

LATEST NEWS ON INSTRUMENTATION

FTS Implementation Under the New Data Acquisitions Environment

The night of 6 November 1989 marked the end of an era, as the beginning of the first FTS run to use the new HP 9000 computers. The FTS was the last CFHT instrument to be moved from the HP 1000 computers to the HP 9000's.

The first task in the conversion to the new computers, due to different hardware architectures, was to modify the computer interface to the FTS electronics in such a way that the HP 9000 system could successfully communicate with the FTS. The changes, specified and implemented by Bernt Grundseth, Philippe Papiasian, and Mark Barbour, went beyond providing a basic interface. They in fact offloaded the most real-time intensive tasks to a microprocessor, thereby liberating the HP 9000 to perform other higher level tasks, for example, real-time FFT's.

Having already successfully ported several major instruments to the new X Window-based user interface, the software team of John Kerr, Bernt Grundseth, Jon Brewster, and Steve Smith, eagerly faced the challenges of the FTS. The most demanding developments were to occur in the real-time plotting packages and the interactive tools needed by the observer to make critical decisions before starting a scan.

The first run with the new computers was intensive. In addition to Jean-Pierre Maillard, and the support astronomer, Tim Davidge, the system was used by 5 different observing teams in a span of seven nights. Much good data was obtained and the new computers proved to be up to the task of managing the FTS.

It is perhaps appropriate that the HP 1000 computers finish out a decade of service to the software group just as CFHT commences its second decade of operations.

John Kerr

Reticon Fix

After a decade of nearly trouble free operation during which we extolled at meetings the virtues of 1872 Reticons for quality spectrophotometry, we were rather slow to respond to a subtle electronic problem which emerged in the last twelve months with the CFHT system. Observers began to complain about small nicks and spikes which often appeared in flat-fielded spectra, an example is shown in Figure 5. They occur in groups with an 8-point period that cannot be eliminated with the usual 8-point normalization. After inconclusive tests at the telescope the system was returned to UBC

Figure 5: A portion of a Reticon spectrum of an early-type star taken in the near-IR, showing two Pachen lines, several lines of HF super-imposed on the stellar continuum. The large number of positive spikes extending over most of the right-hand side of the spectrum are due to the ADC problem. The data have had a mean baseline subtracted and have been divided by a flat field lamp exposure.

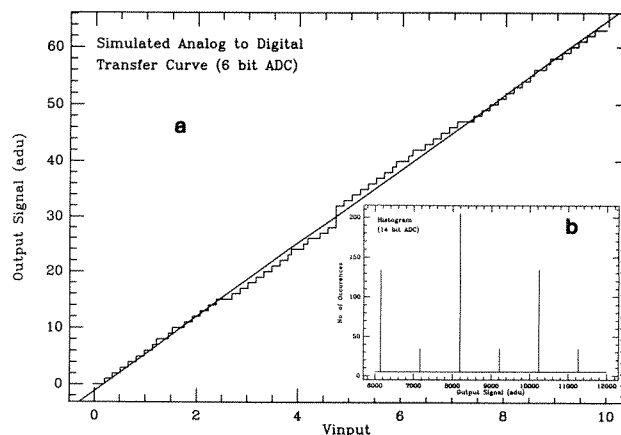
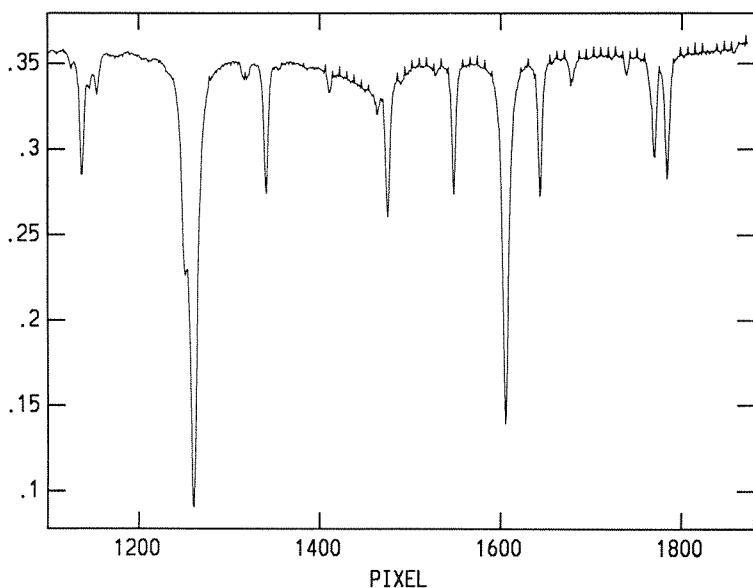


Figure 6: (a) The non-linear step function curve represents a simulated curve for a defective analog-to-digital converter. The straight line of a proper linear transfer curve is shown for reference. (b) The histogram resulting from the defective transfer curve shown in (a), where the input signal is a smooth ramp function.

in August 1989, where the fault was traced to a defective analog-to-digital converter (ADC) in the second channel of the video processing electronics (the 1872 Reticon has four independent outputs).

The ADCs with both the Reticon and CCD detectors use a method of successive approximation to compare the input signal voltage with the various internally established reference voltages that define the bit levels. If one of these internal references is not in a precise binary ratio with its neighbors the ADC output will not be a linear step function. To simulate this we defined a faulty ADC calibration shown in Figure 6a. Figure 6b shows the resulting histogram of output numbers in response to a (noiseless) linear input voltage ramp. The spikes at some numbers and obvious deficits at others are the result of the flawed conversion process.