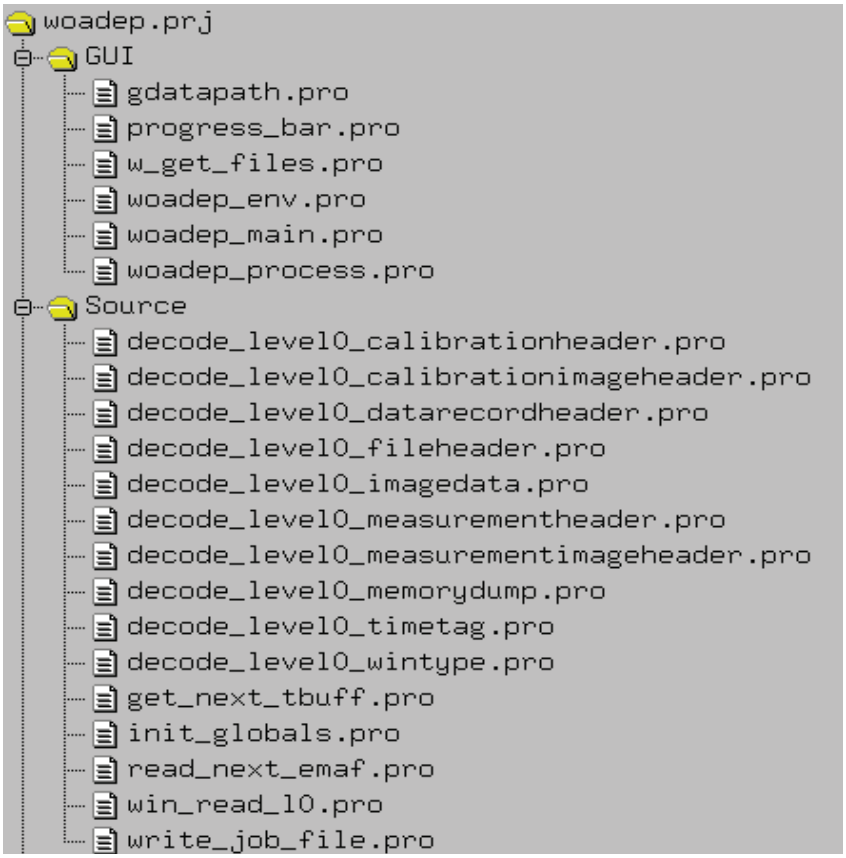
STEP 3: WOADEP creates a job file and spawns a process on the VAX machine to run the OA_EXTRACT program to determine the orbit and attitude data for each image time, using the original WINDII orbit/attitude routines. The results are written to an ascii file OA_EXTRACT_Dnnnn.

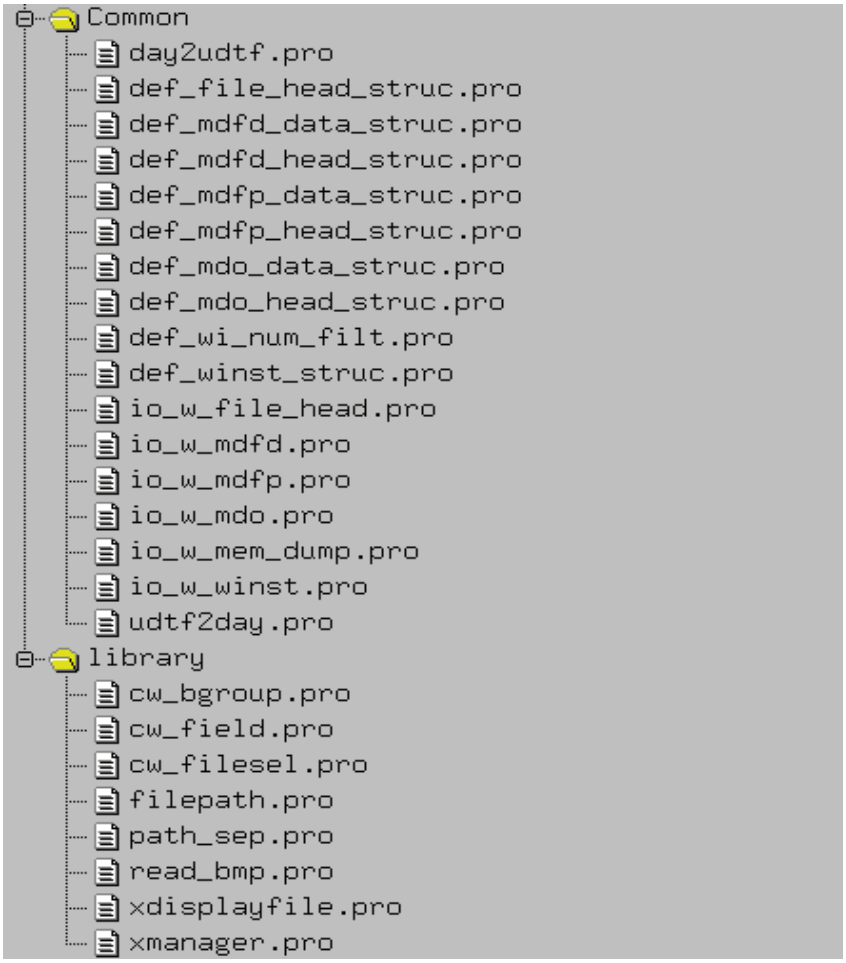
STEP 4: WOADEP copies the OA_EXTRACT_Dnnnn data file back to the Unix machine and then runs it through the OA_EXTRACT_ASC2BIN utility to convert the ascii data into an indexed binary file format. The resulting file is called OA_EXTRACT_B_Dnnnn and becomes an input to the Level 1 and Level 2 data processing programs described in Section 3.

**NB: During STEP 1, as WOADEP extracts the image times file, it may also produce versions of the following files: A_MEMORY_Dnnnn, T1MDFD_Dnnnn, T1MDFP_Dnnnn, T1MDO_Dnnnn, however these files are not used and can be discarded. (They will be reproduced during Level 1 data processing as described in Section 3.)

2.3 Running WOADEP

WOADEP currently exists as a set of routines collected in an IDL project called "woadep.prj".

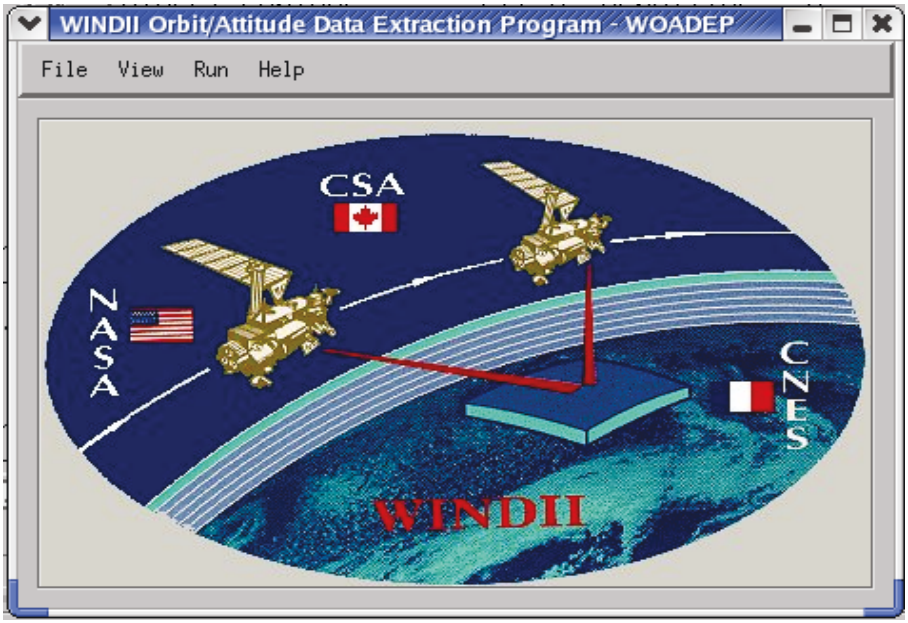




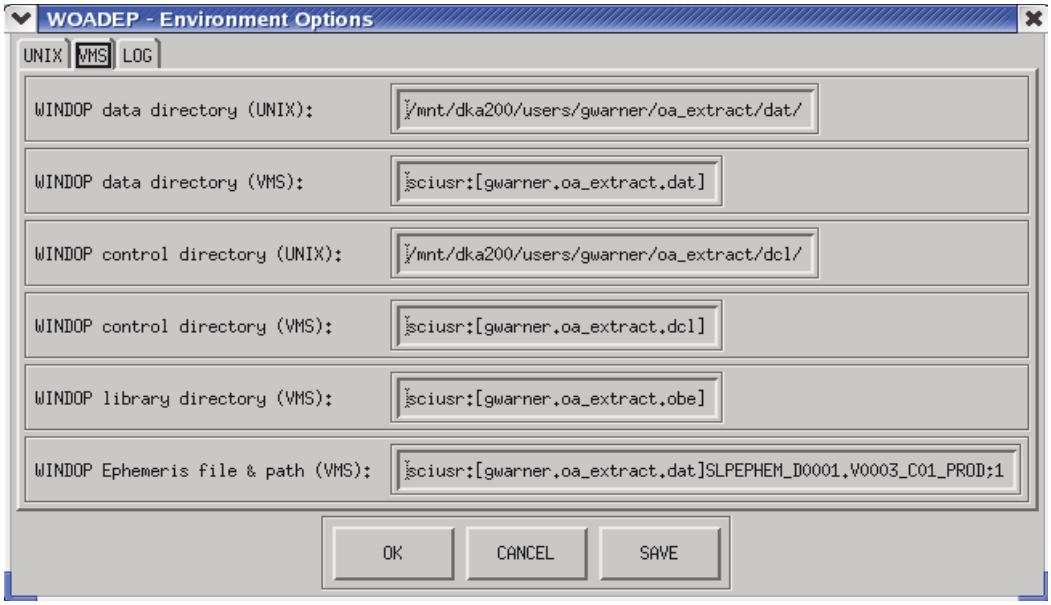
Most of the new code in WOADEP is in the "GUI" portion of the project, which manages the user interface and spawns processes. The code in the "SOURCE" and "COMMON" sections was adapted from previous IDL applications based on the WINDII SDPPS software, and contains the definitions for the Level 0 and Level 1 data files which are accessed and produced by WOADEP. The "LIBRARY" routines are just local copies of some IDL routines and graphical widgets which are used by WOADEP and are easier to keep track of by including them in the project than by trusting IDL to find them through its own paths.

Once the WOADEP code has been compiled, the "woadep_main" routine should be run to launch the program. This will display the program title page and main menu options bar.

There are four main menu options. Currently there is no "Help" available, and initially upon program launch, the "View" options are unavailable. For a typical data processing run, the user should perform the following steps:



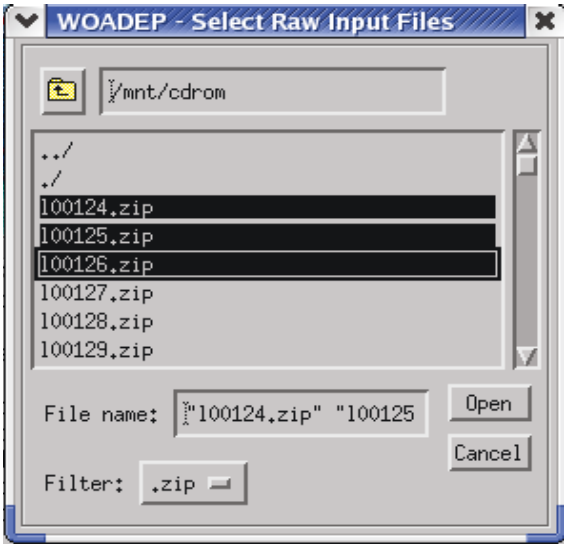
STEP 1: **Click "Run" - "Set Environment Options" to specify the various file path names**. This displays the Environment Options tabs. Note that the paths for the VAX/VMS machine (WINDOP) must be entered in two formats, one as the paths would appear to a UNIX machine which has WINDOP mounted locally, and one in the VMS path syntax. On the third tab, the user can choose to have program status messages displayed to the screen, or written to a data file. **Click "OK" when finished**.



Note: After entering paths, you can choose to "SAVE" them to the woadep.cfg file by clicking the "SAVE" button. By default, WOADEP will check to see if this .cfg file exists in the WOADEP directory before setting defaults. If it is found, it will load the defaults from file when the program starts.

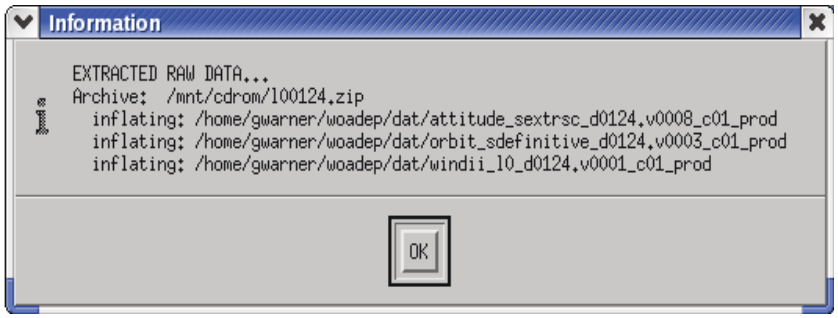
STEP 2: **Click the "File" - "Open" main menu option to select a set of archived WINDII data**. This data is assumed to be archived on a locally mounted CD-ROM

device. The user can select one or multiple days, using normal x-windows keystrokes. Click "Open" when the data has been selected.



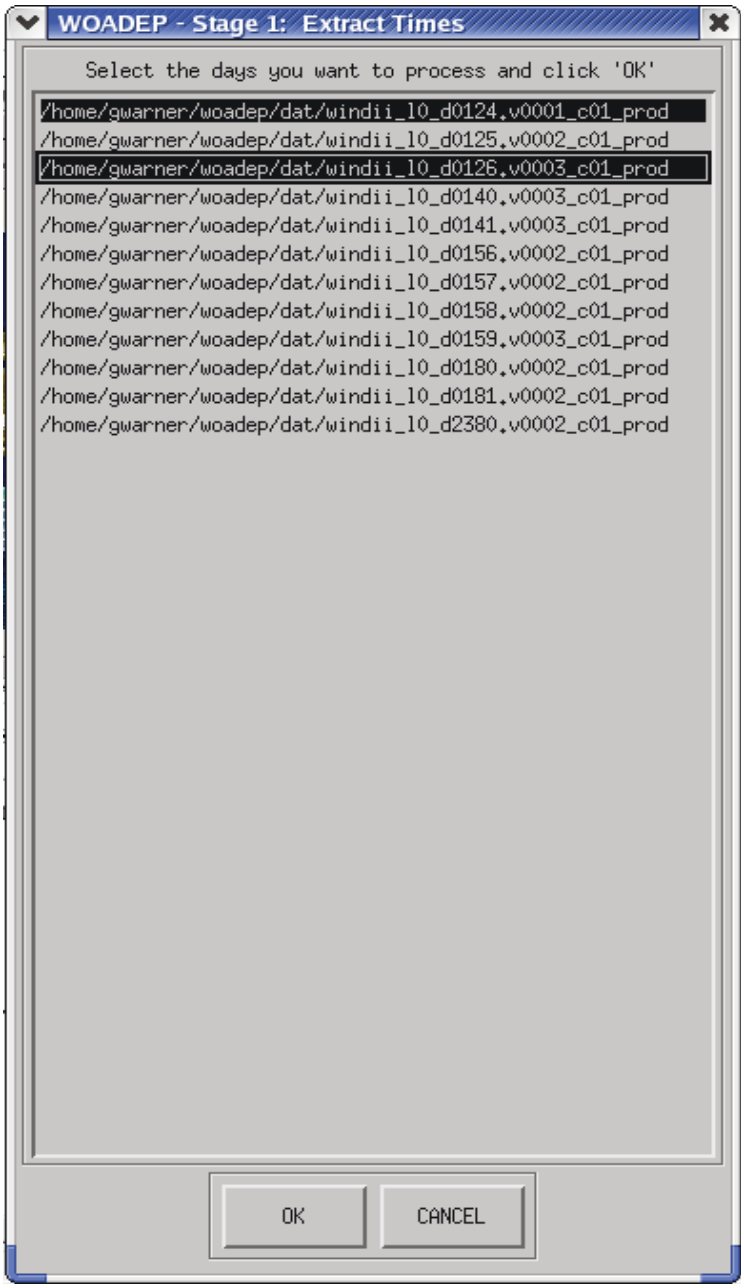
For each WINDII day selected, the Level 0 data and orbit/attitude data will be extracted from the archive and written into a specified directory. **The user will be prompted to enter the target path.**

The program will display summary messages for each archive extracted. (The extraction will take a few seconds for each day).

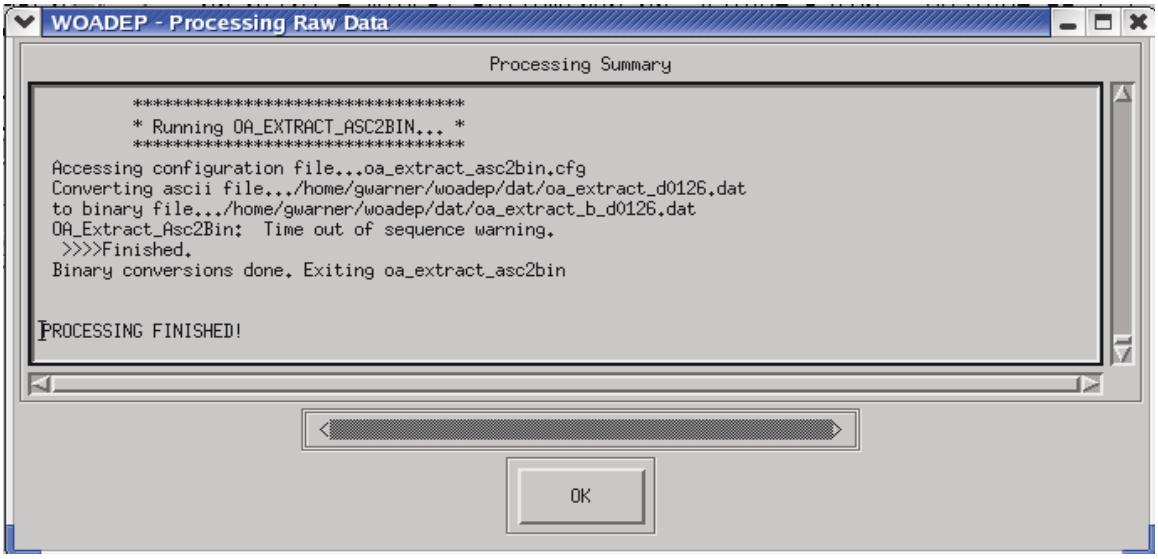


STEP 3: **Click the "Run" - "Submit Job" - "Interactive" main menu option to launch the process of extracting image times and creating a corresponding binary orbit/attitude data file**. This will begin the process of copying specified files to the VAX environment, running OA_EXTRACT on them, copying them back to the UNIX

environment, and then converting them to binary format. It may take a few minutes to run. **The user must first choose which days to process** (this can be any of the recently extracted data, or any other days for which the raw data exists in the currently selected data directory). Click "OK" after choosing day(s).



A scrolling summary window will be opened showing the active status of the processing operation. The amount of summary information displayed will depend on whether the user chose to write to screen or file in the "Environment Options", and as each set of data is produced, path name verification may be requested for the output files.



When the processing is completed, the "OK" button on the processing window will be enabled and should be pressed to terminate the operation. The resulting OA_EXTRACT_B_Dnnnn.DAT data file will be needed by the WINSLIN Level 1 and Level 2 programs described in Section 3 of this guide.

**NB: Once a set of data has been fully processed, the WOADEP program will allow the user to view the log, job, or output data files in a window on the screen using main menu "View" options.

2.4 OA_EXTRACT_B_Dnnnn Data Format

The final stage in the WOADEP process described above involves converting the OA_EXTRACTed orbit/attitude data file OA_EXTRACT_Dnnnn.DAT from the ascii image format written by the OA_EXTRACT program to an indexed binary format which can be quickly accessed by programs in the WINSLIN group during Level 1 and Level 2 processing. This conversion is done by the FORTRAN utility program OA_EXTRACT_ASC2BIN. It is automatically run during the WOADEP process described above, but it could be run separately from the UNIX command line if desired.

OA_EXTRACT_ASC2BIN reads a list of filenames from a local file named "oa_extract_asc2bin.cfg", and will convert the orbit/attitude data contained in the listed files into the required binary format.

For example, the first entry of the file OA_EXTRACT_D0126.DAT reads:

```
    19620
     92015              0
0.4080351E+00     -0.8376222E+00     -0.3631753E+00      0.1471430E+09
```

```
 0.6761399E+00       0.6435180E+00       0.3587749E+00       0.3762762E+06
 0.1231321E+00      -0.9074183E+00      -0.4017842E+00       0.1944451E+09
-0.2178502E+00      -0.9064174E+00      -0.3618683E+00       0.1806215E+09
 0.7249735E-01      -0.9108123E+00      -0.4064050E+00       0.3531399E+09
-0.9622780E+00       0.2402502E+00       0.1276746E+00       0.7045400E+09
 0.6082222E+00      -0.7240656E+00      -0.3252611E+00       0.1628787E+10
 0.2506244E+00      -0.8856142E+00      -0.3909922E+00       0.3063947E+10
 0.2881109E+00      -0.8835609E+00      -0.3692050E+00       0.4662992E+10
-0.2462903E+03

     92015          476227
-0.1674573E+04      -0.5268236E+04       0.4212329E+04
 0.3930413E+01      -0.4767380E+01      -0.4384617E+01
-0.8617992E-02      -0.5429832E-01      -0.1134153E-01
 0.2417914E-04      -0.6251974E-01       0.2351213E-03
 0.5187180E+00      -0.8200979E+00       0.2416005E+00
-0.6290625E+00      -0.1747391E+00       0.7574605E+00
-0.5789747E+00      -0.5448903E+00      -0.6065332E+00
 0.4081246E+00      -0.8375856E+00      -0.3631594E+00       0.1471430E+09
 0.6751775E+00       0.6443673E+00       0.3590628E+00       0.3762416E+06
-0.2443005E+03
```

The first record represents the planetary ephemerii for the day for solar system objects, while the subsequent records provide the orbit/attitude information and Sun/Moon ephemeris for each WINDII image time. Thus the above numerical data represents:

```
   TTL # of Entries in file
    Day/Yr        Time (Milliseconds)
Sun ECI_X           Sun ECI_Y           Sun ECI_Z           Sun_Dist
Moon ECI_X          Moon ECI_Y          Moon ECI_Z          Moon_Dist
Mercury ECI_X       Mercury ECI_Y       Mercury ECI_Z       Mercury_Dist
Venus ECI_X         Venus ECI_Y         Venus ECI_Z         Venus_Dist
Mars ECI_X          Mars ECI_Y          Mars ECI_Z          Mars_Dist
Jupiter ECI_X       Jupiter ECI_Y       Jupiter ECI_Z       Jupiter_Dist
Saturn ECI_X        Saturn ECI_Y        Saturn ECI_Z        Saturn_Dist
Uranus ECI_X        Uranus ECI_Y        Uranus ECI_Z        Uranus_Dist
Neptune ECI_X       Neptune ECI_Y       Neptune ECI_Z       Neptune_Dist
Greenwich Sidereal Time

   Day/Yr         Image Time (Msec)
SAT POS X           SAT POS Y           SAT POS Z
SAT VEL X           SAT VEL Y           SAT VEL Z
ATT_YPR_1           ATT_YPR_2           ATT_YPR_3
YPR_RATE_1          YPR_RATE_2          YPR_RATE_3
OMF_ECI Transform   OMF_ECI Transform   OMF_ECI Transform
OMF_ECI Transform   OMF_ECI Transform   OMF_ECI Transform
OMF_ECI Transform   OMF_ECI Transform   OMF_ECI Transform
Sun ECI_X           Sun ECI_Y           Sun ECI_Z           Sun_Dist
Moon ECI_X          Moon ECI_Y          Moon ECI_Z          Moon_Dist
Greenwich Sidereal Time
```

The binary output file OA_EXTRACT_B_D0126.DAT produced from this ascii file is then created by OA_EXTRACT_ASC2BIN to contain the same data in the following format:

- two 128-byte header records (including planetary ephemerii),
- followed by 1350 128-byte records which contain a lookup key for entry

into the binary file,
- followed by “n” 128-byte records of orbit/attitude data.

The lookup key is an array of 86400 2-byte integers (1 for each second in a day). The values stored in the array are the image record numbers to select for a given second in the day. (This limits the number of allowable image times in the file to 32768). This way, when Level 1 or Level 2 processing programs require orbit/attitude information for a given image, they can quickly jump to the required data using the lookup key, without performing any searches.

Some additional file format notes:

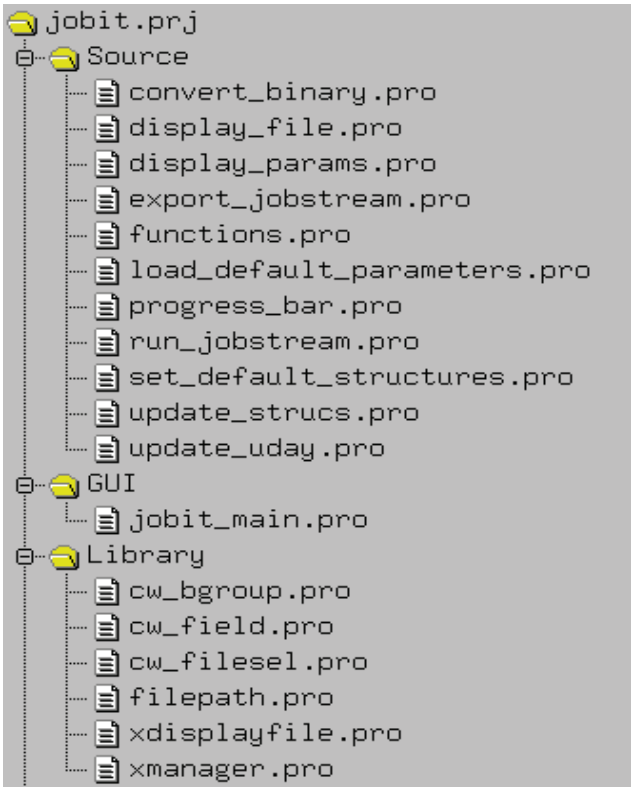
- On rare occasions there are 2 images in the same second. In such cases, the stored lookup key record number will be negative. When such a record number is encountered an image with time fraction below 0.5sec will be found at ABS(rec #). An image with time fraction > 0.5 will be at ABS(rec # + 1).
- For some seconds in the day, there are no corresponding images, and the record entries for those seconds are just written as copies of the record of the second for which the last image occurred. (This is essentially padding in the file, as the only seconds which will ever be accessed by other programs are those which correspond exactly to specific image times).

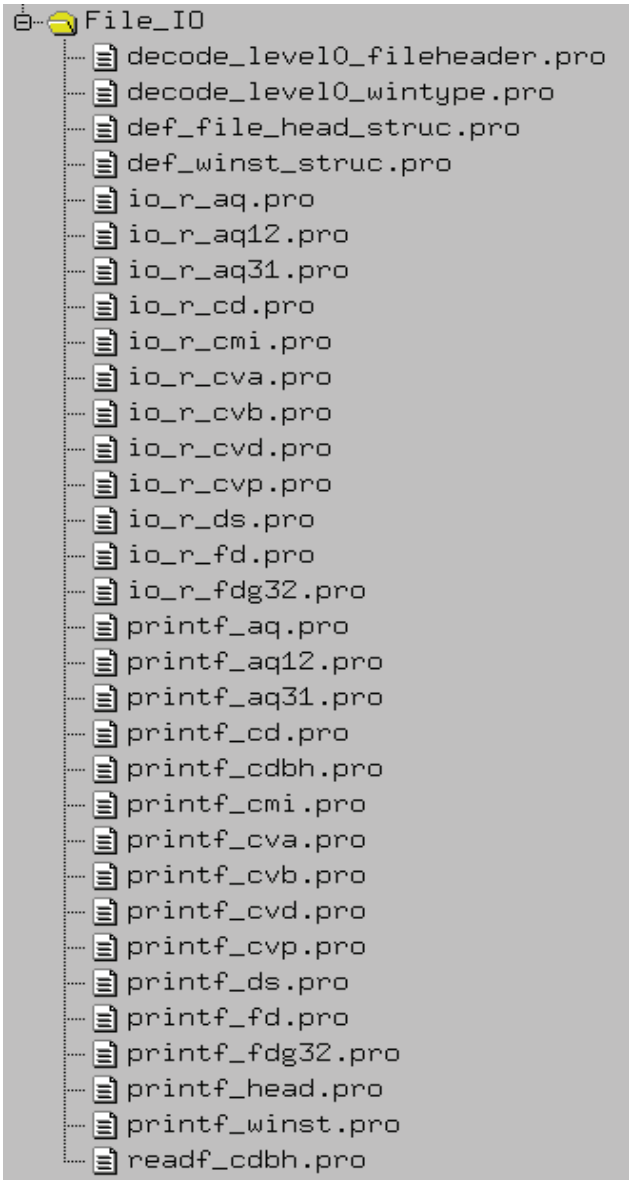
3 JOBIT: Jobstream Initialisation Software

3.1 Introduction

JOBIT was originally intended to be a cute, furry little utility which would perform the relatively simple task of creating jobstream files for WINDII processing runs, similar to WINTOOL in the previous VAX SDPPS realm. However, over time, the humble JOBIT's capabilities evolved, and it has gained a central, starring role in the epic trilogy of software packages which also includes WOADEP and WINSLIN.

Similar to WOADEP, JOBIT was written as an IDL project consisting of a graphical user interface and various collections of associated processing subroutines. The architecture of the JOBIT project is indicated in the tree structures below. The routine "jobit_main.pro" controls the user interface and is the program which should be run from IDL. The "Source" programs consist of additional processing subroutines, while the "FILE_IO" programs are used to read and display the contents of the various Level 1 & 2 WINDII data files. The "Library" programs are just IDL routines which were added directly to the project for convenience in the build process.





(**NB: When building the JOBIT project in IDL, it is sometimes necessary to explicitly compile the "functions.pro" module separately after building the rest of the project.)

JOBIT's primary function is still to allow users to tailor the specifications for the jobstream files which guide the execution of the WINDII Level 1 and Level 2 processing software programs. These jobstream files contain various parameters and file specifications necessary to run the Level 1&2 processes. JOBIT has tried to maintain a format for its jobstream files similar (but not identical) to the format previously used on the VAX machines, however it is worth mentioning that in the evolution to a UNIX platform independent of the UARS CDHF heritage, many of these file parameters serve no practical function in the process any more.

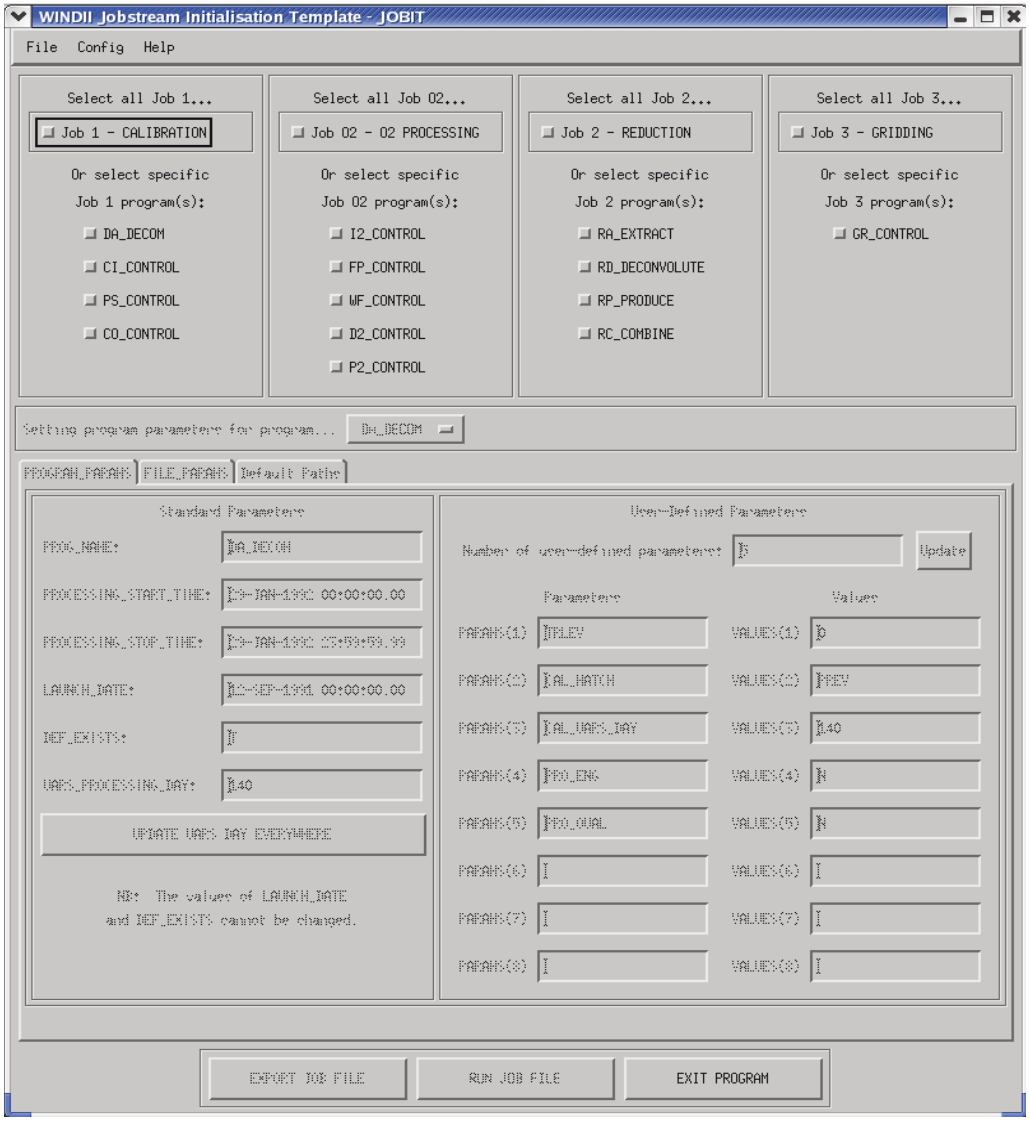
In addition to jobstream specification, JOBIT also now allows users to launch the Level 1 & 2 processing tasks associated with the jobstreams, by directly calling the executable

WINSLIN programs. JOBIT also allows users to open and examine many of the Level 1, 2, and intermediate data files produced during the processing, or to convert them to convenient ASCII formats for examination.

3.2 Creating a Jobstream File

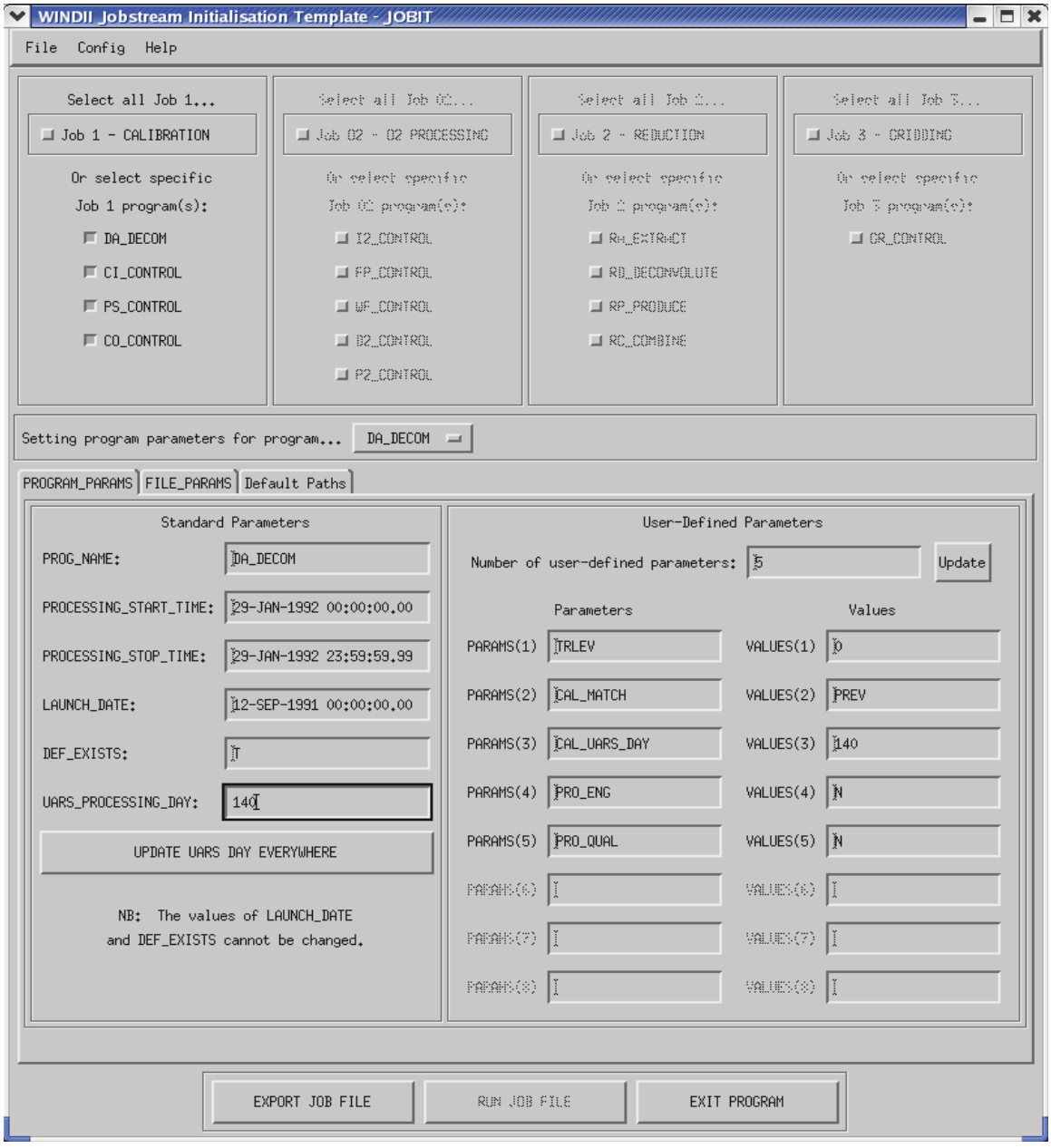
The following procedure describes how to invoke JOBIT and use it to create a jobstream file for a sample Level 1 WINDII data processing run.

STEP 1: **Build the JOBIT project in IDL, then Run the "jobit_main.pro" program**. This will display the JOBIT front page and main menu options.



STEP 2: **Select a job profile**. On the main JOBIT window, only the top section which allows job selections is initially active. The user can select only one job profile, either a complete run of a typical set of programs (e.g. Level 1 – Calibration – normally involves

running all four programs DA_DECOM, CI_CONTROL, PS_CONTROL, and CO_CONROL) or the user can choose some combination of programs within a given job type. (**NOTE:** The O2 and Level 3 jobs are currently not supported!)



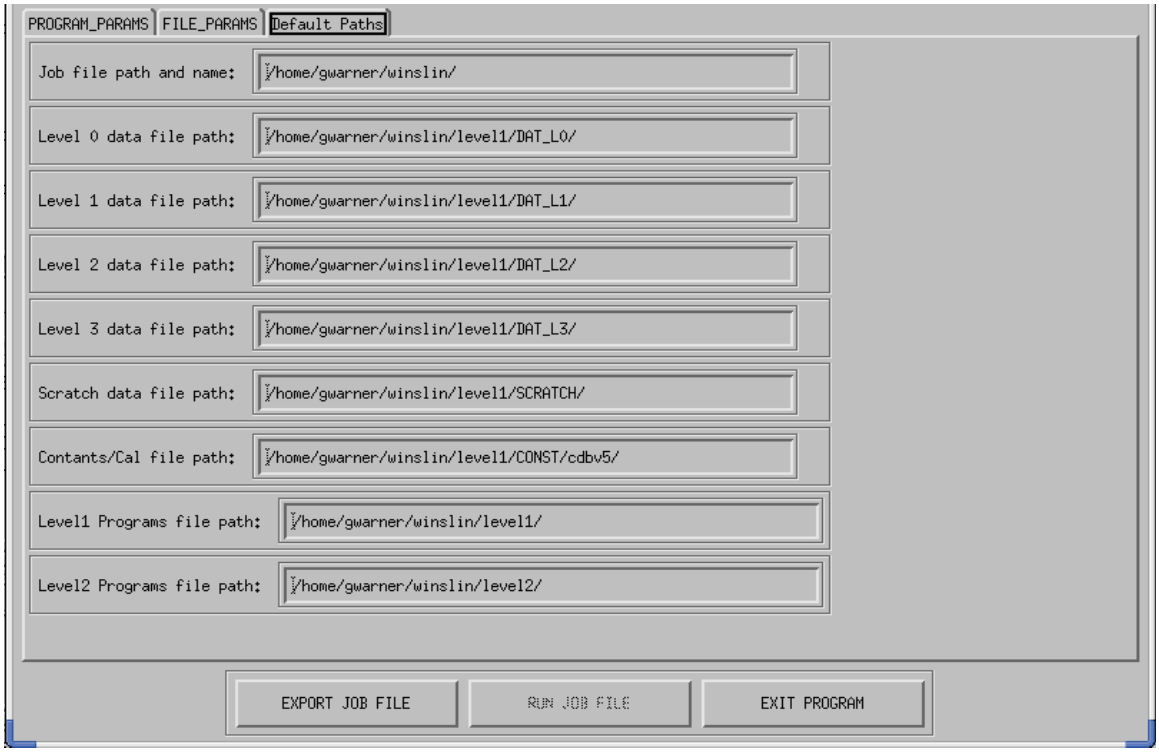
In the above example, the selection of the programs DA_DECOM, CI_CONTROL, PS_CONTROL, and CO_CONTROL has been made. A jobstream file will now be created for this profile. Once the programs have been selected, the parameters section of the window becomes active. Default starting parameters containing typical values for a sample day (Day 140) for each program are initially loaded.

STEP 3: **Set the UARS_PROCESSING_DAY**. This is done by entering the UARS

day number for the data to be processed in the Standard Parameters frame, and clicking the "UPDATE UARS DAY EVERYWHERE" button. This will change the UARS day value in all program parameters and file parameters (including file names) for all programs.

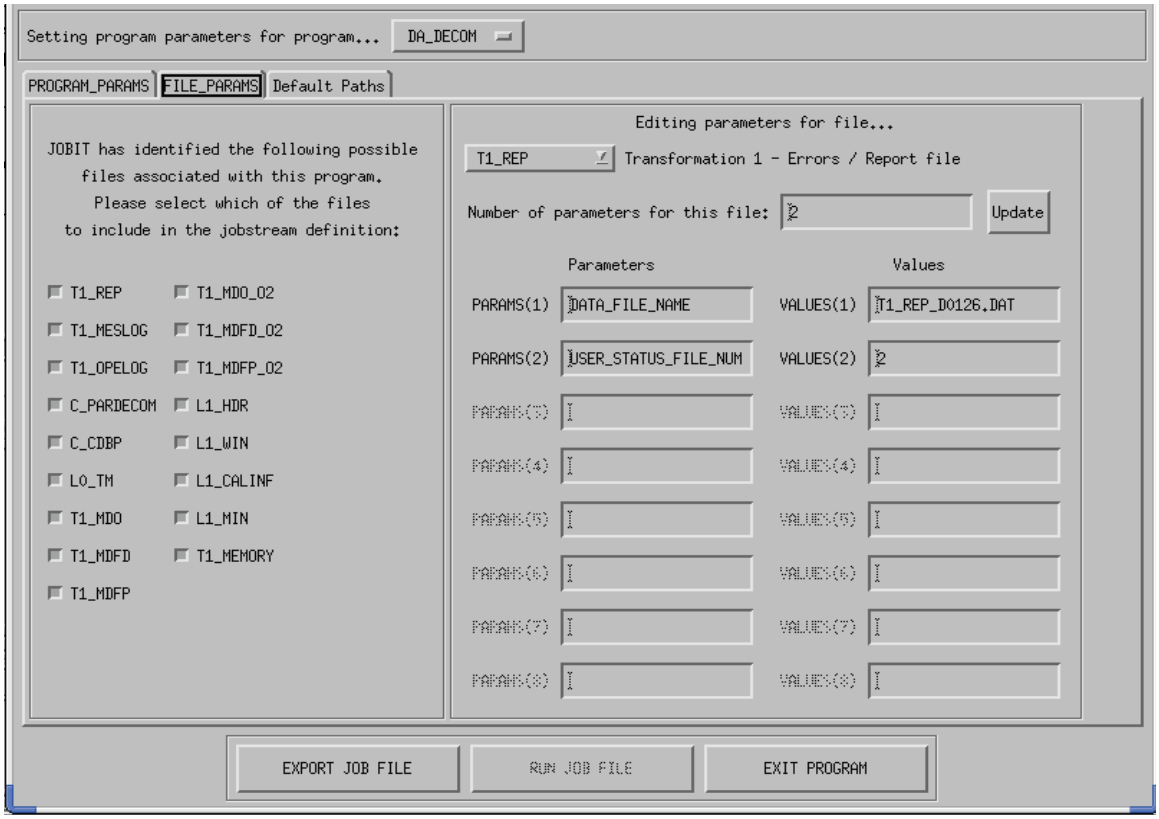
STEP 4: **Set the program parameters for each program**. For most applications, it is not necessary to change any of the standard or user-defined parameters on the PROGRAM_PARAMS tab, after the UARS day has been set. The default values are probably good ones to keep using. In the figure above, the program parameters are initially displayed only for the first program in the profile, DA_DECOM. To view parameters for other files, simply click on the pull-down menu labelled "Setting program parameters for program..." to toggle between the different programs in the profile.

STEP 5: **Set the Default Paths**. This is done by selecting the "Default Paths" tab, and then entering the desired paths in the appropriate text boxes. These paths are of critical importance, as they will become part of the data filenames used for files accessed and produced by the WINDII processing programs. Errors in these path names will cause the programs to crash.



NOTE: The default file path names may be saved to the file "jobit.cfg" by clicking the "Config" - "Write .cfg" option on the main program menu. If this is done, then whatever path names are currently set on the "Default Paths" tab will be saved to the file "jobit.cfg". On subsequent runs, JOBIT will automatically check for the existence of the config file in its local directory, and load default path names from the file. If the "jobit.cfg" file is not found, the program will use internal defaults.

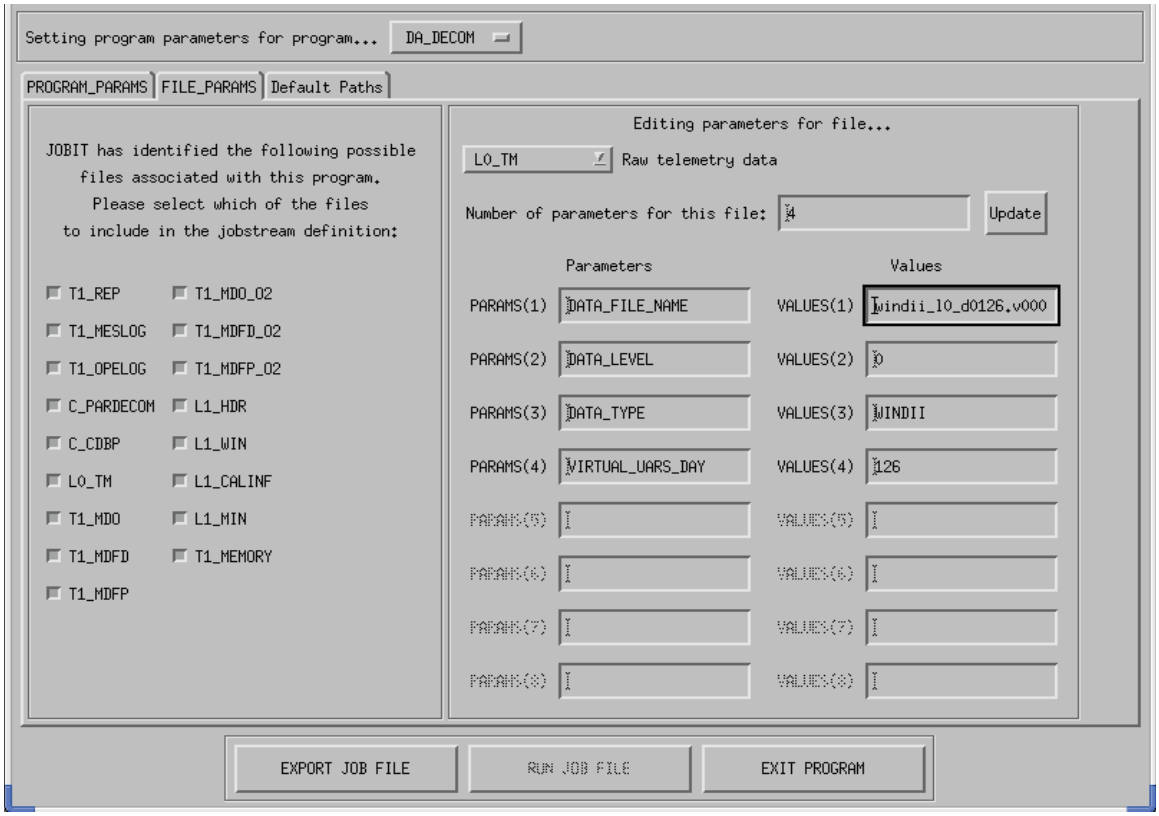
STEP 6: **Make any desired changes to the File Parameters**. Click on the "FILE_PARAMS" tab, and again use the pull-down menu to toggle between different programs in the jobstream profile. Each program needs to have a fully defined set of the various input and output files it will access. By default, JOBIT assumes the standard files that the individual programs require, and sets typical file parameters for each one. For most applications, the user would be wise to accept the JOBIT defaults. JOBIT does allow the user to select or de-select files from the list of those to be used by each program, and it does allow the user to change or add file parameters for any file. However, the WINSLIN/SDPPS programs which will be using these files are relatively inflexible, and any changes to the supplied file lists should be made cautiously, as the programs are not likely to function properly with key input, output, or auxiliary files omitted from the jobstream.



On the left of the screen, the recommended list of files are listed with check boxes. Unchecking the boxes will remove the files from inclusion in the jobstream.

On the right of the screen are the specific parameters for each file. Up to 8 parameters are allowed for each file. In the example above, the file "T1_REP", the temporary Level 1 Report File for the program DA_DECOM is displayed. The program can be changed using the pull-down list labelled "Setting program parameters for program...". The user can toggle between sets of file parameters for each file using the pull-down list below the "Editing parameters for file..." label.

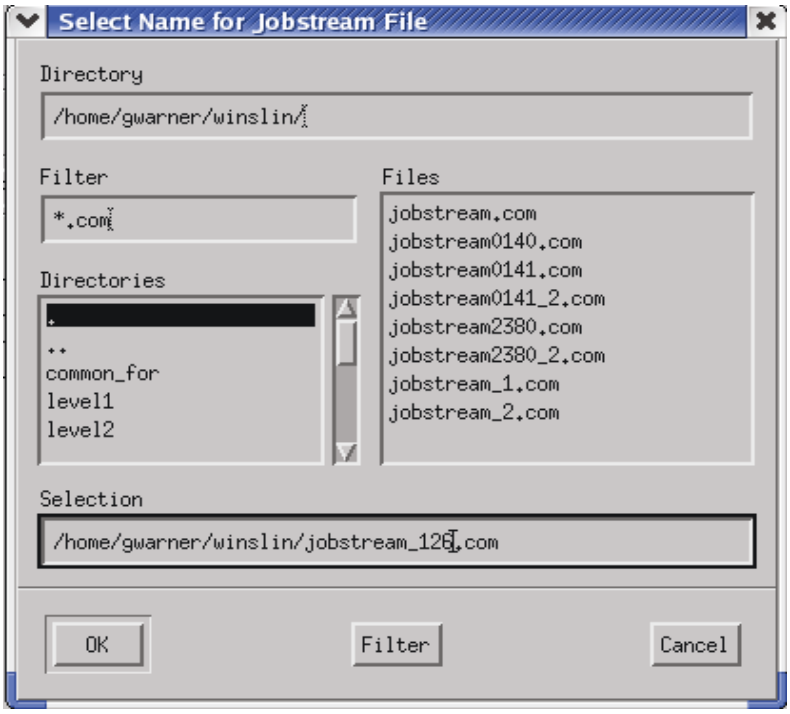
STEP 7: **Double-check the file name for Level 0 Raw Data files, and modify these names if necessary**. Because the raw Level 0 data files have a naming convention which includes a versioning in their extensions, the default file names provided by JOBIT may not correctly capture the version. For example, for program DA_DECOM, display the parameters for the file L0_TM using the pull-down list.

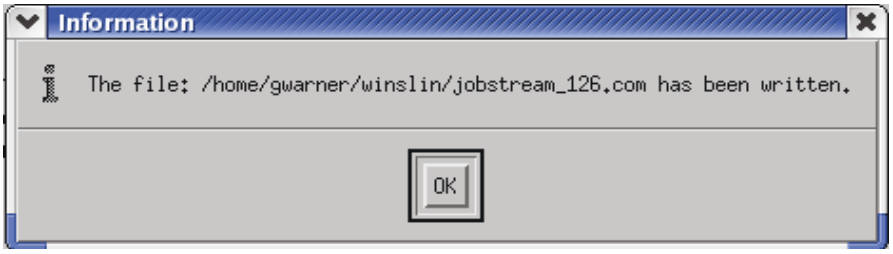


In the "VALUES (1)" text box, corresponding to the DATA_FILE_NAME, you can scroll to the right to reveal that JOBIT has chosen a default file name of "windii_l0_d0126.v0003_c01_prod" as the name of the Level 0 data file. As it happens, this is the correct name for the Day 126 chosen in this example. However, some days have "v0002" or "v0001" in their extensions. JOBIT will always pick "v0003" by default, but the user must manually change the value in the text box if the filename extension for a given day is different.

STEP 8: Click the "EXPORT JOB FILE" button to save all the selected parameters into a jobstream file. JOBIT will automatically prompt the user for the jobstream file name and location, using a standard x-windows interface. At this point, the WINSLIN programs can be executed using the jobstream file produced as an input, as described in Section 4 of this guide.

Sample jobstream files for Level 1 and Level 2 processing are presented in Appendix A.





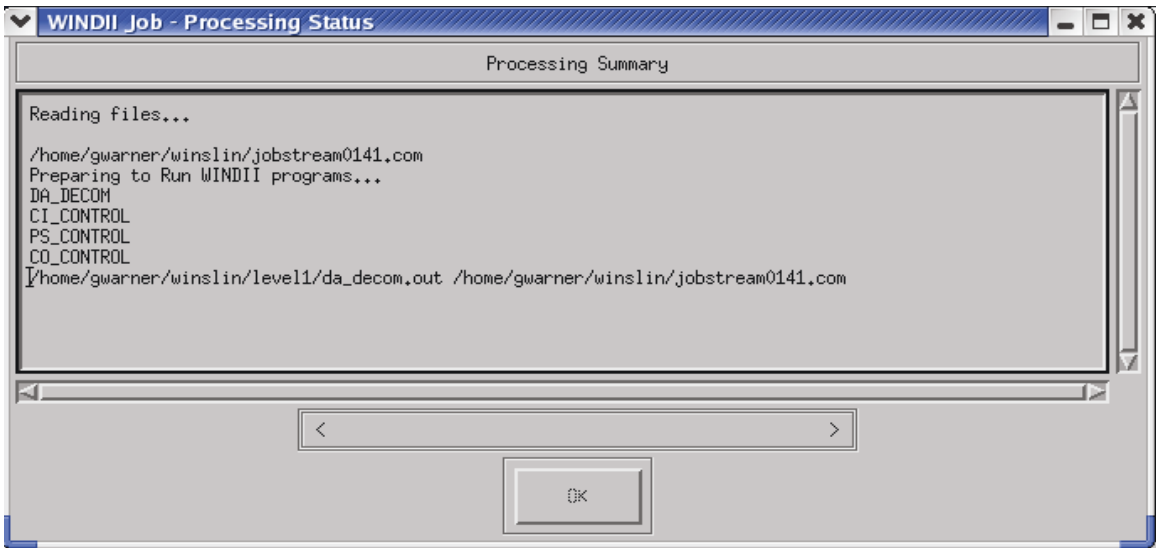
3.3 Using JOBIT to Execute Level 1 WINDII Data Processing

Once a jobstream file has been written by JOBIT, the "RUN JOB FILE" button at the bottom of the main screen will become active, and it is then possible to invoke the WINDII Data Processing programs from within JOBIT. When doing so, the program will prompt the user to select the jobstream filename, and then all programs for which parameters are provided within that jobstream will be executed. A display window will indicate the progress and status of the programs as they execute.

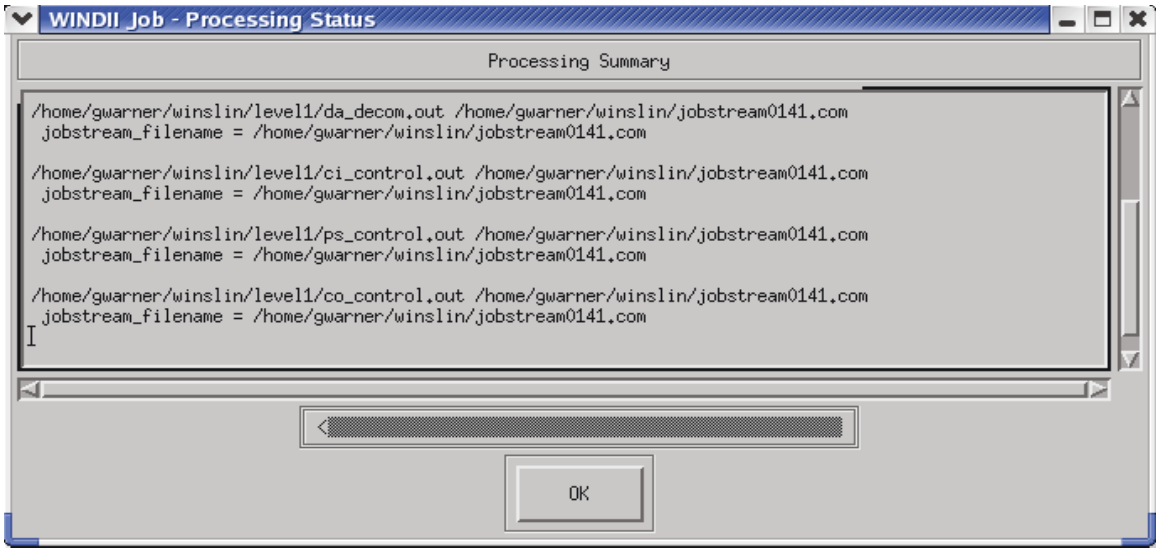
In the example below, the user has run a Day 141 Level 1 jobstream file produced as a

result of the procedure listed in Section 3.2 of this guide. A “Processing Summary” window opens to indicate which programs are being invoked, and then proceeds to echo their output in a scrolling window. When the processing finishes (which may take several minutes depending on the amount of data being processed) a message box will appear to indicate completion.

The Processing Summary window as the job starts:



The Processing Summary window as the job finishes (any error messages from the FORTRAN executables will be echoed in this window if they occur):

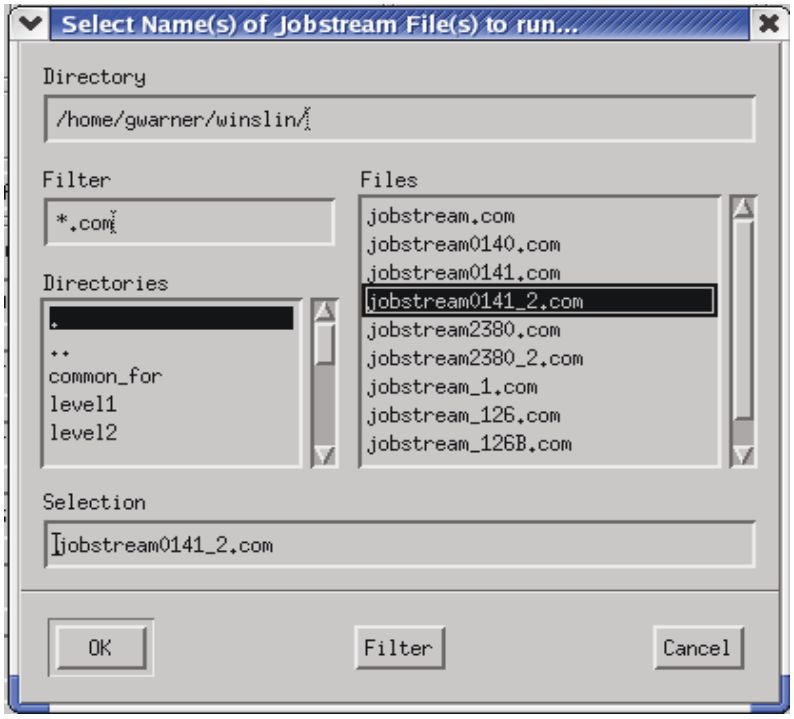


Note that a separate small message box pops up also to indicate the end of the processing run. Click “OK” on the small message box and on the “Processing Summary” window to return to the main JOBIT program screen.

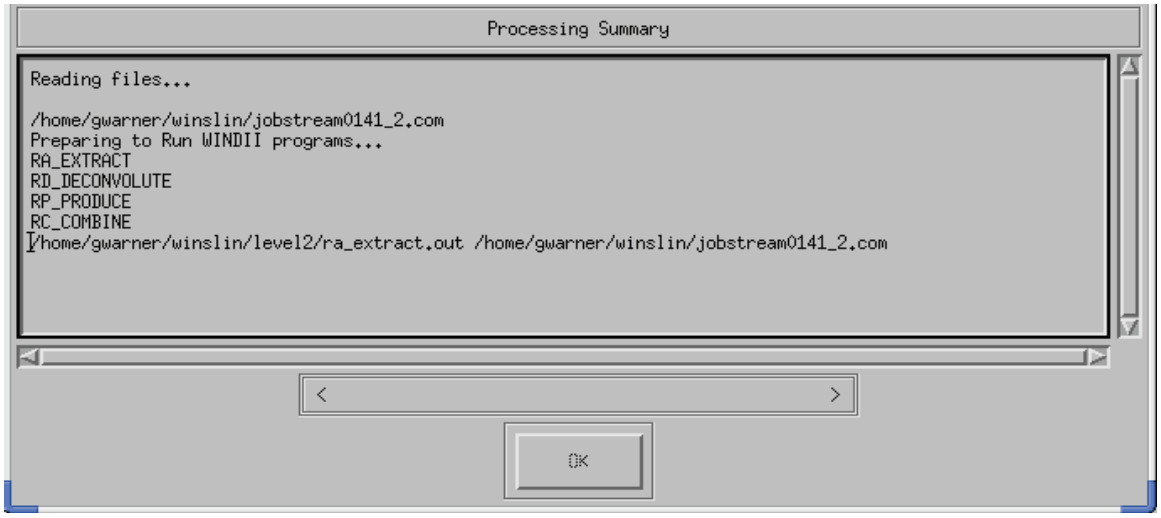
3.4 Using JOBIT to Execute Level 2 WINDII Data Processing

Per Section 3.3, it is a simple matter to execute a jobstream containing parameters for Level 2 jobs by the same procedure. JOBIT will detect which programs are listed in the selected jobstream file and will invoke the corresponding FORTRAN executables.

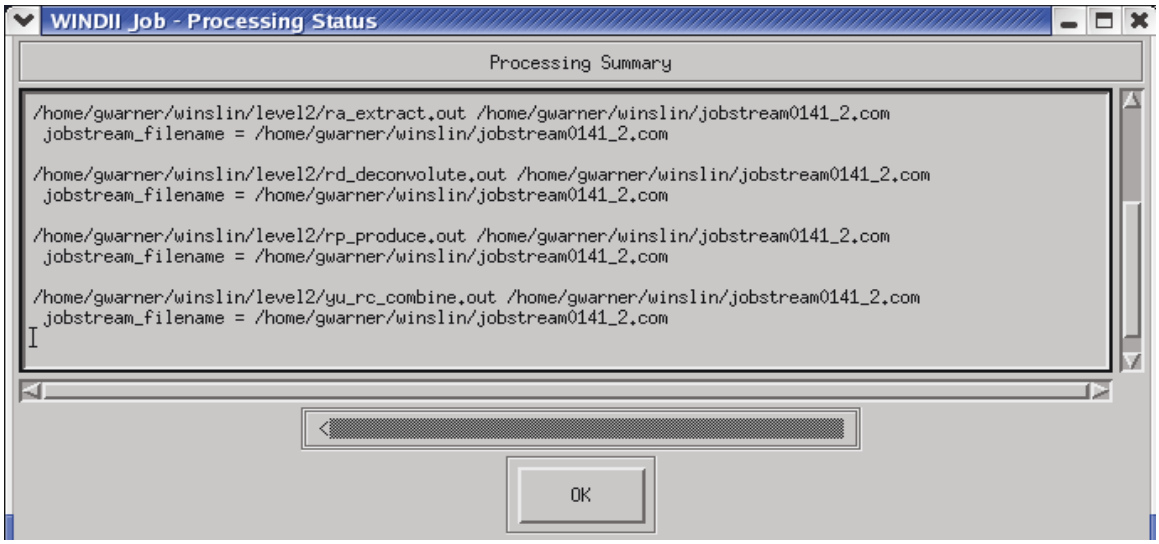
Selecting the jobstream file after pressing "RUN JOB FILE" button:



Processing Summary screen as job starts:



Processing Summary screen as job finishes:



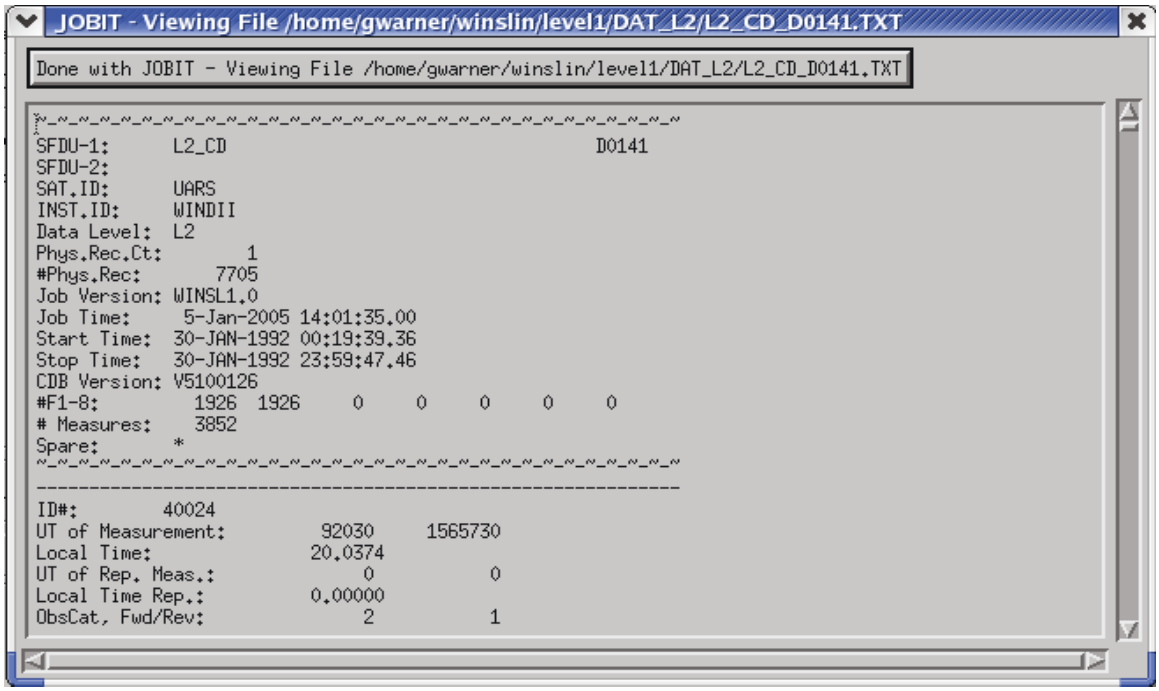
3.5 Other JOBIT Utilities

An additional useful feature of JOBIT is its ability to translate many of the WINDII Level 1, Level 2, and intermediate data files from their native binary formats into formatted ascii text files. This allows files to be visually examined for any irregularities, and it allows comparison to files processed with older software on the VAX machine.

The conversion options are accessed by clicking “File” on the main program menu. For each type of file which JOBIT knows how to read, the user must specify whether the file was created by the UNIX software (WINSLIN FORTRAN programs) or the VMS software (SDPPS programs running on VAX machine).

For example, if the user clicks the “File” - “Convert Unix L2_CD” option, JOBIT will prompt the user to locate the Level 2 CD output binary file, and will then convert it to a formatted ASCII text format. The file will then be displayed in a scrollable window on the screen. It will also be completely written in the same ASCII text format in the same directory as the original binary file, with a “.TXT” extension.

NB: There is a limit to the size of file which can be completely displayed in the scrollable JOBIT window during program execution. Some of the WINDII data files are very large. Any file selected for display may be truncated on display, however the entire contents will always be written to file, so that the complete file can still be examined using external software such as an Emacs editor.



When viewing is finished, push the long "Done with JOBIT – Viewing File ...." button to close the display and return to the main JOBIT screen.

4 WINSLIN: The WINDII SDPPS For Linux Software

4.1 WINSLIN Overview

For decades, the WINDII SDPPS software has been running successfully in the VAX environment. However, with the advancements in desktop processing by the turn of the millenium, the desire to move the SDPPS software into a more accessible and efficient environment gained momentum. Hence all of the Level 1 and Level 2 SDPPS processing programs and their many satellite routines and libraries have been ported to operate in a desktop Linux environment. This collective body of ported SDPPS software has been dubbed "WINSLIN".

The original SDPPS software was written in FORTRAN, and it has been transferred and "tweaked" to compile and run under Linux using the Absoft Pro Fortran compliler (v8.2). Changes to the FORTRAN code during the transfer process have ranged from insignificant to substantial in certain areas. This User's Guide is not designed to document all of the changes. In general, significant changes to the code have occurred in the following instances:

- File i/o interfaces which existed as part of the UARS CDHF facility and RAC simulated services (RSS) mode have been replaced with "Linux simulated services" (LSS) routines which allow the software to independently access jobstream information and handle files in the Linux environment

- Lookups to orbit/attitude data make use of the new OA_EXTRACT_B data files, and hence calls to the OA machine have been replaced with calls to a new set of subroutines prefaced by "YOA" instead of "OA"

- Some commercial NAG (Numerical Algorithms Group) mathematical routines have been replaced by more recent Mark 17 equivalents, which has neccessitated some change in certain parts of the processing code.

- Any VAX/VMS system function calls have been replaced.

Various other cosmetic or functional changes were made in conjunction with or separate from the above mentioned major areas of change, with the end result that the Linux "WINSLIN" programs for Level 1 and Level 2 WINDII data processing have demonstrated their ability to faithfully reproduce the results previously obtained by the VAX/SDPPS software.

4.2 WINSLIN Level 1 Programs

There are 4 programs involved in Level 1 processing:

- DA_DECOM
- CI_CONTROL
- PS_CONTROL (optional)
- CO_CONTROL

As described in Section 3, these programs can be executed from within JOBIT, once a suitable jobstream file has been created to set the various program and file parameters.

Alternatively, the programs can be executed from the Linux command line by typing the name of the executable file followed by the name of a jobstream file which contains the appropriate program and file parameters. For example, in a terminal session a user could type at the prompt from within the winslin/level1 directory:

```
./da_decom.out  jobstream_0141.com
```

This would execute the DA_DECOM program, using the parameters contained in the jobstream file "jobstream_0141.com". Note that the jobstream file can contain parameters for many other programs as well; the software will automatically identify and utilise only the parameters associated with the executed program.

Makefiles for each Level 1 program are provided in Appendix B, indicating the various libraries and compiler options which have been used.

4.3 WINSLIN Level 2 Programs

There are 4 programs involved in Level 2 processing:

- RA_EXTRACT
- RD_DECONVOLUTE
- RP_PRODUCE
- RC_COMBINE

As with the Level 1 programs, these programs can either be executed interactively using JOBIT, or they can be run individually from the command line. For example, in a terminal session a user could type at the prompt from within the winslin/level2 directory:

```
./yu_rc_combine.out  jobstream_0141_2.com
```

This would execute the RC_COMBINE program (note that RC_COMBINE is a special case in that there is a "YU_RC_COMBINE" program with the "YU" prefix which should be run for the final data combination stage instead of the normal "RC_COMBINE" program), using the parameters contained in the jobstream file "jobstream_0141_2.com".

Makefiles for each Level 2 program are provided in Appendix C, indicating the various libraries and compiler options which have been used.

4.4 WINSLIN Libraries

The WINSLIN software suite includes 9 essential subroutine libraries. The compiled versions of the libraries are stored in a single subdirectory below the main WINSLIN directory: /winslin/lib/

In order to create executables for the various Level 1 and Level 2 processing programs, the contents of the /winslin/lib/ directory must contain:

- libCF.a – the common FORTRAN routines whose source is in /winslin/common_for/
- libL1.a – the Level 1 specific processing routines whose source is in /winslin/level1/
- libL2.a – the Level 2 specific processing routines whose source is in /winslin/level2/
- libLSS.a – the "Linux Simulated Services" routines which replace the RSS routines for handling file access whose source is in /winslin/lss/
- libNAG.a – the Numerical Algorithm Group mathematical routines need by the processing programs, whose source is in /winslin/nag/
- libSA.a – spacecraft orbit/attitude and "YOA" routines, found in the directory /winslin/sa/
- libU77.a – library of system functions provided as part of the Absoft Pro Fortran package
- libUTL.a – some utility returns, mostly for converting date and time formats, whose source code is in /winslin/utl/
- libYU.a – additional processing routines added to SDPPS from York U, whose source code is in /winslin/yu/

Another key element of the WINSLIN suite is the collection of include files, commons, and structure definitions which are located in: /winslin/sdpps_include/

4.5 Sample WINSLIN Build Procedure

Under the existing implementation, there is no global build process for the entire WINSLIN package, although it would be a relatively simple manner to create a script file for doing so. Instead, each library and program has its own Makefile.

For libraries, a file named "Makefile" exists in the library's source code directory. When the Makefile is run, all the routines in the library will be compiled and archived to form the library in the /winslin/lib/ directory. For example, to create the Level 1 processing library libL1.a, the "make" command should be entered from within the /winslin/level1/ directory.

[/winslin/level1]$ make

If the libL1.a library does not already exist, it will be created in the /winslin/lib/ directory, and all member subroutines will be compiled and added to it. If it already exists, then any routines which have been changed will be compiled and replaced in the existing library.

The same process is followed for any of the 8 WINSLIN libraries. (The 9th library, libU77.a, is provided pre-compiled by the Absoft Pro FORTRAN package).

Appendix D contains a sample Makefile for the SA library. (Makefiles for the other libraries are of similar format, but as some of the libraries are quite large, the Makefiles are not reproduced in this guide).

Each of the 8 Level 1 and Level 2 programming files has it's own Makefile similarly, distinguished by an identifying suffix, and is located in either the /winslin/level1/ or /winslin/level2/ directory. So for example, the Makefile for the program DA_DECOM is located in the /winslin/level1/ directory and is called "Make_da". In order to run the Makefile to compile and link the DA_DECOM program, the following command should be entered at the linux prompt:

[/winslin/level]$ make -f Make_da

The result will be an executable program called "da_decom.out".

Similar make procedures would be used for any of the other programs to produce the executable files which can be used by JOBIT or run from the command line to process WINDII data.

The Makefiles for each of the Level 1 and Level 2 processing programs are presented in Appendices B and C of this report. The Makefiles include descriptions of the various compilation switches used, and identify which libraries are linked to each of the programs.

Appendix A: Sample Jobstream Files

A.1 Level 1 Processing Jobstream File

```
JOBIT Jobstream, created:Wed Jan  5 12:23:23 2005
**Number of WINDII user programs invoked:
          4
**Listing parameters for WINDII subprogram #       1
 $PROGRAM_PARAMS
   PROG_NAME='DA_DECOM'
   PROCESSING_START_TIME='15-JAN-1992 00:00:00.00'
   PROCESSING_STOP_TIME='15-JAN-1992 23:59:59.99'
   UARS_PROCESSING_DAY=         126
   LAUNCH_DATE='12-SEP-1991 00:00:00.00'
   DEF_EXISTS='T'
   PARAMS(1)='TRLEV'
   VALUES(1)='0'
   PARAMS(2)='CAL_MATCH'
   VALUES(2)='PREV'
   PARAMS(3)='CAL_UARS_DAY'
   VALUES(3)='126'
   PARAMS(4)='PRO_ENG'
   VALUES(4)='N'
   PARAMS(5)='PRO_QUAL'
   VALUES(5)='N'
 $END
 $DEFAULT_PARAMS
 $END
**Number of files associated with this program:
      17
 $FILE_PARAMS
   LOGICAL_FILE_ID='T1_REP'
   DATA_FILE_NAME='/home/gwarner/winslin/level1/SCRATCH/T1_REP_D0126.DAT'
   USER_STATUS_FILE_NUMBER=2
 $END
 $FILE_PARAMS
   LOGICAL_FILE_ID='T1_MESLOG'
   DATA_FILE_NAME='/home/gwarner/winslin/level1/SCRATCH/T1_MESLOG_D0126.DAT'
   USER_STATUS_FILE_NUMBER=7
 $END
 $FILE_PARAMS
   LOGICAL_FILE_ID='T1_OPELOG'
   DATA_FILE_NAME='/home/gwarner/winslin/level1/SCRATCH/T1_OPELOG_D0126.DAT'
   USER_STATUS_FILE_NUMBER=1
 $END
 $FILE_PARAMS
   LOGICAL_FILE_ID='C_PARDECOM'
   DATA_FILE_NAME='/home/gwarner/winslin/level1/CONST/cdbv5/c_pardecom.dat'
   DATA_LEVEL=' '
   CALIBRATION_ID='PARDECOM'
   CALIBRATION_MATCH='PREV'
   PRE_NXT_UARS_DAY=126
   SUBTYPE='WINDII'
   UARS_DAY=126
 $END
 $FILE_PARAMS
   LOGICAL_FILE_ID='C_CDBP'
   DATA_FILE_NAME='/home/gwarner/winslin/level1/CONST/cdbv5/0126/c_cdbp.dat'
   DATA_LEVEL=' '
   CALIBRATION_ID='CDBP'
   CALIBRATION_MATCH='PREV'
```

```
  PRE_NXT_UARS_DAY=126
  SUBTYPE='WINDII'
  UARS_DAY=126
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='L0_TM'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/DAT_L0/windii_l0_d0126.v0003_c01_prod'
  DATA_LEVEL='0'
  DATA_TYPE='WINDII'
  VIRTUAL_UARS_DAY=126
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='T1_MDO'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/SCRATCH/T1_MDO_D0126.DAT'
  OLD_NEW='NEW'
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='T1_MDFD'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/SCRATCH/T1_MDFD_D0126.DAT'
  OLD_NEW='NEW'
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='T1_MDFP'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/SCRATCH/T1_MDFP_D0126.DAT'
  OLD_NEW='NEW'
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='T1_MDO_O2'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/SCRATCH/T1_MDO_O2_D0126.DAT'
  DATA_LEVEL='1'
  DATA_TYPE='WINDII'
  OLD_NEW='NEW'
  SUBTYPE='MDOO2'
  UARS_DAY=126
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='T1_MDFD_O2'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/SCRATCH/T1_MDFD_O2_D0126.DAT'
  DATA_LEVEL='1'
  DATA_TYPE='WINDII'
  OLD_NEW='NEW'
  SUBTYPE='MDFDO2'
  UARS_DAY=126
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='T1_MDFP_O2'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/SCRATCH/T1_MDFP_O2_D0126.DAT'
  DATA_LEVEL='1'
  DATA_TYPE='WINDII'
  OLD_NEW='NEW'
  SUBTYPE='MDFPO2'
  UARS_DAY=126
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='L1_HDR'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/DAT_L1/L1_HDR_D0126.DAT'
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='L1_WIN'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/DAT_L1/L1_WIN_D0126.DAT'
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='L1_CALINF'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/DAT_L1/L1_CALINF_D0126.DAT'
  DATA_LEVEL='1'
  DATA_TYPE='WINDII'
  OLD_NEW='NEW'
  SUBTYPE='CALINF'
  UARS_DAY=126
```

```
 $END
 $FILE_PARAMS
   LOGICAL_FILE_ID='L1_MIN'
   DATA_FILE_NAME='/home/gwarner/winslin/level1/DAT_L1/L1_MIN_D0126.DAT'
   DATA_LEVEL='1'
   DATA_TYPE='WINDII'
   OLD_NEW='NEW'
   SUBTYPE='MIN'
   UARS_DAY=126
 $END
 $FILE_PARAMS
   LOGICAL_FILE_ID='T1_MEMORY'
   DATA_FILE_NAME='/home/gwarner/winslin/level1/SCRATCH/T1_MEMORY_D0126.DAT'
 $END
**Listing parameters for WINDII subprogram #       2
 $PROGRAM_PARAMS
   PROG_NAME='CI_CONTROL'
   PROCESSING_START_TIME='15-JAN-1992 00:00:00.00'
   PROCESSING_STOP_TIME='15-JAN-1992 23:59:59.99'
   UARS_PROCESSING_DAY=126
   LAUNCH_DATE='12-SEP-1991 00:00:00.00'
   DEF_EXISTS='T'
   PARAMS(1)='TRLEV'
   VALUES(1)='0   '
   PARAMS(2)='CAL_MATCH'
   VALUES(2)='PREV'
   PARAMS(3)='CAL_UARS_DAY'
   VALUES(3)='126'
   PARAMS(4)='LEVL1'
   VALUES(4)='Y'
   PARAMS(5)='DCMOD'
   VALUES(5)='Y'
   PARAMS(6)='VERSION'
   VALUES(6)='RC_V511A'
 $END
 $DEFAULT_PARAMS
 $END
**Number of files associated with this program:
      22
 $FILE_PARAMS
   LOGICAL_FILE_ID='T1_REP'
   DATA_FILE_NAME='/home/gwarner/winslin/level1/SCRATCH/T1_REP_D0126.DAT'
   USER_STATUS_FILE_NUMBER=2
 $END
 $FILE_PARAMS
   LOGICAL_FILE_ID='T1_OPELOG'
   DATA_FILE_NAME='/home/gwarner/winslin/level1/SCRATCH/T1_OPELOG_D0126.DAT'
   USER_STATUS_FILE_NUMBER=1
 $END
 $FILE_PARAMS
   LOGICAL_FILE_ID='C_CDBP'
   DATA_FILE_NAME='/home/gwarner/winslin/level1/CONST/cdbv5/0126/c_cdbp.dat'
   DATA_LEVEL=' '
   CALIBRATION_ID='CDBP'
   CALIBRATION_MATCH='PREV'
   PRE_NXT_UARS_DAY=126
   SUBTYPE='WINDII'
   UARS_DAY=126
 $END
 $FILE_PARAMS
   LOGICAL_FILE_ID='C_CDBI'
   DATA_FILE_NAME='/home/gwarner/winslin/level1/CONST/cdbv5/0126/c_cdbi.dat'
   DATA_LEVEL=' '
   CALIBRATION_ID='CDBI'
   CALIBRATION_MATCH='PREV'
   PRE_NXT_UARS_DAY=126
   SUBTYPE='WINDII'
   UARS_DAY=126
 $END
```

```
$FILE_PARAMS
  LOGICAL_FILE_ID='C_CDBI1'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/CONST/cdbv5/0126/c_cdbi1.dat'
  DATA_LEVEL=' '
  CALIBRATION_ID='CDBI1'
  CALIBRATION_MATCH='PREV'
  PRE_NXT_UARS_DAY=126
  SUBTYPE='WINDII'
  UARS_DAY=126
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='C_CDBI2'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/CONST/cdbv5/0126/c_cdbi2.dat'
  DATA_LEVEL=' '
  CALIBRATION_ID='CDBI2'
  CALIBRATION_MATCH='PREV'
  PRE_NXT_UARS_DAY=126
  SUBTYPE='WINDII'
  UARS_DAY=126
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='C_CDBI3'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/CONST/cdbv5/0126/c_cdbi3.dat'
  DATA_LEVEL=' '
  CALIBRATION_ID='CDBI3'
  CALIBRATION_MATCH='PREV'
  PRE_NXT_UARS_DAY=126
  SUBTYPE='WINDII'
  UARS_DAY=126
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='C_CDBI4'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/CONST/cdbv5/0126/c_cdbi4.dat'
  DATA_LEVEL=' '
  CALIBRATION_ID='CDBI4'
  CALIBRATION_MATCH='PREV'
  PRE_NXT_UARS_DAY=126
  SUBTYPE='WINDII'
  UARS_DAY=126
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='C_CDBI5'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/CONST/cdbv5/0126/c_cdbi5.dat'
  DATA_LEVEL=' '
  CALIBRATION_ID='CDBI5'
  CALIBRATION_MATCH='PREV'
  PRE_NXT_UARS_DAY=126
  SUBTYPE='WINDII'
  UARS_DAY=126
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='C_CDBI6'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/CONST/cdbv5/0126/c_cdbi6.dat'
  DATA_LEVEL=' '
  CALIBRATION_ID='CDBI6'
  CALIBRATION_MATCH='PREV'
  PRE_NXT_UARS_DAY=126
  SUBTYPE='WINDII'
  UARS_DAY=126
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='C_CDBI8'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/CONST/cdbv5/0126/c_cdbi8.dat'
  DATA_LEVEL=' '
  CALIBRATION_ID='CDBI8'
  CALIBRATION_MATCH='PREV'
  PRE_NXT_UARS_DAY=126
  SUBTYPE='WINDII'
  UARS_DAY=126
```

```
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='T1_MDO'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/SCRATCH/T1_MDO_D0126.DAT'
  OLD_NEW='HELD'
  ESTIMATED_FILE_SIZE=120000
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='T1_MDFD'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/SCRATCH/T1_MDFD_D0126.DAT'
  OLD_NEW='HELD'
  ESTIMATED_FILE_SIZE=2500
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='T1_MDFP'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/SCRATCH/T1_MDFP_D0126.DAT'
  OLD_NEW='HELD'
  ESTIMATED_FILE_SIZE=10000
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='T1_CMI'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/SCRATCH/T1_CMI_D0126.DAT'
  OLD_NEW='NEW'
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='T1_CMSDC'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/SCRATCH/T1_CMSDC_D0126.DAT'
  OLD_NEW='NEW'
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='L1_CVP'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/DAT_L1/L1_CVP_D0126.DAT'
  DATA_LEVEL='1'
  OLD_NEW='NEW'
  DATA_TYPE='WINDII'
  SUBTYPE='CVP'
  UARS_DAY=126
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='L1_CVD'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/DAT_L1/L1_CVD_D0126.DAT'
  DATA_LEVEL='1'
  OLD_NEW='NEW'
  DATA_TYPE='WINDII'
  SUBTYPE='CVD'
  UARS_DAY=126
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='L1_MESNOT'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/DAT_L1/L1_MESNOT_D0126.DAT'
  DATA_LEVEL='1'
  OLD_NEW='NEW'
  DATA_TYPE='WINDII'
  SUBTYPE='MESNOT'
  UARS_DAY=126
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='L1_HDR'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/DAT_L1/L1_HDR_D0126.DAT'
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='L1_WIN'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/DAT_L1/L1_WIN_D0126.DAT'
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='C_CONST'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/CONST/cdbv5/c_const.dat'
  DATA_LEVEL=' '
  CALIBRATION_ID='CONST'
```

```
   CALIBRATION_MATCH='PREV'
   PRE_NXT_UARS_DAY=126
   SUBTYPE='WINDII'
   UARS_DAY=126
 $END
**Listing parameters for WINDII subprogram #       3
 $PROGRAM_PARAMS
   PROG_NAME='PS_CONTROL'
   PROCESSING_START_TIME='15-JAN-1992 00:00:00.00'
   PROCESSING_STOP_TIME='15-JAN-1992 23:59:59.99'
   UARS_PROCESSING_DAY=126
   LAUNCH_DATE='12-SEP-1991 00:00:00.00'
   DEF_EXISTS='T'
   PARAMS(1)='TRLEV'
   VALUES(1)='0   '
   PARAMS(2)='IND_PREV'
   VALUES(2)='N'
   PARAMS(3)='VERSION'
   VALUES(3)='RC_V511A'
 $END
 $DEFAULT_PARAMS
 $END
**Number of files associated with this program:
       6
 $FILE_PARAMS
   LOGICAL_FILE_ID='T1_REP'
   DATA_FILE_NAME='/home/gwarner/winslin/level1/SCRATCH/T1_REP_D0126.DAT'
   USER_STATUS_FILE_NUMBER=2
 $END
 $FILE_PARAMS
   LOGICAL_FILE_ID='T1_OPELOG'
   DATA_FILE_NAME='/home/gwarner/winslin/level1/SCRATCH/T1_OPELOG_D0126.DAT'
   USER_STATUS_FILE_NUMBER=1
 $END
 $FILE_PARAMS
   LOGICAL_FILE_ID='C_CONST'
   DATA_FILE_NAME='/home/gwarner/winslin/level1/CONST/cdbv5/c_const.dat'
   DATA_LEVEL=' '
   CALIBRATION_ID='CONST'
   CALIBRATION_MATCH='PREV'
   PRE_NXT_UARS_DAY=126
   SUBTYPE='WINDII'
   UARS_DAY=126
 $END
 $FILE_PARAMS
   LOGICAL_FILE_ID='L1_CVP'
   DATA_FILE_NAME='/home/gwarner/winslin/level1/DAT_L1/L1_CVP_D0126.DAT'
   DATA_LEVEL='1'
   OLD_NEW='OLD'
   DATA_TYPE='WINDII'
   SUBTYPE='CVP'
   UARS_DAY=126
 $END
 $FILE_PARAMS
   LOGICAL_FILE_ID='L1_CVP_SM'
   DATA_FILE_NAME='/home/gwarner/winslin/level1/DAT_L1/L1_CVP_SM_D0126.DAT'
   DATA_LEVEL='1'
   OLD_NEW='NEW'
   DATA_TYPE='WINDII'
   SUBTYPE='CVPS'
   UARS_DAY=126
 $END
 $FILE_PARAMS
   LOGICAL_FILE_ID='L1_HDR'
   DATA_FILE_NAME='/home/gwarner/winslin/level1/DAT_L1/L1_HDR_D0126.DAT'
 $END
**Listing parameters for WINDII subprogram #       4
 $PROGRAM_PARAMS
   PROG_NAME='CO_CONTROL'
```

```
   PROCESSING_START_TIME='15-JAN-1992 00:00:00.00'
   PROCESSING_STOP_TIME='15-JAN-1992 23:59:59.99'
   UARS_PROCESSING_DAY=126
   LAUNCH_DATE='12-SEP-1991 00:00:00.00'
   DEF_EXISTS='T'
   PARAMS(1)='TRLEV'
   VALUES(1)='0   '
   PARAMS(2)='IPF_MATCH'
   VALUES(2)='PREV'
   PARAMS(3)='IPF_UARS_DAY'
   VALUES(3)='126'
   PARAMS(4)='ATT_TYP_VER'
   VALUES(4)='E   '
   PARAMS(5)='ORB_TYP_VER'
   VALUES(5)='D   '
   PARAMS(6)='TYP_VER'
   VALUES(6)='D   '
   PARAMS(7)='SMOOTHED_PHAS'
   VALUES(7)='N'
   PARAMS(8)='VERSION'
   VALUES(8)='RC_V511A'
 $END
 $DEFAULT_PARAMS
 $END
**Number of files associated with this program:
      22
 $FILE_PARAMS
   LOGICAL_FILE_ID='T1_REP'
   DATA_FILE_NAME='/home/gwarner/winslin/level1/SCRATCH/T1_REP_D0126.DAT'
   USER_STATUS_FILE_NUMBER=2
 $END
 $FILE_PARAMS
   LOGICAL_FILE_ID='T1_OPELOG'
   DATA_FILE_NAME='/home/gwarner/winslin/level1/SCRATCH/T1_OPELOG_D0126.DAT'
   USER_STATUS_FILE_NUMBER=1
 $END
 $FILE_PARAMS
   LOGICAL_FILE_ID='C_CONST'
   DATA_FILE_NAME='/home/gwarner/winslin/level1/CONST/cdbv5/c_const.dat'
   DATA_LEVEL=' '
   CALIBRATION_ID='CONST'
   CALIBRATION_MATCH='PREV'
   PRE_NXT_UARS_DAY=126
   SUBTYPE='WINDII'
   UARS_DAY=126
 $END
 $FILE_PARAMS
   LOGICAL_FILE_ID='C_IPF'
   DATA_FILE_NAME='/home/gwarner/winslin/level1/CONST/cdbv5/c_ipf.dat'
   DATA_LEVEL=' '
   CALIBRATION_ID='IPF'
   CALIBRATION_MATCH='PREV'
   PRE_NXT_UARS_DAY=126
   SUBTYPE='WINDII'
   UARS_DAY=126
 $END
 $FILE_PARAMS
   LOGICAL_FILE_ID='C_STAR'
   DATA_FILE_NAME='/home/gwarner/winslin/level1/CONST/cdbv5/c_star.dat'
   DATA_LEVEL=' '
   CALIBRATION_ID='STAR'
   CALIBRATION_MATCH='PREV'
   PRE_NXT_UARS_DAY=126
   SUBTYPE='WINDII'
   UARS_DAY=126
 $END
 $FILE_PARAMS
   LOGICAL_FILE_ID='C_CDBP'
   DATA_FILE_NAME='/home/gwarner/winslin/level1/CONST/cdbv5/0126/c_cdbp.dat'
```

```
  DATA_LEVEL=' '
  CALIBRATION_ID='CDBP'
  CALIBRATION_MATCH='PREV'
  PRE_NXT_UARS_DAY=126
  SUBTYPE='WINDII'
  UARS_DAY=126
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='C_CDBI'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/CONST/cdbv5/0126/c_cdbi.dat'
  DATA_LEVEL=' '
  CALIBRATION_ID='CDBI'
  CALIBRATION_MATCH='PREV'
  PRE_NXT_UARS_DAY=126
  SUBTYPE='WINDII'
  UARS_DAY=126
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='C_CDBI1'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/CONST/cdbv5/0126/c_cdbi1.dat'
  DATA_LEVEL=' '
  CALIBRATION_ID='CDBI1'
  CALIBRATION_MATCH='PREV'
  PRE_NXT_UARS_DAY=126
  SUBTYPE='WINDII'
  UARS_DAY=126
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='C_CDBI2'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/CONST/cdbv5/0126/c_cdbi2.dat'
  DATA_LEVEL=' '
  CALIBRATION_ID='CDBI2'
  CALIBRATION_MATCH='PREV'
  PRE_NXT_UARS_DAY=126
  SUBTYPE='WINDII'
  UARS_DAY=126
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='C_CDBI3'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/CONST/cdbv5/0126/c_cdbi3.dat'
  DATA_LEVEL=' '
  CALIBRATION_ID='CDBI3'
  CALIBRATION_MATCH='PREV'
  PRE_NXT_UARS_DAY=126
  SUBTYPE='WINDII'
  UARS_DAY=126
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='C_CDBI4'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/CONST/cdbv5/0126/c_cdbi4.dat'
  DATA_LEVEL=' '
  CALIBRATION_ID='CDBI4'
  CALIBRATION_MATCH='PREV'
  PRE_NXT_UARS_DAY=126
  SUBTYPE='WINDII'
  UARS_DAY=126
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='C_CDBI5'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/CONST/cdbv5/0126/c_cdbi5.dat'
  DATA_LEVEL=' '
  CALIBRATION_ID='CDBI5'
  CALIBRATION_MATCH='PREV'
  PRE_NXT_UARS_DAY=126
  SUBTYPE='WINDII'
  UARS_DAY=126
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='C_CDBI6'
```

```
  DATA_FILE_NAME='/home/gwarner/winslin/level1/CONST/cdbv5/0126/c_cdbi6.dat'
  DATA_LEVEL=' '
  CALIBRATION_ID='CDBI6'
  CALIBRATION_MATCH='PREV'
  PRE_NXT_UARS_DAY=126
  SUBTYPE='WINDII'
  UARS_DAY=126
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='C_CDBI8'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/CONST/cdbv5/0126/c_cdbi8.dat'
  DATA_LEVEL=' '
  CALIBRATION_ID='CDBI8'
  CALIBRATION_MATCH='PREV'
  PRE_NXT_UARS_DAY=126
  SUBTYPE='WINDII'
  UARS_DAY=126
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='T1_CMI'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/SCRATCH/T1_CMI_D0126.DAT'
  OLD_NEW='HELD'
  ESTIMATED_FILE_SIZE=250000
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='T1_CMSDC'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/SCRATCH/T1_CMSDC_D0126.DAT'
  OLD_NEW='HELD'
  ESTIMATED_FILE_SIZE=25000
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='L1_CVP'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/DAT_L1/L1_CVP_D0126.DAT'
  DATA_LEVEL='1'
  OLD_NEW='HELD'
  DATA_TYPE='WINDII'
  SUBTYPE='CVP'
  UARS_DAY=126
  ESTIMATED_FILE_SIZE=20000
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='L1_CVP_SM'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/DAT_L1/L1_CVP_SM_D0126.DAT'
  DATA_LEVEL='1'
  OLD_NEW='OLD'
  DATA_TYPE='WINDII'
  SUBTYPE='CVPS'
  UARS_DAY=126
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='L1_CVA'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/DAT_L1/L1_CVA_D0126.DAT'
  DATA_LEVEL='1'
  OLD_NEW='NEW'
  DATA_TYPE='WINDII'
  SUBTYPE='CVA'
  UARS_DAY=126
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='L1_CVB'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/DAT_L1/L1_CVB_D0126.DAT'
  DATA_LEVEL='1'
  OLD_NEW='NEW'
  DATA_TYPE='WINDII'
  SUBTYPE='CVB'
  UARS_DAY=126
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='L1_HDR'
```

```
  DATA_FILE_NAME='/home/gwarner/winslin/level1/DAT_L1/L1_HDR_D0126.DAT'
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='ORBIT_ATTITUDE'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/DAT_L0/oa_extract_b_d0126.dat'
$END
```

A.2 Level 2 Processing Jobstream File

```
JOBIT Jobstream, created:Wed Jan  5 13:51:23 2005
**Number of WINDII user programs invoked:
           4
**Listing parameters for WINDII subprogram #       1
 $PROGRAM_PARAMS
   PROG_NAME='RA_EXTRACT'
   PROCESSING_START_TIME='15-JAN-1992 00:00:00.00'
   PROCESSING_STOP_TIME='15-JAN-1992 23:59:59.99'
   UARS_PROCESSING_DAY=         126
   LAUNCH_DATE='12-SEP-1991 00:00:00.00'
   DEF_EXISTS='T'
   PARAMS(1)='TRLEV'
   VALUES(1)='0'
   PARAMS(2)='CAL_MATCH'
   VALUES(2)='PREV'
   PARAMS(3)='CAL_UARS_DAY'
   VALUES(3)='126'
   PARAMS(4)='VERSION'
   VALUES(4)='RC_V511A'
 $END
 $DEFAULT_PARAMS
 $END
**Number of files associated with this program:
      16
 $FILE_PARAMS
   LOGICAL_FILE_ID='T2_AQ31'
   DATA_FILE_NAME='/home/gwarner/winslin/level1/SCRATCH/T2_AQ31_D0126.DAT'
   OLD_NEW='NEW'
 $END
 $FILE_PARAMS
   LOGICAL_FILE_ID='L1_CVA'
   DATA_FILE_NAME='/home/gwarner/winslin/level1/DAT_L1/L1_CVA_D0126.DAT'
   DATA_LEVEL='1'
   OLD_NEW='OLD'
   DATA_TYPE='WINDII'
   SUBTYPE='CVA'
   UARS_DAY=126
 $END
 $FILE_PARAMS
   LOGICAL_FILE_ID='C_CONST'
   DATA_FILE_NAME='/home/gwarner/winslin/level1/CONST/cdbv5/c_const.dat'
   DATA_LEVEL=' '
   CALIBRATION_ID='CONST'
   CALIBRATION_MATCH='PREV'
   PRE_NXT_UARS_DAY=126
   SUBTYPE='WINDII'
   UARS_DAY=126
 $END
 $FILE_PARAMS
   LOGICAL_FILE_ID='C_CDBP'
   DATA_FILE_NAME='/home/gwarner/winslin/level1/CONST/cdbv5/0126/c_cdbp.dat'
   DATA_LEVEL=' '
   CALIBRATION_ID='CDBP'
   CALIBRATION_MATCH='PREV'
   PRE_NXT_UARS_DAY=126
   SUBTYPE='WINDII'
   UARS_DAY=126
 $END
 $FILE_PARAMS
   LOGICAL_FILE_ID='C_CDBI'
   DATA_FILE_NAME='/home/gwarner/winslin/level1/CONST/cdbv5/0126/c_cdbi.dat'
   DATA_LEVEL=' '
```

```
  CALIBRATION_ID='CDBI'
  CALIBRATION_MATCH='PREV'
  PRE_NXT_UARS_DAY=126
  SUBTYPE='WINDII'
  UARS_DAY=126
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='C_CDBI1'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/CONST/cdbv5/0126/c_cdbi1.dat'
  DATA_LEVEL=' '
  CALIBRATION_ID='CDBI1'
  CALIBRATION_MATCH='PREV'
  PRE_NXT_UARS_DAY=126
  SUBTYPE='WINDII'
  UARS_DAY=126
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='C_CDBI2'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/CONST/cdbv5/0126/c_cdbi2.dat'
  DATA_LEVEL=' '
  CALIBRATION_ID='CDBI2'
  CALIBRATION_MATCH='PREV'
  PRE_NXT_UARS_DAY=126
  SUBTYPE='WINDII'
  UARS_DAY=126
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='C_CDBI3'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/CONST/cdbv5/0126/c_cdbi3.dat'
  DATA_LEVEL=' '
  CALIBRATION_ID='CDBI3'
  CALIBRATION_MATCH='PREV'
  PRE_NXT_UARS_DAY=126
  SUBTYPE='WINDII'
  UARS_DAY=126
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='C_CDBI4'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/CONST/cdbv5/0126/c_cdbi4.dat'
  DATA_LEVEL=' '
  CALIBRATION_ID='CDBI4'
  CALIBRATION_MATCH='PREV'
  PRE_NXT_UARS_DAY=126
  SUBTYPE='WINDII'
  UARS_DAY=126
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='C_CDBI5'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/CONST/cdbv5/0126/c_cdbi5.dat'
  DATA_LEVEL=' '
  CALIBRATION_ID='CDBI5'
  CALIBRATION_MATCH='PREV'
  PRE_NXT_UARS_DAY=126
  SUBTYPE='WINDII'
  UARS_DAY=126
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='C_CDBI6'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/CONST/cdbv5/0126/c_cdbi6.dat'
  DATA_LEVEL=' '
  CALIBRATION_ID='CDBI6'
  CALIBRATION_MATCH='PREV'
  PRE_NXT_UARS_DAY=126
  SUBTYPE='WINDII'
  UARS_DAY=126
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='C_CDBI7'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/CONST/cdbv5/0126/c_cdbi7.dat'
```

```
   DATA_LEVEL=' '
   CALIBRATION_ID='CDBI7'
   CALIBRATION_MATCH='PREV'
   PRE_NXT_UARS_DAY=126
   SUBTYPE='WINDII'
   UARS_DAY=126
 $END
 $FILE_PARAMS
   LOGICAL_FILE_ID='C_CDBI8'
   DATA_FILE_NAME='/home/gwarner/winslin/level1/CONST/cdbv5/0126/c_cdbi8.dat'
   DATA_LEVEL=' '
   CALIBRATION_ID='CDBI8'
   CALIBRATION_MATCH='PREV'
   PRE_NXT_UARS_DAY=126
   SUBTYPE='WINDII'
   UARS_DAY=126
 $END
 $FILE_PARAMS
   LOGICAL_FILE_ID='T2_OPELOG'
   DATA_FILE_NAME='/home/gwarner/winslin/level1/SCRATCH/T2_OPELOG_D0126.DAT'
   USER_STATUS_FILE_NUMBER=3
 $END
 $FILE_PARAMS
   LOGICAL_FILE_ID='T2_REP'
   DATA_FILE_NAME='/home/gwarner/winslin/level1/SCRATCH/T2_REP_D0126.DAT'
   USER_STATUS_FILE_NUMBER=4
 $END
 $FILE_PARAMS
   LOGICAL_FILE_ID='L1_HDR'
   DATA_FILE_NAME='/home/gwarner/winslin/level1/DAT_L1/L1_HDR_D0126.DAT'
 $END
**Listing parameters for WINDII subprogram #       2
 $PROGRAM_PARAMS
   PROG_NAME='RD_DECONVOLUTE'
   PROCESSING_START_TIME='15-JAN-1992 00:00:00.00'
   PROCESSING_STOP_TIME='15-JAN-1992 23:59:59.99'
   UARS_PROCESSING_DAY=126
   LAUNCH_DATE='12-SEP-1991 00:00:00.00'
   DEF_EXISTS='T'
   PARAMS(1)='TRLEV'
   VALUES(1)='0   '
   PARAMS(2)='CAL_MATCH'
   VALUES(2)='PREV'
   PARAMS(3)='CAL_UARS_DAY'
   VALUES(3)='126'
   PARAMS(4)='VERSION'
   VALUES(4)='RC_V511A'
 $END
 $DEFAULT_PARAMS
 $END
**Number of files associated with this program:
       8
 $FILE_PARAMS
   LOGICAL_FILE_ID='T2_AQ31'
   DATA_FILE_NAME='/home/gwarner/winslin/level1/SCRATCH/T2_AQ31_D0126.DAT'
   OLD_NEW='HELD'
   ESTIMATED_FILE_SIZE=40000
 $END
 $FILE_PARAMS
   LOGICAL_FILE_ID='L2_DS'
   DATA_FILE_NAME='/home/gwarner/winslin/level1/DAT_L2/L2_DS_D0126.DAT'
   DATA_LEVEL='2'
   OLD_NEW='NEW'
   DATA_TYPE='WINDII'
   SUBTYPE='DS'
   UARS_DAY=126
 $END
 $FILE_PARAMS
   LOGICAL_FILE_ID='T2_FDG32'
```

```
   DATA_FILE_NAME='/home/gwarner/winslin/level1/SCRATCH/T2_FDG32_D0126.DAT'
   OLD_NEW='NEW'
 $END
 $FILE_PARAMS
   LOGICAL_FILE_ID='C_CONST'
   DATA_FILE_NAME='/home/gwarner/winslin/level1/CONST/cdbv5/c_const.dat'
   DATA_LEVEL=' '
   CALIBRATION_ID='CONST'
   CALIBRATION_MATCH='PREV'
   PRE_NXT_UARS_DAY=126
   SUBTYPE='WINDII'
   UARS_DAY=126
 $END
 $FILE_PARAMS
   LOGICAL_FILE_ID='C_CDBP'
   DATA_FILE_NAME='/home/gwarner/winslin/level1/CONST/cdbv5/0126/c_cdbp.dat'
   DATA_LEVEL=' '
   CALIBRATION_ID='CDBP'
   CALIBRATION_MATCH='PREV'
   PRE_NXT_UARS_DAY=126
   SUBTYPE='WINDII'
   UARS_DAY=126
 $END
 $FILE_PARAMS
   LOGICAL_FILE_ID='T2_OPELOG'
   DATA_FILE_NAME='/home/gwarner/winslin/level1/SCRATCH/T2_OPELOG_D0126.DAT'
   USER_STATUS_FILE_NUMBER=3
 $END
 $FILE_PARAMS
   LOGICAL_FILE_ID='T2_REP'
   DATA_FILE_NAME='/home/gwarner/winslin/level1/SCRATCH/T2_REP_D0126.DAT'
   USER_STATUS_FILE_NUMBER=4
 $END
 $FILE_PARAMS
   LOGICAL_FILE_ID='L1_HDR'
   DATA_FILE_NAME='/home/gwarner/winslin/level1/DAT_L1/L1_HDR_D0126.DAT'
 $END
**Listing parameters for WINDII subprogram #       3
 $PROGRAM_PARAMS
   PROG_NAME='RP_PRODUCE'
   PROCESSING_START_TIME='15-JAN-1992 00:00:00.00'
   PROCESSING_STOP_TIME='15-JAN-1992 23:59:59.99'
   UARS_PROCESSING_DAY=126
   LAUNCH_DATE='12-SEP-1991 00:00:00.00'
   DEF_EXISTS='T'
   PARAMS(1)='TRLEV'
   VALUES(1)='0   '
   PARAMS(2)='CAL_MATCH'
   VALUES(2)='PREV'
   PARAMS(3)='CAL_UARS_DAY'
   VALUES(3)='126'
   PARAMS(4)='VERSION'
   VALUES(4)='RC_V511A'
 $END
 $DEFAULT_PARAMS
 $END
**Number of files associated with this program:
      12
 $FILE_PARAMS
   LOGICAL_FILE_ID='T2_AQ31'
   DATA_FILE_NAME='/home/gwarner/winslin/level1/SCRATCH/T2_AQ31_D0126.DAT'
   OLD_NEW='HELD'
   ESTIMATED_FILE_SIZE=40000
 $END
 $FILE_PARAMS
   LOGICAL_FILE_ID='T2_FDG32'
   DATA_FILE_NAME='/home/gwarner/winslin/level1/SCRATCH/T2_FDG32_D0126.DAT'
   OLD_NEW='HELD'
   ESTIMATED_FILE_SIZE=30000
```

```
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='T2_AQ1'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/SCRATCH/T2_AQ1_D0126.DAT'
  OLD_NEW='NEW'
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='T2_AQ2'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/SCRATCH/T2_AQ2_D0126.DAT'
  OLD_NEW='NEW'
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='L2_AQ'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/DAT_L2/L2_AQ_D0126.DAT'
  DATA_LEVEL='2'
  OLD_NEW='NEW'
  DATA_TYPE='WINDII'
  SUBTYPE='AQ'
  UARS_DAY=126
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='L2_FD1'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/DAT_L2/L2_FD1_D0126.DAT'
  DATA_LEVEL='2'
  OLD_NEW='NEW'
  DATA_TYPE='WINDII'
  SUBTYPE='FD1'
  UARS_DAY=126
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='L2_FD2'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/DAT_L2/L2_FD2_D0126.DAT'
  DATA_LEVEL='2'
  OLD_NEW='NEW'
  DATA_TYPE='WINDII'
  SUBTYPE='FD2'
  UARS_DAY=126
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='C_CONST'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/CONST/cdbv5/c_const.dat'
  DATA_LEVEL=' '
  CALIBRATION_ID='CONST'
  CALIBRATION_MATCH='PREV'
  PRE_NXT_UARS_DAY=126
  SUBTYPE='WINDII'
  UARS_DAY=126
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='C_CDBP'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/CONST/cdbv5/0126/c_cdbp.dat'
  DATA_LEVEL=' '
  CALIBRATION_ID='CDBP'
  CALIBRATION_MATCH='PREV'
  PRE_NXT_UARS_DAY=126
  SUBTYPE='WINDII'
  UARS_DAY=126
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='T2_OPELOG'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/SCRATCH/T2_OPELOG_D0126.DAT'
  USER_STATUS_FILE_NUMBER=3
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='T2_REP'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/SCRATCH/T2_REP_D0126.DAT'
  USER_STATUS_FILE_NUMBER=4
$END
$FILE_PARAMS
```

```
   LOGICAL_FILE_ID='L1_HDR'
   DATA_FILE_NAME='/home/gwarner/winslin/level1/DAT_L1/L1_HDR_D0126.DAT'
 $END
**Listing parameters for WINDII subprogram #       4
 $PROGRAM_PARAMS
   PROG_NAME='RC_COMBINE'
   PROCESSING_START_TIME='15-JAN-1992 00:00:00.00'
   PROCESSING_STOP_TIME='15-JAN-1992 23:59:59.99'
   UARS_PROCESSING_DAY=126
   LAUNCH_DATE='12-SEP-1991 00:00:00.00'
   DEF_EXISTS='T'
   PARAMS(1)='TRLEV'
   VALUES(1)='0   '
   PARAMS(2)='CAL_MATCH'
   VALUES(2)='PREV'
   PARAMS(3)='CAL_UARS_DAY'
   VALUES(3)='126'
   PARAMS(4)='VERSION'
   VALUES(4)='RC_V511A'
 $END
 $DEFAULT_PARAMS
 $END
**Number of files associated with this program:
      11
 $FILE_PARAMS
   LOGICAL_FILE_ID='L2_CD'
   DATA_FILE_NAME='/home/gwarner/winslin/level1/DAT_L2/L2_CD_D0126.DAT'
   DATA_LEVEL='2'
   OLD_NEW='NEW'
   DATA_TYPE='WINDII'
   SUBTYPE='CD'
   UARS_DAY=126
 $END
 $FILE_PARAMS
   LOGICAL_FILE_ID='L2_FD1_O2'
   DATA_FILE_NAME='/home/gwarner/winslin/level1/DAT_L2/L2_FD1_O2_D0126.DAT'
   DATA_LEVEL='2'
   OLD_NEW='OLD'
   DATA_TYPE='WINDII'
   SUBTYPE='FD1O2'
   UARS_DAY=126
 $END
 $FILE_PARAMS
   LOGICAL_FILE_ID='L2_FD2_O2'
   DATA_FILE_NAME='/home/gwarner/winslin/level1/DAT_L2/L2_FD2_O2_D0126.DAT'
   DATA_LEVEL='2'
   OLD_NEW='OLD'
   DATA_TYPE='WINDII'
   SUBTYPE='FD2O2'
   UARS_DAY=126
 $END
 $FILE_PARAMS
   LOGICAL_FILE_ID='L2_FD1'
   DATA_FILE_NAME='/home/gwarner/winslin/level1/DAT_L2/L2_FD1_D0126.DAT'
   DATA_LEVEL='2'
   OLD_NEW='HELD'
   DATA_TYPE='WINDII'
   SUBTYPE='FD1'
   UARS_DAY=126
   ESTIMATED_FILE_SIZE=15000
 $END
 $FILE_PARAMS
   LOGICAL_FILE_ID='L2_FD2'
   DATA_FILE_NAME='/home/gwarner/winslin/level1/DAT_L2/L2_FD2_D0126.DAT'
   DATA_LEVEL='2'
   OLD_NEW='NEW'
   DATA_TYPE='WINDII'
   SUBTYPE='FD2'
   UARS_DAY=126
```

```
  ESTIMATED_FILE_SIZE=15000
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='C_CONST'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/CONST/cdbv5/c_const.dat'
  DATA_LEVEL=' '
  CALIBRATION_ID='CONST'
  CALIBRATION_MATCH='PREV'
  PRE_NXT_UARS_DAY=126
  SUBTYPE='WINDII'
  UARS_DAY=126
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='C_CDBP'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/CONST/cdbv5/0126/c_cdbp.dat'
  DATA_LEVEL=' '
  CALIBRATION_ID='CDBP'
  CALIBRATION_MATCH='PREV'
  PRE_NXT_UARS_DAY=126
  SUBTYPE='WINDII'
  UARS_DAY=126
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='T2_OPELOG'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/SCRATCH/T2_OPELOG_D0126.DAT'
  USER_STATUS_FILE_NUMBER=3
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='T2_REP'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/SCRATCH/T2_REP_D0126.DAT'
  USER_STATUS_FILE_NUMBER=4
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='L1_HDR'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/DAT_L1/L1_HDR_D0126.DAT'
$END
$FILE_PARAMS
  LOGICAL_FILE_ID='ORBIT_ATTITUDE'
  DATA_FILE_NAME='/home/gwarner/winslin/level1/DAT_L0/oa_extract_b_d0126.dat'
$END
```

Appendix B: Level 1 Program Makefiles

B.1 DA_DECOM Makefile: Make_da

```
# Makefile for the executable of program DA_DECOM
# Options:           -f        folds all symbolic names to lower case
#                    -s        allocate local variables statically
#                    -C        check array indices are within bounds
#                    -N3       includes recl info for sequential
#                              unformatted files
#                    -N51      for DA unf. files, RECL = # 32 bit
#                              words in rec
#                    -W        accept statements beyond column 72
#                              up to column 132
#                    -O2       enable block level optimisation
#                    -N33      causes structure fields to be "packed"
#                    -B19    more than one symbolic name references a
#                             variable's memory location
#                    -V      accept VAX tab-format source code
#                    -B111   issue instructions to ensure the integrity
#                             of the FPU stack
#
f77Opts = -f -s -C -N51 -W -O2 -N33 -B19 -V -B111 -g
LPATH = -L/home/gwarner/winslin/lib

LIB = -lL1 -lU77 -lCF -lLSS

INCLUDES = -I/home/gwarner/winslin/sdpps_include

SRC = da_decom.f
OBJ = da_decom.o
EXE = da_decom.out


# Create the linked executable
$(EXE): $(OBJ)
          f77 $(LPATH) $(LIB) $(f77Opts) -o $(EXE) $(SRC) $(INCLUDES)


# create the binary object file
$(OBJ): $(SRC)
          f77 -c $(f77Opts) $(INCLUDES) $(SRC)
```

B.2 CI_CONTROL Makefile: Make_ci

```
# Makefile for the executable of program CI_CONTROL
# Options:          -f        folds all symbolic names to lower case
#                   -s        allocate local variables statically
#                   -C        check array indices are within bounds
#                   -N3       includes recl info for sequential
#                             unformatted files
#                   -N51      for DA unf. files, RECL = # 32 bit
#                             words in rec
#                   -W        accept statements beyond column 72 up
#                             to column 132
#                   -O2       enable block level optimisation
#                   -N33      causes structure fields to be "packed"
#                   -B19    more than one symbolic name references a
#                            variable's memory location
#                   -V      accept VAX tab-format source code
#                   -B111   issue instructions to ensure the integrity
#                            of the FPU stack
#
f77Opts = -f -s -C -N51 -W -O2 -N33 -B19 -V -B111 -g
LPATH = -L/home/gwarner/winslin/lib

LIB = -lL1 -lCF -lLSS -lYU -lU77 -lUTL -lNAG

INCLUDES = -I/home/gwarner/winslin/sdpps_include

SRC = ci_control.f
OBJ = ci_control.o
EXE = ci_control.out


# Create the linked executable
$(EXE): $(OBJ)
          f77 $(LPATH) $(LIB) $(f77Opts) -o $(EXE) $(SRC) $(INCLUDES)


# create the binary object file
$(OBJ): $(SRC)
          f77 -c $(f77Opts) $(INCLUDES) $(SRC)
```

B.3 PS_CONTROL Makefile: Make_ps

```
# Makefile for the executable of program PS_CONTROL
# Options:           -f        folds all symbolic names to lower case
#                    -s        allocate local variables statically
#                    -C        check array indices are within bounds
#                    -N3       includes recl info for sequential
#                              unformatted files
#                    -N51      for DA unf. files, RECL = # 32 bit
#                              words in rec
#                    -W        accept statements beyond column 72 up
#                              to column 132
#                    -O2       enable block level optimisation
#                    -N33      causes structure fields to be "packed"
#                    -B19    more than one symbolic name references a
#                            variable's memory location
#                    -V      accept VAX tab-format source code
#                    -B111   issue instructions to ensure the integrity
#                            of the FPU stack
#
f77Opts = -f -s -C -N51 -W -O2 -N33 -B19 -V -B111 -g
LPATH = -L/home/gwarner/winslin/lib

LIB = -lL1 -lCF -lLSS -lU77

INCLUDES = -I/home/gwarner/winslin/sdpps_include

SRC = ps_control.f
OBJ = ps_control.o
EXE = ps_control.out


# Create the linked executable
$(EXE): $(OBJ)
          f77 $(LPATH) $(LIB) $(f77Opts) -o $(EXE) $(SRC) $(INCLUDES)


# create the binary object file
$(OBJ): $(SRC)
          f77 -c $(f77Opts) $(INCLUDES) $(SRC)
```

B.4 CO_CONTROL Makefile: Make_co

```
# Makefile for the executable of program CO_CONTROL
# Options:           -f        folds all symbolic names to lower case
#                    -s        allocate local variables statically
#                    -C        check array indices are within bounds
#                    -N3       includes recl info for sequential
#                              unformatted files
#                    -N51      for DA unf. files, RECL = # 32 bit
#                              words in rec
#                    -W        accept statements beyond column 72 up
#                              to column 132
#                    -O2       enable block level optimisation
#                    -N33      causes structure fields to be "packed"
#                    -B19    more than one symbolic name references a
#                            variable's memory location
#                    -V      accept VAX tab-format source code
#                    -B111   issue instructions to ensure the integrity
#                            of the FPU stack
#
f77Opts = -f -s -C -N51 -W -O2 -N33 -B19 -V -B111 -g
LPATH = -L/home/gwarner/winslin/lib

LIB = -lL1 -lSA -lCF -lLSS -lYU -lU77 -lNAG

INCLUDES = -I/home/gwarner/winslin/sdpps_include

SRC = co_control.f
OBJ = co_control.o
EXE = co_control.out


# Create the linked executable
$(EXE): $(OBJ)
          f77 $(LPATH) $(LIB) $(f77Opts) -o $(EXE) $(SRC) $(INCLUDES)


# create the binary object file
$(OBJ): $(SRC)
          f77 -c $(f77Opts) $(INCLUDES) $(SRC)
```

Appendix C: Level 2 Program Makefiles

C.1 RA_EXTRACT Makefile: Make_ra

```
# Makefile for the executable of program RA_EXTRACT
# Options:           -f         folds all symbolic names to lower case
#                    -s         allocate local variables statically
#                    -C         check array indices are within bounds
#                    -N3        includes recl info for sequential
#                               unformatted files
#                    -N51       for DA unf. files, RECL = # 32 bit
#                               words in rec
#                    -W         accept statements beyond column 72 up
#                               to column 132
#                    -O2        enable block level optimisation
#                    -N33       causes structure fields to be "packed"
#                    -B19     more than one symbolic name references a
#                              variable's memory location
#                    -V       accept VAX tab-format source code
#                    -B111    issue instructions to ensure the integrity
#                              of the FPU stack
#
f77Opts = -f -s -C -N51 -W -O2 -N33 -B19 -V -B111 -g
LPATH = -L/home/gwarner/winslin/lib

LIB = -lL2 -lCF -lLSS -lYU -lU77 -lNAG

INCLUDES = -I/home/gwarner/winslin/sdpps_include

SRC = ra_extract.f
OBJ = ra_extract.o
EXE = ra_extract.out


# Create the linked executable
$(EXE): $(OBJ)
          f77 $(LPATH) $(LIB) $(f77Opts) -o $(EXE) $(SRC) $(INCLUDES)


# create the binary object file
$(OBJ): $(SRC)
          f77 -c $(f77Opts) $(INCLUDES) $(SRC)
```

C.2 RD_DECONVOLUTE Makefile: Make_rd

```
# Makefile for the executable of program RD_DECONVOLUTE
# Options:           -f         folds all symbolic names to lower case
#                    -s         allocate local variables statically
#                    -C         check array indices are within bounds
#                    -N3        includes recl info for sequential
#                               unformatted files
#                    -N51       for DA unf. files, RECL = # 32 bit
#                               words in rec
#                    -W         accept statements beyond column 72 up
#                               to column 132
#                    -O2        enable block level optimisation
#                    -N33       causes structure fields to be "packed"
#                    -B19     more than one symbolic name references a
#                              variable's memory location
#                    -V       accept VAX tab-format source code
#                    -B111    issue instructions to ensure the integrity
#                              of the FPU stack
#
f77Opts = -f -s -C -N51 -W -O2 -N33 -B19 -V -B111 -g
LPATH = -L/home/gwarner/winslin/lib

LIB = -lL2 -lCF -lLSS -lSA -lYU -lU77 -lNAG

INCLUDES = -I/home/gwarner/winslin/sdpps_include

SRC = rd_deconvolute.f
OBJ = rd_deconvolute.o
EXE = rd_deconvolute.out


# Create the linked executable
$(EXE): $(OBJ)
          f77 $(LPATH) $(LIB) $(f77Opts) -o $(EXE) $(SRC) $(INCLUDES)


# create the binary object file
$(OBJ): $(SRC)
          f77 -c $(f77Opts) $(INCLUDES) $(SRC)
```

C.3 RP_PRODUCE Makefile: Make_rp

```
# Makefile for the executable of program RP_PRODUCE
# Options:           -f         folds all symbolic names to lower case
#                    -s         allocate local variables statically
#                    -C         check array indices are within bounds
#                    -N3        includes recl info for sequential
#                               unformatted files
#                    -N51       for DA unf. files, RECL = # 32 bit
#                               words in rec
#                    -W         accept statements beyond column 72 up
#                               to column 132
#                    -O2        enable block level optimisation
#                    -N33       causes structure fields to be "packed"
#                    -B19     more than one symbolic name references a
#                              variable's memory location
#                    -V       accept VAX tab-format source code
#                    -B111    issue instructions to ensure the integrity
#                              of the FPU stack
#
f77Opts = -f -s -C -N51 -W -O2 -N33 -B19 -V -B111 -g
LPATH = -L/home/gwarner/winslin/lib

LIB = -lL2 -lCF -lLSS -lU77

INCLUDES = -I/home/gwarner/winslin/sdpps_include

SRC = rp_produce.f
OBJ = rp_produce.o
EXE = rp_produce.out


# Create the linked executable
$(EXE): $(OBJ)
          f77 $(LPATH) $(LIB) $(f77Opts) -o $(EXE) $(SRC) $(INCLUDES)


# create the binary object file
$(OBJ): $(SRC)
          f77 -c $(f77Opts) $(INCLUDES) $(SRC)
```

C.4 YU_RC_COMBINE Makefile: Make_yu

```
# Makefile for the executable of program YU_RC_COMBINE
# Options:           -f        folds all symbolic names to lower case
#                    -s        allocate local variables statically
#                    -C        check array indices are within bounds
#                    -N3       includes recl info for sequential
#                              unformatted files
#                    -N51      for DA unf. files, RECL = # 32 bit
#                              words in rec
#                    -W        accept statements beyond column 72 up
#                              to column 132
#                    -O2       enable block level optimisation
#                    -N33      causes structure fields to be "packed"
#                    -B19    more than one symbolic name references a
#                             variable's memory location
#                    -V      accept VAX tab-format source code
#                    -B111   issue instructions to ensure the integrity
#                             of the FPU stack
#
f77Opts = -f -s -C -N51 -W -O2 -N33 -B19 -V -B111 -g
LPATH = -L/home/gwarner/winslin/lib

LIB = -lL2 -lCF -lLSS -lYU -lSA -lU77 -lNAG

INCLUDES = -I/home/gwarner/winslin/sdpps_include

SRC = yu_rc_combine.f
OBJ = yu_rc_combine.o
EXE = yu_rc_combine.out


# Create the linked executable
$(EXE): $(OBJ)
          f77 $(LPATH) $(LIB) $(f77Opts) -o $(EXE) $(SRC) $(INCLUDES)


# create the binary object file
$(OBJ): $(SRC)
          f77 -c $(f77Opts) $(INCLUDES) $(SRC)
```

Appendix D: Sample Library Makefile

The Makefile for the library libSA.a is reproduced below:

```
# Makefile for creating SA FORTRAN (SA) library for
# WINDII SDPPS Linux (WINSLIN)
# Options:           -f         folds all symbolic names to lower case
#                    -s         allocate local variables statically
#                    -C         check array indices are within bounds
#                    -N3        includes recl info for sequential
#                               unformatted files
#                    -N51       for DA unf. files, RECL = # 32 bit
#                               words in rec
#                    -W         accept statements beyond column 72 up
#                               to column 132
#                    -O2        enable block level optimisation
#                    -N33       causes structure fields to be "packed"
#                    -B19     more than one symbolic name references a
#                              variable's memory location
#                    -V       accept VAX tab-format source code
#                    -B111    issue instructions to ensure the integrity
#                              of the FPU stack
#
f77Opts = -f -s -C -N51 -W -O2 -N33 -B19 -V -B111 -g -c
LIB = /home/gwarner/winslin/lib/libSA.a

INCLUDES = -I/home/gwarner/winslin/sdpps_include
-I/home/gwarner/winslin/lss

SOURCE = \
sa_flag_star.f             sa_preces_cor.f       \
sa_get_orbit.f             sa_scal_prod.f        \
sa_get_planet.f            sa_star_init.f        \
sa_co_least_square.f       sa_light_condition.f  \
sa_star_search.f           co_moon_fov.f         \
sa_co_roal_correct.f       sa_light_r_const.f    \
sa_co_roal.f               sa_planet_update.f    \
yoa_ephem.f                yoa_find_binary_rec.f \
yoa_get_lukey.f            yoa_sat_att.f         \
yoa_sat_orb.f              yoa_limb_calc.f       \
yoa_view_vec_check.f       utl_time_check.f      \
yoa_earth_rad.f       \
yoa_sza_lst.f              yoa_sza_lst_check.f   \
yoa_compute_lst.f          yoa_compute_sza.f

$(LIB): $(SOURCE) \
$(LIB)(sa_flag_star.o)        $(LIB)(sa_preces_cor.o)       \
$(LIB)(sa_get_orbit.o)        $(LIB)(sa_scal_prod.o)        \
$(LIB)(sa_get_planet.o)       $(LIB)(sa_star_init.o)        \
$(LIB)(sa_co_least_square.o)  $(LIB)(sa_light_condition.o)  \
$(LIB)(sa_star_search.o)      $(LIB)(co_moon_fov.o)         \
```

```
$(LIB)(sa_co_roal_correct.o)  $(LIB)(sa_light_r_const.o)    \
$(LIB)(sa_co_roal.o)          $(LIB)(sa_planet_update.o)    \
$(LIB)(yoa_ephem.o)           $(LIB)(yoa_find_binary_rec.o) \
$(LIB)(yoa_get_lukey.o)       $(LIB)(yoa_sat_att.o)         \
$(LIB)(yoa_sat_orb.o)         $(LIB)(yoa_limb_calc.o)       \
$(LIB)(yoa_view_vec_check.o)  $(LIB)(utl_time_check.o)      \
$(LIB)(yoa_earth_rad.o)       \
$(LIB)(yoa_sza_lst.o)         $(LIB)(yoa_sza_lst_check.o)   \
$(LIB)(yoa_compute_lst.o)     $(LIB)(yoa_compute_sza.o)

.f.a:
          f77 $(f77Opts) $(INCLUDES) $<
          ar rv $(LIB) $*.o
          rm -f $*.o
```