

# HET High Resolution Spectrograph Advisory

## The HRS cross disperser camera (XDcam)

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### Issue

The HRS cross disperser positioning mechanism is unreliable, and ensuring its correct use is a burden on the HET RAs, a source of instability in the data produced by the HRS, and a source of inefficiency in observing with the HET. See the background information below.

### Issue resolution

A new cross disperser encoder and control system won't be installed for a while, so an interim solution has been built, and was commissioned on April 28<sup>th</sup>, 2008. It is a video camera system and illumination system that allows the visual inspection of the cross disperser to be done quickly from the control room.

### Use of the Cross disperser camera

The basic steps in using XDcam are as follows:

- The control room video switch must be set to channel 11 in order to view the XDcam output. If you want to view the XDcam output on the large control room monitor, press the *Input* button on the monitor's remote control, scroll to AV2, select it and press OK.
- Turn on XDcam with this command in the HRS ICE window:  
`instrpower=XDcam_on`
- Perform the usual HRS configuration step, viewing the cross disperser with the XDcam as you would have done visually within the HRS enclosure.
- Turn off XDcam with this command in the HRS ICE window:  
`instrument instrpower=XDcam_off`

**NOTE WELL:** do not observe with XDcam on. It emits enough light to put a very large amount of stray light into the data frame.

Plate 2 shows the XDcam output when ball 1 is in socket 1 for the 316g8991 configuration. This is the appearance when the HRS has been parked successfully. Note that there is a label that gives the configuration name so that it cannot be confused with the 600g6869 configuration.

Plate 3 shows the XDcam output for 316g8375. Note that the ball and groove for this configuration are not shown by XDcam, as only groove 1 is shown.

Plate 4 shows the XDcam output for 600g6869. Note that the 600g ball 1 is now in groove 1, and, that there is a label giving the configuration name.

Plate 5 shows the XDcam output when the cross disperser is lifted by the pneumatics. This is the case when the command `instrument tiltpos=gu` is issued prior to manually turned the stepper motor in order to position the correct ball above the correct groove. ICE commands will be added soon to enable small stepper motor moves to be made from the control room for this task of fine positioning.

## Camera Hardware

The hardware is shown in plate 1. A Pulnix video camera is used with a 16 mm focal length lens. A 1.25 mm thick C-mount spacer is between the lens and camera to allow for closer focus and higher magnification. A 7-LED ring light is positioned around the lens to illuminate the area of interest with red light. The use of red light removes the chance of this light source causing anything in the HRS to phosphoresce. The light source and video camera are powered from one power outlet that is turned on and off by the ICE software. The video signal is transmitted to the control room on optical fiber.

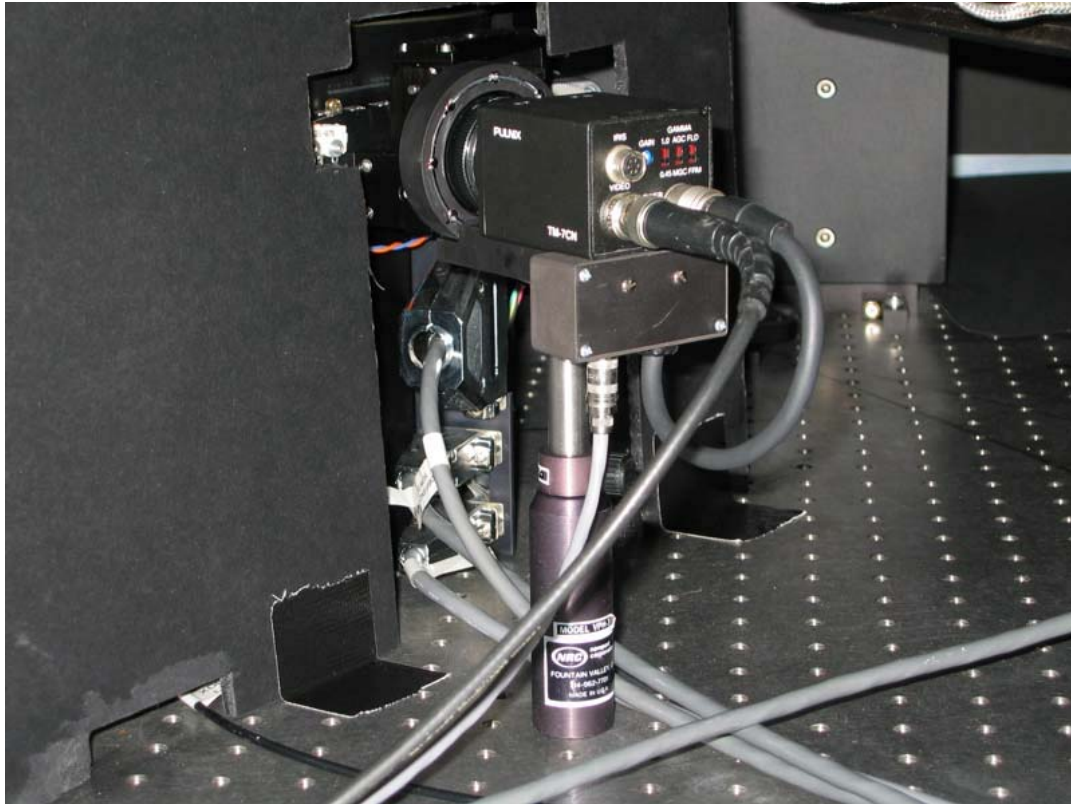


Plate 1: The HRS cross disperser camera and ring light illuminator mounted in the HRS.

## Background

After a re-configuration of the HRS that changes the cross disperser setting, the cross disperser must often be visually inspected to ensure that it reached the correct position. This is done in the HRS enclosure by checking that the correct ball is in the correct groove of the cross disperser kinematic mount. This visual check is undesirable for several reasons:

- The RA must spend time going down into the spectrograph, often quite a number of times per night. This is time consuming and leads to inefficiency.
- Going into the HRS enclosure affects the temperature stability of the HRS.
- The burden of this inspection is a disincentive to changing the cross disperser configuration. This could lead to less than optimized execution of the HET queue.

Gordon taught Phillip how to use Inventor. Jimmy built the metal work. Doug wired it all up. Edmundo found the camera and lens, and organized and installed the fiber link and Pow-R-switch. Sam programmed ICE.

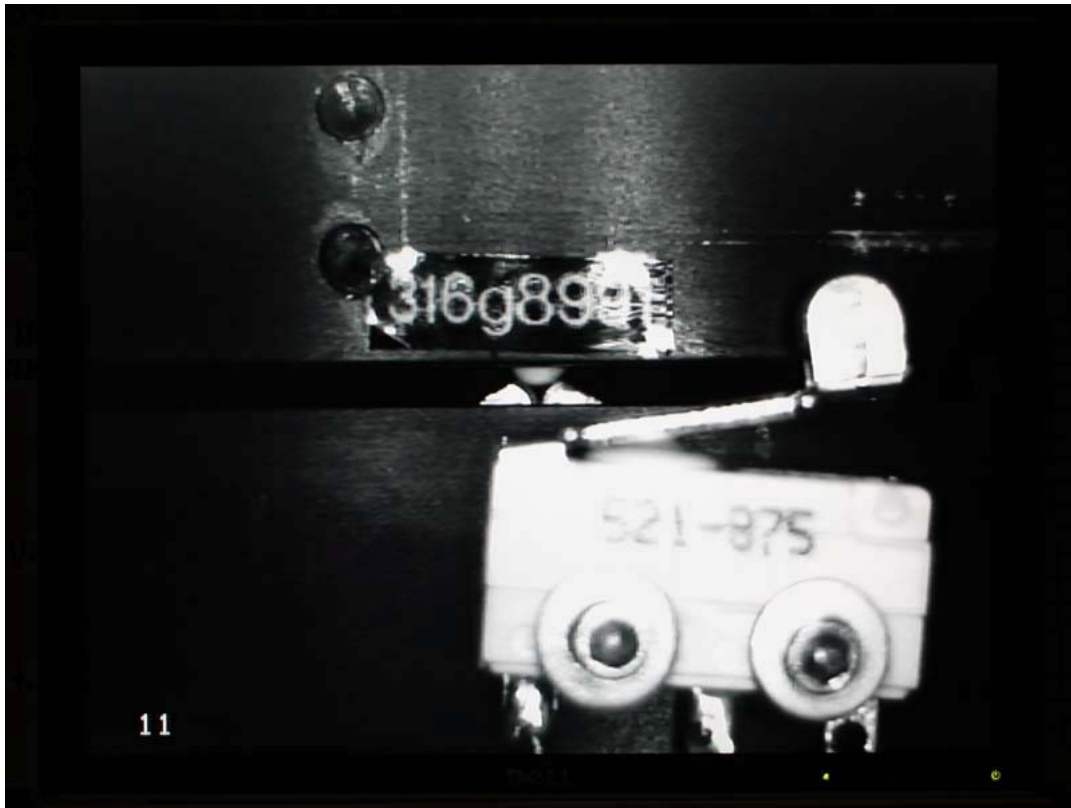


Plate 2: the XDcam view for configuration 316g8991, showing the 316g ball 1 in groove 1.

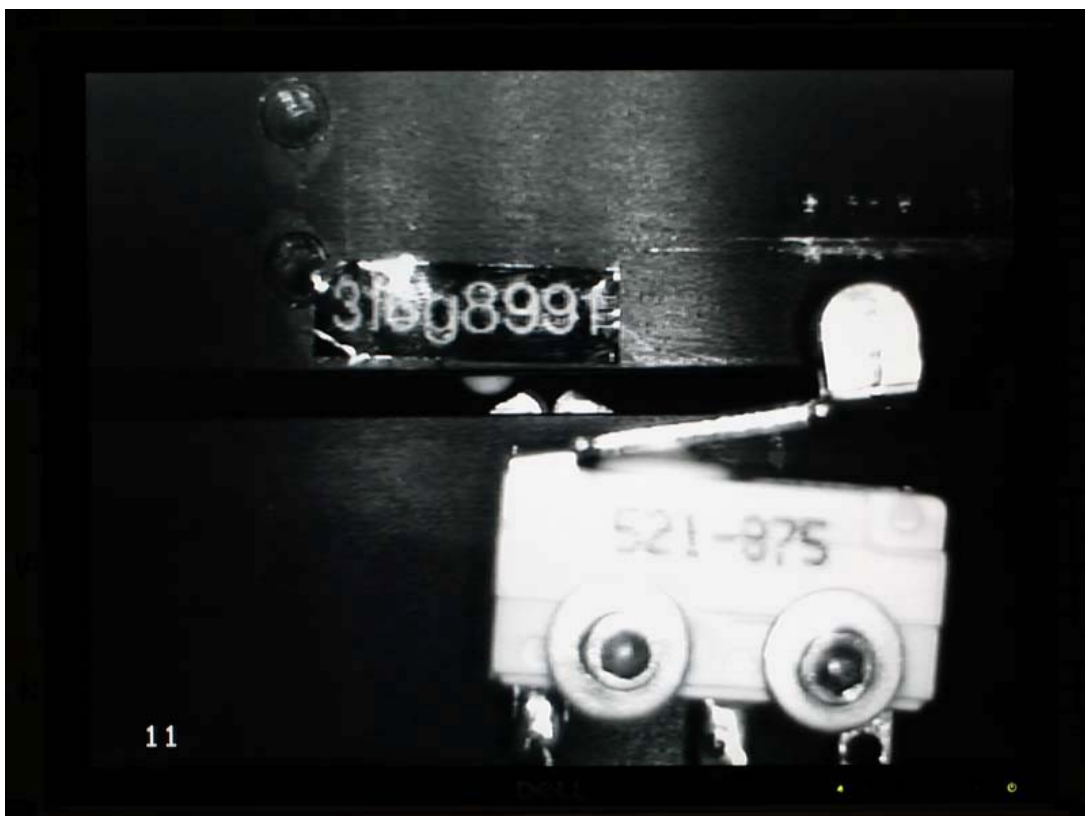


Plate 3: the XDcam view for configuration 316g8375, showing no ball in groove 1.



Plate 4: the XDcam view for configuration 600g6869, showing the 600g ball 1 in groove 1.

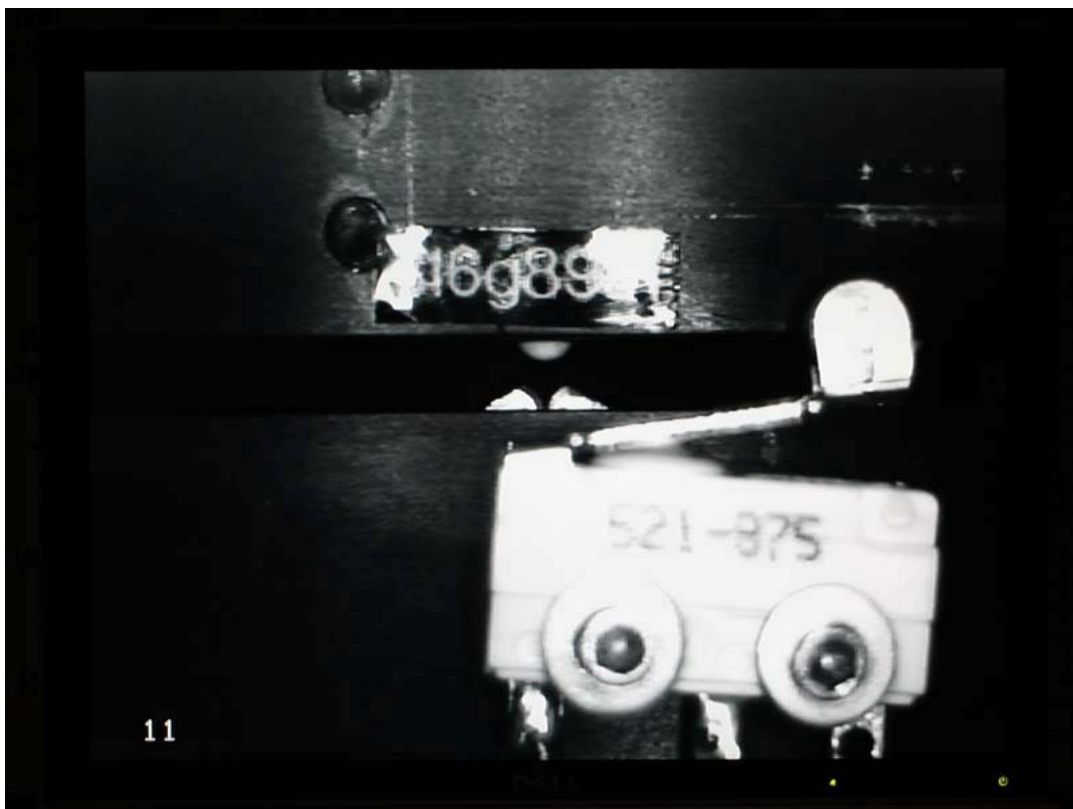


Plate 5: the XDcam view when the grating table has been lifted pneumatically.