

STRESS REPORT

7/0558/63

NATURAL
FREQUENCIES
UNDER
LATERAL
LOAD OF
FUSelage
FORMERS

Classification: ~~Cancelled~~ / Changed to UNCLASS
By authority of AS
Date 20 September 1963
Signature [Signature]
Unit / Rank / Appointment NAES



A. V. ROE CANADA LIMITED
MALTOB - ONTARIO

ANALYSED

TECHNICAL DEPARTMENT (Aircraft)

AIRCRAFT:

REPORT NO. 7-0558-63

FILE NO. ~~CONFIDENTIAL~~

NO. OF SHEETS: 12

Classification cancelled / Changed to UNCLASS
By authority of AVCS
Date 30 Sept 96
Signature [Signature]
Unit / Rank / Appointment AVCS

TITLE:

NATURAL
FREQUENCIES
UNDER LATERAL LOAD
OF
FUSELAGE FORMERS

Stn. 591.65, 644.43, 697.28, 742.50
485.00 538.77

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PREPARED BY [Signature] DATE 25/1/56
CHECKED BY DATE
SUPERVISED BY [Signature] DATE Feb. 5.6.
APPROVED BY DATE

ISSUE NO	REVISION NO	REVISED BY	APPROVED BY	DATE	REMARKS
1					

15865926

FORM 1364



AVRO AIRCRAFT LIMITED
MALTON - ONTARIO

TECHNICAL DEPARTMENT

REPORT NO. 7-0558-63

SHEET NO. 1

AIRCRAFT:

C 105

PREPARED BY

DATE

CHECKED BY

DATE

Calculation of Natural Frequency

CONFIDENTIAL

The Natural Frequency f , in cycles/sec., is given by

$$f = \frac{1}{2\pi n} \sqrt{\frac{k}{m}}$$

where: k = spring constant of structure, in lb. of load per inch of deflexion.

m = mass of structure and equipment, in lb.sec./in.

The values of k , for the five formers under consideration, were obtained in the following reports:

Stn. 591.65 Rep. 7-0558-47

644.43 7-0558-62

697.28 "

742.50 "

538.77 "



AVRO AIRCRAFT LIMITED
MALTON - ONTARIO

TECHNICAL DEPARTMENT

REPORT No. 7-0558-63

SHEET NO. 2

AIRCRAFT:

C 105

PREPARED BY

J. Shaw

DATE

20 | 2 | 56

CHECKED BY

DATE

Calculation of Natural Frequency cont'd.

M is assumed to be the mass of all structure and items of equipment which are situated below the Φ duct, and within half a length forward and half a length aft of the former under consideration. Structure and items of equipment which are situated above the Φ duct are considered not to contribute to the mass which is supported by the former.

M is assumed to be concentrated at the point of application of the lateral load.

TECHNICAL DEPARTMENT (Aircraft)

REPORT No. 7-0558-63

SHEET No. 3

AIRCRAFT:

C 105

STA 538.77 - 742.50

PREPARED BY

DATE

J. J. [Signature]

21/12/55

CHECKED BY

DATE

Weights of Items Mounted Below Φ Duct, Between above Sta.

STA.	ITEM	WEIGHT To nearest lb.	
509.50 to 567.50	Hydraulic Piping (wet)	21	
485 538	} Dive Brake Jacks	33	
491	2 Service Panels i) Refuel + Test ii) Aft Circuit Limiter	8	
524 538	} Main Alternator & Rectifier Panels (2 Panels + Boxes)	175	
514 519	} } Ground Fault Relays (2 off)	9	
529 534	} }		
539	2 Small Valves i) Dive Brakes Selector ii) Emergency by pass for Utility System	6	
542	V/C Selector valve	4	
548	Heat Exchanger (Fuel to Oil) Fuel Proportioner	100	356.

A. V. ROE CANADA LIMITED
MALTON - ONTARIO

TECHNICAL DEPARTMENT (Aircraft)

REPORT NO. 7-0558-63

SHEET NO. 4

AIRCRAFT:

C 105

STA. 538.77 - 742.50

PREPARED BY

DATE

J. J. [Signature]

21 12 55

CHECKED BY

DATE

Weights of Items Mounted Below & Duct, Between above Sta.

STA.	ITEM	WEIGHT to nearest lb.
567.50 to	Hydraulic Piping (wet)	30
615.65	Heat Exchanger (Air to Oil) 2 off	20
580	} Oil Tanks, Auxiliary 2 off (wet)	26
581		
586		
590	Oil Filter	9
594	Regulator Valve	5
594	Switch	1
610	Gear Boxes, Hub Drive	} 300
615	Pumps, 6 off	
596	} Accumulator	60
630		Pressure Manifold
615.65 to	Hydraulic Piping (wet)	34
673.25	} Hydraulic Compensators 2 off (wet) mounted on V brace @ sta 644.43	72
644		
647	} Drain Sump (wet)	19
658		
654	Manifold - Pump 2 off	7

454

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A. V. ROE CANADA LIMITED
MALTON, ONTARIO

TECHNICAL DEPARTMENT (Aircraft)

REPORT NO. 7-0558-63

SHEET NO. 5

AIRCRAFT:

C105

STA 538.77-742.50

PREPARED BY

DATE

CHECKED BY

DATE

21 12 55

Weights of Items Mounted Below ϕ Duct, Between above Sta.

STA	ITEM	WEIGHT to nearest lb
673.25 to 717.36	Hydraulic Piping (wet)	5
697 } 707 }	Hydraulic Accumulators (Flying Controls) 2 off	44
	Control valves 2 off	8
	Pressure Switches 2 off	3
690	Filters 2 off mounted on beam at ϕ duct	15

75

N.B. this table is based on information received from D.O.

AVRO AIRCRAFT LIMITED
MALTON ONTARIO

TECHNICAL DEPARTMENT

REPORT NO. 7-0558-63

SHEET NO. 6

AIRCRAFT:

C 105

FORMER STN
485.00

PREPARED BY

Doherty

DATE

29/2/56

CHECKED BY

DATE

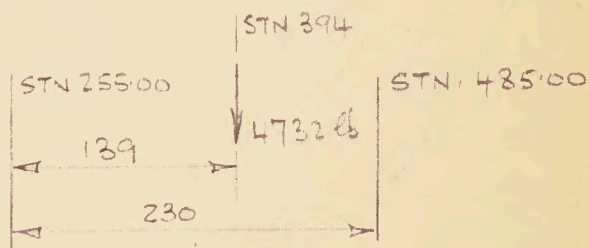
Estimated Weights of items betweenstn. 370.00 and 509.50

Armament Pack: 3700 lb. (D. Turner 29/2/56)
 assume that half of this (1850 lb) is applied
 at stn. 485.00

Fuel Tank + Fuel:

Tank structure: 250 lb assume @ stn 394.31
cells and fuel: 4482 lb. @ stn. 394.31
 (K. Griffin + J. Watson 29/2/56)

Total: 4732 lb @ stn 394.31



$$\text{Reaction @ stn. 485.00} = \frac{139 \times 4732}{230} = \underline{2860 \text{ lb.}}$$

$$\text{Structure (below } \phi \text{ duct)} = \underline{696 \text{ lb.}}$$

(J. Maclean 29/2/56)

$$\text{Power Panel} = 70 \text{ lb. @ stn. 493}$$

(A. Shaw 29/2/56)



AVRO AIRCRAFT LIMITED
MALTON - ONTARIO

TECHNICAL DEPARTMENT

REPORT NO. 7-0558-63

SHEET NO. 7

AIRCRAFT:

C105

FORMER STN
485.00

PREPARED BY

D. Stone

DATE

1/3/56

CHECKED BY

DATE

Hydraulic Equipment mounted on fwd base
of Frame stn. 485.00 (Ref. dwg 7-1954-1)

Item	No.		Est. weight
	part	dwg ref	
Check Valve	7-1994-12	(3)	1 lb.
Pressure Switch	7-3258-35	(4)	0.5 lb.
Coupling, half fixed	CS-C-154-12	(6)	} 3 lb.
" " "	CS-C-152-16	(7)	
Wheel Brake valve 2 off	7-1954-11	(5)	4 lb pair
Piping, wet	—	—	10 lb. 19.



AVRO AIRCRAFT LIMITED
MALTON - ONTARIO

TECHNICAL DEPARTMENT

REPORT NO. 7-0558-63

SHEET NO. 8

AIRCRAFT:
C 105

FORMER STN
485.00

PREPARED BY J. Shuman	DATE 1/3/56
CHECKED BY	DATE

Flying Controls mounted on Frame 485.00
(Ref dwg. 7-1554-1)

Item	No		Est. Weight
	part	dwg ref	
Pulley Bracket	7-1554-33	(3)	0.8 lb
" "	7-1554-26	(4)	0.8
" "	7-1554-25	(5)	0.8
" "	7-1554-29	(6)	1.0

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AVRO AIRCRAFT LIMITED
MALTON - ONTARIO

TECHNICAL DEPARTMENT

REPORT No. 7-0558-63

SHEET No. 9

AIRCRAFT:

C 105

FORMER STN
485.00

PREPARED BY

DATE

CHECKED BY

DATE

11 3 56

Electrical Equipment mounted fwd of
frame 485.00 (Ref dwg 7-1154-1)

Item	No		Est. weight
	part	dwg ref.	
Accessory panel E5	7-1154-4	(2)	41
Distribution " E4	7-1154-13	(3)	15
wiring for above			15
Electronics Cables @ 2.0 lb/ft run 370-485			19
Radio + Radar cables @ 0.5 lb/ft run 370-485			5
<u>Cables aft of 485.00</u>			
Electronics @ 1.0 lb/ft run 485-509.5			2
Radio + Radar @ 0.5 lb/ft run 485-509.5			1

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AVRO AIRCRAFT LIMITED
MALTON - ONTARIO

TECHNICAL DEPARTMENT

REPORT No. 7-0558-63

SHEET No. 10

AIRCRAFT:

C105

FORMER STN.

485'00

PREPARED BY

J. Shaw

DATE

1/3/56

CHECKED BY

DATE

Summary of Items considered acting
at Frame 485'00

Item.	Est weight
Armament Pack	1,850 lb
Fuel Tank + Fuel	2,860
Structure below Φ duct	696
Power Panel	493
Hydraulic Equipment fwd of 485'00	19
Flying Controls " " "	4
Electrical Equipment " " "	} 98
Cables (Radio, Radar, + Electronics) ^{370'0} -509'5	
Σ	6,020 lb



AVRO AIRCRAFT LIMITED
MALTON - ONTARIO

TECHNICAL DEPARTMENT

REPORT NO. 7-0558-63

SHEET NO. 11

AIRCRAFT:

C 105

PREPARED BY

J. Stone

DATE

20/2/56

CHECKED BY

DATE

STN.	509.50 TO 567.50	567.50 TO 615.65	615.65 TO 673.25	673.25 TO 717.36	717.36 TO 768.00	768.00 TO 803.00	803.00 TO 870.00	
SKIN.	538.77	591.65	644.43	697.28	742.50	803.00	870.00	
STRINGERS	38.75	29.12	36.0	34.80	39.30	6.00	72.50	
FORMERS	2.14						29.13	
D.B. LONGERON	52.40	72.00	76.8	70.50	80.00	14.86	181.75	
LONG. BEAMS	43.17	14.51				5.45	153.94	
DIVE BRAKE ACC.	24.73	3.14						
DUCT	10.85	12.95	19.36	9.39	8.44		25.71	
ACC. PANELS STIFF.	103.80	9.38					112.81	
MAIN ENG. FRAME	12.22						8.58	
ENG. TUNNEL	41.50							
E.B. LONG.		43.65	72.70	74.90	35.85			
ENG. ACC. DOOR		22.37	28.97	16.94	7.52	40.48		
TORSION BOX		27.17	49.86					
LONG. BEAMS		13.75	16.25	1.55	2.15		25.62	
CENTRE BEAM			0.49	4.11				
TUNNEL								
LONG. TORS. BOX								
TOTAL	329.56	248.04	300.43	212.19	223.32	92.21	696.18	

FLOOR

MISC

Ref Memo from W't Dept.



AVRO AIRCRAFT LIMITED
MALTON ONTARIO

TECHNICAL DEPARTMENT

REPORT No. 7-0558-63

SHEET No. 12

AIRCRAFT:

C 105

PREPARED BY
D. Shme

DATE
20 2 56

CHECKED BY

DATE

St n.	Struc. Wt. lb.	Items Wt. lb.	Total Wt. lb.	Total Mass lbsec ² /in	k lb/in	k/m /sec ²	$\sqrt{k/m}$ rad/sec	cyc/sec
644443	300	132	432	1.12	3711	3310	57.5	9.2
69728	212	75	287	0.74	4943	6680	81.7	13.0
74250	223	—	223	0.58	2600	4480	67.0	10.7 ^x
"	"	—	223	0.58	132	228	15.1	2.4 ^x
53877	330	356	686	1.78	13500	7580	87.0	13.8
59165	248	454	702	1.82	4943	2720	52.1	8.3
48500	696	5324	6020	156	113000	7250	85.2	13.5

* FOR STN. 7425 NATL. FREQ. LIES BETWEEN TWO FIGURES GIVEN Ref Rep 7-0558-62 pp 4-2 4-3

