

BRISTOL AERO-INDUSTRIES LIMITED

WINNIPEG DIVISION

ER 4073

STRUCTURAL ANALYSIS

804-184200-242-122 TUBE
CENTRE SECTION TROSS

EXPEDITOR 3.

N. D. Brewster
24 APRIL 1955

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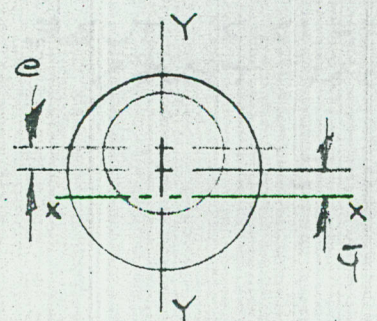
INTRODUCTION

THE CENTRE SECTION TRUSS TUBE, P/N
 004-184200-242-122, ON A/C 4B113
 IS WORN .013" ON ONE SIDE AND
 DIA. REDUCED TO .988" WHERE TAIL
 PIPE ATTACHMENT BRACKET IS
 SECURED.

SIR
 155E

ANALYSIS

THE TUBE IS TREATED AS AN
 ECCENTRIC HOLLOW CIRCLE



OD = .988
 ID = .834
 e = .013

$A = .2204 \text{ in}^2$ $\bar{y} = .0279 \text{ in}$
 $I_{xx} = .0227 \text{ in}^4$ $I_{yy} = .0230$
 $K_{xx} = .3209$ $K_{yy} = .3233$

ANNO
 MAR 1
 SEC V
 SUB SEC
 6.1.1

Now:

$L = 34.76 \text{ IN WITH } C = 2.$

$\therefore L' = \frac{34.76}{\sqrt{2}}$

$= 24.58 \text{ in}$

BREN
 REPORT

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STRUCTURAL ANALYSIS
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$$\frac{L}{K_x} = 76.6 \quad \frac{L'}{K_{x'}} = 76.0$$

TRANSITIONAL $\frac{L'}{K}$ FOR H.T. ALLOY STEEL
 = 56

ANCS

... WE HAVE A LONG COLUMN.

THIS COLUMN, HOWEVER, HAS A VARYING CROSS SECTION.

REF AVRO MANUAL VOL 1, SEC V,
 SUB SEC 6.3, FIG 6.3.1-2

$$P_{CR} = \pi^2 \frac{E_1 I_1}{L^2}$$

L' IS USED FOR L

$$\left. \begin{matrix} a \\ L \end{matrix} \right\} a = 1.0 \quad L = 24.58$$

$$\therefore \frac{a}{L} = .0407$$

$$\left. \begin{matrix} \frac{E_1 I_1}{E_2 I_2} \end{matrix} \right\} E_1 = E_2$$

$$I_1 = .02534 \text{ FOR } 1" \phi \times .083 \text{ WALL}$$

AVRO MAN
 VOL 1
 SEC V
 SUB 4.2.1

$$I_x = .0227 + .2209 (.083 + .087)^2$$

$$= .0233$$

$$I_y = .0230$$

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FOR MIN P_{CR} , I_2 MIN MUST BE USED

$$\therefore \frac{E_1}{E_2} \frac{I_1}{I_2} = \frac{.02534}{.0230} = 1.1$$

$$\therefore M = 9.92 \text{ FROM FIG}$$

$$\therefore P_{CR} = 9.92 \frac{29 \times 10^6 \times .02534}{(24.58)^2} = 12060 \text{ LBS}$$

ACTUAL LOAD = 10165

$$\therefore RF = \frac{12060}{10165} = 1.18$$

\therefore ADEQUATE

$$\text{SINCE } D/t = .988 / .063 = 15.7 < 50$$

LOCAL INSTABILITY IS NOT INVESTIGATED

REFERENCES

BEECH AIRCRAFT CORPORATION
STRUCTURAL ANALYSIS 37, REPORT 700.

BEECH REPORT

ANC'S