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Comparison Of Singles And Two-Fold Yarns
In Single Jersey Fabrics

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1. Introduction

This report is one of a series designed to study the various parameters in 18, 24, and 28 gauge single jersey knitting and to ascertain their effects on the finished fabric geometry. All the fabrics studied were from the K1 and K2 projects.

This report deals only with the comparisons between singles and two-fold yarns of similar resultant counts, through the following finishing routes:

- 1 K1 Tubular Standard: R-95
- 2 K1 Open-Width Standard: RS-OW
- 3 K2 Tubular Mercerised Omez
- 4 K2 Open-width Mercerised Kleinewefers (Kwfrs)

Processing details for these finishing routes are recorded in *Research Records 122, 132, 139, and 133* respectively.

The after-wash (AW) results given in this report are the relaxed dimensions after 1 wash and tumble dry followed by 4 wetting out and tumble dry cycles (termed “fully relaxed”).

2. Yarn Details

In order to avoid any confusion, only the basic standard Z twist yarns, having a 3.5 twist factor were studied. All the two-fold yarns had a nominal single twist factor of 3.5 and a folded factor of between 2.42 and 2.83.

3. Abbreviations

T.F.	Tightness Factor, $\sqrt{\text{Tex}} / l$
l, L	Stitch length, cm
C	Courses
W	Wales
S, CxW	Stitch Density, Courses \times Wales per cm ²
$A_v T/l B$	Average Tex / Stitch length before washing
BW	Before washing (as received)
AW	After washing (fully relaxed)
(nn)	Numbers within brackets e.g. (24) are resultant yarn counts
MnWt	Mean weight, gsm

4. Discussions

This report is mainly a series of graphs plotting various knitting factors against finished measurements.

4.1. Courses

Courses per 3cm against $1/l \text{ cm}^{-1}$ (*Figures 1-9*)

Fabrics made from the two-fold yarns have fewer courses in the fully relaxed state in Grey, through the R-95 tubular finishing route and through the RS-OW open width finishing route.

4.2. Wales

Wales per 3cm against $1/l \text{ cm}^{-1}$ (*Figures 10-18*)

A similar picture emerges as with the courses, i.e. in all cases fewer wales in the fully relaxed state from the two-fold yarns.

4.3. Stitch Density

Courses \times Wales per cm^2 against tightness factor (finished dimensions only) (*Figures 19-24*)

The stitch density effect over each individual resultant yarn count illustrates that in every case the two-fold yarns give a less dense fabric after relaxation.

4.4. Fabric Weight

Fabric Weight against $A_v T/l B$ (*Figures 25-36*)

Each individual gauge in grey, R-95 and RS-OW finishes show, as one would expect from the stitch density findings, that the two-fold yarns produce a lighter fabric.

When the fully relaxed weights are plotted together, it suggests that there is little or no effect of knitting machine gauge on the relaxed weights.

4.5. Fabric Thickness

Fabric thickness against tightness factor (*Figures 37-42*)

These graphs show that, in the main, the two-fold yarns produce a thinner fabric than singles yarns.

However, the scatter of results made it impossible to plot individual yarn counts. At this stage, it is not clear whether this is due to variations in the fabric or to our method of testing.

5. Mercerised Fabric Weight

Weight against $A_v T/l B$ (*Figures 43-44*)

Although mercerisation changes the overall relaxed dimensions, the two-fold yarns showed a similar trend to the non-mercerised fabrics, again the two-fold yarns being lighter.

5.1. Mercerised Fabric, Stitch Density

Courses \times wales against tightness factor (*Figures 45-46*)

The measured stitch density is shown against resultant yarn counts and gauges and again confirms the same trend, of the two-fold yarns having a lower relaxed stitch density.

5.2. Tubular Mercerising/Open-Width Mercerising

X-Y plots of the stitch density and weights (*Figures 47-48*)

During the collection of the data for this report, it was noticed that a large change in relaxed dimensions was evident between the open-width and tubular mercerising routes. This will be reported in more detail in another section of the series of reports. However, the changes which occurred appeared to affect both the two-fold and the singles to a similar degree.

6. Conclusions

- 1 The fully relaxed dimensions of plain jersey fabrics made from singles yarns are significantly different from those of the fabrics made from two-fold yarns. This means that any mathematical analysis will have to treat the two groups separately.
- 2 The main practical consequence of these differences is that a manufacturer who produces cloth from nominally similar constructions and finishes them to the same dimensions will find that the fabric containing the two-fold yarn will have less length and width shrinkage than that containing singles yarn.
- 3 It remains to be seen whether the differences found in “fully-relaxed” fabrics will also be discovered when other methods of relaxation are used - for example the increasingly common one wash and tumble test, or a many-cycle consumer wash-wear trial.

Figure 1

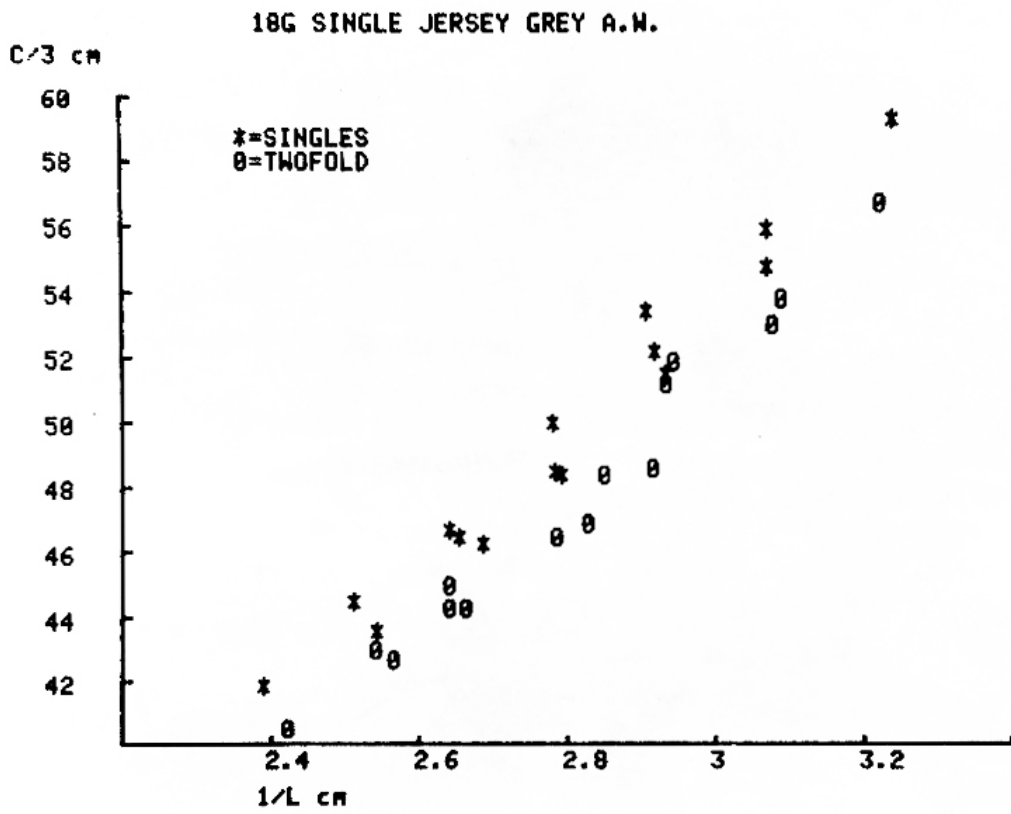


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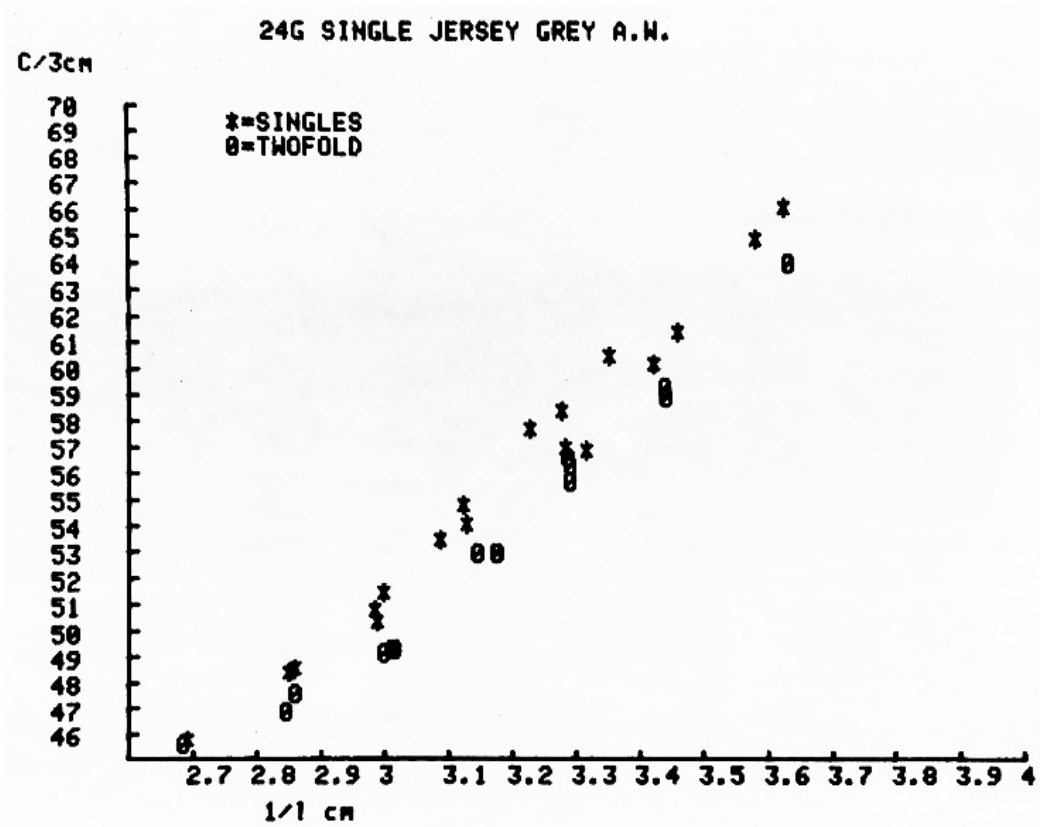


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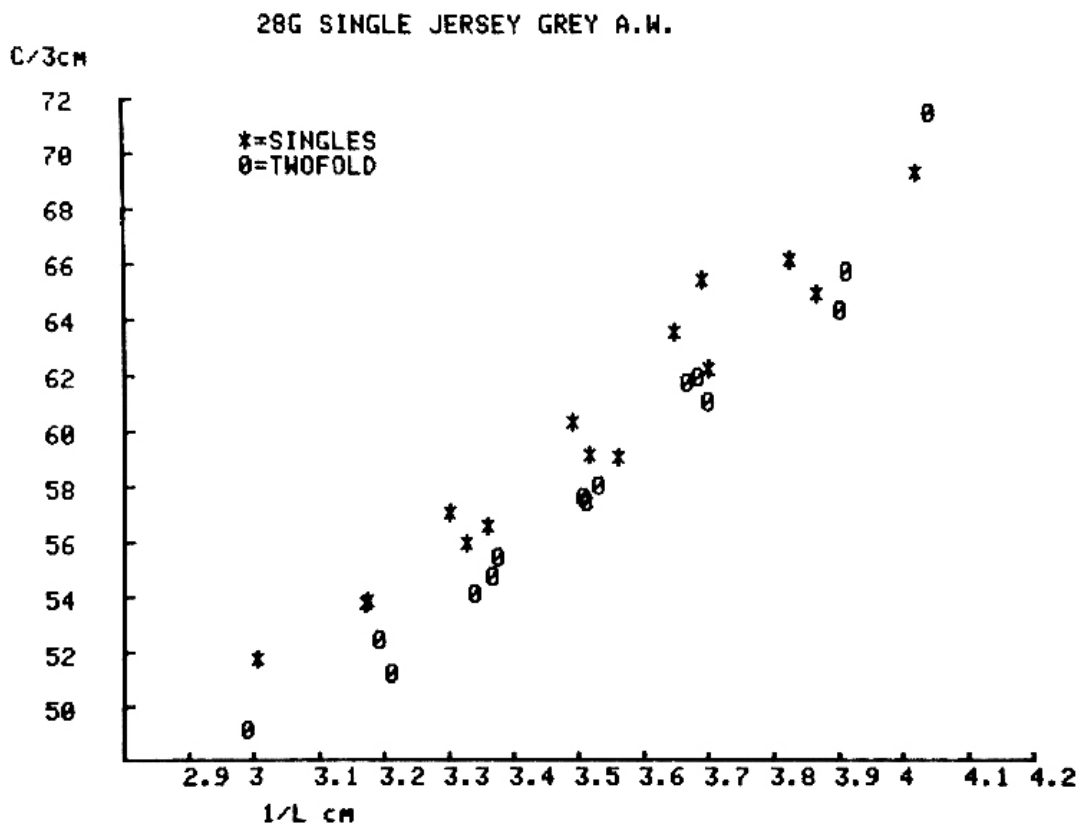


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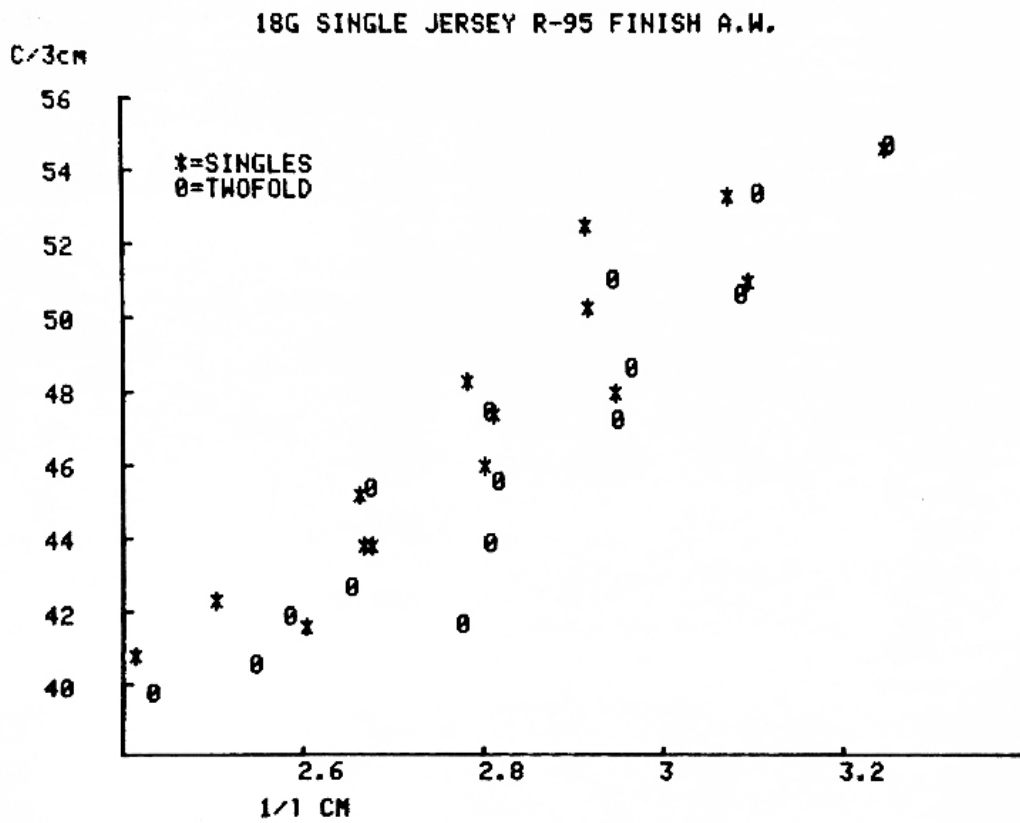


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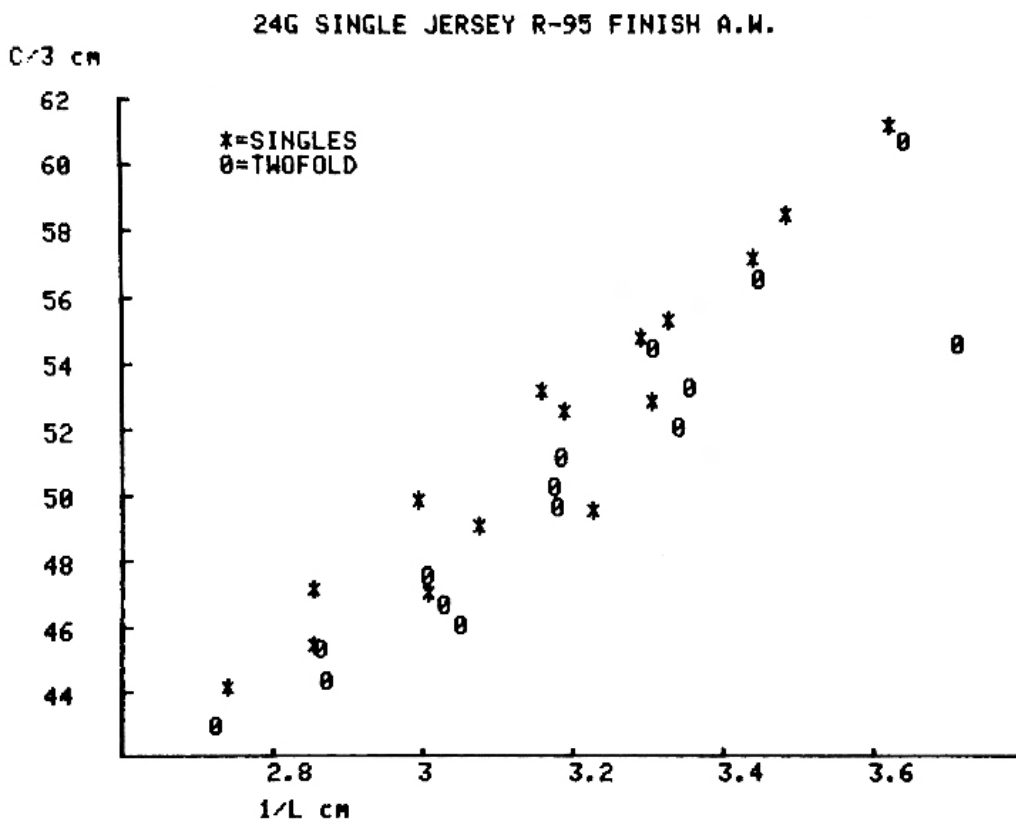


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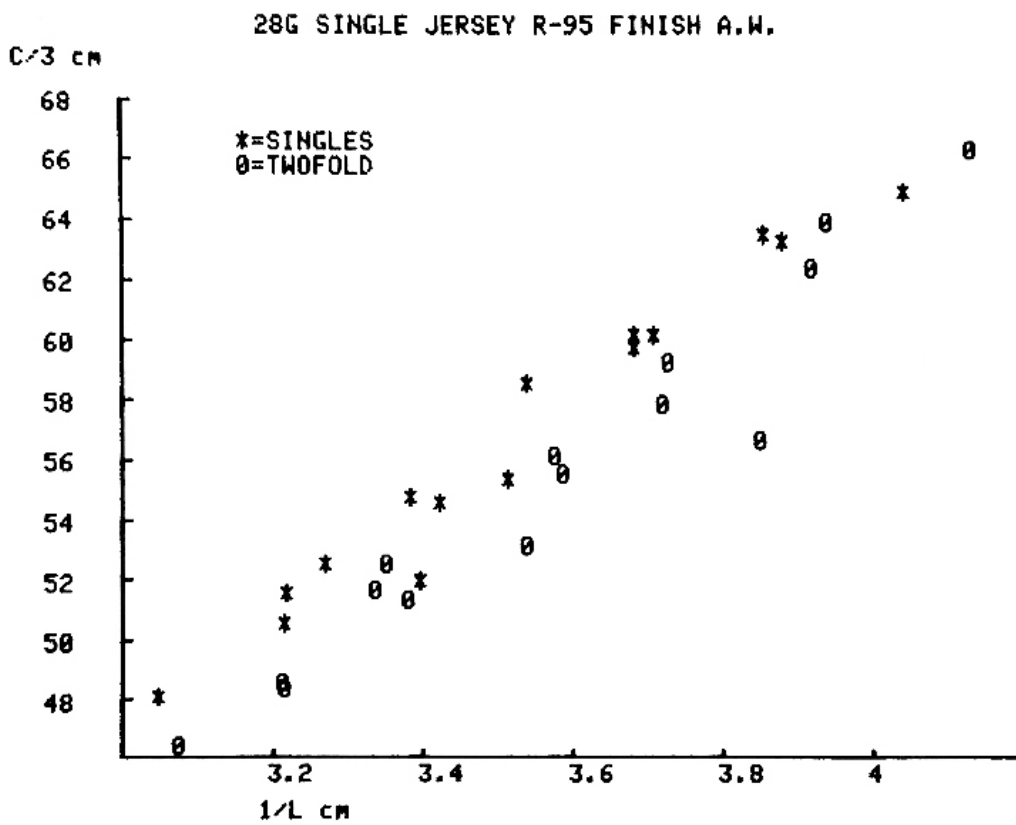


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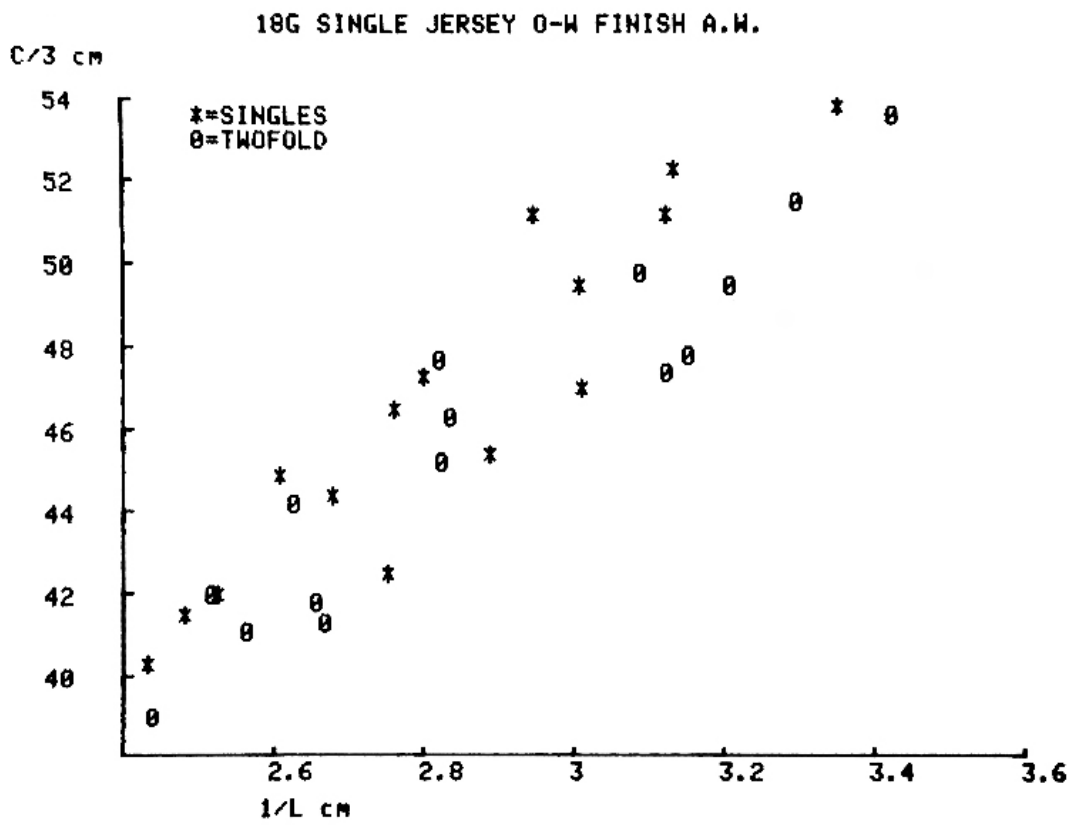


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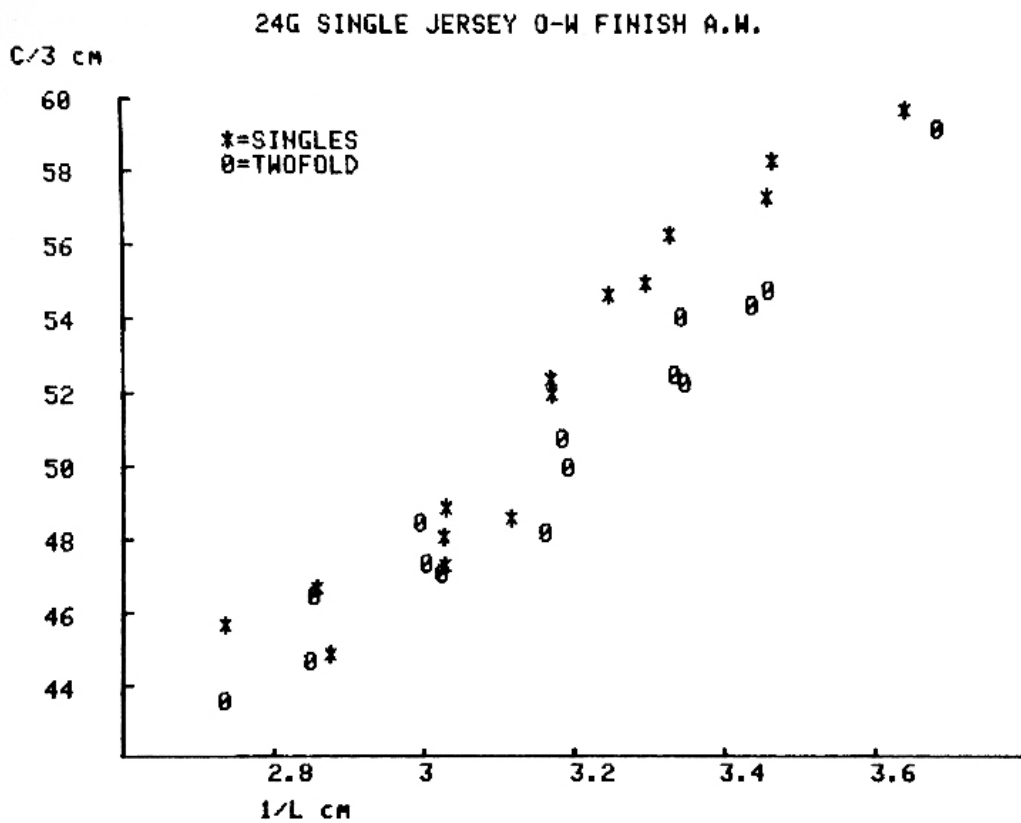


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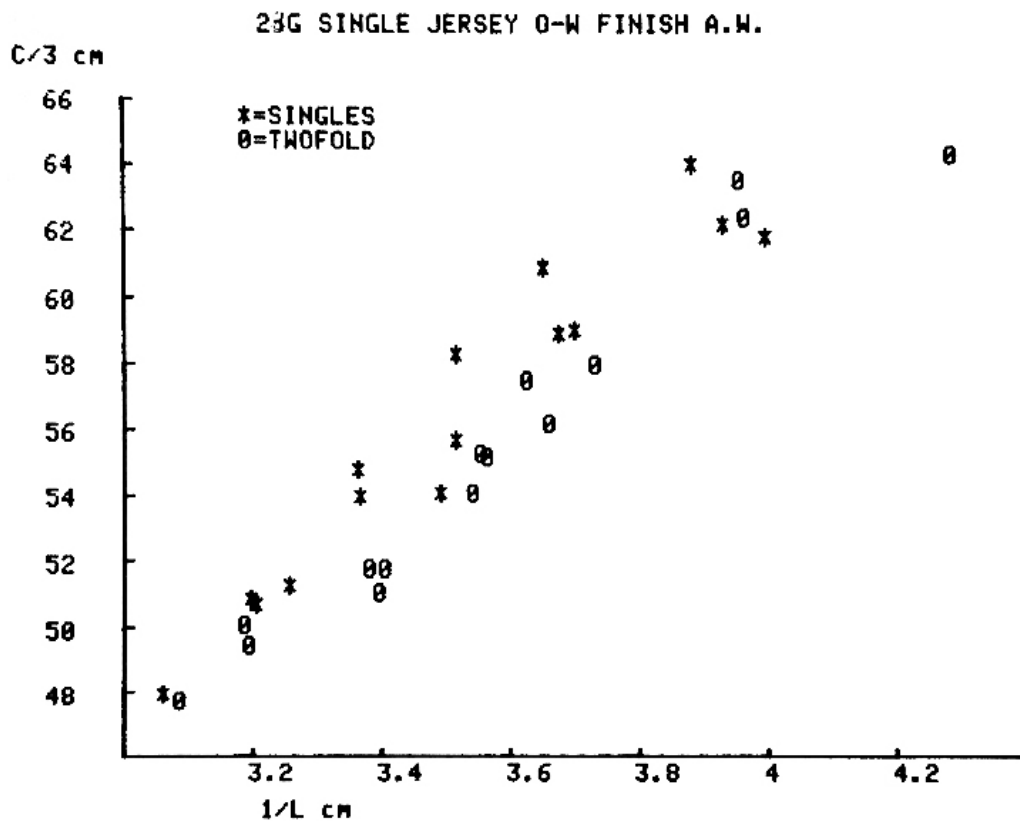


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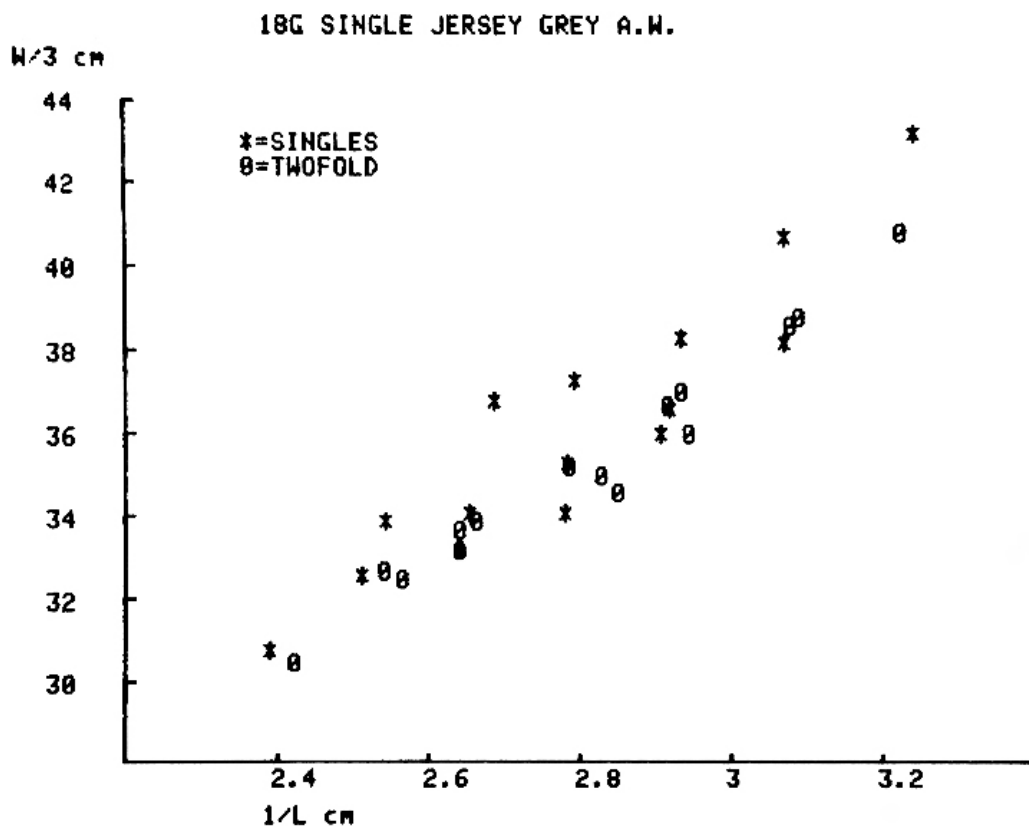


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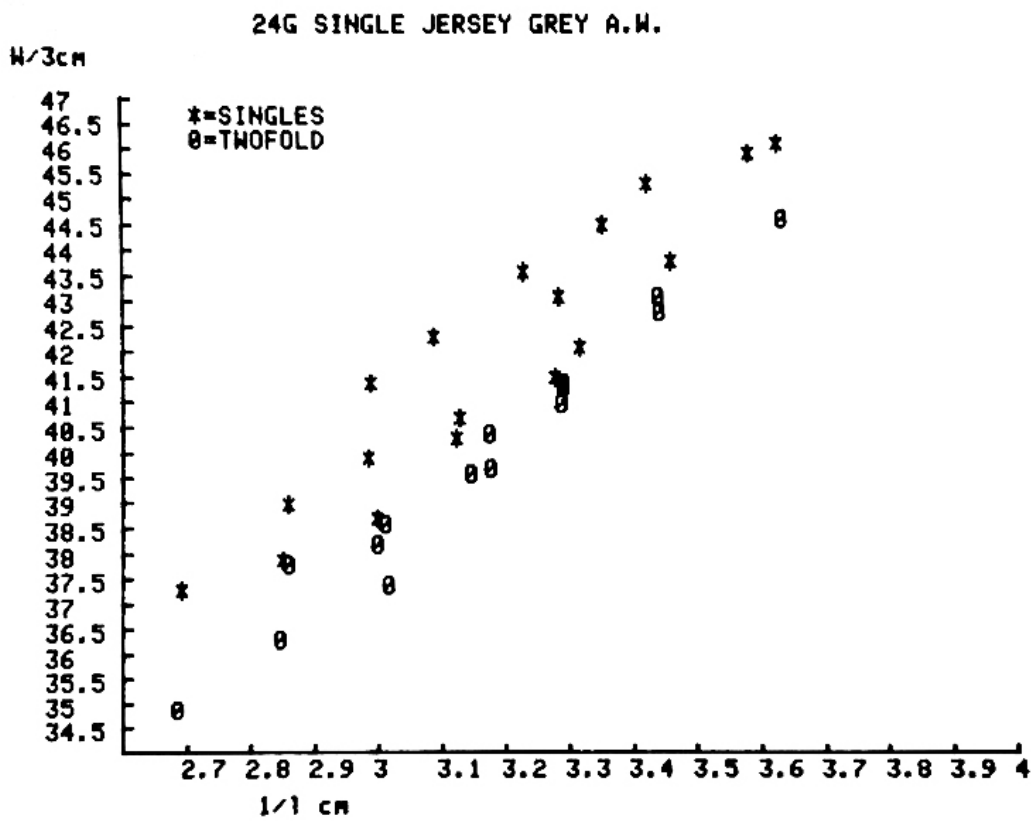


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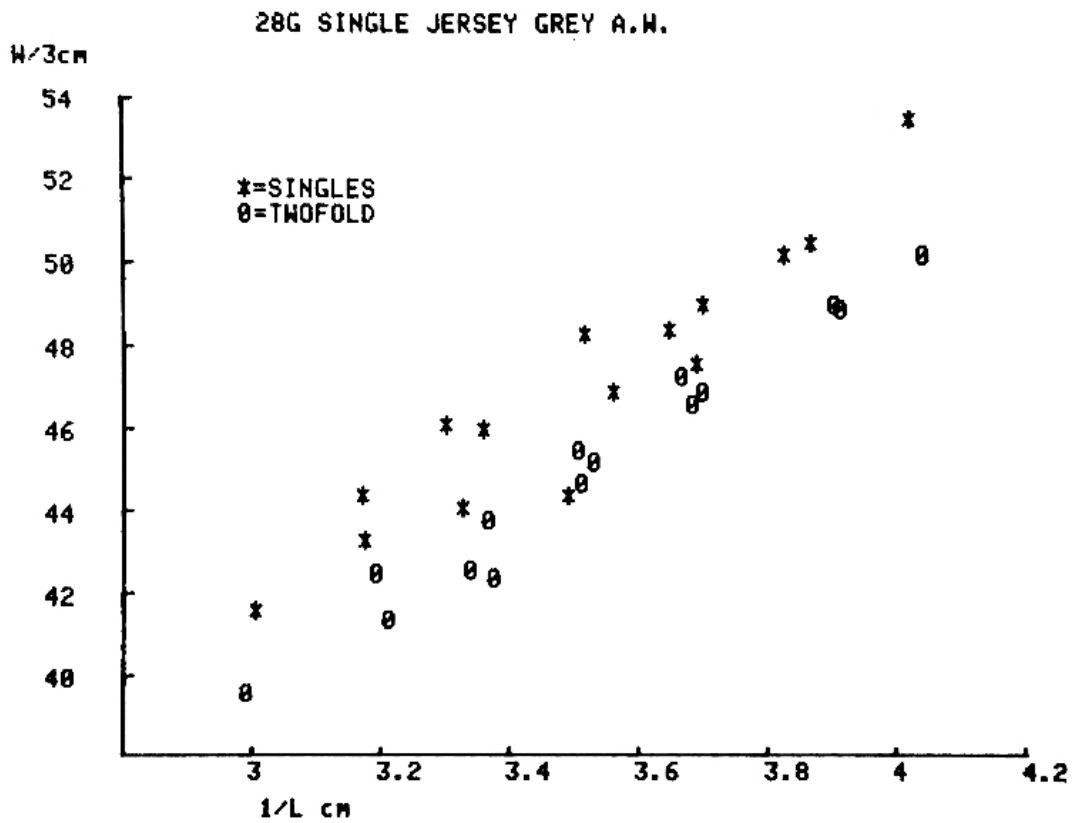


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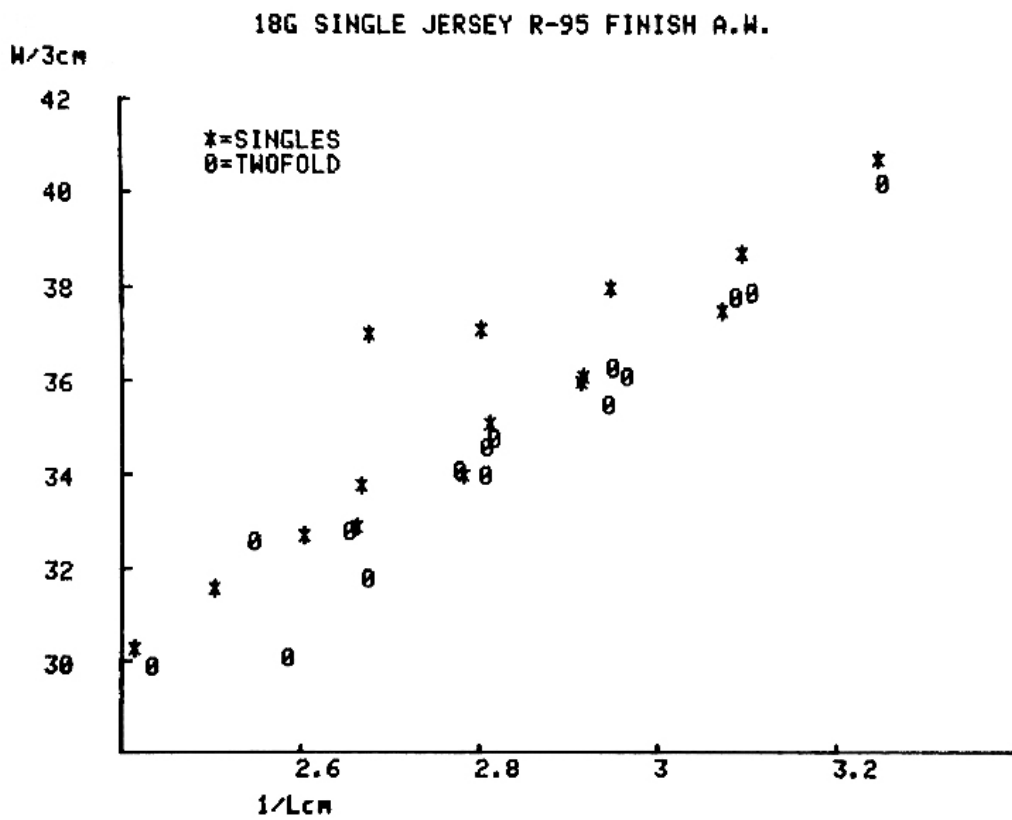


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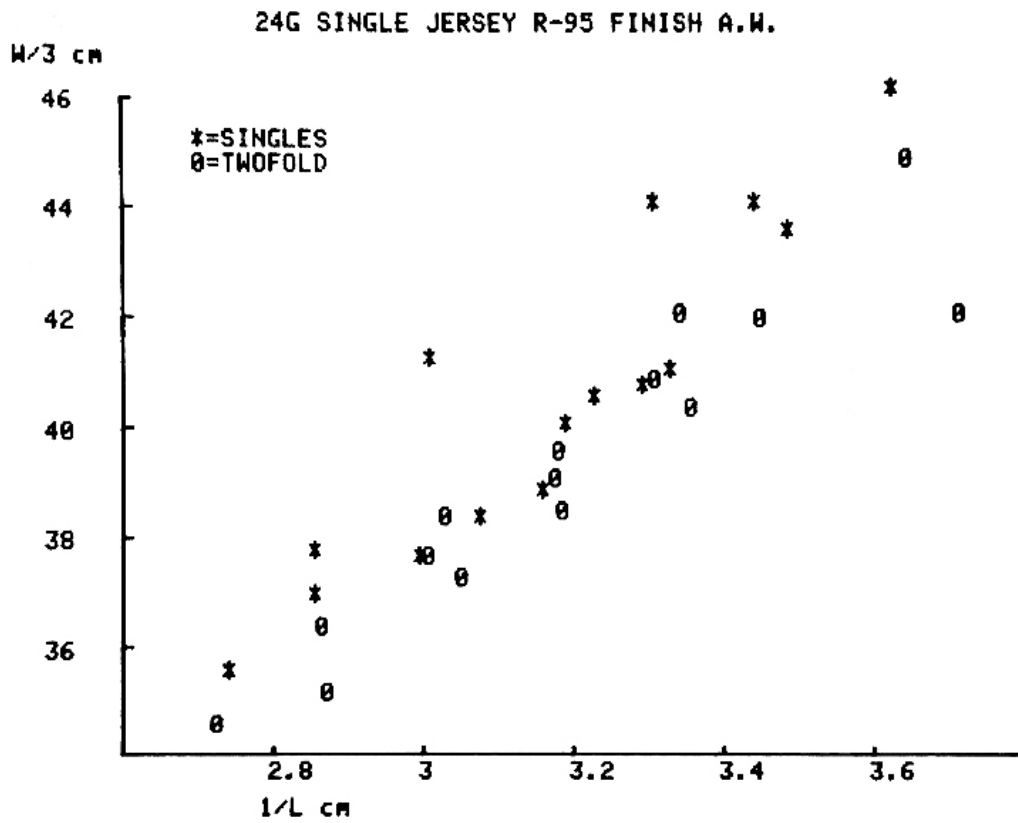


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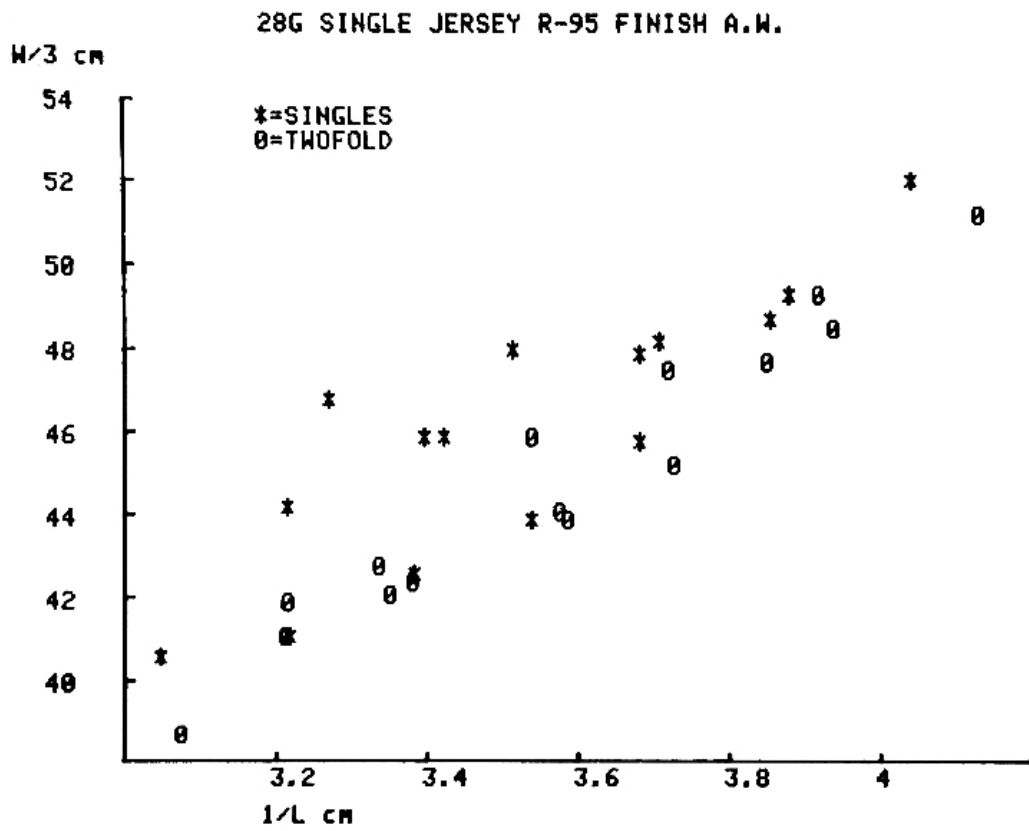


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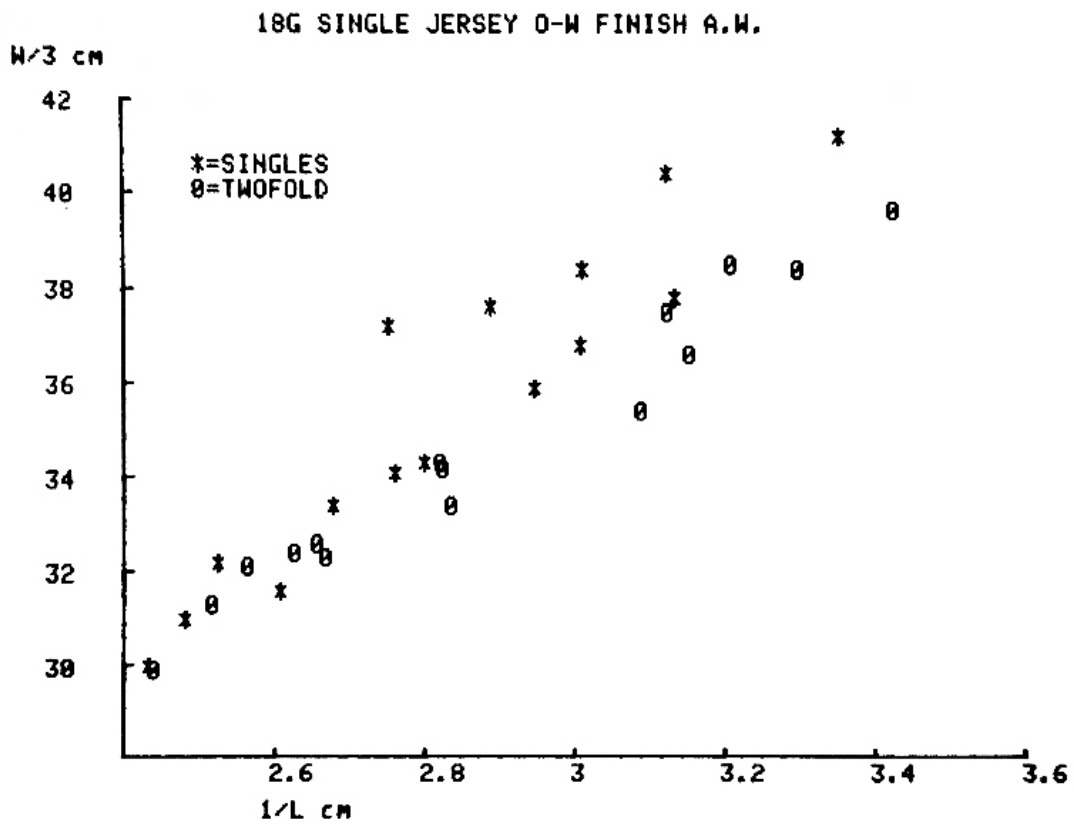


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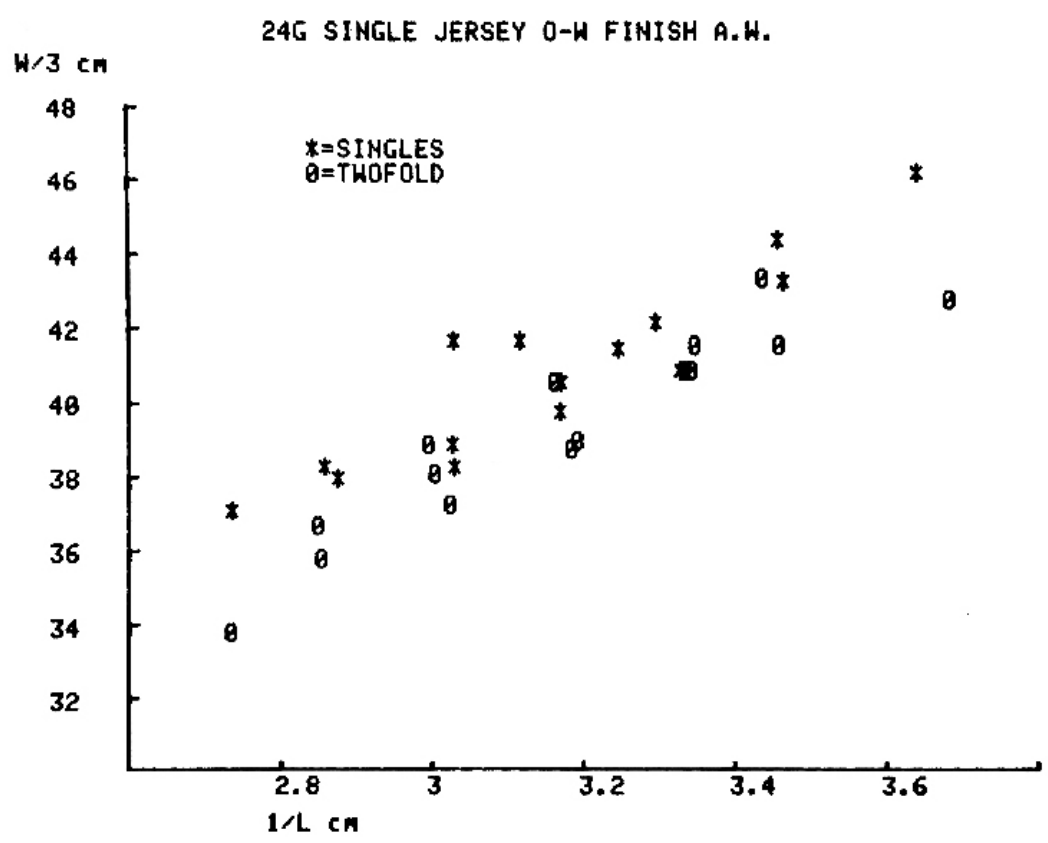


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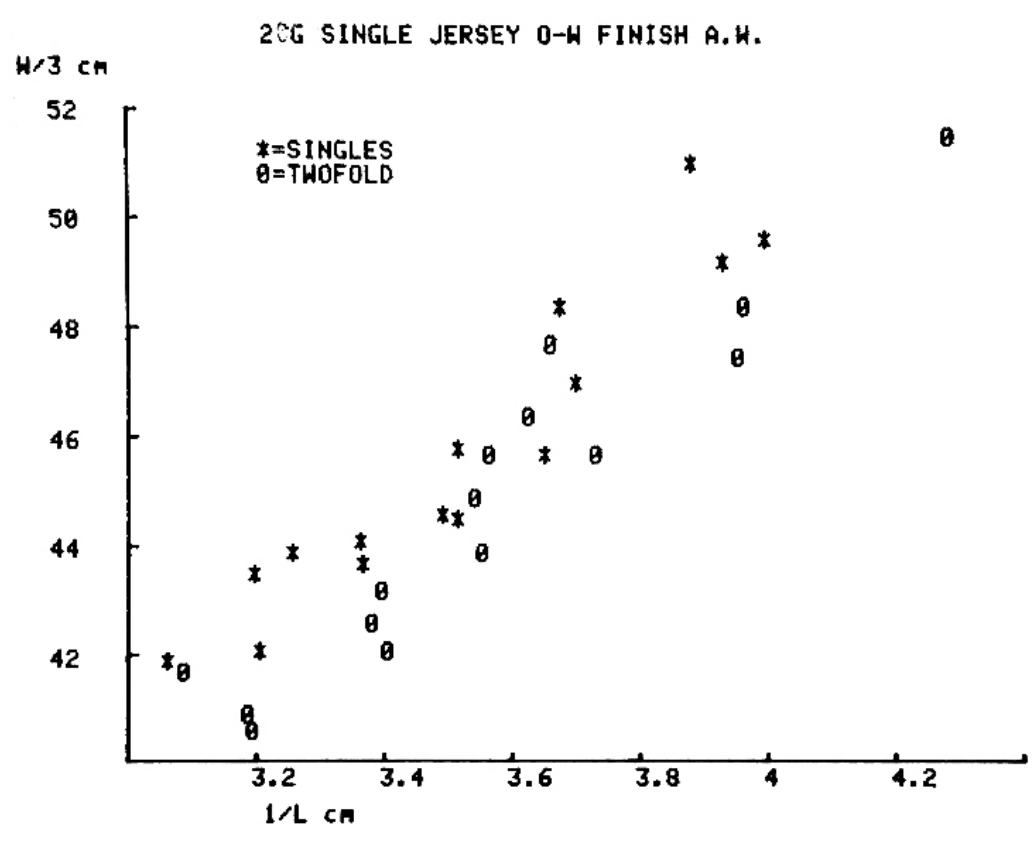


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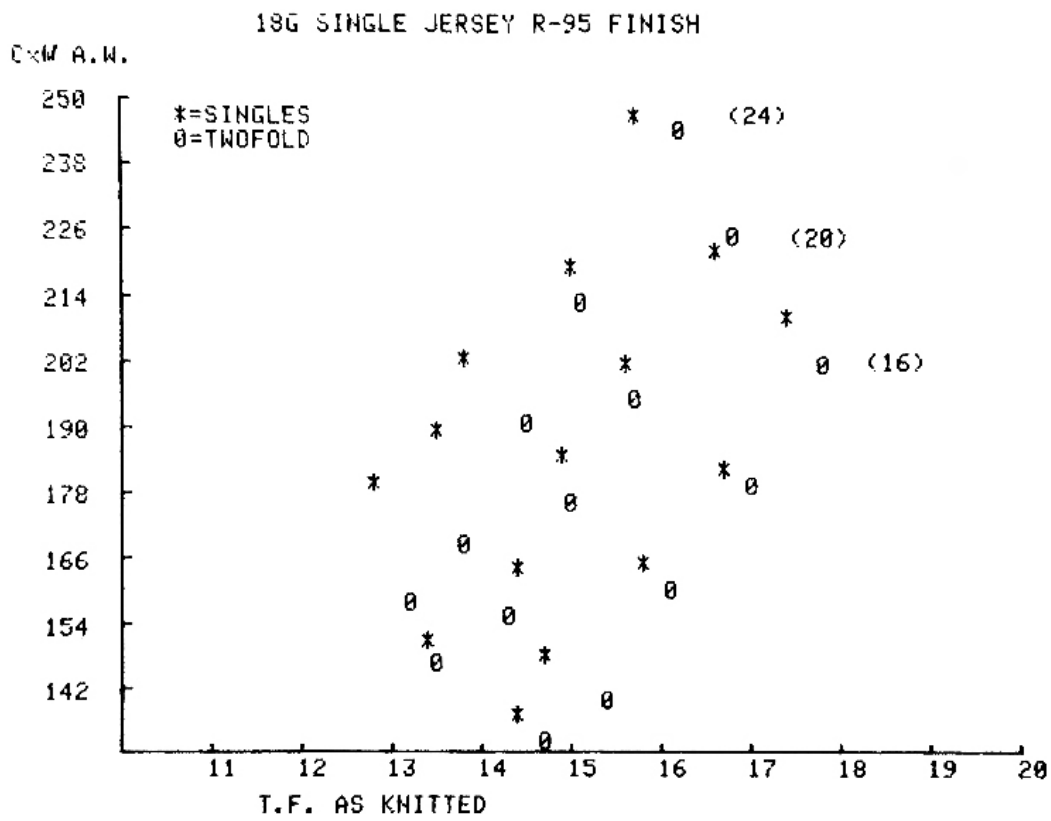


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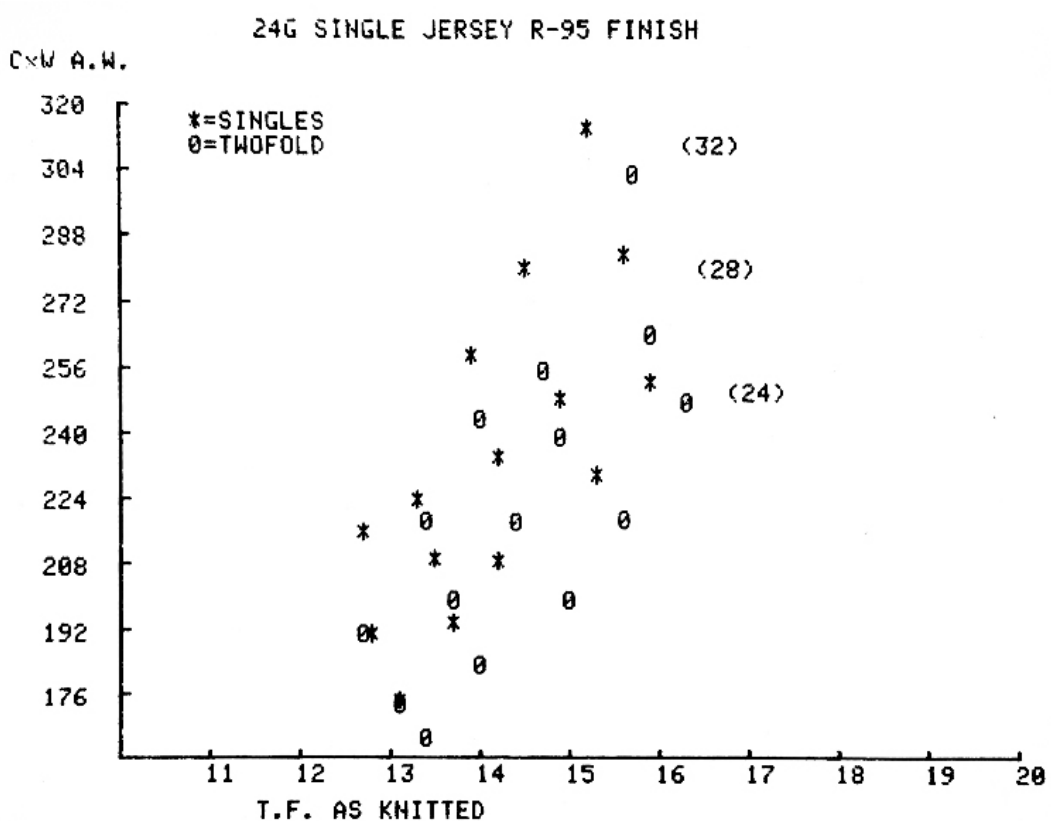


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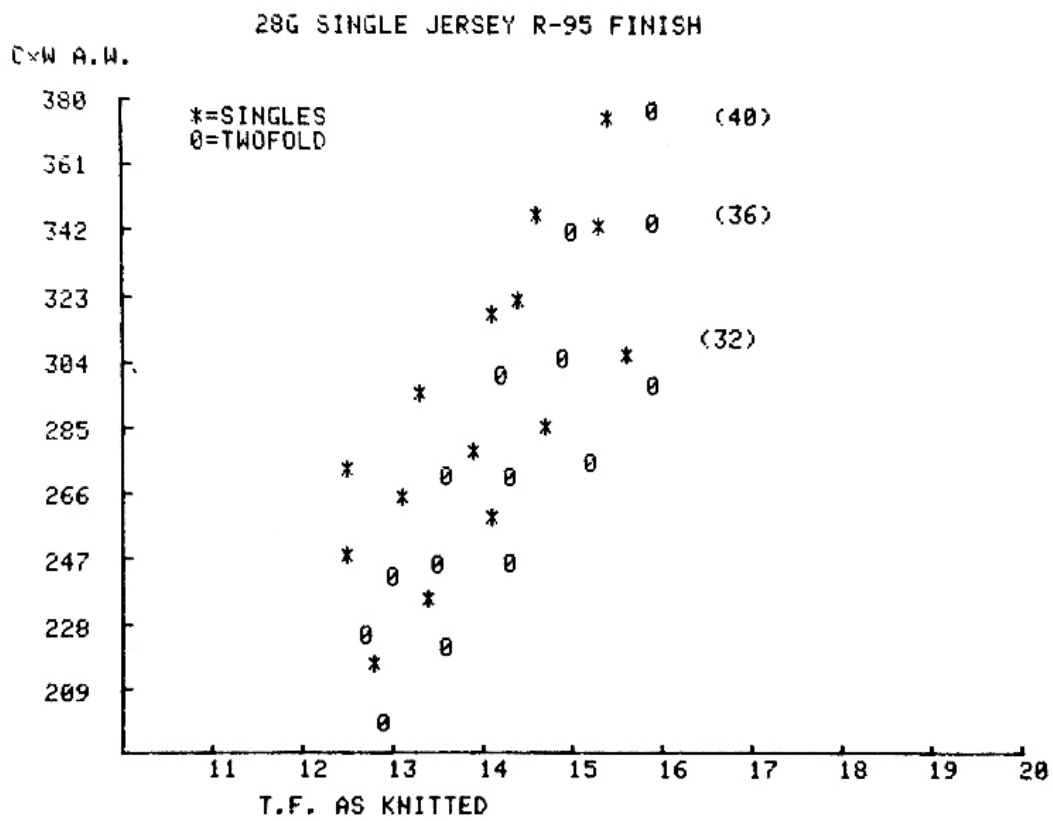


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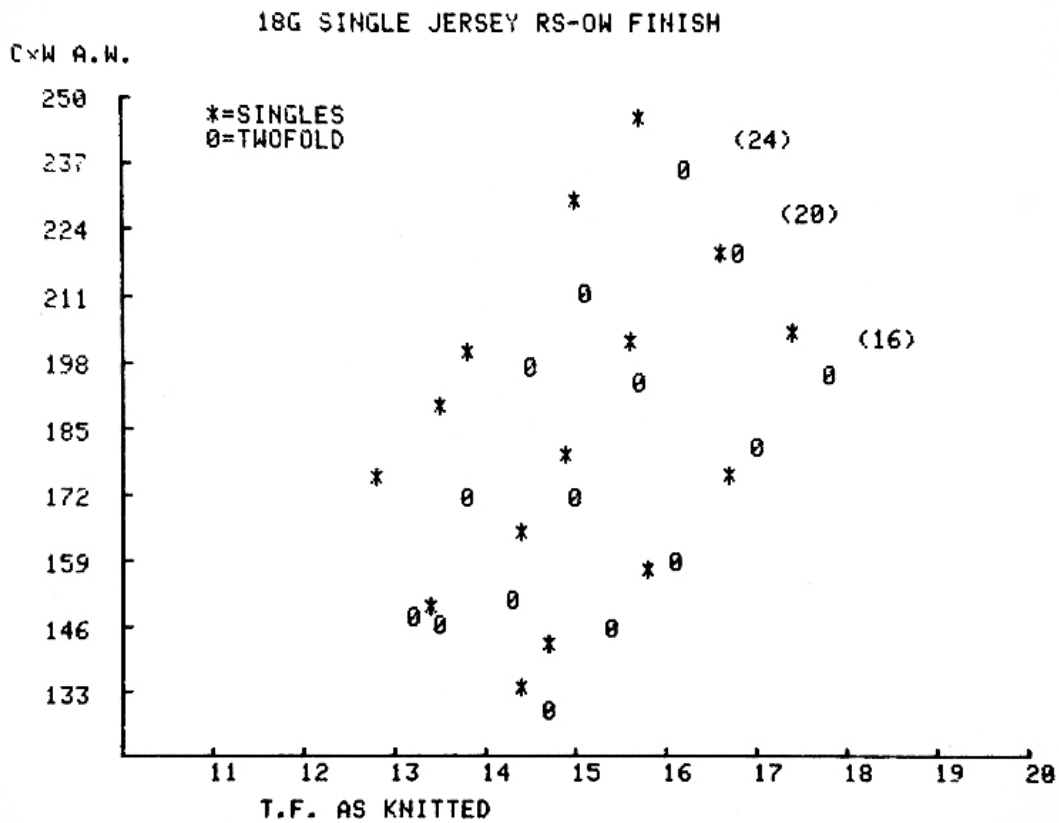


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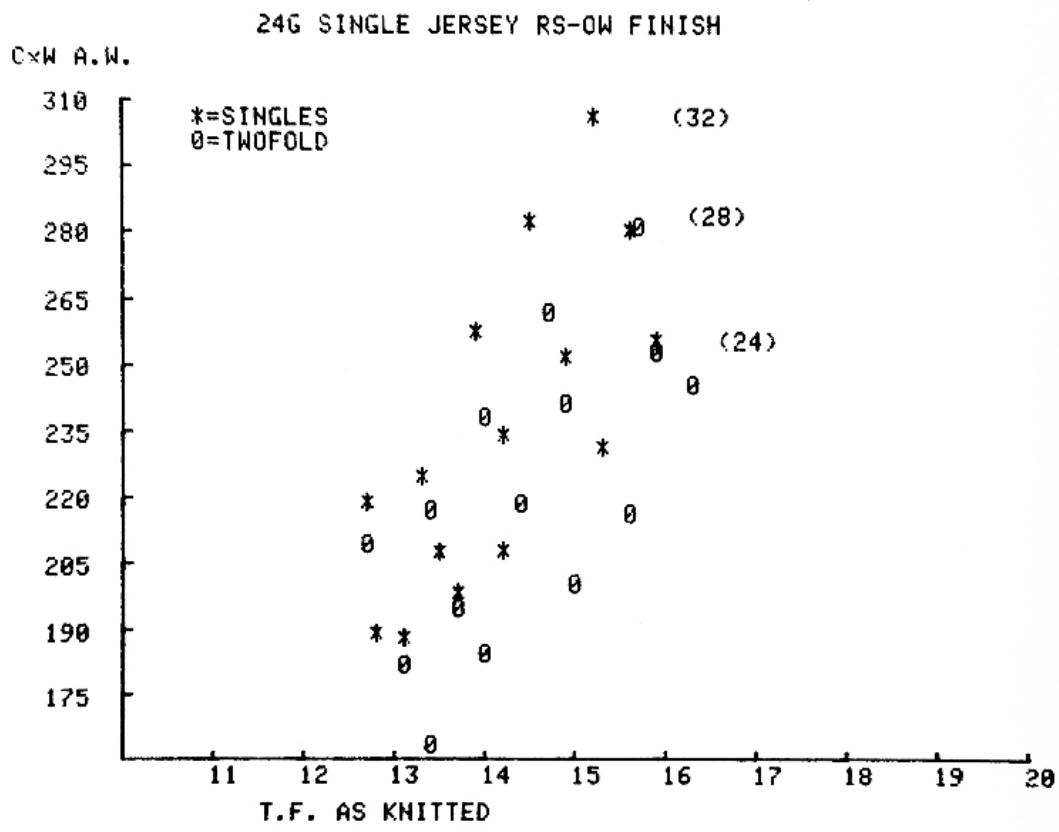


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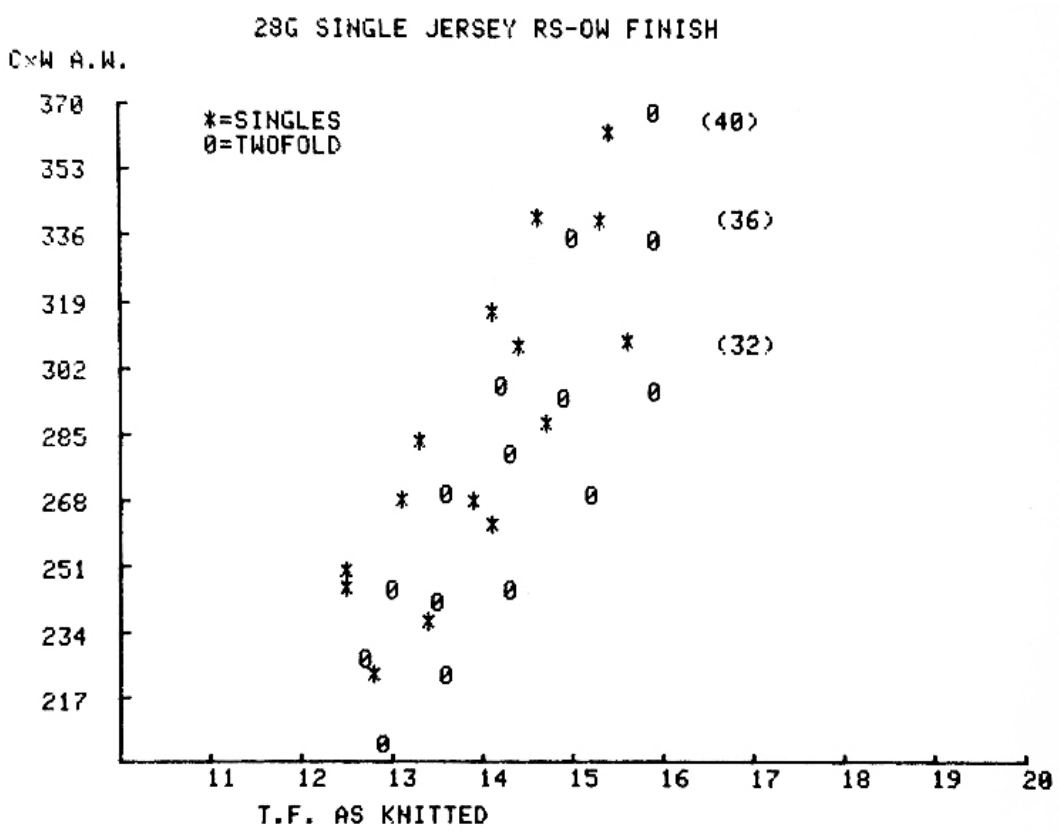


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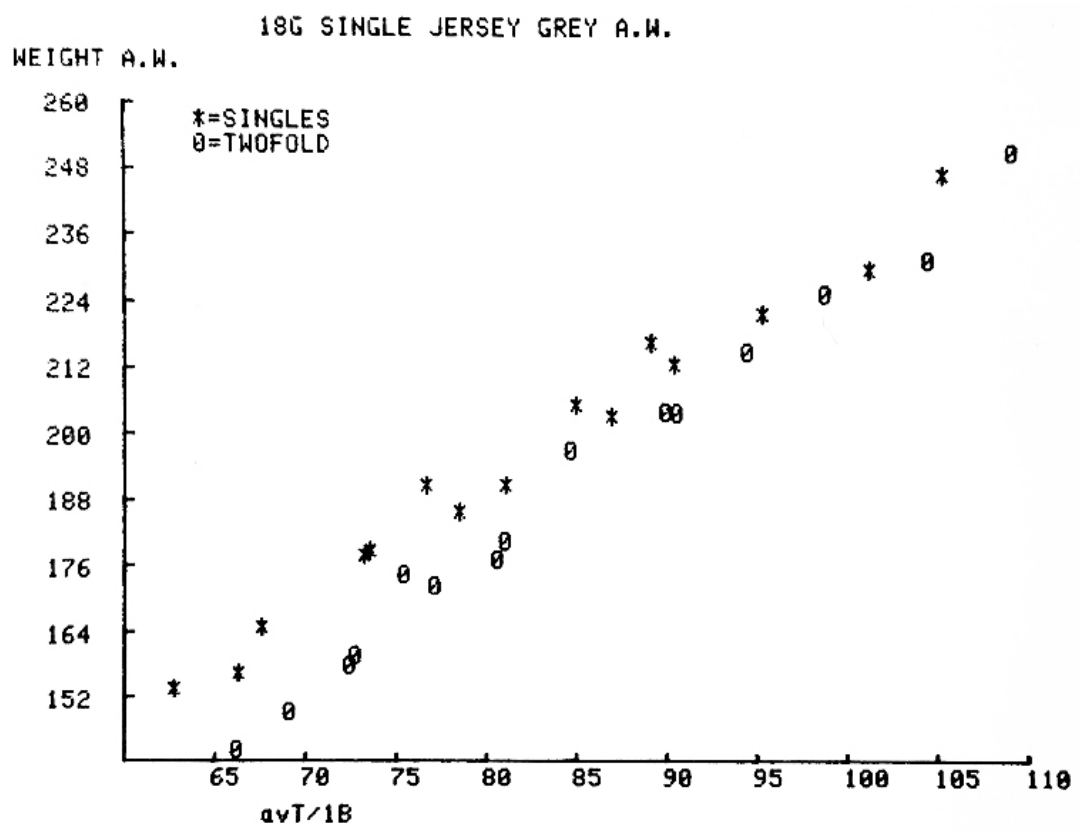


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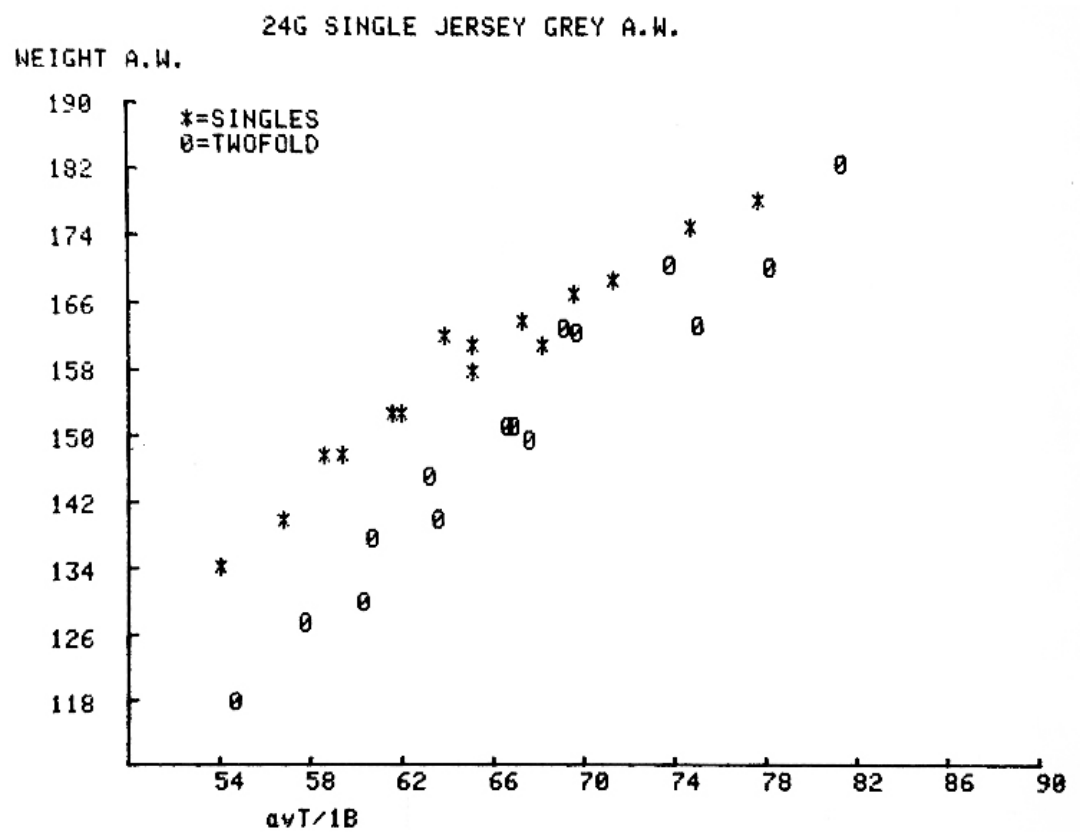


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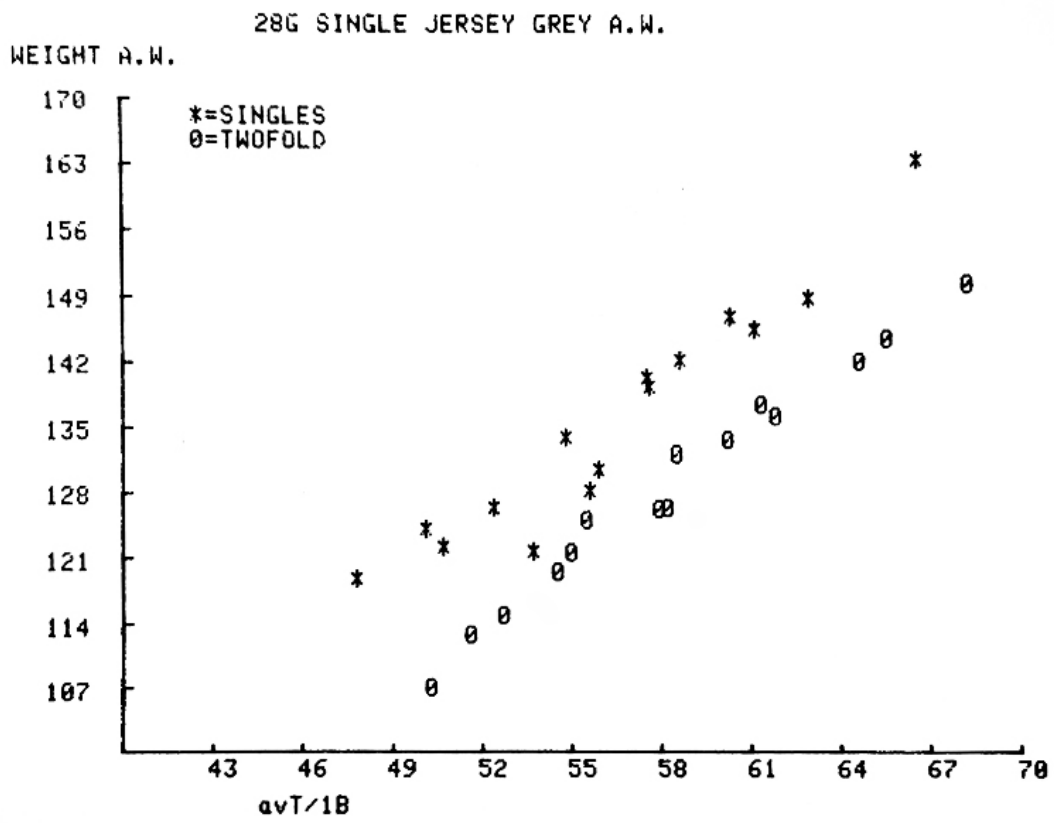


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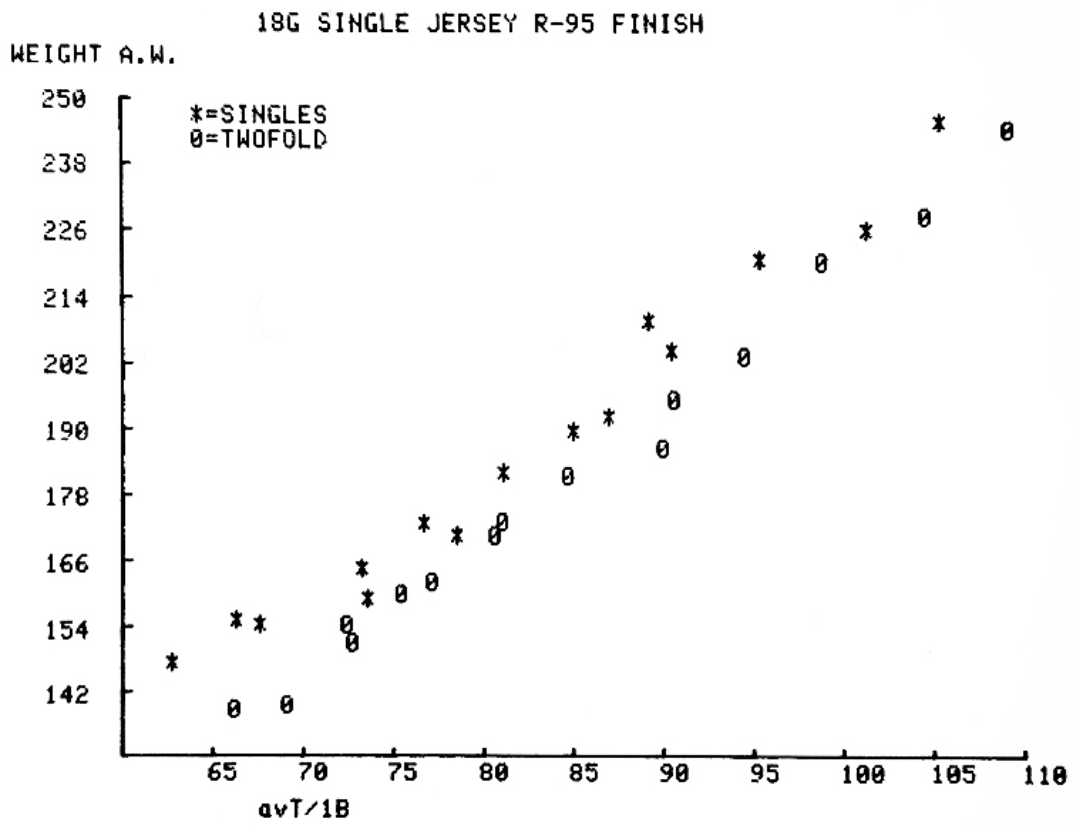


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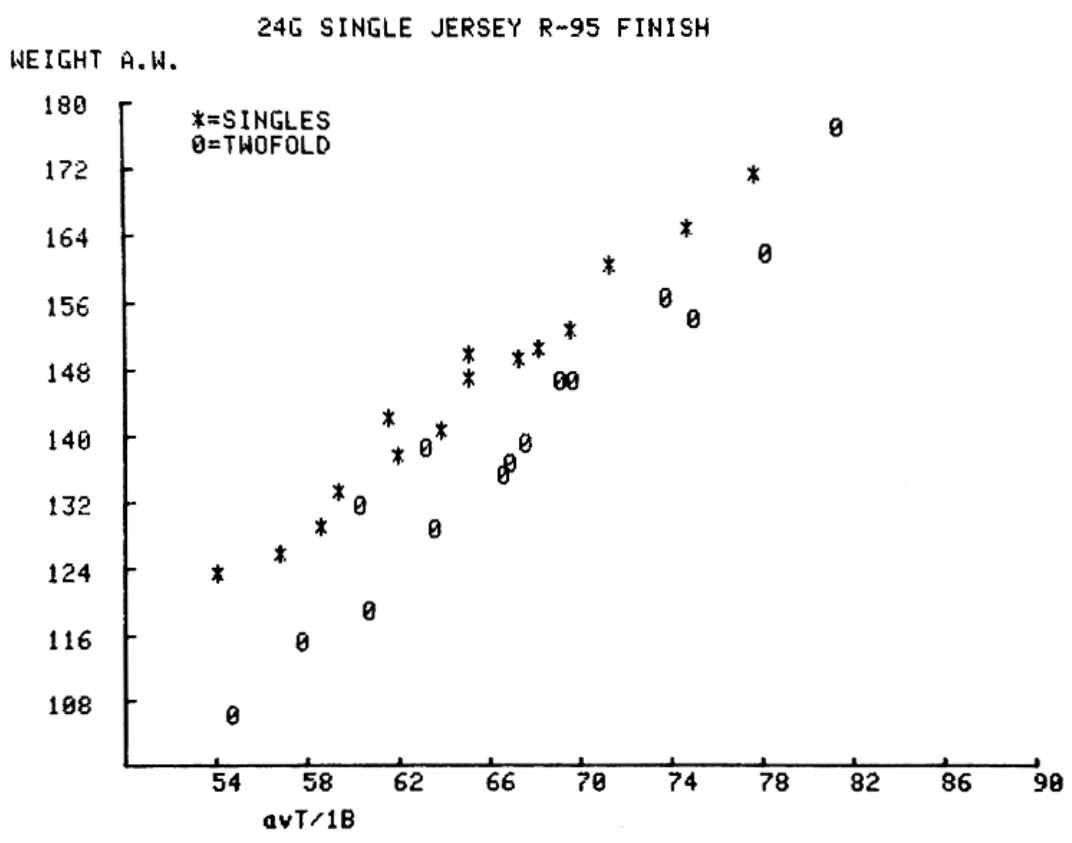


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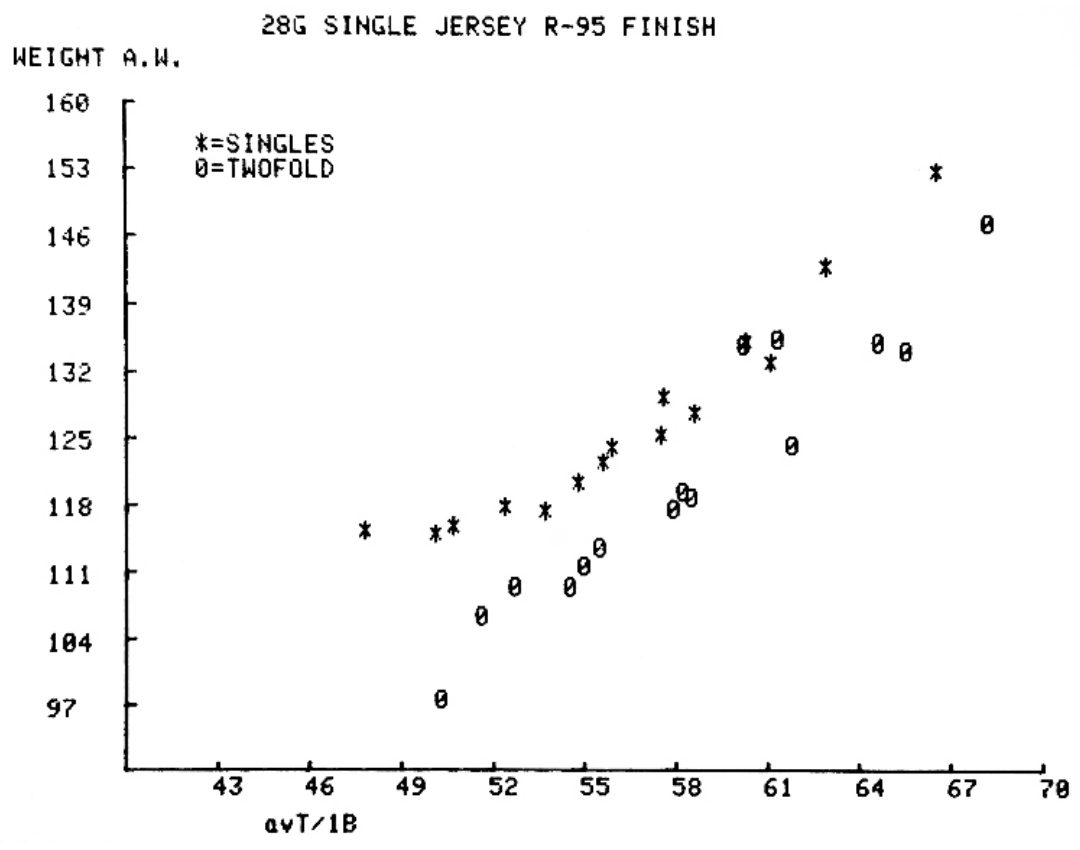


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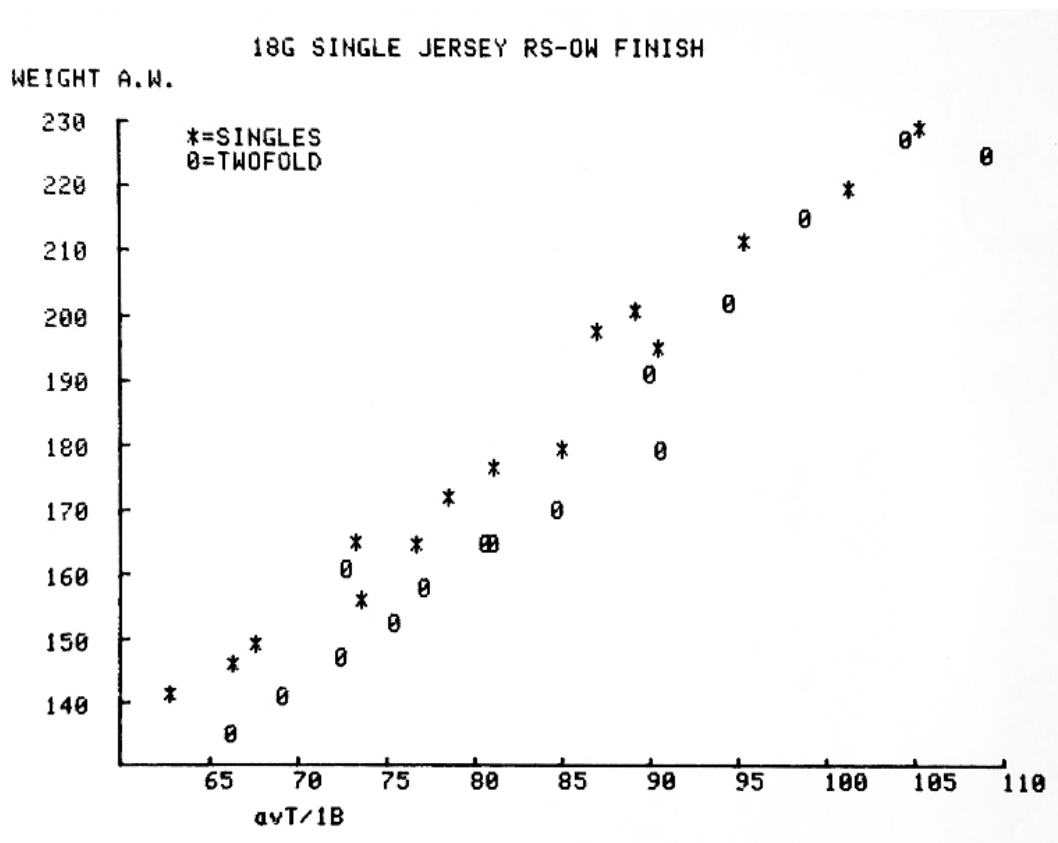


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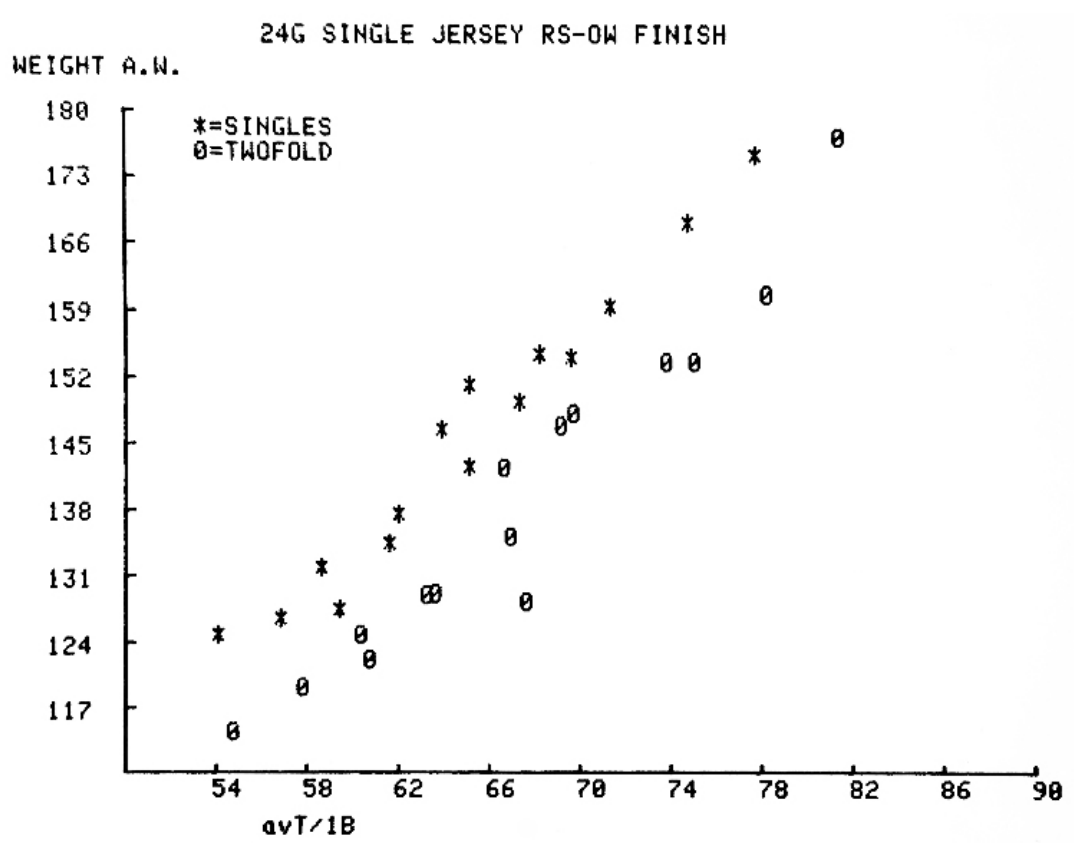


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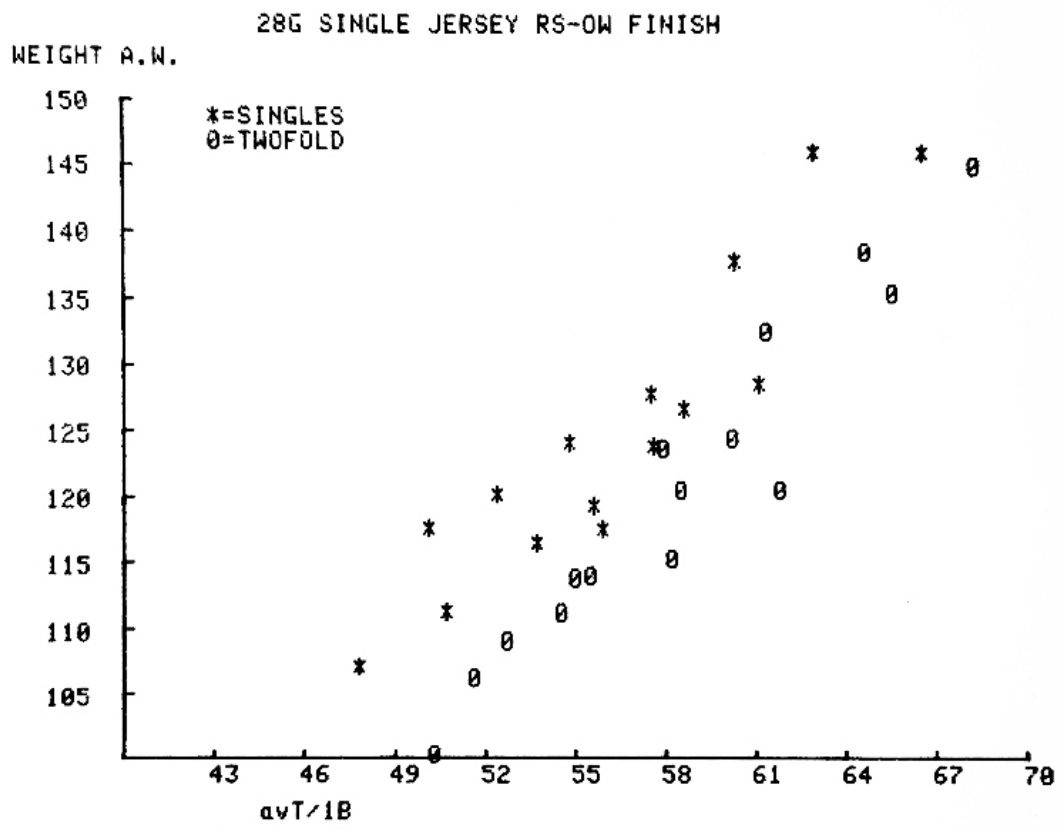


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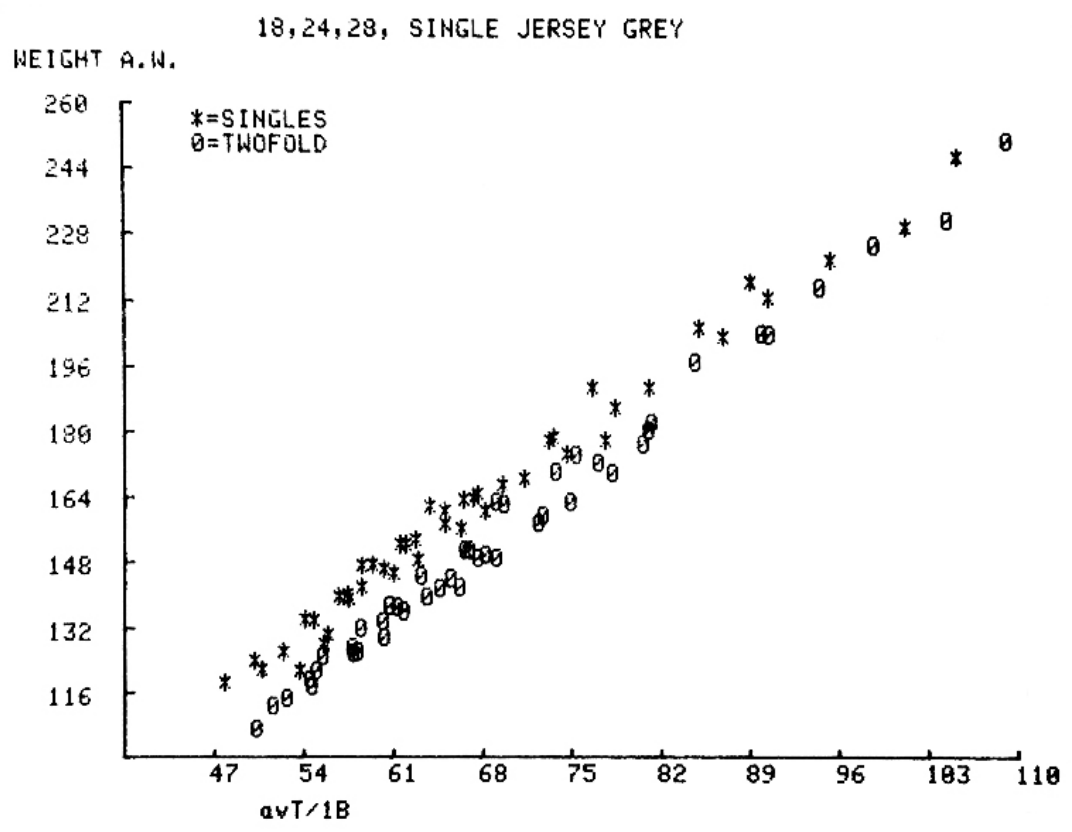


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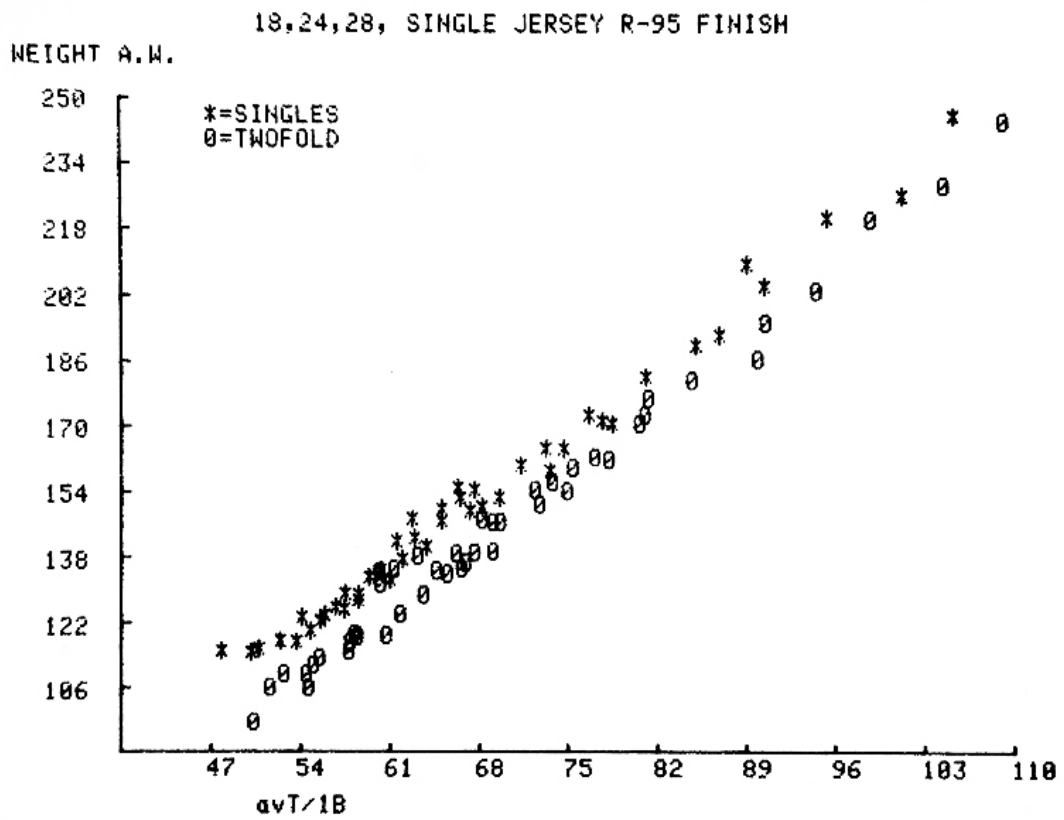


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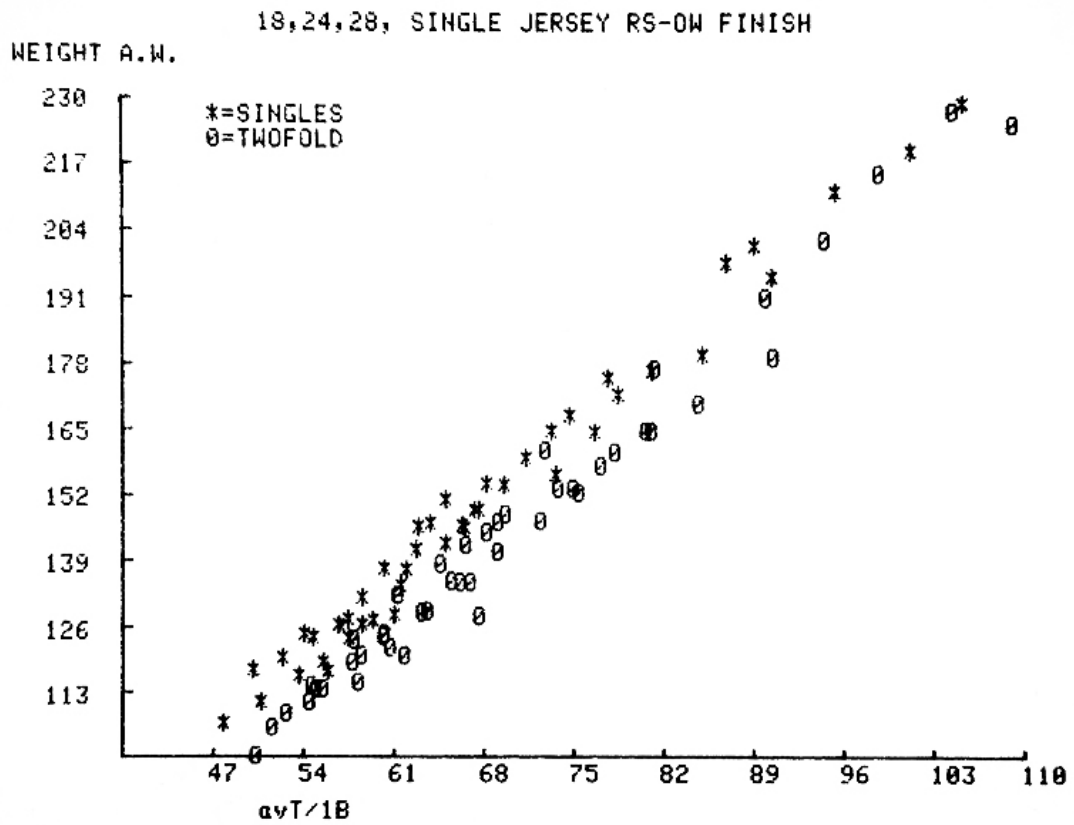


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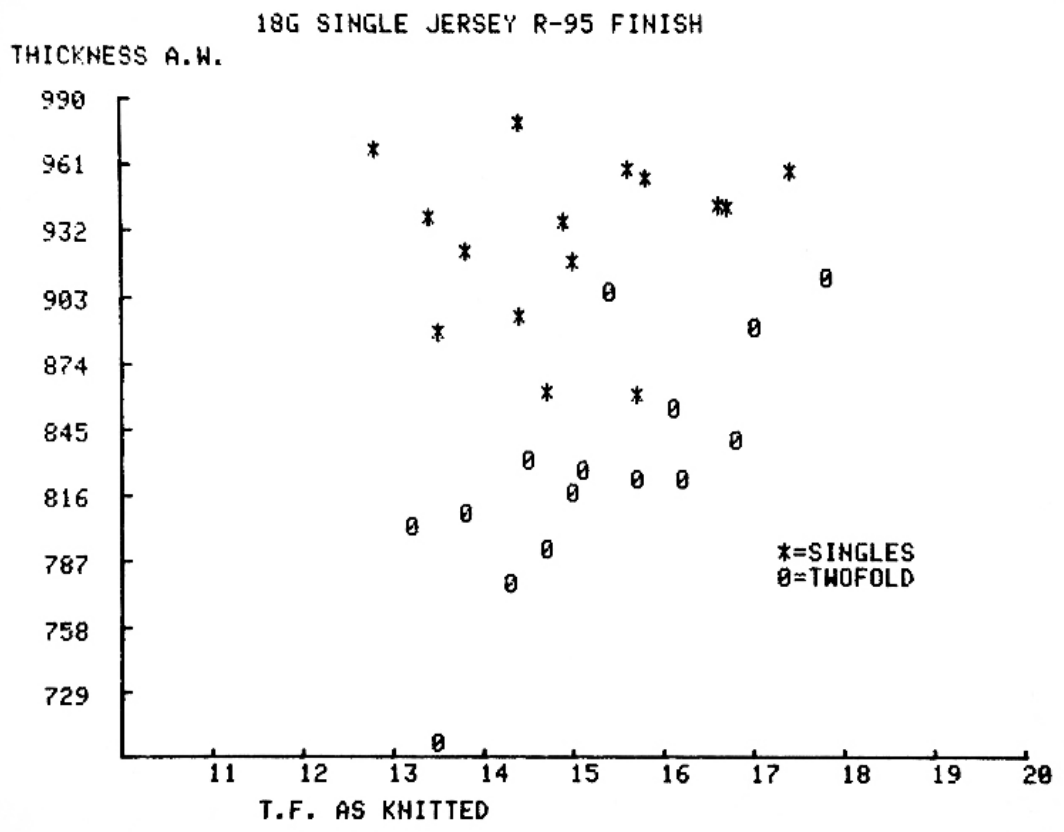


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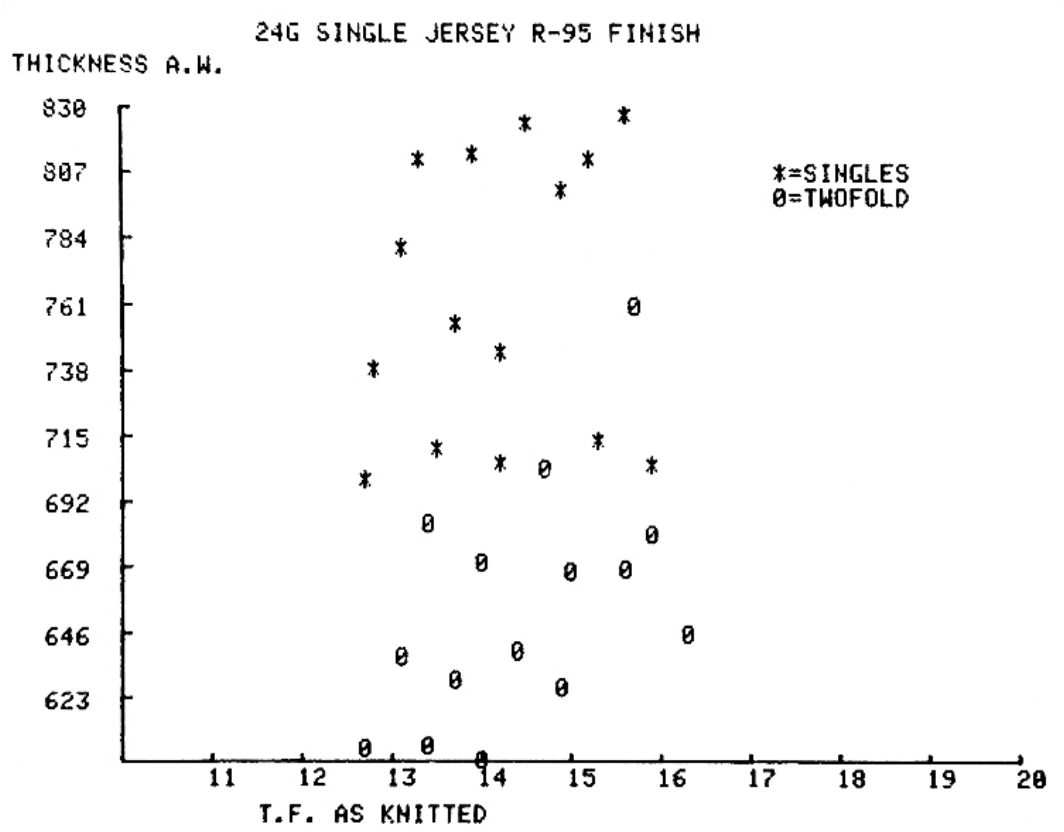


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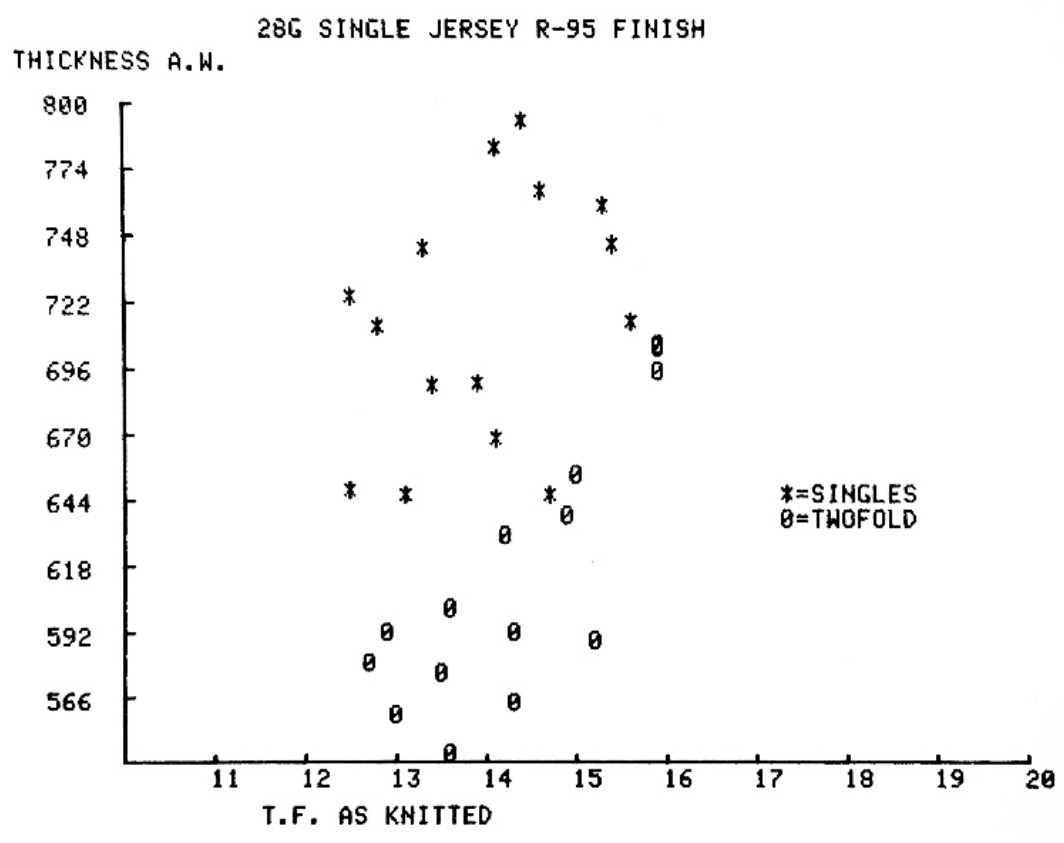


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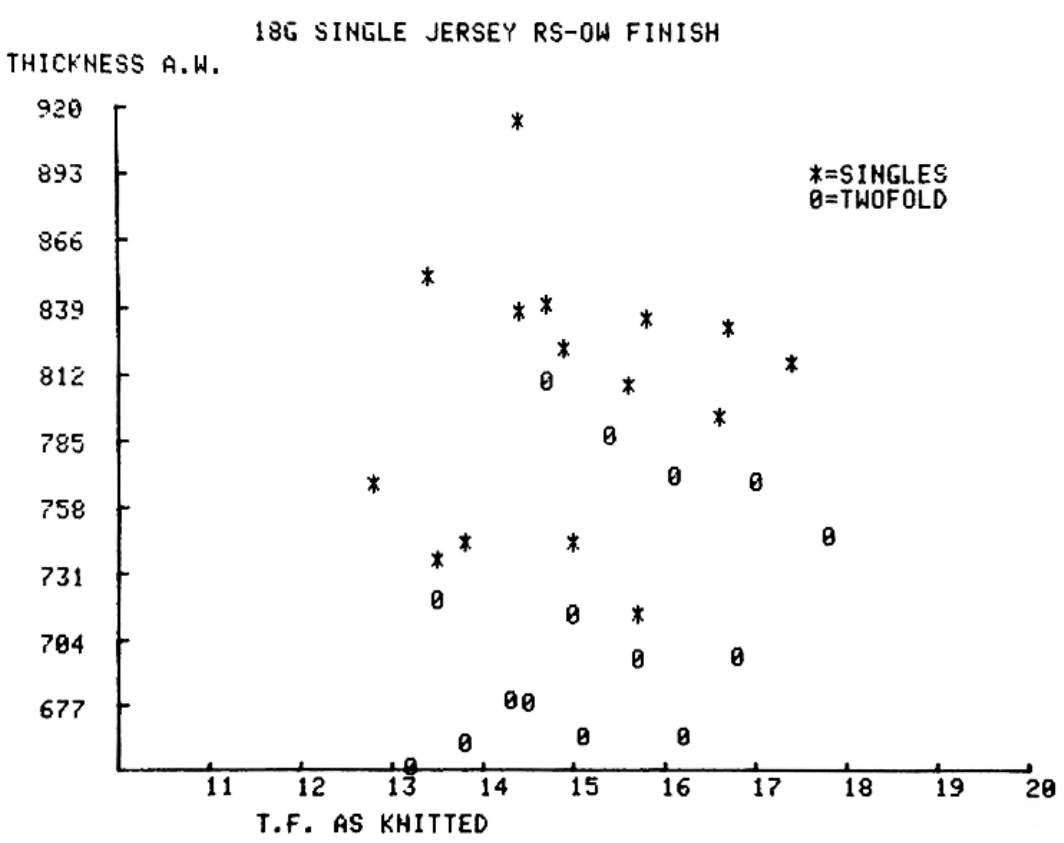


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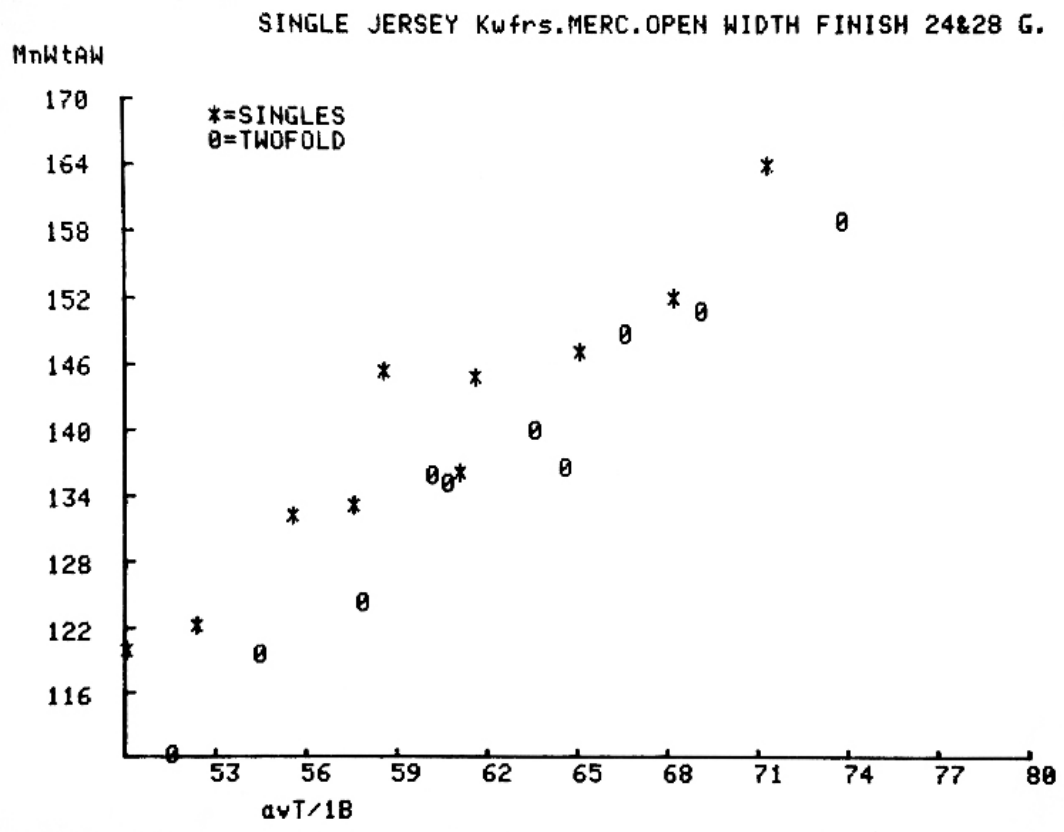


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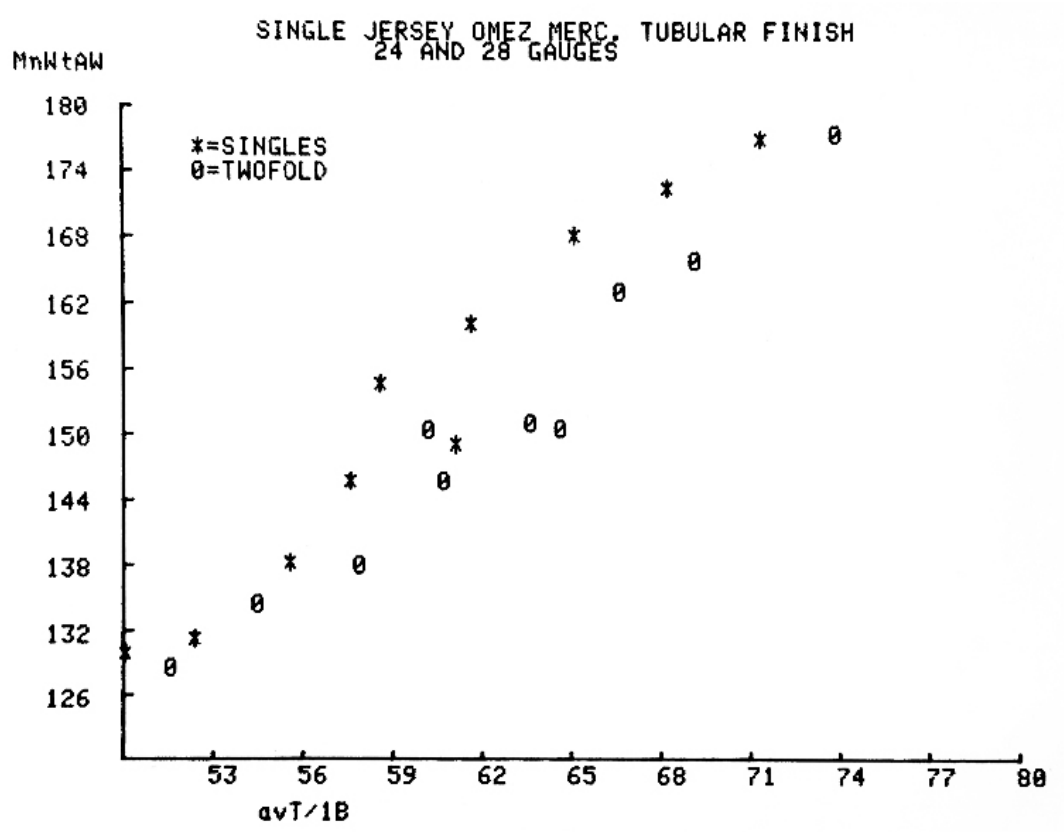


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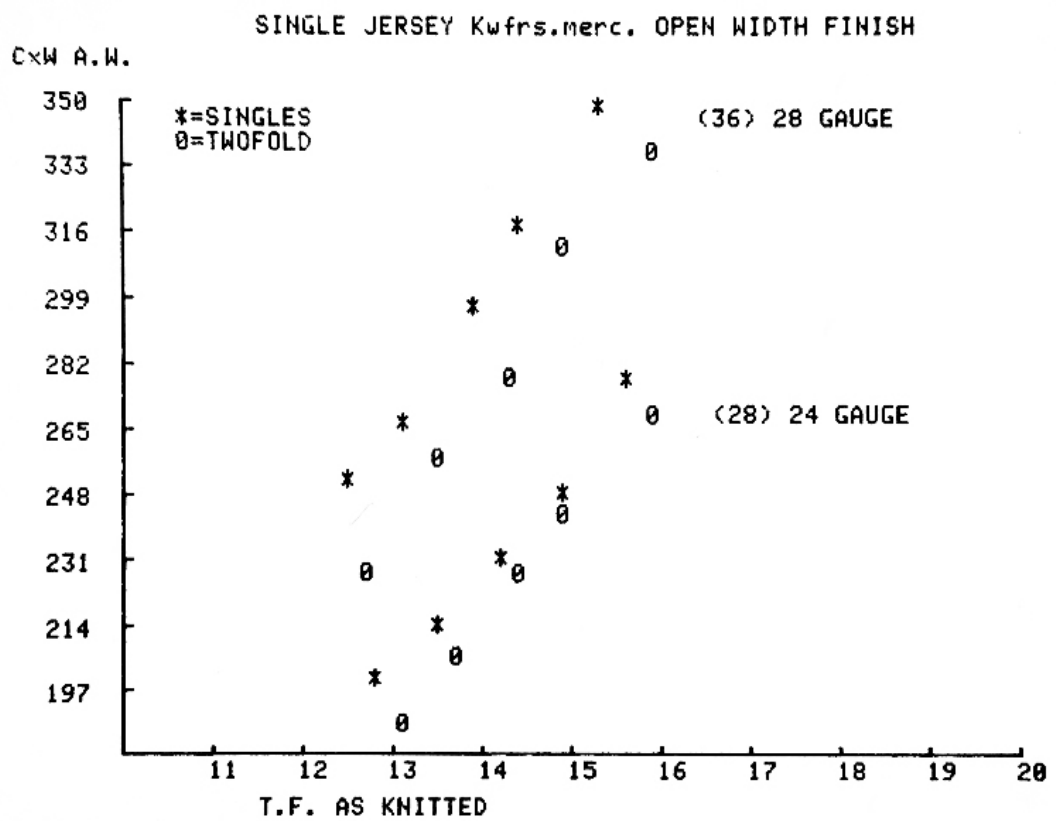


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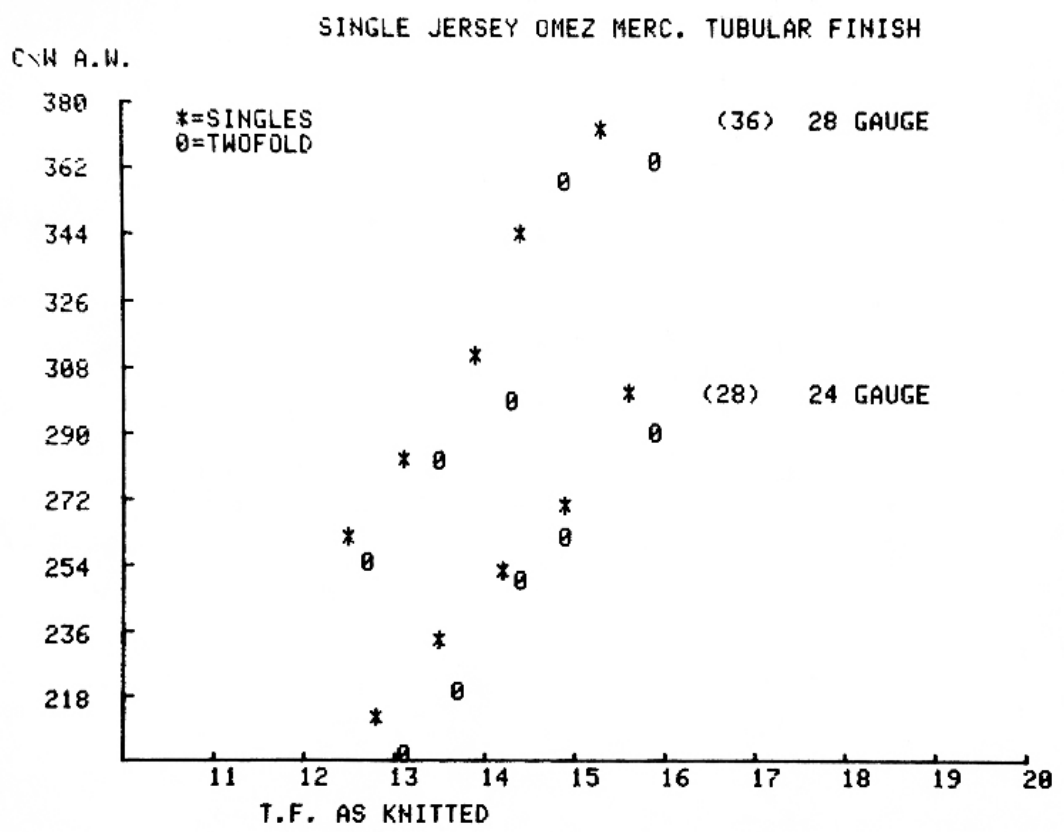


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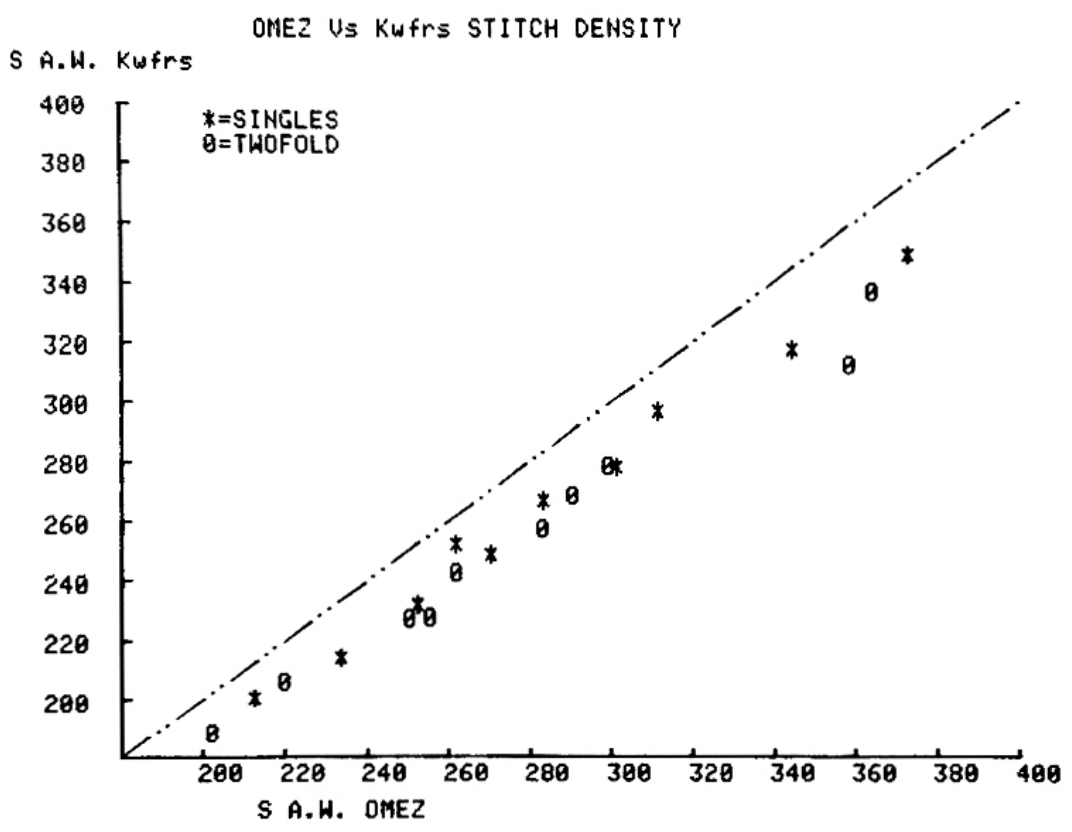


Figure 48

