XXVIII. Recent Software Modifications Affecting Post-Extraction Processing for High Dispersion IUE Images

Several improvements and corrections have been made to the high dispersion post-extraction routine POSTHI since its implementation in production processing on November 10, 1981. A description of these changes, listed chronologically, is given below. Further information describing the impact on the Guest Observer (GO) tape files will be found in updates to the Time History of IUESIPS Configurations to be published in the near future.

1. Incomplete Final Spectral Record

An error existed in POSTHI in which the program failed to read the last physical record of the gross and background flux input files (extracted by the program SPECHI). This resulted in part of the last extracted order being deleted from the MEHI file on the GO tape and also occasionally resulted in the omission of the last 1 or 2 orders from the CalComp plots. Since the last data record contains a variable number of extracted data points, the exact amount of missing data is not constant. In one Short Wavelength Prime (SWP) test run, only 4 data points were found to be missing in the MEHI file. The error was corrected on May 5, 1982 (GMT 125:16:45).

2. Incomplete Search for End-of-Exposure Time

An error which would presumably cause a heliocentric velocity correction error in a small number of extracted images was corrected on May 5, 1982 (GMT 125:16:45). In order to estimate the midpoint of observation, the program POSTHI searches the event-status entries of the image science header to determine the end-of-exposure time. Once this time is extracted, the program subtracts half of the exposure time and assumes the resulting time represents the midpoint of observation. The problem that existed was that POSTHI failed to search for the single event status entry in line 10 of the image header. Therefore, if the end-of-exposure entry happened to appear in line 10, the program would either search for and possibly use another end-of-exposure entry or, if such were not found, not apply any velocity correction at all. The history portion of the MEHI file label can be used to determine whether an error occurred since it contains the calculated midpoint of observation (described as observation date) and the applied velocity correction.

3. Improper Treatment of Negative Declinations

The heliocentric velocity correction procedure was found to contain a slight error for targets with negative declination values. This occurred because the declination was calculated by adding the minutes and seconds of declination (as positive quantities) to the degrees of declination regardless of whether the degree term was positive or negative. This could result in a possible error of up to 2 degrees in the calculation of the declination, which in turn would cause a small error in the velocity correction. Another result of this coding error was that the sign for negative declinations did not appear in the portion of the processing history label where the target coordinates used are specified. Both errors were corrected on August 5, 1982 (GMT 217:14:40).

4. Scaling Error of Net Ripple-Corrected Fluxes

VILSPA personnel discovered an error in the scaling of the ripple-corrected net spectral fluxes contained in the MEHI file generated by POSTHI. POSTHI was scaling the ripple-corrected net flux according to the minimum and maximum values of the uncorrected net flux. This would cause an error in any ripple-corrected net flux values outside the range of the net flux. The correction was implemented on August 5, 1982 (GMT 217:14:40).

5. Improved Ripple Correction

The echelle ripple correction algorithm described by T. Ake in NASA IUE Newsletter No. 19, p. 37, was implemented in production processing on August 27, 1982 (GMT 239:19:45). The second-order equation describing the echelle order dependence of the ripple constant (k) and the adjustable α parameter are contained in the history portion of the MEHI header.

6. "Optimal" Noise-Conditioning Filter for LWP

An "optimal filter" for smoothing long wavelength prime (LWP) high dispersion extracted spectra as determined by F. Schiffer was implemented on October 11, 1982 (GMT 284:13:30). The rationale for such noise-conditioning filtering in the SWP and long wavelength redundant (LWR) cameras was described by Bohlin and Turnrose in NASA IUE Newsletter No. 18, p. 29, and similar arguments apply to LWP. the filter weights of .0017, .0076, .1027, .7760, .1027, .0076, .0017 replace the weights 0, 0, 0, 1, 0, 0, 0 previously used for LWP.

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