There are 2 gratings available for use in the Tull spectrograph, E1 and E2. In order to select the one you wish to use, the following tables were created by Bob Tull. For each combination of grating and spectrograph focus, there are two tables. The first table contains order, blaze wavelength, n, dispersion, free spectral range, and physical dimensions in the focal plane. The second table contains order, blaze wavelength, wavelengths with half the light at the blaze wavelength, dispersion at blaze and at the wavelengths with half the light at the blaze, and angular separation between orders. The two tables for each setup occur on consecutive pages. These links will take you to the first table for a particular setup.

Grating E1 2dcoude Focus F1 8 June 1995

EPRISM Version 4/2/93: OUTPUT FORMAT for an ECHELLE
Coefficients for Fused Silica updated 5/12/88 courtesy H. Epps

ECHELLE: GROOVES/MM = 79.0139 GAMMA = 0.00
BLAZE ANGLE = 63.900 THETA = 3.00

DIAMETERS: COLLIMATOR = 190.0 mm TELESCOPE = 2.72 m f/32.36
CAMERA = 190.0 mm, PRISM = 190.0 mm
CAMERA FOCAL LENGTH = 3316.0 mm R.phi = 65917 arcsec
NUMBER OF PRISMS = 4 APEX ANGLE = 30 Degrees
GLASS TYPE IS SiO2 TOTAL DEVIATION = 58.207 Degrees
SPECTROGRAPH SLIT PROJECTION FACTOR S/DX X L/W = 2.298 X 1.854
IMAGE SCALE: Hor: 5.390''/mm, Vert: 4.348''/mm

ORDER	BLAZE (A)	n	DISP (A/mm)	FSR (A)	LENGTH (mm)	DY (sec)	DY (mm)	Y (mm)
66	3439.35	1.477936	0.281	52.1	185.3	29.68	6.825	99.075
65	3492.27	1.477018	0.286	53.7	188.1	29.08	6.688	92.244
64	3546.83	1.476118	0.290	55.4	191.1	28.51	6.556	85.552
63	3603.13	1.475237	0.295	57.2	194.1	27.94	6.425	78.992
62	3661.25	1.474372	0.299	59.1	197.2	27.37	6.295	72.564
61	3721.27	1.473525	0.304	61.0	200.5	26.83	6.170	66.266
60	3783.29	1.472695	0.309	63.1	203.8	26.28	6.043	60.095
59	3847.41	1.471882	0.315	65.2	207.3	25.75	5.921	54.049
58	3913.75	1.471085	0.320	67.5	210.9	25.22	5.801	48.127
57	3982.41	1.470304	0.326	69.9	214.5	24.71	5.682	42.325
56	4053.52	1.469539	0.331	72.4	218.4	24.20	5.566	36.642
55	4127.22	1.468789	0.337	75.0	222.4	23.70	5.451	31.076
54	4203.65	1.468055	0.344	77.8	226.5	23.22	5.340	25.624
53	4282.97	1.467336	0.350	80.8	230.7	22.74	5.230	20.284
52	4365.33	1.466631	0.357	83.9	235.2	22.27	5.122	15.053
51	4450.93	1.465941	0.364	87.3	239.8	21.82	5.017	9.931
50	4539.94	1.465265	0.371	90.8	244.6	21.37	4.914	4.914
49	4632.60	1.464603	0.379	94.5	249.6	20.92	4.812	0.000
48	4729.11	1.463954	0.387	98.5	254.8	20.50	4.715	-4.812
47	4829.73	1.463318	0.395	102.8	260.2	20.09	4.620	-9.527
46	4934.72	1.462696	0.404	107.3	265.9	19.68	4.525	-14.147
45	5044.38	1.462086	0.412	112.1	271.8	19.29	4.435	-18.672
44	5159.03	1.461488	0.422	117.3	277.9	18.91	4.348	-23.107
43	5279.01	1.460901	0.432	122.8	284.4	18.53	4.263	-27.456
42	5404.70	1.460326	0.442	128.7	291.2	18.18	4.180	-31.719
41	5536.52	1.459762	0.453	135.0	298.3	17.84	4.103	-35.899
40	5674.93	1.459209	0.464	141.9	305.7	17.52	4.029	-40.003
39	5820.44	1.458665	0.476	149.2	313.6	17.21	3.958	-44.032
38	5973.61	1.458131	0.488	157.2	321.8	16.92	3.891	-47.991
37	6135.06	1.457606	0.502	165.8	330.5	16.66	3.831	-51.883
36	6305.48	1.457089	0.516	175.2	339.7	16.41	3.775	-55.715
35	6485.64	1.456580	0.530	185.3	349.4	16.20	3.726	-59.491
34	6676.39	1.456077	0.546	196.4	359.7	16.01	3.683	-63.218
33	6878.70	1.455580	0.562	208.4	370.6	15.86	3.647	-66.902
32	7093.66	1.455088	0.580	221.7	382.2	15.75	3.621	-70.550
31	7322.49	1.454599	0.599	236.2	394.5	15.67	3.605	-74.173
30	7566.57	1.454112	0.619	252.2	407.6	15.66	3.601	-77.780
29	7827.49	1.453626	0.640	269.9	421.7	15.70	3.611	-81.383
28	8107.04	1.453138	0.663	289.5	436.8	15.81	3.637	-84.996
27	8407.30	1.452647	0.687	311.4	452.9	16.01	3.681	-88.636
26	8730.66	1.452150	0.714	335.8	470.4	16.31	3.751	-92.320
25	9079.89	1.451643	0.742	363.2	489.2	16.73	3.847	-96.074
24	9458.22	1.451123	0.773	394.1	509.6	17.30	3.979	-99.925
23	9869.44	1.450586	0.807	429.1	531.7	18.05	4.151	-103.907
22	10318.05	1.450025	0.844	469.0	555.9			-108.062

Grating E1 2dcoude Focus F1 BLAZE FUNCTION at FWHM

EPRISM3 Version 8/26/92: OUTPUT FORMAT for an ECHELLE
Coefficients for Fused Silica updated 5/12/88 courtesy H. Epps

ECHELLE E1 GROOVES/MM = 79.0139 GAMMA = 0.00
BLAZE ANGLE = 63.9000 THETA = 3.00

DIAMETERS: COLLIMATOR = 190.0 mm TELESCOPE = 2.72 m f/32.36
CAMERA FOCAL LENGTH =3316.0 mm
SLIT PROJECTION FACTOR s/dx X L/W = 2.298 X 1.854

NUMBER OF PRISMS = 4 APEX ANGLE = 30 Degrees
GLASS TYPE IS SiO2 TOTAL DEVIATION = 58.124 Degrees

ORDER	BLAZE-1/2 (A)	BLAZE (A)	BLAZE+1/2 (A)	DISP-1/2 (A/mm)	DISP (A/mm)	DISP+1/2 (A/mm)	DY (sec)
66	3413.30	3439.35	3465.41	0.295	0.281	0.267	30.3
65	3465.40	3492.27	3519.13	0.300	0.286	0.271	29.7
64	3519.12	3546.83	3574.54	0.305	0.290	0.275	29.1
63	3574.53	3603.13	3631.73	0.310	0.295	0.279	28.5
62	3631.72	3661.25	3690.77	0.315	0.299	0.283	27.9
61	3690.76	3721.27	3751.77	0.321	0.304	0.288	27.4
60	3751.76	3783.29	3814.81	0.326	0.309	0.292	26.8
59	3814.81	3847.41	3880.02	0.332	0.315	0.297	26.3
58	3880.01	3913.75	3947.48	0.338	0.320	0.302	25.7
57	3947.47	3982.41	4017.34	0.345	0.326	0.307	25.2
56	4017.33	4053.52	4089.71	0.351	0.331	0.312	24.7
55	4089.70	4127.22	4164.74	0.358	0.337	0.317	24.2
54	4164.73	4203.65	4242.58	0.365	0.344	0.323	23.7
53	4242.56	4282.97	4323.37	0.372	0.350	0.328	23.2
52	4323.36	4365.33	4407.31	0.380	0.357	0.334	22.7
51	4407.29	4450.93	4494.56	0.388	0.364	0.340	22.3
50	4494.54	4539.94	4585.34	0.396	0.371	0.347	21.8
49	4585.32	4632.60	4679.87	0.404	0.379	0.353	21.4
48	4679.85	4729.11	4778.37	0.413	0.387	0.360	20.9
47	4778.35	4829.73	4881.11	0.423	0.395	0.367	20.5
46	4881.08	4934.72	4988.36	0.433	0.404	0.374	20.1
45	4988.33	5044.38	5100.43	0.443	0.412	0.382	19.7
44	5100.40	5159.03	5217.65	0.454	0.422	0.390	19.3
43	5217.62	5279.01	5340.39	0.465	0.432	0.398	18.9
42	5340.35	5404.70	5469.04	0.477	0.442	0.407	18.5
41	5469.00	5536.52	5604.04	0.489	0.453	0.416	18.2
40	5603.99	5674.93	5745.87	0.502	0.464	0.426	17.8
39	5745.82	5820.44	5895.06	0.516	0.476	0.436	17.5
38	5895.01	5973.61	6052.21	0.531	0.488	0.446	17.2
37	6052.15	6135.06	6217.97	0.547	0.502	0.457	16.9
36	6217.90	6305.48	6393.05	0.563	0.516	0.468	16.7
35	6392.98	6485.64	6578.29	0.580	0.530	0.480	16.4
34	6578.21	6676.39	6774.57	0.599	0.546	0.493	16.2
33	6774.48	6878.70	6982.93	0.619	0.562	0.506	16.0
32	6982.82	7093.66	7204.50	0.640	0.580	0.520	15.9
31	7204.39	7322.49	7440.60	0.663	0.599	0.535	15.7
30	7440.46	7566.57	7692.68	0.687	0.619	0.550	15.7
29	7692.53	7827.49	7962.45	0.713	0.640	0.567	15.7
28	7962.27	8107.04	8251.81	0.741	0.663	0.585	15.7
27	8251.61	8407.30	8563.00	0.772	0.687	0.603	15.8
26	8562.76	8730.66	8898.56	0.805	0.714	0.623	16.0
25	8898.29	9079.89	9261.49	0.841	0.742	0.644	16.3
24	9261.17	9458.22	9655.26	0.880	0.773	0.667	16.7
23	9654.89	9869.44	10084.00	0.923	0.807	0.691	17.3
22	10083.55	10318.05	10552.56	0.970	0.844	0.717	18.1
21	10552.03	10809.39	11066.76	1.023	0.884	0.745	19.0

Grating E2 2dcoude Focus F1 8 June 1995

EPRISM Version 4/2/93: OUTPUT FORMAT for an ECHELLE
Coefficients for Fused Silica updated 5/12/88 courtesy H. Epps

ECHELLE: GROOVES/MM = 52.6759 GAMMA = 0.00
BLAZE ANGLE = 65.293 THETA = 3.00

DIAMETERS: COLLIMATOR = 190.0 mm TELESCOPE = 2.72 m f/32.36
CAMERA = 190.0 mm, PRISM = 190.0 mm
CAMERA FOCAL LENGTH = 3316.0 mm R.phi = 70734 arcsec
NUMBER OF PRISMS = 4 APEX ANGLE = 30 Degrees
GLASS TYPE IS SiO2 TOTAL DEVIATION = 58.188 Degrees
SPECTROGRAPH SLIT PROJECTION FACTOR S/DX X L/W = 2.331 X 1.854
IMAGE SCALE: Hor: 5.466''/mm, Vert: 4.348''/mm

ORDER	BLAZE (A)	n	DISP (A/mm)	FSR (A)	LENGTH (mm)	DY (sec)	DY (mm)	Y (mm)
101	3410.40	1.478458	0.264	33.8	128.1	19.84	4.564	104.096
100	3444.51	1.477844	0.266	34.4	129.4	19.58	4.504	99.528
99	3479.30	1.477239	0.269	35.1	130.7	19.32	4.444	95.020
98	3514.80	1.476641	0.272	35.9	132.0	19.08	4.387	90.572
97	3551.04	1.476051	0.274	36.6	133.4	18.82	4.329	86.182
96	3588.03	1.475469	0.277	37.4	134.8	18.57	4.270	81.850
95	3625.80	1.474894	0.280	38.2	136.2	18.33	4.215	77.578
94	3664.37	1.474327	0.283	39.0	137.7	18.08	4.159	73.360
93	3703.77	1.473768	0.286	39.8	139.1	17.84	4.103	69.199
92	3744.03	1.473216	0.289	40.7	140.7	17.60	4.048	65.094
91	3785.17	1.472671	0.293	41.6	142.2	17.37	3.995	61.044
90	3827.23	1.472133	0.296	42.5	143.8	17.14	3.941	57.048
89	3870.23	1.471603	0.299	43.5	145.4	16.90	3.887	53.106
88	3914.21	1.471079	0.302	44.5	147.0	16.68	3.836	49.218
87	3959.20	1.470563	0.306	45.5	148.7	16.45	3.783	45.382
86	4005.24	1.470054	0.310	46.6	150.5	16.23	3.733	41.598
85	4052.36	1.469551	0.313	47.7	152.2	16.01	3.682	37.865
84	4100.60	1.469055	0.317	48.8	154.1	15.80	3.634	34.182
83	4150.01	1.468566	0.321	50.0	155.9	15.58	3.583	30.548
82	4200.62	1.468083	0.325	51.2	157.8	15.36	3.534	26.965
81	4252.48	1.467607	0.329	52.5	159.8	15.16	3.486	23.431
80	4305.63	1.467138	0.333	53.8	161.8	14.96	3.439	19.945
79	4360.13	1.466674	0.337	55.2	163.8	14.75	3.392	16.506
78	4416.03	1.466217	0.341	56.6	165.9	14.55	3.345	13.113
77	4473.38	1.465767	0.346	58.1	168.1	14.35	3.301	9.768
76	4532.24	1.465322	0.350	59.6	170.3	14.16	3.255	6.467
75	4592.67	1.464883	0.355	61.2	172.5	13.97	3.212	3.212
74	4654.74	1.464450	0.360	62.9	174.9	13.77	3.168	0.000
73	4718.50	1.464023	0.365	64.6	177.3	13.59	3.124	-3.168
72	4784.04	1.463602	0.370	66.4	179.7	13.40	3.082	-6.292
71	4851.42	1.463187	0.375	68.3	182.3	13.23	3.042	-9.375
70	4920.72	1.462777	0.380	70.3	184.9	13.05	3.000	-12.417
69	4992.04	1.462372	0.386	72.3	187.5	12.88	2.962	-15.417
68	5065.45	1.461973	0.391	74.5	190.3	12.70	2.921	-18.379
67	5141.05	1.461579	0.397	76.7	193.1	12.54	2.884	-21.300
66	5218.95	1.461190	0.403	79.1	196.1	12.38	2.846	-24.184
65	5299.24	1.460806	0.410	81.5	199.1	12.22	2.809	-27.030
64	5382.04	1.460427	0.416	84.1	202.2	12.06	2.774	-29.840
63	5467.47	1.460053	0.423	86.8	205.4	11.91	2.738	-32.614
62	5555.65	1.459684	0.429	89.6	208.7	11.77	2.706	-35.352
61	5646.73	1.459319	0.436	92.6	212.1	11.62	2.672	-38.059
60	5740.84	1.458958	0.444	95.7	215.7	11.48	2.641	-40.731
59	5838.15	1.458602	0.451	99.0	219.3	11.35	2.610	-43.373
58	5938.80	1.458250	0.459	102.4	223.1	11.23	2.582	-45.984
57	6042.99	1.457901	0.467	106.0	227.0	11.11	2.554	-48.566
56	6150.90	1.457557	0.475	109.8	231.1	10.99	2.527	-51.121
55	6262.74	1.457216	0.484	113.9	235.3	10.88	2.502	-53.649
54	6378.71	1.456878	0.493	118.1	239.6	10.78	2.479	-56.152

53	6499.07	1.456543	0.502	122.6	244.2	10.69	2.458	-58.632
52	6624.05	1.456211	0.512	127.4	248.9	10.60	2.438	-61.091
51	6753.93	1.455882	0.522	132.4	253.7	10.53	2.421	-63.530
50	6889.01	1.455556	0.532	137.8	258.8	10.46	2.406	-65.951
49	7029.60	1.455231	0.543	143.5	264.1	10.41	2.394	-68.359
48	7176.05	1.454908	0.555	149.5	269.6	10.36	2.383	-70.754
47	7328.74	1.454586	0.566	155.9	275.3	10.33	2.377	-73.138
46	7488.06	1.454265	0.579	162.8	281.3	10.32	2.373	-75.516
45	7654.46	1.453944	0.592	170.1	287.6	10.32	2.374	-77.890
44	7828.42	1.453624	0.605	177.9	294.1	10.33	2.376	-80.266
43	8010.48	1.453303	0.619	186.3	300.9	10.38	2.387	-82.643
42	8201.20	1.452981	0.634	195.3	308.1	10.43	2.399	-85.032
41	8401.23	1.452657	0.649	204.9	315.6	10.53	2.421	-87.432
40	8611.26	1.452330	0.665	215.3	323.5	10.63	2.445	-89.855
39	8832.07	1.451999	0.683	226.5	331.8	10.78	2.478	-92.301
38	9064.49	1.451665	0.700	238.5	340.5	10.96	2.521	-94.782
37	9309.47	1.451324	0.719	251.6	349.7	11.17	2.570	-97.304
36	9568.07	1.450977	0.739	265.8	359.5	11.44	2.632	-99.877
35	9841.45	1.450621	0.761	281.2	369.7	11.77	2.706	-102.511
34	10130.90	1.450256	0.783	298.0	380.6	12.14	2.793	-105.219
33	10437.90	1.449878	0.807	316.3	392.1			-108.015

Grating E2 2dcoude Focus F1 BLAZE FUNCTION at FWHM

EPRISM3 Version 8/26/92: OUTPUT FORMAT for an ECHELLE
Coefficients for Fused Silica updated 5/12/88 courtesy H. Epps

ECHELLE E2 GROOVES/MM = 52.6759 GAMMA = 0.00
BLAZE ANGLE = 65.2930 THETA = 3.00

DIAMETERS: COLLIMATOR = 190.0 mm TELESCOPE = 2.72 m f/32.36
CAMERA FOCAL LENGTH =3316.0 mm
SLIT PROJECTION FACTOR s/dx X L/W = 2.331 X 1.854

NUMBER OF PRISMS = 4 APEX ANGLE = 30 Degrees
GLASS TYPE IS SiO2 TOTAL DEVIATION = 58.133 Degrees

ORDER	BLAZE-1/2 (A)	BLAZE (A)	BLAZE+1/2 (A)	DISP-1/2 (A/mm)	DISP (A/mm)	DISP+1/2 (A/mm)	DY (sec)
101	3393.52	3410.40	3427.28	0.273	0.264	0.254	20.1
100	3427.28	3444.51	3461.73	0.276	0.266	0.256	19.8
99	3461.73	3479.30	3496.87	0.279	0.269	0.259	19.6
98	3496.87	3514.80	3532.73	0.282	0.272	0.261	19.3
97	3532.73	3551.04	3569.34	0.285	0.274	0.264	19.1
96	3569.34	3588.03	3606.71	0.288	0.277	0.267	18.8
95	3606.71	3625.80	3644.88	0.291	0.280	0.269	18.6
94	3644.88	3664.37	3683.86	0.294	0.283	0.272	18.3
93	3683.86	3703.77	3723.68	0.298	0.286	0.275	18.1
92	3723.68	3744.03	3764.38	0.301	0.289	0.278	17.8
91	3764.37	3785.17	3805.97	0.304	0.293	0.281	17.6
90	3805.97	3827.23	3848.49	0.308	0.296	0.284	17.4
89	3848.49	3870.23	3891.97	0.312	0.299	0.287	17.1
88	3891.97	3914.21	3936.45	0.315	0.302	0.290	16.9
87	3936.45	3959.20	3981.96	0.319	0.306	0.293	16.7
86	3981.95	4005.24	4028.53	0.323	0.310	0.296	16.5
85	4028.52	4052.36	4076.20	0.327	0.313	0.299	16.2
84	4076.19	4100.60	4125.01	0.331	0.317	0.303	16.0
83	4125.01	4150.01	4175.01	0.335	0.321	0.306	15.8
82	4175.00	4200.62	4226.23	0.339	0.325	0.310	15.6
81	4226.23	4252.48	4278.73	0.344	0.329	0.314	15.4
80	4278.72	4305.63	4332.54	0.348	0.333	0.317	15.2
79	4332.54	4360.13	4387.73	0.353	0.337	0.321	15.0
78	4387.73	4416.03	4444.34	0.358	0.341	0.325	14.8
77	4444.34	4473.38	4502.43	0.362	0.346	0.329	14.5
76	4502.43	4532.24	4562.06	0.367	0.350	0.333	14.4
75	4562.06	4592.67	4623.29	0.372	0.355	0.337	14.2
74	4623.29	4654.74	4686.19	0.378	0.360	0.342	14.0
73	4686.18	4718.50	4750.82	0.383	0.365	0.346	13.8
72	4750.81	4784.04	4817.26	0.389	0.370	0.351	13.6
71	4817.25	4851.42	4885.58	0.395	0.375	0.355	13.4
70	4885.57	4920.72	4955.87	0.400	0.380	0.360	13.2
69	4955.86	4992.04	5028.21	0.407	0.386	0.365	13.0
68	5028.20	5065.45	5102.70	0.413	0.391	0.370	12.9
67	5102.69	5141.05	5179.42	0.419	0.397	0.375	12.7
66	5179.41	5218.95	5258.49	0.426	0.403	0.381	12.5
65	5258.48	5299.24	5340.00	0.433	0.410	0.386	12.4
64	5339.99	5382.04	5424.09	0.440	0.416	0.392	12.2
63	5424.08	5467.47	5510.86	0.447	0.423	0.398	12.1
62	5510.85	5555.65	5600.46	0.455	0.429	0.404	11.9
61	5600.45	5646.73	5693.02	0.463	0.436	0.410	11.8
60	5693.00	5740.84	5788.68	0.471	0.444	0.416	11.6
59	5788.67	5838.15	5887.62	0.480	0.451	0.423	11.5
58	5887.61	5938.80	5990.00	0.488	0.459	0.430	11.3
57	5989.98	6042.99	6096.00	0.497	0.467	0.437	11.2
56	6095.98	6150.90	6205.82	0.507	0.475	0.444	11.1
55	6205.80	6262.74	6319.67	0.517	0.484	0.451	11.0
54	6319.65	6378.71	6437.78	0.527	0.493	0.459	10.9
53	6437.76	6499.07	6560.38	0.537	0.502	0.467	10.8

52	6560.36	6624.05	6687.74	0.548	0.512	0.475	10.7
51	6687.72	6753.93	6820.15	0.560	0.522	0.484	10.6
50	6820.12	6889.01	6957.90	0.572	0.532	0.493	10.5
49	6957.87	7029.60	7101.33	0.584	0.543	0.502	10.5
48	7101.30	7176.05	7250.80	0.597	0.555	0.512	10.4
47	7250.77	7328.74	7406.70	0.611	0.566	0.522	10.4
46	7406.66	7488.06	7569.45	0.625	0.579	0.532	10.3
45	7569.41	7654.46	7739.51	0.640	0.592	0.543	10.3
44	7739.46	7828.42	7917.38	0.656	0.605	0.554	10.3
43	7917.33	8010.48	8103.62	0.672	0.619	0.566	10.3
42	8103.57	8201.20	8298.84	0.690	0.634	0.578	10.4
41	8298.78	8401.23	8503.69	0.708	0.649	0.590	10.4
40	8503.62	8611.26	8718.91	0.727	0.665	0.604	10.5
39	8718.83	8832.07	8945.30	0.747	0.683	0.618	10.6
38	8945.22	9064.49	9183.76	0.769	0.700	0.632	10.8
37	9183.67	9309.47	9435.28	0.792	0.719	0.647	11.0
36	9435.18	9568.07	9700.96	0.816	0.739	0.663	11.2
35	9700.85	9841.45	9982.04	0.841	0.761	0.680	11.4
34	9981.92	10130.90	10279.88	0.868	0.783	0.697	11.8
33	10279.75	10437.90	10596.05	0.897	0.807	0.716	12.1
32	10595.89	10764.08	10932.27	0.928	0.832	0.735	12.6

Grating E1 2dcoude Focus F3 8 June 1995

EPRISM Version 4/2/93: OUTPUT FORMAT for an ECHELLE
Coefficients for Fused Silica updated 5/12/88 courtesy H. Epps

ECHELLE: GROOVES/MM = 79.0139 GAMMA = 0.00
BLAZE ANGLE = 63.900 THETA = 3.00

DIAMETERS: COLLIMATOR = 190.0 mm TELESCOPE = 2.72 m f/32.36
CAMERA = 190.0 mm, PRISM = 190.0 mm
CAMERA FOCAL LENGTH = 775.0 mm R.phi = 65917 arcsec
NUMBER OF PRISMS = 4 APEX ANGLE = 30 Degrees
GLASS TYPE IS SiO2 TOTAL DEVIATION = 58.207 Degrees
SPECTROGRAPH SLIT PROJECTION FACTOR S/DX X L/W = 9.834 X 7.933
IMAGE SCALE: Hor: 23.062''/mm, Vert: 18.605''/mm

ORDER	BLAZE (A)	n	DISP (A/mm)	FSR (A)	LENGTH (mm)	DY (sec)	DY (mm)	Y (mm)
66	3439.35	1.477936	1.203	52.1	43.3	29.68	1.595	23.155
65	3492.27	1.477018	1.222	53.7	44.0	29.08	1.563	21.559
64	3546.83	1.476118	1.241	55.4	44.7	28.51	1.532	19.995
63	3603.13	1.475237	1.261	57.2	45.4	27.94	1.502	18.462
62	3661.25	1.474372	1.281	59.1	46.1	27.37	1.471	16.959
61	3721.27	1.473525	1.302	61.0	46.9	26.83	1.442	15.487
60	3783.29	1.472695	1.324	63.1	47.6	26.28	1.412	14.045
59	3847.41	1.471882	1.346	65.2	48.4	25.75	1.384	12.632
58	3913.75	1.471085	1.369	67.5	49.3	25.22	1.356	11.248
57	3982.41	1.470304	1.393	69.9	50.1	24.71	1.328	9.892
56	4053.52	1.469539	1.418	72.4	51.0	24.20	1.301	8.564
55	4127.22	1.468789	1.444	75.0	52.0	23.70	1.274	7.263
54	4203.65	1.468055	1.471	77.8	52.9	23.22	1.248	5.989
53	4282.97	1.467336	1.498	80.8	53.9	22.74	1.222	4.741
52	4365.33	1.466631	1.527	83.9	55.0	22.27	1.197	3.518
51	4450.93	1.465941	1.557	87.3	56.0	21.82	1.173	2.321
50	4539.94	1.465265	1.588	90.8	57.2	21.37	1.148	1.148
49	4632.60	1.464603	1.621	94.5	58.3	20.92	1.125	0.000
48	4729.11	1.463954	1.655	98.5	59.5	20.50	1.102	-1.125
47	4829.73	1.463318	1.690	102.8	60.8	20.09	1.080	-2.227
46	4934.72	1.462696	1.727	107.3	62.1	19.68	1.058	-3.306
45	5044.38	1.462086	1.765	112.1	63.5	19.29	1.037	-4.364
44	5159.03	1.461488	1.805	117.3	65.0	18.91	1.016	-5.401
43	5279.01	1.460901	1.847	122.8	66.5	18.53	0.996	-6.417
42	5404.70	1.460326	1.891	128.7	68.1	18.18	0.977	-7.413
41	5536.52	1.459762	1.937	135.0	69.7	17.84	0.959	-8.390
40	5674.93	1.459209	1.986	141.9	71.5	17.52	0.942	-9.349
39	5820.44	1.458665	2.036	149.2	73.3	17.21	0.925	-10.291
38	5973.61	1.458131	2.090	157.2	75.2	16.92	0.909	-11.216
37	6135.06	1.457606	2.146	165.8	77.2	16.66	0.895	-12.126
36	6305.48	1.457089	2.206	175.2	79.4	16.41	0.882	-13.021
35	6485.64	1.456580	2.269	185.3	81.7	16.20	0.871	-13.904
34	6676.39	1.456077	2.336	196.4	84.1	16.01	0.861	-14.775
33	6878.70	1.455580	2.407	208.4	86.6	15.86	0.852	-15.636
32	7093.66	1.455088	2.482	221.7	89.3	15.75	0.846	-16.489
31	7322.49	1.454599	2.562	236.2	92.2	15.67	0.842	-17.335
30	7566.57	1.454112	2.647	252.2	95.3	15.66	0.842	-18.178
29	7827.49	1.453626	2.739	269.9	98.6	15.70	0.844	-19.020
28	8107.04	1.453138	2.836	289.5	102.1	15.81	0.850	-19.865
27	8407.30	1.452647	2.941	311.4	105.9	16.01	0.860	-20.716
26	8730.66	1.452150	3.055	335.8	109.9	16.31	0.877	-21.577
25	9079.89	1.451643	3.177	363.2	114.3	16.73	0.899	-22.454
24	9458.22	1.451123	3.309	394.1	119.1	17.30	0.930	-23.354
23	9869.44	1.450586	3.453	429.1	124.3	18.05	0.970	-24.285
22	10318.05	1.450025	3.610	469.0	129.9			-25.256

Grating E1 2dcoude Focus F3 BLAZE FUNCTION at FWHM

EPRISM3 Version 8/26/92: OUTPUT FORMAT for an ECHELLE
Coefficients for Fused Silica updated 5/12/88 courtesy H. Epps

ECHELLE E1 GROOVES/MM = 79.0139 GAMMA = 0.00
BLAZE ANGLE = 63.9000 THETA = 3.00

DIAMETERS: COLLIMATOR = 190.0 mm TELESCOPE = 2.72 m f/32.36
CAMERA FOCAL LENGTH = 775.0 mm
SLIT PROJECTION FACTOR s/dx X L/W = 9.834 X 7.933

NUMBER OF PRISMS = 4 APEX ANGLE = 30 Degrees
GLASS TYPE IS SiO2 TOTAL DEVIATION = 58.124 Degrees

ORDER	BLAZE-1/2 (A)	BLAZE (A)	BLAZE+1/2 (A)	DISP-1/2 (A/mm)	DISP (A/mm)	DISP+1/2 (A/mm)	DY (sec)
66	3413.30	3439.35	3465.41	1.264	1.203	1.143	30.3
65	3465.40	3492.27	3519.13	1.284	1.222	1.160	29.7
64	3519.12	3546.83	3574.54	1.305	1.241	1.177	29.1
63	3574.53	3603.13	3631.73	1.327	1.261	1.194	28.5
62	3631.72	3661.25	3690.77	1.349	1.281	1.213	27.9
61	3690.76	3721.27	3751.77	1.373	1.302	1.231	27.4
60	3751.76	3783.29	3814.81	1.397	1.324	1.251	26.8
59	3814.81	3847.41	3880.02	1.422	1.346	1.271	26.3
58	3880.01	3913.75	3947.48	1.448	1.369	1.291	25.7
57	3947.47	3982.41	4017.34	1.474	1.393	1.312	25.2
56	4017.33	4053.52	4089.71	1.502	1.418	1.334	24.7
55	4089.70	4127.22	4164.74	1.531	1.444	1.357	24.2
54	4164.73	4203.65	4242.58	1.561	1.471	1.381	23.7
53	4242.56	4282.97	4323.37	1.592	1.498	1.405	23.2
52	4323.36	4365.33	4407.31	1.625	1.527	1.430	22.7
51	4407.29	4450.93	4494.56	1.658	1.557	1.456	22.3
50	4494.54	4539.94	4585.34	1.694	1.588	1.483	21.8
49	4585.32	4632.60	4679.87	1.730	1.621	1.511	21.4
48	4679.85	4729.11	4778.37	1.769	1.655	1.540	20.9
47	4778.35	4829.73	4881.11	1.809	1.690	1.571	20.5
46	4881.08	4934.72	4988.36	1.851	1.727	1.602	20.1
45	4988.33	5044.38	5100.43	1.895	1.765	1.635	19.7
44	5100.40	5159.03	5217.65	1.941	1.805	1.669	19.3
43	5217.62	5279.01	5340.39	1.989	1.847	1.705	18.9
42	5340.35	5404.70	5469.04	2.040	1.891	1.742	18.5
41	5469.00	5536.52	5604.04	2.093	1.937	1.781	18.2
40	5603.99	5674.93	5745.87	2.150	1.986	1.821	17.8
39	5745.82	5820.44	5895.06	2.209	2.036	1.864	17.5
38	5895.01	5973.61	6052.21	2.272	2.090	1.908	17.2
37	6052.15	6135.06	6217.97	2.339	2.146	1.954	16.9
36	6217.90	6305.48	6393.05	2.409	2.206	2.003	16.7
35	6392.98	6485.64	6578.29	2.484	2.269	2.055	16.4
34	6578.21	6676.39	6774.57	2.563	2.336	2.108	16.2
33	6774.48	6878.70	6982.93	2.648	2.407	2.165	16.0
32	6982.82	7093.66	7204.50	2.739	2.482	2.225	15.9
31	7204.39	7322.49	7440.60	2.835	2.562	2.288	15.7
30	7440.46	7566.57	7692.68	2.939	2.647	2.355	15.7
29	7692.53	7827.49	7962.45	3.051	2.739	2.426	15.7
28	7962.27	8107.04	8251.81	3.172	2.836	2.501	15.7
27	8251.61	8407.30	8563.00	3.302	2.941	2.581	15.8
26	8562.76	8730.66	8898.56	3.443	3.055	2.666	16.0
25	8898.29	9079.89	9261.49	3.597	3.177	2.757	16.3
24	9261.17	9458.22	9655.26	3.765	3.309	2.853	16.7
23	9654.89	9869.44	10084.00	3.949	3.453	2.957	17.3
22	10083.55	10318.05	10552.56	4.152	3.610	3.068	18.1
21	10552.03	10809.39	11066.76	4.377	3.782	3.187	19.0

Grating E2 2dcoude Focus F3 8 June 1995

EPRISM Version 4/2/93: OUTPUT FORMAT for an ECHELLE - R.G.Tull
Coefficients for Fused Silica updated 5/12/88 courtesy H. Epps

ECHELLE: GROOVES/MM = 52.6759 GAMMA = 0.00
BLAZE ANGLE = 65.293 THETA = 3.00

DIAMETERS: COLLIMATOR = 190.0 mm TELESCOPE = 2.72 m f/32.36
CAMERA = 190.0 mm, PRISM = 190.0 mm
CAMERA FOCAL LENGTH = 775.0 mm R.phi = 70734 arcsec
NUMBER OF PRISMS = 4 APEX ANGLE = 30 Degrees
GLASS TYPE IS SiO2 TOTAL DEVIATION = 58.188 Degrees
SPECTROGRAPH SLIT PROJECTION FACTOR S/DX X L/W = 9.973 X 7.933
IMAGE SCALE: Hor: 23.388''/mm, Vert: 18.605''/mm

ORDER	BLAZE (A)	n	DISP (A/mm)	FSR (A)	LENGTH (mm)	DY (sec)	DY (mm)	Y (mm)
101	3410.40	1.478458	1.128	33.8	29.9	19.84	1.067	24.329
100	3444.51	1.477844	1.139	34.4	30.2	19.58	1.053	23.261
99	3479.30	1.477239	1.150	35.1	30.5	19.32	1.039	22.208
98	3514.80	1.476641	1.162	35.9	30.9	19.08	1.025	21.168
97	3551.04	1.476051	1.174	36.6	31.2	18.82	1.012	20.142
96	3588.03	1.475469	1.186	37.4	31.5	18.57	0.998	19.130
95	3625.80	1.474894	1.199	38.2	31.8	18.33	0.985	18.131
94	3664.37	1.474327	1.212	39.0	32.2	18.08	0.972	17.145
93	3703.77	1.473768	1.225	39.8	32.5	17.84	0.959	16.173
92	3744.03	1.473216	1.238	40.7	32.9	17.60	0.946	15.214
91	3785.17	1.472671	1.252	41.6	33.2	17.37	0.934	14.267
90	3827.23	1.472133	1.265	42.5	33.6	17.14	0.921	13.333
89	3870.23	1.471603	1.280	43.5	34.0	16.90	0.908	12.412
88	3914.21	1.471079	1.294	44.5	34.4	16.68	0.897	11.503
87	3959.20	1.470563	1.309	45.5	34.8	16.45	0.884	10.606
86	4005.24	1.470054	1.324	46.6	35.2	16.23	0.872	9.722
85	4052.36	1.469551	1.340	47.7	35.6	16.01	0.861	8.850
84	4100.60	1.469055	1.356	48.8	36.0	15.80	0.849	7.989
83	4150.01	1.468566	1.372	50.0	36.4	15.58	0.837	7.140
82	4200.62	1.468083	1.389	51.2	36.9	15.36	0.826	6.302
81	4252.48	1.467607	1.406	52.5	37.3	15.16	0.815	5.476
80	4305.63	1.467138	1.424	53.8	37.8	14.96	0.804	4.662
79	4360.13	1.466674	1.442	55.2	38.3	14.75	0.793	3.858
78	4416.03	1.466217	1.460	56.6	38.8	14.55	0.782	3.065
77	4473.38	1.465767	1.479	58.1	39.3	14.35	0.771	2.283
76	4532.24	1.465322	1.499	59.6	39.8	14.16	0.761	1.511
75	4592.67	1.464883	1.519	61.2	40.3	13.97	0.751	0.751
74	4654.74	1.464450	1.539	62.9	40.9	13.77	0.740	0.000
73	4718.50	1.464023	1.560	64.6	41.4	13.59	0.730	-0.740
72	4784.04	1.463602	1.582	66.4	42.0	13.40	0.720	-1.471
71	4851.42	1.463187	1.604	68.3	42.6	13.23	0.711	-2.191
70	4920.72	1.462777	1.627	70.3	43.2	13.05	0.701	-2.902
69	4992.04	1.462372	1.651	72.3	43.8	12.88	0.692	-3.603
68	5065.45	1.461973	1.675	74.5	44.5	12.70	0.683	-4.295
67	5141.05	1.461579	1.700	76.7	45.1	12.54	0.674	-4.978
66	5218.95	1.461190	1.726	79.1	45.8	12.38	0.665	-5.652
65	5299.24	1.460806	1.752	81.5	46.5	12.22	0.657	-6.317
64	5382.04	1.460427	1.780	84.1	47.3	12.06	0.648	-6.974
63	5467.47	1.460053	1.808	86.8	48.0	11.91	0.640	-7.622
62	5555.65	1.459684	1.837	89.6	48.8	11.77	0.632	-8.262
61	5646.73	1.459319	1.867	92.6	49.6	11.62	0.624	-8.895
60	5740.84	1.458958	1.898	95.7	50.4	11.48	0.617	-9.520
59	5838.15	1.458602	1.930	99.0	51.3	11.35	0.610	-10.137
58	5938.80	1.458250	1.964	102.4	52.1	11.23	0.604	-10.747
57	6042.99	1.457901	1.998	106.0	53.1	11.11	0.597	-11.351
56	6150.90	1.457557	2.034	109.8	54.0	10.99	0.591	-11.948
55	6262.74	1.457216	2.071	113.9	55.0	10.88	0.585	-12.539

54	6378.71	1.456878	2.109	118.1	56.0	10.78	0.579	-13.124
53	6499.07	1.456543	2.149	122.6	57.1	10.69	0.575	-13.703
52	6624.05	1.456211	2.190	127.4	58.2	10.60	0.570	-14.278
51	6753.93	1.455882	2.233	132.4	59.3	10.53	0.566	-14.848
50	6889.01	1.455556	2.278	137.8	60.5	10.46	0.562	-15.414
49	7029.60	1.455231	2.324	143.5	61.7	10.41	0.559	-15.976
48	7176.05	1.454908	2.373	149.5	63.0	10.36	0.557	-16.536
47	7328.74	1.454586	2.423	155.9	64.3	10.33	0.555	-17.093
46	7488.06	1.454265	2.476	162.8	65.7	10.32	0.555	-17.649
45	7654.46	1.453944	2.531	170.1	67.2	10.32	0.555	-18.204
44	7828.42	1.453624	2.588	177.9	68.7	10.33	0.555	-18.759
43	8010.48	1.453303	2.649	186.3	70.3	10.38	0.558	-19.315
42	8201.20	1.452981	2.712	195.3	72.0	10.43	0.561	-19.873
41	8401.23	1.452657	2.778	204.9	73.8	10.53	0.566	-20.434
40	8611.26	1.452330	2.847	215.3	75.6	10.63	0.571	-21.000
39	8832.07	1.451999	2.920	226.5	77.5	10.78	0.579	-21.572
38	9064.49	1.451665	2.997	238.5	79.6	10.96	0.589	-22.152
37	9309.47	1.451324	3.078	251.6	81.7	11.17	0.601	-22.742
36	9568.07	1.450977	3.164	265.8	84.0	11.44	0.615	-23.343
35	9841.45	1.450621	3.254	281.2	86.4	11.77	0.632	-23.958
34	10130.90	1.450256	3.350	298.0	89.0	12.14	0.653	-24.591
33	10437.90	1.449878	3.451	316.3	91.6			-25.245

Grating E2 2dcoude Focus F3 BLAZE FUNCTION at FWHM

EPRISM3 Version 8/26/92: OUTPUT FORMAT for an ECHELLE
Coefficients for Fused Silica updated 5/12/88 courtesy H. Epps

ECHELLE E2 GROOVES/MM = 52.6759 GAMMA = 0.00
BLAZE ANGLE = 65.2930 THETA = 3.00

DIAMETERS: COLLIMATOR = 190.0 mm TELESCOPE = 2.72 m f/32.36
CAMERA FOCAL LENGTH = 775.0 mm
SLIT PROJECTION FACTOR s/dx X L/W = 9.973 X 7.933

NUMBER OF PRISMS = 4 APEX ANGLE = 30 Degrees
GLASS TYPE IS SiO2 TOTAL DEVIATION = 58.133 Degrees

ORDER	BLAZE-1/2 (A)	BLAZE (A)	BLAZE+1/2 (A)	DISP-1/2 (A/mm)	DISP (A/mm)	DISP+1/2 (A/mm)	DY (sec)
101	3393.52	3410.40	3427.28	1.169	1.128	1.086	20.1
100	3427.28	3444.51	3461.73	1.181	1.139	1.097	19.8
99	3461.73	3479.30	3496.87	1.194	1.150	1.107	19.6
98	3496.87	3514.80	3532.73	1.206	1.162	1.118	19.3
97	3532.73	3551.04	3569.34	1.219	1.174	1.129	19.1
96	3569.34	3588.03	3606.71	1.232	1.186	1.140	18.8
95	3606.71	3625.80	3644.88	1.246	1.199	1.152	18.6
94	3644.88	3664.37	3683.86	1.259	1.212	1.164	18.3
93	3683.86	3703.77	3723.68	1.274	1.225	1.176	18.1
92	3723.68	3744.03	3764.38	1.288	1.238	1.188	17.8
91	3764.37	3785.17	3805.97	1.303	1.252	1.200	17.6
90	3805.97	3827.23	3848.49	1.318	1.265	1.213	17.4
89	3848.49	3870.23	3891.97	1.333	1.280	1.226	17.1
88	3891.97	3914.21	3936.45	1.349	1.294	1.240	16.9
87	3936.45	3959.20	3981.96	1.365	1.309	1.253	16.7
86	3981.95	4005.24	4028.53	1.382	1.324	1.267	16.5
85	4028.52	4052.36	4076.20	1.398	1.340	1.281	16.2
84	4076.19	4100.60	4125.01	1.416	1.356	1.296	16.0
83	4125.01	4150.01	4175.01	1.434	1.372	1.311	15.8
82	4175.00	4200.62	4226.23	1.452	1.389	1.326	15.6
81	4226.23	4252.48	4278.73	1.471	1.406	1.342	15.4
80	4278.72	4305.63	4332.54	1.490	1.424	1.358	15.2
79	4332.54	4360.13	4387.73	1.509	1.442	1.374	15.0
78	4387.73	4416.03	4444.34	1.530	1.460	1.391	14.8
77	4444.34	4473.38	4502.43	1.550	1.479	1.408	14.5
76	4502.43	4532.24	4562.06	1.572	1.499	1.425	14.4
75	4562.06	4592.67	4623.29	1.594	1.519	1.443	14.2
74	4623.29	4654.74	4686.19	1.616	1.539	1.462	14.0
73	4686.18	4718.50	4750.82	1.640	1.560	1.481	13.8
72	4750.81	4784.04	4817.26	1.663	1.582	1.500	13.6
71	4817.25	4851.42	4885.58	1.688	1.604	1.520	13.4
70	4885.57	4920.72	4955.87	1.713	1.627	1.541	13.2
69	4955.86	4992.04	5028.21	1.739	1.651	1.562	13.0
68	5028.20	5065.45	5102.70	1.766	1.675	1.583	12.9
67	5102.69	5141.05	5179.42	1.794	1.700	1.606	12.7
66	5179.41	5218.95	5258.49	1.823	1.726	1.629	12.5
65	5258.48	5299.24	5340.00	1.852	1.752	1.652	12.4
64	5339.99	5382.04	5424.09	1.883	1.780	1.676	12.2
63	5424.08	5467.47	5510.86	1.914	1.808	1.701	12.1
62	5510.85	5555.65	5600.46	1.947	1.837	1.727	11.9
61	5600.45	5646.73	5693.02	1.981	1.867	1.753	11.8
60	5693.00	5740.84	5788.68	2.016	1.898	1.781	11.6
59	5788.67	5838.15	5887.62	2.052	1.930	1.809	11.5
58	5887.61	5938.80	5990.00	2.089	1.964	1.838	11.3
57	5989.98	6042.99	6096.00	2.128	1.998	1.868	11.2
56	6095.98	6150.90	6205.82	2.169	2.034	1.899	11.1
55	6205.80	6262.74	6319.67	2.211	2.071	1.931	11.0
54	6319.65	6378.71	6437.78	2.254	2.109	1.964	10.9
53	6437.76	6499.07	6560.38	2.299	2.149	1.998	10.8

52	6560.36	6624.05	6687.74	2.347	2.190	2.034	10.7
51	6687.72	6753.93	6820.15	2.396	2.233	2.071	10.6
50	6820.12	6889.01	6957.90	2.447	2.278	2.109	10.5
49	6957.87	7029.60	7101.33	2.500	2.324	2.148	10.5
48	7101.30	7176.05	7250.80	2.556	2.373	2.189	10.4
47	7250.77	7328.74	7406.70	2.615	2.423	2.232	10.4
46	7406.66	7488.06	7569.45	2.676	2.476	2.276	10.3
45	7569.41	7654.46	7739.51	2.740	2.531	2.322	10.3
44	7739.46	7828.42	7917.38	2.807	2.588	2.370	10.3
43	7917.33	8010.48	8103.62	2.877	2.649	2.420	10.3
42	8103.57	8201.20	8298.84	2.951	2.712	2.472	10.4
41	8298.78	8401.23	8503.69	3.029	2.778	2.526	10.4
40	8503.62	8611.26	8718.91	3.112	2.847	2.583	10.5
39	8718.83	8832.07	8945.30	3.198	2.920	2.642	10.6
38	8945.22	9064.49	9183.76	3.290	2.997	2.704	10.8
37	9183.67	9309.47	9435.28	3.387	3.078	2.769	11.0
36	9435.18	9568.07	9700.96	3.490	3.164	2.837	11.2
35	9700.85	9841.45	9982.04	3.599	3.254	2.909	11.4
34	9981.92	10130.90	10279.88	3.715	3.350	2.984	11.8
33	10279.75	10437.90	10596.05	3.839	3.451	3.063	12.1
32	10595.89	10764.08	10932.27	3.972	3.559	3.146	12.6