Tracking
Software Interface

User's Manual

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1 - Introduction

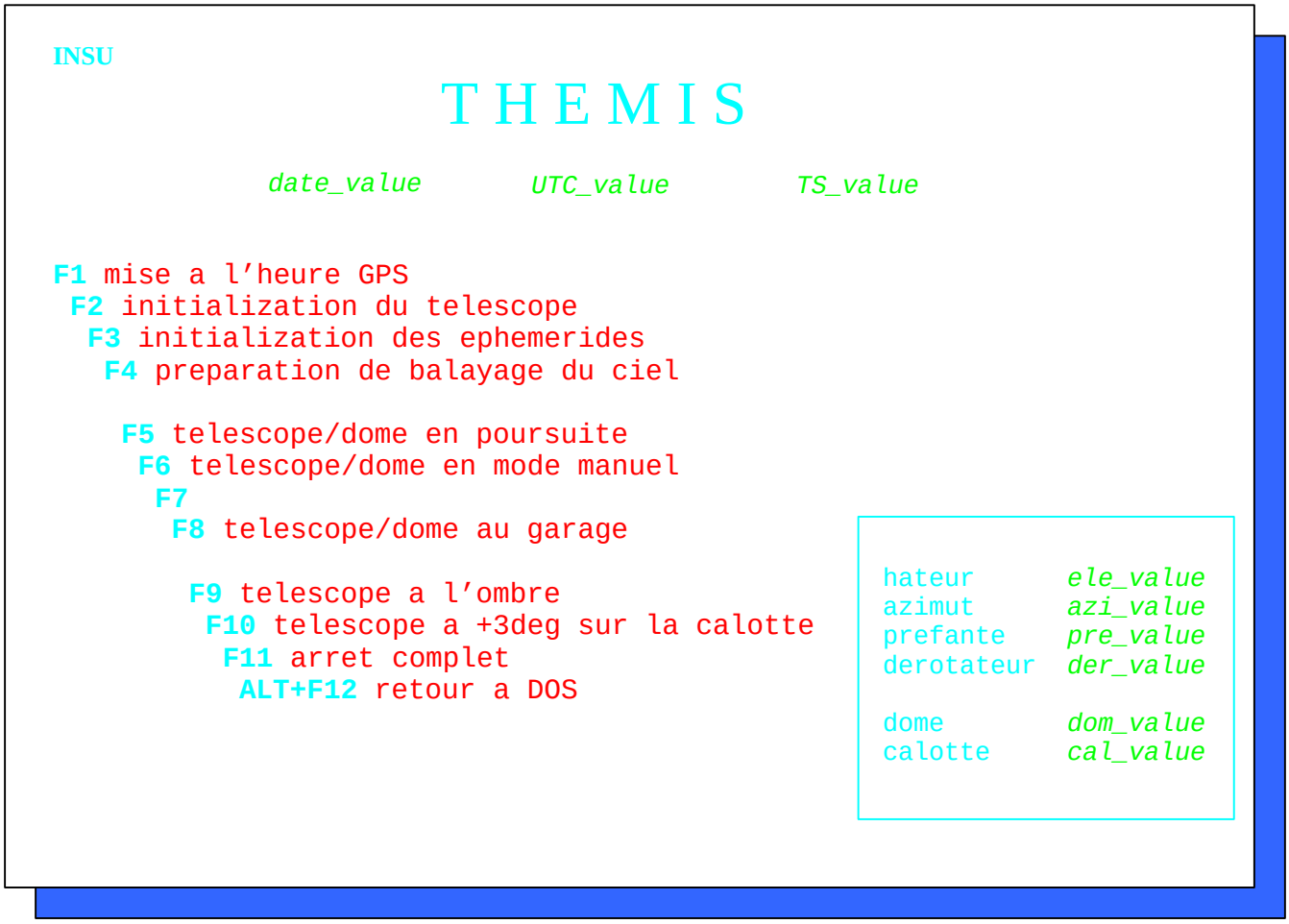
This manual gives an overview of the possibilities offered by the Tracking Software Interface . It is deserved to the observers. Anyone wanting more details on the program itself should look at the internal web documentation present at THEMIS (reserved to the local team).

Different levels compose the tracking program: from 0 to 2. Next sections describe the menu offered and describe the possible actions for each level.

The program is authomatically started when the computer is turned on. To start the program from the DOS prompt the current directory must be **`c:\source`** ; thus the command **`tel`** must be entered.

2 - Level 0 : Supervisor Mode Software Interface

This level is entered just when the program is started. The displayed screen is reported below :



Informations about date/time are displayed on the top of the screen :

`date_value` = current date (*day / month / year*)

`UTC_value` = current value of the Coordinated Universal Time (*hour / minute / second*) ; this value is retrieved from the GPS device connected to the computer

`TS_value` = current value of the Local Sideral Time (*hour / minute / second*) this value is computed by the program starting from the UTC value

Information about the position of both the telescope and the dome are displayed on the bottom right corner of the screen :

`ele_value` = current telescope's elevation angle (*degree units*)
`azi_value` = current telescope's azimut angle (*degree units*)
`pre_value` = current preslit angle (*degree units*)
`der_value` = current derotator angle (*degree units*)
`dom_value` = current dome's azimut angle (*degree units*)
`cal_value` = current dome's pseudo-elevation angle (*degree units*)

A menu with 11 options is offered at this stage (option **F7** is reserved for future use).

OPTIONS F2 , F6 , F8 , F9 , F10 AND F11
ARE STRICTLY FORBIDDEN TO EVERYBODY BUT THE OPERATORS

To start an action, just press the "F" key indicated in front of each command line. It is also possible to send a command from the UCCI (cf. table 1 in annex 1).

- Option **F1** allows for the initialization of the GPS card inside the computer

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- Option **F3** allows for creating a new updated version of the 9 Target Position Files corresponding to the 9 possible solar system targets (the Sun and the 8 planets, except the Earth). Each file will contain the necessary informations to compute the target's position during the 12 hours following the current time retrived from the GPS device.
  Position data are constructed starting from the JPL Lunar and Planetary Ephemeris DE405 (1) .

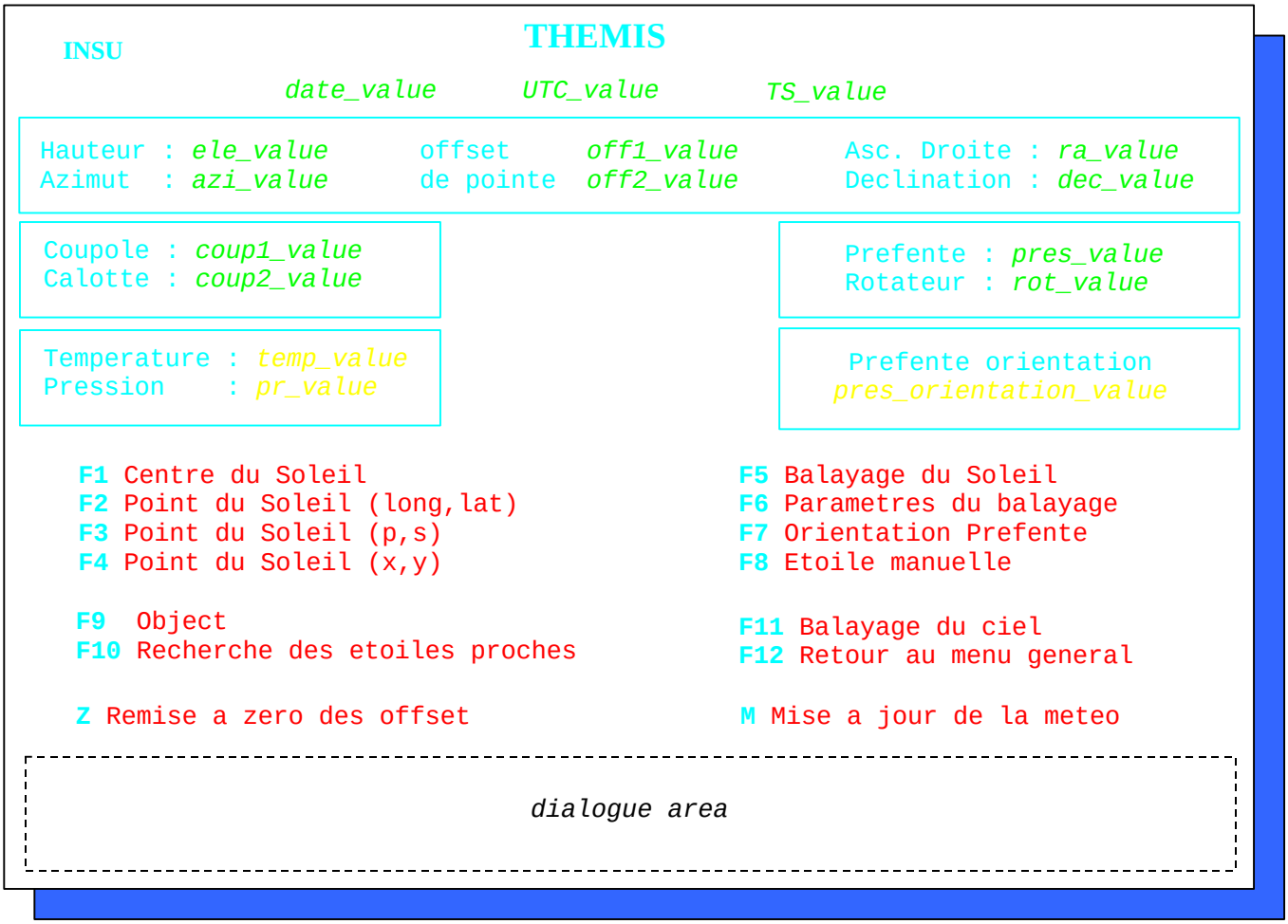
  (1) E.M. Standish , X.X. Newhall, J.G. Williams and W.M. Folkner
  " JPL Planetary and Lunar Ephemerides "
  Copyright © 1997 , The Jet Propulsion Laboratory, California Institute of technology
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  website : www.willbell.com

- Option **F4** allows for the computation of the equatorial coordinates of the stars to be used for the sky-mapping procedure . Such procedure is used to update the telescope mount model.

- Option **F5** allows for moving on to Level 1 , starting the Driving Mode Graphic Interface which will allow for driving the telescope to track a source.

2 - Level 1 : Driving Mode Software Interface

The displayed screen is reported below :



Informations about date/time are displayed on the top of the screen as at Level_0.

Information about the position of both the telescope and the dome are displayed as follows :

- *ele_value* = current telescope's elevation angle (*degrees* , *arcminutes* , *arcseconds*)
- *azi_value* = current telescope's azimut angle (*degrees* , *arcminutes* , *arcseconds*)

- *off1_value* = current value of the pointing offset on the elevation axis (*degree units*)
- *off1_value* = current value of the pointing offset on the azimut axis (*degree units*)

- *ar_value , dec_value* = Equatorial Coordinates of the sky target pointed at ; that is : the Altazimutal Coordinates (*ar_value, dec_value*) of the telescope correspond to these values plus a correction for refraction and mounting effects.

- `pres_value` = current preslit angle (*degree units*)
- `rot_value` = current derotator angle (*degree units*)
- `pres_orientation_value` = current preslit orientation (see the description of the option **F7** for the possible values)

- `coup1_value` = current dome's azimut angle (*degree units*)
- `coup2_value` = current dome's pseudo-elevation angle (*degree units*)

- `temp_value` = current local external temperature (*dummy value : not available yet*)
- `pr_value` = current local external pressure (*dummy value : not available yet*)

A menu with 14 options is offered at this stage.

As at Level 0 , to start an action just press the "F" key or the letter (M , Z) indicated in front of each command line. Sometimes this implies the user to give more information. In this case a command line will then appears in the dialogue area located on the bottom part of the screen. Commands may also be sent via UCCI (cf. table 1 in annex 1).

Care has to be taken on the coordinate format. Inadequate behavior of the telescope may come from a bad format (sign must be indicated even in the case of + sign).

- Option **F1** allows for pointing and tracking the centre of the solar disk .
  The program moves on to Level 2 , starting the Tracking Mode Graphic Interface .

- Option **F2** allows for pointing and tracking a peculiar position on the solar disk given by its Heliographic Coordinates (longitude = Carrington longitude , ie. absolute) .

  Pointing outside the solar disk is not possible with this coordinate system (heliographic longitude has then no sense).

  - ✓ When the key "F2" is pressed then the string

    `Longitude ? ( ° , ° )`

    will appear in the dialogue area . Just type in the value of the desired Carrington longitude in *degrees units* with f7.2 format (Fortran standard) and then press the RETURN key to enter it.
  - ✓ The just entered value will be displayed on the right and a new string

    `Latitude ? ( ° , ° )`

    will appear. Just type in the desired value again in *degrees units* with *F7.2 format* (Fortran standard) and then press the RETURN key to enter it.
  - ✓ At this point the program moves on to Level 2 , starting the Tracking Mode Graphic Interface .

- Option **F3** allows for pointing and tracking a peculiar position on the solar disk given by its Polar Coordinates (p,s) .

  Angle **p** of the *polar coordinates* is referred to the Solar North and counted counterclockwise. **s** is the distance from limb. Thus **s** is negative on the solar disk. This coordinate system allows the observer to point outside the solar disk.

  - ✓ When the key "F3" is pressed then the string

    Angle de position ? (° , °)

    will appear in the dialogue area . Just type in the desired value in *degrees units* with *F7.2 format* (Fortran standard) and then press the RETURN key to enter it.
  - ✓ The just entered value will be displayed on the right and a new string

    Distance au bord ? (″, ″)

    will appear. Just type in the desired value in *decimal arcsecond units* and press the RETURN key to enter it.
  - ✓ At this point the program moves on to Level 2 , starting the Tracking Mode Graphic Interface .

- Option **F4** allows for pointing and tracking a peculiar position on the solar disk given by its rectangular coordinates relative to the disk center .
  - ✓ When the key "F4" is pressed then the string

    X ? (dAlpha*cos(Delta)) ? (″ , ″)

    will appear in the dialogue area . Just type in the desired value in *decimal arcsecond units* and then press the RETURN key to enter it.
  - ✓ The just entered value will be displayed on the right and a new string

    X ? (dDelta)) ? (″ , ″)

    will appear. Just type in the desired value in *decimal arcsecond units* and press the RETURN key to enter it.
  - ✓ At this point the program moves on to Level 2 , starting the Tracking Mode Graphic Interface .

- Option **F5** allows for starting a standard scanning of the solar disk (only available for Full Sun mode).

- Option **F6** allows for setting the configuration of the scanning of the solar disk which is started by option **F5** (presently not available).

- Option **F7** allows for changing the preslit's orientation.

  ✓ When the key "F7" is pressed then the following menu

  1 = Solar North 3 = Celestial North 5 = local Zenit
  2 = Solar Equator 4 = Celestial Equator 6 = custom angle

  will appear in the dialogue area . Just type in the numerical code corrresponding to the desired option and then press the RETURN key to enter it.

  ✓ Only if the code 6 was entered the string

  Orientation de la prefente ? (° , °)

  will replace the above menu. Just type in the desired value in *degrees units* with *F7.2 format* (Fortran standard) and press the RETURN key to enter it.

  ✓ At this point the dialogue area will be cleared and the and the string variable " `pres_orientation_value` " (contained inside the Prefente Orientation display box) will be updated.

- Option **F8** allows for pointing and tyracking a peculiar star given its absolute Equatorial Coordinates .

  ✓ When the key "F8" is pressed then the string

  Ascension Droite ? (hh mm ss.ss)

  will appear in the dialogue area . Just type in the desired values in units of *hours , time-minutes , decimal time-seconds* and then press the RETURN key to enter it.

  ✓ The just entered value will be displayed on the right and a new string

  Declinasion ? (± dd mm ss.ss)

  will appear. Just type in the desired value in units of *degrees , arcminutes , decimal arcseconds* and press the RETURN key to enter it.

  ✓ The just entered value will be displayed on the right and a new string

  Epoque ? (0 = courante , 1 = 1950 , 2 = 2000)

  will appear. Just type in the numerical code corresponding to the desired option and press the RETURN key to enter it. The entered Equatorial Coordinates will then be supposed to correspond to the selected epoch.

  ✓ At this point the program moves on to Level 2 , starting the Tracking Mode Graphic Interface .

- Option **F9** allows for pointing and tracking a peculiar celestial object selected from an internal list.

  ✓ When the key "F9" is pressed then the following string

  `Object ? (0= etoile manuelle , 1 ...100 = etoile , 101 ... 109 = planete )`

  will appear in the dialogue area . Just type in the numerical code corrresponding to the desired option and then press the RETURN key to enter it. Code `0` will authomatically start the function **F8** just described above. Codes from `1` to `109` correspond to the peculiar objects of the internal list. Codes `1` to `100` are reserved for stars while codes from `101` to `109` are reserved to planets as follows :

`101` - Mercury	`106` - Saturnus
`102` - Venus	`107` - Urane
`103` - not used	`108` - Neptune
`104` - Mars	`109` - Pluton
`105` - Jupiter	

  ✓ At this point the program moves on to Level 2 , starting the Tracking Mode Graphic Interface .

- Option **F10** allows for preparing and printing out a list of the stars close to the current telescope position.

- Option **F11** allows for running the sky-mapping procedure . Such procedure is used to update the telescope mount model. See separate description.

- Option **F12** allows for going back to Level 0 .

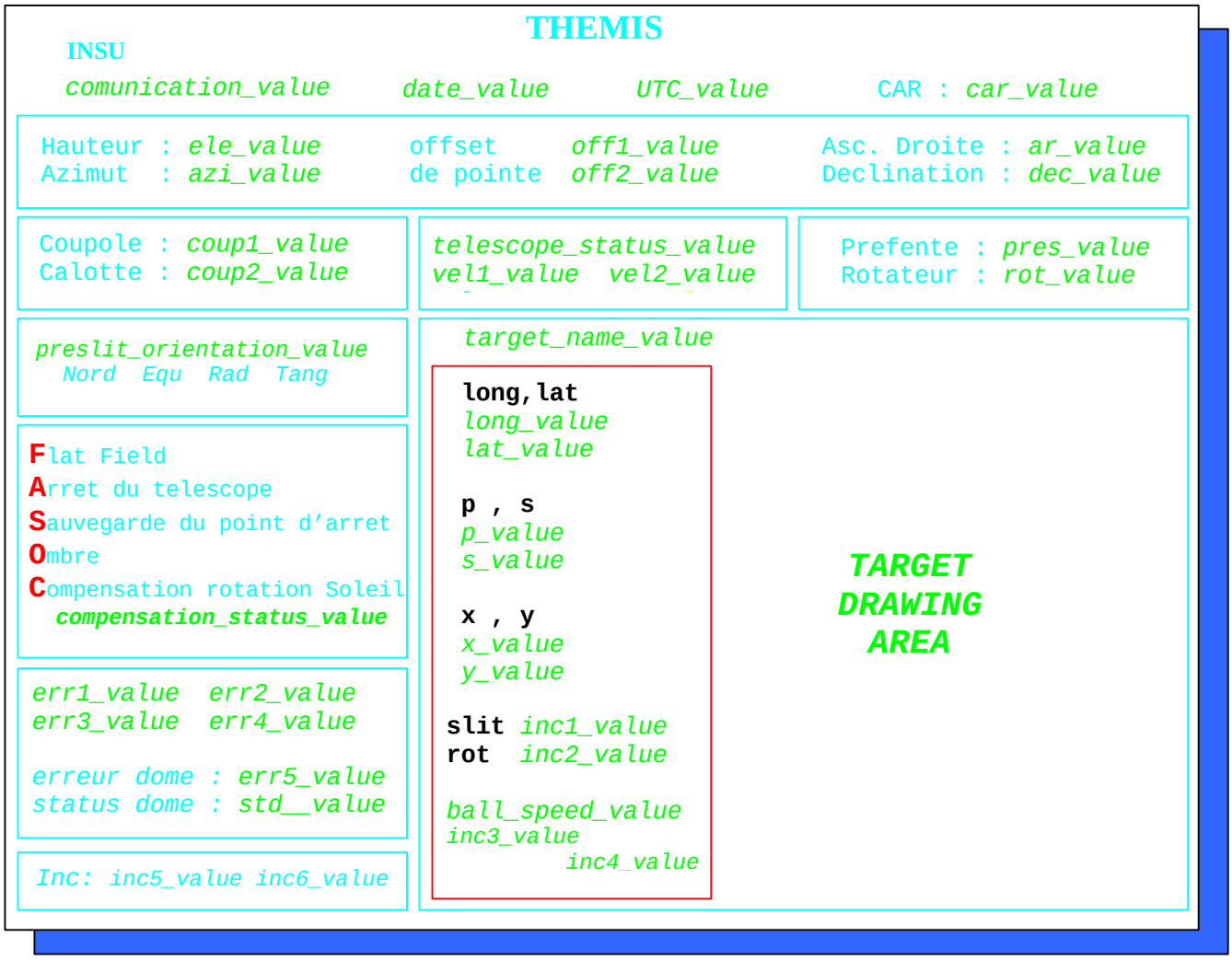
- Option **Z** allows for resetting back to zero the values of the pointing offsets on both the elevation and azimut axes which are displayed as *`off1_value`* and *`off1_value`*.

- Option **M** allows for updating the meteorological data (presently not implemented).

- Option `+` allows for restarting the same pointing as the last run.

4 - Level 1 : Tracking Mode Software Interface

The displayed screen is reported below :



The following subsection contain a description of the informations displayed on the screen and of the possible actions the user can take at this level.

4.1 - General telescope/dome informations

- *comunication_value* = four integer values showing the status of the communication between the computer hosting the Poursuite Software Interface and the telescope's and dome's racks. The usual values are 0099 when the dome is not in tracking mode. When the dome is in tracking mode, these values will change a few seconds after the telescope has reached its position. The values will transit through -2099 and finally 1099.

- *date_value* = current date (*day / month / year*)

- *UTC_value* = current value of the Coordinated Universal Time (*hour / minute / second*) ; this value is retrieved from the GPS device connected to the computer

- *ele_value* = current telescope's elevation angle (*degrees , arcminutes , arcseconds*)
- *azi_value* = current telescope's azimut angle (*degrees , arcminutes , arcseconds*)

- *off1_value* = current value of the pointing offset on the elevation axis (*degree units*)
- *off2_value* = current value of the pointing offset on the azimut axis (*degree units*)

- *ar_value , dec_value* = Equatorial Coordinates of the sky target pointed at ; that is : the Altazimutal Coordinates (*ar_value, dec_value*) of the telescope correspond to these values plus a correction for refraction and mounting effects.

- *coup1_value* = current dome's azimut angle (*degree units*)
- *coup2_value* = current dome's pseudo-elevation angle (*degree units*)

- *telescope_status_value* = when a peculiar target was requested and the telescope is running to reach the target position, then this field is updated with a message stating how many seconds are still needed for the telescope to reach its tracking position; then - when such tracking postion is reached - the message will be changed into :
  telescope en poursuite !

- *vel1_value* = current velocity of the telescope's elevation axis (*degree* / *sec units*)
- *vel2_value* = current velocity of the telescope's azimut axis (*degree* / *sec units*)

- *pres_value* = current preslit angle (*degree units*)
- *rot_value* = current derotator angle (*degree units*)

- *pres_orientation_value* = current preslit's orientation as previously set at Level 1 ;
  - see the description of the option **F7** of Level 1 for the possible values;
  - anyway the preslit's orientation may be changed during the tracking as described in section 2.3 .

- *err1_value* = current position error of the telescope's elevation axis (*arcsec units*)
- *err2_value* = current position error of the telescope's azimut axis (*arcsec units*)
- *err3_value* = current position error of the dome's azimut axis (*arcsec units*)
- *err4_value* = current position error of the dome's pseudo-elevation axis (*arcsec units*)

  Current position errors represent the differences between the requested position and the current position. For this computation, the delay time necessary for the telescope to perform its movement is taken into account. These values are very important while scanning a region via the UCCI. Indeed, the telescope sends its acknowledgement to the UCCI when the errors position on the elevation and azimuth are lowered than a defined value (typically 1 arcsec). This value may be adjusted without entering in the program. Ask the resident astronomer or operator to set the value of this parameter to the adequate one.

  These errors may change a lot during day and month. The program tries to maintain them as small as possible. However, some problems may appear when playing too much with the track ball. If the errors are greater than 1 arcsec after a manual pointing, it is recommended to wait a few seconds before starting a scan (the errors should decrease below 1 arcsec). An indicator is also afforded: on the same line that the elevation-azimuth error may be found "**fb**" (for feedback). Each time the program has made a correction the value of this parameter is increase by one unit (from 0 to 9 then back to 0).

- *err5_value* = current angular distance between the dome's light entrance hole and the telescope

- *std_value* = status of the comunication between the PC holding the Tracking Software Interface and the rack controlling the dome

4.2 - Target informations

- *target_name_value* = character string indicating the celestial object which is beeing tracked on

- *TARGET_DRAWING_AREA* = *a)* if the target is the Sun, then a drawing of the solar disk is displayed in this area. Such a drawing takes into account the annual variation of the apparent solar radius, Bo and Po. Meridians and parallels are indicated every 10°.

  b) for any other point-like target just a Cartesian reference frame is displayed, the reference's centre being the target position.

  In both cases a 4-pixel yellow pointer indicates the actual position tracked by the telescope with respect to the displayed frame (the solar disk or the Cartesian reference).

  This position may be changed by using the trackball or by sending a command via the UCCI .

- *car_value* = number of Carrington rotations

- *compensation_status_value* = character string indicating if the tracking is compensated for the solar rotation or not

- *long_value , lat_value* = *Heliographic Coordinates* in *degrees units* of the pointer (see description of *TARGET_DRAWING_AREA*).

  Longitude is the Carrington longitude Carrington longitude (i.e. absolute).

  Pointing outside the solar disk is not possible with this coordinate system (heliographic longitude has then no sense).

- *p_value , s_value* = *Polar Coordinates* of the pointer (see description of *TARGET_ _DRAWING_AREA*).
  Angle **p** (*degree units*) of the Polar Coordinates is referred to the Solar North and counted counterclockwise. **s** (*arcsecond units*) is the distance from limb. Thus **s** is negative on the solar disk. This coordinate system allows the observer to point outside the solar disk.

- *x_value , y_value =* *Equatorial Coordinates* of the pointer (see description of *TARGET_DRAWING_AREA*) relative to the disk center in decimal arcsecond units .

  X is parallel to the right ascension axis and Y parallel to the declinaition axis. X=Y=0. at Sun center. X is positive towards East (left on the screen) and Y is positive toward North (top of the screen).

- *inc1_value =* current value (*arcsec units*) of the increment of the preslit angle with respect to the starting value displayed as *pres_value* .

- *inc2_value =* current value (*arcsec units*) of the increment of the derotator angle with respect to the starting value displayed as *rot_value* .

- *inc3_value =* current value (*arcsec units*) of the pointing offset on the telescope's elevation axis given in addition to the value displayed as *off1_value* .

- *inc4_value =* current value (*arcsec units*) of the pointing offset on the telescope's azimut axis given in addition to the value displayed as *off2_value* .

- *inc5_value =* current value (*arcsec units*) of the increment along the azimut axis of the pointer position (see description of *TARGET_DRAWING_AREA*) with respect to the centre of the target's reference (the solar disk or the Cartesian reference).

- *inc6_value =* current value (*arcsec units*) of the increment along the elevation axis of of the pointer position (see description of *TARGET_DRAWING_AREA*) with respect to the centre of the target's reference (the solar disk or the Cartesian reference).

- *ball_speed_value =* the trackball may be used to move the pointer position (see description of *TARGET_DRAWING_AREA*) with two velocity modes : SLOW and FAST . This value is a character string indicating the current speed mode.

4.3 - Keyboard actions

There are 9 action the user can start via the keyboard.

The keys "**N**" , "**T**" , "**R**" and "**E**" may be used to change the preslit's orientation as follows :

- pressing the "**N**" key will orientate the preslit parallel to the Solar North axis
- pressing the "**T**" key will orientate the preslit tangent to the solar lim bwith respect to the current position
- pressing the "**R**" key will orientate the preslit radially with respect to the current position
- pressing the "**E**" key will orientate the preslit parallel to the Solar Equator

When any of such action is taken then the variable *pres_orientation_value* (see section 2.1) is updated.

The keys "**F**" , "**O**" , "**S**" , "**A**" and "**C**" may be used to start the following actions :

- pressing the "**F**" key will start a FLAT FIELD procedure (see section 4.6)

- pressing the "**O**" key will send both the telescope and the dome to their ombre postition. Such ombre position is an emergency position, thus

PRESENCE OF THE OPERATOR IS IMPERATIVE BEFORE SENDING SUCH COMMAND !

- pressing the "**S**" key will stop the present level and move back to Level 1 saving the both the current pointing offsets and the position of the pointer (see section 4.2, description of *TARGET_DRAWING_AREA*) . If the pointing offsets are not zero

PLEASE CHECK WITH THE OPERATOR BEFORE SENDING SUCH COMMAND !

- pressing the "**A**" key will stop the present level and move back to Level 1 without saving the current pointing offset .

- pressing the "**C**" key will allow for switching between to tracking options :

  (1) an internal model for the solar rotation is taken into account while tracking a peculiar position on the solar disk;
  when this option is active the string message :
  ROTATION SOLAIRE COMPENSEE
  is displayed in the site of the variable *compensation_status_value*

  (see the reproduction of the screen displayed at Level 2)

  (2) no model for the solar rotation is taken into account ;
  when this option is active the string message :
  ROTATION SOLAIRE NON COMPENSEE
  is displayed in the site of the variable *compensation_status_value*

4.4 - Trackball actions

The track ball allows moving on the solar disk. The right button allows you to change the speed of the telescope movement by a simple click on the button (The current speed status is indicated below the rotator position command). The left button changes the location of the cursor. It is used to select the coordinate system or to request a new preslit and rotator orientation. Each click produces a displacement of the cursor in front of a next coordinate system.

The ball itself is to be used for displacement on the solar disk. An horizontal movement on the ball displaces the telescope along the first axis of the selected coordinate system while a vertical movement displaces the telescope along the second axis.

It is very convenient for example to scan the limb: move a little bit from Sun center, select the P, S coordinate system (1), then move the ball vertically until reaching the limb (2) and finally move the ball horizontally.

(1) S has no sense at Sun center. No movement is possible
(2) It is also possible to point the limb another way (!)

Some commands may be sent via the UCCI. See table 1 in annex 1 for the complete list.

4.5 - Pointing in alt-azimutal mode

The telescope's elevation and azimut may be directly changed by the user in two different ways :

(1) send an AZC command from the UCCI (see Appendix 1); the position of the pointer (see section 4.2, description of *TARGET_DRAWING_AREA*) will be updated as well as all the displayed coordinate values. The value current value of the alt-azimutal increments are displayed as the values of *inc5_value* and *inc6_value* (see section 4.2).

(2) use the trackball's right button to positionate the trackball's cursor on the side of the display variables (*inc3_value* , *inc4_value*) an then move the trackball to change pointing offsets of both the telescope's elevation and azimut axis.
The values appear in violet when the cursor is displaced. However, this action is strictly reserved for technical reason and may cause some damages on the tracking quality if used without appropriate knowledge.

For this reason : **THIS OPTION IS STRICTLY RESERVED TO THE TECHNICAL TEAM !**

If inadvertently some values were given to this parameter they must be removed. Two options are possible:

- select this action with the tracking ball and put the offsets back to zero
- come back to level 1 through the "**a**" key and start again the pointing

If the "**s**" key was pressed to come back to Level 1 , then a reset of the offsets ("mise à zéro des offsets") must be requested at this level before moving to Level 2 again.

4.6 - Flat-Field procedure

The program offers the possibility to move the telescope along a spiraling ellipse.

Let's call a0, b0 and phi0 the requested parameters for the ellipse (respectively major axis minor axis and the major axis angle with the X axis of the equatorial coordinate system).

The default values for the ellipse are: a0 = 70", b0 = 70", φ0 = 17°. To change these parameters use the UCCI "FLA" function (cf. table 1 in annex 1).

The Flat-Field starts at the current position of the telescope, with a major axis equal to $0.6 \cdot a0$. The major axis value increases up to $1.6 \cdot a0$. The major axis is then rotated by 0.1° and decreases down to $0.6 \cdot a0$ etc… .

A revolution takes about 14 seconds and the enlargement of the major axis is of 1" after one revolution. It takes about 15 minutes to complete the whole flat trajectory (with the predefined parameters).

Details on flat-field computation to try to optimize ellipse parameters are as follows :

1 step = 100 msec	
The step angle is given by :	step = π/a0 rad
The number of step in one revolution :	np = 2.π/step = 2.a0
The enlargement is of :	enl = 1./np arcsec

5 - Problems

5.1 - Red screen

This means that a communication problem has been found with the dome. Usually it is sufficient to stop the tracking and point again.

5.2 - Screen loocked

Under different circumstances (reaching of the position, request from UCCI, use of the track ball), the screen is completely blocked. The reasons of this is not fully understood but under investigation. The only opportunity to escape is to reboot the PC.

5.3 - Comunication error during a scan

An “err 31 on EM24” may appear on the UCCI during a scan. This means that the UCCI has not received the acknowledgement prompt from the tracking program. If the screen is not blocked, this comes from the fact that the pointing error are too high compared to the limit given to accept the positioning (see also sect. 4.1.1).

To overcome this problem:

- Let the program go a few seconds before sending the scan again (cf. sect. 4.1.1)
- Change the limit parameter

5.4 - Other errors on a request from the UCCI

If the answer of the telescope is “8” after a command has been sent from the UCCI, this means that the request has been done from an incorrect level. Change the level from the tracking program and send the command again.

Other problems should be reported by mail to cbriand@ll.iac.es and mainella@themis.iac.es. A complete description of the problem and the context must be given.

AI. Appendix 1

List of the most useful UCCI commands

Table 1: List of the most usefull UCCI commands. In first column the command name; Second column: the level from which the command has to be sent; Third column: The action of the command; Fourth column: the format (in Fortran standard); Fifth column: the eventual answer

command name	***level***	***action***	***send format***	***return format***
AZC	2	Increment in alt-azimuthal coordinates (elevation – azimuth)	AZC(f7.2,f7.2)	
CEN	1	Point the telescope at the solar disk's center	CEN( )	
COA	2	Require the current step in *elevation* and *azimuth * cos(elevation)*	COA( )	COA(f7.1,f7.1)
COE	2	Require the current position in equatorial coordinates	COE( )	COE(f7.1,f7.1)
COH	2	Require the current position in heliographic coordinates	COH( )	COE(f7.2,f7.2)
DA0	1	Require the following data : *year* *month* *day* *hour* *minute* *second (integer)* *P0* *B0* *L0* *central Carrington meridian*	DA0( )	DA0(i4, 5i2, 3f7.2 i5)

DA1	2	Require the following data : *hour* *minute* *second* *refraction correction* *preslit angle* *derotator angle*	DA1( )	DA1(2i2, f3.1, f5.1, 2f7.2)
DA2	2	Require the followinf data : *hour* *minute* *second* *right ascension (in °)* *declinaison (in °)* *polar angle* *radius vector* *Carrington longitude* *hel. latitude* *east-west distance to Sun center (in “)* *North-South distance to Sun center* *preslit angle* *derotator angle* *elevation* *azimut* *Carrington longitode of the solra central meridian*	DA2( )	DA2(i2, i3, f4.0, i1, 2f8.3, 2f9.3, 2f9.4, 2f8.1, 2f8.2, 2f8.3, 1x, f8.4, 3a1)
DA4	2	Like DA0 but at level 2		
EQC	2	Increment request in $\Delta\alpha\cos\delta$, $\Delta\delta$ with respect to the current pointing position	EQC(f7.1,f7.1)	

EQU	2	Pointing request in $\Delta\alpha\cos\delta$, $\Delta\delta$ that is : Increment request in $\Delta\alpha\cos\delta$, $\Delta\delta$ with respect to the current pointing position	EQU(f7.1,f7.1)	
FLA	2	Flat requested	FLA(2f4.0,f5.0)	
HAL	2	Stop the current tracking and go back to level 1	HAL( )	
HEL	1	Pointing to a given Carrington longitud and latitude	HEL(f7.2,f7.2)	
HLG	2	Increment in heliographic coordinates	HLC(f7.2,f7.2)	
OFD	2	Give an offset to the derotator	OFD(f6.1)	
OFF	2	Give an offset to the preslit	OFF(f6.1)	
POS	1	Pointing to a given polar angle and radius vector	POS(f7.2,f7.2)	
PR1	1	Preslit parallel to solar axis	PR1()	
PR2	1	Preslit parallel to solar equator		
PR3	1	Preslit parallel to the celestial North direction		

PR4	1	Preslit parallel to the celestial equator direction		
PR5	1	Preslit parallel to the zenith direction		
PR6	1	Preslit orientation (from the solar North)	PR6(f7.2)	
ROT	2	Require the current derotator angle		ROT(f7.2)