

BHS 1 x 1 RIB CASE STUDY

Results of an Interlaboratory Comparison

AUTHOR: PETER F. GREENWOOD

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INTRODUCTION

A study of the variations present in a commercially produced 14 gauge 1 x 1 rib fabric was described in Research Record 189. The fabric was manufactured to a British Home Stores specification by two knitters, Klynton Davis of Leicester and Atkins of Hinckley.

The report described an analysis of data obtained on grey and finished fabric samples in the IIC laboratory. Duplicate finished fabric samples were also examined in the BHS laboratory at Atherstone, and as some of the tests carried out in the two laboratories were nominally identical, or nearly so, it was considered that a comparison of the two sets of data might be instructive. This report describes the analysis of these results.

TEST METHODS

Properties which were examined in both laboratories included:-

Shrinkage, one machine wash, tumble dried
Shrinkage, five machine washes, tumble dried
Fabric weight, conditioned and after five launderings
Course and wale densities, conditioned and after five launderings
Stitch length, conditioned and after five launderings
Yarn count, conditioned and after five launderings.

Measurements in the IIC laboratory were carried out in a controlled atmosphere of 20°C, 65% relative humidity; at BHS, however, conditions were not well controlled.

Shrinkage tests at BHS were carried out according to BS 4923, method 2A (60°C) using the approved washing machine (Wascator) and a Servis or Creda tumble drier with reversing action. At IIC a modified method 2A was carried out using a Hoover, Model "Electron 800", and a Hoover tumble drier without reversing action. (The main departures from method 2A concerned the wash load, 3kg instead of 4kg; the spin speed, 800 rpm instead of 530 rpm; and the sample size 25 x 25cm instead of 50 x 50cm). At BHS the specimens were sewn in tubular form.

Both IIC and BHS used a shortened wash programme for the second and subsequent test cycles, in which a simple wetting out process replaced the full wash treatment.

RESULTS AND ANALYSIS

Of the 59 finished samples described in Research Record No. 189, 51 were duplicated in testing at BHS in Atherstone. A complete set of the relevant test data from both laboratories is given in Table I.

Table II shows the overall mean values for each of the properties studied, together with the variability of the results in terms of standard deviation and %CV. Differences in the means are studied in greater detail below, but the %CV figures do not reveal any significant difference in variability, or scatter, in the results obtained in the two laboratories.

The test data are compared in Figures 1 to 14. In all these graphs, the IIC data have been plotted along the horizontal axis, with the BHS figures on the vertical axis.

Shrinkage data comparisons are given in Figures 1 to 4, showing that after both the first and the fifth wash, the overall shrinkage figures found by BHS were, in general, slightly lower (about 1-2%) in length than the corresponding IIC data and slightly higher (again 1-2%) in width.

Fabric weight data from BHS were slightly higher than corresponding IIC figures, both before and after laundering. The graphs are shown in Figures 5 and 6. This could be due to the conditioning problem at BHS.

Course and wale spacings are plotted in Figures 7 to 10. The changes in these properties as a result of laundering show trends which confirm the shrinkage results; that is to say, BHS found a slightly smaller change in course density and a larger change in wale density than did IIC.

The IIC stitch length data given in Figures 11 and 12 have been converted from mm. to cm. to provide easier comparison. The figures show that BHS were obtaining slightly, but significantly longer stitch lengths, about 2% greater.

The BHS yarn count results are lighter than the IIC figures. This could be due to the conditioning problem, but the trend here is opposite to the fabric weight data. It is probable that the same samples were used in each laboratory for both yarn count and stitch length measurements, and the count difference is the effect of the difference in measured stitch length.

Significance and correlation tests were applied to the data, and the results are summarised in Table III. The "Students-t" test for differences between paired data show significant differences at the 99% level of confidence for all data except course and wale densities (conditioned only) and width shrinkage after one wash.

The data were fitted to the model $y = a + bx$, and the coefficients are also tabulated in Table III, together with the correlation coefficients (r^2). Correlation between laboratories is fairly good except for the weight-related properties.

CONCLUSIONS

The results of this comparison should not give either laboratory great cause for concern. The correlation was quite good; roughly speaking that means that if the samples were to be placed in order of rank by means of the data, the order would be approximately the same for both laboratories.

Differences of some consistency in shrinkage and stitch length data have been noted, the reasons for which are not known. They may be related to differences in testing procedure.

KEY TO TESTS

IIC TESTS

ShrL(1x)	Length shrinkage (1 wash/tumble dry cycle)
ShrW(1x)	Width shrinkage (1 wash/tumble dry cycle)
ShrL(5x)	Length shrinkage (5 wash/tumble dry cycles)
ShrW(5x)	Width shrinkage (5 wash/tumble dry cycles)
Wt BW	Weight (gms. per square metre), as received
Wt AW	Weight (gms. per square metre), after 5 wash cycles
C/3cmBW	Courses per 3cm., as received
C/3cmAW	Courses per 3cm., after 5 wash cycles
W/3cmBW	Wales per 3cm., as received
W/3cmAW	Wales per 3cm., after 5 wash cycles
SL BW	Stitch length (mm.), as received
SL AW	Stitch length (mm.), after 5 wash cycles
Tex BW	Yarn count (tex), as received
Tex AW	Yarn count (tex), after 5 wash cycles

BHS TESTS

*SL BW	Stitch Length (cm) - Original
*SL 5x	Stitch Length (cm) - after 5 TD cycles
*Tex BW	Yarn Count (Tex) - Original
*Tex 5x	Yarn Count (Tex) - after 5 TD cycles
*C/3cmBW	Courses per 3cm - Original
*C/3cm5x	Courses per 3cm - after 5 TD cycles
*W/3cmBW	Wales per 3cm - Original
*W/3cm5x	Wales per 3cm - after 5 TD cycles
*Wt BW	Weight (gsm) - Original
*Wt 5x	Weight (gsm) - after 5 TD cycles
*ShrL1x	Average Length Shrinkage - 1 TD cycle (C&D)
*ShrL5x	Average Length Shrinkage - 5 TD cycles (C&D)
*ShrW1x	Average Width Shrinkage - 1 TD cycle (C&D)
*ShrW5x	Average Width Shrinkage - 5 TD cycles (C&D)

COMPLETE DATA SET - (a) Shrinkage

Sample	ShrL(1x)	ShrW(1x)	ShrL(5x)	ShrW(5x)	*ShrL1x	*ShrW1x	*ShrL5x	*ShrW5x
BAW 1	7.30	8.30	10.20	7.50	7.40	8.80	9.50	8.70
BAW 2	9.50	12.50	11.00	10.80	8.30	14.10	9.70	12.90
BAW 3	10.70	9.40	13.20	8.20	10.20	10.70	12.00	8.90
BAW 4	10.00	9.70	12.30	9.10	12.20	6.85	14.30	7.50
BAW 6	10.00	4.00	12.70	4.60	9.50	5.10	11.10	4.70
BKW 1	10.70	8.10	12.60	7.60	10.05	8.90	11.95	7.25
BKW 2	14.00	8.50	15.50	8.20	14.00	8.20	15.10	8.70
BKW 3	14.40	7.30	16.50	6.70	14.00	8.15	15.10	7.45
BKW 4	11.80	9.10	13.30	8.50	9.85	10.00	11.35	8.05
BKW 5	11.70	8.70	13.20	7.90	10.45	10.35	11.00	9.55
BKW 6	14.00	7.90	15.90	7.70	12.20	6.85	14.30	7.50
BAW 9	8.50	14.40	11.00	12.80	6.60	13.90	8.70	14.60
BAW 10	8.10	10.90	10.20	9.60	8.10	11.75	9.80	10.85
BAJ 13	9.30	10.20	11.50	8.60	8.40	12.50	10.50	13.40
BAJ 18	10.50	10.70	12.40	8.10	9.30	10.90	11.70	10.90
BKW 13	10.50	10.40	12.50	9.10	9.30	10.10	10.70	10.50
BKW 14	11.60	9.40	13.60	8.40	11.00	9.70	12.90	10.00
BKW 15	9.20	8.80	11.30	7.80	8.40	8.40	10.60	9.10
BKW 16	12.30	8.60	14.10	6.30	12.55	10.75	13.60	10.70
BKW 17	11.40	8.80	13.30	6.40	10.40	10.55	12.35	9.65
BKW 18	10.90	9.00	12.60	7.30	10.35	8.60	12.65	9.65
BKW 19	10.20	9.40	11.60	8.20	8.00	10.20	10.70	10.70
BKW 20	11.90	9.10	13.20	7.80	10.40	9.80	13.10	10.60
BKW 21	11.00	9.50	12.30	8.30	8.70	10.50	10.70	11.30
BAJ 20	10.90	8.70	13.10	8.80	10.10	10.30	12.30	9.70
BAJ 21	11.50	8.70	13.70	9.20	11.30	9.15	13.20	9.95
BAW 23	9.70	14.20	12.40	13.00	9.35	13.65	10.45	13.30
BAW 24	8.80	12.20	11.10	10.90	6.40	11.55	8.50	12.80
BKW 25	12.90	11.10	14.30	10.10	11.35	12.25	13.05	12.75
BKW 26	14.80	8.30	16.30	7.30	13.45	9.90	15.35	10.80
BKW 27	14.00	10.40	15.90	9.70	12.25	12.05	14.35	13.25
BKW 28	8.50	10.80	10.50	10.20	8.50	12.20	10.00	12.40
BKW 29	9.50	12.20	11.70	11.20	9.80	12.10	11.20	12.60
BKW 30	8.50	11.50	10.70	10.90	8.50	12.60	9.40	12.70
BAJ 20A	9.40	11.30	11.00	10.40	7.90	12.10	13.80	12.10
BAJ 21A	9.70	12.00	11.10	10.70	9.40	11.90	11.60	12.30
BKW 31	11.40	9.00	14.10	7.90	11.20	8.60	12.60	8.50
BKW 32	11.10	9.10	13.40	7.40	9.40	7.80	12.00	7.20
BKW 33	11.20	9.10	13.20	7.70	9.70	7.40	11.80	8.00
BKW 34	11.20	10.80	13.90	10.40	10.30	11.25	12.60	11.75
BKW 35	11.80	10.20	14.50	9.30	10.65	11.65	13.10	12.20
BKW 36	11.80	10.60	13.90	9.50	9.50	12.25	11.30	11.35
BKW 37	13.30	11.60	15.60	10.60	12.20	13.00	13.80	13.10
BKW 38	13.90	12.30	16.10	11.00	12.80	12.90	14.30	13.20
BKW 39	10.40	14.80	12.30	13.80	11.20	13.00	12.50	13.00
BAW 31	9.60	12.30	11.40	10.80	7.90	13.10	10.20	13.20
BAW 32	9.30	11.40	10.90	12.00	5.30	10.40	9.80	12.80
BAW 33	11.80	12.20	14.40	11.90	9.75	11.30	12.10	13.25
BAW 34	10.70	16.10	12.80	15.10	9.95	15.65	11.75	15.60
BAW 35	10.40	13.90	12.50	13.40	8.30	14.00	10.30	14.55
BAW 36	10.10	13.30	12.10	13.70	9.00	13.20	11.10	13.80

COMPLETE DATA SET - (b) Weight (gm per sq m)

Sample	Wt BW	Wt AW	*Wt BW	*Wt 5x
BAW 1	170.10	201.20	182.00	211.00
BAW 2	168.60	203.70	167.00	210.00
BAW 3	165.30	204.20	171.00	209.00
BAW 4	170.40	209.20	172.00	213.00
BAW 6	180.80	207.20	186.00	213.00
BKW 1	175.40	212.60	182.00	216.00
BKW 2	161.40	204.60	185.00	224.00
BKW 3	164.40	202.20	167.00	210.00
BKW 4	170.80	212.80	177.00	223.00
BKW 5	177.30	212.40	183.00	220.00
BKW 6	166.20	204.20	172.00	213.00
BAW 9	174.80	216.90	192.00	220.00
BAW 10	178.60	216.90	200.00	227.00
BAJ 13	173.80	206.00	175.00	217.00
BAJ 18	167.10	201.10	173.00	210.00
BKW 13	167.70	205.50	174.00	210.00
BKW 14	166.50	205.70	194.00	211.00
BKW 15	177.10	209.00	174.00	214.00
BKW 16	170.90	213.80	179.00	226.00
BKW 17	167.50	208.00	173.00	214.00
BKW 18	167.90	209.00	176.00	210.00
BKW 19	177.50	215.80	175.00	212.00
BKW 20	173.80	211.40	173.00	210.00
BKW 21	172.80	209.40	175.00	214.00
BAJ 20	168.60	203.30	170.00	206.00
BAJ 21	164.60	201.20	174.00	208.00
BAW 23	161.60	208.90	168.00	218.00
BAW 24	169.30	211.50	181.00	219.00
BKW 25	163.80	212.40	168.00	216.00
BKW 26	163.80	209.70	161.00	212.00
BKW 27	160.70	209.40	161.00	218.00
BKW 28	186.90	227.60	185.00	235.00
BKW 29	180.40	225.50	178.00	228.00
BKW 30	183.20	230.00	185.00	231.00
BAJ 20A	163.20	202.10	170.00	208.00
BAJ 21A	162.60	201.60	172.00	207.00
BKW 31	170.80	209.30	175.00	215.00
BKW 32	171.30	208.50	174.00	209.00
BKW 33	170.90	208.70	174.00	212.00
BKW 34	167.80	209.90	167.00	213.00
BKW 35	162.70	211.10	172.00	216.00
BKW 36	164.20	209.80	167.00	214.00
BKW 37	166.30	216.60	166.00	222.00
BKW 38	165.40	217.30	165.00	220.00
BKW 39	168.40	215.20	173.00	220.00
BAW 31	176.50	213.10	174.00	226.00
BAW 32	182.70	215.40	181.00	226.00
BAW 33	173.70	216.90	174.00	217.00
BAW 34	166.10	214.70	172.00	223.00
BAW 35	174.20	214.70	175.00	220.00
BAW 36	167.40	214.20	176.00	222.00

COMPLETE DATA SET - (c) Courses & Wales per 3cm

Sample	C/3cmBW	C/3cmAW	W/3cmBW	W/3cmAW	*C/3cBW	*C/3c5x	*W/3cBW	*W/3c5x
BAW 1	48.40	53.60	29.50	33.20	49.70	53.30	30.70	33.00
BAW 2	46.90	52.60	30.40	33.30	47.20	51.00	29.00	34.00
BAW 3	46.40	52.60	30.50	33.30	46.70	51.00	30.60	34.10
BAW 4	46.50	52.10	31.20	33.70	45.20	52.50	32.80	34.80
BAW 6	47.60	53.60	31.30	32.80	47.30	53.30	32.70	33.30
BKW 1	48.00	54.60	33.20	35.80	47.70	54.00	33.90	35.50
BKW 2	45.80	53.30	31.80	33.80	48.00	53.50	33.00	35.60
BKW 3	45.10	53.40	32.30	34.10	45.00	53.00	32.30	34.50
BKW 4	47.20	54.20	32.90	35.50	47.00	53.10	33.60	36.50
BKW 5	47.80	54.50	33.20	35.30	47.00	53.50	33.80	36.00
BKW 6	45.40	53.20	31.40	34.40	45.20	52.50	32.80	34.80
BAW 9	47.20	52.40	30.20	35.10	51.40	52.00	30.70	35.10
BAW 10	48.00	53.30	31.10	34.30	48.00	53.00	32.20	34.50
BAJ 13	47.30	52.90	30.50	33.90	47.30	50.50	30.40	35.80
BAJ 18	46.70	52.60	30.80	33.40	45.40	52.50	31.30	35.00
BKW 13	47.80	54.10	32.50	35.40	48.10	53.60	32.30	36.30
BKW 14	47.60	54.10	32.00	34.70	47.80	54.30	32.00	36.20
BKW 15	48.20	54.00	33.10	35.50	48.00	53.50	32.30	36.00
BKW 16	46.40	54.40	32.10	34.50	46.70	53.80	31.30	35.80
BKW 17	47.20	54.60	31.80	34.10	47.00	52.70	31.50	34.50
BKW 18	47.70	54.90	30.90	33.90	47.80	54.00	32.40	35.00
BKW 19	48.90	54.50	32.50	34.80	48.50	53.00	31.70	35.50
BKW 20	47.60	54.50	32.70	34.90	47.70	53.00	32.00	34.70
BKW 21	47.70	54.30	32.10	35.00	48.50	54.40	31.90	35.30
BAJ 20	45.40	51.80	30.00	33.30	46.00	51.20	30.70	34.00
BAJ 21	45.10	52.10	29.80	33.50	45.50	52.00	31.70	33.50
BAW 23	46.50	51.80	29.90	33.80	46.90	52.00	30.10	35.00
BAW 24	47.80	52.60	30.10	33.80	45.00	53.10	32.10	34.70
BKW 25	47.40	54.90	30.90	34.40	47.30	54.20	31.20	34.80
BKW 26	45.10	53.10	32.50	34.60	45.00	53.10	32.10	34.70
BKW 27	45.60	53.40	30.90	34.30	46.50	53.80	30.30	35.00
BKW 28	50.60	56.00	30.90	34.60	50.80	57.00	31.00	34.80
BKW 29	48.90	54.90	31.10	35.30	48.80	54.30	31.80	36.00
BKW 30	49.80	54.80	31.70	35.40	51.30	55.30	31.00	35.00
BAJ 20A	45.90	50.20	29.90	33.20	45.50	50.60	30.70	34.10
BAJ 21A	45.40	50.40	30.00	33.00	45.50	50.90	31.20	33.70
BKW 31	46.20	52.60	32.10	34.00	46.70	53.20	32.50	33.80
BKW 32	45.80	52.60	32.20	34.30	47.30	52.80	31.70	34.50
BKW 33	46.10	52.60	32.10	34.40	45.50	52.70	32.50	34.80
BKW 34	48.00	55.30	31.20	35.30	48.00	55.30	31.30	34.70
BKW 35	47.10	55.00	32.10	34.80	47.70	54.30	33.00	35.70
BKW 36	47.40	54.70	31.80	35.20	48.70	56.70	33.00	36.70
BKW 37	47.20	55.00	32.20	35.70	47.00	55.10	31.80	36.10
BKW 38	46.70	55.10	32.10	35.20	45.70	53.50	32.30	36.70
BKW 39	48.50	55.20	31.50	35.70	48.00	54.00	32.60	36.50
BAW 31	48.00	53.50	30.90	34.00	47.20	53.00	30.40	35.00
BAW 32	49.00	54.20	30.70	33.80	50.00	54.00	29.40	35.30
BAW 33	45.10	52.80	31.50	34.90	46.30	54.60	30.80	36.00
BAW 34	45.90	52.90	30.80	35.80	46.60	51.90	30.90	36.20
BAW 35	46.70	52.90	30.40	34.40	47.60	52.70	30.30	35.00
BAW 36	47.10	53.00	30.00	34.20	47.40	53.00	30.50	35.00

COMPLETE DATA SET - (d) Tex & Stitch Length

Sample	Tex BW	Tex AW*Tex	BW *Tex	5x	SL BW	SL AW	*SL BW	*SL 5x
BAW 1	19.28	19.35	19.80	19.40	2.78	2.82	0.282	0.279
BAW 2	19.44	19.55	19.70	19.10	2.79	2.78	0.287	0.285
BAW 3	19.15	18.69	18.50	19.40	2.82	2.85	0.284	0.284
BAW 4	19.11	19.41	19.10	18.60	2.84	2.81	0.279	0.278
BAW 6	19.21	19.31	19.30	18.60	2.78	2.81	0.283	0.282
BKW 1	18.78	18.73	18.40	18.60	2.72	2.69	0.274	0.274
BKW 2	18.90	18.63	18.60	19.40	2.75	2.75	0.274	0.283
BKW 3	18.84	18.79	18.50	18.80	2.75	2.76	0.28	0.278
BKW 4	18.95	18.53	18.50	19.60	2.72	2.71	0.275	0.273
BKW 5	18.65	18.74	18.60	18.90	2.72	2.70	0.276	0.274
BKW 6	18.89	18.88	19.10	18.60	2.75	2.77	0.279	0.278
BAW 9	19.66	19.35	19.10	19.20	2.81	2.80	0.28	0.282
BAW 10	19.68	19.59	19.70	19.70	2.83	2.80	0.284	0.284
BAJ 13	19.54	19.28	19.20	18.70	2.80	2.79	0.282	0.281
BAJ 18	19.22	19.02	19.00	19.20	2.80	2.77	0.282	0.282
BKW 13	18.38	18.34	18.10	18.40	2.72	2.73	0.27	0.274
BKW 14	18.10	18.21	17.30	17.70	2.74	2.73	0.276	0.274
BKW 15	18.45	18.25	17.90	17.90	2.73	2.72	0.274	0.273
BKW 16	19.37	19.04	19.20	18.80	2.72	2.73	0.277	0.272
BKW 17	19.01	18.79	18.90	18.60	2.74	2.73	0.277	0.28
BKW 18	19.02	18.91	18.90	18.60	2.74	2.73	0.275	0.274
BKW 19	18.79	18.73	18.40	18.50	2.77	2.73	0.28	0.278
BKW 20	18.60	18.73	18.60	16.30	2.77	2.74	0.279	0.279
BKW 21	18.56	18.39	18.30	18.10	2.77	2.75	0.277	0.276
BAJ 20	19.67	19.07	19.80	19.00	2.80	2.85	0.285	0.287
BAJ 21	19.62	19.09	18.90	19.10	2.81	2.84	0.289	0.29
BAW 23	19.44	19.42	19.10	19.50	2.80	2.78	0.281	0.281
BAW 24	19.17	19.29	19.20	19.10	2.79	2.78	0.281	0.281
BKW 25	18.82	18.96	18.80	18.50	2.76	2.74	0.279	0.277
BKW 26	18.81	18.97	18.10	18.40	2.76	2.74	0.279	0.277
BKW 27	18.93	18.86	18.90	18.70	2.77	2.75	0.278	0.276
BKW 28	19.75	19.93	19.00	19.60	2.73	2.71	0.276	0.274
BKW 29	20.02	20.05	20.10	19.90	2.72	2.70	0.274	0.274
BKW 30	19.79	20.11	19.60	19.30	2.72	2.70	0.275	0.273
BAJ 20A	19.43	19.17	18.80	19.20	2.82	2.84	0.28	0.283
BAJ 21A	19.67	19.29	19.90	19.40	2.81	2.83	0.282	0.282
BKW 31	19.65	19.40	18.70	18.80	2.76	2.76	0.279	0.278
BKW 32	19.38	19.18	18.40	18.40	2.77	2.75	0.279	0.277
BKW 33	19.24	19.27	19.30	18.50	2.76	2.77	0.28	0.275
BKW 34	18.75	18.92	18.40	18.10	2.72	2.70	0.275	0.273
BKW 35	18.70	18.65	18.20	18.40	2.72	2.71	0.272	0.271
BKW 36	18.65	18.77	20.40	20.40	2.71	2.71	0.27	0.269
BKW 37	18.86	18.59	17.90	17.90	2.73	2.71	0.279	0.274
BKW 38	18.75	18.97	18.30	18.10	2.73	2.70	0.281	0.273
BKW 39	18.60	18.81	18.20	17.90	2.73	2.70	0.275	0.273
BAW 31	19.95	19.62	19.20	20.20	2.83	2.82	0.286	0.285
BAW 32	19.71	19.61	18.80	20.10	2.79	2.77	0.282	0.281
BAW 33	19.42	19.38	18.80	18.90	2.79	2.80	0.28	0.277
BAW 34	19.40	19.39	19.30	19.40	2.77	2.79	0.279	0.279
BAW 35	19.77	19.72	18.40	20.30	2.81	2.81	0.284	0.285
BAW 36	19.79	19.55	19.10	19.80	2.80	2.82	0.282	0.282

N.B. Stitch length units are:- IIC,mm., BHS,cm.

*** STATISTICS - IIC DATA ***

	Mean	SD	CV%	Max	Min
1. ShrL(1x)	10.896	1.723	15.81	14.800	7.300
2. ShrW(1x)	10.408	2.187	21.01	16.100	4.000
3. ShrL(5x)	12.920	1.672	12.94	16.500	10.200
4. ShrW(5x)	9.459	2.184	23.09	15.100	4.600
5. Wt BW	170.271	6.231	3.66	186.900	160.700
6. Wt AW	210.616	6.422	3.05	230.000	201.100
7. C/3cmBW	47.092	1.250	2.65	50.600	45.100
8. C/3cmAW	53.563	1.236	2.31	56.000	50.200
9. W/3cmBW	31.359	0.989	3.15	33.200	29.500
10. W/3cmAW	34.424	0.814	2.36	35.800	32.800
11. SL BW	2.766	0.037	1.33	2.840	2.710
12. SL AW	2.760	0.046	1.68	2.850	2.690
13. Tex BW	19.163	0.460	2.40	20.020	18.100
14. Tex AW	19.084	0.444	2.33	20.110	18.210

*** STATISTICS - BHS DATA ***

	Mean	SD	CV%	Max	Min
1. *ShrL1x	9.904	1.880	18.98	14.000	5.300
2. *ShrW1x	10.802	2.180	20.19	15.650	5.100
3. *ShrL5x	11.879	1.703	14.33	15.350	8.500
4. *ShrW5x	10.967	2.356	21.48	15.600	4.700
5. *Wt BW	175.196	7.772	4.44	200.000	161.000
6. *Wt 5x	216.431	6.706	3.10	235.000	206.000
7. *C/3cBW	47.294	1.540	3.26	51.400	45.000
8. *C/3c5x	53.241	1.361	2.56	57.000	50.500
9. *W/3cBW	31.649	1.082	3.42	33.900	29.000
10. *W/3c5x	35.080	0.894	2.55	36.700	33.000
11. *SL BW	0.279	0.004	1.47	0.289	0.270
12. *SL 5x	0.278	0.005	1.67	0.290	0.269
13. *Tex BW	18.869	0.612	3.24	20.400	17.300
14. *Tex 5x	18.894	0.751	3.97	20.400	16.300

TABLE III

Student's t-test & fit to equation ($y=a+bx$)

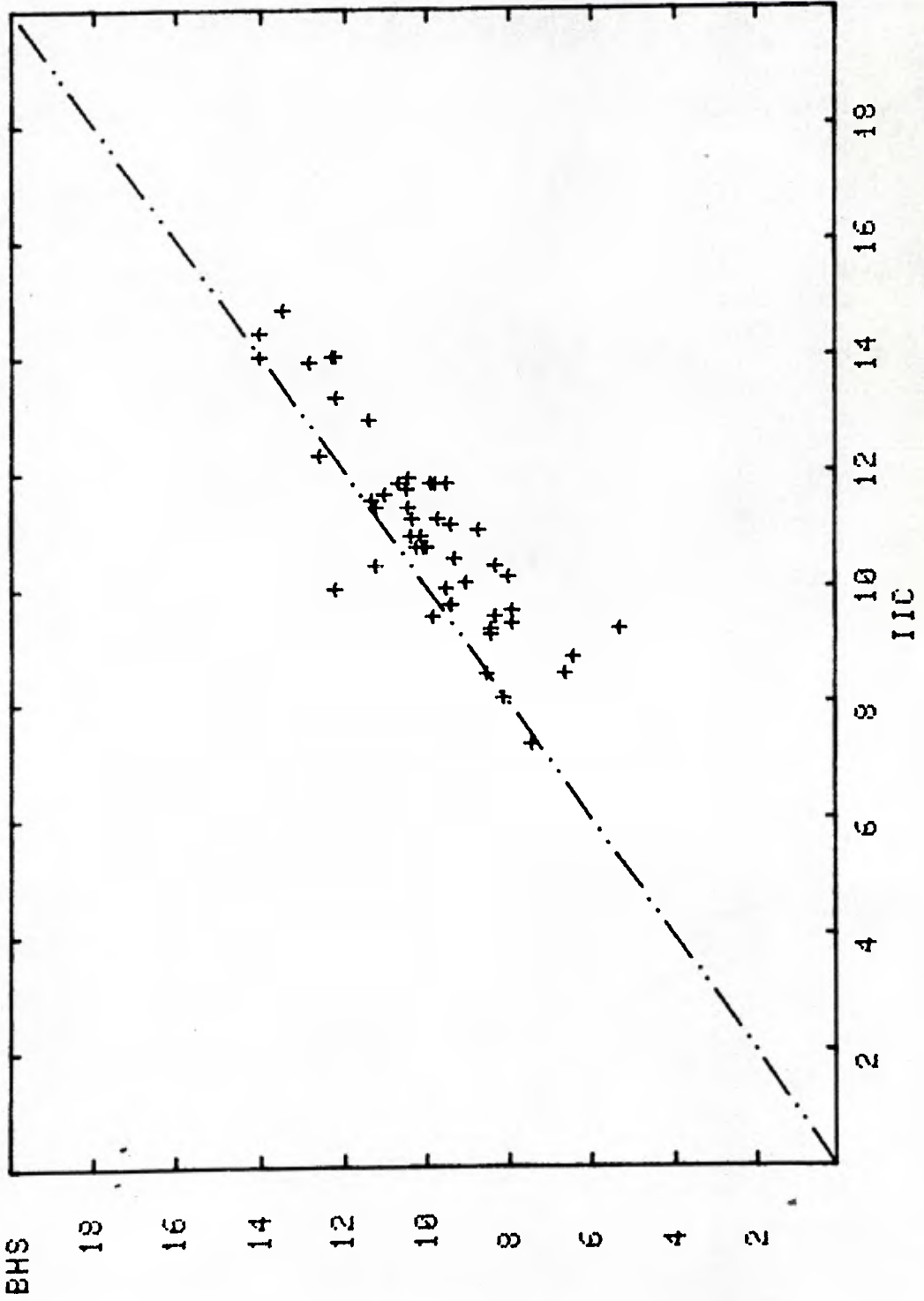
Property	t	a	b	r-squared
Length Shrinkage - 1 wash	7.0842 **	-0.2305	0.9301	0.7266
Width " "	2.5327 *	1.7423	0.8705	0.7622
Length " - 5 washes	7.4284 **	0.9823	0.8435	0.6855
Width " "	8.1582 **	2.4294	0.9026	0.7004
Weight - conditioned only	5.2988 **	52.3536	0.7215	0.3346
Weight after 5 washes	10.4101 **	36.1473	0.8560	0.6720
Courses/3cm - cond. only	1.4257	3.1185	0.9381	0.5796
Courses/3cm after 5 washes	2.6758 **	6.6534	0.8698	0.6239
Wales/3cm - cond. only	2.5000 *	7.9789	0.7548	0.4752
Wales/3cm after 5 washes	8.0404 **	5.7418	0.8523	0.6009
Stitch length - cond. only	6.8046 **	0.0301	0.8998	0.6475
Stitch length after 5 washes	5.7061 **	0.0443	0.8471	0.7166
Yarn count - cond. only	4.3135 **	2.8946	0.8336	0.3928
Yarn count after 5 washes	2.2039 *	0.0177	0.9891	0.3422

** Significant difference at 99% confidence level

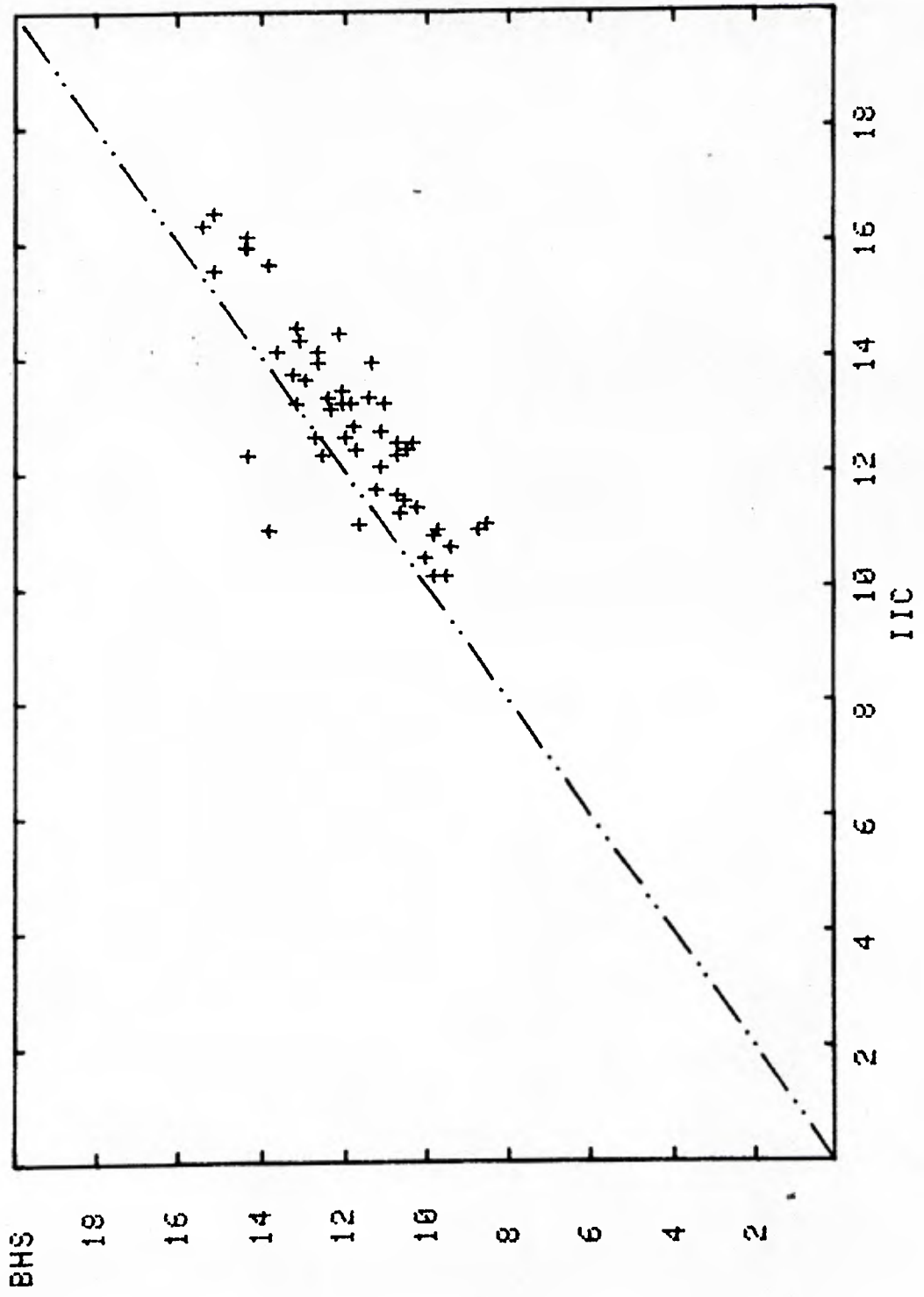
* Significant difference at 95% confidence level

FIGURE 1

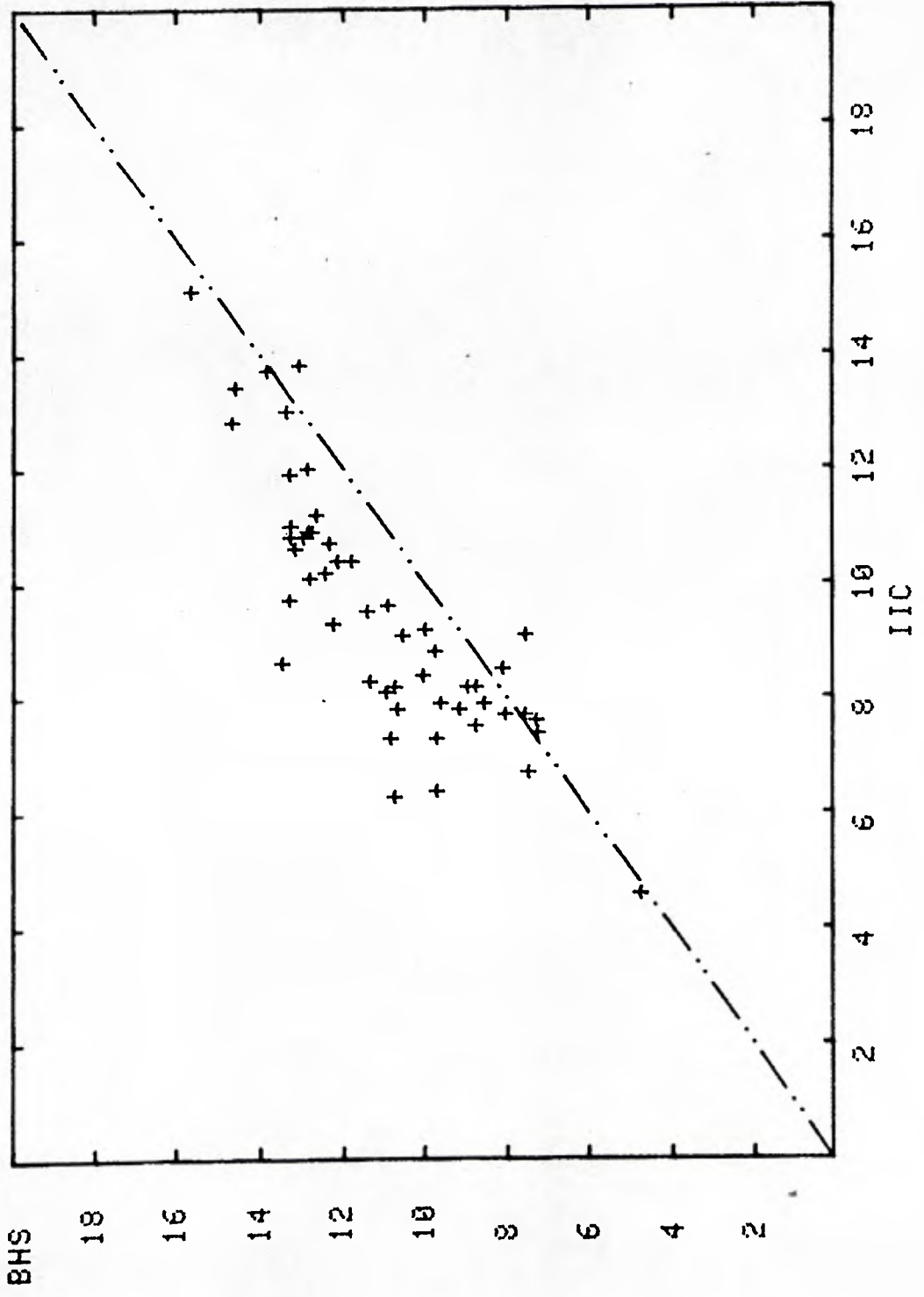
Length Shrinkage in One Wash & Tumble Dry Cycle.



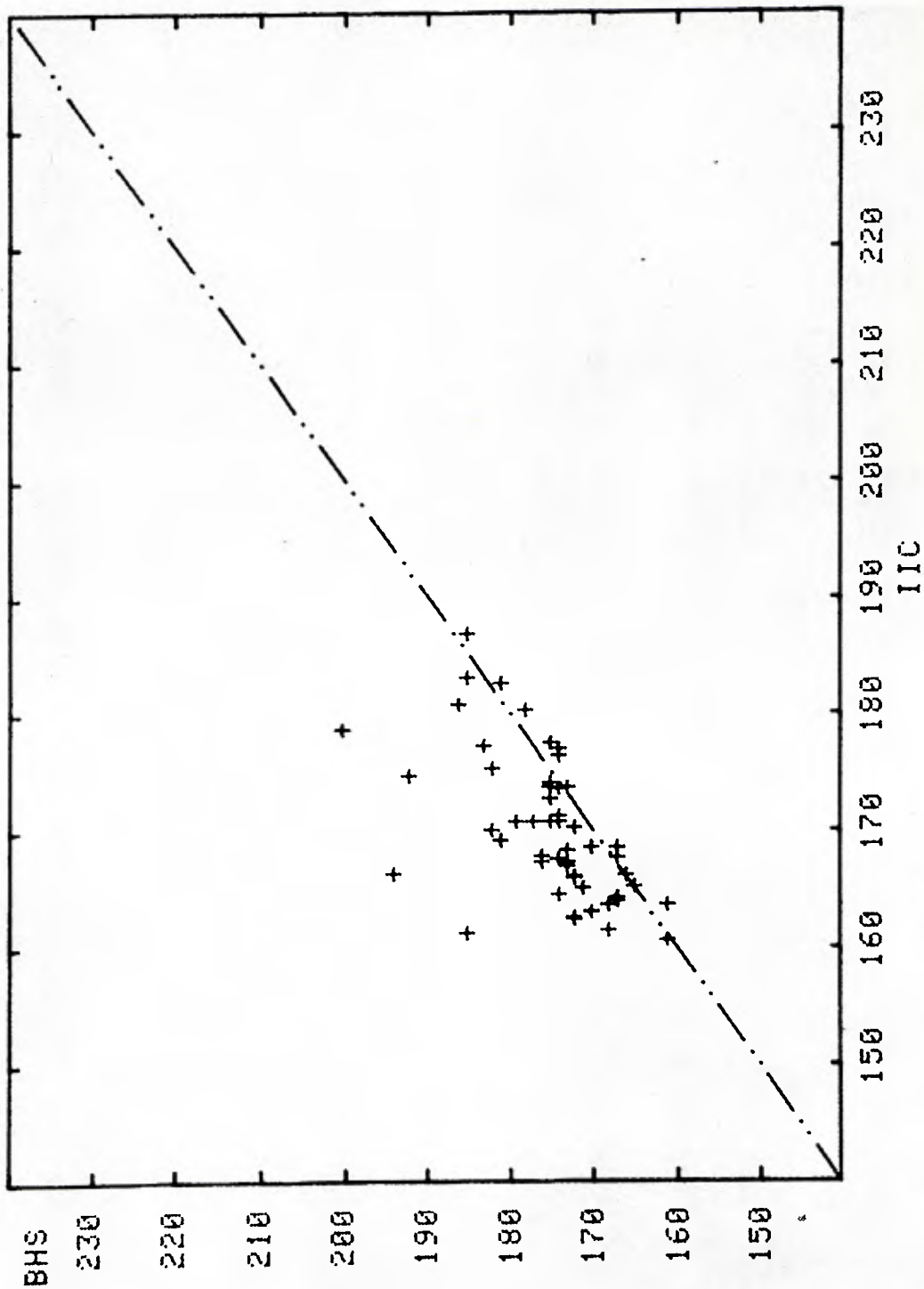
Length Shrinkage in Five Wash & Tumble Dry Cycles.



Width Shrinkage in Five Wash & Tumble Dry Cycles.



Fabric Weight (gm per sq m), Conditioned only.



Fabric Weight (gm per sq m), after 5 Wash/Tumble Dry Cycles.

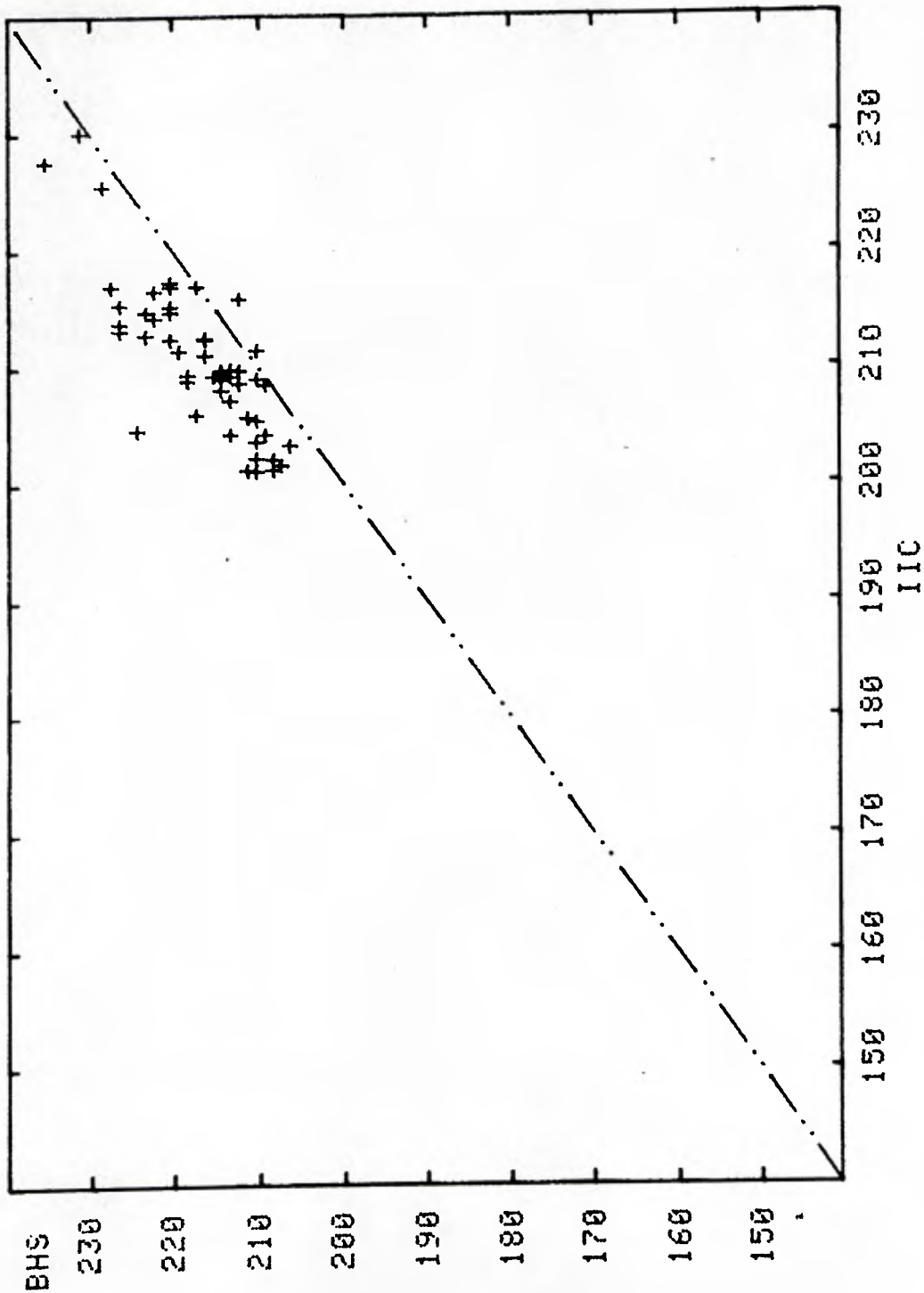
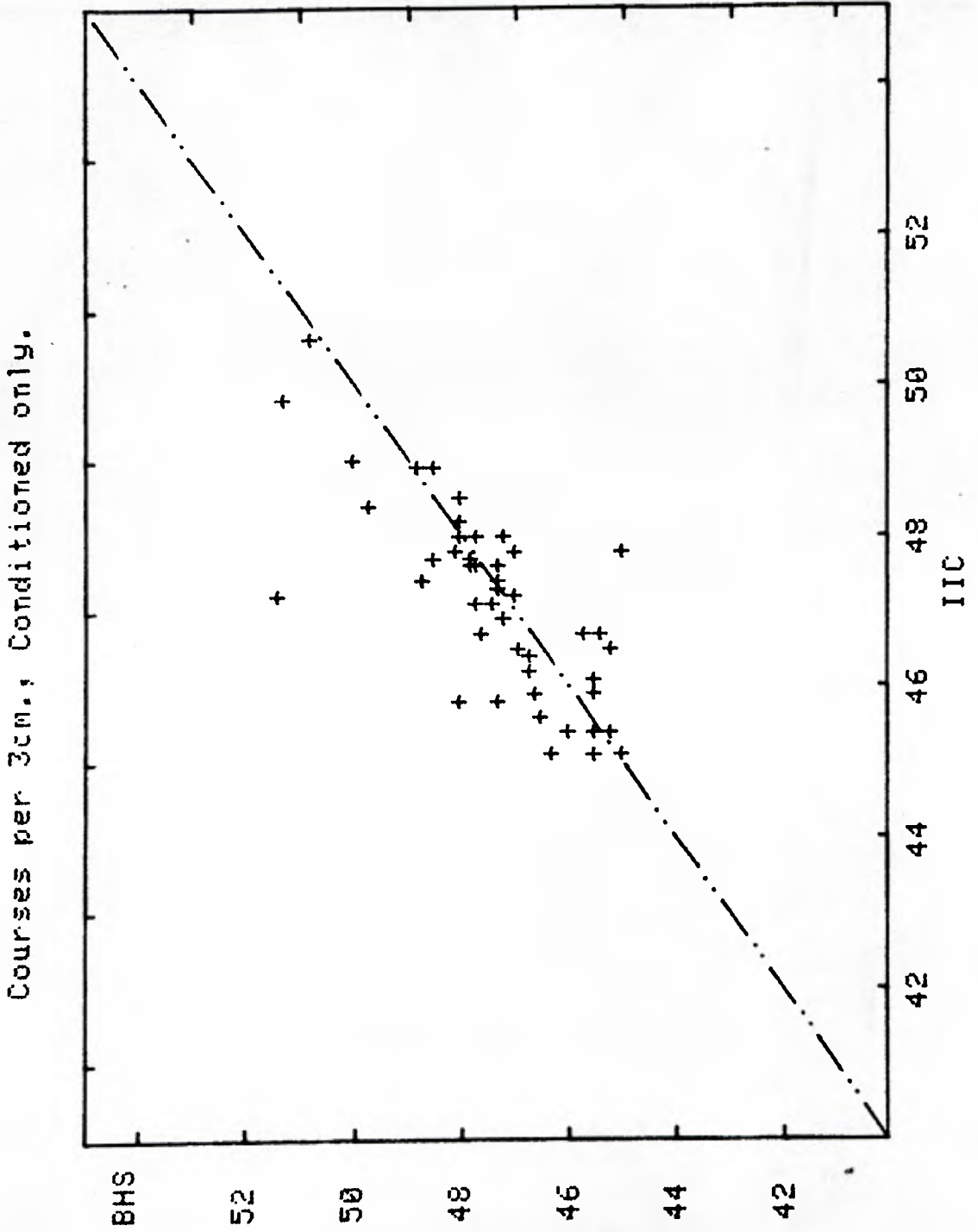
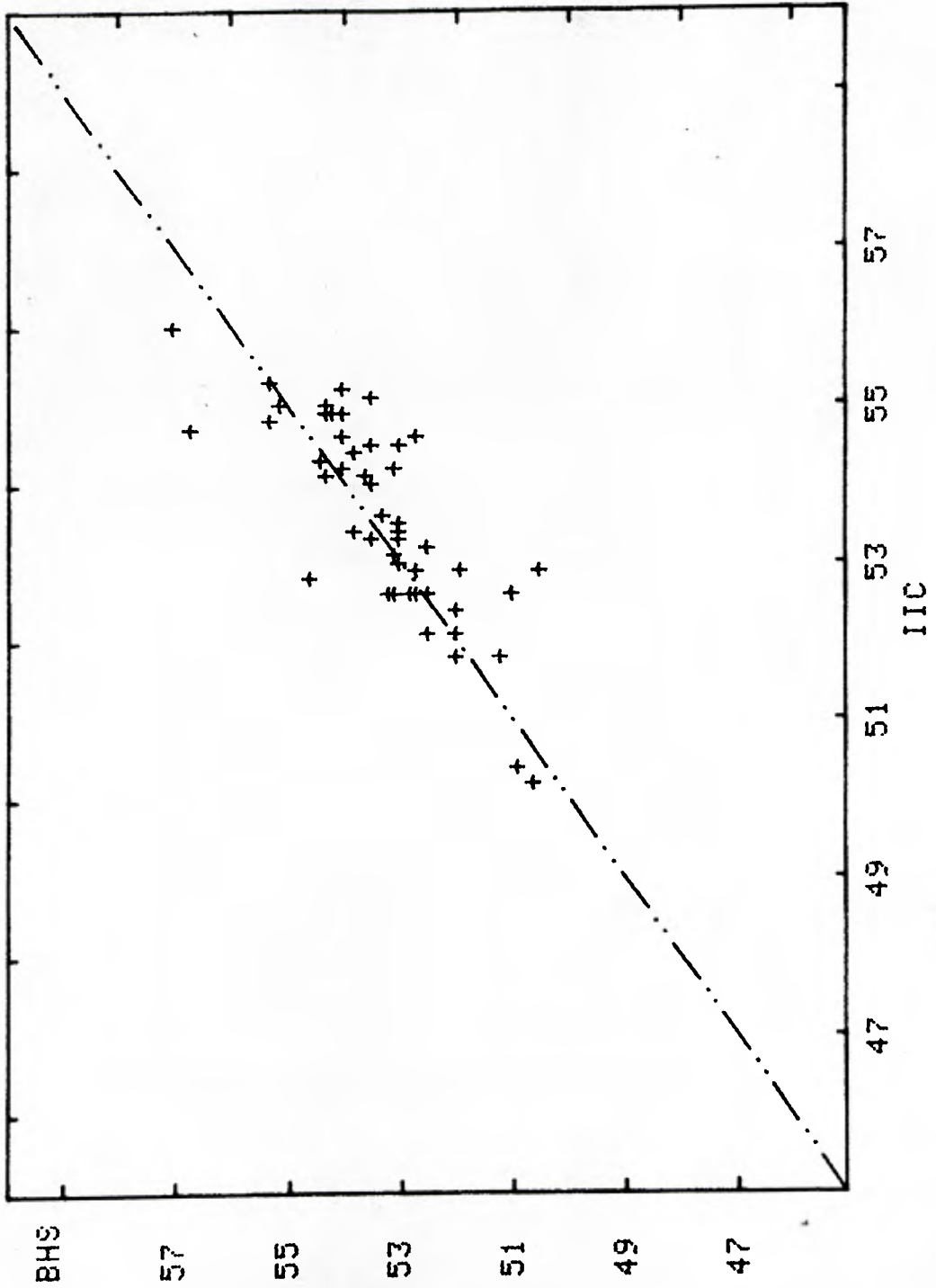


FIGURE 6

FIGURE 7



Courses per 3cm., after 5 Wash/Tumble Dry Cycles.



Wales per 3cm., Conditioned only.

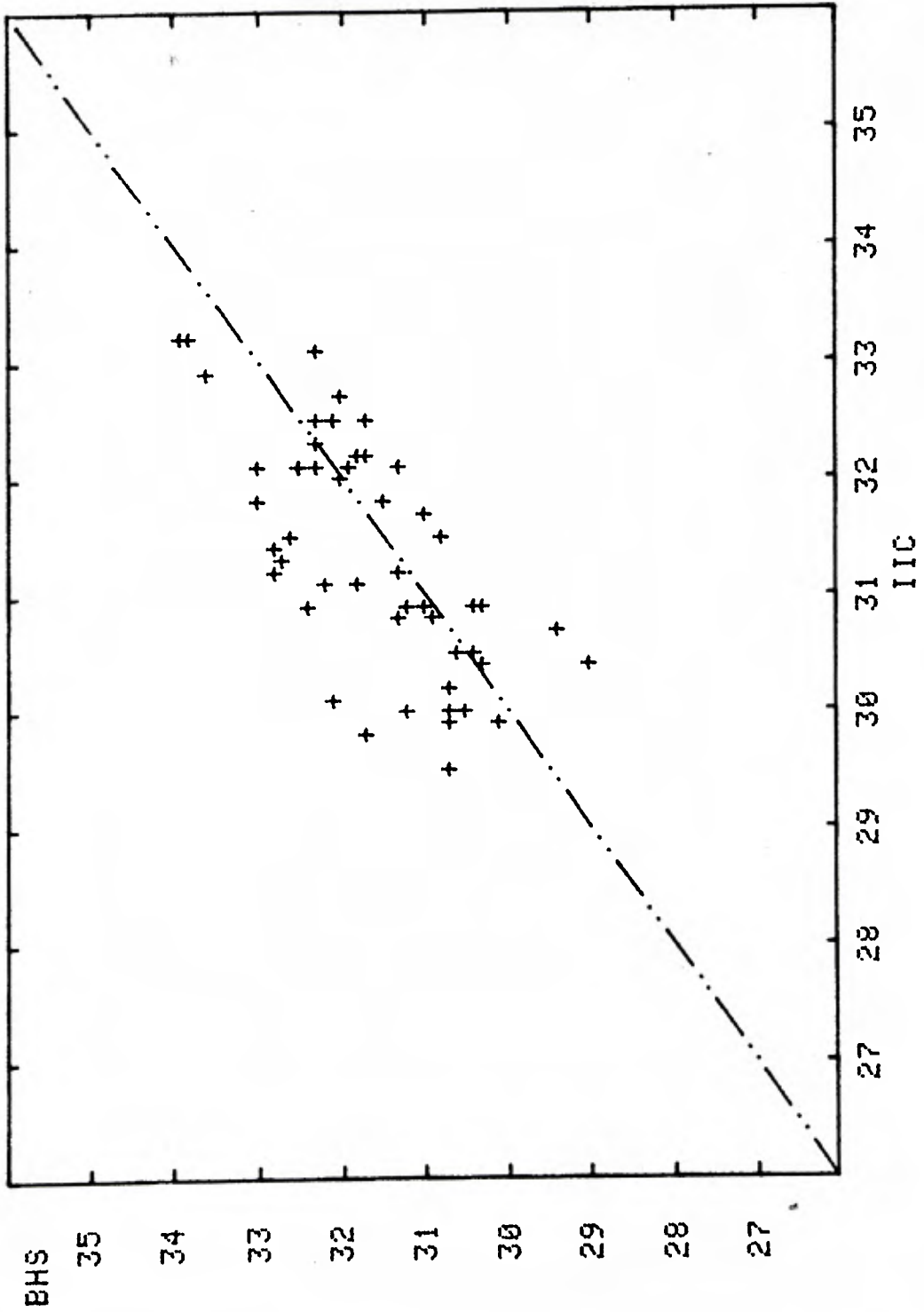
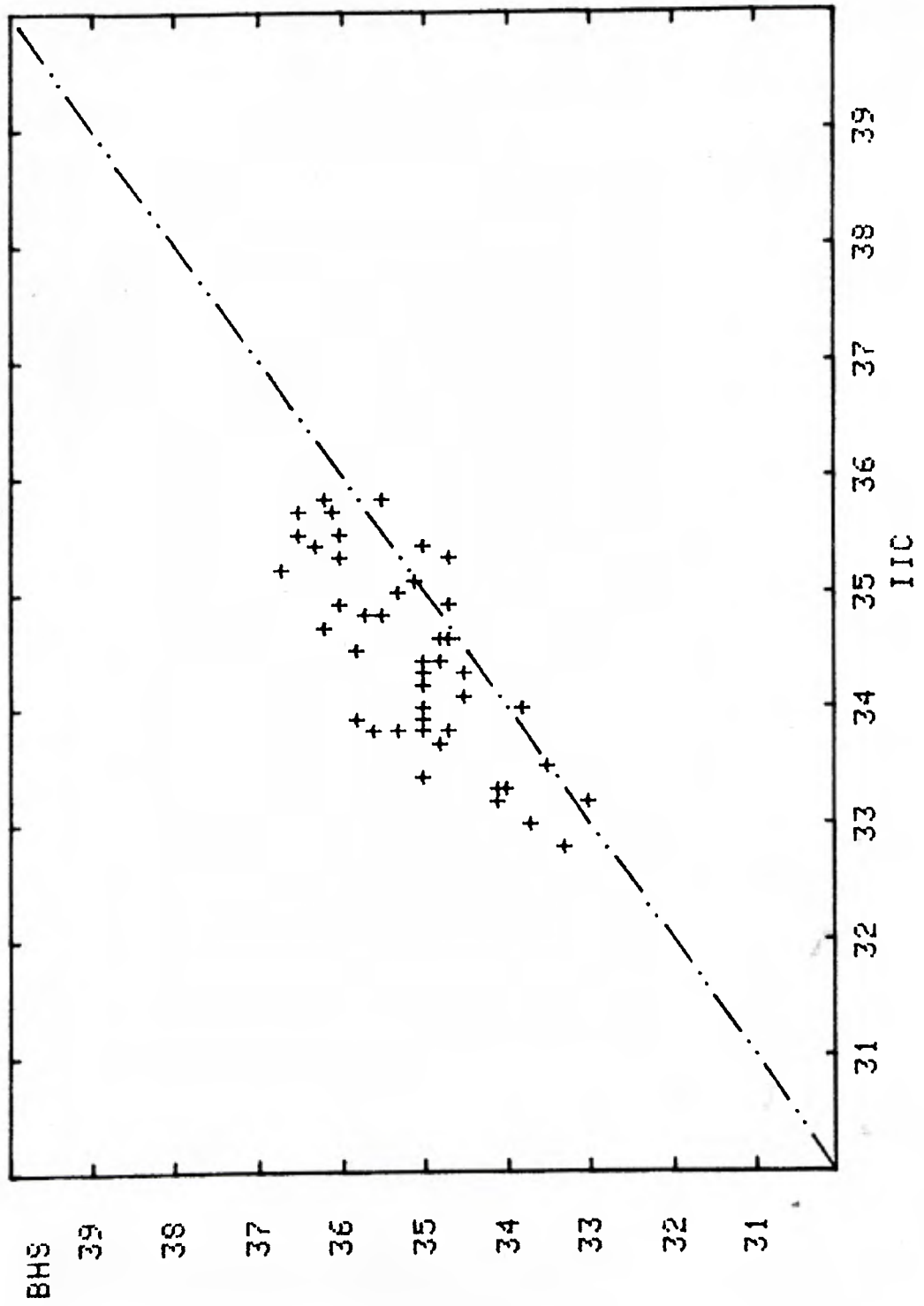
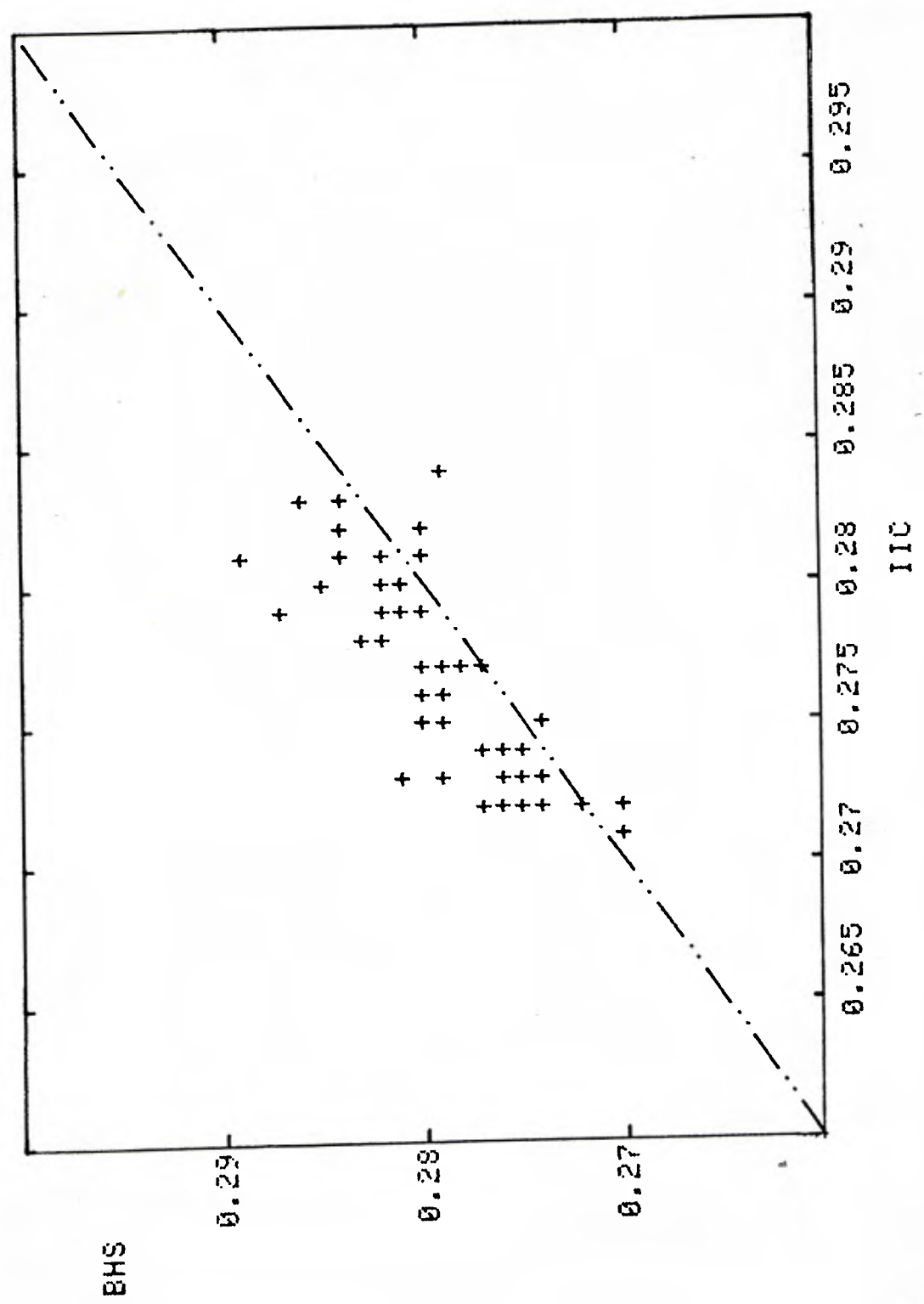


FIGURE 10

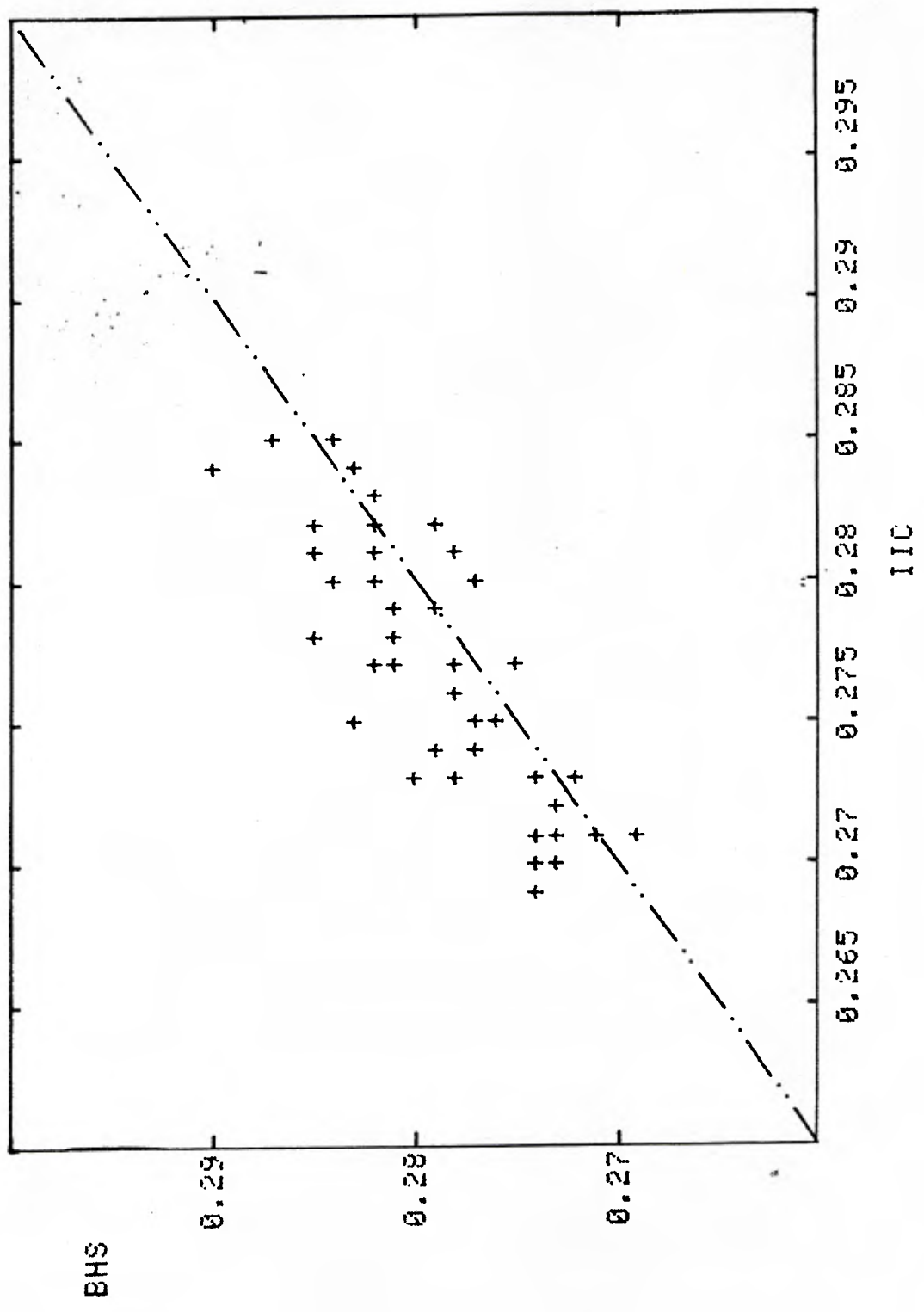
Wales per 3cm., after 5 Wash/Tumble Cycles.



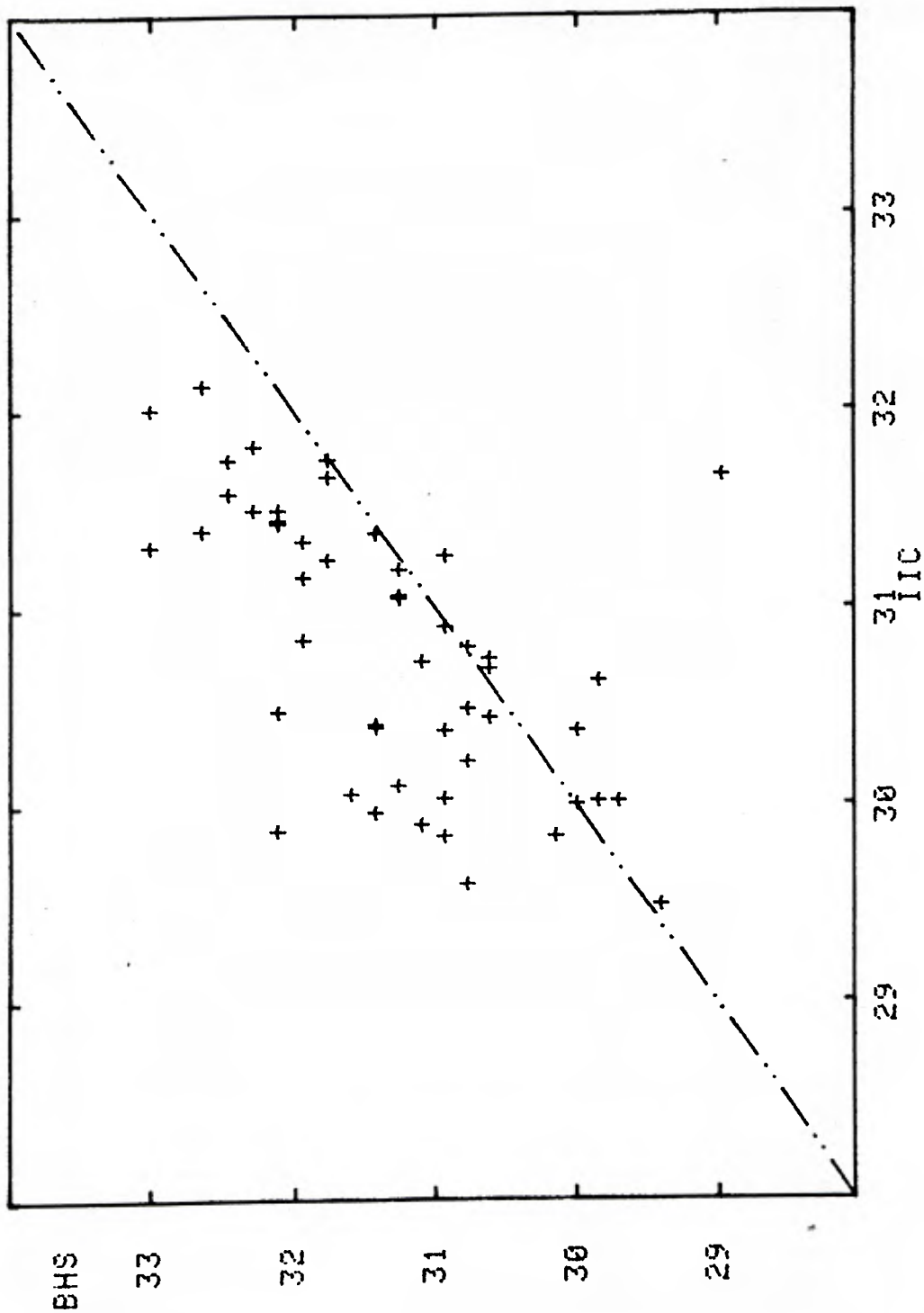
Stitch Length, cm., Conditioned only.



Stitch Length, cm., after 5 Wash/Tumble Dry Cycles.



Yarn Count (Ne), Conditioned only.



Yarn Count (Ne), after 5 Wash/Tumble Dry Cycles.

