

IUE Data Reduction

XXXIII. Temperature Correction of LWP Dispersion Constants

On April 12, 1983 (GMT 102:16:12) the temperature correction of updated LWP dispersion constants was implemented in production processing at GSFC. The LWP dispersion constant files utilized previously did not include either a temperature or time correction, primarily because insufficient data existed for defining meaningful correlations. The updated LWP dispersion constants replace those originally implemented on September 21, 1982 and described in IUE Data Reduction Memo XXX (NASA IUE Newsletter No. 20).

Statistics for the dispersion constants and the standard deviations before and after correction for temperature are shown in Table 1. The actual dispersion constants and correlation coefficients for all operational cameras are listed in Tables 2 and 3. Note that Tables 2 and 3 incorporate corrections to numerical errors which appeared in Table 3 of IUE Data Reduction Memo XXX. These terms define the sample (S) and line (L) position of a given wavelength (λ , in Å) and order (m) using the following formulae for the high dispersion case:

$$S = a_1 + a_2 m \lambda + a_3 (m \lambda)^2 + a_4 m + a_5 \lambda + a_6 m^2 \lambda + a_7 m \lambda^2 \quad (1)$$

$$L = b_1 + b_2 m \lambda + b_3 (m \lambda)^2 + b_4 m + b_5 \lambda + b_6 m^2 \lambda + b_7 m \lambda^2 \quad (2)$$

In low dispersion ($m = 1$), only the first two terms are used.

The correction for temperature and time is applied by adding a value W where $W(S)$ and $W(L)$ are the corrections to equations 1 and 2 respectively, such that

$$W = W_1 + W_2 T + W_3 t \quad (3)$$

where

T = head amplifier temperature (THDA, in C°) and

t = number of days since January 1, 1978.

The correlation coefficients W above are defined such that the mean time and temperature correspond to a correction of zero. Note that for the LWP camera the W_3 coefficients are set to zero, signifying that no correction for time is applied for this camera.

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Table 1

LWP Dispersion Constant Statistics

	<u>low</u>	<u>high</u>
Number of dispersion solutions	28	28
Mean time	7/20/82	7/20/82
start	6/17/80	6/17/80
end	3/21/83	3/21/83
Mean THDA(C°)	8.5	9.1
lowest	6.2	6.5
highest	11.5	11.8
Slope (DL/DS)	-.8600	1.20*
Raw scatter (1 σ in pixels)		
parallel	.43	.78
perpendicular	.72	.39
Scatter after THDA correction (1 σ in pixels)		
parallel	.32	.44
perpendicular	.48	.18

*
m = 100

Table 2

Updated Coefficients Defining the Dispersion Relations
for the Small Aperture (High Dispersion)

DISPERSION CONSTANTS

	LWP HIGH	LWR HIGH	SWP HIGH
A1	6.519567430691839E 03	-4.877917909118001E 03	6.218892050975904E 02
A2	-1.778483034226251E-01	1.472791022260271E-01	-1.72318869446298E-01
A3	6.674810991848808E-07	-5.522146305212622E-07	1.273046286227277E-06
A4	1.598582672397747E 01	7.449215787825510E-03	2.768587190334483E-02
A5	3.553799013108267E-01	2.76734997273978E-01	-4.658400112925802E-01
A6	-6.882926804695988E-05	2.920103076528571E-09	-1.991352524783476E-07
A7	-2.764837136203847E-06	1.110510384889110E-07	-1.311560455819058E-08
B1	1.204170348210633E 03	1.540903104020054E 04	-7.263344584922493E 03
B2	-1.481415791069993E-01	-2.774574415612283E-01	-1.167948613338929E-01
B3	6.141328065489587E-07	9.077724306570848E-07	1.217348513144755E-06
B4	3.920442560853582E-03	5.925811878052170E-02	-8.673599101745899E-04
B5	3.214292514202579E-01	2.260993410233010E-01	3.988096737403947E-01
B6	4.968180685794447E-08	-8.819420360642425E-09	2.123655462298873E-08
B7	-3.245305013106521E-07	4.017085561525235E-09	-1.725994284098098E-07

CORRELATION COEFFICIENTS

W1(S)	-9.397546052932739E-01	5.279257774353027E 00	-2.243103027343750E 00
W2(S)	1.034402847290039E-01	-2.944609522819519E-01	2.709355205297470E-02
W3(S)		-1.101587899029255E-03	1.696390565484762E-03
W1(L)	-4.678806304931641E 00	-8.647566795349121E 00	-2.585970878601074E 00
W2(L)	5.145044326782227E-01	5.825527310371399E-01	2.170356512069702E-01
W3(L)		6.621174979954958E-04	5.693519487977028E-04

Table 3

Updated Coefficients Defining the Dispersion Relations
for the Small Aperture (Low Dispersion)

DISPERSION CONSTANTS

	LWP LOW	LWR LOW	SWP LOW
A1	1.045978073509556E 03	-2.990875719313456E 02	9.831253793383688E 02
A2	-2.866200015671855E-01	3.022277020991960E-01	-4.664930994754992E-01
A3			
A4			
A5			
A6			
A7			
B1	-2.722438935715519E 02	-2.644043768193267E 02	-2.633810950912196E 02
B2	2.465021881612769E-01	2.255967850073182E-01	3.762518274366946E-01
B3			
B4			
B5			
B6			
B7			

CORRELATION COEFFICIENTS

W1(S)	-7.499701976776123E-01	5.347592353820801E 00	-2.239044189453125E 00
W2(S)	8.839589357376099E-02	-2.516177892684937E-01	1.984719652682543E-03
W3(S)		-1.652141334488988E-03	1.870391191914678E-03
W1(L)	-3.398871421813965E 00	-8.600588798522949E 00	-1.632983207702637E 00
W2(L)	4.001707434654236E-01	5.316009521484375E-01	1.545836925506592E-01
W3(L)		1.222184859216213E-03	2.332759177079424E-04