

- A and B are coefficients from `ccr8`.
- s is the photocathode sample position.
- m is the spectral order.

Table 37.6: Incident Angle Correction for GHRS Gratings

Grating	A	B	Previous A
G140L ^a	0.0	0.0	0.0
G140M	−0.0065	0.0	0.0
G160M	−0.0448	0.0	−0.022±0.023
G200M	−0.057	0.0	−0.037±0.012
G270M	−0.060	0.0	−0.036±0.007
Ech-A	$−0.0076 \times m$	0.0	0.0
Ech-B	$−0.0078 \times m$	0.0	0.0

a. The entries for G140L are not based on measurements. They are set to 0.0 since the incident angle correction for the G140L grating is expected to be insignificant.

37.6.2 Doppler Compensation

Since HST orbits the Earth with a velocity of 7.5 km s^{-1} , spectra obtained with GHRS could see a Doppler shift of up to 15 km s^{-1} . The effect of the spacecraft velocity was corrected for in real time for ACCUM mode observations by deflecting the image of the spectrum an amount equal to the Doppler shift so that the spectrum appears fixed with respect to the diode array which is recording the spectrum. RAPID mode observations are not corrected for this effect. Unfortunately, it was discovered that GHRS spectra obtained prior to the end of March 1993 suffered from incorrect Doppler compensation.

The problem became visible in a set of high dispersion spectra obtained with short exposure times, where one could actually see a doubling of spectral features corresponding to the different Doppler shifts applied. At the maximum required correction, the flight software was mistakenly applying zero correction. Affected data will be obvious only in extreme cases, but the problem may degrade your data even when the effect is not obvious.

An on-board fix to the first problem was implemented in the flight software as of April 1993. Observations made after the update should not suffer from the Doppler compensation error. However a cumulative error in the onboard Doppler compensation still existed, which caused the accuracy of the Doppler compensation to be reduced for long exposures.