USE OF THE LWP CAMERA, AND ITS ABSOLUTE CALIBRATION *

(Preliminary Report)

Over the last eighteen months the Project has invested considerable time in the calibration and study of the LWP camera. Much of the work has been completed, and the camera is now available on a routine basis to all Guest Observers. In this note we compare the properties of the two long wavelength cameras (See also ESA IUE Newsletter # 11), in order to help GOs decide which camera they should choose, and present the absolute calibration of the LWP camera (see also Barylak (this newsletter)).

In the Users Guide for the LWP camera (Settle, Shuttleworth and Sandford, 1981) a comparison of the two LW cameras in the low-dispersion mode shows that the LWP is both more sensitive and has better S/N characteristics longward of 2500 A. Shortward of 2500 A the LWR is the better camera. Figures 1 and 2 illustrate these properties. Other studies presented at the September 1982 3-Agency Meeting, VILSPA showed that at high dispersion the spectroscopic resolution is better in the LWP over most of the orders studied, except near 2800 A and longward - where the resolutions are similar (see Figure 3, and Barylak loc.cit). The LWP camera shows the same characteristic high frequency noise as the other cameras, and has the same sensitivity to the background radiation as the SWP camera. The LWP camera does not suffer from the narrow band of microphonic type distortion prevalent in the LWR camera.

However the LWP ITF table may not be as well defined as the LWR ITF, since it contains only two, rather than four images. Also, it has been used much less than the LWR camera over the lifetime of the IUE, so there is much less photometric data available for this camera.

GOs wishing to use the LWP camera should inform the Resident Astronomer during their training session. Both tracking stations keep each other informed of planned LWP usage, thereby minimizing the switches between the two LW cameras as well as saving time during operations. Only one switch to the LWP and back is allowed per shift. Some time will be lost to the user during the switch - in the worst case about 20 mins - although some of the time can be hidden in other satellite operations.

Over the last year, both Observatories have been acquiring observations of standard stars to calibrate the LWP camera, and a provisonal curve was presented at the 3-Agency meeting. Although a small amount of work still needs to be done on verification of the absolute

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calibration, we present the data here, so that GOs can use it in their observations. The calibration has been included within IUESIPS by the end of October.* The full details of the work will be published elsewhere.

The procedure used to determine the sensitivity curve of the LWP camera was to establish its overall shape, using trailed images of bright stars having well-established fluxes. To fix its absolute value we used fainter stars which can be accurately timed during exposure with IUE. This method is the same as that used in the revision of the absolute calibration of the SWP and LWR cameras and is independent of the LWR camera. To determine the shape, 12 trailed spectra of 4 HD stars (3360, 34816, 155763 and 214680) were used, whilst the absolute value was fixed with 23 spectra of 4 other stars (HD 60753,HD 93521,BD +28° 4211 and BD +75° 325). The resulting mean sensitivity curve, weighted according to the square-root of the number of individual spectra, is shown in Figure 4, and given in table I in 25 A bins for a wavelength range from 1900-3200 A.

As a first check on this calibration, we have compared fluxes obtained from both the LWP and LWR observations of the same star, finding the result that the two cameras are internally consistent, i.e. both cameras give the same fluxes to within reasonable errors (10%). There is a tendency for the LWP to give slightly large fluxes, of the order of 5%, compared to the LWR. Taken overall, the two calibrations agree well.

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* Editor's Note: As of May, 1983 neither ground station has incorporated this calibration into IUESIPS.

TABLE I *

ABSOLUTE CALIBRATION OF THE LWP CAMERA AT LOW DISPERSION

Lambda (A)	S_λ^{-1}	Lambda (A)	S_λ^{-1}
1900	11	2600	0.583
1925	4.13	2625	0.539
1950	3.04	2650	0.506
1975	2.59	2675	0.507
2000	2.44	2700	0.502
2025	2.17	2725	0.498
2050	1.97	2750	0.501
2075	1.96	2775	0.500
2100	1.98	2800	0.511
2125	1.96	2825	0.520
2150	1.99	2850	0.540
2175	2.05	2875	0.549
2200	1.95	2900	0.565
2225	1.93	2925	0.604
2250	1.81	2950	0.663
2275	1.62	2975	0.704
2300	1.50	3000	0.795
2325	1.37	3025	0.909
2350	1.26	3050	1.09
2375	1.14	3075	1.25
2400	1.02	3100	1.48
2425	0.947	3125	1.79
2450	0.864	3150	2.15
2475	0.804	3175	2.70
2500	0.730	3200	5.98
2525	0.679		
2550	0.624		
2575	0.599		

S_λ^{-1} : 10^{-14} erg cm^{-2} A^{-1} FN^{-1}

* Editor's Note: As mentioned in "IUE News Notes," p. 8 of this Newsletter the values of S_λ^{-1} given above for 1900 and 3200Å are incorrect. A revised calibration will be available soon.

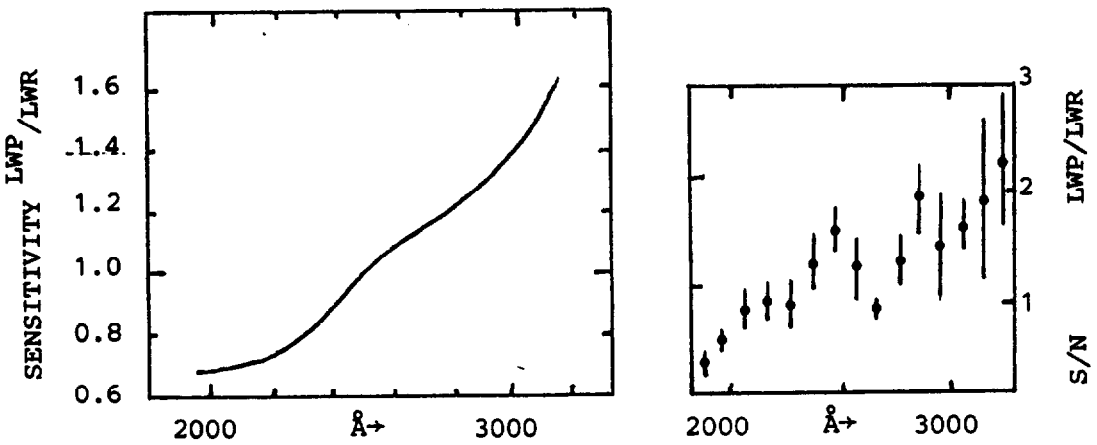

FIGURE 1 (a & b) - Comparison of the sensitivity of the S/N ratio for the two long wavelength cameras (Settle, Shittleworth, Sanford, 1981)

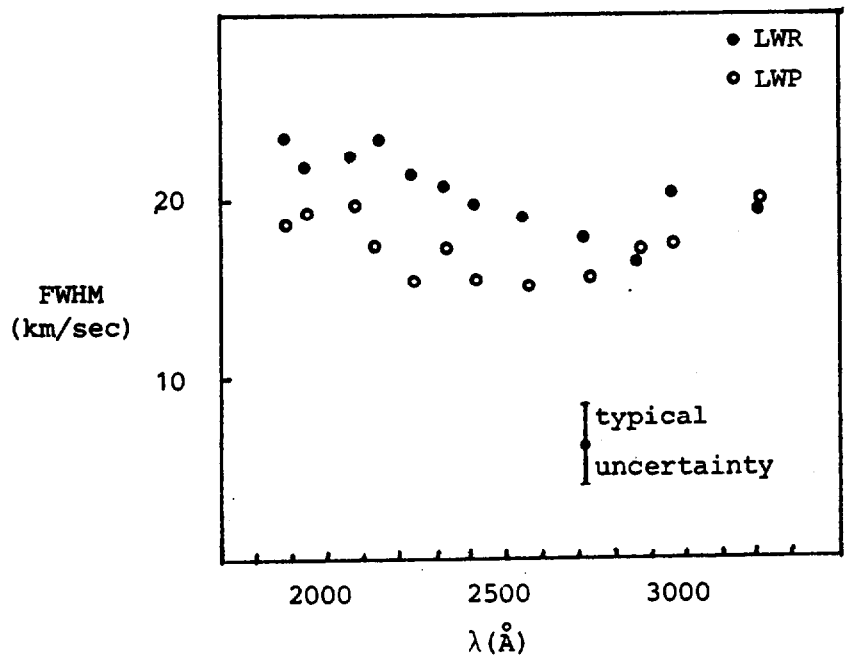

FIGURE 2 - Comparison of the resolution of the two long wavelength cameras in high dispersion mode. The results shown are based on exposures with the on-board Pt-Ne lamp (Imhoff, internal report)

FIGURE 3 - SENSITIVITY CURVE OF THE LWP CAMERA