# User Guide for New User Interface Program

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## 1  Introduction

User Interface Program (UIP) is an application program to control the telescope and take heterodyne receiver data at the Caltech Submillimeter Observatory (CSO). The original UIP was written mostly in PASCAL, with a small portion in FORTRAN and C. It ran on the VMS operating system. A new UIP, described in this memo, is written in C++ and meant to be run on modern Linux/UNIX operating systems. The original UIP utilized the DEC Command Language (DCL) as a command line interpreter. As a result, its interface was essentially the same with the VMS operating system itself. On the other hand, the new UIP is built upon the GILDAS Sympathique Interpréteur de Commandes (SIC). Its look and feel are similar to the DCL, but there are some syntactic differences.

## 2  Running New UIP

Although technically it can run on any Linux computers at the summit, namely `kilauea`, `puuoo`, `lapakahi`, and others, the new UIP should only be started on `kilauea`. Each user account on `kilauea` is set up to have an immediate access to the new UIP. There is a common user account named `observer` which can also be used to run the new UIP. Log on to `kilauea` directly from the console or using a secure shell. Type `uip` then `RETURN` to start the new UIP. Note that the path of the actual program to run is `/opt/uip/bin/uip.bin`. The "`uip`" is an alias to execute the above with appropriate options.

A set of UIP commands can be executed automatically when the UIP is started by placing them in `~/.gag/init/init.uip`.

### 2.1  Warm Start

For regular use, simply log on to `kilauea` and run the new UIP. The communication link with the antenna should already be open, and you should be able to move the antenna. If you are getting exceptions like "TRANSIENT", try the following UIP command: `ANTENNA_LOAD /RESTART`.

### 2.2  Cold Start

The new UIP requires various network services to be present on `kilauea` in order to be able to communicate with the antenna, spectrometers, and other telescope control subsystems. For technical reasons, these services can not be started automatically at boot time or manually by regular users. Instead, they must be started once interactively by the superuser. If the main control workstation `kilauea` has been rebooted for whatever reason, the services have to be initialized and started by the following script: `/opt/uip/sbin/rcuip start`. Then the communication link between the new UIP and antenna has to be reset by the following UIP command: `ANTENNA_LOAD /RESTART`. If one of the facility heterodyne receivers and spectrometers are in use, the

following command should be used instead: `ANTENNA_LOAD /RESTART /NOSYNCHRONIZE`, and the communication links with the spectrometers and IF processor should also be reset using the following commands: `SPECTROMETER ... /RESTART` and `LO ....`.

## 2.3 Restart

When the new UIP is having troubles communicating with the antenna or one of other telescope control subsystems, and `ANTENNA_LOAD /RESTART`, `SPECTROMETER ... /RESTART`, etc. do not fix the problem, the above mentioned script can be used as a last resort to reinitialize and restart the network services needed by the new UIP: `/opt/uip/sbin/rcuip restart`. This has to be done by the superuser. All instances of the new UIPs will be terminated. Once the services are restarted, the communication links have to be reset by following the instructions for cold start above.

# 3 Catalogs

Source and line catalogs are in plain text format. Existing entries can be edited and new entries can be added directly using any text editor. (`SOURCE` and `LINE` commands are no longer available.)

Catalog filenames must be all in lower case letters. The default filename extension is `.cat` for source catalogs and `.line_cat` for line catalogs. The location of system's default catalogs is `kilauea:/opt/uip/cat`, and the location of user's private catalogs is `kilauea:~/.uip/cat`. The `CATALOG` command looks for a catalog in the current directory, user's private catalog directory, then system's default catalog directory, in that order.

## 3.1 Source Catalogs

The format of source catalogs is a derivative of GILDAS ASTRO's.

The simplest form, suitable for continuum sources, is:

> `SOURCE_NAME COORDINATE_TYPE LONGITUDE LATITUDE`

`SOURCE_NAME` is the name(s) of the source. Two or more names are separated by "|". `COORDINATE_TYPE` is the type of the coordinate system and it has to be either "EQ" for equatorial, "GA" for Galactic II, "DA" for apparent equatorial, or "HO" for horizontal coordinates. If the coordinate system is equatorial, the keyword "EQ" has to be followed by the epoch of the coordinate system, or equinox, like "EQ 2000" for J2000.0 or "EQ 1950" for B1950.0. `LONGITUDE` is the longitude-like coordinate and it has to be either in sexagesimal notation like "hh:mm:ss.ss" or "hh:mm.mmmm" or simply in hours or degrees like "hh.hhhhhh". `LATITUDE`" is the latitude-like coordinate and it has to be in the same format as `LONGITUDE`.

When the source has a proper-motion, the following form is used:

> `SOURCE_NAME COORDINATE_TYPE LONGITUDE,PM_LONGITUDE LATITUDE,PM_LATITUDE`

`PM_LONGITUDE` and `PM_LATITUDE` are the rate of change of the coordinate value in the longitude-like and latitude-like axes, respectively. For the equatorial coordinates, `PM_LONGITUDE` is in $\mathrm{s\,yr^{-1}}$ and `PM_LATITUDE` is in $''\,\mathrm{yr^{-1}}$.

The most commonly used form is:

> `SOURCE_NAME COORDINATE_TYPE LONGITUDE LATITUDE VELOCITY_TYPE VELOCITY`

`VELOCITY_TYPE` is the type of the velocity and it has to be either "LS" for the LSR, "HE" for the Solar-system barycentric, "EA" for the geocentric, or "OB" for the topocentric velocity. `VELOCITY` is the velocity in $\mathrm{km\,s^{-1}}$.

As an example, a few entries from the system default source catalog are shown below:

```
O_CET    EQ 1950.00 02:16:49.040,-0.00080 -03:12:13.39,-0.2330 LSR  46.80
W3OHUH   EQ 1950.00 02:23:16.700            61:38:54.01          LSR -47.40
NGC1333  EQ 2000.00 03:29:03.700            31:16:02.70          LSR   0.00
ORIUH    EQ 1950.00 05:32:47.000           -05:24:21.00          LSR   9.00
W51UH    EQ 1950.00 19:21:27.001            14:24:30.00          LSR  57.10
```

Designated OFF positions can be named freely, as the /DESIGNATED_OFF option of the OFF_POSITION, OO_SCAN, OTF_MAP, TCAL, and TEXAS commands takes a source name as an optional argument. By default, these commands look for a source named SOURCE_NAME:off_position in the open catalogs, where SOURCE_NAME is the name of the current ON source. Suffixes other than :off_position do not have any special meaning.

## 3.2 Line Catalogs

The format of line catalogs is:

```
LINE_NAME FREQUENCY FREQUENCY_UNIT SIDEBAND
```

LINE_NAME is the name(s) of the line. Two or more names are separated by "|". FREQUENCY is the frequency of the line in GHz. FREQUENCY_UNIT is the unit of the frequency and it has to be "GHz". SIDEBAND is the sideband to put the line in (all the CSO heterodyne receivers are double sideband) and it has to be either "USB" for upper sideband or "LSB" for lower sideband.

As an example, a few entries from the system default line catalog are shown below:

```
12CO2-1 230.5379700 GHz LSB
12CO3-2 345.7959900 GHz USB
12CO4-3 461.0408110 GHz LSB
12CO6-5 691.4729800 GHz USB
12CO7-6 806.6517200 GHz LSB
```

# 4  Ephemerides

Ephemerides for Solar System objects are plain text files with entries in the following format:

```
DATE RIGHT_ASCENSION DECLINATION RANGE RANGE_RATE
```

DATE is the universal time (UTC) in Julian day format. RIGHT_ASCENSION is the geocentric apparent right ascension in sexagesimal notation "hh mm ss.ss" or alternatively "hh:mm:ss.ss". DECLINATION is the geocentric apparent declination in sexagesimal notation "+dd mm ss.s" or alternatively "+dd:mm:ss.s". RANGE is the geocentric range in AU. RANGE_RATE is the geocentric range rate in $\mathrm{km\,s^{-1}}$.

As an example, a few entries from the ephemeris file for Titan are shown below:

```
2454832.500000000 11 33 04.8430 +05 08 56.079 9.00952445513056 -29.4049816
2454832.625000000 11 33 05.4242 +05 08 58.749 9.00739372774336 -29.6222299
2454832.750000000 11 33 05.9865 +05 09 01.449 9.00524749734546 -29.8343300
2454832.875000000 11 33 06.5286 +05 09 04.179 9.00308615465248 -30.0407553
2454833.000000000 11 33 07.0492 +05 09 06.937 9.00091012827573 -30.2409828
```

Ephemeris files in the above format can be generated using JPL's HORIZONS system. The example shown above has been generated through the HORIZONS web-interface using the following settings then removing everything from $$SOE and before and from $$EOE and after: Alternatively, a utility program kilauea:/opt/uip/bin/ephemeris_generator can be used to generate ephemerides in the above format, or the PLANET command with the /JPL_HORIZONS option can generate ephemerides on-the-fly.

| Observer Location | : | Geocentric [500] |
|---|---|---|
| Table Settings | : | QUANTITIES=2,20; date/time format=JD; extra precision=YES; object page=NO |
| Display/Output | : | plain text |

Ephemeris filenames must be all in lower case letters. The default filename extension is `.dat`. The location of system's default ephemerides is `kilauea:/opt/uip/eph`, and the location of user's private ephemerides is `kilauea:~/.uip/eph`. The `PLANET` command looks for an ephemeris in the current directory, user's private ephemeris directory, then system's default ephemeris directory, in that order.

# 5   Command Procedures (Macros)

Command procedures (macros), or observing scripts, are realized by underlying GILDAS SIC's scripting capability. Command procedures are executed using the `SIC\@` command. For details, please see the SIC Manual.

Command procedure filenames must be all in lower case letters. The default filename extensions are `.uip` and `.pro`. The location of system procedures is `kilauea:/opt/uip/pro`, and the location of user's private procedures is `kilauea:~/.uip/pro`.

The `SIC\@` command does *not* automatically look for procedures in the above mentioned directories, however. A full path must be specified if a procedure is not in the current directory. The search path of the `SIC\@` command can be changed by the `SIC\SIC MACRO` command. For example, to let the `SIC\@` command search procedures in the current directory, user's private directory, and system directory, in that order, add a following command to `kilauea:~/.gag/init/init.uip`:

```
sic\sic macro "./;~/.uip/pro/;$UIP_ROOT/pro/;"
```

# 6   User Defined Commands and Symbols (Aliases)

User defined commands and symbols (aliases) are capabilities provided by underlying GILDAS SIC. The `SIC\DEFINE COMMAND` command allows to define a new command with optional help. The `SIC\SYMBOL` command allows to define an alias, or shorthand, for any text string.

One use case of user defined commands and symbols is as a shorthand for command procedures. For example, the system defines a new command `fazo` as "`sic\@ $UIP_ROOT/pro/fazo.uip`", as shown below:

```
sic\define command fazo "sic\@ $UIP_ROOT/pro/fazo.uip" $UIP_ROOT/pro/fazo.hlp
```

Thus the command procedure `fazo.uip`, which is not in the current directory, can be executed by simply typing `fazo`. A similar result can be obtained by defining a symbol `fazo` as "`sic\@ $UIP_ROOT/pro/fazo.uip`", as shown below:

```
sic\symbol fazo "sic\@ $UIP_ROOT/pro/fazo.uip"
```

System commands and symbols are defined in `kilauea:$GAG_ROOT_DIR/pro/define.uip`, and user's private commands and symbols are defined in `kilauea:~/.gag/init/init.uip`.

# A   References

- Release Notes for New User Interface Program (pdf)

- Transition Guide for New User Interface Program (pdf)

- SIC Manual (pdf)

# B Revision History

- 1.0 (July 8, 2009) HY — Initial release.

- 1.1 (August 17, 2009) HY — Updated information about user accounts.

- 1.2 (August 31, 2009) HY — Actual inclusion of command help texts.

- 1.3 (October 5, 2009) HY — Detailed information about source catalog format.

- 1.4 (July 12, 2010) HY — Instructions for (re)starting CORBA and UIP services.

- 1.5 (October 12, 2010) HY — Instruction for starting the weather logging services.

- 1.6 (June 17, 2011) HY — Added sections for ephemerides, command procedures, symbols, and user defined commands.

- 1.7 (June 21, 2011) HY — File naming rules.

- 1.8 (June 30, 2011) HY — Favors user defined commands over plain symbols.

# C Command Help

This section was automatically generated from the latest help file.

## C.1   Language

UIP\ Command Language Summary

## C.2   _NEW_POSITION

[UIP\]_NEW_POSITION

## C.3   _OFF_POSITION

[UIP\]_OFF_POSITION [/CLEAR [/ONLY_OFF]]

### C.3.1   _OFF_POSITION /CLEAR

### C.3.2   _OFF_POSITION /ONLY_OFF

## C.4   _ON_POSITION

[UIP\]_ON_POSITION [/CLEAR [/ONLY_ON]]

### C.4.1   _ON_POSITION /CLEAR

### C.4.2   _ON_POSITION /ONLY_ON

## C.5   _TAKE_DATA

[UIP\]_TAKE_DATA [/LEAVE]

### C.5.1   _TAKE_DATA /LEAVE

## C.6  ACQUIRE_LIMITS

```
[UIP\]ACQUIRE_LIMITS [ON_TOLERANCE [OFF_TOLERANCE]]
```

Allows  you to set, independently, the acquisition limits for the ON and
OFF positions.  The smaller these values are, the longer  it  will  take
the  antenna  to  decide it has acquired the source, and the slower your
data taking will be.

Typing this command with no parameters will result in the current values
being typed on the terminal.

### C.6.1  ACQUIRE_LIMITS ON_TOLERANCE

The acquisition limit for ON scans, in arc seconds.

### C.6.2  ACQUIRE_LIMITS OFF_TOLERANCE

The acquisition limit for OFF scans, in arc seconds.

## C.7  ADJUST_ATTN

```
[UIP\]ADJUST_ATTN
```

Tells  the backend to automatically set its attenuator at this time.  It
only sets it once per invocation, no automatic updating is  done.   This
command currently only works if the AOS or FFTS is the backend.

## C.8  ALTAZ

```
[UIP\]ALTAZ
```

Tells the antenna computer to switch to altazimuthal pointing mode.  The
values given with the AZ and EL commands are used.  The  telescope  will
not  be  idle,  and  it  will  continuously try to stay at the requested
position.

## C.9  ANTENNA_LOAD

```
[UIP\]ANTENNA_LOAD /RESTART [/NOSYNCHRONIZE]
```

```
[UIP\]ANTENNA_LOAD /SHUTDOWN

[UIP\]ANTENNA_LOAD
```

Allows you to restart various server processes running  on  the  antenna
computer  as  well as their client processes which are needed for proper
operation of the telescope.

### C.9.1   ANTENNA_LOAD /RESTART

If /RESTART is specified, client processes on kilauea (antenna messenger
and  event handler), and servers and other processes on the antenna com-
puter will be restarted in an appropriate order.

### C.9.2   ANTENNA_LOAD /SHUTDOWN

If /SHUTDOWN is specified, client processes on kilauea (antenna  messen-
ger  and  event handler), and servers and other processes on the antenna
computer will be stopped.  This is useful, for example,  when  the  sec-
ondary mirror needs to be homed.

### C.9.3   ANTENNA_LOAD /NOSYNCHRONIZE

If  /NOSYNCHRONIZE is specified, no messages will be sent to the backend
computer.  This will prevent the ANTENNA_LOAD command from hanging  when
the  spectrometer  related processes are not running on the backend com-
puter.

## C.10   ANWAIT

```
[UIP\]ANWAIT
```

Causes the UIP to pause until the  antenna  computer  has  acquired  the
source  it  is trying to track.  It is primarily of use in synchronizing
command file (schedule) execution.

If this command is executed interactively, it can  be  aborted  via  ^C.
This is also true if the ANWAIT command appears in a DEFINEd macro, such
as IAZ or IZA.  Note that canceling ANWAIT in  this  manner  will  also
force any other process to continue if it was waiting for the antenna to
acquire the requested position.

## C.11  ATLST

```
[UIP\]ATLST TIME [/SLACK_TIME SLACK_TIME]
```

Halts execution until the specified local sidereal time.  It is used  to
control the execution of schedules.

### C.11.1  ATLST TIME

The local sidereal time in the format HH:MM:SS.

### C.11.2  ATLST /SLACK_TIME

If  the  specified  LST is earlier than the current LST, but not by more
than SLACK_TIME seconds, execution  continues  without  halting.   For
instance if ATLST 12:00:00 is executed at 12:05:00 LST, and SLACK_TIME =
3600, then execution will continue.  However if SLACK_TIME = 60  in  the
example above, then execution would have halted until the next day.

## C.12  ATUT

```
[UIP\]ATUT TIME [DATE]
```

Halts  execution  until the specified coordinated universal time.  It is
used to control the execution of schedules.

### C.12.1  ATUT TIME

The coordinated universal time in the format HH:MM:SS.

### C.12.2  ATUT DATE

The date in the format YYYYMMDD.

## C.13  DB

```
[UIP\]DB ATTENUATION [/ADD | /SUBTRACT] [/AOS5] [/FFTS1]
```

```
[UIP\]DB /MAXIMUM [/AOS5] [/FFTS1]
```

```
[UIP\]DB /SAVE [/AOS5] [/FFTS1]

[UIP\]DB /RESTORE [/AOS5] [/FFTS1]

[UIP\]DB [/AOS5] [/FFTS1]
```

Sets the programmable attenuator in the currently active backend to a
new value. This command currently only works with the AOS and FFTS
backend, and, with the AOS backend, only when manual attenuation is dis-
abled on the front panel.

### C.13.1  DB ATTENUATION

The attenuation to insert in dB. Valid values are integers between 0
and 63 for the AOS5, or integers between 0 and 20 for the FFTS1.

### C.13.2  DB /ADD

Causes the ATTENUATION to be added to the current attenuation.

### C.13.3  DB /SUBTRACT

Causes the ATTENUATION to be subtracted the current attenuation.

### C.13.4  DB /MAXIMUM

Causes the attenuator to be set to its maximum possible value.

### C.13.5  DB /SAVE

Causes the current attenuator value to be saved so that it can temporar-
ily be changed and later be restored.

### C.13.6  DB /RESTORE

Causes the attenuator to be restored to the previously saved value.

### C.13.7 DB /AOS5

Causes  the attenuator for the AOS5 to be set, regardless of which spectrometer is currently active.

### C.13.8 DB /FFTS1

Causes the attenuator for the FFTS1 to be set, regardless of which spectrometer is currently active.

## C.14 AZ

```
[UIP\]AZ [ANGLE]
```

Sends a new azimuth angle to the antenna computer.  The command AZ automatically selects altazimuthal coordinates.

### C.14.1 AZ ANGLE

The new azimuth angle to be sent to the antenna computer.

## C.15 AZO

```
[UIP\]AZO [OFFSET] [/FIXED FIXED_OFFSET]  [/MAPPING  MAPPING_OFFSET]
[/FIELD FIELD_OFFSET] [/TEXAS TEXAS_OFFSET] [/CHOPPING CHOPPING_OFFSET]
```

```
[UIP\]AZO [/FIXED | /MAPPING | /FIELD | /TEXAS | /CHOPPING]
```

```
[UIP\]AZO /LHS_BEAM | /RHS_BEAM
```

Sends a new azimuth offset to the antenna computer.

### C.15.1 AZO OFFSET

The new azimuth offset in arc seconds.

### C.15.2 AZO /FIXED

Modifies or prints the fixed offset.

### C.15.3 AZO FIXED_OFFSET

The new fixed azimuth offset in arc seconds.

### C.15.4 AZO /MAPPING

Modifies or prints the mapping offset.

### C.15.5 AZO MAPPING_OFFSET

The new mapping azimuth offset in arc seconds.

### C.15.6 AZO /FIELD

Modifies or prints the field offset.

### C.15.7 AZO FIELD_OFFSET

The new field azimuth offset in arc seconds.

### C.15.8 AZO /TEXAS

Modifies or prints the Texas offset. The Texas switching mode is acti-
vated (that moves the telescope ON and OFF source based on a digital
input signal to the antenna computer) if the offset is given.

### C.15.9 AZO TEXAS_OFFSET

The new Texas azimuth offset in arc seconds.

### C.15.10 AZO /CHOPPING

Modifies or prints the chopping offset. This offset is intended
primarily for use in bolometer mode. It is NOT recorded in spectral
line data files.

### C.15.11  AZO CHOPPING_OFFSET

The new chopping azimuth offset (CAZO) in arc seconds.

### C.15.12  AZO /LHS_BEAM

Modifies the chopping azimuth offset (CAZO) such that the LHS beam is
pointed toward the source.  This is to be used in bolometer mode.

### C.15.13  AZO /RHS_BEAM

Modifies the chopping azimuth offset (CAZO) such that the  RHS  beam  is
pointed toward the source.  This is to be used in bolometer mode.

## C.16  BEWAIT

```
[UIP\]BEWAIT [/UNINTERRUPTIBLE]
```

Causes the UIP to pause until the backend computer has finished its cur-
rent integration.  It is primarily of use in synchronizing command  file
(schedule) execution.

If  this  command  is  executed interactively, it can be aborted via ^C.
This is also true if the BEWAIT command  appears  in  a  DEFINEd  macro.
Note  that  canceling  BEWAIT  in  this manner will also force any other
process to continue if it was waiting for an integration to complete.

### C.16.1  BEWAIT /UNINTERRUPTIBLE

If this option is specified, BEWAIT cannot be interrupted by ^C.

## C.17  BSWITCH

```
[UIP\]BSWITCH
```

### C.17.1  BSWITCH /FOCUS_ADJUST

## C.17.2  BSWITCH /LEVEL_ADJUST

## C.18  BEEP

```
[UIP\]BEEP COUNT [MESSAGE]

[UIP\]BEEP /SCAN_BEEP | /NOSCAN_BEEP

[UIP\]BEEP
```

Causes the terminal to beep.

### C.18.1  BEEP COUNT

The number of times the terminal should beep.

### C.18.2  BEEP MESSAGE

The message to be typed out after the beep.

### C.18.3  BEEP /SCAN_BEEP

Specifying /SCAN_BEEP will result in the control terminal  beeping  each
time a scan is completed.

### C.18.4  BEEP /NOSCAN_BEEP

Specifying  /NOSCAN_BEEP  will turn off the automatic beep at the end of
each scan.

## C.19  UCB_SCAN

```
[UIP\]UCB_SCAN [RAO1 [RAO2]] [/START | /SETUP]

[UIP\]UCB_SCAN /STOP
```

Enables switching of the telescope between two  right  ascension  offset
positions  and driftscanning according to a signal at the digital input
1 of the antenna computer.  A highlowhighlow sequence at the input
will  result in a pair of driftscans starting from the two offset posi-

tions. The first high at the input 1 will cause the antenna to move to
the offset RAO1. The subsequent low at the input will start a drift
scan from this offset. The next high at the input will cause a move to
RAO2, then the low will start a drift scan from there.

### C.19.1 UCB_SCAN RAO1

The first right ascension offset in arc seconds.

### C.19.2 UCB_SCAN RAO2

The second right ascension offset in arc seconds.

### C.19.3 UCB_SCAN /START

Enables the UCB control of driftscanning.

### C.19.4 UCB_SCAN /STOP

Disables the UCB control of driftscanning.

### C.19.5 UCB_SCAN /SETUP

Sets up the antenna for the UCB instrument.

## C.20 BOX_SCAN

```
[UIP\]BOX_SCAN  X_SIZE Y_SIZE SCAN_VELOCITY [SCAN_DIRECTION] [/ORDER
ORDER]  [/TIME_OFFSET TIME_OFFSET]  [/POSITION_ANGLE  POSITION_ANGLE]
[/ALTAZIMUTHAL | /EQUATORIAL]
```

```
[UIP\]BOX_SCAN /STOP
```

```
[UIP\]BOX_SCAN
```

Implements a trackandboxscan observing mode for SHARC II. This co
mand generates a *billiardball* trajectory using the following paramet-
ric equations:

ORDER

```
     dx(t) = 4 X_SIZE / pi ^ 2  >    Ci sin Fi Wx (t + TIME_OFFSET)

                              i = 1

                              ORDER

     dy(t) = 4 Y_SIZE / pi ^ 2  >    Ci sin Fi Wy (t + TIME_OFFSET)

                              i = 1

     Wx = pi SCAN_VELOCITY / X_SIZE  cos pi SCAN_DIRECTION / 180
     Wy = pi SCAN_VELOCITY / Y_SIZE  sin pi SCAN_DIRECTION / 180
     Fi = 2 i  1
     Ci = 1 ^ (i  1) / Fi ^ 2
```

### C.20.1   BOX_SCAN X_SIZE

The size of the scan box along the X axis in arc seconds.

### C.20.2   BOX_SCAN Y_SIZE

The size of the scan box along the Y axis in arc seconds.

### C.20.3   BOX_SCAN SCAN_VELOCITY

The scan velocity in arc seconds per second.

### C.20.4   BOX_SCAN SCAN_DIRECTION

The initial scan direction, in arc degrees, measured from +X through +Y.
The default is 45.

### C.20.5   BOX_SCAN /ORDER

The number of terms in the sine series to use.  The default is  3.    The
valid range is [1, 16].

### C.20.6   BOX_SCAN /TIME_OFFSET

The time offset in seconds.  This may be useful to restart patterns with
a long period.  The default is 0.

### C.20.7 BOX_SCAN /POSITION_ANGLE

The orientation of the scan coordinates relative to the sky coordinates. It is defined as an angle, in arc degrees, between the X axis of the scan and +AZ, +RA, or +L, measured through +EL, +DEC, or +B. The default is 0, i.e., the scan coordinates (+X, +Y) correspond to the sky coordinates (+AZ, +EL), (+RA, +DEC), or (+L, +B). Note this definition is not sky right.

### C.20.8 BOX_SCAN /ALTAZIMUTHAL

The scan coordinates will be altazimuthal. This is the default.

### C.20.9 BOX_SCAN /EQUATORIAL

The scan coordinates will be apparent equatorial.

### C.20.10 BOX_SCAN /STOP

Will stop the scan.

## C.21 VANE

[UIP\]VANE [/OUT | /IN | /SPIN | /STOP | /SKY0 | /LOAD90 | /SKY180 | /LOAD270]

Allows you to move the temperature calibration vane in and out of the beam.

### C.21.1 VANE /OUT

Moves the temperature calibration vane out of the beam.

### C.21.2 VANE /IN

Moves the temperature calibration vane in the beam.

### C.21.3  VANE /SPIN

Spins the temperature calibration vane.

### C.21.4  VANE /STOP

Stop spinning the temperature calibration vane.

### C.21.5  VANE /SKY0

Positions the temperature calibration vane at 0 degree angle so that the ambient load is out of the beam  same as /OUT.

### C.21.6  VANE /LOAD90

Positions the temperature calibration vane at 90 degree  angle  so  that the ambient load is in the beam  same as /IN.

### C.21.7  VANE /SKY180

Positions  the  temperature calibration vane at 180 degree angle so that the ambient load is out of the beam.

### C.21.8  VANE /LOAD270

Positions the temperature calibration vane at 270 degree angle  so  that the ambient load is in the beam.

### C.21.9  VANE /RESTART

## C.22  CATALOG

[UIP\]CATALOG [NAME] [/CLOSE]

[UIP\]CATALOG /LINE [LINE_NAME] [/CLOSE]

Opens  or  closes  a  file  for use as a source catalog or line catalog. More than one catalogs may be open at once, and they are searched in the

order opposite the order in which they were opened. The source catalog CAT_DIR:DEFAULT_CATALOG.CAT and line catalog CAT_DIR:DEFAULT_CATA-LOG.LINE_CAT are always open, and are searched last. In addition, each user automatically has private source and line catalogs. Their names are

```
PRIVATE_CATALOG.CAT
PRIVATE_CATALOG.LINE_CAT
```

Entering CATALOG without any arguments results in the listing of all the currently open catalogs.

If you do not specify the directory in which the catalog resides, the program will search for the catalog by searching first the current directory, then the home directory, and finally CAT_DIR:. If no file extension is given, .CAT is assumed for the source catalog, and .LINE_CAT is assumed for the line catalog.

### C.22.1  CATALOG NAME

The name of the source catalog.

### C.22.2  CATALOG /LINE

Specifies that a line catalog is to be opened, closed or listed.

### C.22.3  CATALOG LINE_NAME

The name of the line catalog.

### C.22.4  CATALOG /CLOSE

Closes the named or last catalog file opened.

## C.23  CELES

```
[UIP\]CELES
```

Tells the antenna computer to switch to celestial pointing mode. The most recently supplied RA and DEC positions will be used.

## C.24 CHICAGO

[UIP\]CHICAGO [AZOFF1 [AZOFF2]]

[UIP\]CHICAGO /STOP

Enables switching of the telescope between two azimuth offset positions
according to pulses received at the digital inputs 1 and 2 of the
antenna computer. A positive pulse of at least 20 ms at the input 1
will cause the antenna to move to the offset AZOFF1, while a similar
pulse at the input 2 will cause a move to AZOFF2.

### C.24.1 CHICAGO AZOFF1

The first azimuth offset position in arc seconds.

### C.24.2 CHICAGO AZOFF2

The second azimuth offset position in arc seconds.

### C.24.3 CHICAGO /STOP

Disables the Chicago control of position switching.

## C.25 CHOP_SLEWY

[UIP\]CHOP_SLEWY [CYCLES] [/ASYMMETRIC [/LHS_BEAM | /RHS_BEAM]]
[/EFFICIENCY EFFICIENCY] [/NOFOCUS_ADJUST] [/NOLO_ADJUST] [/NOATTENUA-
TOR_ADJUST] [/CALIBRATE_AT_START | /NOCALIBRATE_AT_START]
[/PAUSE_AFTER_CAL [TIME] | /NOPAUSE_AFTER_CAL]

The data taking command for observing with the chopping secondary. It
commands the antenna and backend computers to take ONOFF data by
repeating one of three basic patterns by default, it performs a sym-
metric set of measurements with the pattern + +. Using the /ASYM-
METRIC option, you can get + + (/LHS_BEAM default) or (/RHS_BEAM

### C.25.1 CHOP_SLEWY CYCLES

The number of times the basic pattern should be repeated. The default
is 1.

### C.25.2 CHOP_SLEWY /ASYMMETRIC

Tells CHOP_SLEWY to take data using a + + or    pattern on the sky.  By
default, + + is used unless the /RHS_BEAM option is specified.

### C.25.3 CHOP_SLEWY /LHS_BEAM

Tells CHOP_SLEWY that the basic asymmetric pattern will be + +, which is
the default.

### C.25.4 CHOP_SLEWY /RHS_BEAM

Tells  CHOP_SLEWY  that  the basic asymmetric pattern will be    rather
than + +.

### C.25.5 CHOP_SLEWY /EFFICIENCY

Overrides the chopping efficiency value used by the AOS5.  For  example,
specifying  /EFFICIENCY  80 will force the AOS5 to integrate 80 % of the
time in each chop  phase,  regardless  of  a  true  chopping  efficiency
reported by the chopper controller.

### C.25.6 CHOP_SLEWY /NOFOCUS_ADJUST

Tells CHOP_SLEWY not to adjust the focus at the beginning of each cycle.

### C.25.7 CHOP_SLEWY /NOLO_ADJUST

Tells CHOP_SLEWY not to adjust the phase lock frequency at the beginning
of each cycle, to allow for Doppler tracking.

### C.25.8 CHOP_SLEWY /NOATTENUATOR_ADJUST

Tells CHOP_SLEWY not to adjust the programmable attenuator at the begin-
ning of a scan.

## C.25.9   CHOP_SLEWY /CALIBRATE_AT_START

Tells  CHOP_SLEWY  to  take a temperature calibration scan before taking
any source data.  The default action is to calibrate at the  start  only
if no valid temperature calibration scan is already available.


## C.25.10   CHOP_SLEWY /NOCALIBRATE_AT_START

Tells  CHOP_SLEWY  not to take a temperature calibration scan even if no
valid calibration scan is available.


## C.25.11   CHOP_SLEWY /PAUSE_AFTER_CAL

Allows the observer to specify a number of seconds  to  wait  after  the
temperature  calibration scan, before taking the sources data.  This is
desirable if the thermal load of the calibration vane  seems  to  affect
the  receivers  performance  for some period after taking a temperature
calibration scan.  For example, /PAUSE_AFTER_CAL 5 will result  in  a  5
second  pause  between  temperature  calibration  and data taking.  This
option is selected by default, and the default time is 20 seconds.


## C.25.12   CHOP_SLEWY /NOPAUSE_AFTER_CAL

Tells CHOP_SLEWY not to pause after the temperature calibration scan.


# C.26   DATA_FILE

    [UIP\]DATA_FILE NAME [SCAN_NUMBER [OBSERVATION_NUMBER]] [/NOARCHIVE]

Opens a data file into which the scans will be written.  If a file  with
the  specified  name exists, it is reopened otherwise a new file is cre-
ated.


## C.26.1   DATA_FILE NAME

The name of the new file.


## C.26.2   DATA_FILE SCAN_NUMBER

The first scan number in the file.

### C.26.3  DATA_FILE OBSERVATION_NUMBER

The first observation number in the file.

### C.26.4  DATA_FILE /NOARCHIVE

This option causes the data not to be written to the observatorys
SYBASE database. Observers should not specify this option it is
intended to be used only when engineering scans are being taken.

## C.27  DECO

```
    [UIP\]DECO [OFFSET] [/MAPPING MAPPING_OFFSET] [/FIELD  FIELD_OFFSET]
[/TEXAS TEXAS_OFFSET]
```

```
    [UIP\]DECO [/MAPPING | /FIELD | /TEXAS]
```

Sends a new declination offset to the antenna computer.

### C.27.1  DECO OFFSET

The new declination offset in arc seconds.

### C.27.2  DECO /MAPPING

Modifies or prints the mapping offset.

### C.27.3  DECO MAPPING_OFFSET

The new mapping declination offset in arc seconds.

### C.27.4  DECO /FIELD

Modifies or prints the field offset.

### C.27.5 DECO FIELD_OFFSET

The new field declination offset in arc seconds.

### C.27.6 DECO /TEXAS

Modifies or prints the Texas offset. The Texas switching mode is acti-
vated (that moves the telescope ON and OFF source based on a digital
input signal to the antenna computer) if the offset is given.

### C.27.7 DECO TEXAS_OFFSET

The new Texas declination offset in arc seconds.

## C.28 DRIFT_SCAN

```
    [UIP\]DRIFT_SCAN     SCAN_LENGTH     [NUMBER_OF_SCANS]     [/STEP_SIZE
STEP_SIZE] [/OFFSET X_OFFSET [Y_OFFSET]] [/SETTLING_TIME  SETTLING_TIME]
[/NOFOCUS_ADJUST] [/NOROTATOR_ADJUST]
```

```
    [UIP\]DRIFT_SCAN /CANCEL
```

```
    [UIP\]DRIFT_SCAN
```

Implements a drift scan observing mode for bolometers.

### C.28.1 DRIFT_SCAN SCAN_LENGTH

The scan length in arc seconds.

### C.28.2 DRIFT_SCAN NUMBER_OF_SCANS

The number of scans to be performed. The default is 1.

### C.28.3 DRIFT_SCAN /STEP_SIZE

The latitudinal separation, in arc seconds, between two adjacent scans.
The default is 0, i.e., all scans will be repeated at the same latitude.

### C.28.4   DRIFT_SCAN /OFFSET

The initial scan offsets in arc seconds.

### C.28.5   DRIFT_SCAN X_OFFSET

The initial longitudinal offset in arc seconds.   The   default   is
SCAN_LENGTH / 2.

### C.28.6   DRIFT_SCAN Y_OFFSET

The initial latitudinal offset in arc seconds.   The   default is
STEP_SIZE (NUMBER_OF_SCANS  1) / 2.

### C.28.7   DRIFT_SCAN /SETTLING_TIME

The settling time in seconds.  The default is 10.

### C.28.8   DRIFT_SCAN /NOFOCUS_ADJUST

Will not adjust the secondary mirror focus position.  By  default,  the
secondary mirror focus is adjusted at the beginning of each scan.

### C.28.9   DRIFT_SCAN /NOROTATOR_ADJUST

Will  not  adjust  the  instrument  rotator  position.  By default, the
instrument rotator is adjusted at the beginning of each scan.

### C.28.10   DRIFT_SCAN /CANCEL

Will cancel the scan.

## C.29   EL

    [UIP\]EL [ANGLE]

Sends a new elevation angle to the antenna  computer.   The   command   EL
automatically selects altazimuthal coordinates.

### C.29.1  EL ANGLE

The new elevation angle to be sent to the antenna computer.


## C.30  ELO

[UIP\]ELO  [OFFSET]  [/FIXED FIXED_OFFSET] [/MAPPING MAPPING_OFFSET]
[/FIELD FIELD_OFFSET]

[UIP\]ELO [/FIXED | /MAPPING | /FIELD]

Sends a new elevation offset to the antenna computer.


### C.30.1  ELO OFFSET

The new elevation offset in arc seconds.


### C.30.2  ELO /FIXED

Modifies or prints the fixed offset.


### C.30.3  ELO FIXED_OFFSET

The new fixed elevation offset in arc seconds.


### C.30.4  ELO /MAPPING

Modifies or prints the mapping offset.


### C.30.5  ELO MAPPING_OFFSET

The new mapping elevation offset in arc seconds.


### C.30.6  ELO /FIELD

Modifies or prints the field offset.

### C.30.7  ELO FIELD_OFFSET

The new field elevation offset in arc seconds.

## C.31  EQU

```
    [UIP\]EQU       RIGHT_ASCENSION      DECLINATION         [EQUINOX
[PROPER_MOTION_IN_RIGHT_ASCENSION        [PROPER_MOTION_IN_DECLINATION
[ANNUAL_PARALLAX [RADIAL_VELOCITY [EPOCH]]]]]]
```

Sends new equatorial coordinates to the antenna computer.

### C.31.1  EQU RIGHT_ASCENSION

The new right ascension in hours, or in the format HH:MM:SS.

### C.31.2  EQU DECLINATION

The new declination in degrees, or in the format +DD:MM:SS.

### C.31.3  EQU EQUINOX

The epoch of the coordinate system in Julian or Besselian year.

### C.31.4  EQU PROPER_MOTION_IN_RIGHT_ASCENSION

The proper motion in right ascension in seconds per year.

### C.31.5  EQU PROPER_MOTION_IN_DECLINATION

The proper motion in declination in arc seconds per year.

### C.31.6  EQU ANNUAL_PARALLAX

The annual parallax in arc seconds.

### C.31.7 EQU RADIAL_VELOCITY

The radial velocity with respect to the Solar system barycenter in kilometers per second.

### C.31.8 EQU EPOCH

The epoch of the position in Julian or Besselian year.

## C.32 FAST_TRACK

```
[UIP\]FAST_TRACK [FACTOR [LENGTH]]
```

Allows you to examine and modify the variables used in the FAST_TRACK scan mode. In the FAST_TRACK scan mode, the antenna is told to track at some multiple of the sidereal rate. Data are then taken as if a drift scan had been requested. This allows scanning a source in constant declination strips at a faster rate than would be possible with drift scans. Scans are initiated with the command TAKE_DATA /FAST_TRACK. Typing this command with no parameters will result in the current parameter values being typed on the terminal.

### C.32.1 FAST_TRACK FACTOR

This multiple of the sidereal rate will be added to the LST. A speedup factor of 0 results in the normal tracking rate. If you want to scan over the source at 5 times the sidereal rate, you can use a speedup factor of 5 (for an east to west scan) or 5 (for a west to east scan). A speedup factor of 1 will freeze the antennas position, and all the sky to drift by.

### C.32.2 FAST_TRACK LENGTH

The length of the scan, in arc seconds. Once the antenna has moved by this amount from the position at which the scan started, the antenna will revert to the normal sidereal rate, and reacquire the initial position.

## C.33 FIVE_POINT

```
[UIP\]FIVE_POINT  OFFSET  [HALF_WIDTH  [/CENTER  CENTER]]  [/AOS5  |
/FFTS1 | /FFTS2] [/ONE_OFF | /ASYMMETRIC] [/SAVE_SCANS] [/NOQUERY]
```

[/APPLY] [/NOGAUSS]

Allows you check the pointing on a strong line or continuum source.  It
will  command  the antenna to the sources nominal position, and to four
surrounding positions in the AZ and EL directions.  Data will  be  taken
at  each  position, and the line will be integrated. Finally, the inte-
grated line strengths will be displayed, along with new suggested point-
ing offsets.

You  must supply an offset step size and a line halfwidth over which to
integrate.  The width must be given in channels.  Here is an example:

    FIVE_POINT 30 25        ! Step around by 30 arcsecond steps

The individual integrations are performed by the  OO_SCAN  command.   In
chopping mode, FIVE_POINT uses CHOP_SLEWY.  In heterodyne chopping mode,
FIVE_POINT will measure the throw also.

A linear baseline can be removed in the backend computer prior to calcu-
lating  the  line  integral.  The SPECTROMETER command allows you to set
the windows for this baseline. FIVE_POINT requires  pretty  good  base-
lines to give good results.

The  corrections are calculated in one of two ways.  In most cases, fit-
ting a three parameter Gaussian is appropriate (one for AZ and  one  for
EL).  In this case, for EL

$$\text{delta EL} = \frac{\text{offset} \{ \ln(Ip)  \ln(Im) \}}{2 \{ \ln(Ip)  2 \ln(Ic) + \ln(Im) \}}$$

where  Ip,  Im, and Ic are the measurements from positive, negative, and
zero offset points respectively.  If /NOGAUSS is selected, then  a  more
conservative,  centroiding calculation is used to calculate the offsets.
The formula in this case is

$$\text{delta EL} = \frac{\text{offset} ( Ip  Im )}{Ip + Ic + Im}$$

This approach is useful if for some reason the receiver is giving fluxes
with both positive and negative values, because a Gaussian is never neg-
ative.

Gaussian fitting is the default.  With either type of fitting, the  rou-
tine  will  refuse to suggest any pointing corrections unless the center
position is the strongest.

The results of five points will be logged in a file  together  with  the
pointing constants, T terms, refraction and weather parameters in use.

### C.33.1   FIVE_POINT OFFSET

The size of the steps to be taken, in arc seconds.


### C.33.2   FIVE_POINT HALF_WIDTH

The number of channels, on either side of the center channel, over which
integration should be performed.  If this  argument  is  not  specified,
then  integration will take place over all the channels between the high
limit of the low baseline window and the low limit of the high  baseline
window.   For  instance if you specified the baseline windows by issuing
the command

```
SPECTROMETER /BASELINE 400 500 520 620
```

and you did not pass a second argument to FIVE_POINT, then channels  501
through 519 will be summed to produce the line integral.

If  no  baseline  window has been given, then a warning will be printed,
and all channels will be summed to form the integral.


### C.33.3   FIVE_POINT /CENTER

Allows you to tell the backend computer to center the integration over a
specific channel.

By default, the integration is centered on the center channel found when
the last frequency calibration scan (FCAL) was processed.  If no  infor-
mation  is available from an FCAL, a warning message will be issued, and
the default center channel defined for each spectrometer will be used.


### C.33.4   FIVE_POINT /RANGE

Allows you to specify the  range  of  channels  over  which  integration
should be performed.

```
    FIVE_POINT 15 /RANGE 501 519
```

is equivalent to

```
    FIVE_POINT 15 9 /CENTER 510
```


### C.33.5   FIVE_POINT /AOS5

Specifies that the 4 GHz array AOS is to be used for pointing (only one spectrometer can be used at a time). By default, one is selected from the active spectrometers using the following order of precedence: AOS5, FFTS1, then FFTS2.

### C.33.6 FIVE_POINT /FFTS1

Specifies that the 1 GHz FFTS is to be used for pointing (only one spectrometer can be used at a time). By default, one is selected from the active spectrometers using the following order of precedence: AOS5, FFTS1, then FFTS2.

### C.33.7 FIVE_POINT /FFTS2

Specifies that the 8 GHz FFTS is to be used for pointing (only one spectrometer can be used at a time). By default, one is selected from the active spectrometers using the following order of precedence: AOS5, FFTS1, then FFTS2.

### C.33.8 FIVE_POINT /ONE_OFF

If /ONE_OFF is specified, then only one OFF position data will be taken at the beginning of FIVE_POINT. All five ON points will share this same OFF position data. This procedure will save something like a factor of 2 in time, at the expense of poorer baselines.

### C.33.9 FIVE_POINT /ASYMMETRIC

If /ASYMMETRIC is specified in heterodyne chopping mode, FIVE_POINT uses asymmetric chopping to measure the chopper throw as well as to determine pointing corrections.

### C.33.10 FIVE_POINT /SAVE_SCANS

Causes all five scans taken to be stored in the current data file. /SAVE_SCANS CENTER tells FIVE_POINT to just save the central position scan, the other four will be discarded.

### C.33.11 FIVE_POINT /NOQUERY

If /NOQUERY is specified, you will not be asked if you want the calcu-

lated FAZO and FZAO to be sent to the antenna computer.

### C.33.12 FIVE_POINT /APPLY

Causes the newly calculated FAZO and FZAO to be sent to the antenna computer.

### C.33.13 FIVE_POINT /NOGAUSS

Causes centroiding calculation to be used instead of Gaussian fitting to find pointing offsets.

## C.34 FLSIGNAL

[UIP\]FLSIGNAL VALUE [/MASK MASK]

[UIP\]FLSIGNAL 0 | 1 /BIT BIT

Changes the state of the digital outputs of the antenna computer. There are 8 digital outputs, numbered from 1 through 8. They can be addressed by an 8bit value and an 8bit mask, or by a bit number and a bit value. Bits are numbered from 0 (LSB) through 7 (MSB). The bit 0 corresponds to the digital output 1.

```
+
|MSB      Value/Mask Bit      LSB|
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
+
|          Digital Output        |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
+
```

Setting a bit will cause the corresponding digital output to become high. Clearing a bit will cause the output to become low.

### C.34.1 FLSIGNAL VALUE

The new value to be sent to the digitial outputs. Valid values are integers between 0 and 255.

### C.34.2 FLSIGNAL /MASK

The mask to be applied to the VALUE argument.  Valid values are integers between  0  and  255.   For example, FLSIGNAL 128 /MASK 192 will set the digital output 7 (bit 6) to low and the digital  output  8  (bit  7)  to high.

## C.34.3   FLSIGNAL /BIT

The  bit number to be set or cleared.  Valid values are integers between 0 and 7.  The specified bit will be cleared if the VALUE argument is  0, otherwise the bit will be set.

## C.35   FLWAIT

[UIP\]FLWAIT VALUE [/MASK MASK]

[UIP\]FLWAIT 0 | 1 /BIT BIT

Waits  until  the state of the digital inputs and outputs of the antenna computer matches the specified pattern.  There  are  8  digital  inputs, numbered  from  1 through 8, and 8 digital outputs, also numbered from 1 through 8.  They can be addressed by a 16bit value and a  16bit  mask, or  by  a  bit  number  and a bit value. Bits are numbered from 0 (LSB) through 15 (MSB).  The bits 0 though 7 correspond to the digital outputs 1 though 8, and the bits 8 thgouth 15 correspond to the digital inputs 1 though 8, respectively.

```
+
|MSB                    Value/Mask Bit                    LSB|
| 15| 14| 13| 12| 11| 10| 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
+
|         Digital Input        |        Digital Output       |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
+
```

A high at a digital input or output will cause the corresponding bit  to be set.  A low at an input or output will cause the bit to be cleared.

## C.35.1   FLWAIT VALUE

The  value at the digitial inputs and outputs to wait for.  Valid values are integers between 0 and 65535.

## C.35.2   FLWAIT /MASK

The mask to be applied to the VALUE argument.  Valid values are integers
between  0  and 65535.  For example, FLWAIT 384 /MASK 448 will cause the
execution to pause until the digital input 1 becomes high while the dig-
ital outputs 7 and 8 are (programmed to be) high and low, respectively.


### C.35.3   FLWAIT /BIT


## C.36   FOCUS

      [UIP\]FOCUS   [POSITION  |  /CONSTANT_UPDATES  |  /STEALTHY_UPDATES]
[/OFFSET OFFSET] [/SET_OFFSET] [/POINTING_UPDATE]

Allows the user to control the focusing of the  secondary  mirror.   One
can set the mirror at a fixed point, or enable autofocusing via a focus
curve.  If autofocusing is chosen, an offset may be  applied,  and  the
timing of the focus changes may be controlled.

If FOCUS is entered without any arguments or options, and if the antenna
is in STEALTHY mode, the antenna will be instructed to adjust the  focus
and Y tilt based on its pointing curve.  Note that this is done automat-
ically at the beginning of an OO_SCAN, OBSERVE or PLANET command.


### C.36.1   FOCUS POSITION

If this optional argument is specified, it will be sent to  the  antenna
computer  and used as a fixed focus position.  The antenna computer will
not update the position.


### C.36.2   FOCUS /CONSTANT_UPDATES

Tells the antenna computer to update the position of the secondary when-
ever  the position should be changed.  In this mode, the secondary might
be moved when an integration is taking place.


### C.36.3   FOCUS /STEALTHY_UPDATES

Tells the antenna computer to update the position of the secondary  only
when  data  is  not  being taken, so that during a given integration the
focus will remain fixed.

### C.36.4   FOCUS /OFFSET

Allows you to specify a fixed offset which will be added to the value from the focus curve when the antenna computer updates the secondary position.

### C.36.5   FOCUS /SET_OFFSET

This option, which should be used alone, is used to calculate the offset which should be applied to the focus curve. First one should find the best focus position, using the FOCUS command to send the secondary to specific positions. Then when the focus is good, invoke FOCUS with this qualifier, and the offset will be calculated. Then invoke FOCUS with either the /STEALTHY_UPDATES or the /CONSTANT_UPDATES option to tell the antenna to use the focus curve.

### C.36.6   FOCUS /POINTING_UPDATE

Tells the computer to adjust the TAZO and TZAO to where they should be at the present elevation angle. Note that when the antenna is in /CONSTANT_UPDATES or /STEALTHY_UPDATES mode, these constants will be updated automatically every time the focus position is changed.

## C.37   FCAL

```
[UIP\]FCAL [/NOATTENUATOR_ADJUST]
```

Takes a frequency calibration scan.

### C.37.1   FCAL /NOATTENUATOR_ADJUST

Without this option, the programmable attenuator will be adjusted after a frequency calibration.

## C.38   FSWITCH

```
[UIP\]FSWITCH SEPARATION [CYCLES] [/NOFOCUS_ADJUST] [/NOATTENUA-
TOR_ADJUST]      [/CALIBRATE_AT_START    |     /NOCALIBRATE_AT_START]
[/PAUSE_AFTER_CAL [TIME] | /NOPAUSE_AFTER_CAL]
```

The data taking command for observing with the frequency switching mode. The actual frequency change takes place at the first LO.

### C.38.1   FSWITCH SEPARATION

The size of the frequency step in MHz.  The two line images will be separated by twice the amount, symmetrically offset from 0.

### C.38.2   FSWITCH CYCLES

The number of times the frequency switch cycle should be repeated.  The default is 1.

### C.38.3   FSWITCH /NOFOCUS_ADJUST

Tells FSWITCH not to adjust the focus.

### C.38.4   FSWITCH /NOATTENUATOR_ADJUST

Tells FSWITCH not to adjust the programmable attenuator.

### C.38.5   FSWITCH /CALIBRATE_AT_START

Tells  FSWITCH  to take a temperature calibration scan before taking any source data.  The default action is to calibrate at the start only if no valid temperature calibration scan is already available.

### C.38.6   FSWITCH /NOCALIBRATE_AT_START

Tells  FSWITCH  not  to  take  a temperature calibration scan even if no valid calibration scan is available.

### C.38.7   FSWITCH /PAUSE_AFTER_CAL

Allows the observer to specify a number of seconds  to  wait  after  the temperature  calibration scan, before taking the sources data.  This is desirable if the thermal load of the calibration vane  seems  to  affect the  receivers  performance  for some period after taking a temperature calibration scan.  For example, /PAUSE_AFTER_CAL 5 will result  in  a  5 second  pause  between  temperature  calibration  and data taking.  This option is selected by default, and the default time is 20 seconds.

### C.38.8   FSWITCH /NOPAUSE_AFTER_CAL

Tells FSWITCH not to pause after the temperature calibration scan.

## C.39   GAL

[UIP\]GAL LONGITUDE LATITUDE

Sends new Galactic coordinates to the antenna computer.

### C.39.1   GAL LONGITUDE

The new Galactic longitude in degrees.

### C.39.2   GAL LATITUDE

The new Galactic latitude in degrees.

## C.40   GBO

[UIP\]GBO [OFFSET] [/MAPPING MAPPING_OFFSET] [/FIELD FIELD_OFFSET]

[UIP\]GBO [/MAPPING | /FIELD]

Sends a new Galactic latitude offset to the antenna computer.

### C.40.1   GBO OFFSET

The new Galactic latitude offset in arc seconds.

### C.40.2   GBO /MAPPING

Modifies or prints the mapping offset.

### C.40.3 GBO MAPPING_OFFSET

The new mapping Galactic latitude offset in arc seconds.

### C.40.4 GBO /FIELD

Modifies or prints the field offset.

### C.40.5 GBO FIELD_OFFSET

The new field Galactic latitude offset in arc seconds.

## C.41 GLO

```
[UIP\]GLO [OFFSET] [/MAPPING MAPPING_OFFSET] [/FIELD FIELD_OFFSET]
```

```
[UIP\]GLO [/MAPPING | /FIELD]
```

Sends a new Galactic longitude offset to the antenna computer.

### C.41.1 GLO OFFSET

The new Galactic longitude offset in arc seconds.

### C.41.2 GLO /MAPPING

Modifies or prints the mapping offset.

### C.41.3 GLO MAPPING_OFFSET

The new mapping Galactic longitude offset in arc seconds.

### C.41.4 GLO /FIELD

Modifies or prints the field offset.

### C.41.5  GLO FIELD_OFFSET

The new field Galactic longitude offset in arc seconds.

## C.42  IDLE

```
[UIP\]IDLE
```

Stops the drive motors and applies the brakes.  This is the  state  when
the  computer  is first turned on.  The status display shows IDLE.  To
observe a source, you must type TRACK.  Note that  the  IDLE  stops  the
servo  loop entirely, and applies the brakes when the telescope comes to
rest.  The telescope will not necessarily come to rest at the  point  it
was  tracking.   To stop the telescope at the current position, e.g., to
do a drift scan, switch from celestial coordinates to altazimuthal coor-
dinates by typing ALTAZ.

## C.43  INSTRUMENT

```
[UIP\]INSTRUMENT [NAME] [/BACKEND BACKEND[,...]]
```

Selects a new instrument.

### C.43.1  INSTRUMENT NAME

The name of the new instrument.  Currently the following instruments are
supported: RX230, RX345, RX460, RX690, RX805,  RX230X,  RX345X,  SHARC2,
BOLOCAM, ZSPEC, FTS, BOLOMETER, ZEUS, and MUSIC.

### C.43.2  INSTRUMENT /BACKEND

The name of the new backend(s) to be used with the new instrument.

## C.44  JOY_STICK

```
[UIP\]JOY_STICK  STEP_SIZE [/ALTAZIMUTHAL [/FIXED_OFFSET] | /EQUATO-
RIAL | /GALACTIC]
```

Is intended to aid in the manual tweaking of the telescope offsets.   It
allows  you  to change the offsets by using the arrow keys on the termi-
nal, rather than explicitly typing in the offsets.  The  following  keys

have special functions when you are executing this command:

```
        E                   Exits this command
        H                   Prints this help message
        L                   Logs the current values in file
        O                   Allows a new source to be selected
        R                   Resets the offsets to their original values
        S                   Changes the step size
        V                   Verifies the position of a source
        Z                   Zeros the offsets in play
        <Arrow keys>        Changes the offsets
```

### C.44.1  JOY_STICK STEP_SIZE

Specifies,  in arc seconds, how large a step is to be taken each time an
arrow key is hit.

### C.44.2  JOY_STICK /ALTAZIMUTHAL

Causes the arrow keys to effect the AZ and  EL  offsets.   This  is  the
default.

### C.44.3  JOY_STICK /EQUATORIAL

Causes  the arrow keys to effect the RA and DEC offsets, rather than the
AZ and EL offsets which are changed by default.

### C.44.4  JOY_STICK /GALACTIC

Causes the arrow keys to effect the GL and GB offsets, rather  than  the
AZ and EL offsets which are changed by default.

### C.44.5  JOY_STICK /FIXED_OFFSET

Causes the arrow keys to effect the fixed altazimuthal offsets.

## C.45   LIMB_POINTING

```
    [UIP\]LIMB_POINTING   SEMIMAJOR_AXIS   [SEMIMINOR_AXIS [SCAN_LENGTH
[STEP_SIZE]]]  [/INTEGRATION_TIME  INTEGRATION_TIME]  [/OFFSET   OFFSET]
[/AOS5  |  /FFTS1  |  /FFTS2]   [/RANGE  MIN  MAX]  [/POSITION_ANGLE
```

```
POSITION_ANGLE] [/ONE_OFF]
```

Allows you to check the telescope pointing using the limb  of  a  large,
disklike object.  Four scans across the limb at 9, 3, 12, and 6 oclock
positions are taken to determine the distances to the limb from the cur-
rent  nominal  pointing  center.  The actual scans are taken by stepping
the telescope beam by the specified amount and integrating at each posi-
tion.  The limb is determined by finding in each scan the position where
the gradient of the integrated intensity peaks.  In practice,  the  dif-
ference between two consecutive positions is used to estimate the gradi-
ent at midpoint.  Three such neighboring gradient values are then inter-
polated to determine the peak position.

### C.45.1  LIMB_POINTING SEMIMAJOR_AXIS

The  semimajor  axis,  or the equatorial semidiameter, of the pointing
object in arc seconds.

### C.45.2  LIMB_POINTING SEMIMINOR_AXIS

The semiminor axis, or the polar semidiameter, of the pointing  object
in arc seconds.  The default is equal to the semimajor axis.

### C.45.3  LIMB_POINTING SCAN_LENGTH

The  length of the scans across the limb in arc seconds.  The default is
four times the telescope beam size.

### C.45.4  LIMB_POINTING STEP_SIZE

The size of the steps in arc seconds.  The default is half the telescope
beam size.

### C.45.5  LIMB_POINTING /INTEGRATION_TIME

The  integration  time per step in seconds.  The default is equal to the
integration time for the OFF integrations, which is set by the SPECTROM-
ETER command.

### C.45.6 LIMB_POINTING /OFFSET

The azimuth offset for the OFF integrations. The default is ten times
the telescope beam size away from the limb.

### C.45.7 LIMB_POINTING /AOS5

Specifies that the AOS5 is to be used when more than one spectrometers
are active.

### C.45.8 LIMB_POINTING /FFTS1

Specifies that the FFTS1 is to be used when more than one spectrometers
are active.

### C.45.9 LIMB_POINTING /FFTS2

Specifies that the FFTS2 is to be used when more than one spectrometers
are active.

### C.45.10 LIMB_POINTING /RANGE

The range of the spectrometer channels to integrate. This option
requires two values for example /RANGE 1 1024. The default is [1,
8192] or [4097, 6144] for the AOS5, depending on the receiver it is
working with, [1, 8192] or [1, 16384] for the FFTS1, depending on the
spectrometer configuration, and [1, 32768] for the FFTS2.

### C.45.11 LIMB_POINTING /POSITION_ANGLE

The position angle of the scans in degrees. It is measured anticlock-
wise from the north. The default is zero no rotation.

### C.45.12 LIMB_POINTING /ONE_OFF

Specifies that only one OFF integration is to be taken, which is then
shared by the four ON scans.

## C.46    LO

        [UIP\]LO [NAME] [/FREQUENCY FREQUENCY] [/RECEIVER RECEIVER[,IF_CHAN-
NEL[,LO_CHANNEL]]] [/SIDEBAND SIDEBAND]  [/MULTIPLIER  MULTIPLIER]  [/IF
IF]    [/F_OFFSET    F_OFFSET]    [/V_OFFSET    V_OFFSET]    [/LOCK_LOOP
LOCK_LOOP[,MODULE]]   [/LOOP_NUMBER   LOOP_NUMBER]   [/RADIAL_VELOCITY
RADIAL_VELOCITY  |  /NORADIAL_VELOCITY]  [/FORCE_RECEIVER_CHANGE [NOMIR-
RORS]] [/ANTENNA_ONLY] [/RESTART]

        [UIP\]LO /GUNN_ON | /NOGUNN_ON

        [UIP\]LO /LOG

Sends information to the antenna computer that is  needed  to  calculate
the phase lock loop frequency.  It can be used to center the bandpass on
a line from the line catalog, or with an arbitrary  frequency.   Default
values  for  such things as sideband may be overridden with options.  If
LO is executed with no arguments or options,  the  antenna  computer  is
instructed to recalculate the phase lock frequency.

This  command  is  executed  automatically  when  the OBSERVE command is
given.  Whenever the LO characteristics are changed, the new values  are
logged in the log file.

### C.46.1   LO NAME

The  name  of the spectral line you wish the bandpass to be centered on.
It must be a line in the catalog.

### C.46.2   LO /FREQUENCY

This option may be used with or without the NAME argument, to load in  a
specific frequency.  It takes a value, which is the desired frequency in
GHz.

### C.46.3   LO /RECEIVER

The name of the receiver you will be using  (RX230,  RX345,  RX460,  and
RX690  for the SideCab receivers, RX805 for the 850 GHz receiver, RX230X
for Frank Rices receiver, and RX345X for Barney).   If  not  specified,
the  computer  will  select  the default receiver for the observing fre-
quency and IF.  For the 12 GHz IF receivers, the IF and LO channel num-
bers can be overridden by specifying them immediately after the receiver
name, separated by commas, for example LO /RECEIVER RX805,1,1.

### C.46.4 LO /SIDEBAND

Specifies a sideband. This will override any default value found in the
line catalog. The valid values are LOWER, UPPER, and DOUBLE

### C.46.5 LO /MULTIPLIER

This option takes an argument which is an integer specifying what har-
monic of the Gunn oscillator output is to be used as the first LO.

### C.46.6 LO /IF

Allows you to specify a different intermediate frequency (IF). The unit
is GHz.

### C.46.7 LO /F_OFFSET

Allows a frequency offset to be sent to the antenna computer. It is
specified in GHz.

### C.46.8 LO /V_OFFSET

Allows a velocity offset to be sent to the antenna computer. It is
specified in km/s.

### C.46.9 LO /LOCK_LOOP

This option, which is sticky, allows you to specify which method you are
using to phase lock the LO system. The valid values are DEFAULT_PLL
(Sidecab), SMA_PLL (Cassegrain), and NONE (synthesized LO).

When more than one SMA phase lock modules are present, the argument
SMA_PLL can immediately be followed by the module number separated by
comma, for example LO /LOCK_LOOP SMA_PLL,2. The default module number
is 1. The modules currently in use are tabulated in
kilauea:/opt/uip/etc/sma_plls.txt.

### C.46.10 LO /LOOP_NUMBER

Allows you to specify the harmonic number for the Gunn PLL. The Gunn

oscillator is locked to a certain harmonic (+ LO) of the reference sig-
nal generated by the synthesizer. By default the antenna computer
chooses a harmonic number so that the synthesizer frequency is close to
7.5 GHz for the SMA PLL or 6 GHz for the default PLL. Unless explicitly
specified using this option, it will automatically be updated whenever a
new line name, line frequency, intermediate frequency, sideband, multi-
plier harmonic number, frequency offset, or velocity offset is sent by
the LO command.

### C.46.11  LO /RADIAL_VELOCITY

Allows you to specify a radial velocity that you have calculated your-
self. It disables the radial velocity calculation that the antenna com-
puter normally performs, and substitutes for it the value you specify
with this option. Automatic radial velocity calculation will be sus-
pended until you issue an LO command with the /NORADIAL_VELOCITY option.
The unit is km/s, and a negative value indicates approach. The OBSERVE
and PLANET commands implicitly execute the LO /NORADIAL_VELOCITY command
unless the /NOLO option is used.

### C.46.12  LO /NORADIAL_VELOCITY

Resumes automatic radial velocity calculation.

### C.46.13  LO /FORCE_RECEIVER_CHANGE

By default, the computer will not attempt to reprogram the LO Matrix Box
if it does not think it needs to. This option allows you to force the
computer to reprogram the box. It is primarily for use by other UIP
commands, but it will certainly work if given manually. The computer
will also inquire whether or not you want to move the sidecab mirrors,
unless the NOMIRRORS argument is given.

### C.46.14  LO /ANTENNA_ONLY

If /ANTENNA_ONLY is specified, commands will be sent only to the antenna
computer. No messages will be sent to the backend computers. Note that
this means the IF down converter will not be configured, so there is a
very good chance that if you use this qualifier, the IF will not be
plumbed to the spectrometers correctly.

### C.46.15  LO /RESTART

Causes the process for the IF down converter to be restarted.

### C.46.16  LO /GUNN_ON

The  antenna computer will be instructed to turn on the Gunn oscillator.
No other action (such as recalculating the sky frequency) will be taken.

### C.46.17  LO /NOGUNN_ON

The antenna computer will be instructed to turn off the Gunn oscillator.
No other action (such as recalculating the sky frequency) will be taken.

### C.46.18  LO /LOG

Causes the current LO parameters to be printed on the terminal.  All the
other arguments and options will be ignored.

## C.47  LOG

[UIP\]LOG ["MESSAGE"] [/STAMP]

[UIP\]LOG /OPEN [NAME]

[UIP\]LOG /CLOSE

[UIP\]LOG

Writes a text to the current log file.

### C.47.1  LOG MESSAGE

The text to be written.

### C.47.2  LOG /STAMP

A time stamp is written before the text is written into the file.

### C.47.3 LOG /OPEN

Opens a new log file and records the time and date. While the log file is open, significant events, such as source changes, are recorded in this file.

### C.47.4 LOG NAME

The name of the log file. The default is username_yyyymm ddThh:mm:ss.log, for instance observer_20090101T04:00:00.log.

### C.47.5 LOG /CLOSE

Closes the current log file. No other log file is automatically opened, so unless a LOG /OPEN command is given, events will not be logged.

## C.48 OBSERVE

[UIP\]OBSERVE NAME [/NOLO_ADJUST] [/NOFCAL_AUTO] [/NOTCAL_INVALI-DATE]

Looks up the coordinates of an object, and sends them to the antenna computer. The currently open source catalogs are searched in the reverse of the order in which they where opened. If the object is found, its name and coordinates will be sent to the antenna computer.

### C.48.1 OBSERVE NAME

The name of the object.

### C.48.2 OBSERVE /NOLO_ADJUST

Without this option, the LO frequency will be updated after the new source position has been entered. This option has no effect if you are not observing in spectral line mode.

### C.48.3 OBSERVE /NOFCAL_AUTO

Without this option, the backend will take a frequency calibration scan if you are going to slew more than 40 degrees in azimuth. This option

has no effect if you are not observing in spectral line mode.  A frequency calibration scan will not be taken if the OBSERVE command is executed in a command file.

### C.48.4  OBSERVE /NOTCAL_INVALIDATE

Without this option, the current temperature calibration will be invalidated  after  the new source position has been entered.  This option has no effect if you are not observing in spectral line mode.

## C.49  OFF_POSITION

    [UIP\]OFF_POSITION X_OFFSET [Y_OFFSET] [/ALTAZIMUTHAL |  /EQUATORIAL | /GALACTIC] [/SYMMETRIC | /ASYMMETRIC]

    [UIP\]OFF_POSITION /DESIGNATED_OFF [NAME]

    [UIP\]OFF_POSITION

Allows  you  to  specify  the  default OFF position used by the OO_SCAN, OTF_MAP, and TCAL commands.

### C.49.1  OFF_POSITION X_OFFSET

The longitudinal offset in arc seconds.

### C.49.2  OFF_POSITION Y_OFFSET

The latitudinal offset in arc seconds.  The default is 0.

### C.49.3  OFF_POSITION /ALTAZIMUTHAL

Specifies that the X_OFFSET and Y_OFFSET  are  in  altazimuthal  coordinates.  This is the default.

### C.49.4  OFF_POSITION /EQUATORIAL

Specifies that the X_OFFSET and Y_OFFSET are in equatorial coordinates.

### C.49.5  OFF_POSITION /GALACTIC

Specifies that the X_OFFSET and Y_OFFSET are in Galactic coordinates.


### C.49.6  OFF_POSITION /SYMMETRIC

Specifies that the symmetric pattern should be used by the OO_SCAN command. The OFF positions to be used are (+X_OFFSET, +Y_OFFSET) and (X_OFFSET, Y_OFFSET).


### C.49.7  OFF_POSITION /ASYMMETRIC

Specifies that the asymmetric pattern should be used by the OO_SCAN command. The OFF position to be used is (X_OFFSET, Y_OFFSET).


### C.49.8  OFF_POSITION /DESIGNATED_OFF

Specifies that the designated OFF position should be used by the OO_SCAN, OTF_MAP, and TCAL commands.


### C.49.9  OFF_POSITION NAME

The name of the designated OFF position.


## C.50  OO_SCAN

```
    [UIP\]OO_SCAN  [CYCLES]  [/STEP  X_STEP  [Y_STEP]  | /DESIGNATED_OFF
[NAME]]  [/ALTAZIMUTHAL  |  /EQUATORIAL  |  /GALACTIC]  [/ASYMMETRIC]
[/REVERSE]  [/ALTERNATE]  [/NOFOCUS_ADJUST]  [/NOLO_ADJUST] [/NOATTENUA-
TOR_ADJUST]      [/CALIBRATE_AT_START     |     /NOCALIBRATE_AT_START]
[/PAUSE_AFTER_CAL [TIME] | /NOPAUSE_AFTER_CAL]
```

The data taking command for observing with the position switching mode. It commands the antenna and backend computers to take ONOFF data by repeating one of two basic patterns  symmetric or asymmetric. By default, it performs a symmetric set of measurements. The basic symmetric pattern is

    +OFF ON ON OFF.

If the argument CYCLES is set to 2, the actual pattern will be

```
    +OFF ON ON OFF OFF ON ON +OFF.
```

The basic asymmetric pattern is just

```
    ON OFF.
```

If the argument CYCLES is set to 2, the actual pattern will be

```
    ON OFF OFF ON.
```

Unlike in the legacy UIP, the arguments and options of OO_SCAN are not sticky. Exceptions are the /(NO)REVERSE and /(NO)ALTERNATIVE options.


### C.50.1   OO_SCAN CYCLES

The number of times the basic pattern should be repeated. The default is 1.


### C.50.2   OO_SCAN /STEP

Specifies the size of the step, in arc seconds, to get to the OFF position. This option is normally used with the /ALTAZIMUTHAL, /EQUATORIAL, or /GALACTIC option. If none is given, the offset is assumed to be in altazimuthal coordinates.


### C.50.3   OO_SCAN /DESIGNATED_OFF

Tells OO_SCAN to search the open source catalogs for a designated OFF position for the object being observed. Such OFF positions must have the objects name followed by ":off_position", or they must be named explicitly as an argument of the /DESIGNATED_OFF option.


### C.50.4   OO_SCAN NAME

The name of the designated OFF position.


### C.50.5   OO_SCAN /ALTAZIMUTHAL

Specifies that the offset given by the STEP option is in altazimuthal coordinates. This is the default.

### C.50.6   OO_SCAN /EQUATORIAL

Specifies that the offset given by the  STEP  option  is  in  equatorial
coordinates.


### C.50.7   OO_SCAN /GALACTIC

Specifies  that the offset given by the STEP option is in Galactic coor-
dinates.


### C.50.8   OO_SCAN /ASYMMETRIC

Tells OO_SCAN to use only one OFF position.


### C.50.9   OO_SCAN /REVERSE

Tells OO_SCAN to reverse the order in which ONs and OFFs are taken.  The
basic asymmetric pattern becomes

    OFF ON

and the basic symmetric pattern becomes (for CYCLES = 2)

    ON +OFF +OFF ON ON OFF OFF ON

Note  that  the  number of cycles must be even in the symmetric case, or
you will have uneven numbers of +OFF and OFF integrations.  This option
is sticky.


### C.50.10   OO_SCAN /NOREVERSE

Tells OO_SCAN not to /REVERSE.  This option is sticky.


### C.50.11   OO_SCAN /ALTERNATE

Every other OO_SCAN will be taken /REVERSE.  This option is sticky.


### C.50.12   OO_SCAN /NOALTERNATE

Tells OO_SCAN not to /ALTERNATE.  This option is sticky.

### C.50.13 OO_SCAN /NOFOCUS_ADJUST

Tells OO_SCAN not to adjust the focus at the beginning of each cycle.

### C.50.14 OO_SCAN /NOLO_ADJUST

Tells OO_SCAN not to adjust the phase lock frequency at the beginning of each cycle, to allow for Doppler tracking.

### C.50.15 OO_SCAN /NOATTENUATOR_ADJUST

Tells OO_SCAN not to adjust the programmable attenuator at the beginning of a scan.

### C.50.16 OO_SCAN /CALIBRATE_AT_START

Tells  OO_SCAN  to take a temperature calibration scan before taking any source data.  The default action is to calibrate at the start only if no valid temperature calibration scan is already available.

### C.50.17 OO_SCAN /NOCALIBRATE_AT_START

Tells  OO_SCAN  not  to  take  a temperature calibration scan even if no valid calibration scan is available.

### C.50.18 OO_SCAN /PAUSE_AFTER_CAL

Allows the observer to specify a number of seconds  to  wait  after  the temperature  calibration scan, before taking the sources data.  This is desirable if the thermal load of the calibration vane  seems  to  affect the  receivers  performance  for some period after taking a temperature calibration scan.  For example, /PAUSE_AFTER_CAL 5 will result  in  a  5 second  pause  between  temperature  calibration  and data taking.  This option is selected by default, and the default time is 20 seconds.

### C.50.19 OO_SCAN /NOPAUSE_AFTER_CAL

Tells OO_SCAN not to pause after the temperature calibration scan.

## C.51 OTF_MAP

```
     [UIP\]OTF_MAP LONGITUDE_SIZE LATITUDE_SIZE [SCAN_SPEED [RAMP_UP_TIME
[LONGITUDE_RESOLUTION    [LATITUDE_RESOLUTION]]]]    [/DIMENSION  NCOLUMNS
NROWS]  [/POSITION_ANGLE  POSITION_ANGLE  |  /SIDEWAYS]  [/SKEW  OFFSET]
[/ZIGZAG]  [/SKIP  N]  [/ALTAZIMUTHAL | /EQUATORIAL | /GALACTIC] [/NOFO-
CUS_ADJUST]   [/NOROTATOR_ADJUST]   [/NOLO_ADJUST]   [/NOATTENUATOR_ADJUST]
[/CALIBRATE    [N]   |   /NOCALIBRATE]   [/PAUSE_AFTER_CAL   [TIME]   |
/NOPAUSE_AFTER_CAL] [/OFFSET X_OFFSET [Y_OFFSET] | /AZO OFFSET | /DESIG-
NATED_OFF [NAME]] [/MOVE_ONLY]
```

Maps an area surrounding the source position. Data are taken continu-
ously while the telescope is scanning the source, rather than acquiring
individual offset positions. In some cases this can result in a factor
of 2 or more increase in the observing dutycycle.

The considerations involved in using OTF_MAP are fairly complex, partic-
ularly for spectral line work. You should consult with a CSO staff mem-
ber before using this mapping mode.

### C.51.1  OTF_MAP LONGITUDE_SIZE

The size of the map in the longitudelike coordinate (right ascension,
azimuth, or Galactic longitude) in arc seconds.

### C.51.2  OTF_MAP LATITUDE_SIZE

The size of the map in the latitudelike coordinate (declination, eleva-
tion, or Galactic latitude) in arc seconds.

### C.51.3  OTF_MAP SCAN_SPEED

The speed at which the telescope should move across the sky, in arc sec-
onds per second of time. In heterodyne receiver mode, the SPEED and
LONGITUDE_RESOLUTION arguments determine the intergration time for each
cell:

    INTEGRATION_TIME = LONGITUDE_RESOLUTION / SPEED.

The default is LONGITUDE_RESOLUTION arc seconds per second. The scan
proceeds from negative values of the longitudelike coordinate towards
positive. This argument must be positive.

### C.51.4 OTF_MAP RAMP_UP_TIME

The time in seconds to wait for the antenna computer to acquire the new moving position. Data will not be taken during this time. The default RAMP_UP_TIME is 10 seconds, which is adequate for speeds of up to several times the sidereal rate. For speeds below about 5 arc seconds per second, substantially smaller values of RAMP_UP_TIME may be used. At very slow speeds (about 1 arc second per second), RAMP_UP_TIME may be set to 0.

### C.51.5 OTF_MAP LONGITUDE_RESOLUTION

The step size in the longitudelike coordinate, in arc seconds. This argument is optional, if not specified, 1/2 the beam width, rounded to the nearest arc second, will be used. This argument must be positive.

### C.51.6 OTF_MAP LATITUDE_RESOLUTION

The step size in the latitudelike coordinate, in arc seconds. This argument is optional, if not specified, the value of the argument LONGITUDE_RESOLUTION will be used. This argument can be either positive or negative. If the argument is positive, the map is started at the bottom (negative declination, elevation, or Galactic latitude).

### C.51.7 OTF_MAP /DIMENSION

Specifies the number of columns (cells in the scan direction) and rows in the map. This option, together with the LONGITUDE_RESOLUTION and LATITUDE_RESOLUTION arguments, is an alternative way of specifying the OTF map geometry. The LONGITUDE_SIZE and LATITUDE_SIZE arguments are ignored. They are instead calculated as:

    LONGITUDE_SIZE = NCOLUMNS * | LONGITUDE_RESOLUTION |

and

    LATITUDE_SIZE = NROWS * | LATITUDE_RESOLUTION |.

LATITUDE_RESOLUTION can be zero when /DIMENSION is specified, in which case a (singlerow) scan will be repeated NROWS times along the same strip.

### C.51.8 OTF_MAP NCOLUMNS

### C.51.9  OTF_MAP NROWS

### C.51.10  OTF_MAP /POSITION_ANGLE

Causes the telescope to be scanned in the direction specified by the position angle in degrees, which is measured from north through east. If the position angle is 0, for example, south to north scans will be taken. If the position angle is 45, scans will go from southwest to northeast. If no position angle is given, the source is scanned from west to east, which is equivalent to a position angle of 90.

### C.51.11  OTF_MAP /SIDEWAYS

Causes the map to be scanned in elevation, rather than in azimuth.

### C.51.12  OTF_MAP /SKEW

Causes each row to be offset from the previous row by the specified step in arc seconds. This will result in a parallelogramshaped map.

### C.51.13  OTF_MAP /ZIGZAG

Causes the scan direction to be alternated by reversing the position angle for even number rows. For example, rows 2, 4, 6, 8, ... will be taken from east to west instead of from west to east when the position angle is set to 90 degrees.

### C.51.14  OTF_MAP /SKIP

/SKIP N tells OTF_MAP to skip the first N rows of your map.

### C.51.15  OTF_MAP /ALTAZIMUTHAL

Causes the map area to be scanned in altazimuthal coordinates. The default is /EQUATORIAL.

## C.51.16   OTF_MAP /EQUATORIAL

Causes  the  map  area  to be scanned in equatorial coordinates of date.
This is the default.

## C.51.17   OTF_MAP /GALACTIC

Causes the map area to be scanned in Galactic coordinates.  The  default
is /EQUATORIAL.  *** This option is NOT working yet!!! ***

## C.51.18   OTF_MAP /NOFOCUS_ADJUST

Tells OTF_MAP not to adjust the focus at the beginning of each row.

## C.51.19   OTF_MAP /NOROTATOR_ADJUST

Tells  OTF_MAP  not to adjust the instrument rotator at the beginning of
each row.

## C.51.20   OTF_MAP /NOLO_ADJUST

Tells OTF_MAP not to adjust the phase lock frequency at the beginning of
each row, to allow for Doppler tracking.

## C.51.21   OTF_MAP /NOATTENUATOR_ADJUST

Tells OTF_MAP not to adjust the programmable attenuator at the beginning
of each row.

## C.51.22   OTF_MAP /CALIBRATE

Tells OTF_MAP to take a temperature calibration scan before  taking  any
source data.  The default action is to calibrate at the start only if no
valid temperature calibration scan is already available.  If an optional
argument  is  given  to  this option as /CALIBRATE N, then a temperature
calibration will be taken at the beginning and  also  before  every  Nth
row.

### C.51.23  OTF_MAP /NOCALIBRATE

Tells OTF_MAP not to take a temperature calibration scan even if no
valid calibration scan is available.

### C.51.24  OTF_MAP /PAUSE_AFTER_CAL

Allows the observer to specify a number of seconds to wait after the
temperature calibration scan, before taking the sources data. This is
desirable if the thermal load of the calibration vane seems to affect
the receivers performance for some period after taking a temperature
calibration scan. For example, /PAUSE_AFTER_CAL 5 will result in a 5
second pause between temperature calibration and data taking. This
option is selected by default, and the default time is 20 seconds.

### C.51.25  OTF_MAP /NOPAUSE_AFTER_CAL

Tells OTF_MAP not to pause after the temperature calibration scan.

### C.51.26  OTF_MAP /OFFSET

Allows you to specify the OFF position by the offset, in arc seconds,
from the center of the map in the mapping coordinate system.

### C.51.27  OTF_MAP /AZO

Allows you to specify the OFF position by the offset, in arc seconds,
from the center of the row being scanned. The duration of the OFF inte-
gration will be whatever integration time was specified in the most
recent SPECTROMETER command. Temperature calibration scans will be
taken with this same azimuth offset, relative to the center of the map.
This option may not be used with /DESIGNATED_OFF.

### C.51.28  OTF_MAP /DESIGNATED_OFF

If /DESIGNATED_OFF is specified, OFF data will be taken at a designated
OFF position after each row has been scanned. This is useful if no
region of the area you are mapping is free of signal, and you know of a
particular position which is clean. See OO_SCAN for more information on
how to set up a designated OFF position in the source catalog. The
duration of the OFF integration will be whatever integration time was
specified in the SPECTROMETER command. Any temperature calibration

scans requested with the map will be taken at the designated OFF posi-
tion, and an extra OFF integration will be taken after each temperature
calibration scan. This option may not be used with /AZO.

### C.51.29 OTF_MAP NAME

The name of the designated OFF position.

### C.51.30 OTF_MAP /MOVE_ONLY

When /MOVE_ONLY is specified, the antenna will perform the rastering
movements, but no data will be taken. This can be helpful for determin-
ing what amount of time is needed for ramping up (see RAMP_UP_TIME). It
can also be handy when you scan an area to find your beam on the strip
chart recorder.

## C.52 OPTICAL_POINTING

    [UIP\]OPTICAL_POINTING    NAME    [/EXPOSURE_TIME    EXPOSURE_TIME]
[/REPEAT_COUNT REPEAT_COUNT] [/OFFSET X_OFFSET Y_OFFSET]

    [UIP\]OPTICAL_POINTING [/AZIMUTH AZIMUTH]   [/ELEVATION   ELEVATION   |
/ZENITH_ANGLE ZENITH_ANGLE] [/DISTANCE_LIMIT DISTANCE_LIMIT] [/NEAREST |
/BRIGHTEST] [/EXPOSURE_TIME EXPOSURE_TIME] [/REPEAT_COUNT  REPEAT_COUNT]
[/OFFSET X_OFFSET Y_OFFSET]

Allows you to check the pointing with the optical telescope. You can
specify the name of a star to point on, or the system can search for a
suitable guide star near the current telescope position, or near the sky
position you specify. Once a star has been selected, the optical tele-
scope will be commanded to take an exposure. The optical telescope will
then take an exposure, and find the star within the frame. The offsets
will then be reported.

### C.52.1 OPTICAL_POINTING NAME

The name of the star to point on.

### C.52.2 OPTICAL_POINTING /AZIMUTH

Allows you to enter an azimuth value for a star for optical pointing. A
star will be chosen near this azimuth.

### C.52.3   OPTICAL_POINTING /ELEVATION

Allows you to enter an elevation value for a star for optical  pointing.
A star will be chosen near this elevation.


### C.52.4   OPTICAL_POINTING /ZENITH_ANGLE

Similar  to  the /ELEVATION option, but the angle is specified in zenith
distance.  It can be abbreviated as /ZA.


### C.52.5   OPTICAL_POINTING /ZA


### C.52.6   OPTICAL_POINTING /DISTANCE_LIMIT

Allows you specify the maximum angular distance, in  degrees  to  search
for a star for optical pointing.  The default is 5 degrees.


### C.52.7   OPTICAL_POINTING /NEAREST

Tells  the  system to use the nearest star within the DISTANCE_LIMIT for
optical pointing.


### C.52.8   OPTICAL_POINTING /BRIGHTEST

Tells the system to use the brightest star within the DISTANCE_LIMIT for
optical pointing.


### C.52.9   OPTICAL_POINTING /EXPOSURE_TIME

Allows  you to specify the duration, in milliseconds, of exposures taken
for optical pointing.


### C.52.10   OPTICAL_POINTING /REPEAT_COUNT

Allows you to specify how many exposures and fits should be  taken  when
doing an optical pointing.

### C.52.11 OPTICAL_POINTING /OFFSET

Allows you to give the CCD camera initial guesses for the X and Y positions of the star in the CCD frame.

## C.53 PAGE

[UIP\]PAGE

## C.54 PLANET

[UIP\]PLANET NAME [/JPL_HORIZONS] [/DOPPLER] [/NOLO_ADJUST] [/NOF-CAL_AUTO] [/NOTCAL_INVALIDATE]

Looks up the coordinates of an object in the ephemeris file called cat_dir:NAME.dat, where NAME is the name of the object, and passes three consecutive lines of information to the antenna computer. The three lines are those closest to the current time and are used by the antenna computer for a quadratic fit to compute the actual position of the object. Each line of the file should contain the following four quantities: UTC epoch in JD, right ascension, declination, range (distance) in AU, and range rate (radial velocity) in km/s. The right ascension, declination, range, and range rate should be geocentric. For example:

```
2451525.5 09:20:00.07 01:31:02.2 0.8536949382 21.92113
2451526.5 09:21:20.10 01:42:13.3 0.8410722778 21.78948
2451527.5 09:22:39.58 01:53:21.4 0.8285261389 21.65616
```

The lines should be in chronological order.

### C.54.1 PLANET NAME

The name of the object.

### C.54.2 PLANET /JPL_HORIZONS

Produces an ephemeris onthefly using the JPL HORIZONS system.

### C.54.3 PLANET /DOPPLER

Causes the antenna computer to Doppler track the object using the radial velocity information in the ephemeris file.

### C.54.4  PLANET /NOLO_ADJUST

Without this option, the LO frequency will  be  updated  after  the  new
source  position has been entered.  This option has no effect if you are
not observing in spectral line mode.

### C.54.5  PLANET /NOFCAL_AUTO

Without this option, the backend will take a frequency calibration  scan
if  you  are going to slew more than 40 degrees in azimuth.  This option
has no effect if you are not observing in spectral line  mode.   A  fre-
quency  calibration scan will not be taken if the PLANET command is exe-
cuted in a command file.

### C.54.6  PLANET /NOTCAL_INVALIDATE

Without this option, the current temperature calibration will be invali-
dated  after  the new source position has been entered.  This option has
no effect if you are not observing in spectral line mode.

## C.55   POINTING

    [UIP\]POINTING [NAME]

Loads a file of pointing constants into the antenna computer, to facili-
tate changing pointing modes.  For instance

    POINTING optical

will  load  in  the  most  recent  set of pointing constants for optical
pointing, and

    POINTING 345_side

will load in the most recent parameters for the 345 GHz SIS receiver  in
the sidecab.

### C.55.1  POINTING NAME

The name of the pointing setup such as OPTICAL or BOLOMETER.

## C.56   PSWITCH

```
[UIP\]PSWITCH
```

### C.56.1   PSWITCH /FOCUS_ADJUST

### C.56.2   PSWITCH /LEVEL_ADJUST

## C.57   PUNDIT

```
[UIP\]PUNDIT [STATUS]
```

By default, only one process running the UIP can issue commands which
affect the observatorys operation. If another terminal is running the
UIP, you will not be allowed to issue any command which communicates
with the antenna or backend computers, or changes the data acquisition
setup. However, the PUNDIT command allows you to override this feature.
Typing PUNDIT TRUE will tell the UIP to allow your terminal to issue
all UIP commands. PUNDIT FALSE disables this feature. Typing PU
DIT by itself will tell you whether you are a pundit or a pleb.

### C.57.1   PUNDIT STATUS

A TRUE or FALSE response.

## C.58   RASTER_SCAN

```
    [UIP\]RASTER_SCAN   SCAN_VELOCITY   SCAN_LENGTH   [NUMBER_OF_SCANS]
[/STEP_SIZE  STEP_SIZE]  [/OFFSET  X_OFFSET [Y_OFFSET]] [/POSITION_ANGLE
POSITION_ANGLE]  [/ALTERNATE_DIRECTION]  [/ALTAZIMUTHAL  |  /EQUATORIAL]
[/SETTLING_TIME SETTLING_TIME] [/NOFOCUS_ADJUST] [/NOROTATOR_ADJUST]
```

```
    [UIP\]RASTER_SCAN /CANCEL
```

```
    [UIP\]RASTER_SCAN
```

Implements a raster scan observing mode for bolometers.

### C.58.1 RASTER_SCAN SCAN_VELOCITY

The scan velocity in arc seconds per second.

### C.58.2 RASTER_SCAN SCAN_LENGTH

The scan length in arc seconds.

### C.58.3 RASTER_SCAN NUMBER_OF_SCANS

The number of scans to be performed. The default is 1.

### C.58.4 RASTER_SCAN /STEP_SIZE

The latitudinal separation, in arc seconds, between two adjacent scans.
The default is 0, i.e., all scans will be repeated at the same latitude.

### C.58.5 RASTER_SCAN /OFFSET

The initial scan offsets in arc seconds.

### C.58.6 RASTER_SCAN X_OFFSET

The initial longitudinal offset in arc seconds. The default is
SCAN_LENGTH / 2.

### C.58.7 RASTER_SCAN Y_OFFSET

The initial latitudinal offset in arc seconds. The default is
STEP_SIZE (NUMBER_OF_SCANS  1) / 2.

### C.58.8 RASTER_SCAN /POSITION_ANGLE

The direction of the scan, in arc degrees, measured from north through
east. The default is 90, i.e., scans will be taken from west to east.

## C.58.9   RASTER_SCAN /ALTERNATE_DIRECTION

Will reverse the direction of every other scan.


## C.58.10   RASTER_SCAN /ALTAZIMUTHAL

The scan coordinates will be altazimuthal.  This is the default.


## C.58.11   RASTER_SCAN /EQUATORIAL

The scan coordinates will be apparent equatorial.


## C.58.12   RASTER_SCAN /SETTLING_TIME

The settling time in seconds.  The default is 10.


## C.58.13   RASTER_SCAN /NOFOCUS_ADJUST

Will  not  adjust  the secondary mirror focus position.  By default, the
secondary mirror focus is adjusted at the beginning of each scan.


## C.58.14   RASTER_SCAN /NOROTATOR_ADJUST

Will not adjust  the  instrument  rotator  position.  By default,  the
instrument rotator is adjusted at the beginning of each scan.


## C.58.15   RASTER_SCAN /CANCEL

Will cancel the scan.


# C.59   REPEAT_COMMAND

    [UIP\]REPEAT_COMMAND NUM_ITERATIONS "COMMAND_LINE" [/BEEP_AT_END]

Allows you to repeat a command several times.

### C.59.1 REPEAT_COMMAND NUM_ITERATIONS

The number of times to repeat the command.

### C.59.2 REPEAT_COMMAND COMMAND_LINE

The command to be executed.

### C.59.3 REPEAT_COMMAND /BEEP_AT_END

Will beep 3 times when finished.

## C.60 RAO

```
[UIP\]RAO  [OFFSET]  [/MAPPING MAPPING_OFFSET] [/FIELD FIELD_OFFSET]
[/TEXAS TEXAS_OFFSET]
```

```
[UIP\]RAO [/MAPPING | /FIELD | /TEXAS]
```

Sends a new right ascension offset to the antenna computer.

### C.60.1 RAO OFFSET

The new right ascension offset in arc seconds.

### C.60.2 RAO /MAPPING

Modifies or prints the mapping offset.

### C.60.3 RAO MAPPING_OFFSET

The new mapping right ascension offset in arc seconds.

### C.60.4 RAO /FIELD

Modifies or prints the field offset.

### C.60.5 RAO FIELD_OFFSET

The new field right ascension offset in arc seconds.


### C.60.6 RAO /TEXAS

Modifies or prints the Texas offset.  The Texas switching mode is  acti-
vated  (that  moves  the  telescope ON and OFF source based on a digital
input signal to the antenna computer) if the offset is given.


### C.60.7 RAO TEXAS_OFFSET

The new Texas right ascension offset in arc seconds.


## C.61 ROTATOR

```
    [UIP\]ROTATOR [POSITION | /CONSTANT_UPDATES | /NOCONSTANT_UPDATES  |
/STEALTHY_UPDATES  |  /NOSTEALTHY_UPDATES] [/LHS  |  /RHS  | /BOLOCAM |
/NONE] [/OFFSET OFFSET]
```

Allows the user to control the motion of the Cassegrain instrument rota-
tors.  One can set the rotator at a fixed angle, or enable auto adjust-
ment to follow the parallactic angle.  If auto adjustment  is  selected,
an  offset  may  be  applied, and the timing of the angle changes may be
controlled.

If ROTATOR is entered without any  arguments  or  options,  and  if  the
antenna  is  in  STEALTHY mode, the antenna will be instructed to adjust
the rotator based on the parallactic angle.


### C.61.1 ROTATOR POSITION

If this optional argument is specified, it will be sent to  the  antenna
computer and used as a fixed rotator position.


### C.61.2 ROTATOR /CONSTANT_UPDATES

Tells  the  antenna computer to update the position of the rotator when-
ever the position should be changed.  In this mode, the rotator might be
moved when an integration is taking place.

### C.61.3   ROTATOR /NOCONSTANT_UPDATES

Disables `/CONSTANT_UPDATES`.

### C.61.4   ROTATOR /STEALTHY_UPDATES

Tells the antenna computer to update the position of the rotator only when data is not being taken, so that during a given integration the rotator will remain fixed.

### C.61.5   ROTATOR /NOSTEALTHY_UPDATES

Disables `/STEALTHY_UPDATES`.

### C.61.6   ROTATOR /LHS

Activates the left (as seen from the control room) rotator. Only one rotator can be active at a time.

### C.61.7   ROTATOR /RHS

Activates the right (as seen from the control room) rotator. Only one rotator can be active at a time.

### C.61.8   ROTATOR /BOLOCAM

Activates the rotator of `BOLOCAM`.

### C.61.9   ROTATOR /NONE

Deactivates the any active rotator.

### C.61.10   ROTATOR /OFFSET

Allows you to specify a fixed offset which will be added to the parallactic angle when the antenna computer updates the rotator position.

## C.62   SECONDARY

    [UIP\]SECONDARY   THROW   FREQUENCY    [ON_TOLERANCE    [OFF_TOLERANCE]]
[/ANALOG_PID_ONLY  | /TTL_SYNC | /SQUARE_WAVE | /FORCE] [/MEASURED_THROW
MEASURED_THROW]

    [UIP\]SECONDARY /RESTART [/FORCE] [/MEASURED_THROW MEASURED_THROW]

    [UIP\]SECONDARY /STOP

    [UIP\]SECONDARY /MEASURED_THROW MEASURED_THROW

    [UIP\]SECONDARY

Controls the chopping secondary mirror.  It allows the  chop  throw  and
frequency to be specified, as well as where in the chop cycle the system
will acquire data.

By default, the SECONDARY command will use the digital, selftuning con-
troller.  It  may  take  a few minutes for the controller to acquire an
initial solution.  Subsequently the selftuning process can  be  skipped
by reloading the existing solution.  It needs to be retuned whenever the
chop throw or frequency is changed.

The digital controller utilizes the analog PID controller to  shape  the
closed  loop response of the chopping secondary mirror.  It must be pre-
set as follows PRIOR TO issuing this command:

```
        =======================================
          Throw        P      I      D      G

                150.0   2.00   4.40   4.60   4.20
        150.0   210.0   1.70   4.20   4.60   4.20
        210.0   330.0   1.60   3.90   4.60   4.20
        330.0           1.30   3.40   4.60   3.20
```

### C.62.1   SECONDARY THROW

The separation of two beams on the sky  in  arc  seconds.   The  maximum
throw  is 480 arc seconds when the digital controller is used or 540 arc
seconds otherwise.

### C.62.2   SECONDARY FREQUENCY

The chopping frequency in Hz.  The minimum frequency is 0.1 Hz, and  the
maximum  frequency  is  4 Hz when the digital controller is used or 5 Hz

otherwise.

### C.62.3  SECONDARY ON_TOLERANCE

The pointing error tolerance for the ON beam in arc seconds. The default is 10.

### C.62.4  SECONDARY OFF_TOLERANCE

The pointing error tolerance for the OFF beam in arc seconds. The default is the same as the ON_TOLERANCE.

### C.62.5  SECONDARY /MEASURED_THROW

The measured (actual) beam separation on the sky in arc seconds.

### C.62.6  SECONDARY /ANALOG_PID_ONLY

Will use the analog PID controller only.

### C.62.7  SECONDARY /TTL_SYNC

Will use the analog PID controller in TTLsync mode.

### C.62.8  SECONDARY /SQUARE_WAVE

Will use the digital controller in square wave mode.

### C.62.9  SECONDARY /RESTART

Will restart chopping. When the digital controller has not been tuned recently, the SECONDARY command will suggest you to retune it. Specifying /FORCE along with /RESTART will force keeping the current tuning.

## C.62.10  SECONDARY /FORCE

Will force keeping the current tuning or retuning of  the  digital  con-
troller.


## C.62.11  SECONDARY /STOP

Will  stop  the  secondary  mirror from chopping and park it at the rest
position.


# C.63  SHUTTER

[UIP\]SHUTTER /OPEN [APERTURE]

[UIP\]SHUTTER /CLOSE

[UIP\]SHUTTER /STOP

[UIP\]SHUTTER /SHADOW [COVERAGE]

[UIP\]SHUTTER /ALARMOFF

[UIP\]SHUTTER

Controls the dome shutter and its security alarm.  If no option is spec-
ified, it prints the current status of the shutter,


## C.63.1  SHUTTER /OPEN

Starts  the  open  or  close cycle of the shutter.  Without the optional
APERTURE argument, it starts the open cycle.  The shutter will be  fully
opened  unless SHUTTER /STOP command is issued or the stop switch on the
control panel is pressed manually.  If the optional  APERTURE  argument,
in %,  is  given, it starts either the open or close cycle depending on
the current aperture.  Then the shutter will be held in a position which
realizes the specified aperture.


## C.63.2  SHUTTER /CLOSE

Starts the close cycle of the shutter.  The shutter will be fully closed
unless SHUTTER /STOP command is issued or the stop switch on the control
panel is pressed manually.

### C.63.3   SHUTTER /STOP

Stops the open or close cycle of the shutter.


### C.63.4   SHUTTER /SHADOW

Starts the closed loop control of the shutter. The shutter position
will be adjusted continuously so that at least COVERAGE % of the primary
dish surface is in shadow. This may or may not result in a partial or
total brokage of the telescope beam. The default value for COVERAGE  is
100 %. THIS FEATURE IS NOT WORKING YET.


### C.63.5   SHUTTER /ALARMOFF

Resets the security alarm which monitors the shutter opening area on the
first floor.


## C.64   SPECTROMETER

    [UIP\]SPECTROMETER [INTEGRATION_TIME] [/AOS5 [OFFSET1 [OFFSET2 OFF-
SET3 OFFSET4]] | /NOAOS5] [/FFTS1W [OFFSET] | /FFTS1N [OFFSET] |
/NOFFTS1] [/FFTS2 [OFFSET1 OFFSET2 [OFFSET3 OFFSET4]] | /NOFFTS2]
[/RESTART]   [/DISPLAY   DISPLAY]   [/LOCK_IGNORE   |   /NOLOCK_IGNORE]
[/ACQUIRED_IGNORE | /NOACQUIRED_IGNORE] [/IDLE_IGNORE  |  /NOIDLE_IGNORE]
[/ON_SAVE   |   /NOON_SAVE]  [/OFF_SAVE  |  /NOOFF_SAVE]  [/DARK_SAVE  |
/NODARK_SAVE] [/BASELINE WINDOW1 WINDOW2 WINDOW3 WINDOW4 | /NOBASELINE]

Allows you to change the integration time and certain  other  parameters
of  the AOS and FFTS backends.  It also informs the system that you will
be observing in spectroscopy mode (as opposed to bolometer mode).   Typ-
ing SPECTROMETER without any arguments results in the current parameters
being displayed.  All parameters, except the  baseline  parameters,  are
sticky.

SPECTROMETER  also allows you to specify which AOS and FFTS backends are
active and to position them within the IF passband.


### C.64.1   SPECTROMETER INTEGRATION_TIME

How long the AOS and FFTS backends should integrate, in seconds.  It may
not  be  possible  to integrate for precisely the time you request since
the true integration time must be a  multiple  of  the  Reticon/CCD/FPGA
readout time.

### C.64.2   SPECTROMETER /AOS5

Tells the system that the AOS5 (4 GHz) should be active.

An array of four 1.1 GHz AOS segments covers the 4 GHz passband of the wideband receivers. The segments are by default centered at 4.5, 5.5, 6.5, and 7.5 GHz. They can be moved independently by specifying four offsets in GHz as the optional arguments. The legal range of each off-set is 0.10 to 0.10 GHz. Only one of the four AOS segments is used to cover the 1 GHz passband of the narrowband receivers. It can be moved by specifying the offset in GHz as the optional argument.

### C.64.3   SPECTROMETER /NOAOS5

Tells the system that the AOS5 (4 GHz) should be deactivated.

### C.64.4   SPECTROMETER /FFTS1W

Tells the system that the FFTS1 should be active in the wideband mode (1 GHz).

The optional argument specifies the offset in GHz relative to the IF where the FFTS1 should be positioned. The legal range is 2.00 to 2.00 GHz for the wideband receivers and 0.50 to 0.50 GHz for the narrowband receivers.

### C.64.5   SPECTROMETER /FFTS1N

Tells the system that the FFTS1 should be active in the narrowband mode (500 MHz).

The optional argument specifies the offset in GHz relative to the IF where the FFTS1 should be positioned. The legal range is 2.00 to 2.00 GHz for the wideband receivers and 0.50 to 0.50 GHz for the narrowband receivers.

### C.64.6   SPECTROMETER /FFTS1

[DEPRECATED] Tells the system that the FFTS1 (1 or 0.5 GHz) should be active.

The optional argument specifies the offset in GHz relative to the IF where the FFTS1 should be positioned. The legal range is 2.00 to 2.00 GHz for the wideband receivers and 0.50 to 0.50 GHz for the narrowband

receivers.

## C.64.7   SPECTROMETER /NOFFTS1

Tells the system that the FFTS1 (1 or 0.5 GHz) should be deactivated.

## C.64.8   SPECTROMETER /BANDWIDTH

[DEPRECATED]  Specifies  the  bandwidth  of the FFTS1 in GHz.  It can be
configured to cover either 1 or 0.5 GHz with 8192 channels.  The default
is 1 GHz.

## C.64.9   SPECTROMETER /FFTS2

Tells the system that the FFTS2 (8 GHz) should be active.

Four FFTS segments of 2 GHz wide each conver the maximum 8 GHz passband.
The segments 1 and 2 are by default centered at 5  and  7  GHz,  respec-
tively, in the first 48 GHz IF channel for the wideband receivers.  The
segments 3 and 4 are by default centered at 5 and 7  GHz,  respectively,
in  the  second  48 GHz IF channel.  The segments 3 and 4 are only used
with Frank Rices receiver, and their default center frequencies (5  and
7  GHz)  correspond  to  11  and 9 GHz, respectively, in the original IF
passband of the receiver (416 GHz).

Each segment can be positioned anywhere within the 48 GHz  passband  of
the  IF channel it is connected by specifying four offsets in GHz as the
optional arguments.  Note that the segments 3 and 4  are  inverted  in
frequency.   Shifting them higher in the downconverted 48 GHz IF moves
them lower in the original 812 GHz IF.

For the narrowband receivers, the segments 1 and 2 are both  by  default
centered  at  7 GHz, which corresponds to 1 GHz in the original passband
of the receivers (12 GHz).  The segments 1 and 2 can be repositioned by
specifying  two offsets in GHz as the optional arguments.  Note that the
spectra are inverted in frequency, but the offsets are not, i.e.,  the
offsets are relative to 1.5 GHz in the 12 GHz IF of the receivers.

## C.64.10   SPECTROMETER /NOFFTS2

Tells the system that the FFTS2 (8 GHz) should be deactivated.

## C.64.11 SPECTROMETER /RESTART

Causes the processes for the active AOS and FFTS backends to be restarted. This is sometimes useful if the AOS and FFTS processes in the backend computer have become messed up.

## C.64.12 SPECTROMETER /DISPLAY

Allows you to redirect the realtime display for each spectrometer, which shows the current integration. This option must be given an argument, and it must be a domain name or an IP address of the X server, followed by a colon and a display number (which is usually 0), then optionally a dot and a screen number (beginning at 0). For example, /DISPLAY kilauea:0.1 will redirect the realtime display of the active spectrometers to the second screen of kilauea.

## C.64.13 SPECTROMETER /LOCK_IGNORE

Tells the backend computer to ignore the LO lock signal from the antenna computer. The default action is not to ignore the LO lock signal. It is selected by default when the synthesized LO is being used.

## C.64.14 SPECTROMETER /NOLOCK_IGNORE

Tells the backend computer not to ignore the LO lock signal. This is the default action.

## C.64.15 SPECTROMETER /ACQUIRED_IGNORE

Tells the backend computer to ignore the acquired signal from the antenna computer. The default action is not to ignore the acquired signal.

## C.64.16 SPECTROMETER /NOACQUIRED_IGNORE

Tells the backend computer not to ignore the acquired signal. This is the default action.

## C.64.17   SPECTROMETER /IDLE_IGNORE

Tells the backend computer to integrate even if the antenna is idle.
The default action is not to integrate when the antenna is idle.

## C.64.18   SPECTROMETER /NOIDLE_IGNORE

Tells the backend computer not to integrate if the antenna is idle.
This is the default action.

## C.64.19   SPECTROMETER /ON_SAVE

Specifies that the ON position scan should be stored separately after an
integration.

## C.64.20   SPECTROMETER /NOON_SAVE

Specifies that the ON position scan should not be stored separately.
This is the default action.

## C.64.21   SPECTROMETER /OFF_SAVE

Specifies that the OFF position scan should be stored separately after
an integration.

## C.64.22   SPECTROMETER /NOOFF_SAVE

Specifies that the OFF position scan should not be stored separately.
This is the default action.

## C.64.23   SPECTROMETER /DARK_SAVE

Specifies that the DARK scan should be stored separately after an inte-
gration.

## C.64.24   SPECTROMETER /NODARK_SAVE

Specifies that the DARK scan should not be stored separately.  This is
the default action.

### C.64.25 SPECTROMETER /BASELINE

Activates the linear baseline. This baseline only affects the display and the line integrals calculated by the FIVE_POINT command. The data written to data files are not affected. Four channel numbers, specifying two windows, must be given as the arguments.

### C.64.26 SPECTROMETER /NOBASELINE

Turns off the baseline. The baseline is automatically erased when you change sources.

## C.65 STATUS

[UIP\STATUS]

Prints the current values of certain system parameters relating to logging, command and data file status.

## C.66 STOW

[UIP\]STOW [/ZENITH]

Causes the antenna to be driven to a random azimuth in a roughly eastern direction. The reason is that if the dome is parked at a fixed azimuth every day, the electrical slip rings, powering the dome, will wear unevenly. The antenna is driven to an elevation angle of 60, and the antenna is idled.

If the file kilauea:/opt/uip/etc/stow.txt exists, and if it contains a valid elevation angle, the antenna will be stowed at that elevation angle.

### C.66.1 STOW /ZENITH

The antenna is driven to zenith.

## C.67 SWEEP

```
    [UIP\]SWEEP X_AMPLITUDE X_PERIOD [X_PHASE]  [/Y_COORDINATE  Y_AMPLI-
TUDE  [Y_PERIOD [Y_PHASE]]]  [/POSITION_ANGLE  POSITION_ANGLE] [/ALTAZ-
IMUTHAL | /EQUATORIAL]

    [UIP\]SWEEP /STOP

    [UIP\]SWEEP
```

Implements a trackandsweep observing mode for SHARC II.  This  command
generates  a  Lissajous  trajectory using the following parametric equa-
tions:

```
    dx(t) = X_AMPLITUDE cos 2 pi (t / X_PERIOD + X_PHASE / 360)
    dy(t) = Y_AMPLITUDE sin 2 pi (t / Y_PERIOD + Y_PHASE / 360)
```

### C.67.1  SWEEP X_AMPLITUDE

The amplitude of the sweep along the X axis in arc seconds.

### C.67.2  SWEEP X_PERIOD

The period of the sweep along the X axis in seconds.

### C.67.3  SWEEP X_PHASE

The initial phase of the sweep along the X axis in arc degrees.

### C.67.4  SWEEP /Y_COORDINATE

### C.67.5  SWEEP Y_AMPLITUDE

The amplitude of the sweep along the Y axis in arc seconds.  The default
is 0.

### C.67.6  SWEEP Y_PERIOD

The  period  of  the  sweep along the Y axis in seconds.  The default is
X_PERIOD.

### C.67.7  SWEEP Y_PHASE

The initial phase of the sweep along the Y axis in arc degrees. The default is 0.

### C.67.8  SWEEP /POSITION_ANGLE

The orientation of the sweep coordinates relative to the sky coordinates. It is defined as an angle, in arc degrees, between the X axis of the sweep and +AZ, +RA, or +L, measured through +EL, +DEC, or +B. The default is 0, i.e., the sweep coordinates (+X, +Y) correspond to the sky coordinates (+AZ, +EL), (+RA, +DEC), or (+L, +B). Note this definition is not sky right.

### C.67.9  SWEEP /ALTAZIMUTHAL

The sweep coordinates will be altazimuthal. This is the default.

### C.67.10  SWEEP /EQUATORIAL

The sweep coordinates will be apparent equatorial.

### C.67.11  SWEEP /STOP

Will stop the sweep.

## C.68  TCAL

```
     [UIP\]TCAL [/OFFSET X_OFFSET [Y_OFFSET]  |  /DESIGNATED_OFF  [NAME]]
[/ALTAZIMUTHAL  |  /EQUATORIAL  |  /GALACTIC] [/INTEGRATION_TIME INTEGRA-
TION_TIME]  [/MANUAL]   [/NOATTENUATOR_ADJUST]   [/DB   ATTENUATION]
[/STAY_OFF]
```

Takes a temperature calibration scan.

### C.68.1  TCAL /OFFSET

Specifies how many arc seconds to step off the source before taking the calibration scan.

## C.68.2 TCAL /DESIGNATED_OFF

Tells TCAL to search the open source catalogs for a designated OFF position for the object being observed. Such OFF positions must have the objects name followed by ":off_position", or they must be named explicitly as an argument of the /DESIGNATED_OFF option.

## C.68.3 TCAL NAME

The name of the designated OFF position.

## C.68.4 TCAL /ALTAZIMUTHAL

Specifies that the offset given by the OFFSET option is in altazimuthal coordinates. This is the default.

## C.68.5 TCAL /EQUATORIAL

Specifies that the offset given by the OFFSET option is in equatorial coordinates.

## C.68.6 TCAL /GALACTIC

Specifies that the offset given by the OFFSET option is in Galactic coordinates.

## C.68.7 TCAL /INTEGRATION_TIME

Specifies the time, in seconds, that the spectrometer will integrate for both the HOT and SKY spectra. The default is 5 seconds.

## C.68.8 TCAL /MANUAL

If /MANUAL is specified, no commands will be sent to the chopper wheel. Instead, the user will be prompted to insert and remove the hot load manually. This option is sticky.

### C.68.9  TCAL /NOATTENUATOR_ADJUST

Tells TCAL not to adjust the programmable attenuator at the beginning of
a scan.

### C.68.10  TCAL /DB

Causes the current programmable attenuator setting to be incremented  by
the  specified  amount  before the hot load is inserted.  This new value
remains in place until the calibration scan is completed, at which  time
the attenuator is returned to its original state.   The default is 3 dB.

### C.68.11  TCAL /STAY_OFF

Will  keep  the antenna at the OFF source position after the calibration
scan.

### C.68.12  TCAL /NOMOVE_OFF

Internal use only.  Indicates that the  telescope  is  already  OFF  the
source.

### C.68.13  TCAL /OTF

Internal use only.  Keeps the OTF map grid from being erased when a tem-
perature calibration scan is taken.

## C.69  TERTIARY

[UIP\]TERTIARY /SIDECAB

[UIP\]TERTIARY /NASMYTH2

[UIP\]TERTIARY /CASSEGRAIN | /STOW

[UIP\]TERTIARY

Moves the tertiary mirrors to one of the preconfigured  positions.   If
no  option  is  specified,  it prints the current status of the tertiary
mirrors.

### C.69.1 TERTIARY /SIDECAB

Configures the tertiary mirrors for the Side Cabin receivers.

### C.69.2 TERTIARY /NASMYTH2

Configures the tertiary mirrors for the instruments at the second Nasmyth focus.

### C.69.3 TERTIARY /CASSEGRAIN

Configures the tertiary mirrors for the instruments at the Cassegrain focus.

### C.69.4 TERTIARY /STOW

Same as /CASSEGRAIN configures the tertiary mirrors for the instruments at the Cassegrain focus.

## C.70 TEXAS

```
[UIP\]TEXAS [AZOFF]

[UIP\]TEXAS /DESIGNATED_OFF [NAME]

[UIP\]TEXAS /STOP
```

Enables switching of the telescope between the source and OFF positions according to a signal at the digital input 1 of the antenna computer. The antenna will be moved to the OFF position if the digital input 1 is low. If the input is high, the offset will be removed.

### C.70.1 TEXAS AZOFF

The azimuth offset for the OFF position in arc seconds.

### C.70.2 TEXAS /DESIGNATED_OFF

Uses the designated OFF positition instead of the azimuth offset.

### C.70.3  TEXAS NAME

The name of the designated OFF position.

### C.70.4  TEXAS /STOP

Disables the Texas control of position switching.

## C.71   THETA_POSITION

```
[UIP\]THETA_POSITION [POSITION] [/OFFSET OFFSET] [/SET_OFFSET]
```

Allows the user to control the rotation of the secondary mirror.  If  an
absolute position is specified, then autofocusing is disabled.  An off-
set can also be specified to be added to the stored focus curve.

### C.71.1  THETA_POSITION POSITION

If this optional argument is specified, it will be sent to  the  antenna
computer  and used as a fixed THETA position.  The antenna computer will
not update the position.

### C.71.2  THETA_POSITION /OFFSET

Allows you to specify a fixed offset which will be added  to  the  value
from  the  focus  curve  when the antenna computer updates the secondary
position.

### C.71.3  THETA_POSITION /SET_OFFSET

This option, which should be used alone, is used to calculate the offset
which  should  be applied to the focus curve.  First one should find the
best THETA position, using the THETA_POSITION command to send  the  sec-
ondary  to  specific  positions.   Then  when  the focus is good, invoke
THETA_POSITION with this option, and  the  offset  will  be  calculated.
Then  invoke  FOCUS  with  either  the  /STEALTHY_UPDATES  or  the /CON-
STANT_UPDATES option to tell the antenna to use the focus curve.

## C.72   TILT_CURVE

        [UIP\]TILT_CURVE [STEP_SIZE  [SETTLE_TIME]]  [/FILE_NAME  FILE_NAME]
    [/RETROGRADE]

Takes the dome for a spin, and reads the tilt meters, generating a curve
of tilt vs azimuth.  New tilt meter zeros are determined and sent to the
antenna.

### C.72.1   TILT_CURVE STEP_SIZE

How  many  degrees  the  dome and antenna are stepped between tilt meter
readings.

### C.72.2   TILT_CURVE SETTLE_TIME

Number of seconds to wait for the reading to settle.  The values brought
back from the antenna are smoothed values.  This necessitates waiting at
each point to allow the average to drift to its proper value.

### C.72.3   TILT_CURVE /FILE_NAME

The name of the file to write values into.

### C.72.4   TILT_CURVE /RETROGRADE

Normally the curve is taken going from AZ 20 to  AZ  340.   /RETROGRATE
causes the curve to be taken in the reverse direction.

## C.73   TOANTENNA

        [UIP\]TOANTENNA "MESSAGE"

Sends a text message to the antenna computer.

### C.73.1   TOANTENNA MESSAGE

The text to be sent.

## C.74   TO_DWNCVTR

```
[UIP\]TO_DWNCVTR "MESSAGE"
```

Sends  a  text message to the down converter process on the backend computer.

### C.74.1   TO_DWNCVTR MESSAGE

The text to be sent.

## C.75   TO_SPECTROMETER

```
[UIP\]TO_SPECTROMETER "MESSAGE" [/AOS5] [/FFTS1] [/FFTS2]
```

Sends a text message to the AOS or FFTS process on the backend computer.

### C.75.1   TO_SPECTROMETER MESSAGE

The text to be sent.

### C.75.2   TO_SPECTROMETER /AOS5

The message is to be sent to an AOS process which runs the AOS5.

### C.75.3   TO_SPECTROMETER /FFTS1

The message is to be sent to a FFTS process which runs the FFTS1.

### C.75.4   TO_SPECTROMETER /FFTS2

The message is to be sent to a FFTS process which runs the FFTS2.

## C.76   TRACK

```
[UIP\]TRACK
```

Causes the telescope to slew to the requested position  and  then  track

that position, adjusting the pointing of the telescope as necessary.

## C.77   VERIFY

    [UIP\]VERIFY NAME [/NODEFAULT] [/BRIEF | /LONG] [/ALTAZIMUTH] [/ELE-
VATION ELEVATION | /ZENITH_ANGLE ZENITH_ANGLE] [/PARALLACTIC_ANGLE  PAR-
ALLACTIC_ANGLE]

    [UIP\]VERIFY /LINE LINE_NAME [/NODEFAULT] [/BRIEF | /LONG]

Allows  you  to inspect entries in either one of the source catalogs, or
one of the spectral line catalogs.  Catalogs are searched in the reverse
of  the  order in which they were opened.  Wildcards may be used for the
name.  VERIFY will also work on planets, and other Solar system  objects
with associated ephemeris files.

### C.77.1   VERIFY NAME

   The name of the source.

### C.77.2   VERIFY /LINE

   Tells  VERIFY  to  look  in  the  spectral line catalog, rather than the
   source catalog, to find the entry named by the LINE_NAME argument.

### C.77.3   VERIFY LINE_NAME

   The name of the line.

### C.77.4   VERIFY /NODEFAULT

   Tells VERIFY not to search the default catalog.  This  is  particularly
   useful  if  you  want  to get a listing of your personal file, without a
   copy of the default catalog appended to the end.

### C.77.5   VERIFY /BRIEF

   Selects the short form of output. It  is  automatically  selected  when
   wildcards are used.

### C.77.6 VERIFY /LONG

Selects the short form of output. It is automatically selected when wildcards are not used.

### C.77.7 VERIFY /ALTAZIMUTH

Tells VERIFY to display the altitude and azimuth of the source, as well as the hour angle and parallactic angle.

### C.77.8 VERIFY /ELEVATION

Tells VERIFY to calculate the UT at which the source will rise to this elevation angle, and when it will set below this angle. Specify the angle in degrees.

### C.77.9 VERIFY /ZENITH_ANGLE

Similar to the /ELEVATION option, but the angle is specified in zenith distance. It can be abbreviated as /ZA.

### C.77.10 VERIFY /ZA

### C.77.11 VERIFY /PARALLACTIC_ANGLE

Tells VERIFY to calculate the UT at which the source will cross this parallactic angle. Specify the angle in degrees.

## C.78 WEATHER

[UIP\]WEATHER TEMPERATURE HUMIDITY PRESSURE [/AUTOMATIC | /NOAUTO-MATIC] [/FAHRENHEIT]

Enables the user to send weather parameters to the antenna computer, so that the refraction corrections can be made accurately.

### C.78.1   WEATHER TEMPERATURE

The ambient temperature in degrees Celsius.

### C.78.2   WEATHER HUMIDITY

The relative humidity in percents.

### C.78.3   WEATHER PRESSURE

The barometric pressure in millibars.

### C.78.4   WEATHER /AUTOMATIC

The  antenna computer will automatically update the weather using values
from the weather station.

### C.78.5   WEATHER /NOAUTOMATIC

The antenna computer will NOT automatically  update  the  weather  using
values from the weather station.

### C.78.6   WEATHER /FAHRENHEIT

The ambient temperature is taken to be in degrees Fahrenheit.

## C.79   X_POSITION

```
[UIP\]X_POSITION [POSITION] [/OFFSET OFFSET] [/SET_OFFSET]
```

Allows the user to control the focusing of the secondary mirror, by mov-
ing it perpendicular to the optical axis.  If an  absolute  position  is
specified, then autofocusing is disabled.  An offset can also be speci-
fied to be added to the stored focus curve.

### C.79.1   X_POSITION POSITION

If this optional argument is specified, it will be sent to  the  antenna

computer and used as a fixed X position. The antenna computer will not update the position.

### C.79.2  X_POSITION /OFFSET

Allows you to specify a fixed offset which will be added to the value from the focus curve when the antenna computer updates the secondary position.

### C.79.3  X_POSITION /SET_OFFSET

This option, which should be used alone, is used to calculate the offset which should be applied to the focus curve. First one should find the best X position, using the X_POSITION command to send the secondary to specific positions. Then when the focus is good, invoke X_POSITION with this option, and the offset will be calculated. Then invoke FOCUS with either the /STEALTHY_UPDATES or the /CONSTANT_UPDATES option to tell the antenna to use the focus curve.

## C.80  Y_POSITION

    [UIP\]Y_POSITION [POSITION] [/OFFSET OFFSET] [/SET_OFFSET]

Allows the user to control the focusing of the secondary mirror, by moving it perpendicular to the optical axis. If an absolute position is specified, then autofocusing is disabled. An offset can also be specified to be added to the stored focus curve.

### C.80.1  Y_POSITION POSITION

If this optional argument is specified, it will be sent to the antenna computer and used as a fixed Y position. The antenna computer will not update the position.

### C.80.2  Y_POSITION /OFFSET

Allows you to specify a fixed offset which will be added to the value from the focus curve when the antenna computer updates the secondary position.

### C.80.3  Y_POSITION /SET_OFFSET

This option, which should be used alone, is used to calculate the offset
which should be applied to the focus curve.  First one should  find  the
best  Y  position, using the Y_POSITION command to send the secondary to
specific positions.  Then when the focus is good, invoke Y_POSITION with
this  option, and the offset will be calculated.  Then invoke FOCUS with
either the /STEALTHY_UPDATES or the /CONSTANT_UPDATES option to tell the
antenna to use the focus curve.

## C.81  ZA

```
[UIP\]ZA [ANGLE]
```

Sends  a  new  zenith  distance to the antenna computer.  The command ZA
automatically selects altazimuthal coordinates.

### C.81.1  ZA ANGLE

The new zenith distance to be sent to the antenna computer.

## C.82  ZAO

```
[UIP\]ZAO [OFFSET] [/FIXED FIXED_OFFSET]  [/MAPPING  MAPPING_OFFSET]
[/FIELD FIELD_OFFSET]
```

```
[UIP\]ZAO [/FIXED | /MAPPING | /FIELD]
```

Sends a new zenith distance offset to the antenna computer.

### C.82.1  ZAO OFFSET

The new zenith distance offset in arc seconds.

### C.82.2  ZAO /FIXED

Modifies or prints the fixed offset.

### C.82.3   ZAO FIXED_OFFSET

The new fixed zenith distance offset in arc seconds.

### C.82.4   ZAO /MAPPING

Modifies or prints the mapping offset.

### C.82.5   ZAO MAPPING_OFFSET

The new mapping zenith distance offset in arc seconds.

### C.82.6   ZAO /FIELD

Modifies or prints the field offset.

### C.82.7   ZAO FIELD_OFFSET

The new field zenith distance offset in arc seconds.