STRESS REPORT

7/0558/50

ENGINE
MANIFOLD
ACCESS
PANEL

Classification cancelled / Changed to UNCLASS
By authority of AWES
Date 23 Sept 81
Signature
Unit / Rank / Appointment AWES

CONFIDENTIAL

J Thurston

A. V. ROE CANADA LIMITED
MALTON - ONTARIO

TECHNICAL DEPARTMENT (Aircraft)

ANALYZED

AIRCRAFT: C105

REPORT No. 7/0558/50

FILE No. CONFIDENTIAL

No. OF SHEETS: 9

TITLE: ENGINE MANIFOLD ACCESS PANEL

		SHEET.
1.	DOOR EFFICIENCY	1 – 7
2.	INSTABILITY STRESS FOR EDGE MEMBER	8
3.	RIVETING.	9

Classification cancelled / Changed to UNCLASS
By authority of AVRO
Date 30 Sept 56
Signature D Bull
Unit / Rank / Appointment AVRO

PREPARED BY G. M. COILET. DATE 27-12-55

CHECKED BY DATE

SUPERVISED BY DATE

APPROVED BY DATE

ISSUE No.	REVISION No.	REVISED BY	APPROVED BY	DATE	REMARKS
					15867 401

FORM 1316A

A. V. ROE CANADA LIMITED
MALTON · ONTARIO
TECHNICAL DEPARTMENT (Aircraft)

REPORT No. 7/0558/50
SHEET No. 1

AIRCRAFT:		PREPARED BY	DATE
C105	ENGINE MANIFOLD	G M. COILET	23-10-50
	ACCESS PANEL	CHECKED BY	DATE
	ENGINE BAY.		

DRG Nº 7-0158-289

CONFIDENTIAL

DOOR EFFICIENCY :-

INITIAL LACK OF FIT OF BOLT

FROM AN STANDARDS

AN 509 — Nº 10-32 N.F.-3A

MAX. DIA = .1890 $\bar{x} + .0015$

MIN DIA = .1860 $\bar{x} - .0015$

AV ROE STANDARD TOLERANCES.

(CLASS I FIT HOLE $+.001\ 0$)

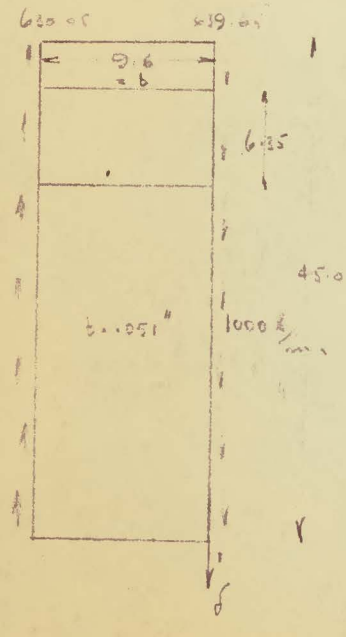
CLEARANCE HOLE $+.003\ -0$.

IF BOLT IS DOWN AND HOLE UP :-

DIFFERENCE ON DIA. = .0045 —

DIFFERENCE ON RADIUS = .00225 in.

DEFLECTION OF SPAR PANEL



$$\delta = \frac{\sum q_n q_{ab}}{Gt}$$

$$\text{WEB } q_n = \frac{1}{45.0 - 6.35} = \frac{1}{38.65} = .0259 \text{ in}$$

$$q = \frac{1000 \times 45}{38.65} = 1165 \text{ lb/in}$$

$$\delta = \frac{.0259 \times 1165 \times 38.65 \times 9.6}{3.9 \times 10^6 \times .051}$$

$$= 0.0562 \text{ in.}$$

NOTE: NO TEMP. EFFECTS NEED TO BE USE WITH A SHEAR FLOW OF 100 lb/in

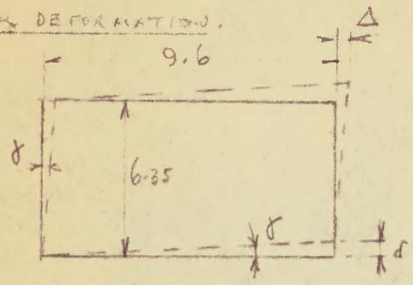
FORM 1316A

A. V. ROE CANADA LIMITED
MALTON · ONTARIO
TECHNICAL DEPARTMENT (Aircraft)

REPORT NO.
SHEET NO. 2

AIRCRAFT:		PREPARED BY	DATE
C105	ENGINE MANIFOLD ACCESS PANEL	G.M. COILEY	28-6-55
		CHECKED BY	DATE

SHEAR DEFORMATION.



$9.6\gamma = \delta$ AND $6.35\gamma = \Delta$

$\therefore \frac{\delta}{9.6} = \frac{\Delta}{6.35}$

THEN $\Delta = \frac{6.35}{9.6}\delta$

FOR $\delta = .0562$

$\Delta = .0372$ in.

COMPARING THIS DEFLECTION WITH INITIAL LACK OF FIT OF .0045 in.

LACK OF FIT, $\eta = \frac{.0372 - .0045}{.0372} = \frac{.0327}{.0372} = .879$.

BOLT SLIP.

{ FOR 1/4 DIA BOLTS
TEST RESULTS – SPECIMEN 7 & 211

SAY SHEAR FLOW IN PANEL = 800 #/in.

LOAD ON EACH 3/16 BOLT = $\frac{800 \times 6.35}{5} = 1020$ #.

ULT. BEARING STRENGTH OF 3/16 BOLT = 974 × 1.46 = 1420 #.

LOAD AS A % AGE OF ULT = $\frac{1020}{1420} \times 100 = 71.9\%$.

From TEST RESULTS (SPECIMEN 7AD 211) REP REF T2, 2104
RT No 3641-733

SLIP FOR 1/4 DIA BOLT = .013 in.
SAY SLIP FOR 3/16 BOLT IS THE SAME.

THEN SLIP $\eta = \frac{.0327 - .013}{.0327} = \frac{.0247}{.0327} = .756$

∴ OVERALL η @ 1000 #/in = .879 × .756 = .664

RM 1319A

A. V. ROE CANADA LIMITED
MALTON · ONTARIO
TECHNICAL DEPARTMENT (Aircraft)

REPORT No.
SHEET No 3

AIRCRAFT:		PREPARED BY	DATE
C105	ENGINE MANIFOLD ACCESS PANEL	G. A. COILEY	23-10-51
		CHECKED BY	DATE

DOOR SURROUND.

LOAD IN CARRIED BY DOOR = 664 #/"

LOAD TO BE CARRIED BY SURROUND = (1000 − 664) × 6.35

= 336 × 6.35

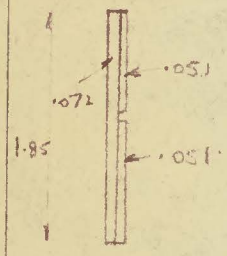
= 2130 #

B.M. = M = $\frac{2,130 \times 9.6}{4}$

= 5,110 ℔ ″

BENDING SECT – HORIZONTAL MEMBERS

SAY EFFECTIVE Z = $\frac{.123 \times 1.85^2}{6}$ = .0701 in.³



f = 72,800 #/in.²

SIDE MEMBERS f = 47,000 × $\left(\frac{1.35}{2.75}\right)^2$

= 30,700 #/in.²

INSTABILITY STARTS FOR .072 DOUBLER.

SAY f_c = 0.53 × 10.5 × 10⁶ × $\left(\frac{.072}{.75}\right)^2$

= 51,000 #/in.²

F_{cy} = 64,000 #/in.²

RF 1.08

FORM 1319A

A. V. ROE CANADA LIMITED
MALTON · ONTARIO
TECHNICAL DEPARTMENT (Aircraft)

REPORT No. _____
SHEET No 5

AIRCRAFT:		PREPARED BY	DATE
C 105	ENGINE MANIFOLD ACCESS PANEL	G. M. COLLEW	24-10-57
		CHECKED BY	DATE

USEING SLIP AS GIVEN FOR 3/16 DIA DIMPLED RIVETS

1ST APPROX

SAY LOAD/IN IN DOOR = 700 #/in

LOAD/BOLT = 890

SLIP FOR .064" = .021 in

SAY " " .051" = $\frac{.021 \times .064}{.051}$ = .0263 in

THEN SLIP η = $\frac{.0351 - .0263}{.0351}$ = $\frac{.0088}{.0351}$ = .251

∴ TOTAL η = .251 × .944 = .237

2nd APPROX

SAY LOAD/IN = 350 #/in

LOAD/BOLT = 445 #

SLIP FOR .064 = .009

" " .051 = .0113 in

THEN SLIP η = $\frac{.0351 - .0113}{.0351}$ = $\frac{.0238}{.0351}$ = .678

TOTAL η = .678 × .944 = .640

3RD APPROX

LOAD/IN = 509 #/in

LOAD/BOLT = 636 #

SLIP FOR .064 = .0130

SLIP FOR .051 = .0163

THEN SLIP η = $\frac{.0351 - .0163}{.0351}$ = $\frac{.0188}{.0351}$ = .526

TOTAL η = .526 × .944 = 49.6 %

FORM 1318A