



TECHNICAL NOTE

TN104

IRS COMMAND INTERFACE

REV: 1.0

REVISION HISTORY

Rev	Date	Change Description	Prepared By	Verified By	Approved By
0.0	16/01/2023	Applicable to Z175/ID09	M. Rispoli .	L.Nastasi .	G.B.Peretta .
1.0	20/02/2023	Applicable to Z175/ID11	M. Rispoli .	L.Nastasi .	G.B.Peretta .

CHANGE LOG

- In the **config:** menu it has been added the commands to configure the Gantry Options;
- In the **config:** menu it has been added the commands *setDemoMode()*;
- The menu **generatore** has been renamed **generator:**;
- In the menu **generator:** it has been added commands for the Manual Exposure;

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1. Document Overview

This document describes the functions of the DBTController IRS command interface.

2. IRS Overview

The IRS (Remote Service Interface) is basically a low level command "shell" providing textual functions that interact with the DBT with a very low level functions.

3. IRS activation

The IRS interface can be activated locally on the AWS station, launching the pre installed application called putty.exe. Otherwise, the IRS interface can be activated using a Laptop PC that should be connected through the Ethernet interface to the back service Ethernet slot of the DBT.

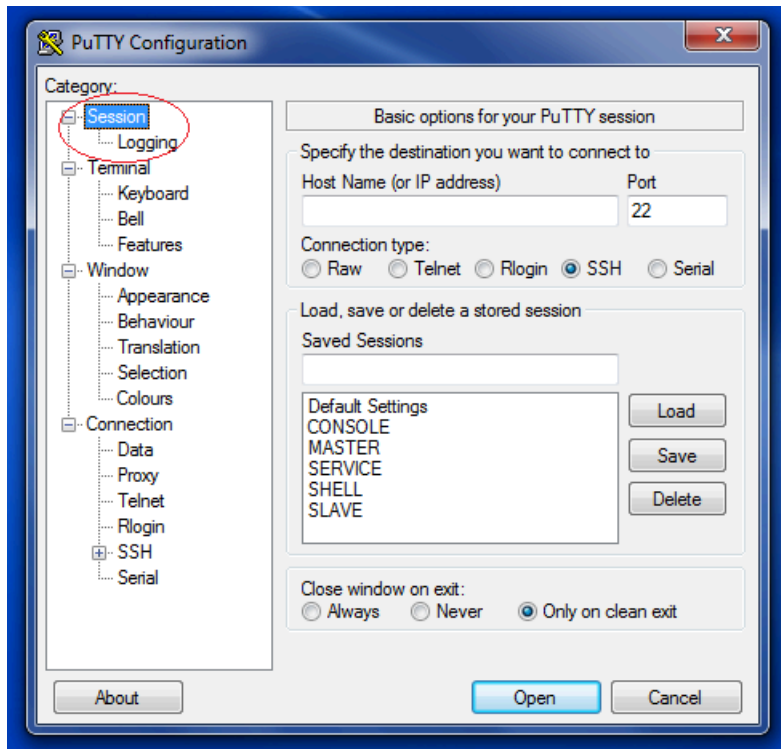
4. PC connection setup

In case it should be used a PC, after connecting it to the service socket (in the back of the DBT), it has to set the IP address of the PC to : 192.168.30.10.

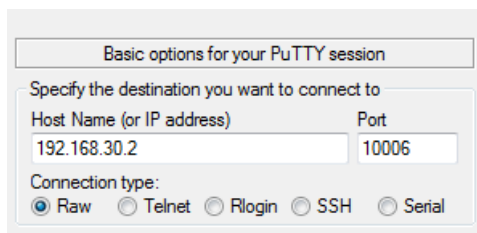
To connect the interface, the program putty.exe shall be used: the program has not to be installed, so it can be also launched by the USB mass storage in case or copied to an PC internal directory.

5. IRS connection establishment

1. Launch putty.exe;
2. Select from the left panel (Category) the "Session" voice:



3. Set the "Basic options.." fields as follows:



4. Press the button OPEN to start the session: If the connection success the a shell pop-up displaying a welcome row reporting the current revision version of the IRS interface.

6. Command syntax

The command syntax is easy:

[group name:] <command name> [parameter1, parameter2,...parameter-n]

Group Name Description

The **group_name** is a sub-set of commands grouped together

For example:

```
system:
system >
```

In the example above, the "system" sub group is entered, having access to a set of commands belonging to this group.

In order to get the command content of the group, it can be send the ? command into the group:

```
system: ?
```

NOTE: when a group is entered it is not necessary to repeat the group name when a command is typed!



In order to get the whole group availables, the user can type the command ? in the root of the Terminal:

Type the following commands:

```
..
?
```

The ".." command causes the Terminal enter the MAIN group (the root of all groups);

The command "?" request for the list of all available groups

7. Group command description

7.1. SYSTEM COMMANDS (system:)

7.1.1. *setDATE*

COMMAND
setDATE Year Month Day hour minute second
DESCRIPTION
Set the current display date

7.1.2. *getRevisions*

COMMAND
getRevisions
DESCRIPTION
Get the list of the firmware revisions in the package

7.1.3. *setShotMode*

COMMAND
setShotMode
DESCRIPTION
Rx Test mode activation (with detector)

NOTE: *the study is automatically Opened*

7.1.4. *setShotNodetMode*

COMMAND

setShotNodetMode

DESCRIPTION

Rx Test mode activation (without detector)

NOTE: the study is automatically Opened

7.1.5. *setCalibKv*

COMMAND

setCalibKv

DESCRIPTION

Set the kV calibration Mode

NOTE: the study is automatically Opened

7.1.6. *setCalibla*

COMMAND

setCalibla

DESCRIPTION

Set the Anodic Current calibration Mode

NOTE: the study is automatically Opened

7.1.7. *setCalibTomo*

COMMAND

setCalibTomo num_samples

DESCRIPTION

Set the Tomo calibration Mode

NOTE: the study is automatically Opened

7.1.8. *setOperatingMode*

COMMAND

setOperatingMode

DESCRIPTION

Set the Operating mode

NOTE: the study is NOT automatically Opened

7.1.9. *reboot*

COMMAND

reboot

DESCRIPTION

The Master and Slave Terminals will reboot

7.1.10. **setPowerOff**

COMMAND
setPowerOff
DESCRIPTION
Init the System power off

NOTE: this command works only with the Closed Study

7.1.11. **setUnpark**

COMMAND
setUnpark
DESCRIPTION
Activate the ARM unparking procedure

7.1.12. **setPark**

COMMAND
setPark
DESCRIPTION
Activate the ARM parking procedure

7.2. CONFIGURATION COMMANDS (config:)

7.2.1. **setAutoFilter**

COMMAND
setAutoFilter ON/OFF
DESCRIPTION
Activate/Deactivate the system option Auto Filter

If set to ON the system will activate the Filter selection.

If set to OFF the system will use the Fixed Filter (no filter selection).

NOTE: reboot the Gantry after modification

7.2.2. **setHsStarter**

COMMAND
setHsStarter ON/OFF
DESCRIPTION
Activate/Deactivate the High Speed Starter system option

NOTE: reboot the Gantry after modification

7.2.3. **setArmMotor**

COMMAND
setArmMotor ON/OFF

COMMAND

DESCRIPTION

Activate/Deactivate the Motorized ARM

If set to ON the system will activate the ARM with Motor.

If set to OFF the system will provide a Manual ARM activation (with electrical brake device).

NOTE: reboot the Gantry after modification

7.2.4. *setTrxMotor*

COMMAND

setTrxMotor ON/OFF

DESCRIPTION

Activate/Deactivate the Tilting

NOTE: reboot the Gantry after modification

7.2.5. *setDemoMode*

COMMAND

setDemoMode ON/OFF

DESCRIPTION

Activate/Deactivate the Demo Mode

***NOTE: after the command execution Gantry automatically reboot ***

7.2.6. *enableAccessory*

COMMAND

enableAccessory ON/OFF

DESCRIPTION

Activate/Deactivate the test on the Protection Patient

7.2.7. *setSN*

COMMAND

setSN serial_number

DESCRIPTION

Set the Gantry serial number

NOTE: The serial_number shall be composed of only digits

Usage:

| setSN 123456

set the Gantry serial number to 123456

| setSN .

erases the serial number!

7.2.8. *setPSW*

COMMAND

setPSW password_number

DESCRIPTION

Set the Gantry service password number

NOTE: The password_number shall be composed of only digits

7.2.9. *enableStarterKeep*

COMMAND

enableStarterKeep ON/OFF

DESCRIPTION

Enables/Disables the Starter keeping mode

NOTE: For Low speed starter set this parameter to OFF!!

7.2.10. *setTubeTemp*

COMMAND

setTubeTemp LT HT

DESCRIPTION

Set the Tube alarm threshold(HT) and the reset alarm threshold (LT)

- HT: is the Tube temperature in (°C) to trigger the Alarm;
- LT: is the Tube temperature in (°C) to reset the Alarm;

7.2.11. *setLanguage*

COMMAND

setLanguage [ITA/ENG/SPA/FRA/POR/RUS]

DESCRIPTION

Set the GUI current language

NOTE: The Language is immediatelly changed!!

7.2.12. *resetGantry*

COMMAND

resetGantry

DESCRIPTION

Clear the Gantry System Configuration file

Use this command when the Gantry shall be reconfigured for the hardware setup:

- Motor/Manual rotation;
- HS or LS starter;
- Tilting presence;

7.2.13. *resetKvCalib*

COMMAND

resetKvCalib

DESCRIPTION

Clear the kV-sense calibration file

Use this command when the kV read back calibration shall be removed.

NOTE: In case of switch between 35kV generator to 49kV or viceversa it is recommended to clear the calibration file!!

7.2.14. *sysBackup*

COMMAND

sysBackup backup_name

DESCRIPTION

Create a backup of both Master and Slave terminals

The command creates the backup files of the Master terminal and the Slave terminal, stored in the HOME directories:

- MASTER: /home/user/master_**backup_name**.tar
- SLAVE: /home/user/slave_**backup_name**.tar

7.2.15. *sysRestore*

COMMAND

sysRestore backup_name

DESCRIPTION

Restore the backup file into Master and Slave terminals

The file present into the HOME directory of the Master shall be: master_**backup_name**.tar;

The file present into the HOME directory of the Slave shall be: slave_**backup_name**.tar;

7.3. COLLIMATOR COMMANDS (collimatore:)

7.3.1. Collimator configuration

7.3.1.1. *readColliConf*

COMMAND

readColliConf

DESCRIPTION

Read the Collimator configuration file

The command doesn't update the Devices. Use the download command (see below)

7.3.1.2. *setCalib2D*

COMMAND

setCalib2D Paddle Focus Left Right Front Back Trap

DESCRIPTION

COMMAND

Set the Paddle collimation parameters

- Paddle is one of the following paddles type:
 - PAD24x30
 - PAD18x24_C
 - PAD18x24_L
 - PAD18x24_R
 - PADBIOP_3D
 - PAD9x21
 - PADD75_MAG
 - PAD10x24
 - PADBIOP_2D
 - PADPROSTHESIS
 - PAD9x9_MAG
 - OPEN
- Focus is the focus target of the collimation:
 - W
 - Mo
- Left is the left collimation blade position: 0 to 255;
- Right is the right collimation blade position: 0 to 255;
- Front is the front collimation blade position: 0 to 255;
- Back is the back collimation blade position: 0 to 255;
- Trap: is the Trap collimation blade position: 0 to 255;

7.3.1.3. *setCalibCustom*

COMMAND

setCalibCustom Left Right Front Back Trap

DESCRIPTION

Set the Custom collimation parameters

- Left is the left collimation blade position: 0 to 255;
- Right is the right collimation blade position: 0 to 255;
- Front is the front collimation blade position: 0 to 255;
- Back is the back collimation blade position: 0 to 255;
- Trap: is the Trap collimation blade position: 0 to 255;

7.3.1.4. *getCalib*

COMMAND

getCalib

DESCRIPTION

Return the current content value of the collimation parameter

The command returns the memory content, not the configuration file!

7.3.1.5. *STORE*

COMMAND

STORE

DESCRIPTION

Store the current collimator parameters from memory to the configuration file

7.3.1.6. **download**

COMMAND
download
DESCRIPTION
Download the collimator parameters to the COLLimator device (PCB249U1 and U2)

7.3.2. Collimation format activation

The following commands allow to control the Collimator Device bypassing the Gantry

7.3.2.1. **getStatus**

COMMAND
getStatus
DESCRIPTION
Return the current Collimator Device activation mode

Returned string description:

- COLLI MODEL: ASSY 01 or ASSY 02;
- COLLIMAZIONE LAME: MANUALE/AUTMATICA;
- COLLIMAZIONE FILTRO: MANUALE/AUTOMATICA;

When the Collimation type is AUTOMATICA then the Gantry controls the collimation.

When the Collimation type is MANUALE then the collimation is controlled manually by IRS commands.

7.3.2.2. **setManual**

COMMAND
setManual
DESCRIPTION
Set Only the collimation format in Manual mode

The Filter setting remains in Automatic mode!!

7.3.2.3. **setAuto**

COMMAND
setAuto
DESCRIPTION
Set both the Filter and the Collimation format in Auto mode

7.3.2.4. **setL**

COMMAND
setL val
DESCRIPTION
Set the left manual blade position

*** This position is valid only in Manual Mode and it is updated only after the command -update-***

7.3.2.5. **setR**

COMMAND

setR val

DESCRIPTION

Set the right manual blade position

*** This position is valid only in Manual Mode and it is updated only after the command -update-***

7.3.2.6. *setF*

COMMAND

setF val

DESCRIPTION

Set the front manual blade position

*** This position is valid only in Manual Mode and it is updated only after the command -update-***

7.3.2.7. *setB*

COMMAND

setB val

DESCRIPTION

Set the back manual blade position

*** This position is valid only in Manual Mode and it is updated only after the command -update-***

7.3.2.8. *setT*

COMMAND

setT val

DESCRIPTION

Set the Trap manual blade position

*** This position is valid only in Manual Mode and it is updated only after the command -update-***

7.3.2.9. *update*

COMMAND

update

DESCRIPTION

Update the collimator device with the current left, right, front, back and trap manual blade positions

7.3.3. Filter activation commands

The following commands allow to control the Filter selection and calibration

7.3.3.1. *setFiltro*

COMMAND

setFiltro filterType

DESCRIPTION

Set the current filter position to the filterType

- The filter type is one of those tags:
 - Ag;
 - Rh;
 - Al;
 - Cu;

NOTE: after this command the filter is set in Manual mode. To reset the manual mode uses setAuto command

7.3.3.2. **setCalibFiltro**

COMMAND

setCalibFiltro filterType Position

DESCRIPTION

Set the position of the FilterType

- The filter type is one of those tags:
 - Ag;
 - Rh;
 - Al;
 - Cu;
- The Position: is the current position of the filter (0:255)

NOTE: this command changes only the memory not the configuration File. Use the command STORE to update the configuration File

7.3.4. Mirror and Light activation commands

The following commands allow to control the Mirror position and the Light state.

7.3.4.1. **setMirror**

COMMAND

setMirror OUT/HOME

DESCRIPTION

Set the Mirror to one of the status: OUT or HOME

7.3.4.2. **setLamp**

COMMAND

setLamp ON/OFF

DESCRIPTION

Set the Lamp to one of the status: ON or OFF

7.3.4.3. **setCalibMirror**

COMMAND

setCalibMirror val

DESCRIPTION

Set the steps for the Mirror position when OUT

NOTE: this command changes only the memory not the configuration File. Use the command STORE to update the configuration File

7.3.5. Test commands

The following commands help to test the collimator device.

7.3.5.1. **setTrx**

COMMAND
setTrx angle
DESCRIPTION
Move the Tube to a target angle

7.3.5.2. **testColli**

COMMAND
testColli cycles
DESCRIPTION
Activate the collimation loop test for a given number of cycles

The Test performs sequential activation of the format blades, the filter, the Mirror.

NOTE: Avoid to activate a test with more of 50 cycles to prevent an overheat of the device!

7.4. COMPRESSOR COMMANDS (compressore:)

The following commands may change the calibration parameter in memory.

The content of the Calibration file is update only when the command storePadConfig is used.

7.4.1. Configuration File Modification

7.4.1.1. **readPadConfig**

COMMAND
readPadConfig
DESCRIPTION
Reloads the Compressor configuration file

7.4.1.2. **storePadConfid**

COMMAND
storePadConfid
DESCRIPTION
Stores the Compressor configuration file

7.4.2. Trolley Calibration Commands

7.4.2.1. **setCalibPos**

COMMAND
setCalibPos offset klin
DESCRIPTION
Changes the current position calibration parameters

NOTE: this command changes only the memory not the configuration File. Use the command storePadConfig to update the configuration File

7.4.2.2. *getCalibPos*

COMMAND
getCalibPos
DESCRIPTION
Returns the current position calibration parameters

7.4.2.3. *getTrolley*

COMMAND
getTrolley
DESCRIPTION
Returns the current position of the trolley

7.4.3. Breast Thickness Calibration

7.4.3.1. *getPadList*

COMMAND
getPadList
DESCRIPTION
Returns the list of available compressor paddles

7.4.3.2. *setCalibPad*

COMMAND
setCalibPad offset k-force weight
DESCRIPTION
Changes the current detected paddle calibration parameters

This command allow to tune the current detected paddle parameter in order to provide a more accurate breast thickness measure.

7.4.3.3. *setThick*

COMMAND
setThick thickness
DESCRIPTION
Calibrate the current measure thickness

In orde to perform this calibration the User should compress to 40N (no more) a phantom. The user shall measure the true thickness setting it wit this command.

7.4.3.4. *setKF*

COMMAND
setKF kF_val
DESCRIPTION

COMMAND

Calibrate the current paddle elasticity

In order to perform this calibration the User:

- shall compress to 150N a phantom;
- shall measure the true thickness at this compression;
- shall change the kF_val until the detected thickness equal the measured thickness.

7.4.4. Compression Force Parameters

7.4.4.1. *setWeight*

COMMAND

setWeight val

DESCRIPTION

Set the weigh of the Trolley

The weight is subtracted from the detected compression force when the ARM is in CounterUpright position.

7.4.4.2. *setLimitForce*

COMMAND

setLimitForce val

DESCRIPTION

Set the maximum applicable compression force

The value can be set in a range from 70 to 200 Newton.

7.5. MOTOR ACTIVATION COMMANDS (rotazioni:)

7.5.1. Configuration File Management

7.5.1.1. *readTrxConfig*

COMMAND

readTrxConfig

DESCRIPTION

Read the TRX configuration File

7.5.1.2. *saveTrxConfig*

COMMAND

saveTrxConfig

DESCRIPTION

Store the TRX configuration File

7.5.1.3. *readArmConfig*

COMMAND

readArmConfig

COMMAND

DESCRIPTION

Read the ARM configuration File

7.5.1.4. *saveArmConfig*

COMMAND

saveArmConfig

DESCRIPTION

Store the ARM configuration File

7.5.1.5. *readLenzeConfig*

COMMAND

readLenzeConfig

DESCRIPTION

Read the LENZE configuration File

7.5.1.6. *saveLenzeConfig*

COMMAND

saveLenzeConfig

DESCRIPTION

Store the LENZE configuration File

7.5.2. Inclinomometer management

7.5.2.1. *resetGonio*

COMMAND

resetGonio

DESCRIPTION

Resets the inclinometer to the current ARM and TRX position

7.5.2.2. *getGonio*

COMMAND

getGonio

DESCRIPTION

Returns the TRX, ARM and Gonio angles

The returned values are:

- TRX: the value is in 0.01 ° units;
- ARM: then angle is in 0.1 ° units;
- GONIO: then angle is in 0.1 ° units;

7.5.3. Activation Commands

7.5.3.1. *TRX*

COMMAND

TRX target

DESCRIPTION

Activate the TRX to a target angle

The target can be of different nature:

- STOP: stops any current rotation;
- WHOME: move TRX to Wide Home position;
- NHOME: move TRX to Narrow Home position;
- IHOME: move TRX to Intermediate Home position;
- WEND: move TRX to Wide End position;
- NEND: move TRX to Narrow End position;
- IEND: move TRX to Intermediate End position;
- angle: the target is in (°). Example: TRX 10 moves TRX to 10°

7.5.3.2. **TRX LOOP**

COMMAND

TRX LOOP angle

DESCRIPTION

Activate the TRX in a loop mode

The TRX will move from +angle and -angle until a STOP command is provided.

7.5.3.3. **ARM**

COMMAND

ARM target

DESCRIPTION

Activate the ARM to a target angle

7.6. POTTER COMMANDS (potter:)

7.6.1. **setGrid2D**

COMMAND

setGrid2D ON/OFF

DESCRIPTION

Activate (ON) or Deactivate (OFF) the 2D grid (if present)

7.6.2. **setGrid3D**

COMMAND

setGrid3D ON/OFF

DESCRIPTION

Activate (ON) or Deactivate (OFF) the 3D grid (if present)

7.7. AWS SIMULATOR COMMANDS (aws:)

7.7.1. *simulateRx*

COMMAND

simulateRx frame

DESCRIPTION

Simulate the reception of an acquisition command frame

The frame shall be a valid command frame, in the format:

<ID NUM %Command param ... %>

7.7.2. *getFormat*

COMMAND

getFormat frame

DESCRIPTION

Returns information about the frame format

The command can be used to test the validity of a frame

that should be simulatedD

7.7.3. *pcPowerOff*

COMMAND

COMMAND

getSignals

DESCRIPTION

Returns the sensors read value

The sensor revealed are:

- X: the X position
- Y: the Y position;
- Z: the Z position;
- SHR: the X-SHIFT sensor position;
- SH: the Needle shift sensor value;
- LAT: the current laterality decoded.

7.8.2. Calibration commands

7.8.2.1. *calibXbase*

COMMAND

calibXbase value

DESCRIPTION

Calibrate the current distance from the bottom of the X Axis and the detector plane

7.8.2.2. *calibSh*

COMMAND

calibSh zero +150_pos -150_pos

DESCRIPTION

Calibrate the Needle cursor

- Zero is the sensor position when the cursor is set to zero
- +150_pos is the sensor value when the cursor is set to +15 mm;
- -150_pos is the sensor value when the cursor is set to -15 mm;

7.8.3. Activation commands

7.8.3.1. *moveXYZ*

COMMAND

moveXYZ X Y Z

DESCRIPTION

Activate the Biopsy to X Y Z target

X, Y, Z are expressed in 0.1mm unit.

7.8.3.2. *moveLoop*

COMMAND

moveLoop n-cycles X0 Y0 Z0 X1 Y1 Z1

DESCRIPTION

Activate the Biopsy in Loop mode from a coordinate (X0,Y0,Z0) to (X1,Y1,Z1) n-cycles time

To early stop the loop use the same command without the parameters

7.8.3.3. *moveHome*

COMMAND

moveHome [C/L/R]

DESCRIPTION

Activate the Home procedure for C (center) l (left) or R (right) position

7.8.3.4. *testBuzzer*

COMMAND

testBuzzer

DESCRIPTION

Activate the Buzzer for test purpose

7.8.3.5. *powerLed*

COMMAND

powerLed ON/OFF

DESCRIPTION

Activate (ON) or Deactivate (OFF) the Light

7.9. GENERATOR COMMANDS (generator:)

This section provides commands to interact with the Generator fonctionnalités:

- Handle with the Tube configuration file;
- Handle with the current Focus selection;
- Handle with the Starter commands;

7.9.1. Configuration commands

7.9.1.1. *reloadTube*

COMMAND

reloadTube

DESCRIPTION

Reload the current selected Tube

The data of the current selected tube are reloaded into memory.
This command allows to update the system with some modification on the configuration file.

7.9.1.2. *getStatistics*

COMMAND

getStatistics

DESCRIPTION

Display the content of the statistics file

The statistic file contains the statistics related to the usage of the Gantry:

- Tube file name in use;
- Total number of shots;
- Total cumulated kHU;
- Total number of Tomo executed;
- Total number of Standard Exposure executed;

7.9.1.3. ***getAnodeHU***

COMMAND

getAnodeHU

DESCRIPTION

Display the current Anode Hu

NOTE: the anode Hu is not the Tube temperature: it is the internal HU currently cumulated.
The cumulated Hu will reduce with the Time due to the inherent Tube dissipation curve.

7.9.2. Activation commands

7.9.2.1. ***selectFilament***

COMMAND

selectFilament filament

DESCRIPTION

Select the current filament and activate/deactivate the Filament current

The filament parameter:

- filament = *WL* : select the W Large focus;
- filament = *WS* : select the W Small focus;
- filament = *MoL* : select the Mo Large focus;
- filament = *MoS* : select the Mo Small focus;
- filament = *OFF* or other values: set the filament OFF.

7.9.2.2. ***activateStarter***

COMMAND

activateStarter command

DESCRIPTION

Activate the current starter in one of the possible speeds

command parameter:

- command = *HS* : activate the starter at the High Speed (if the High speed starter is present);
- command = *LS* : activate the starter at low speed;
- command = *OFF* : stops the starter speed;

7.9.3. Manual Exposure commands

7.9.3.1. Manual Exposure Overview

This section provides commands to open a special session that allow to activate a Manual Exposure for test purpose.

The Manual exposure allow to:

- Select to use a 35kv or 49 kV template file;
- Set the nominal value of the kV;

- Set the mAs of the pulse;
- Set the Focus to be used;
- Set the IDAC of the anodic current.

The Exposure has the following limitations:

- The maximum exposure time with kV < 35 is 100ms;
- The maximum exposure time with kV ≥ 35 is 50ms;
- The maximum IDAC is 2500;

In order to execute the Manual exposure:

- Open the session with the command: **activateManualXray()**;
- Set the Exposure parameters to be used: **setExposure()**;
- Press the X-Ray button to activate the procedure;
- To repeat the exposure with the same Exposure parameters only press again the X-RAY push button;
- When the session termines, close the session with the command: **closeManualXray()**

The Exposed data will be displayed at the sequence completion.

7.9.3.2. **activateManualXray**

COMMAND

activateManualXray tubeType

DESCRIPTION

Activate the Manual Exposure session uploading the Tube template type

tubeType parameter:

- tubeType = "35KV": upload the TEMPLATE_35KV_XM1016T configuratin file;
- tubeType = "49KV": upload the TEMPLATE_XM1016THI configuratin file;

When the session is open the Study is Open and the Gantry is ready to expose.

The initial exposure parameters are:

- kV = 20;
- Focus = WL;
- mAs = 10;
- Idac = 2000;

7.9.3.3. **setExposure**

COMMAND

setExposure Focus kV mAs Idac

DESCRIPTION

Set the next exposure data

Focus parameter:

- Focus = "WL": will use the W large focus;
- Focus = "WS": will use the W small focus;
- Focus = "MoL": will use the Mo large focus;
- Focus = "MoS": will use the Mo small focus;

kV parameter: set 20 to 49 kV (max 35 for 35 KV template file);

mAs parameter: set in a range 1 to 640 (it is time limited anyway);

Idac parameter: set the Idac value in a range 1 to 2500;

7.9.3.4. *closeManualXray*

COMMAND
closeManualXray
DESCRIPTION
Closes the manual Xray session

When the session is closed, the configured Tube configuration file is reloaded into the Gantry.

7.10. LOADER COMMANDS (loader:)

This section allows to upload a firmware to a remote Device.

The firmware that can be uploaded are:

- FW190.hex : the firmware of the PCB190 (generator);
- FW240.hex : the firmware of the PCB240 (service board);
- FW269.hex : the firmware of the PCB269 (compressor board);
- FW249U1.hex : the firmware of the PCB249 (collimator) Assy 2 controller U1;
- FW249U1A.hex : the firmware of the PCB249 Assy 1 controller U1;
- FW249U2.hex : the firmware of the PCB249 Assy 2 controller U2;
- FW249U2A.hex : the firmware of the PCB249 Assy 1 controller U2;
- FW244.hex: the firmware of the PCB244 (potter)

In order to upload the firmare to the target device, that firmware shall be properly formatted and copied into the /home/user directory of the master terminal.

In order to format a native firmware (the one just compiled) the native firmware shall be copied in the /home/user directory then it shall be used the command **setCRC**.

When the firmware is properly formatted, it can be uploaded on the target with the command **UPLOAD**

7.10.1. *setCRC*

COMMAND
setCRC target revision
DESCRIPTION
Format a native firmware related to the Target device with the revision code of the firmware
<ul style="list-style-type: none">• Target is the Device PCB code:<ul style="list-style-type: none">◦ PCB190;◦ PCB269;◦ PCB240;◦ PCB249U1;◦ PCB249U2;◦ PCB244;• revision code: is in the format x.y

NOTE: the revision code is compared with the revision table configuration file in order to keep the compatibility with the current system package.

7.10.2. *UPLOAD*

COMMAND

UPLOAD target

DESCRIPTION

Upload a target device with the related pre formatted firmware

- Target is the Device PCB code:
 - PCB190;
 - PCB269;
 - PCB240;
 - PCB249U1;
 - PCB249U2;
 - PCB244;

NOTE: the firmware related to the target shall be present into the /home/user directory of the Master terminal.

7.11. DEBUGGING TOOLS

In order to provide some tool to help the Application debugging, this chapter describes additional commands and methods.

7.11.1. DEVICE SERIAL PROTOCOL COMMANDS (driver:)

7.11.1.1. *freeze*

COMMAND

freeze

DESCRIPTION

Stop the execution of the Mater threads

NOTE: Only Expert. Dont't use this command!!

7.11.1.2. *run*

COMMAND

run

DESCRIPTION

Restart the execution of the Mater threads

NOTE: Only Expert. Dont't use this command!!

7.11.1.3. *read8*

COMMAND

read8 target address

DESCRIPTION

Read the **address** 8 bit register from the **target**

the target can be:

- PCB269: this is the Compressor board;
- PCB190: this is the Generator board;
- PCB244: this is the Potter board;
- PCB249U1: this is the Collimator U1;
- PCB249U2: this is the Collimator U2;

the address can be in hex format (0x00AB) or decimal format.

Example:

| read8 PCB269 0x80

This command reads the Bank-0 0x80 register of the PCB269 board.

7.11.1.4. *read16*

COMMAND

read16 target address

DESCRIPTION

Read the **address** 16 bit register from the **target**

the target can be:

- PCB269: this is the Compressor board;
- PCB190: this is the Generator board;
- PCB244: this is the Potter board;
- PCB249U1: this is the Collimator U1;
- PCB249U2: this is the Collimator U2;

This command reads the 16 bit register in little endian encoding where:

- 0x80 is the address of the L-Byte;
- 0x81 is the address of the H-Byte.

7.11.1.5. *write8*

COMMAND

write8 target address value

DESCRIPTION

Write the **address** 8 bit register of the **target**

the target can be:

- PCB269: this is the Compressor board;
- PCB190: this is the Generator board;
- PCB244: this is the Potter board;
- PCB249U1: this is the Collimator U1;
- PCB249U2: this is the Collimator U2;

The address can be in hex format (0x00AB) or decimal format.

The val can be in hex format (0x00AB) or decimal format.

TargetRegister[address] = 8bit-value

7.11.1.6. *write16*

COMMAND

write16 target address value

DESCRIPTION

Write the **address** 16 bit register of the **target**

the target can be:

- PCB269: this is the Compressor board;
- PCB190: this is the Generator board;

- PCB244: this is the Potter board;
- PCB249U1: this is the Collimator U1;
- PCB249U2: this is the Collimator U2;

The address can be in hex format (0x00AB) or decimal format.

The value can be in hex format (0x00AB) or decimal format.

TargetRegister[address] = 16bit-value, little endian address

7.11.1.7. **command**

COMMAND

command *target command_code command_param*

DESCRIPTION

Send a Command frame to the **target**

the target can be:

- PCB269: this is the Compressor board;
- PCB190: this is the Generator board;
- PCB244: this is the Potter board;
- PCB249U1: this is the Collimator U1;
- PCB249U2: this is the Collimator U2;

command_code and command_param can be in hex format or decimal format;

7.11.1.8. **special**

COMMAND

special *target b1 b2*

DESCRIPTION

Send a Special frame to the **target**

the target can be:

- PCB269: this is the Compressor board;
- PCB190: this is the Generator board;
- PCB244: this is the Potter board;
- PCB249U1: this is the Collimator U1;
- PCB249U2: this is the Collimator U2;

b1 and b2 can be in hex format or decimal format;

7.11.2. Debug Terminals

There are two possible debugging terminal types:

- The RS232 serial terminal;
- The Tcplp terminal.

7.11.2.1. The RS232 serial terminal

The Gantry provides a DB9 connector in the back side of the cabinet providing two serial link:

- A serial link for low level debugging in the Master Terminal;
- A serial link for the low level debugging in the Slave Terminal;

After Gantry startup, those terminals remain active only for the system configuration setup time (the early steps of the Gantry startup)

then they are disabled.

In order to activate the serial links the user shall use the following a IRS command:

- debug: ***enablePrint***

After the command is used both serial links will be activated until the system Power Off.

7.11.2.2. The TcpIp terinal debug

The user can open two separated Debug Terminals one for the Master activities and one for the Slave activities.

The Master terminal connection details are:

- IP: 192.168.30.2;
- PORT: 10010;
- Protocol Raw;

The Slave terminal connection details are:

- IP: 192.168.30.3;
- PORT: 10010;
- Protocol Raw;

In those terminals will be conveyed both the low level activities as well the high level activities.