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Data acquisition with the fiber-fed echelle spectrograph HEROS

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We present a short cook-book for the acquisition of data exposed by the fiber-fed echelle spectrograph HEROS.

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1 Introduction

This is a short manual for the spectra exposure with the HEROS (**H**eidelberg **E**xtended **R**ange **O**ptical **S**pectrograph) installed in the Cassegrain focus of the 2-meter Ondřejov telescope.

The HEROS is a two-channel fiber echelle spectrograph with two independent CCD cameras. The range of the first camera is 3800÷5740 Å. The range of the second camera is 5800÷8300 Å. Cameras are driven via two independent PCs. They operate in MS-DOS. Therefore we present the tutorial in two parallel columns for two cameras.

We hope the manual will be useful, for example, for students or visitors of the stellar department.

2 The acquisition of the HEROS data: two cameras

The HEROS consists of two fully independent cameras, covering 3840÷5650Å and 5850÷8350Å, respectively (in the current configuration). The blue camera is driven by the controller separated from the user's computer (which is also used to saving exposed data). The red camera is driven by the specific computer with controller included inside this computer. Schematic picture on driving both cameras is on the figure Fig. 1 (see AT1(1990)).

Therefore we in parallel describe data acquisition in both cameras in two parallel text columns (see Appendix B). The appearance of screens is shown in the Fig. 2 (Appendix A).

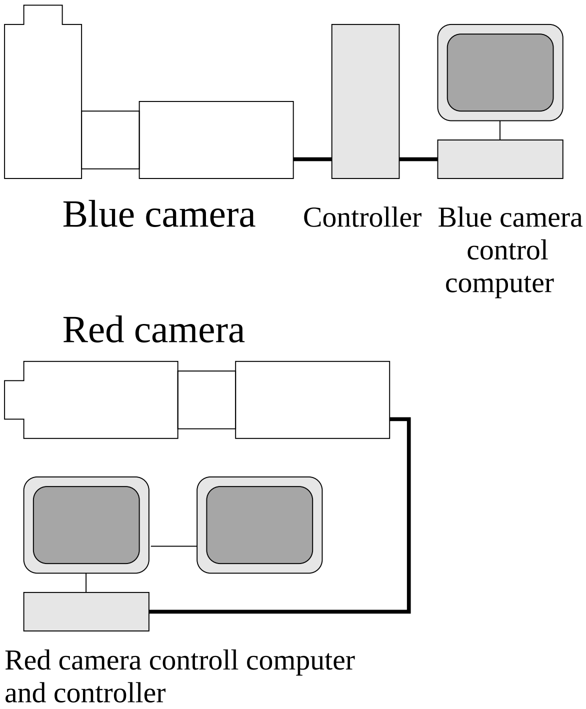

Fig. 1: Two schemes of the blue and red cameras connection to user's computer.

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References

AT1 Operator's Guide (AT1 Version 2.03), Wright Instruments Ltd, Jan 1990

A Red and blue cameras screens

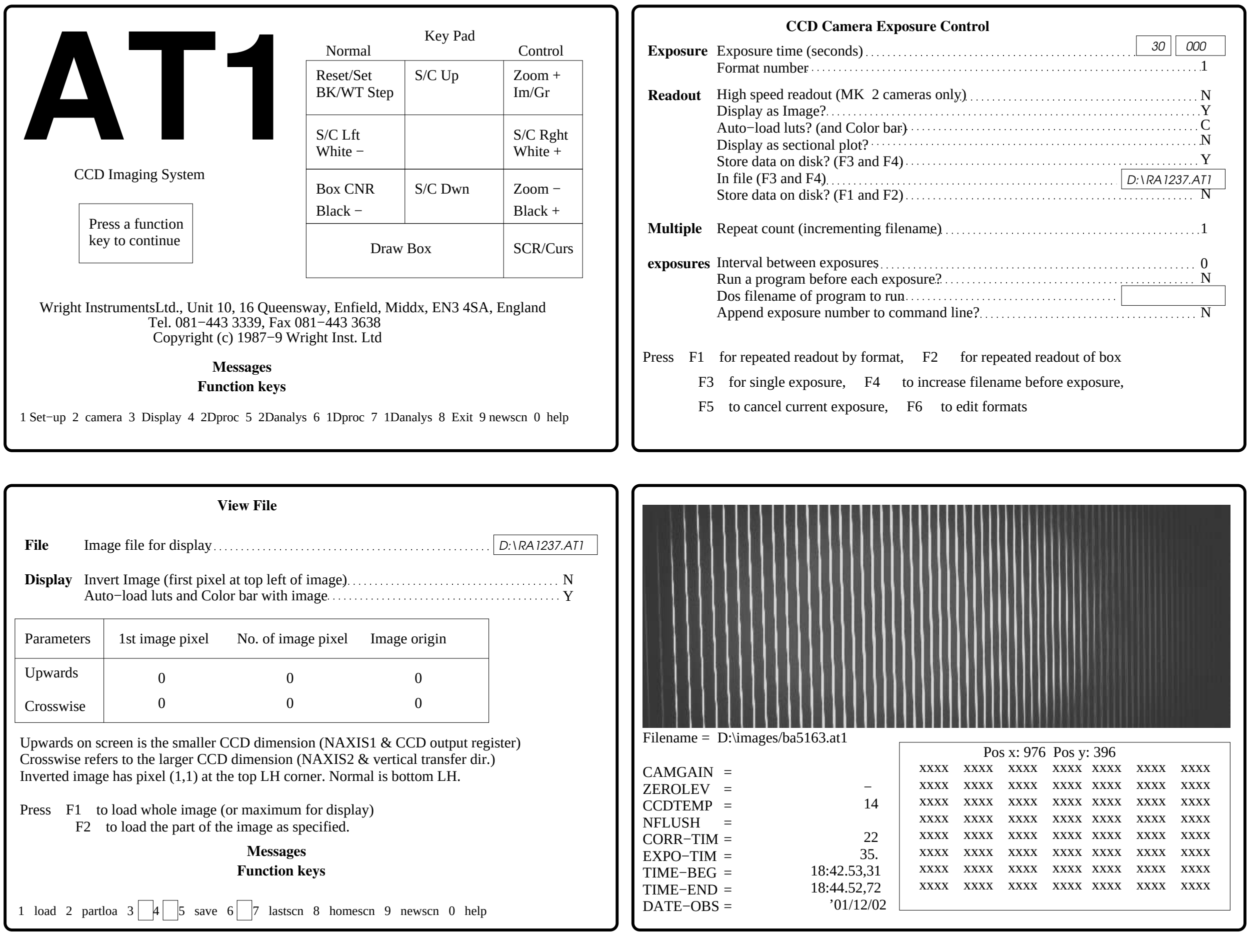

Fig. 2: The appearance of screens in the red and blue cameras. Above-left: starting menu of `AT1` (red camera); above-right: "page" 21, main page for data acquisition; below-left: "page" 31 for downloading older files; below-right: the screen of the blue camera. The signal (ADU) in pixel near to the current position of the cursor is projected to the small rectangle on the below-right edge of the screen (it is formally depicted by "xxxx"). The temperature is really not 14K; it has to be near 139÷141K, but only two characters(!) are depicted on the screen – it is inconsistency of the graphical interface.

B Succession of commands in blue and red cameras

BLUE CAMERA

Write the command

`settime`

in order to synchronise the blue computer.

RED CAMERA

Write the command

`settime`

in order to synchronise the red computer.

B.1 Prepare the first exposure

Blue camera:

We have to be on the disc `D:\>` or in the directory

`D:\IMAGES >`

Red camera:

We have to be on the disc `C:\>` or in the directory

`C:\AT1 >`

The user-interface we start via the command

`at1`

– it opens a new menu. The schematic picture of the

starting screen is on the picture Fig. 2. Any item of the menu has a "page" where it can be found to work.
Press the key

F9

to activate a command line and be able to select "pages" in the menu.

The menu for exposing a spectra is on the "page" 21, so we press 2 1 (do not press Enter) to reach it. The "page" 21 is schematically shown on the picture Fig. 2.

It is possible to move inside it via

Tab (forward) or Shift Tab (back)

Now we have to prepare the name of the first file we will expose. The name of any file has 6 positions: 2 letters and 4 numbers; the extension is `AT1`. So it has, generally: <`LL`*nnnn*>`.AT1` Letters define the camera:

it is `BA` for the blue camera

and `RA` for the red one

The number denote how many files were exposed. The numbering has started from `0001` and then it runs independently of the date, year etc.

In the evening, the astronomer should inspect the number of the last exposed file and increase the number by 1 due to keeping the continuity.

Example: The full name of the file thus can be
`BA1237.AT1` in the blue camera

and `RA1237.AT1` in the red one

We put (with respect to the upper text)

`expose␣BA1237␣` $<$ *time* $>$

on the command line, where
$<$ *time* $>$ is the exposure time in seconds. It must be an `INTEGER`
Warning: Do not write an extension of the file – it will be appended automatically!
Example: We have decided to expose for 50s, so we write

`expose␣BA1237␣50`

We fill the exposure time (in seconds) and the name of the first file we will expose.

Warning: The name of the file must be

`D:\RA1237.AT1`

In the red camera user-interface we have to fill both the extension (i.e. `*.AT1`) and the path which is `D:\` $>$
Remark: The exposure time is limited (due to user-interface environment) to 9999.999s

Example: The exposure time will be 30.00s, so fill the item for the exposure time:

30 000

B.2 Start

Now, we are ready to start the exposure.)

We have prepared `expose␣BA1237␣50` so we can press the key

Enter

and start the exposure

The first exposure we start via the key

F3

(do not press Enter then

The second and following exposure we prepare via command

`expose␣BA␣+␣` $<$ *time* $>$

We do not write full name since the mark "+" will increase the number of the file by 1 automatically.

The second and following exposures we start via the key

F4

We do not write name of the file again since the key F4 will increase the number by 1 automatically. The astronomer has to upgrade the exposure time only.

B.3 Measuring ADU

As the exposure stops and the chip is read out, the image of the chip is depicted on the screen. Moreover, it depicts automatically the signal integrated in pixels near to the position of the cursor.

The submenu for the ADU measuring is on the "page" 33. Thus the astronomer should depicts the main menu via

`F9`

and then select the page, i.e. press

`3` `3`

(do not press `Enter`) The command shows a table with signals in pixels near to the topic position of the cursor.

B.4 Showing the older files

Exposed files are saved automatically to `D:\IMAGES>` It is possible to display them via the command

`display␣` < *filename* >

Warning: Do not write extension!

Example: `display␣BA1158`

It opens a file `BA1158.AT1` and it is possible, for example, to find ADU...

The submenu for the looking for elder spectra is on the "page" 31. Thus the astronomer should depict the main menu via

`F9`

and then select the page, i.e. press

`3` `1`

(do not press `Enter`) It opens a submenu in which one can find a command line `DISPLAY`. Fill the name of the needed file. Schematic figure with the menu for displaying older spectra is shown on the Fig. 2.

Warning: It is necessary to write extension!

Example: `RA1158.AT1`

B.5 Stop the session

It is not necessary to do anything, perhaps except for the return to the MS-DOS environment via

`F8`

(pressed once)

Repeat some times

`F8`

B.6 Premature stop of the exposure

We do not recommend to do this. It is better to close the dome, close the shutters of the telescope and expose "dark" for the remaining time then to kill the exposure.

The reason, in fact, is such that the blue channel is not able to save the exposure before the correct readout.

Press the key

`F5`

and verify (i.e. `OK`) the premature finish. It reads out the chip, nevertheless data will not be saved and the file will be lost.

Press the key

`F5`

and verify (i.e. `OK`) the premature finish. It reads out the chip and save the file.

B.7 Saving data to the disc array of the stellar department

A short script written by Petr Škoda was installed both in "red" and "blue" computer for the comfortable saving of data. Therefore the run of the script is the same in both PCs.

Put the command `savedata`. The script will start ftp connection to the data server of the stellar department and asks for the identification of the observing group (HEROS or ONDREJOV). The user can easily answer (press a corresponding key `H` or `O`) and all data will be saved to the disc array connected with the data server. Moreover, for the HEROS team, the data is transfered automatically to the upload area of the HEROS and FEROS anonymous FTP server in Heidelberg. After the upload is finished, files are transformed (byte-swapping, FITS header correction) to the standard FITS files and stored at the central disk storage array of stellar department.