AVRO AIRCRAFT

TECHNICAL REPORT

A. V. ROE CANADA LIMITED

MALTON - ONTARIO

ANALYZED

TECHNICAL DEPARTMENT (Aircraft)

AIRCRAFT: C105

REPORT NO. 7/0583/17

FILE NO:

NO. OF SHEETS: 110

TITLE: ~~CONFIDENTIAL~~

Classification cancelled / Changed to UNCLASS

By authority of AVRS

Date 30 Sept 58

Signature

Unit / Rank / Appointment AVRS

FIN

ENGINEER'S BENDING DISTRIBUTION

PREPARED BY S. YOUNG DATE SEPT 23/1953

CHECKED BY DATE

SUPERVISED BY DATE

APPROVED BY DATE

ISSUE NO.	REVISION NO.	REVISED BY	APPROVED BY	DATE	REMARKS

FORM 1316A

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

REPORT No. 7/0523/17
SHEET No.

AIRCRAFT:		PREPARED BY	DATE
C105	FIN	S. YOUNG	SEPT 23/55
		CHECKED BY	DATE

CONFIDENTIAL

INDEX

RM 1514

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

REPORT No. 7/9583/17
SHEET No 1-0

AIRCRAFT:		PREPARED BY	DATE
C105	FIN	S. YOUNG	SEPT. 23/58
		CHECKED BY	DATE

INTRODUCTION

SECTION 1

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

REPORT No. 7/0583/11
SHEET No. 1-1

AIRCRAFT:		PREPARED BY	DATE
C105	FIN	S. JONES	SEPT 23/55
		CHECKED BY	DATE

INTRODUCTION

THE ENGINEER'S BENDING DISTRIBUTION IS CALCULATED FOR THE FIN BETWEEN STATIONS 34 AND 137 FOR THE C.P. AFT CASE.

THE FIN LOADING CURVES OF B.M., SHEAR, AND TORQUE AT THE HINGE LINE ARE FROM REPORT 7/0583/3B, PAGE 3-14. THESE CURVES INCLUDE THE EFFECT OF FIN AND RUDDER INTERACTION DEFLECTION LOADS.

THE FIN SECTION PROPERTIES ARE RECALCULATED FROM THE INFORMATION GIVEN IN REPORT 7/0583/3B, SECTION 1, WHICH QUOTES SPAR TO SPAR SHEAR FLOWS. THIS REPORT QUOTES STRINGER TO STRINGER SHEAR FLOWS AND THE SECTION PROPERTIES MUST BE ADJUSTED ACCORDINGLY.

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

AIRCRAFT:	
C105	FIN

REPORT NO. 7/0585/17
SHEET NO. 1-2

PREPARED BY	DATE
S YOUNG	SEPT 23/55
CHECKED BY	DATE

INTRODUCTION

IN THIS REPORT, SPAR (OR CORRECTLY, STRINGER) #4 IS TAKEN AS CONTINUOUS THROUGH THE ACCESS DOOR BETWEEN STA 42 AND 92. THE ACCESS DOOR IS CONSIDERED FULLY EFFECTIVE AND CONTINUING SPAR #4 THROUGH THE ACCESS DOOR IS ONE METHOD OF TREATING THE ACCESS DOOR PROBLEM.

THERE IS A WEB AT SPAR #5 BETWEEN STATIONS 42 AND 92 — THIS WEB IS NOT CONSIDERED EFFECTIVE.

PROCEEDING INBOARD TO THE ROOT, EACH NEW SPAR IS TAKEN AS FULLY EFFECTIVE ONE RIB INBOARD OF IT'S APPEARANCE. IN SOME CASES, THIS CAUSES A REVERSAL OF SHEAR FLOW IN SKIN PANELS ADJACENT TO THE FRONT SPAR.

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

REPORT No. 7/2583/17
SHEET No. 1-3

AIRCRAFT:		PREPARED BY	DATE
C105	FIN	S. YOUNG	SEPT. 23/57
		CHECKED BY	DATE

INTRODUCTION

IN SECTIONS 7, 8, AND 9 SPANWISE WEB SHEAR, SPANWISE SKIN SHEAR FLOWS, AND SPANWISE SPAR BENDING STRESSES ARE PLOTTED.

FORM 1319A

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

REPORT No. 7/2582/17
SHEET No. 2-0

AIRCRAFT:		PREPARED BY	DATE
C105	FIN	S. YOUNG	SEPT. 23/55
		CHECKED BY	DATE

BAY 24 - 42

SECTION 2

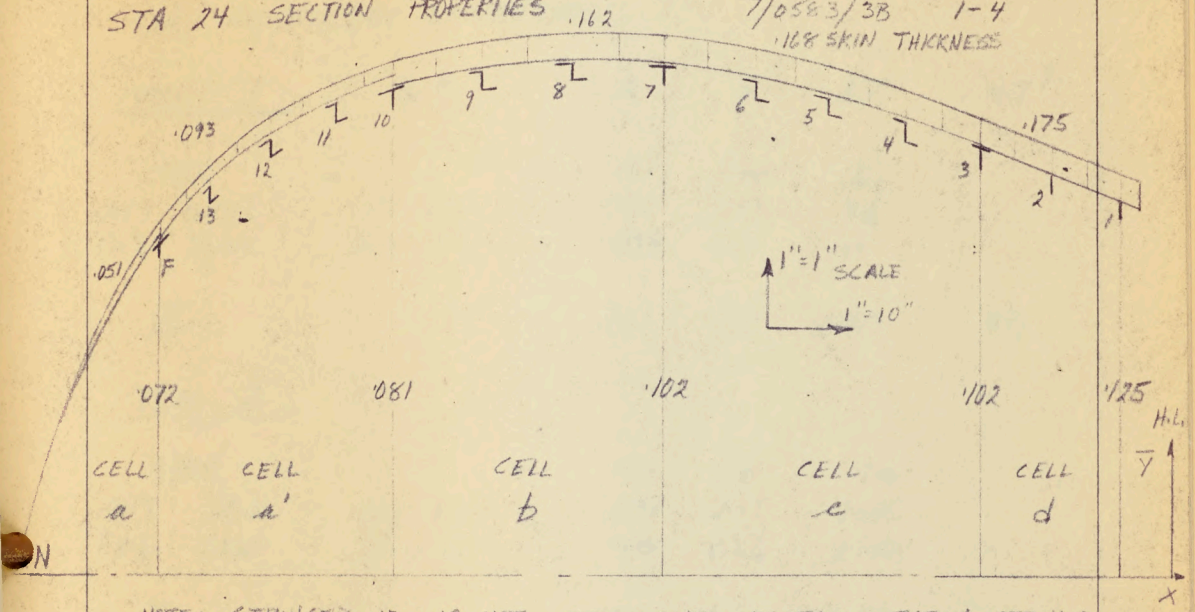
FORM 1319A

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

REPORT NO. 7/0583/17
SHEET NO. 2-1

AIRCRAFT:		PREPARED BY	DATE
C105	FIN	S. YOUNG	SEPT. 20/55
		CHECKED BY	DATE

STA 24 SECTION PROPERTIES 7/0583/3B 1-4



NOTE: STRINGER 13 IS NOT EFFECTIVE AT THIS STATION. STRINGER 4 IS ASSUMED EFFECTIVE THROUGH ACCESS DOOR, STA 42-92.

ITEM	SPAR CAP A	CAP $\bar{Y}$	X
1	.117	1.94	-3.5
2	.117	2.10	-8.0
3	.460	2.63	-13.
4	.193	2.65	-18.
5	.143	2.80	-23.
6	.143	2.90	-28.
7	.446	3.16	-34.6
8	.141	2.97	-40.6
9	.141	2.93	-46.6
10	.434	3.02	-52.6
11	.115	2.69	-56.6
12	.115	2.45	-61.1
~~13~~	~~.115~~	2.13	-65.6
F	.296	2.01	-69.
N		0	-78.

FORM 1319A

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

REPORT NO. 7/0582/117
SHEET NO. 2-2

AIRCRAFT:		PREPARED BY	DATE
C105	FIN	S. YOUNG	SEPT. 20/55
		CHECKED BY	DATE

STA 24 SECTION PROPERTIES

ITEM 1	b x t	A	$\bar{Y}$	AY	AY^2
SPAR		.117	1.94	.227	
AFT SKIN	1.5 x .175	.262	2.58	.676	
FWD SKIN	2.25 x .175	.394	2.64	1.04	
Σ		.773	2.52	1.943	4.90

ITEM 2					
SPAR		.117	2.10	.246	
AFT SKIN	2.75 x .175	.394	2.73	1.075	
FWD SKIN	2.5 x .175	.438	2.83	1.240	
Σ		.949	2.71	2.561	6.94

ITEM 3					
SPAR		.460	2.63	1.21	
AFT SKIN	2.5 x .175	.438	2.92	1.278	
FWD SKIN	2.5 x .168	.420	3.02	1.268	
Σ		1.318	2.85	3.756	10.70

ITEM 4					
SPAR		.143	2.65	.379	
AFT SKIN	2.5 x .168	.420	3.10	1.302	
FWD SKIN	2.5 x .168	.420	3.18	1.235	
Σ		.983	2.96	2.916	8.64

FORM 1319A

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

REPORT No. 7/0583/17
SHEET No. 2-3

AIRCRAFT: C105	FIN	PREPARED BY: S. YOUNG	DATE: SEPT. 20/55
		CHECKED BY	DATE

STA 24 SECTION PROPERTIES

ITEM 5	b x t	A	$\bar{Y}$	$A\bar{Y}$	$A\bar{Y}^2$
SPAR		.143	2.80	.401	
AFT SKIN	2.5 x .168	.420	3.25	1.365	
FWD SKIN	2.5 x .168	.420	3.31	1.390	
Σ		.983	3.21	3.156	10.12

ITEM 6					
SPAR		.143	2.80	.414	
AFT SKIN	2.5 x .168	.420	3.38	1.420	
FWD SKIN	3.3 x .168	.554	3.42	1.895	
		1.117	3.34	3.729	12.45

ITEM 7					
SPAR		.446	3.17	1.412	
AFT SKIN	3.3 x .168	.554	3.46	1.915	
FWD SKIN	3.0 x .162	.486	3.48	1.689	
		1.486	3.38	5.016	16.95

ITEM 8					
SPAR		.141	2.97	.419	
AFT SKIN	3.0 x .162	.486	3.49	1.695	
FWD SKIN	3.0 x .162	.486	3.47	1.685	
Σ		1.113	3.41	3.799	12.97

HN 1194

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

REPORT No. 7/0583/17
SHEET No. 2-4

AIRCRAFT: C105	FIN	PREPARED BY: S. YOUNG	DATE: SEPT. 20/55
		CHECKED BY	DATE

STA 24 SECTION PROPERTIES

ITEM 9

SPAR		.141	2.93	.413	
AFT SKIN	3.0×.162	.486	3.44	1.670	
FWD SKIN	3.0×.162	.486	3.40	1.652	
Σ		1.113	3.35	3.735	12.52

ITEM 10

SPAR		.434	3.02	1.310	
AFT SKIN	3.0×.162	.486	3.34	1.622	
FWD SKIN	2.0×.093	.279	3.31	.924	
Σ		1.199	3.21	3.856	12.38

ITEM 11

SPAR		.115	2.69	.309	
AFT SKIN	2.0×.093	.279	3.24	.905	
FWD SKIN	2.25×.093	.209	3.17	.663	
Σ		.603	3.11	1.877	5.84

ITEM 12

SPAR		.115	2.45	.282	
AFT SKIN	2.25×.093	.209	3.05	.638	
FWD SKIN	3.95×.093	.367	2.85	1.045	
		.691	2.84	1965	5.58

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

REPORT No.
SHEET No. 2-5

AIRCRAFT:		PREPARED BY	DATE
C105	FIN	S. YOUNG	SEPT. 20/55
		CHECKED BY	DATE

STA 24 SECTION PROPERTIES

ITEM	F	t x t	A	$\bar{Y}$	$A\bar{Y}$	$A\bar{Y}^2$
SPAR			·286	2·01	·595	
AFT SKIN		3·95 x ·093	·367	2·53	·928	
FWD SKIN		3·0 x ·051	·153	2·13	·326	
Σ			·816	2·27	1·849	4·19

$$\tfrac{1}{2} I = \Sigma A \bar{Y}^2 = 124.18$$

$$I = 248.4 \text{ IN}^4$$

FORM 1319A

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

REPORT No. 7/0583/117
SHEET No. 2-6

AIRCRAFT: C105	FIN	PREPARED BY: S. YOUNG	DATE: SEPT. 21/55
		CHECKED BY	DATE

BAY 24-42 SECTION PROPERTIES

DETERMINE MID BAY SECTION PROPERTIES BY AVERAGING STA 24 & 42 (SIMILAR TO BAY 92-112)

CELL AREAS

$$A_d = 2\left[A_{1-2} + A_{2-3} - \tfrac{1}{2}X_3\bar{Y}_3 + \tfrac{1}{2}X_1\bar{Y}_1\right] = 2A_{1-2} + 2A_{2-3} - X_3\bar{Y}_3 + X_1\bar{Y}_1$$

$$= 10.4 + 11.9 + 13.0 \times 2.80 - 3.5 \times 2.46 = \underline{50.1\ \square''}$$

$$A_c = 2A_{3-4} + 2A_{4-5} + 2A_{5-6} + 2A_{6-7} - X_2\bar{Y}_2 + X_3\bar{Y}_3$$

$$= 12.1 + 11.5 + 16.1 + 16.1 + 34.6 - 3.28 - 13.0 \times 2.80 = \underline{132.9\ \square''}$$

$$A_b = 2A_{7-8} + 2A_{8-9} + 2A_{9-10} - X_{10}\bar{Y}_{10} + X_7\bar{Y}_7$$

$$= 19.0 + 22.8 + 28.0 + 52.6 - 3.04 - 34.5 \times 3.28 = \underline{116.1\ \square''}$$

$$A_a = 2A_{10-11} + 2A_{11-12} + 2A_{12-F} - X_F\bar{Y}_F + X_{10}\bar{Y}_{10}$$

$$= 23.0 + 23.2 + 35.5 + 66.9 - 2.20 - 52.6 \times 3.04 = \underline{75.1\ \square''}$$

$A_a = 27.4\ \square''$ STA 24 7/0583/38 1-5

$A_a = 24.8$ STA 42

$$A_a = \underline{26.1\ \square''}$$

FORM 1319A

BAY 24-42

$$2A = X_i \bar{Y}_{i+1} - X_{i+1} \bar{Y}_i$$

A. V. RO

TEC

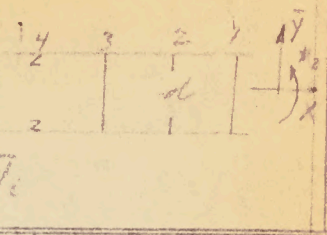
AIRCRAFT

WEIGHT

C. G. POSITI

ITEM	1 STA X	2 42 Ȳ	3 STA X	4 24 Ȳ	5 MID X	6 BAY Ȳ	7	8 $X_i \bar{Y}_{i+1}$	9 Y_{i+1}	10 ITEM	11 2A
1	-3.5	2.39	-3.5	2.52	-3.5	2.46		-9.25	19.7	1-2	10
2	-8.0	2.57	-8.	2.71	-8	2.64		-22.4	34	2-3	11
3	-13.	2.74	-13.	2.85	-13.	2.80		-38.3	50	3-4	12
4	-18.	2.94	-18.	2.96	-18.	2.95		-56.5	68	4-5	11
5	-23.	3.06	-23.	3.21	-23.	3.14		-71.8	87	5-6	16
6	-28.	2.89	-28.	3.34	-28	3.12		-91.9	108	6-7	16
7	-34.6	3.16	-34.6	3.38	-34.6	3.28		-114.	133	7-8	17
8	-40.6	3.17	-40.6	3.41	-40.6	3.29		-130.7	152	8-9	22
9	-46.6	3.08	-46.6	3.35	-46.6	3.22		-141.5	167	9-10	28
10	-52.6	2.87	-52.6	3.21	-52.6	3.04		-149.	172	10-11	23
11	-56.6	2.54	-56.6	3.11	-56.6	2.83		-143.8	173	11-12	27
12	(-61.1)	(3.24)	-61.1	2.84	-61.1	2.54		-134.5	170	12-F	35
F	-64.8	2.12	-68.0	2.27	-66.9	2.20					
N	-73.0	0	-70.0	0	-75.5	0					

FORM 1843



A. V. ROE CANADA LIMITED

MALTON, ONTARIO

TECHNICAL DEPT. (AIRFRAME)

AIRCRAFT - - C 105

WEIGHT - -

C. G. POSITION - -

REPORT NO. - 7/058/10

SHEET - - 2-7

DATE - - SEPT. 21/55

PREPARED BY - S. YOUNG

7	8	9	10	11	12	13	14	15	16	17	18	19
	$X_i \bar{Y}_{i+1} - X_{i+1} \bar{Y}_i$		ITEM	2A		ITEM	L	t	$\frac{2c}{4t}$		CELL	$\frac{2}{r}$
	-9.25	19.7	1-2	10.4		1-2	4.5	.177	26.2		a	42.4
	-22.4	34.2	2-3	11.9		2-3	5.	.177	29.1		a'	45.4
	-38.3	50.4	3-4	12.1		3-4	5.	.165	30.3		b	36.6
	-56.5	68.6	4-5	11.5		4-5	5.	.165	30.3		c	38.1
	-71.8	87.7	5-6	16.1		5-6	5.	.165	30.3		d	20.5
	-91.9	108.	6-7	16.1		6-7	6.6	.165	40.0			
	-114.	133.	7-8	17.		7-8	6.	.159	37.7			
	-130.7	153.	8-9	22.6		8-9	6.	.159	37.7		CELL	A
	-141.5	163.5	9-10	28.0		9-10	6.	.159	37.7		a	26.1
	-149.	172.	10-11	23.0		10-11	4.	.090	44.4		a'	25.1
	-143.8	173.	11-12	27.2		11-12 12-F	4.5 5.8	.090 .090	50.0 64.4		b	11.6.1
	-134.5	170.	12-F	35.5	19.0 20. 17.9 40.	F-N-7	18.5	.051	36.3		c	132.9
						1-1 3-3	4.72 5.62	.125 .102	31.3 34.9		d	50.1
						7-7 10-10	6.56 6.88	.102 .102	64.4 75.0			
						F-F	4.40	.072	61.2			

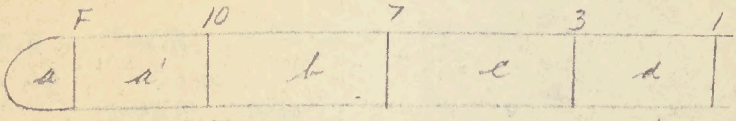
A. V. ROE CANADA LIMITED
MALTON - ONTARIO
TECHNICAL DEPARTMENT (Aircraft)

REPORT No. 7/0583/17
SHEET No. 2-8

AIRCRAFT:		PREPARED BY	DATE
C105	FIN	S. YOUNG	SEPT. 21/55
		CHECKED BY	DATE

BAY 24-42

DETERMINE THE CELL TRANSFORMATION FACTORS.



$$d = \frac{t_{WEB}}{t_{CELL}} \qquad \text{i.e.} \quad d_{a-a'} = \frac{t_{F\cdot F}}{t_a}$$

$$d_{a'-a} = \frac{t_{F\cdot F}}{t_{a'}}$$

$$d_{a-a'} = \frac{61.2}{424} = .1445.$$

$$d_{a'-a} = \frac{61.2}{454} = .1345$$

$$d_{a'-b} = \frac{75.0}{454} = .165$$

$$d_{b-a'} = \frac{75.0}{366} = .205$$

$$d_{b-c} = \frac{64.4}{366} = .176$$

$$d_{c-b} = \frac{64.4}{381} = .169$$

$$d_{c-d} = \frac{54.9}{381} = .1442$$

$$d_{d-c} = \frac{54.9}{205} = .268$$

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

REPORT NO. 7/0583/17
SHEET NO. 2-9

AIRCRAFT:		PREPARED BY	DATE
C105	FIN	S. YOUNG	SEPT 21/55
		CHECKED BY	DATE

STA 24

LOADING 7/0583/32B 3-14

ULTIMATE SHEAR OVTB'D = 34750 #

SHEAR INB'D = 38100 #

B.M. = 2,900,000 "#

H.L. TORQUE OVTB'D = 345 000 "#

H.L. TORQUE INB'D = 445,000 "#

$f = \frac{2900000}{248.4} \bar{Y} = 11,650 \bar{Y}$ $P = 11650\ A\bar{Y}$

ITEM	$\bar{Y}$	$A\bar{Y}$	f	P
1	2.52	1.943	.29400	22650
2	2.71	2.561	31600	29250
3	2.85	3.756	33250	43800
4	2.96	2.916	34500	34000
5	3.21	3.156	37450	35600
6	3.34	3.729	38950	43500
7	3.38	5.016	39400	58500
8	3.41	3.799	39750	44300
9	3.35	3.735	39100	43500
10	3.21	3.856	37400	44900
11	3.11	1.877	36250	21850
12	2.84	1.965	33100	22900
F	2.27	1.849	26500	21550

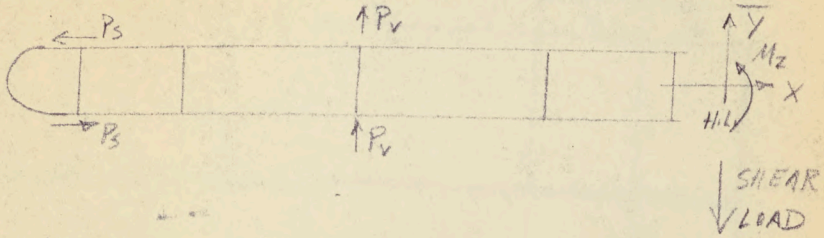
ORM 1319A

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

REPORT No. 7/0583/17
SHEET No. 2-10

AIRCRAFT:		PREPARED BY	DATE
C105	FIN	S. YOUNG	SEPT. 21/55
		CHECKED BY	DATE

STA 24 SLOPE & SWEEPBACK SHEAR



$$P_V = \frac{\bar{Y}_{24} - \bar{Y}_{42}}{24-42} P_{CAP} = \frac{\Delta \bar{Y}}{-18} P_{CAP}$$

$$P_S = \frac{X_{24} - X_{42}}{-18} P_{CAP}$$

2 SKINS $\quad \Sigma P_V = 2(+6462) = +12,924^{\#}$

2 SKINS $\quad \Sigma P_V \cdot X = 2(-252,359) = -504,718^{"\#}$

FRONT SPAR $\quad \Sigma P_S \cdot \bar{Y} = 2(+11400) = +22,800^{"\#}$

FORM 1319A

BAY 24-42

SLOPE & SWEEPBACK SHEAR

A. V. R

AIRCRAF
WEIGHT
C. G. PO

ITEM	1 $\bar{Y}_{24}$	2 $\bar{Y}_{42}$	3 ΔY	4 P_{CAP} STA 24	5 P_1	6 X	7 $P_1 X$	8	9	10 $X_{24} - X_{42}$
1	2.52	2.39	.13	22050	164	-3.5	-574			
2	2.71	2.57	.14	29250	228	-8.	-1825			
3	2.85	2.74	.11	43800	268	-13.	-3480			
4	2.96	2.94	.02	34000	38	-18	-685			
5	3.21	3.06	.15	35600	297	-23	-6840			
6	3.34	2.89	.45	43500	1088	-28	-30450			
7	3.38	3.18	.20	58500	650	-34.6	-22500			
8	3.41	3.17	.24	44300	591	-40.6	-23950			
9	3.35	3.08	.27	43500	653	-46.6	-30400			
10	3.21	2.87	.34	44800	849	-52.6	-44700			
11	3.11	2.54	.57	21850	692	-56.6	-39150			
12	2.84	(2.24)	.60	22900	764	-61.1	-46600			
F	2.27	2.12	.15	21550	180	-66.9	-1205			-4.2
Σ					+6462		-227,359			

FORM 1543

SHEAR

A. V. ROE CANADA LIMITED

MALTON, ONTARIO

TECHNICAL DEPT. (AIRFRAME)

AIRCRAFT - - C105

WEIGHT - -

C. G. POSITION -

REPORT NO. - 7/05883/12

SHEET - - 2-11

DATE - - SEPT. 21/55

PREPARED BY - S. YOUNG

	7	8	9	10	11	12	13	14	15	16	17	18	19
	$P_V X$			$X_{24} - X_{42}$	P_3	$\bar{y}$	$P_3 \bar{y}$						
	-574												
	-1825												
	-3480												
	-685												
	-6840												
	-20450												
	-22500												
	-23950												
	-30400												
	-44000												
	-39150												
	-46600												
	-1205			-4.2	5030	2.27	+11400						
	-257,359						+11400						

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

REPORT No. 7/0583/17
SHEET No. 2-12

AIRCRAFT		PREPARED BY	DATE
C105	FIN	S. YOUNG	SEPT 21/55
		CHECKED BY	DATE

BAY 24-42

COMPUTE THE BENDING SHEAR FLOWS q_0, THE CORRECTIVE SHEAR q_s', & THE CORRECTIVE TORQUE q_T' IN SIMILAR FASHION TO BAY 92-112.

ITEM AREAS ABOUT H.L.

F-N-F $2A = 2A_a - 2\bar{X}_F\bar{Y}_F = 2\times 26.1 - 2\times -16.9\times 2.20$
$= 52.2 + 294.5 = 346.7$ □"

1-1 $2A = 2\bar{X}_1\bar{Y}_1 = 2\times 3.5\times 2.46 = 17.2$ □"

3-3 $2A = 2\times 13.0\times 2.80 = 72.9$

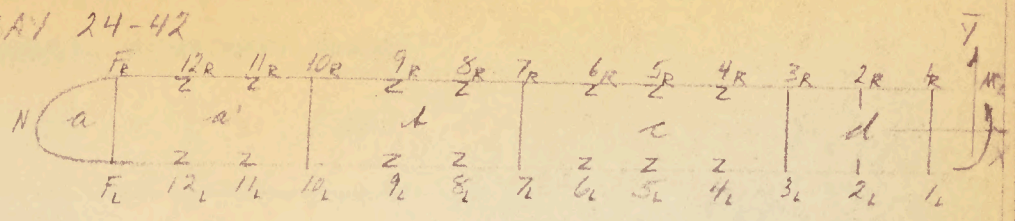
7-7 $2A = 2\times 34.6\times 3.28 = 227.$

10-10 $2A = 2\times 52.6\times 3.04 = 320.$

F-F $2A = 2\times 16.9\times 2.20 = 294.5$

FORM 1318A

BAY 24-42



A. V. RO

TE

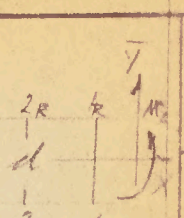
AIRCRAFT

WEIGHT

C. G. POSIT

ITEM	1 P_{24}	2 $-P_{42}$	3 $P_{24}-P_{42}$ ΔP	4 $\frac{P_{24}-P_{42}}{24-42}$ $\Delta P/-18$	5	6 ITEM	7 y_o	8 x	9 $x\,y_o$	10 2A	11 2A
1_R	22650	-20450	2200	-122		F_L-N-F_R	0	36.3	0	346.7	0
2_R	29250	-26900	2350	-131		F_R-12_R	132	64.4	8500	35.5	468
3_R	43600	-39700	4100	-228		12_R-11_R	1404	50.0	70200	29.2	4100
4_R	34000	-33000	1000	-56		11_R-10_R	1551	44.4	68900	23.0	3515
5_R	35600	-34300	1300	-72		10_R-9_R	2121	37.7	80000	28.0	5940
6_R	43500	-39550	3950	-219		9_R-8_R	2446	37.7	92200	22.8	5578
7_R	58500	-52000	6500	-361		8_R-7_R	2757	37.7	103900	19.0	5230
8_R	44300	-38700	5600	-311		7_R-6_R	3118	40.0	124,700	16.1	5020
9_R	43500	-37650	5850	-325		6_R-5_R	3337	30.3	101,000	16.1	5370
10_R	44900	-34650	10250	-570		5_R-4_R	3409	30.3	103,300	11.5	3920
11_R	21850	-18200	2650	-147		4_R-3_R 3_R-2_R	3465 3693	30.3 29.1	105000 107300	12.1 11.9	4190 4390
12_R	22900	0	22900	-1272		2_R-1_R	3824	26.2	100000	7.04	4360
F_R	21550	-19180	2370	-132		1_L-1_R 3_L-3_R	3946 0	39.3 54.9	155000 0	17.2 72.9	-6140
						7_L-7_R 10_L-10_R	0 0	64.4 75.0	0 0	22.7 32.0	
						F_L-F_R	0	61.2	0	294.5	

FORM 1543



A. V. ROE CANADA LIMITED

MALTON, ONTARIO

TECHNICAL DEPT. (AIRFRAME)

AIRCRAFT . . C105

WEIGHT . .

C. G. POSITION .

REPORT NO. . 7/0583/17

SHEET . . 2-13

DATE . . SEPT. 21/55

PREPARED BY . S. YOUNG

8	9	10	11	12	13	14	15	16	17	18	19
ℓ	$q_0\ell$	2A	$2Aq_0$	$\Sigma 2Aq_0$			SHEAR CORRECTION q'_s	TORQUE CORRECTION q'_T	q (14)+(15)+(16)		
363	0	346.7	0				151	334	183		
644	8500	35.5	4680				-1047	864	-51		
50.0	70200	29.2	41000				-1047	864	1221		
444	68700	23.0	35150				1047	864	1368		
37.7	80000	28.0	59400				-2284	1545	1382		
37.7	92200	22.8	55700				-2284	1545	1707		
37.7	103900	19.0	52300				-2284	1545	2018		
40.0	124,300	16.1	50200				-3191	1635	1562		
30.3	101,000	16.1	53700				3191	1635	1781		
30.3	103,300	11.5	39200				3191	1635	1853		
30.3	105000	12.1	41900				-3191	1635	1909		
29.1	107300	11.9	43900				-3640	1283	1336		
26.2	100000	10.4	43600	2x 521230			-3640	1283	1467		
39.3	155000	17.2	-67900	-67900			-3640	1283	1589		
54.9	0	72.9					444	352	801		
44.4	0	22.7					907	-90	817		
75.0	0	32.0					1237	-681	556		
1.2	0	294.5		+974,560			8K	-530	366		

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

REPORT NO. 7/0583/117
SHEET NO. 2-14

AIRCRAFT: C105	FIN	PREPARED BY: S. YOUNG	DATE: SEPT. 21/55
		CHECKED BY	DATE

BAY 24-42

SHEAR LOAD ACTING AT SHEAR CENTRE

1ST APPROXIMATION $q_s' = \frac{\Sigma q_0 r}{\Sigma r}$

$\Sigma_a q_0 r = 0$

$\Sigma_{a'} q_0 r = 2(8500 + 70200 + 68,900) = 295,200$

$\Sigma_b q_0 r = 2(80\,000 + 92210 + 103,800) = 552000$

$\Sigma_c q_0 r = 2(124800 + 101000 + 103300 + 105000) = 868200$

$\Sigma_d q_0 r = 2(107300 + 100000) + 155000 = 570,600$

$\Sigma_a r = 424$

$\Sigma_{a'} r = 454$

$\Sigma_b r = 366$

$\Sigma_c r = 381$

$\Sigma_d r = 205$

$q_{s_a}' = 0$

$q_{s_{a'}}' = \frac{295,200}{454} = 650$

$q_{s_b}' = \frac{552,000}{366} = 1509$

$q_{s_c}' = \frac{868,200}{381} = 2280$

$q_{s_d}' = \frac{570600}{205} = 2785$

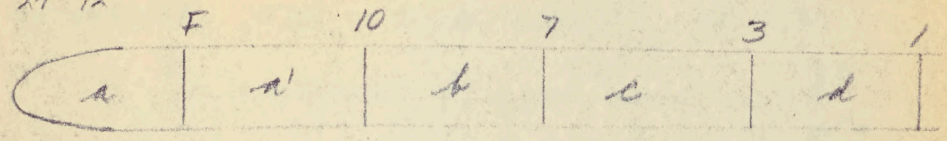
FORM 1319A

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

REPORT No. 7/0583/17
SHEET No. 2-15

AIRCRAFT:		PREPARED BY	DATE
C105	FIN	S. YOUNG	SEPT 21/55
		CHECKED BY	DATE

BAY 24-42



d	.1445	.1345	.165	.205	.176	.169	.1442	.268	
d TRANSPOSE	.1345	.1445	.205	.165	.169	.176	.268	.1442	

q'_s 1ST APPROX	0		650		1509		2280		2735	
2ND "	94.0		0	248.5	133.2	402.0	255.0	402	611.0	
3RD "	35.9		12.6	88.4	51.0	115.5	98.5	88.0	176.0	
4TH "	14.6		4.8	27.5	20.7	31.4	28.1	25.4	47.8	
5TH "	4.7		2.0	8.6	6.6	9.4	8.8	6.9	14.3	
6TH "	1.5		.6	2.6	2.2	2.8	2.7	2.1	4.2	
q'_s	150.7		1045.6		2283.8		3189.5		3638.3	

ITERATE	151		203	376.5	214.5	562	385.5	525	855	
q'_s 1ST APPROX	0		650		1509		2280		2785	
q'_s	151		1046.8		2285.5		3190.5		3640	

ITERATE	151		203	377	214.5	561	386	525	855	
q'_s 1ST APPROX	0		650		1509		2280		2785	
q'_s	151		1047		2284		3191		3640	

BY INSPECTION, THE q'_s VALUES MUST BE NEGATIVE TO BALANCE THE SECTION.

$q'_{s_a} = -151$

$q'_{s_{a'}} = -1047$

$q'_{s_b} = -2284$

$q'_{s_c} = -3191$

$q'_{s_d} = -3640$

FORM 1319A

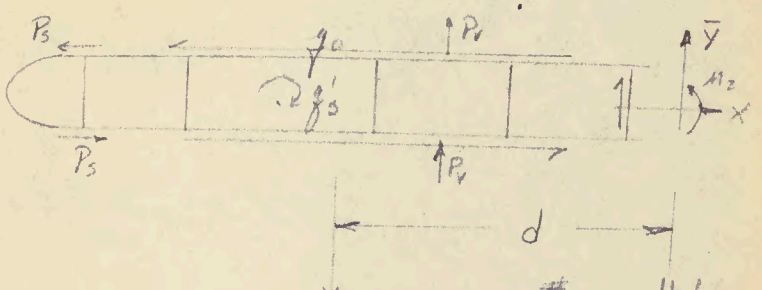
A. V. ROE CANADA LIMITED
MALTON · ONTARIO
TECHNICAL DEPARTMENT (Aircraft)

REPORT NO. 7/0583/17
SHEET NO. 2-16

AIRCRAFT: C105	FIN	PREPARED BY: S. YOUNG	DATE: SEPT. 21/55
		CHECKED BY	DATE

BAY 24-42

DETERMINE THE SHEAR CENTRE POSITION.



ABOUT H.L.

$$\Sigma M_z = +S_y d + \Sigma 2A q_0 + \Sigma P_1 X + \Sigma P_3 Y + \Sigma 2A q'_3 = 0$$

$$34750\,d + 974,560 - 504,718 + 22800 - 2\times 26.1\times 151 - 2\times 75.1\times 1047$$
$$- 2\times 116.1\times 2284 - 2\times 132.2\times 3191 - 2\times 501\times 3640 = 0$$

$$34750\,d + 974,560 - 504,718 + 22,800 - 7880 - 157,000 - 528,000$$
$$- 841,000 - 371,000 = 0$$

$$d = \frac{1,412,238}{34750} = 40.7''$$

FORM 1319A

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

REPORT No. 7/0583/17
SHEET No. 2-17

AIRCRAFT:		PREPARED BY	DATE
C105	FIN	S. YOUNG	SEPT. 21/55
		CHECKED BY	DATE

BAY 24-42

TORSIONAL SHEAR FLOW q'_T

1ST APPROX $q'_T = \frac{2A}{\Sigma r_c}$

$$q'_{T_a} = \frac{2 \times 26.1}{424} = .123$$

$$q'_{T_a} = \frac{2 \times 75.1}{454} = .331$$

$$q'_{T_b} = \frac{2 \times 116.1}{366} = .635$$

$$q'_{T_c} = \frac{2 \times 132.9}{381} = .698$$

$$q'_{T_d} = \frac{2 \times 50.1}{205} = .497$$

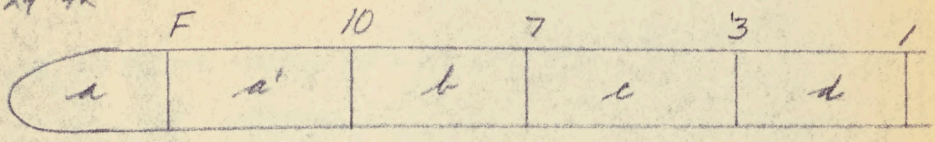
FORM 1319A

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

REPORT No. 7/0583/17
SHEET No. 2-18

AIRCRAFT: C105	FIN	PREPARED BY: S. YOUNG	DATE: SEPT 21/55
		CHECKED BY	DATE

BAY 24-42



d	.1445	.1345	.165	.205	.176	.169	.1442	.268	
d TRANSPOSE	.1345	.1445	.205	.165	.169	.176	.268	.1442	

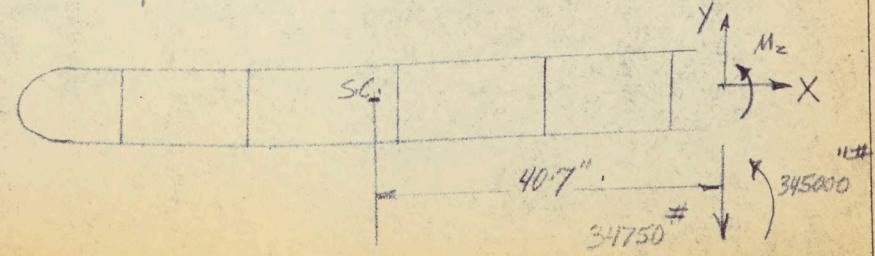
q'_T 1ST APPROX.	.123	.331	.635	.698	.497
2ND "	.0478	.066 .1048	.0678 .1228	.1073 .0714	.1870
3RD "	.0176	.0064 .0314	.0249 .0314	.0322 .0270	.0479
4TH "	.0055	.0024 .0093	.0078 .0104	.0095 .0069	.0158
5TH "	.0017	.0007 .0030	.0024 .0029	.0031 .0023	.0044
q'_T	.1956	.5056	.9054	.9577	.7521

ITERATE	.0731	.0263 .1492	.1037 .1685	.1530 .1085	.2585
q'_T 1ST APPROX	.123	.331	.635	.698	.497
q'_T	.1961	.5065	.9072	.9595	.7535

ITERATE	.0732	.0263 .1495	.1039 .1690	.1531 .1085	.257
q'_T 1ST APPROX	.123	.331	.635	.698	.497
q'_T	.1962	.5068	.9079	.9596	.754

A	26.1	75.1	116.1	132.9	50.1
$2A\,q'_T$	10.25	76.2	211.	254.5	75.4

$$J = \Sigma 2A q'_T = 627.4$$



FORM 1319A

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

REPORT NO. 7/0583/17
SHEET NO. 2-19

AIRCRAFT:		PREPARED BY	DATE
C105	FIN	S. YOUNG	SEPT 21/55
		CHECKED BY	DATE

BAY 24-42

AT S.C.; $M_z = +345000 - 34750 \times 40.7 = -1,067,000$ in-#

FACTOR ON $q'_T = \frac{1067000}{627.4} = 1702$

$\therefore q'_{T_a} = .1962 \times 1702 = 334$

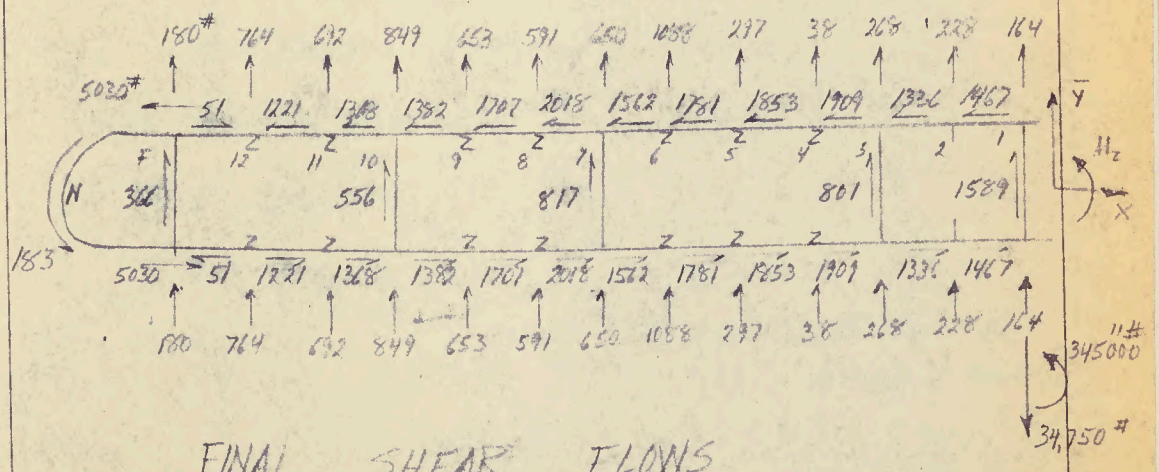
$q'_{T_A} = .5064 \times 1702 = 864$

$q'_{T_b} = .9079 \times 1702 = 1545$

$q'_{T_c} = .9596 \times 1702 = 1635$

$q'_{T_d} = .754 \times 1702 = 1283$

ADD THE BENDING SHEAR FLOW q_0, CORRECTIVE SHEAR q'_s, AND CORRECTIVE TORQUE q'_T.



FINAL SHEAR FLOWS

BAY 24 - 42

C.P. AFT CASE

RM 1319A

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

REPORT No. 7/0583/17
SHEET No. 2-20

AIRCRAFT: C105	FIN	PREPARED BY: S. YOUNG	DATE: SEPT. 21/55
		CHECKED BY	DATE

BAY 24 - 42

CHECK THE VERTICAL SHEAR BALANCE

SKIN SHEAR = 2 (357) = + 714

WEB & NOSE SHEAR = 21,825

P_V SHEAR = 12,924

+35463 REACTIVE SHEAR

−34,750 APPLIED SHEAR

CHECK THE H.L. TORQUE BALANCE

SKIN TORQUE = 2(310,640) = + 621,280

WEB & NOSE TORQUE = − 493,150

$P_V.X$ TORQUE = − 504,718

$P_S.Y$ TORQUE = + 22,800

−353,788 REACTIVE TORQUE

+345,000 APPLIED TORQUE

A. V.

AIRCR
WEIGH
C. G

BAY 24-42

SHEAR & TORQUE BALANCE CHECK

	1	2	3	4	5	6	7	8	9	10
ITEM	MID BAY $\bar{y}$	ITEM	$\Delta\bar{y}$	$\bar{q}$	SHEAR					
F	2.20	F-N-F	4.40	183	-805					
12	2.54	F-12	.34	-51	+17					
11	2.83	12-11	.29	1221	-354					
10	3.04	11-10	.21	1368	-287					
9	3.22	10-9	.18	1382	-249					
8	3.29	9-8	.07	1707	-119	$\frac{1}{2}\Sigma$ SKIN SHEAR = +357				
7	3.28	8-7	-.01	2018	20	Σ WEB & NOSE SHEAR = +21825				
6	3.12	7-6	-.16	1562	250					
5	3.14	6-5	+.02	1781	-36					
4	2.95	5-4	-.19	1853	352					
3	2.80	4-3 3-2	-.15 -.16	1909 1336	286 213					
2	2.64	2-1	-.18	1467	264					
1	2.46	1-1 3-3	4.92 5.60	1584 801	7800 4480					
		7-7 10-10	6.56 6.08	817 556	5360 3380					
		F-F	4.40	366	1610					

FORM 1543

A. V. ROE CANADA LIMITED

MALTON, ONTARIO

TECHNICAL DEPT. (AIRFRAME)

REPORT NO. - 7/0583/17

SHEET - - 2-21

DATE - - SEPT 21/55

AIRCRAFT - - C105

WEIGHT - -

C. G. POSITION -

PREPARED BY - S. YOUNG

7	8	9	10	11	12	13	14	15	16	17	18	19
				ITEM	2A	7	2A 7					
				F-N-F	346.7	183	63400					
				F-12	35.5	-51	-1810					
				12-11	29.2	1221	35700					
				11-10	23.0	1362	31450					
				10-9	28.0	1382	38700					
IN SHEAR = +357				9-8	22.8	1707	38900	½ Σ SKIN. TORQUE			=+310,640	
ER & F SHEAR = +21825				8-7	19.0	2020	38300	2 WEB NOSE	& TORQUE		=-493,450	
				7-6	16.1	1562	25150					
				6-5	16.1	1781	28700					
				5-4	11.5	1853	21300					
				4-3	12.1	1909	23100					
				3-2	11.9	1336	15900					
				2-1	10.4	1467	15250					
				1-1	17.2	1589	-27350					
				3-3	72.9	801	-58400					
				7-7	22.7	817	-185500					
				10-10	32.0	556	-177500					
				F-F	294.5	366	-107800					

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

AIRCRAFT:	
C-105	FIN

REPORT No. 7/3583/17
SHEET No. 3-0

PREPARED BY	DATE
S. YOUNG	SEPT. 23/55
CHECKED BY	DATE

BAY 42 - 67

SECTION 3

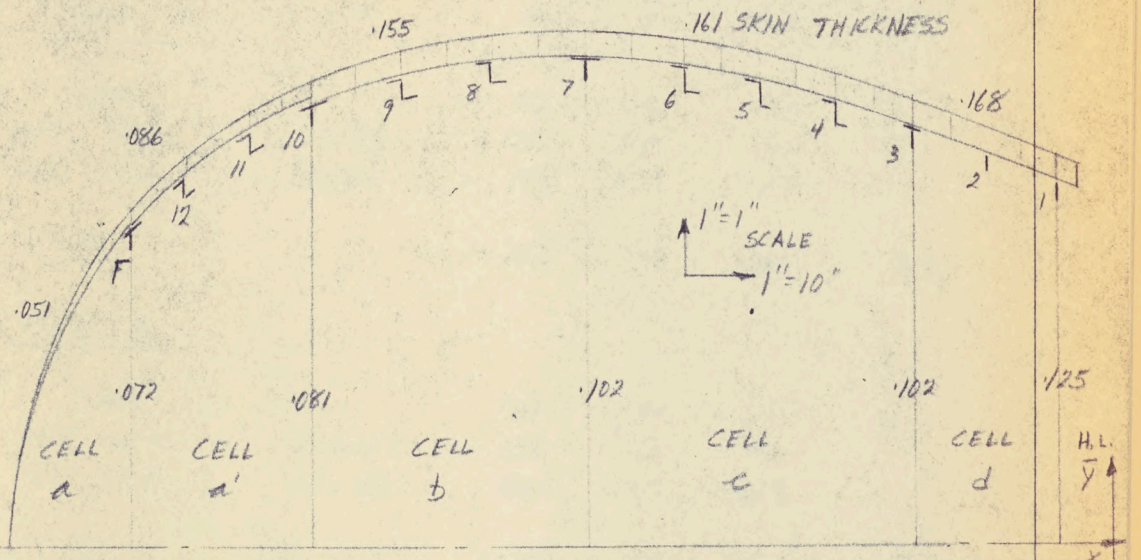
FORM 1319A

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

REPORT No. 7/0583/17
SHEET No. 3-1

AIRCRAFT:		PREPARED BY	DATE
C105	FIN	S. YOUNG	SEPT. 16/55
		CHECKED BY	DATE

STA 42 SECTION PROPERTIES 7/0583/38 1-6



NOTE: STRINGER 12 NOT EFFECTIVE AT THIS STATION.
STRINGER 4 ASSUMED EFFECTIVE & CONTINUOUS THROUGH ACCESS DOOR STA 42-92.

ITEM	SPAR CAP A	CAP $\bar{y}$	X
1	.117	1.81	− 3.5
2	.117	1.99	− 8.0
3	.446	2.53	− 13.0
4	.141	2.51	− 18.0
5	.141	2.64	− 23.0
6	.141	2.73	− 28.0
7	.432	2.97	− 34.6
8	.138	2.74	− 40.6
9	.138	2.64	− 46.6
10	.420	2.67	− 52.6
11	.112	2.28	− 56.6
12	~~.112~~	1.98	− 61.1
F	.283	1.89	− 64.8
N		0	− 73.0

RM-1319A

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

REPORT No. 7/0583/17
SHEET No. 3-2

AIRCRAFT:		PREPARED BY	DATE
C 105	FIN	S. YOUNG	SEPT. 6/55
		CHECKED BY	DATE

STA 42 SECTION PROPERTIES

ITEM 1	b×t	A	$\bar{y}$	$A\bar{y}$	$A\bar{y}^2$
SPAR		·117	1·81	·212	
AFT SKIN	1.5×·168	·252	2·45	·617	
FWD SKIN	2·25×·168	·378	2·53	·957	
Σ		·747	2·39	1·786	4·26

ITEM 2					
SPAR		·117	1·99	·233	
AFT SKIN	2·25×·168	·378	2·62	·930	
FWD SKIN	2·5×·168	·420	2·69	1·129	
Σ		·915	2·57	2·352	6·04

ITEM 3					
SPAR		·446	2·53	1·129	
AFT SKIN	2·5×·168	·420	2·80	1·175	
FWD SKIN	2·5×·161	·403	2·89	1·165	
Σ		1·269	2·74	3·469	9·50

ITEM 4					
SPAR		·141	2·51	·354	
AFT SKIN	2·5×·161	·420	2·98	1·250	
FWD SKIN	2·5×·161	·420	3·05	1·280	
Σ		·981	2·94	2·884	8·49

FORM 1316A

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

REPORT No. 7/0583/117
SHEET No. 3-3

AIRCRAFT:		PREPARED BY	DATE
C105	FIN	S. YOONG	SEPT. 16/55
		CHECKED BY	DATE

STA 42 SECTION PROPERTIES

ITEM 5	b×t	A	$\bar{Y}$	$A\bar{Y}$	$A\bar{Y}^2$
SPAR		·141	2·64	·372	
AFT SKIN	2·5×·161	·420	3·11	1·305	
FWD SKIN	2·5×·161	·420	3·15	1·322	
Σ		·981	3·06	2·999	9·18

ITEM 6					
SPAR		·141	2·73	·385	
AFT SKIN	2·5×·161	·420	3·20	1·345	
FWD SKIN	3·3×·161	·532	3·25	1·728	
Σ		N93	2·89	3458	10·00

ITEM 7					
SPAR		·432	2·97	1·281	
AFT SKIN	3·3×·161	·532	3·26	1·735	
FWD SKIN	3·0×·155	·465	3·27	1·522	
Σ		1·429	3·18	4·538	14·44

ITEM 8					
SPAR		·138	2·74	·378	
AFT SKIN	3·0×·155	·465	3·25	1·511	
FWD SKIN	3·0×·155	·465	3·21	1·492	
Σ		1·068	3·17	3·381	10·70

ORN 1319A

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

REPORT No. 7/0583/117
SHEET No. 3-4

AIRCRAFT:		PREPARED BY	DATE
C105	FIN	S. YOUNG	SEPT 16/55
		CHECKED BY	DATE

STA 42 SECTION PROPERTIES

ITEM 9	b x t	A	$\bar{Y}$	$A\bar{Y}$	$A\bar{Y}^2$
SPAR		·138	2·64	·364	
AFT SKIN	3·0 x ·155	·465	3·18	1·48	
FWD SKIN	3·0 x ·155	·465	3·11	1·445	
Σ		1·068	3·08	3·289	10·12

ITEM 10					
SPAR		·420	2·67	1·120	
AFT SKIN	3·0 x ·155	·465	3·02	1·405	
FWD SKIN	2·0 x ·086	·172	2·95	·508	
Σ		1·057	2·87	3·033	8·70

ITEM 11					
SPAR		·112	2·28	·255	
AFT SKIN	2·0 x ·086	·172	2·85	·490	
FWD SKIN	4·1 x ·086	·353	2·65	·935	
Σ		·637	2·54	1·680	4·44

ITEM F					
SPAR		·283	1·89	·535	
AFT SKIN	4·1 x ·086	·353	2·35	·830	
FWD SKIN	3·0 x ·051	·153	2·02	·309	
Σ		·789	2·12	1·674	3·55

$\frac{1}{2} I = \Sigma A\bar{Y}^2 = 99.42$

STA 42 $I = 198.8$ IN^4

RM 1319A

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

REPORT No. 7/0583/17
SHEET No. 3-5

AIRCRAFT:		PREPARED BY	DATE
C105	FIN	S. YOUNG	SEPT. 19/58
		CHECKED BY	DATE

BAY 42-67

DETERMINE MID-BAY SECTION PROPERTIES BY AVERAGING STA 42 & 67 (SIMILAR TO BAY 12-112).

CELL AREAS

$$A_d = 2\left[A_{1\text{-}2} + A_{2\text{-}3} - \frac{X_3 \bar{Y}_3}{2} + \frac{X_1 \bar{Y}_1}{2}\right].$$

$$= 2A_{1\text{-}2} + 2A_{2\text{-}3} - X_2 \bar{Y} + X_1 \bar{Y}_1$$

$$= 9.70 + 111 + 130.263 - 35.229 = \underline{47.0\ \square''}$$

$$A_c = 2\left[A_{3\text{-}4} + A_{4\text{-}5} + A_{5\text{-}6} + A_{6\text{-}7} - \frac{X_2 \bar{Y}_2}{2} + \frac{X_8 \bar{Y}_8}{2}\right]$$

$$= 10.7 + 12.1 + 15.4 + 15.5 + 34.6 \times 3.03 - 13.0 \times 2.63 = \underline{124.3\ \square''}$$

$$A_b = 2A_{7\text{-}8} + 2A_{8\text{-}9} + 2A_{9\text{-}10} - X_{10} \bar{Y}_{10} + X_7 \bar{Y}_7$$

$$= 18.9 + 23.3 + 30.0 + 526 \times 2.60 - 34.6 \times 3.03 = \underline{103.9\ \square''}$$

$$A_a = 2A_{10\text{-}11} + 2A_{11\text{-}T} - X_T \bar{Y}_T + X_{10} \bar{Y}_{10}$$

$$= 28.1 + 28.3 + 61.8 \times 1.97 - 526 \times 2.60 = \underline{41.7\ \square''}$$

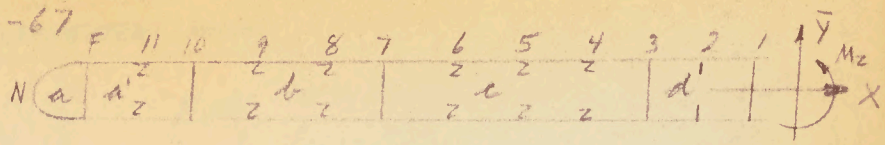
$A_a = 24.8\ \square''$ 7/0583/3B Pg 1-7 STA 42

$A_a = 19.3$ STA 67

$\therefore A_a = \underline{22.1\ \square''}$

ARM 1318A

BAY 42-67



$$2A = X_i Y_{i+1} - X_{i+1} Y_i$$

A. V. R

AIRCRAFT

WEIGHT

C. G. PO

ITEM	1 STA 67 X	2 $\bar{Y}$	3 STA 42 X	4 $\bar{Y}$	5 MID BAY X	6 $\bar{Y}$	7	8 $X_i \bar{Y}_{i+1}$	9 $-X_{i+1} Y_i$	10 ITEM
1	-3·5	2·18	-3·5	2·39	-3·5	2·29		-8·65	18·9	1-2
2	-8·0	2·36	-8·0	2·57	-8·0	2·47		-21·0	32·1	2-3
3	-13·0	2·51	-13·0	2·74	-13·0	2·63		-36·7	47·4	3-4
4	-18·0	2·70	-18·0	2·94	-18·0	2·82		-52·8	64·9	4-5
5	-23·0	2·80	-23·0	3·06	-23·0	2·93		-66·7	83·1	5-6
6	-28·0	2·90	-28·0	2·89	-28·0	2·90		-84·8	100·1	6-7
7	-34·6	2·87	-34·6	3·18	-34·6	3·03		-104·	122·9	7-8
8	-40·6	2·82	-40·6	3·17	-40·6	3·00		-116·5	139·9	8-9
9	-46·6	2·66	-46·6	3·08	-46·6	2·87		-121·	151·	9-10
10	-52·6	2·32	-52·6	2·87	-52·6	2·60		-118·9	147·1	10-11
11	(-56·6)	(1·97)	-56·6	2·54	-52·6	2·26		-111·5	139·9	11-F
F	-58·8	1·82	-64·8	2·12	-61·8	1·97				
N	-66·1	0	-73·0	0	-69·6	0				
NOTE (X, $\bar{Y}$) FOR ITEM 11; STA 67 ARE ASSUMED VALUES.										

FORM 1543

A. V. ROE CANADA LIMITED

MALTON, ONTARIO

TECHNICAL DEPT. (AIRFRAME)

AIRCRAFT - - C105

WEIGHT - -

C. G. POSITION -

REPORT NO. - 7/0585/17

SHEET - - 3-6

DATE - - SEPT. 16/55

PREPARED BY - S. YOUNG

7	8	9	10	11	12	13	14	15	16	17	18	19
	$X_i \bar{Y}_{i+1}$	$-X_{i+1} \bar{Y}_i$	ITEM	2A		ITEM	L	t	r/t		CELL	r
	-8.65	18.3	1-2	9.70		1-2	4.5	.164	27.4		a	328.8
	-21.0	32.1	2-3	11.1		2-3	5.	.164	30.5		a'	316.5
	-36.1	47.4	3-4	10.7		3-4	5.	.157	31.8		L	353.8
	-52.8	64.9	4-5	12.1		4-5	5.	.157	31.8		c	385.8
	-66.7	82.4	5-6	15.4		5-6	5.	.157	31.8		d	203.9
	-84.8	100.	6-7	15.5		6-7	6.6	.157	42.0			
	-104.	122.4	7-8	18.1		7-8	6.0	.150	40.0			
	-116.5	139.8	8-9	23.3		8-9	6.0	.150	40.0		CELL	A
	-121.	151.	9-10	30.0		9-10	6.0	.150	40.0		a	22.1
	-118.9	147.	10-11	28.1		10-11	4.0	.082	48.8		a'	41.7
	-111.5	139.8	11-F	28.3		11-F	4.5	.082	54.9		L	103.9
					151.0-67.1 179-42.0	F-N-F	16.9	.051	332.		c	124.3
						1-1 3-3	4.58 5.26	.115 .102	36.6 51.5		d	470
						7-7 10-10	6.06 5.40	.102 .081	59.5 54.3			
						F-F	3.94	.072	54.8			

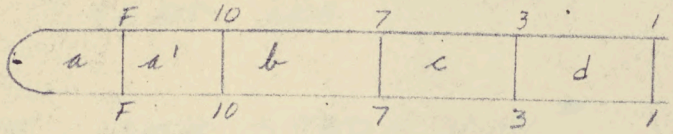
A. V. ROE CANADA LIMITED
MALTON - ONTARIO
TECHNICAL DEPARTMENT (Aircraft)

REPORT No. 7/0583/17
SHEET No. 3-7

AIRCRAFT: C105	FIN	PREPARED BY: S. YOUNG	DATE: SEPT. 19/55
		CHECKED BY	DATE

BAY 42-67

DETERMINE THE CELL TRANSFORMATION FACTORS



$$d = \frac{r_{WEB}}{r_{CELL}} \qquad \text{i.e.} \quad d_{a\text{-}a'} = \frac{r_{F\text{-}F}}{r_a}$$

$$d_{a'\text{-}a} = \frac{r_{F\text{-}F}}{r_{a'}}$$

$$d_{a\text{-}a'} = \frac{54.8}{386.8} = .142$$

$$d_{a'\text{-}a} = \frac{54.8}{316.5} = .1735$$

$$d_{a'\text{-}b} = \frac{54.3}{316.5} = .1715$$

$$d_{b\text{-}a'} = \frac{54.3}{353.8} = .1535$$

$$d_{b\text{-}c} = \frac{59.5}{353.8} = .1682$$

$$d_{c\text{-}b} = \frac{59.5}{385.8} = .1542$$

$$d_{c\text{-}d} = \frac{51.5}{385.8} = .1335$$

$$d_{d\text{-}c} = \frac{51.5}{203.9} = .2525$$

FORM 1319A

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

REPORT No. 7/0583/17
SHEET No. 3-8

AIRCRAFT:		PREPARED BY	DATE
C105	FIN	S. YOUNG	SEPT. 19/55
		CHECKED BY	DATE

STA 42

LOADING 7/0583/38 3-14
C.P. AFT CASE

ULTIMATE SHEAR OUTB'D = 30750 #

SHEAR INB'D = 34750 #

B. M. = 2,275,000 " #

H.L. TORQUE OUTB'D = 258,000 " #

H.L. TORQUE INB'D = 345,000 " #

$f = \frac{2275000}{198.8} \bar{Y} = 11,450 \bar{Y}$ $P = 11,450 A\bar{Y}$

ITEM	$\bar{Y}$	$A\bar{Y}$	f	P
1	2.39	1.786	27350	20450
2	2.57	2.352	29400	26900
3	2.74	3.469	31350	39700
4	2.94	2.884	33650	33000
5	3.06	2.999	35000	34300
6	2.89	3.458	33100	39550
7	3.18	4.538	36400	52000
8	3.17	3.381	36250	38700
9	3.08	3.289	35250	37650
10	2.87	3.033	32850	34650
11	2.54	1.680	29050	19200
F	2.12	1.674	24250	19180

FORM 1319A

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

REPORT NO. 7/05583/117
SHEET NO 3-9

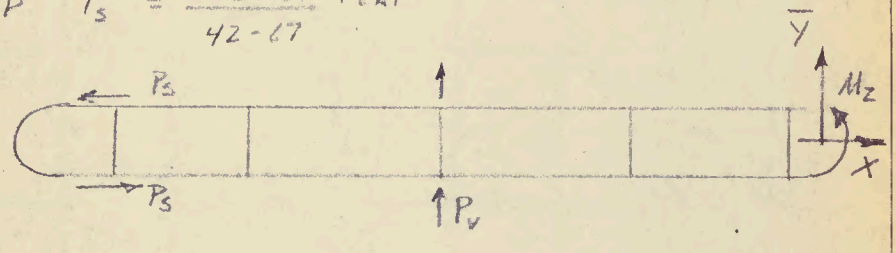
AIRCRAFT:		PREPARED BY	DATE
C105	FIN	S. YOUNG	SEPT. 19/55
		CHECKED BY	DATE

BAY 42-67

SLOPE & SWEEPBACK SHEARS

SLOPE $P_V = \frac{\bar{Y}_{42} - \bar{Y}_{67}}{42-67} P_{CAP} = \frac{\Delta \bar{Y}}{-25} P_{CAP}$

SWEEP $P_S = \frac{X_{42} - X_{67}}{42-67} P_{CAP}$



2 SKINS $\Sigma P_V = 2 \times +4688 = +\ 9376$ #

2 SKINS $\Sigma P_V \cdot X = 2 \times -174620 = -\ 349,240$ " #

FRONT SPAR $\Sigma P_S \cdot \bar{Y} = 2 \times +9750 = +\ 19,500$ " #

BAY 42-67

SLOPE & SWEEPBACK SHEAR

A. V.

AIRCRA
WEIGHT
C. G. P

ITEM	1 $\bar{Y}_{42}$	2 $\bar{Y}_{67}$	3 $\Delta\bar{Y}$	4 P_{CAP} STA 42	5 P_Y	6 X	7 $P_Y X$	8	9	10 $X_{42}-X_{67}$
1	2.39	2.18	.21	20450	172	-3.5	-600			
2	2.57	2.36	.21	26900	226	-8.	-1810			
3	2.74	2.51	.23	39700	365	-13.	-4750			
4	2.94	2.70	.24	33000	317	-18.	-5700			
5	3.06	2.80	.26	34300	357	-23.	-8210			
6	2.89	2.90	0	34550	0	-28	-0			
7	3.18	2.87	.31	52000	645	-34.6	-22300			
8	3.17	2.82	.35	38700	542	-40.6	-22000			
9	3.08	2.66	.42	37650	633	-46.6	-29500			
10	2.87	2.32	.55	34650	763	-52.6	-40100			
11	2.54	(1.97)	.57	19200	438	-56.6	-24750			
F	2.12	1.82	.30	19180	230	-64.8	-14900			-60
Σ					+4688		-174620			

FORM 1543

A. V. ROE CANADA LIMITED

MALTON, ONTARIO

TECHNICAL DEPT. (AIRFRAME)

REPORT NO. - 7/0583/17

SHEET - - 3-10

DATE - - SEPT 16/55

PREPARED BY - S. YOUNG

AIRCRAFT - - C105

WEIGHT - -

C. G. POSITION -

7	8	9	10	11	12	13	14	15	16	17	18	19
$P_1 X$			$X_{42} \cdot X_{67}$	$P_5 \cdot$	$\bar{Y}$	$P_5 \cdot \bar{Y}$						
-600												
1810												
4750												
5700												
-8210												
-0												
-22300												
-22000												
29500												
40100												
24750												
14900			-60	4600	212	9750						
174620						+9750						

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

REPORT No. 7/058/17
SHEET No. 3-11

AIRCRAFT: C105	TIN

PREPARED BY	DATE
S. YOUNG	SEPT. 19/55
CHECKED BY	DATE

BAY 42-67

COMPUTE THE BENDING SHEAR . FLOWS, CORRECTIVE SHEAR q_o FLOW & CORRECTIVE TORQUE q_T FLOW IN SIMILAR FASHION TO BAY 92-112

ITEM AREAS ABOUT H.L.

F-N-F $2A = 2A_o - 2X\bar{Y}$

$= 2 \times 22.1 - 2 \times 6.18 \times 1.97 = 44.2 + 24.35 = 28.17$ □"

1-1 $2A = 2X\bar{Y}$

$= 2 \times 3.5 \times 2.27 = 16.0$

3-3 $2A = 2 \times 1.30 \times 2.13 = 6.57$

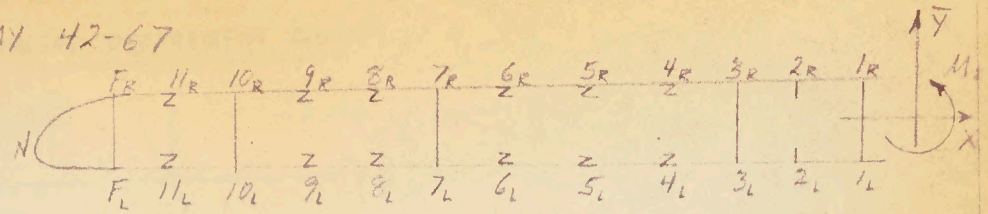
7-7 $2A = 2 \times 3.46 \times 3.03 = 20.95$

10-10 $2A = 2 \times 5.26 \times 2.60 = 27.4.$

F-F $2A = 2 \times 6.18 \times 1.97 = 24.35$

FORM 1319A

BAY 42-67

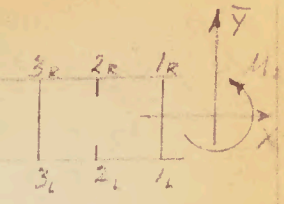


A. V. ROE
M
TECH

AIRCRAFT
WEIGHT
C. G. POSITIO

	1	2	3	4	5	6	7	8	9	10	11
ITEM	P_{42}	$-P_{67}$	$P_{42}-P_{67}$ ΔP	$\frac{P_{42}-P_{67}}{42-67}$ $\frac{\Delta P}{-25}$		ITEM	g_0	x_2	$x_2 g_0$	$2A$	$2Ag_0$
1_R	20450	-16410	3960	-158		$F_L N-F_R$	0	33.2	0	28.7	0
2_R	26900	-21850	5050	-202		F_R-11_R	26.2	54.9	143[illegible]0	28.3	7420
3_R	39700	-32000	7700	-308		11_R-10_R	103.0	48.8	50[illegible]0	28.1	28950
4_R	33000	-25450	7550	-302		10_R-9_R	136.6	40.0	54[illegible]00	30.0	40900
5_R	34300	-26500	7800	-312		9_R-8_R	174.6	40.0	69[illegible]00	23.3	40700
6_R	37550	-31150	8400	-336		8_R-7_R	209.6	40.0	83[illegible]00	18.9	39600
7_R	52000	-40900	11100	-444		7_R-6_R	254.0	42.0	106,[illegible]00	15.5	39400
8_R	38700	-29950	8750	-350		6_R-5_R	287.6	31.8	91,[illegible]00	15.4	44300
9_R	34650	-28150	9500	-380		5_R-4_R	318.8	31.8	101,[illegible]00	12.1	38600
10_R	34650	-26250	8400	-336		4_R-3_R	349.0	31.8	111,[illegible]00	8.7	37400
11_R	19200	-0	19200	-768		3_R-2_R	379.8	30.5	115,[illegible]00	11.1	42200
F_R	19180	-12520	6660	-262		2_R-1_R	400.0	27.4	109,[illegible]00	9.7	38800
						1_L-1_R	415.8	36.6	152,[illegible]00	16.0	-6500
						3_L-3_R	0	51.5	0	65.7	0
						7_L-7_R	0	57.5	0	207.5	0
						10_L-10_R	0	54.3	0	274.	0
						F_L-F_R	0	54.8	0	243.5	0

FORM 1543



A. V. ROE CANADA LIMITED

MALTON, ONTARIO

TECHNICAL DEPT. (AIRFRAME)

AIRCRAFT - - C105

WEIGHT - -

C. G. POSITION -

REPORT NO. - 7/0583/17.

SHEET - - 3-12

DATE - - SEPT. 19/55

PREPARED BY - S. YOUNG

7	8	9	10	11	12	13	14	15	16	17	18	19
f_0	λ_2	$\lambda_2 f_0$	2A	$2A f_0$	$\Sigma 2A f_0$			SHEAR CORRECTION f_S'	TORQUE CORRECTION f_T'	f (3)+(12)+(16)		
0	33.2	0	287.7	0				-104	302	198		
262	54.9	14300	283	74200				-730	744	276		
1030	48.8	50300	381	289500				-730	744	1044		
1366	40.0	54500	300	409000				-1773	1378	971		
1746	40.0	69700	233	407000				-1773	1378	1351		
2096	40.0	83800	189	396000				-1773	1378	1701		
2540	42.0	106700	155	344000				-2896	1482	1126		
2876	31.8	91400	154	443000				-2896	1482	1462		
3188	31.8	101400	121	386000				-2896	1482	1774		
3490	31.8	111000	87	314000				-2896	1482	2076		
3792	30.5	115700	111	422000				-3690	1170	1278		
4000	27.4	109600	97	388000	$2_x + 3182700$			-3690	1170	1480		
4158	36.6	152200	164	-650000	-650000			-3690	1170	1638		
0	51.5	0	657	0				+774	332	1106		
0	53.5	0	207.5	0				+1123	-104	1019		
0	54.3	0	274.	0				+1093	-684	409		
0	54.8	0	243.5	0	731,540			+678	-494	184		

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

REPORT No. 7/0583/17
SHEET No. 3-13

AIRCRAFT: C105	FIN	PREPARED BY: S. YOUNG	DATE: SEPT. 19/53
		CHECKED BY	DATE

BAY 42-67

SHEAR LOAD ACTING AT SHEAR CENTRE

1ST APPROXIMATION $q_s' = \frac{\Sigma q_o r}{\Sigma r}$

$\Sigma_a q_o r = 0$

$\Sigma_a q_o r = 2(14380 + 50300) = 129,360$

$\Sigma_b q_o r = 2(54600 + 69700 + 83800) = 416,200$

$\Sigma_c q_o r = 2(106,700 + 91400 + 101,500 + 111,000) = 821,200$

$\Sigma_d q_o r = 2(115,900 + 109600) + 152,200 = 603,200$

$\Sigma_a r = 386.8$

$\Sigma_a r = 316.5$

$\Sigma_b r = 353.8$

$\Sigma_c r = 385.8$

$\Sigma_d r = 203.9$

$\therefore q_{s_a}' = 0$

$q_{s_a}' = \frac{129360}{316.5} = 408$

$q_{s_b}' = \frac{416200}{353.8} = 1175$

$q_{s_c}' = \frac{821200}{385.8} = 2130$

$q_{s_d}' = \frac{603200}{203.9} = 2960$

FORM 1319A

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

REPORT No. 7/0583/17
SHEET No 3-14

AIRCRAFT:		PREPARED BY	DATE
C105	FIN	S. YOUNG	SEPT 19/55
		CHECKED BY	DATE

BAY 42-67

d		·142	·1735	·1715	·1535	·168	·1542	·1335	·2525
d TRANSPOSE		·1735	·142	·1535	·1715	·1542	·168	·2525	·1335
q_s' 1ST APPROX.	0		408		1175		2130		2960
2ND "	58·	0	203·5	626	358·	181·1	395·	538·	
3RD "	28·9	10·1	70·6	31·2	96·7	64·9	71·8	145·2	
4TH "	11·5	5·0	21·9	12·4	25·0	19·7	19·4	34·3	
5TH "	3·8	2·0	6·4	4·1	6·6	5·8	4·6	9·9	
q_s'	102·2	727·5		1771·6		2892·3		3687·4	

ITERATE	103·3	17·7	304	111·8	486	273	493	730	
q_s' 1ST APPROX	0		408		1175		2130		2960
q_s'	103·3	729·7		1772·8		2896		3690	

ITERATE	103·7	17·9	304	112·	486	273	493	730	
q_s' 1ST APPROX	0		408		1175		2130		3690
q_s'	103·7	729·7		1773·0		2896		3690	

BY INSPECTION, THE q_s' VALUES MUST BE NEGATIVE TO BALANCE THE SECTION.

$q'_{s_a} = -104$

$q'_{s_{a'}} = -730$

$q'_{s_b} = -1773$

$q'_{s_c} = -2896$

$q'_{s_d} = -3690$

FORM 1319A

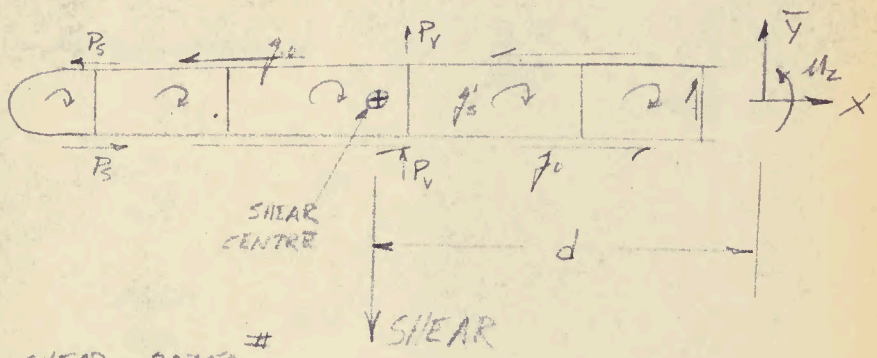
A. V. ROE CANADA LIMITED
MALTON - ONTARIO
TECHNICAL DEPARTMENT (Aircraft)

REPORT No. 7/0583/117
SHEET No. 3-15

AIRCRAFT:		PREPARED BY	DATE
C105	FIN	S. YOUNG	SEPT. 19/55
		CHECKED BY	DATE

BAY 42-67

DETERMINE THE SHEAR CENTRE POSITION.



BAY SHEAR = 30750 #

ΣM_z AT $M_1 = S \cdot d + \Sigma 2Aq_0 + \Sigma P_s x + \Sigma P_s \bar{y} + \Sigma 2Aq_s = 0$

$+30750d + 731{,}540 - 349{,}240 + 19500 - 2 \times 22.1 \times 104 - 2 \times 41.7 \times 730$

$- 2 \times 103.9 \times 1773 - 2 \times 124.3 \times 2896 - 2 \times 470 \times 3690 = 0$

$30750d + 731540 - 349240 + 19500 - 4600 - 60{,}900 - 368{,}500$

$- 720{,}000 - 347{,}000 = 0$

$$d = \frac{1099200}{30750} = 35.75''$$

DRN. 1319A

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

REPORT No. 7/0583/117
SHEET No. 3-16

AIRCRAFT:		PREPARED BY	DATE
C105	FIN	S. YOUNG	SEPT. 19/55
		CHECKED BY	DATE

BAY 42-67

TORSIONAL SHEAR FLOW q'_T

1ST APPROXIMATION $q'_T = \frac{2A}{\Sigma s}$

$q'_{Ta} = \frac{2 \times 22.1}{386.8} = .1141$

$q'_{Ta'} = \frac{2 \times 41.7}{316.5} = .2635$

$q'_{Tb} = \frac{2 \times 103.9}{353.8} = .588$

$q'_{Tc} = \frac{2 \times 124.3}{385.8} = .645$

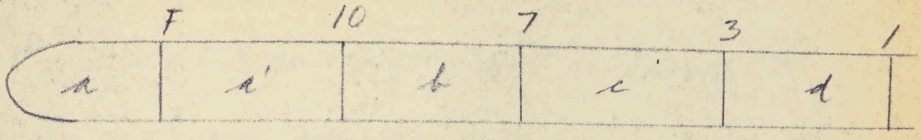
$q'_{Td} = \frac{2 \times 47.0}{203.9} = .461$

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

REPORT NO: 7/0583/17
SHEET NO: 3-17

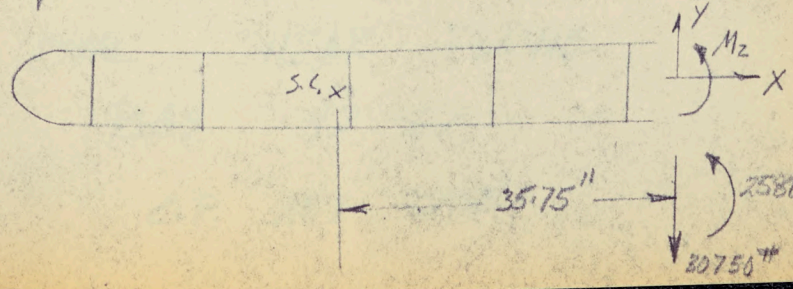
AIRCRAFT:		PREPARED BY	DATE
C105	FIN	S. YOUNG	
		CHECKED BY	DATE

BAY 42-67



d	·142	·1735	·1715	·1535	·168	·1542	·1335	·2525	
d TRANSPOSE	·1735	·142	·1535	·1715	·1542	·168	·2525	·1335	
f_T' 1ST APPROX	·1141		·2635		·588		·645		·461
2ND "	·0374	·0118	·1010	·0404	·1082	·0906	·0615	·1628	
3RD "	·0171	·0065	·0254	·0185	·0256	·0229	·0217	·0384	
4TH "	·0045	·0030	·0076	·0049	·0075	·0069	·0051	·0113	
5TH "	·0015	·0008	·0021	·0016	·0020	·0019	·0015	·0030	
	·1746		·4297		·7967		·8571		·6765
ITERATE	·0610	·0302	·1365	·0659	·1440	·1229	·0904	·2165	
f_T' 1ST APPROX	·1141		·2635		·588		·645		·461
f_T'	·1751		·4302		·7979		·8583		·6775
ITERATE	·0610	·0304	·1370	·0659	·1440	·1232	·0905	·2165	
f_T' 1ST APPROX	·1141		·2635		·588		·645		·461
f_T'	·1751		·4309		·7979		·8587		·6775
A	22·1		41·7		103·9		124·3		47·0
$2A f_T'$	7·74		36·9		165·5		213·5		63·6

$J = \Sigma 2A f_T' = 487·2$



FORM 1398A

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

REPORT No. 7/0583/17
SHEET No. 3-18

AIRCRAFT:		PREPARED BY	DATE
C105	FIN	S. YOUNG	SEPT. 19/55
		CHECKED BY	DATE

BAY 42-67

AT S.C., $M_z = +258{,}000 - 30750 \times 3575 = -841{,}000$ "#

FACTOR ON UNIT TORQUES, q'_T

$$\frac{841000}{487{\cdot}2} = 1737$$

$q'_{T_a} = {\cdot}1751 \times 1737 = 302$

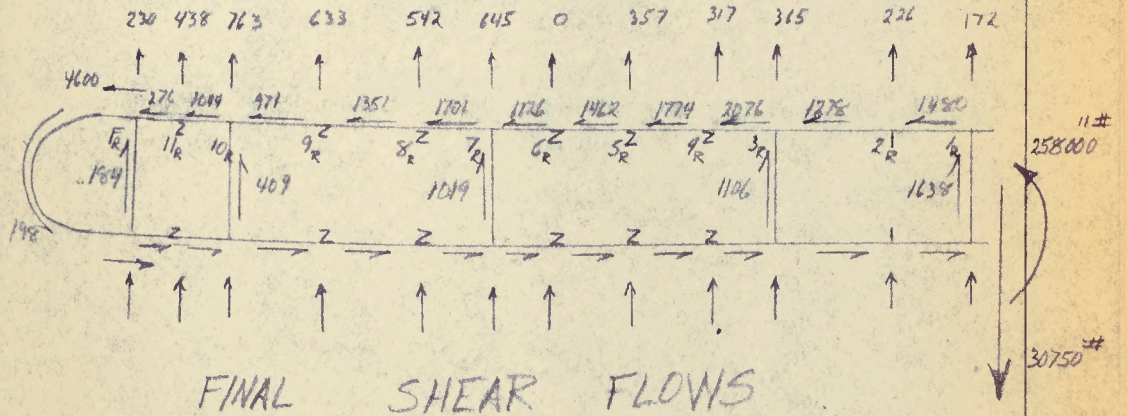
$q'_{T_c} = {\cdot}8587 \times 1737 = 1482$

$q''_{T_a} = {\cdot}4309 \times 1737 = 744$

$q'_{T_d} = {\cdot}6775 \times 1737 = 1170$

$q'_{T_b} = {\cdot}7979 \times 1737 = 1378$

ADD THE ASSUMED BENDING SHEAR FLOW q_0, CORRECTIVE SHEAR q'_s, AND CORRECTIVE TORQUE q'_T.



FINAL SHEAR FLOWS

BAY 42-67

C.P. AFT CASE

FORM 1170A

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

REPORT NO. 7/0583/17
SHEET NO. 3-19

AIRCRAFT		PREPARED BY	DATE
C105	FIN	S. YOUNG	SEPT. 19/55.
		CHECKED BY	DATE

BAY 42-67

CHECK THE VERTICAL SHEAR BALANCE.

SKIN SHEAR = 2(237) = +474
WEBS & NOSE SHEAR = 21565
P_V SHEAR = 9376
+31415# REACTIVE SHEAR
−30750# APPLIED SHEAR

CHECK H.L. TORQUE BALANCE

SKIN TORQUE = +484,340
WEBS & NOSE TORQUE = −412,400
P_V TORQUE = −349240
P_S TORQUE = +19500
−257800 "# REACTIVE TORQUE
+258000 "# APPLIED TORQUE

FORM 1319A

BAY 42-67

SHEAR & TORQUE BALANCE CHECK

A. V. R

AIRCRAF
WEIGHT
C. G. PO

ITEM	1 MID BAY $\bar{y}$	2 ITEM	3 $\Delta\bar{y}$	4 q	5 SHEAR	6	7	8	9	10 ITEM
F	1.97	F-N-F	3.94	196	-780					F-N-F
11	2.26	F-11	.29	276	-80					F-11
10	2.60	11-10	.34	1044	-355					11-10
9	2.87	10-9	.27	971	-262	½ ΣSKIN SHEAR = +237				10-9
8	3.00	9-8	.13	1351	-176	ΣWEB & NOSE SHEAR = +2165				9-8
7	3.03	8-7	.03	1701	-51					8-7
6	2.90	7-6	-.13	1126	146					7-6
5	2.93	6-5	.03	1467	-44					6-5
4	2.82	5-4	-.11	1774	195					5-4
3	2.63	4-3	-.19	2076	394					4-3
2	2.47	3-2	-.16	1278	204					3-2
1	2.29	2-1	-.18	1460	266					2-1
		1-1 3-3	4.58 5.26	1638 1106	7510 5810					1-1 3-3
		7-7 10-10	6.06 5.20	1019 409	6170 2130					7-7 10-10
		F-F	3.94	184	725					F-F

FORM 1543

ECK

A. V. ROE CANADA LIMITED

MALTON, ONTARIO

TECHNICAL DEPT. (AIRFRAME)

REPORT NO. - 7/0583/17

SHEET - - 3-20

DATE - - SEPT. 19/56

AIRCRAFT - - C105

WEIGHT - -

C. G. POSITION -

PREPARED BY - S. YOUNG

7	8	9	10	11	12	13	14	15	16	17	18	19
			ITEM	2A	7	2A 7						
			F-N-F	28.7.7	198	57000						
			F-11	23.3	276	7820						
			11-10	28.1	1044	29350						
KIN SHEAR = +237			10-9	30.0	971	29100	½ Σ SKN TORQUE =			242,170		
B & SHEAR = +21565			9-8	23.3	1351	31450	Σ WEB NOS & TORQUE = -			412,400		
			8-7	18.9	1701	32200						
			7-6	15.5	1126	17450						
			6-5	15.4	1462	22500						
			5-4	12.1	1774	21500						
			4-3	10.7	2076	22250						
			3-2	11.1	1278	14200						
			2-1	9.7	1460	14350						
			1-1	16.0	1638	-26200						
			3-3	65.7	1106	-72800						
			7-7	209.5	1019	-213,500						
			10-10	274.	409	-112,100						
			F-F	243.5	184	-44800						

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

REPORT No. 7/0583/17
SHEET No. 4-0

AIRCRAFT: C105	FIN

PREPARED BY	DATE
S. YOUNG	SEPT. 23/55
CHECKED BY	DATE

BAY 67 - 92

SECTION 4

FORM 1319A

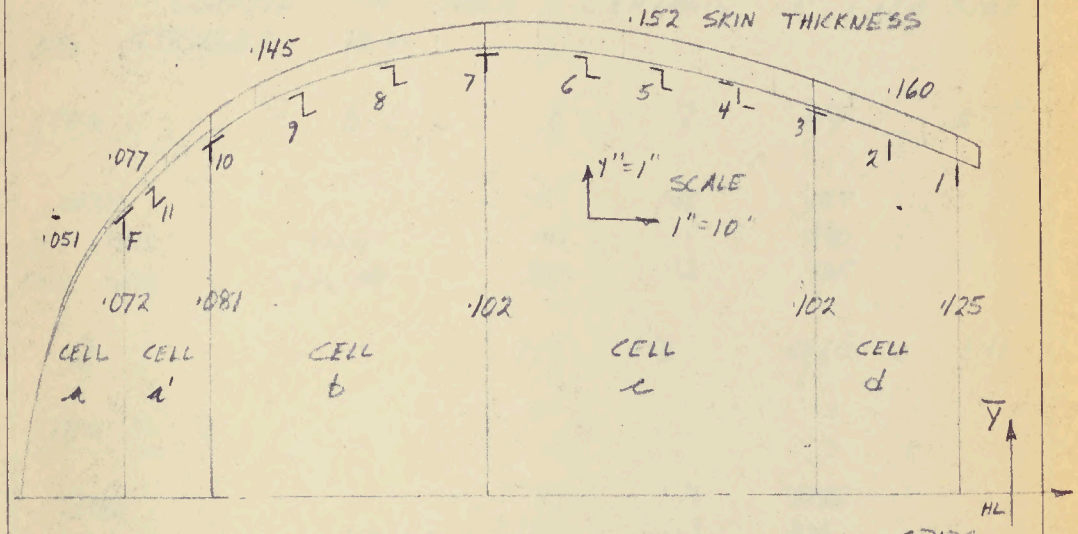
A. V ROE CANADA LIMITED
MALTON · ONTARIO
TECHNICAL DEPARTMENT (Aircraft)

REPORT No. 7/0583/17
SHEET No. 4-1

AIRCRAFT:		PREPARED BY	DATE
C105	FIN	S. YOUNG	SEPT. 15/55
		CHECKED BY	DATE

STA 67 SECTION PROPERTIES

7/0583/3B 1-8



NOTE: THERE IS AN ACCESS DOOR BETWEEN SPARS 3 & 5 WHICH IS CONSIDERED AS A FULLY EFFECTIVE STRESS CARRYING DOOR. HENCE ASSUME SPAR 4 IS CONTINUOUS. SPAR 11 STARTS AT STA 67 & HENCE WILL HAVE ZERO CAP LOAD.

ITEM	SPAR CAP A	CAP Ȳ	X
1	.117	1.60	-3.5
2	.117	1.76	-8.0
3	.180	2.30	-13.0
4	.137	2.25	-18.0
5	.137	2.35	-23.0
6	.137	2.53	-28.0
7	.414	2.66	-34.6
8	.135	2.38	-40.6
9	.135	2.21	-46.6
10	.400	2.11	-52.6
F	.264	1.61	-58.8
N		0	-66.1

FORM 1319A

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

REPORT No. 7/0583/17
SHEET No. 4-2

AIRCRAFT: C105	FIN	PREPARED BY: S. YOUNG	DATE: SEPT. 15/55
		CHECKED BY	DATE

STA 67 SECTION PROPERTIES

COMPUTE THE AREA & CENTROID OF EACH SPAR AND STRINGER ITEM

ITEM 1	b×t	A	$\bar{y}$	$A\bar{y}$	$A\bar{y}^2$
SPAR		.117	1.60	.187	
AFT SKIN	1.5×.160	.240	2.25	.540	
FWD SKIN	2.25×.160	.360	2.32	.835	
Σ		.717	2.18	1.562	3.41

ITEM 2					
SPAR		.117	1.76	.2055	
AFT SKIN	2.25×.160	.360	2.42	.872	
FWD SKIN	2.5×.160	.400	2.48	.993	
Σ		.877	2.36	2.0705	4.89

ITEM 3					
SPAR		.430	2.30	.989	
AFT SKIN	2.5×.160	.400	2.58	1.032	
FWD SKIN	2.5×.152	.380	2.67	1.015	
Σ		1.210	2.51	3.036	7.61

ITEM 4					
SPAR		.137	2.25	.308	
AFT SKIN	2.5×.152	.380	2.75	1.045	
FWD SKIN	2.5×.152	.380	2.80	1.065	
Σ		.897	2.70	2.418	6.51

FORM 1319A

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

REPORT NO. 7/0583/17
SHEET NO. 4-3

AIRCRAFT: C105	FIN

PREPARED BY	DATE
S. YOUNG	SEPT. 15/55
CHECKED BY	DATE

STA -67 SECTION PROPERTIES

ITEM 5	b×t	A	$\bar{y}$	$A\bar{y}$	$A\bar{y}^2$
SPAR		·137	2·35	·322	
AFT SKIN	2·5×·152	·380	2·87	1·090	
FWD SKIN	2·5×·152	·380	2·91	1·105	
Σ		·897	2·80	2·517	7·05

ITEM 6					
SPAR		·137	2·53	·347	
AFT SKIN	2·5×·152	·380	2·95	1·120	
FWD SKIN	3·3×·152	·502	2·97	1·490	
Σ		1·019	2·90	2·957	8·57

ITEM 7					
SPAR		·414	2·66	1·100	
AFT SKIN	3·3×·152	·502	2·98	1·492	
FWD SKIN	3·0×·145	·435	2·96	1·288	
Σ		1·351	2·87	3·880	11·15

ITEM 8					
SPAR		·135	2·38	·322	
AFT SKIN	3·0×·145	·435	2·93	1·275	
FWD SKIN	3·0×·145	·435	2·86	1·243	
Σ		1·005	2·82	2840	8·02

FORM 1319A

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

REPORT No. 7/0583/17
SHEET No. 4-4

AIRCRAFT:		PREPARED BY :	DATE
C105	FIN	S. YOUNG	SEPT. 15/55
		CHECKED BY	DATE

STA 67 SECTION PROPERTIES

ITEM 9	b x t	A	$\bar{Y}$	$A\bar{Y}$	$A\bar{Y}^2$
SPAR		·135	2·21	·298	
AFT SKIN	3·0 x ·145	·435	2·78	1·210	
FWD SKIN	3·0 x ·145	·435	2·67	1·162	
Σ		1·005	2·66	2·670	7·10

ITEM 10					
SPAR		·400	2·11	·844	
AFT SKIN	3·0 x ·145	·435	2·51	1·092	
FWD SKIN	3·1 x ·077	·238	2·32	·553	
Σ		1·073	2·32	2·489	5·78

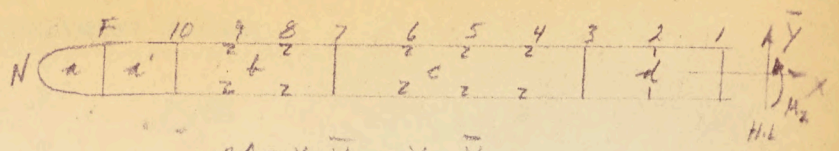
ITEM F					
SPAR		·264	1·61	·425	
AFT SKIN	3·1 x ·077	·238	2·07	·493	
FWD SKIN	3·0 x ·051	·153	1·77	·271	
Σ		·655	1·82	1·189	2·16

½ SECTION $I = \Sigma A\bar{Y}^2 = 72·25$

∴ STA 67 $I = 144·5$ IN^4

OPM 1319A

BAY 67-92



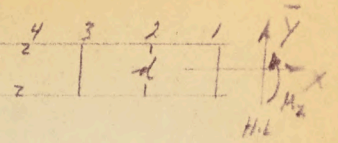
$$2A = X_i \bar{Y}_{(i+1)} - X_{i+1} \bar{Y}_i$$

ITEM	1 STA / X	2 92 / $\bar{Y}$	3 STA / X	4 67 / $\bar{Y}$	5 MID / X	6 BAY / $\bar{Y}$	7	8 $X_i \bar{Y}_{(i+1)}$	9 $-X_{i+1} \bar{Y}_i$	10 ITEM	11 2A
1	-3·5	1·95	-3·5	2·18	-3·5	2·07		-7·9	16·6	1-2	8·7
2	-8·0	2·14	-8·0	2·36	-8·0	2·25		-19·2	29·2	2-3	10·0
3	-13·0	2·28	-13·0	2·51	-13·0	2·40		-33·4	43·2	3-4	9·8
4	-18·0	2·44	-18·0	2·70	-18·0	2·57		-47·9	59·2	4-5	11·3
5	-23·0	2·52	-23·0	2·80	-23·0	2·66		-63·0	74·5	5-6	11·5
6	-28·0	2·57	-28·0	2·90	-28·0	2·74		-74·3	94·8	6-7	20·5
7	-34·6	2·42	-34·6	2·87	-34·6	2·65		-90·4	107·8	7-8	17·4
8	-40·6	2·39	-40·6	2·82	-40·6	2·61		-97·0	121·8	8-9	24·8
9	-46·6	2·11	-46·6	2·66	-46·6	2·39		-93·7	125·6	9-10	32·1
10	(-52·6)	(1·70)	-52·6	2·32	-52·6	2·01		-91·5	112·1	10-F	20·5
F	-52·6	1·45	-58·8	1·82	-55·7	1·74					
N	-59·1	0	-66·1	0	-62·6	0					
NOTE (X,Y) FOR ITEM 10 STA 92 ARE ASSUMED VALUES.											

FORM 1543

A. V. ROE
MA
TECHNI

AIRCRAFT
WEIGHT
C.G. POSITION



A. V. ROE CANADA LIMITED

MALTON, ONTARIO

TECHNICAL DEPT. (AIRFRAME)

AIRCRAFT - - C105

WEIGHT - -

C. G. POSITION

REPORT NO. - 7/0583/17

SHEET - - 4-5

DATE - - SEPT. 15/55

PREPARED BY - S. YOUNG

6	7	8	9	10	11	12	13	14	15	16	17	18	19
AY / $\bar{Y}$		X_1 $\bar{Y}_{(2)}$	$-X_1$ $\bar{Y}_2$	ITEM	2A		ITEM	L	t	$\frac{r}{t}$		CELL	r
.07		-7.9	16	1-2	8.7		1-2	4.5	.152	29.6		a	342
.25		-19.2	29	2-3	10.0		2-3	5.0	.152	32.9		a'	178.5
.40		-33.4	43	3-4	9.8		3-4	5.0	.144	34.7		b	324.4
.57		-47.9	59	4-5	11.3		4-5	5.0	.144	34.7		c	378.8
.66		-63.0	74.5	5-6	11.5		5-6	5.0	.144	34.7		d	205.1
.74		-74.3	94.8	6-7	20.5		6-7	6.6	.144	45.8			
.45		-90.4	107.8	7-8	17.4		7-8	6.0	.137	43.8			
.61		-97.0	121.8	8-9	24.8		8-9	6.0	.137	43.8		CELL	AREA
.39		-93.7	125.6	9-10	32.1		9-10	6.0	.137	43.8		a	17.8
.01		-91.5	112	10-F	20.5		10-F	3.1	.077	40.3		a'	11.9
.14						14.0-92 15.8-67	F-N-F	14.9	.051	294		b	88.1
							1-1	4.14	.125	33.1		c	113.6
							3-3	4.80	.102	47.0		d	42.6
							7-7 10-10	5.30 4.02	.102 .081	52.0 49.6			
							F-F	3.48	.072	48.3			

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

REPORT No. 7/0583/117
SHEET No 4-6

AIRCRAFT:		PREPARED BY	DATE
C105	FIN	S. YOUNG	SEPT 15/55
		CHECKED BY	DATE

BAY 67-92

DETERMINE MID-BAY SECTION PROPERTIES BY AVERAGING STA 67 & 92 (SIMILAR TO BAY 92-112).

CELL AREAS:

$$A_d = 2\left[A_{1\text{-}2} + A_{2\text{-}3} - \tfrac{1}{2}X_3\bar{Y}_3 + \tfrac{1}{2}X_1\bar{Y}_1\right]$$

$$= 2A_{1\text{-}2} + 2A_{2\text{-}3} - X_3\bar{Y}_3 + X_1\bar{Y}_1$$

$$= 8.7 + 10.0 + 13.0 \times 2.40 - 3.5 \times 2.07 = \underline{42.6}\ \square''$$

$$A_c = 2A_{3\text{-}4} + 2A_{4\text{-}5} + 2A_{5\text{-}6} + 2A_{6\text{-}7} - X_7\bar{Y}_7 + X_3\bar{Y}_3$$

$$= 9.8 + 11.3 + 11.5 + 20.5 + 34.6 \times 2.65 - 13.0 \times 2.40 = \underline{113.6}\ \square''$$

$$A_b = 2A_{7\text{-}8} + 2A_{8\text{-}9} + 2A_{9\text{-}10} - X_{10}\bar{Y}_{10} + X_7\bar{Y}_7$$

$$= 17.4 + 24.8 + 32.1 + 52.6 \times 2.01 - 34.6 \times 2.65 = \underline{88.1}\ \square''$$

$$A_{a'} = 2A_{11\text{-}F} - X_F\bar{Y}_F + X_{10}\bar{Y}_{10}$$

$$= 20.5 + 55.7 \times 1.74 - 52.6 \times 2.01 = \underline{11.9}\ \square''$$

A_a STA 67 = 19.3 □" 7/0583/3B 1-9

A_a STA 92 = 16.2 □"

$$\therefore\ \underline{A_a = 17.8\ \square''}$$

DRM 1319A

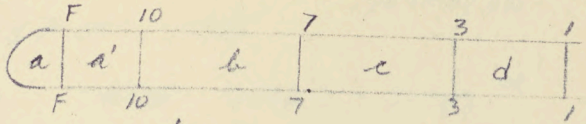
A. V. ROE CANADA LIMITED
MALTON - ONTARIO
TECHNICAL DEPARTMENT (Aircraft)

REPORT No. 7/0583/17
SHEET No. 4-7

AIRCRAFT: C105	FIN

PREPARED BY	DATE
S. YOUNG	SEPT. 15/55
CHECKED BY	DATE

DETERMINE THE CELL TRANSFORMATION FACTORS



$$d = \frac{r_{WEB}}{r_{CELL}} \qquad \text{i.e. } d_{a-a'} = \frac{r_{F-F}}{r_a}$$

$$d_{a'-a} = \frac{r_{F-F}}{r_b}$$

$$d_{a-a'} = \frac{48.3}{342} = .141$$

$$d_{a'-a} = \frac{48.3}{178.5} = .2705$$

$$d_{a'-b} = \frac{49.6}{178.5} = .278$$

$$d_{b-a'} = \frac{49.6}{364.4} = .136$$

$$d_{b-c} = \frac{52.0}{364.4} = .1428$$

$$d_{c-b} = \frac{52.0}{398.8} = .1302$$

$$d_{c-d} = \frac{47.0}{398.8} = .1169$$

$$d_{d-c} = \frac{47.0}{205.1} = .229$$

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

REPORT No. 7/0583/17
SHEET No. 4-8

AIRCRAFT:		PREPARED BY	DATE
C105	FIN	S. YOUNG	SEPT. 15/55
		CHECKED BY	DATE

STA 67

LOADING CP AFT CASE 7/0583/33 3-14

ULTIMATE SHEAR OUTB'D = 22000 #

SHEAR INB'D = 30750 #

B.M. = 1,525,000 "#

H.L. TORQUE OUTB'D = 186,000 "#

H.L. TORQUE INB'D = 258,000 "#

$f = \frac{1525000}{144.5}\ \bar{Y} = 10550\,\bar{Y}$ $P = 10550\,A\bar{Y}$

ITEM	$\bar{Y}$	$A\bar{Y}$	f	P
1	2.18	1.562	23000	16490
2	2.36	2.071	24900	21850
3	2.51	3.036	26450	32000
4	2.70	2.418	28450	25450
5	2.80	2.517	29550	26500
6	2.90	2.957	30600	31150
7	2.87	3.880	30300	40900
8	2.82	2.840	29750	29950
9	2.66	2.670	28100	28150
10	2.32	2.489	24450	26250
F	1.82	1.189	19200	12520

FORM 1319A

BAY 67-92

SLOPE & SWEEPBACK SHEAR

A. V.

AIRCRA

WEIGHT

C. G. P

ITEM	1 $\bar{Y}_{67}$	2 $\bar{Y}_{92}$	3 $\Delta\bar{Y}$	4 P_{CAP} STA 67	5 P_v STA 67	6 X	7 $P_v X$	8	9	10 $X_{67}-X_{92}$
1	2·18	1·95	·23	16490	152	- 3·5	- 533			
2	2·36	2·14	·22	21850	193	- 8·0	-1545			
3	2·51	2·28	·23	32090	295	-13·0	-3840			
4	2·70	2·44	·26	25450	265	-18·0	-4780			
5	2·80	2·52	·28	26500	297	-23·0	-6840			
6	2·90	2·57	·33	31150	411	-28·0	-11520			
7	2·87	2·42	.45	40700	736	- 34·6	-25500			
8	2·82	2·39	.43	27950	515	- 40·6	-20900			
9	2·66	2·11	·55	28150	619	- 46·6	-28900			
10	2·32	1·70	·62	26250	652	- 52·6	-34300			
F	1·82	1·65	·17	12520	85	- 58·8	- 5000			- 6·2
Σ					4220		-74360			

FORM 1543

A. V. ROE CANADA LIMITED

MALTON, ONTARIO

TECHNICAL DEPT. (AIRFRAME)

AIRCRAFT - - C105

WEIGHT - -

C. G. POSITION -

REPORT NO. - 7/0583/17

SHEET - - 4-9

DATE - - SEPT. 15/55

PREPARED BY - S. YOUNG

6	7	8	9	10	11	12	13	14	15	16	17	18	19
X	$P_v \cdot X$			$X_{67} - X_{92}$	P_s STA 67	$\bar{Y}$	$P_s \bar{Y}$						
05	- 533												
30	- 1545												
30	- 3840												
80	- 4780												
30	- 6840												
30	- 11570												
46	- 25500												
96	- 20100												
46	- 28900												
96	- 34300												
88	- 5600			- 62	3110	1.82	5660						
	- 74360						+ 5660						

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

REPORT NO. 7/0582/17
SHEET NO. 4-10

AIRCRAFT: C105	FIN	PREPARED BY: S. YOUNG	DATE: SEPT. 15/55
		CHECKED BY	DATE

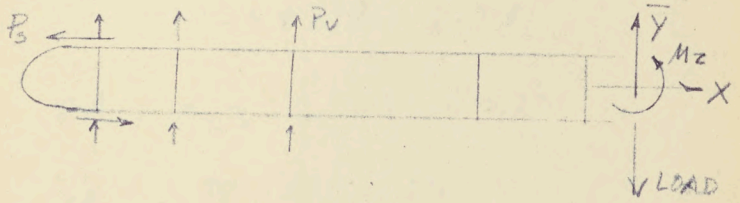
BAY 67-92

SLOPE SHEARS

$$P_V = \frac{\bar{Y}_{67} - \bar{Y}_{92}}{67-92} P_{CAP} = \frac{\Delta Y}{-25} P_{CAP}$$

SWEEP BACK SHEARS

$$P_S = \frac{X_{67} - X_{92}}{-25} P_{CAP}$$



2 SKINS $\Sigma P_V = 2 \times 4220 = +8440$ #

2 SKINS $\Sigma P_V \cdot X = 2 \times -143{,}660 = -287{,}320$ " #

FRONT SPAR: $\Sigma P_S \cdot \bar{Y} = 2 \times +5660 = +11{,}320$ " #

RM 1319A

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

REPORT No. 7/0583/17
SHEET No. 4-11

AIRCRAFT:		PREPARED BY	DATE
C105	FIN	S. YOUNG	SEPT. 15/55
		CHECKED BY	DATE

BAY 67-92

COMPUTE THE BENDING SHEAR FLOWS, CORRECTIVE SHEAR FLOWS, & CORRECTIVE TORQUE SHEAR FLOWS IN SIMILAR FASHION TO BAY 92-112.

ITEM AREAS ABOUT H.L.

F-N-F $2A = 2A_s - 2\times\bar{Y} = 2\times 17.8 - 2\times -55.7\times 1.74$
$= 35.6 + 194 = 229.6$ in²

F-F $2A = 2X_F\bar{Y}_F = 2\times 55.7\times 1.74 = 194$

10-10 $2A = 2\times 52.6\times 2.01 = 211$

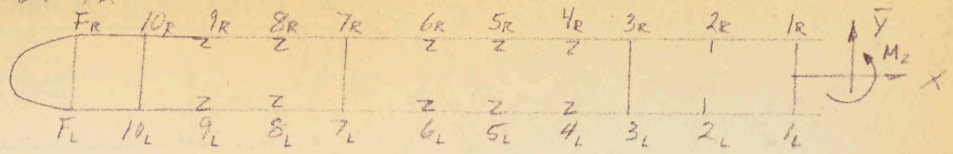
7-7 $2A = 2\times 34.6\times 2.65 = 183.5$

3-3 $2A = 2\times 13.0\times 2.40 = 62.5$

1-1 $2A = 2\times 3.5\times 2.07 = 14.5$

CRN 1319A

BAY 67-92



A. V. F

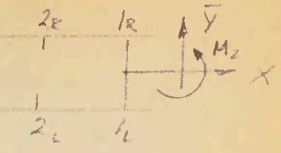
AIRCRAF

WEIGHT

C. G. P

	1	2	3	4	5	6	7	8	9	10	
ITEM	P_{67}	$-P_{92}$	$P_{67}-P_{92}$ ΔP	$\frac{P_{67}-P_{92}}{67-92}$ $\Delta P/-25$		ITEM	y_0	x_0	$y_0 A$	$2A$	
1_R	16490	-13200	3290	-132		F_L-N-F_R	0	294	0	229.6	
2_R	21850	-17630	4220	-169		F_R-10_R	-115	40.3	-4630	20.5	-
3_R	32000	-25950	6050	-242		10_R-9_R	935	43.8	41000	32.1	3
4_R	25450	-20650	4850	-194		9_R-8_R	1265	43.8	55400	24.8	3
5_R	26500	-21350	5150	-206		8_R-7_R	1565	43.8	68500	17.4	2
6_R	31150	-24600	6550	-262		7_R-6_R	1931	45.8	88500	20.5	3
7_R	40900	-31750	9150	-366		6_R-5_R	2193	34.7	72700	11.5	2
8_R	29950	-22450	7500	-300		5_R-4_R	2339	34.7	83200	11.3	2
9_R	28150	-19900	8250	-330		4_R-3_R	2593	34.7	90000	9.8	2
10_R	26250	0	26250	-1050		3_R-2_R	2835	32.9	93300	10.0	2
F_R	12520	-15400	-2880	+115		2_R-1_R	3004	29.6	89000	8.7	2
						1_L-1_R	3136	33.1	103900	14.5	4
						3_L-3_R	0	47.0	0	62.5	
						7_L-7_R	0	52.0	8	103.5	
						10_L-10_R	0	49.6		211	
						F_L-F_R	0	48.3	0	19.4	

FORM 1543



A. V. ROE CANADA LIMITED

MALTON, ONTARIO

TECHNICAL DEPT. (AIRFRAME)

AIRCRAFT - - C105

WEIGHT - -

C. G. POSITION -

REPORT NO. - 7/[illegible]/17

SHEET - - 4-12

DATE - - SEPT. 15/55

PREPARED BY - S. YOUNG

6	7	8	9	10	11	12	13	14	15	16	17	18	19
EM	q_o	x	$\bar{y}$	$2A$	$2Aq_o$	$\Sigma 2Aq_o$			SHEAR CORRECTION q_s	TORQUE CORRECTION q_T	FINAL SECTION q (7)+(15)+(16)		
F_R	0	294	0	221.6	0				-42	264	+222		
10_R	-115	403	-46[illegible]0	20.5	-2360				-307	603	+181		
9_R	935	438	41[illegible]0	32.1	30000				-1255	1088	+768		
8_R	1265	438	55[illegible]0	24.8	31400				-1255	1088	1098		
7_R	1565	438	68[illegible]0	17.4	27200				-1255	1088	1398		
6_R	1921	459	8[illegible]0	20.5	39600				-2167	1235	999		
5_R	2193	347	72[illegible]0	11.5	25300				-2167	1235	1261		
4_R	2339	347	83[illegible]0	11.3	27150				-2167	1235	1467		
3_R	2593	347	900[illegible]0	9.8	25400				-2167	1235	1661		
2_R	2835	329	93[illegible]0	10.0	28350				-2186	978	1047		
1_R	3004	296	81[illegible]0	8.7	26150	2(25870)			-2186	978	1216		
1_R	3136	331	103[illegible]0	14.5	45500	-44500			-2186	978	1348		
3_R	0	470	0	62.5	0				619	237	856		
7_R	0	520	0	123.5	0				912	-147	765		
10_R	0	496	0	21.1	0				948	-485	463		
F_R	0	483	0	19.4	0	471880			245	-339	-74		

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

REPORT No. 7/0583/17
SHEET No. 4-13

AIRCRAFT:		PREPARED BY	DATE
C105	FIN	S. YOUNG	SEPT. 15/55
		CHECKED BY	DATE

BAY 67-92

SHEAR LOAD ACTING AT SHEAR CENTRE

1ST APPROXIMATION $f_s' = \frac{\Sigma f_o r}{\Sigma r}$

$\Sigma_a r = 342$

$\Sigma_{a'} r = 178.5$

$\Sigma_b r = 364.4$

$\Sigma_c r = 398.8$

$\Sigma_d r = 205.1$

$\Sigma_a f_o r = 0$

$\Sigma_{a'} f_o r = 2(-4630) = -9260$

$\Sigma_b f_o r = 2(41000 + 55400 + 68500) = 329,800$

$\Sigma_c f_o r = 2(88500 + 72700 + 83200 + 90000) = (334,400)2 = 668,800$

$\Sigma_d f_o r = 2(93300 + 89000) + 103900 = 468500$

$f_{s_a}' = 0$

$f_{s_{a'}}' = \frac{-9260}{178.5} = -52$

$f_{s_b}' = \frac{329800}{364.4} = +905$

$f_{s_c}' = \frac{668800}{398.8} = +1678$

$f_{s_d}' = \frac{468500}{205.1} = 2290$

ORM 139A

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

REPORT NO. 7/0583/117
SHEET NO. 4-14

AIRCRAFT:		PREPARED BY	DATE
C105	FIN	S. YOUNG	SEPT. 15/55
		CHECKED BY	DATE

BAY 67-92

d	·141	·2705	·278	·136	·1428	·1302	·1169	·229	
d TRANSPOSE	·2705	·141	·136	·278	·1302	·1428	·229		·1169

f'_s 1ST APPROX	0		-52		+905		+1678		+2290
2ND "	-7·3	0	25·1		-7·1	29·6	117·8	267·5	384·
3RD "	35·4	-2·0	61·8		34·2	55·0	29·0	44·9	88·1
4TH "	8·4	9·6	24·8		8·1	10·5	11·6	10·2	16·9
f'_s	36·5		-293·2		1235·3		2159·0		2779·0

1ST ITERATION	41·4	9·8	343·5		39·8	30·8	161·0	324·5	495·
f'_s 1ST APPROX	0		-52		905		1678		2290
f'_s	41·4		301·3		1252·8		2163·5		2785

2ND ITERATION	42·4	11·2	348		40·9	30·9	163·	325·5	496
f'_s 1ST APPROX	0		-52		905		1678		2290
f'_s	42·4		307·2		1254·9		2166·5		2786

BY INSPECTION, THE f'_s VALUES MUST BE NEGATIVE TO BALANCE THE SECTION.

$f'_{s_a} = -42$

$f'_{s_{a'}} = -307$

$f'_{s_b} = -1255$

$f'_{s_c} = -2167$

$f'_{s_d} = -2786$

FORM 1319A

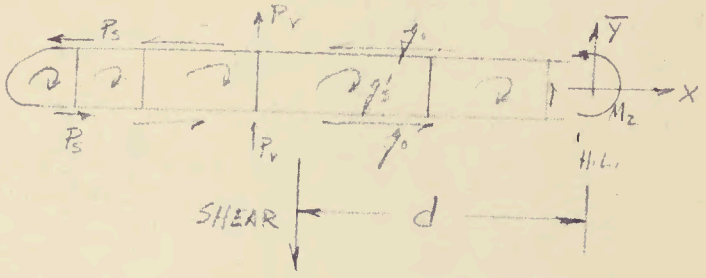
A. V. ROE CANADA LIMITED
MALTON - ONTARIO
TECHNICAL DEPARTMENT (Aircraft)

REPORT NO. 7/0583/17
SHEET NO. 4-15

AIRCRAFT: C105	FIN	PREPARED BY: S. Young	DATE: SEPT. 16/55
		CHECKED BY	DATE

BAY 67-92

DETERMINE THE SHEAR CENTRE POSITION



$$\Sigma M_z \text{ AT H.L.} = +S_y d + \Sigma 2A q_o + \Sigma P_v X + \Sigma P_s Y - \Sigma 2A q_s = 0$$

BAY SHEAR = 22 000 #

$$22000\,d + 471{,}880 - 287{,}320 + 11320 - 2 \times 11.6 \times 42 - 2 \times 11.9 \times 307$$
$$- 2 \times 28.1 \times 1255 - 2 \times 113.6 \times 2167 - 2 \times 426 \times 2786 = 0$$

$$22\,000\,d + 471{,}880 - 287{,}320 + 11{,}320 - 1{,}495 - 7310 - 221{,}000$$
$$- 492{,}000 - 237000 = 0$$

$$d = \frac{762{,}925}{22\,000} = 34.7''$$

RM 1394

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

REPORT No. 7/0583/17
SHEET No. 4-16

AIRCRAFT:		PREPARED BY	DATE
C105	FIN	S. YOUNG	SEPT. 14/55
		CHECKED BY	DATE

BAY 67-92

COMPUTE THE TORSION SHEAR FLOWS, q'_T.

1ST APPROX. $q'_T = \frac{2A}{\Sigma z}$

$q'_{T_a} = \frac{2 \times 17.8}{342} = .104$

$q'_{T_{a'}} = \frac{2 \times 11.9}{178.5} = .1332$

$q'_{T_b} = \frac{2 \times 88.1}{364.4} = .1484$

$q'_{T_c} = \frac{2 \times 113.6}{398.8} = .569$

$q'_{T_d} = \frac{2 \times 42.6}{205.1} = .1416$

FORM 1319A

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

REPORT No. 7/0583/17
SHEET No. 4-17

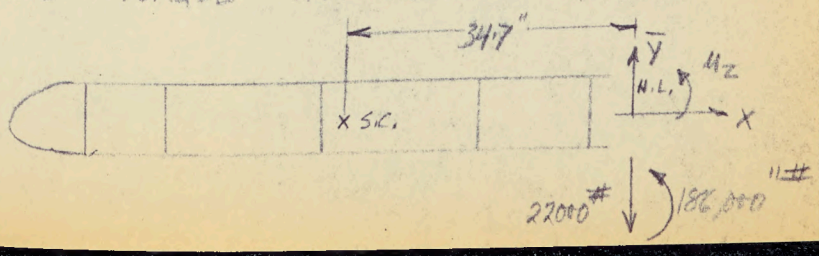
AIRCRAFT: C105	FIN	PREPARED BY: S. YOUNG	DATE: SEPT. 16/55
		CHECKED BY	DATE

BAY 67-92

d	·141	·2705	·278	·136	·1428	·1302	·1169	·229	
d TRANSPOSE	·2705	·141	·136	·278	·1302	·1428	·229	·1169	
q'_T 1ST APPROX.	·104		·1332		·484		·569		·416
2ND "	·0188	·0282	·1345	·0181	·0812	·0631	·0487	·1305	
3RD "	·0229	·005	·0276	·0221	·0159	·0129	·0153	·0256	
4TH "	·0046	·0062	·0106	·0044	·0040	·0050	·0030	·0065	
5TH "	·0024	·0012	·0023	·0023	·0011	·0011	·0007	·0018	
q'_T	·1527		·3489		·6331		·7188		·5804
1ST ITERATION	·0492	·0413	·1760	·0475	·1025	·0824	·0678	·1648	
1ST APPROX q'_T	·104		·1332		·484		·569		·416
q'_T	·1532		·3505		·6340		·7192		·5808
2ND ITERATION	·0494	·0415	·1762	·0477	·1025	·0826	·0678	·1648	
1ST APPROX q'_T	·104		·1332		·484		·569		·416
q'_T	·1534		·3509		·6342		·7194		·5808
A	17.8		11.9		88.1		113.6		42.6
2A q'_T	5.46		8.36		111.8		161.		49.5

$J = \Sigma 2A\, q'_T = 336.1$

APPLIED TORQUE AT SHEAR CENTRE



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

REPORT No. 7/0583/17
SHEET No. 4-18

AIRCRAFT:		PREPARED BY	DATE
C105	FIN	S. YOUNG	SEPT. 16/55
		CHECKED BY	DATE

BAY 67-92

$M_z = +186000 - 22000 \times 34.7$

$= -577{,}000$ "# TORQUE AT SHEAR CENTRE

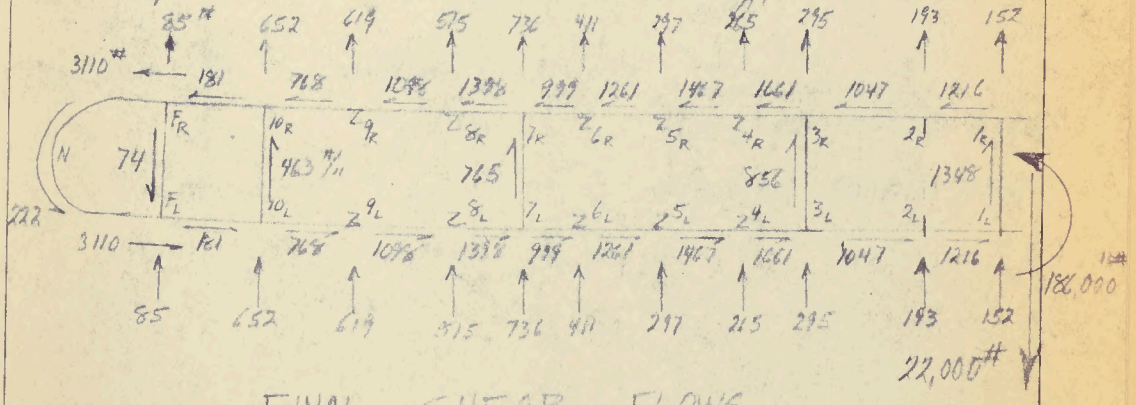
RATIO ON $q'_T = \frac{577000}{336.1} = 1718$

$q'_{T_a} = .1534 \times 1718 = 264$ $\quad q'_{T_c} = .7194 \times 1718 = 1235$

$q'_{T_{a'}} = .3509 \times 1718 = 603$ $\quad q'_{T_d} = .5805 \times 1718 = 998$

$q'_{T_b} = .6342 \times 1718 = 1088$

ADD THE ASSUMED BENDING SHEAR FLOW q_o, CORRECTIVE SHEAR q'_s, AND CORRECTIVE TORQUE q'_T.



FINAL SHEAR FLOWS

BAY 67-92

C.P. AFT CASE

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

REPORT NO. 7/0583/17
SHEET NO. 4-19

AIRCRAFT:		PREPARED BY	DATE
C105	FIN	S. YOUNG	SEPT 16/55
		CHECKED BY	DATE

BAY 67-92

CHECK THE VERTICAL SHEAR BALANCE,

SKIN SHEAR = 2(164) = +328
WEB & NOSE SHEAR = +14580
P_V SHEAR = 2(4220) = +8440
+23348# REACTIVE SHEAR
-22000# APPLIED SHEAR

CHECK H.L. TORQUE BALANCE

SKIN TORQUE = 2(168,790) = +337,580
WEB & NOSE TORQUE = -245,900
P_V TORQUE = 2(-143,660) = -287,320
P_S TORQUE = 2(+5660) = +11,320
-184,320 REACTIVE TORQUE
+186,000 APPLIED TORQUE

ORM-1319A

BAY 67-92

SHEAR & TORQUE BALANCE CHECK

A. V. ROE
M
TECH

AIRCRAFT
WEIGHT
C. G. POSITIO

ITEM	1 MID BAY $\bar{Y}$	2 ITEM	3 $\Delta\bar{Y}$	4 q	5 SHEAR	6	7	8	9	10 ITEM	11 2A
F	174	F-N-F	3.48	222	-773					F-N-F	229.6
10	201	F-10	.27	181	-49					F-10	20.5
9	239	10-9	.38	766	-292					10-9	32.1
8	261	9-8	.22	1096	-241					9-8	24.8
7	265	8-7	.04	1398	-56	$\frac{1}{2}$ SKIN	SHEAR =	+164#		8-7	17.4
6	274	7-6	.09	999	-89	2 WEB NOSE	& SHEAR =	+14580#		7-6	20.5
5	266	6-5	-.08	1261	101					6-5	11.5
4	257	5-4	-.09	1467	132					5 4	11.3
3	240	4-3	-.17	1661	282					4-3	9.8
2	235	3-2	-.15	1047	157					3-2	10.0
1	207	2-1	-.18	1216	219					2-1	30.7
		1-1	4.14	1348	5580					1-1	14.5
		3-3	4.80	856	4110					3-3	62.5
		7-7 10-10	5.30 4.02	765 463	4060 1860					7-7 10-10	183.5 211
		F-F	3.48	-74	-257					F-F	194

FORM 1543

A. V. ROE CANADA LIMITED

MALTON, ONTARIO

TECHNICAL DEPT. (AIRFRAME)

AIRCRAFT - - C105

WEIGHT - -

C. G. POSITION -

REPORT NO. - 7/0583/17

SHEET - - 4-20

DATE - - SEPT. 16/55

PREPARED BY - S. YOUNG

6	7	8	9	10	11	12	13	14	15	16	17	18	19
				ITEM	2A	$\int$	2A $\int$						
				F-N-F	229.6	222	51000						
				F-10	20.5	181	3710						
				10-9	32.1	768	24700						
				9-8	24.8	1078	27200						
SKIN	SHEAR = +	164 #		8-7	17.4	1398	24300	1/2 SKIN		TORQUE = + 168,740			
WEB SHEAR	$\int$ SHEAR	= +14580 #		7-6	20.5	999	20500	2 WEB NOSE	$\int$ TORQUE	= - 245,300			
				6-5	11.5	1261	14500						
				5-4	11.3	1467	16550						
				4-3	9.8	1661	16280						
				3-2	10.0	1047	10470						
				2-1	8.7	1216	10580						
				1-1	14.5	1348	-19550						
				3-3	62.5	856	-53500						
				7-7	183.5	765	-140500						
				10-10	211	463	-97700						
				F-F	194	-74	+14350						

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

REPORT No. 7/0583/17
SHEET No. 5-0

AIRCRAFT:		PREPARED BY	DATE
C105	FIN	S. YOUNG	SEPT. 23/55
		CHECKED BY	DATE

BAY 92 - 112

SECTION 5

FORM 1319A

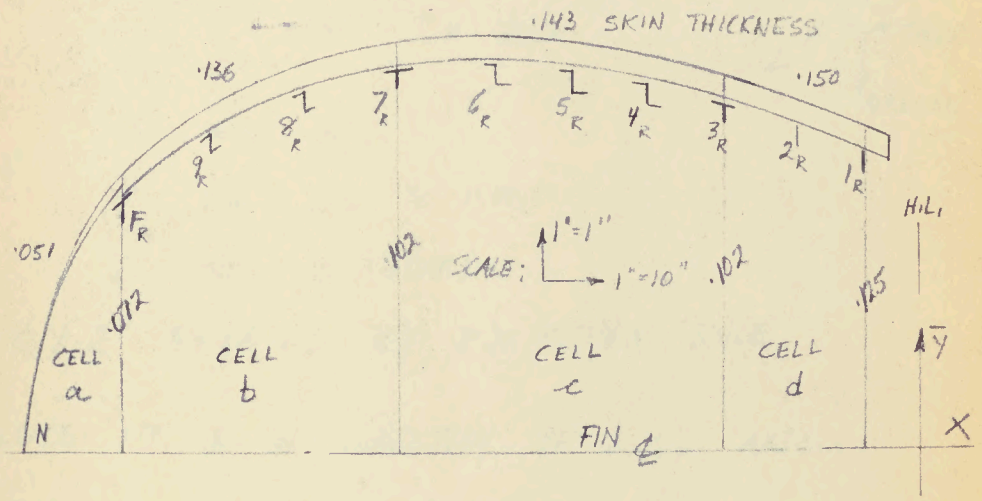
A. V. ROE CANADA LIMITED
MALTON · ONTARIO
TECHNICAL DEPARTMENT (Aircraft)

REPORT No. 7/0583/12
SHEET No. 5-1

AIRCRAFT: C105	FIN	PREPARED BY: S. YOUNG	DATE: SEPT. 13/55.
		CHECKED BY	DATE

STA 92

FIN STA 92.25 SECTION PROPERTIES ARE GIVEN IN REPORT 7/0583/14, SECTION 2. ALL REFERENCES TO A, Y, X, ETC. ARE FROM THAT REPORT.



THE LOADING CURVES ARE GIVEN IN REPORT 7/0583/3B, PG 3-14, FOR FIN C.P. AFT CASE AND INCLUDES FIN-RUDDER INDUCED HINGE LOADS

ULTIMATE SHEAR OUT'D 92 = 18250 #

SHEAR IN'D 92 = 22000 #

B. M. = 975,000 "#

H.L. TORQUE OUT'D 92 = 150,000 "#

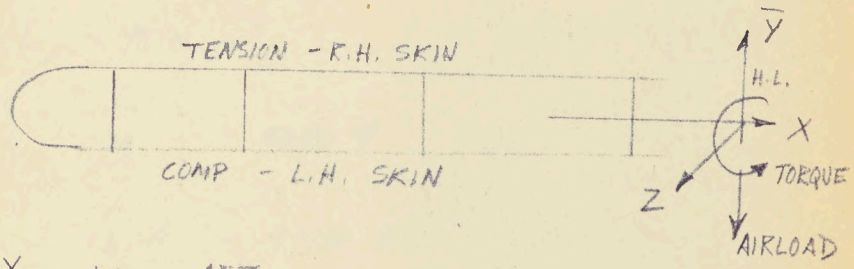
H.L. TORQUE IN'D 92 = 186,000 "#

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

REPORT No. 7/0583/17
SHEET No. 5-2

AIRCRAFT:		PREPARED BY	DATE
C105	FIN	S. YOUNG	SEPT. 13/55
		CHECKED BY	DATE

NOTATION:



X +VE AFT

Y +VE L.H. TO R.H.

Z +VE OUTBOARD

X, Y, Z RELATED BY R.H. SCREW RULE.

LOADS +VE IF IN DIRECTION OF X, Y, Z AXES.

MOMENTS +VE IF R.H. SCREW RULE GIVES PROGRESSION IN X, Y, Z AXES.

NOTE: CAP STRESSES ARE +VE & -VE FOR TENSION & COMP.

CAP LOADS ARE +VE IN DIRECTION OF X, Y, Z AXES.

SKIN SHEAR FLOWS WHICH PRODUCE $+M_z$ ABOUT H.L. ARE +VE.

WEB SHEAR FLOWS WHICH ACT IN $+\bar{Y}$ DIRECTION ARE +VE.

RM 1139A

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

REPORT NO. 7/0583/17
SHEET NO. 5-3

AIRCRAFT:		PREPARED BY	DATE
C105	FIN	S. YOUNG	SEPT. 13/55
		CHECKED BY	DATE

STA 92

BM = 975000 " #

$I_x = 98.14 \text{ in}^4$

$f_b = \frac{M}{I}\bar{y} = 9950\,\bar{y}$ PSI

$P = f_b A = 9950\,A\bar{y}$ LB.

ITEM	$\bar{y}$	$A\bar{y}$	f_b	P
1	1.95	1.327	19400	13200
2	2.44	1.773	21300	17630
3	2.28	2.609	22700	25950
4	2.44	2.074	24250	20650
5	2.52	2.145	25050	21350
6	2.57	2.476	25600	24600
7	2.42	3.193	24050	31750
8	2.39	2.260	23750	22450
9	2.11	1.999	21000	19900
F	1.65	1.555	16400	15450
N	0	0	0	0

FORM 1319A

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

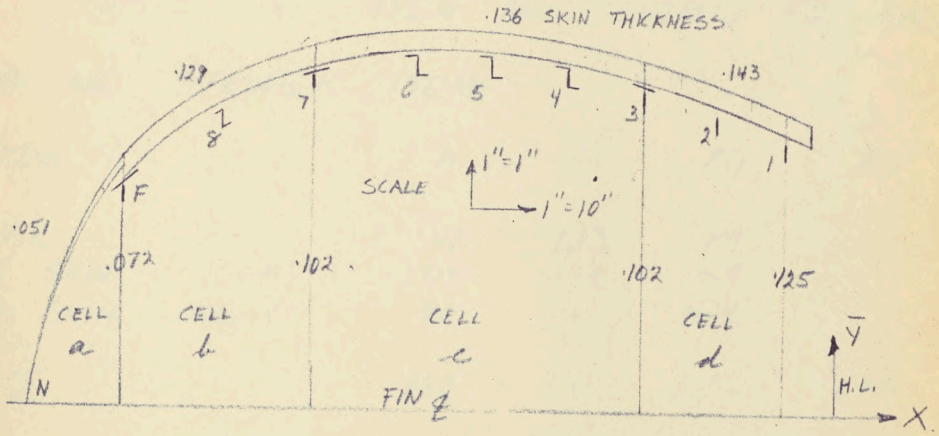
REPORT NO. 7/0583/17
SHEET NO. 5-4

AIRCRAFT: C105	FIN

PREPARED BY	DATE
S. YOUNG	SEPT. 13/55
CHECKED BY	DATE

STA 112 SECTION PROPERTIES

7/0583/38 1-12



ITEM	SPAR A	SPAR $\bar{y}$	X
1	·117	1·23	− 3·5
2	·117	1·40	− 8·0
3	·396	1·92	− 13·0
4	·131	1·83	− 18·0
5	·131	1·89	− 23·0
6	·131	1·89	− 28·0
7	·382	1·97	− 34·62
8	·129	1·53	− 40·62
F	·368	1·29	− 47·0
N		0	− 53·3

FORM 1319A

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

REPORT No. 7/0583/17
SHEET No. 5-5

AIRCRAFT: C105	FIN	PREPARED BY: S. YOUNG	DATE: SEPT. 13/55
		CHECKED BY	DATE

STA 112 SECTION PROPERTIES

COMPUTE THE AREA AND CENTROID FOR EACH SPAR AND STRINGER ITEM.

ITEM 1	b x t	A	$\bar{Y}$	$A\bar{Y}$	$A\bar{Y}^2$
SPAR		·117	1·23	·144	
AFT SKIN	1·5 x ·143	·214	1·89	·405	
FWD SKIN	2·25 x ·143	·322	1·97	·634	
Σ		·653	1·81	1·183	2·145

ITEM 2					
SPAR		·117	1·40	·164	
AFT SKIN	2·25 x ·143	322	2·05	·660	
FWD SKIN	2·5 x ·143	·358	2·12	·760	
Σ		·797	1·99	1·584	3·15

ITEM 3					
SPAR		·396	1·92	·760	
AFT SKIN	2·5 x ·143	·358	2·20	·788	
FWD SKIN	2·5 x ·136	·340	2·27	·772	
Σ		1·094	2·12	2·320	4·92

FORM 1319A

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

REPORT No. 7/0583/17
SHEET No. 5-6

AIRCRAFT: C105	FIN	PREPARED BY	DATE
		S. YOUNG	SEPT. 13/55
		CHECKED BY	DATE

STA 112 SECTION PROPERTIES

ITEM 4	b×t	A	$\bar{Y}$	$A\bar{Y}$	$A\bar{Y}^2$
SPAR		.131	1.83	.240	
AFT SKIN	2.5×.136	.340	2.32	.789	
FWD SKIN	2.5×.136	.340	2.37	.806	
Σ		.811	2.26	1.835	4.15

ITEM 5					
SPAR		.131	1.89	.248	
AFT SKIN	2.5×.136	.340	2.40	.816	
FWD SKIN	2.5×.136	.340	2.42	.823	
Σ		.811	2.32	1.886	4.38

ITEM 6					
SPAR		.131	1.89	.248	
AFT SKIN	2.5×.136	.340	2.42	.822	
FWD SKIN	3.3×.136	.448	2.40	1.075	
Σ		.919	2.33	2.145	5.00

ITEM 7					
SPAR		.382	1.97	.752	
AFT SKIN	3.3×.136	.448	2.35	1.055	
FWD SKIN	3.0×.129	.387	2.25	.871	
Σ		1.217	2.20	2.678	5.89

FRM 1319A

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

REPORT No. 7/0583/17
SHEET No. 5-7

AIRCRAFT:		PREPARED BY	DATE
C 105	FIN	S. YOUNG	SEPT. 13/55
		CHECKED BY	DATE

STA 112 SECTION PROPERTIES

ITEM 8	b.t	A	$\bar{y}$	$A\bar{y}$	Ay^2
SPAR		·129	1·53	·197	
AFT SKIN	3·0 x ·129	·387	2·13	·825	
FWD SKIN	3·2 x ·129	·413	1·98	·818	
Σ		·929	1·98	1840	3·65

ITEM F

SPAR		·368	1·29	·475	
AFT SKIN	3·2 x ·129	·413	1·72	·711	
FWD SKIN	3·0 x ·051	·153	1·40	·214	
Σ		·934	1·50	1400	2·10

1/2 SECTION $I = \Sigma Ay^2 = 35.385$

$\therefore$ STA 112 $I = 70.77\ IN^4$

FORM 1319A

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

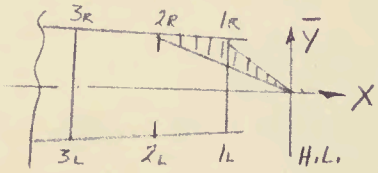
REPORT No. 7/0583/117
SHEET No. 5-8

AIRCRAFT: C105	FIN.	PREPARED BY: S. YOUNG	DATE: SEPT. 13/55
		CHECKED BY	DATE

BAY 92 - 112

DETERMINE MID-BAY PROPERTIES BY AVERAGING THE X, Y VALUES AT STA'S 92 - 112.

CALCULATE THE SKIN AREA BETWEEN ITEMS ABOUT THE HINGE LINE



$$A_{1-2} = X_1\bar{Y}_2 - X_2\bar{Y}_1$$

CELL AREA CALCULATIONS

$$A_d = 2\left[A_{1-2} + A_{2-3} - \tfrac{1}{2}X_3\bar{Y}_3 + \tfrac{1}{2}X_1\bar{Y}_1\right]$$

$$= 2A_{1-2} + 2A_{2-3} - X_3\bar{Y}_3 + X_1\bar{Y}_1$$

$$= 7.8 + 9.3 + 13.0 \times 2.12 - 3.5 \times 18.8 = \underline{39.1} \ \square''$$

$$A_c = 2A_{3-4} + 2A_{4-5} + 2A_{5-6} + 2A_{6-7} - X_7\bar{Y}_7 + X_3\bar{Y}_3 \ \square''$$

$$= 9.3 + 10.0 + 11.5 + 20.0 + 34.6 \times 2.31 - 13.0 \times 2.20 = \underline{102.2}$$

$$A_b = 2A_{7-8} + 2A_{8-9} + 2A_{9-F} - X_F\bar{Y}_F + X_7\bar{Y}_7 \ \square''$$

$$= 18.0 + 24.2 + 22.6 + 49.8 \times 1.57 - 34.6 \times 2.31 = \underline{63.1}$$

STA 112 $A_a = 14.0$ Pg 1 } 7/0583/3B
STA 92 $A_a = 16.2$ Pg 1-11 }

$\therefore A_a = 15.1 \ \square''$

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

REPORT No. 7/0583/17
SHEET No. 5-9

AIRCRAFT:		PREPARED BY	DATE
C105	FIN	S. YOUNG	SEPT. 13/55
		CHECKED BY	DATE

BAY 92-112

CALCULATE LENGTH TO THICKNESS RATIO FOR SKIN & WEB ELEMENTS.

$$r = \frac{L}{t} \qquad \text{SKIN } L = |X_i - X_{i+1}|$$

$$\text{WEB } L = 2Y_i$$

NOTE NOSE $F_L\text{-}N\text{-}F_R = 13.0$ " STA 112 PG 1-13 } 7/0583/35
14.0 STA 92 PG 1-11 }
13.5 " AVGE

DETERMINE CELL "r" VALUES.

DETERMINE THE DISTRIBUTION FACTORS.

$$d_{a\text{-}b} = \frac{r_{FF}}{r_a} = \frac{45.8}{319.8} = .1435$$

$$d_{b\text{-}a} = \frac{r_{F\text{-}F}}{r_b} = \frac{45.8}{358.5} = .1278$$

$$d_{b\text{-}c} = \frac{r_{7\text{-}7}}{r_b} = \frac{47.5}{358.5} = .1325$$

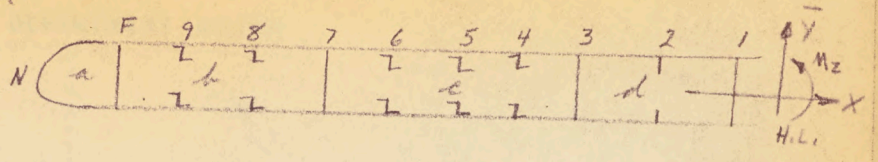
$$d_{c\text{-}b} = \frac{r_{7\text{-}7}}{r_c} = \frac{47.5}{394.6} = .1205$$

$$d_{c\text{-}d} = \frac{r_{3\text{-}3}}{r_c} = \frac{44.7}{394.6} = .1132$$

$$d_{d\text{-}c} = \frac{r_{3\text{-}3}}{r_d} = \frac{44.7}{213.1} = .210$$

FORM 1318A

BAY 92-112



$2A = X_i \bar{Y}_{i+1} - X_{i+1} \bar{Y}_i$

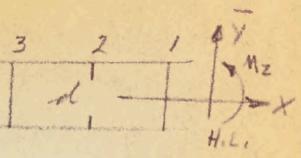
A. V. ROE
MA
TECHN

AIRCRAFT .
WEIGHT .
C. G. POSITION

ITEM	1	2	3	4	5	6	7	8	9	10	11
	STA 112		STA 92		MID BAY						
	X	$\bar{Y}$	X	$\bar{Y}$	X	$\bar{Y}$		$X_i Y_{i+1}$	$-X_{i+1} \bar{Y}_i$	ITEM	2A
1	-3·5	1·81	-3·5	1·95	-3·5	1·88		-7·35	15·05	1-2	7·8
2	-8·0	1·99	-8·0	2·14	-8·0	2·07		-17·6	26·9	2-3	9·3
3	-13·0	2·12	-13·0	2·28	-13·0	2·20		-30·3	39·6	3-4	9·3
4	-18·0	2·26	-18·0	2·44	-18·0	2·33		-43·6	53·6	4-5	10·0
5	-23·0	2·32	-23·0	2·52	-23·0	2·42		-56·3	67·8	5-6	11·5
6	-28·0	2·33	-28·0	2·57	-28·0	2·45		-64·7	84·7	6-7	20·0
7	-34·62	2·20	-34·62	2·42	-34·6	2·31		-75·8	93·8	7-8	18·0
8	-40·62	1·98	-40·62	2·39	-40·6	2·19		-78·3	102·5	8-9	24·2
9	(-46·6)	(1·74)	-46·6	2·11	-46·8	1·93		-73·5	96·1	9-F	22·6
F	-47·0	1·50	-52·6	1·65	-49·8	1·57		-0	88·2		
N	-53·3	0	-59·1	0	-56·2	0					

NOTE $(X, \bar{Y})$ FOR ITEM 9, STA 112 ARE ASSUMED VALUES.

FORM 1543



$\bar{Y}_{i+1} - X_{i+1}\bar{Y}_i$

A. V. ROE CANADA LIMITED

MALTON, ONTARIO

TECHNICAL DEPT. (AIRFRAME)

AIRCRAFT - - C105

WEIGHT - -

C. G. POSITION -

REPORT NO. - 7/0583/17

SHEET - - 5-10

DATE - - SEPT. 13/55

PREPARED BY - S. YOUNG

7	8	9	10	11	12	13	14	15	16	17	18	19
	$X_i Y_{(i+1)}$	$-X_{(i+1)}\bar{Y}_i$	ITEM	2A		ITEM	L	t.	$\frac{L}{t}$		CELL	L
	-7.25	15.25	1-2	7.8		1-2	4.5	.147	30.6		a	308.6
	-17.6	26.9	2-3	9.3		2-3	5.	.147	34.0		b	466.6
	-30.3	39.6	3-4	9.3		3-4	5.	.140	35.7		c	397.0
	-43.6	53.6	4-5	10.0		4-5	5.	.140	35.7		d	202.4
	-56.3	67.8	5-6	11.5		5-6	5.	.140	35.7			
	-64.7	84.7	6-7	20.0		6-7	6.6	.140	47.2			
	-75.8	93.8	7-8	18.0		7-8	6.0	.133	45.2		CELL	A
	-78.3	102.5	8-9	24.2		8-9	6.2	.133	46.6		a	15.1
	-73.5	96.1	9-F	22.6		9-F	3.	.133	22.6		b	63.1
	-0	88.2			13.0 - 11.2 14.0 - 9.2	F-N-F	13.5	.051	265		c	102.2
						1-1	3.76	.125	30.1		d	39.1
						3-3	4.40	.102	43.1			
						7-7	4.62	.102	45.3			
						F-F	3.14	.072	43.6			

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

REPORT NO. 7/0583/17
SHEET NO. 5-11

AIRCRAFT:		PREPARED BY	DATE
C105	FIN	S. YOUNG	SEPT 13/55
		CHECKED BY	DATE

LOADING - STA 112
7/0583/3B 3-14
C.P. AFT

ULTIMATE SHEAR OUTB'D = 12,250 #
SHEAR INB'D = 18250 #
BM = 625000 "#
H.L. TORQUE OUTB'D = 100000 "#
H.L. TORQUE INB'D = 150600 "#

$f_b = \frac{625000}{70.77}\bar{y} = 8840\,\bar{y}$ $\qquad P = 8840\,A\bar{y}$

ITEM	$\bar{y}$	$A\bar{y}$	f-PSI	P-LBS.
1	1.81	1.183	16000	10430
2	1.99	1.584	17580	14000
3	2.12	2.320	18700	20510
4	2.26	1.835	19950	16200
5	2.32	1.886	20500	16650
6	2.33	2.145	20600	18950
7	2.20	2.678	19400	23650
8	1.98	1.840	17490	16250
F	1.50	1.400	13250	12380

DOM 1319A

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

REPORT NO. 7/0583/17
SHEET NO 5-12

AIRCRAFT:		PREPARED BY	DATE
C105	FIN	S. YOUNG	SEPT. 14/55
		CHECKED BY	DATE

BAY 92-112

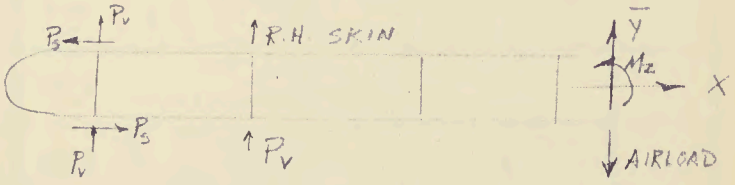
CAP SLOPE SHEAR

$$P_v = \frac{Y_{112} - Y_{92}}{\Delta L} P_{CAP} \qquad \Delta L = 112 - 92 = 20"$$

SIMILARLY

FRONT SPAR SWEEPBACK SHEAR LOAD,

$$P_s = \frac{X_{92} - X_{112}}{\Delta L} P_{CAP}$$



2 SKINS, $\Sigma P_v = 2(2422) = 4844\#$

2 SKINS, $\Sigma P_v \cdot X = 2(74635) = -149{,}270"\#$ $-ve M_z$ DIRECTION

FRONT SPAR $\Sigma P_s \cdot Y = 2(11750) = +23{,}500"\#$

FORM 1319A

BAY 92-112

SLOPE & SWEEPBACK SHEAR

A. V

AIR
WE
C. J

ITEM	1 $\bar{Y}_{92}$	2 $\bar{Y}_{112}$	3 $\bar{Y}_{92}-\bar{Y}_{112}$	4 $P_{CAP\ STA\ 92}$	5 $P_{V\ STA\ 92}$	6 X	7 $P_V \cdot X$	8	9 $X_{92}+X_{112}$	10 $P_{S\ STA\ 92}$
1	1.95	1.81	.14	13200	93	-3.5	- 325			
2	2.14	1.99	.15	17650	132	-8.0	-1060			
3	2.28	2.12	.16	25950	208	-13.0	-2710			
4	2.44	2.26	.18	20650	186	-18.0	-3350			
5	2.52	2.32	.20	21350	214	-23.0	-4920			
6	2.57	2.33	.24	24600	295	-28.0	-8260			
7	2.42	2.20	.22	31750	350	-34.6	-12100			
8	2.39	1.98	.41	22450	460	-40.6	-18650			
9	2.11	(1.74)	.37	19900	368	-46.6	-17150			
F	1.65	1.50	.15	15450	116	-52.6	-6100		-5.2	556
Σ					2422		-74,695			

FORM 1543

A. V. ROE CANADA LIMITED

MALTON, ONTARIO

TECHNICAL DEPT. (AIRFRAME)

AIRCRAFT - - C105

WEIGHT - -

C. G. POSITION -

REPORT NO. - 7/0583/17

SHEET - - 5-13

DATE - - SEPT. 13/55

PREPARED BY - S. YOUNG

6	7	8	9	10	11	12	13	14	15	16	17	18	19
X	$P_v.X$		$X_{92} - X_{112}$	P_s STA 92	$\bar{Y}_{92}$	$P_s.\bar{Y}$							
5	- 325												
0	-1060												
0	-2710												
0	-3350												
0	-4920												
0	-8260												
	-12100												
5	-16650												
	-17150												
	-6100		-5.4	5560	2.11	11,750							
	-74,635					11,750							

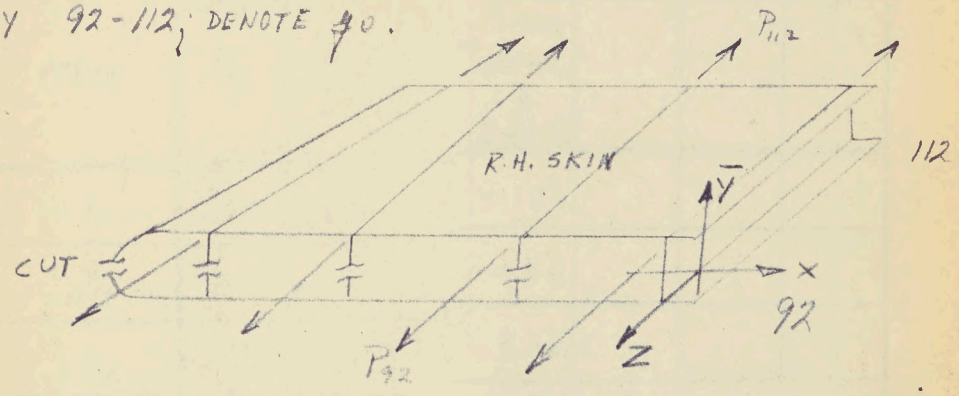
A. V. ROE CANADA LIMITED
MALTON - ONTARIO
TECHNICAL DEPARTMENT (Aircraft)

REPORT No. 7/0583/17
SHEET No. 5-14

AIRCRAFT: C105	FIN	PREPARED BY: S. YOUNG	DATE: SEPT 14/55
		CHECKED BY	DATE

BAY 92-112

COMPUTE ASSUMED BENDING SHEAR FLOW FOR BAY 92-112; DENOTE q_0.



$$q_0 = \frac{P_{92} - P_{112}}{92 - 112}$$ $\oint$ SUMMED IN ROTATION NOSE, F, 9, 8, 7, ETC

CALCULATE $\sum q_0 \oint 2A\, q_0$ FOR ALL ITEMS.

AREAS ABOUT H.L.

2A FOR $F_L - N - F_R$ = 2A OF CELL 'a' $- X_F \cdot Y_{F_R - F_L}$

$= 2 \times 15.1 + 49.8 \times (2 \times 1.57) = 30.2 + 156.2 = 186.2$ □"

2A FOR $F_R - F_L = (2 \times 1.57)\, 49.8 = 156.2$

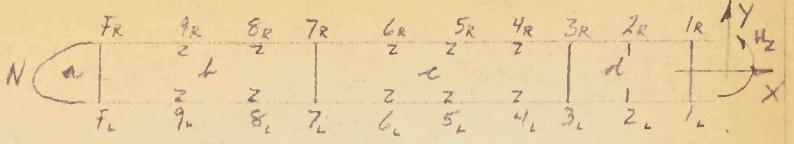
$7_R - 7_L = (2 \times 2.31)\, 34.6 = 159.5$

$3_R - 3_L = (2 \times 2.20)\, 13.0 = 57.3$

$1_R - 1_L = (2 \times 1.86)\, 3.5 = 13.2$

FORM 1319A

BAY 92-112

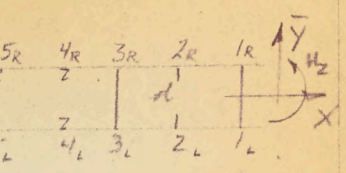


A. V. ROE
M
TECH

AIRCRAFT
WEIGHT
C. G. POSITIO

ITEM	1 P_{92}	2 $-P_{112}$	3 ΔP	4 $\frac{P_{92}-P_{112}}{92-112}$ $\frac{\Delta P}{-20}$	5 ITEM	6 $\bar{y}_0$	7 x	8 $x\bar{y}_0$	9 $2A$	10 $2A\bar{y}_0$	11 $\Sigma 2A\bar{y}_0$
1_R	13200	-10430	2770	-139	F_L-N-F_R	0	265	0	13[illegible]2	0	
2_R	17630	-14000	3630	-182	F_R-9_R	+151	22.6	3410	22[illegible]6	3410	
3_R	25950	-20500	5450	-272	9_R-8_R	+1146	46.6	53400	24[illegible]2	27700	
4_R	20650	-16200	4450	-223	8_R-7_R	+1456	45.2	65700	18[illegible]0	26200	
5_R	21350	-16650	4700	-235	7_R-6_R	+1861	47.2	87800	20[illegible]0	37200	
6_R	24600	-18950	5650	-283	6_R-5_R	+2144	35.7	76500	11[illegible]5	24650	
7_R	31750	-23650	8100	-405	5_R-4_R	+2379	35.1	85000	10[illegible]0	23790	
8_R	22450	-16250	6200	-310	4_R-3_R	+2602	35.7	92900	9[illegible]3	24200	
9_R	19900	0	19900	-995	3_R-2_R	+2874	34.0	97800	9[illegible]8	26750	
F_R	15400	-12380	3020	-151	2_R-1_R	+3056	30.6	93500	7[illegible]4	23800	2(21770
					1_R-1_L	+3195	30.1	96200	13[illegible]8	-42200	-422
					3_R-3_L	0	43.1		57[illegible]8	0	
					7_R-7_L	0	45.3		15[illegible]5	0	
					F_R-F_L	0	43.6		15[illegible]2	0	
											393.20

FORM 1543



A. V. ROE CANADA LIMITED

MALTON, ONTARIO

TECHNICAL DEPT. (AIRFRAME)

AIRCRAFT - - C105

WEIGHT - -

C. G. POSITION -

REPORT NO. - 7/0583/17

SHEET - - 5-15

DATE - - SEPT. 14/55

PREPARED BY - S. YOUNG

6	7	8	9	10	11	12	13	14	15	16	17	18	19
q_0	r	$r q_0$	$2A$	$2A q_0$	$\Sigma 2A q_0$			SHEAR CORRECTION q_S	TORQUE CORRECTION q_T	FINAL SECTION (6)+(14)+(15)			
0	26.5	0	1[illegible]2	0				-130	+253	+123			
51	22.6	3410	22.6	3410				-905	+664	-90			
146	46.6	53400	24.2	27700				-905	+664	905			
456	45.2	65700	18.0	26200				-905	+664	1215			
661	47.2	87800	20.0	37200				-2150	+1003	714			
144	35.7	76500	11.5	24650				-2150	+1003	997			
379	35.7	85000	10.0	23790				-2150	+1003	1232			
602	35.7	92900	9.3	24200				-2150	+1003	1455			
874	34.0	97800	9.8	26750				-2822	+834	886			
056	30.6	93500	7.[illegible]	23800	2(217700)			-2822	+834	1068			
195	30.1	96200	13.[illegible]	-42200	-42200			-2822	+834	1207			
0	43.1		5.[illegible]	0				+672	+169	+841			
0	45.3		15.[illegible]	0				+1245	-339	+906			
0	43.6		15.[illegible]	0				+775	-411	+364			
					393,200								

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

REPORT NO. 7/2583/17
SHEET NO. 5-16

AIRCRAFT:		PREPARED BY	DATE
C105	FIN	S. YOUNG	SEPT. 14/55
		CHECKED BY	DATE

BAY 92-112

FOR A SHEAR LOAD ONLY, SOLVE THE MULTI-CELL SECTION BY AN ITERATION METHOD GIVEN IN

J. R. Ae Soc. FEB 1954 SHEAR DISTRIBUTION FOR MULT-CELL BEAMS

$\Sigma_a r = 308.6$

$\Sigma_b r = 406.6$

$\Sigma_c r = 397.0$

$\Sigma_d r = 202.4$

1ST APPROXIMATION q' FOR EACH CELL

$$q_s' = \frac{\Sigma_a q_o r}{\Sigma_a r}$$

$\Sigma_a q_o r = 0$

$\Sigma_b q_o r = 2(3410 + 53400 + 65700) = 245,020$

$\Sigma_c q_o r = 2(87800 + 76500 + 85000 + 92900) = 684,400$

$\Sigma_d q_o r = 2(97800 + 93500) + 96200 = 478,800$

$$q_{sa}' = \frac{0}{308.6} = 0$$

$$q_{sb}' = \frac{245020}{406.6} = 603$$

$$q_{sc}' = \frac{684400}{397.0} = 1721$$

$$q_{sd}' = \frac{478800}{202.4} = 2370$$

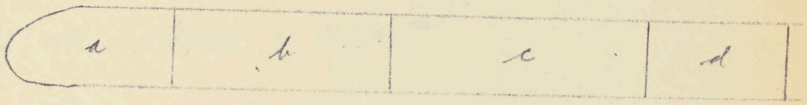
FORM 1319A

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

REPORT No. 7/0583/17
SHEET No. 5-17

AIRCRAFT:		PREPARED BY	DATE
C105	FIN	S. YOUNG	SEPT 14/55
		CHECKED BY	DATE

BAY 92-112



d	.1435	.1278	.1325	.1205	.1132	.210	
d TRANSPOSE		.1278	.1435	.1205	.1325	.210	.1132

q_s' 1ST APPROX	0	603.	1721.	2370.
2ND "	86.6	0 228.	72.7 268.5	361.5
3RD "	32.7	11.1 45.2	27.4 40.9	71.6
4TH "	8.1	4.2 9.1	6.8 8.1	14.3
5TH "	1.9	.1 2.0	1.6 1.6	3.1
$\Sigma q_s'$	129.3	902.7	2148.6	2820.5
ITERATE	129.5	16.5 285.	108.8 319	452.
+ q_s' 1ST APPROX	0	603	1721	2370.
q_s	129.5	904.5	2148.8	2822.
ITERATE	130.	16.6 285	109 320	452
+ q_s' 1ST APPROX	0	603	1721	2370
q_s	130	904.6	2150	2822

BY INSPECTION, THE q VALUES MUST BE NEGATIVE TO BALANCE THE SECTION.

$q_{sa} = -130$ $\quad q_{sc} = -2150$

$q_{sb} = -905$ $\quad q_{sd} = -2822$

ORM 1319A

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

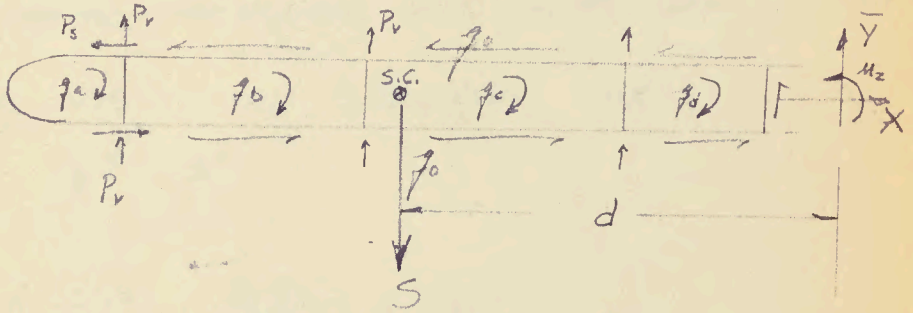
REPORT No. 7/0583/17
SHEET No. 5-18

AIRCRAFT:		PREPARED BY	DATE
C105	FIN	S. YOUNG	SEPT. 14/55.
		CHECKED BY	DATE

BAY 92-112

DETERMINE THE POSITION OF THE SHEAR CENTRE BY TAKING MOMENTS ABOUT THE A.L.

BAY 92-112 SHEAR = 18250#



$$\Sigma M_z = +18250\,d + \Sigma 2A_s q_o + 2A_a q_a + 2A_b q_b + 2A_c q_c + 2A_d q_d + \Sigma 2P_v \cdot X + \Sigma 2P_s \cdot \bar{Y} = 0$$

$$18250\,d + 393{,}200 - 2 \cdot 15 \cdot 1{,}130 - 2 \cdot 63.1 \times 905 - 2 \cdot 1022 \cdot 2150 - 2 \times 39.1 \times 2822 - 149270 + 23500 = 0$$

$$18250\,d + 393{,}200 - 3930 - 114{,}100 - 440{,}000 - 220{,}500 - 149{,}270 + 23500 = 0$$

$$d = \frac{511100}{18250} = 28.0''$$

ADD THE ASSUMED BENDING q_o SHEAR FLOWS TO THE CELL CLOSING q_a, q_b, q_c, q_d SHEAR FLOWS TO OBTAIN THE SHEAR FLOW PICTURE FOR THE APPLIED SHEAR ACTING AT THE SHEAR CENTRE.

FORM 1319A

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

REPORT No. 7/0583/17
SHEET No. 5-19

AIRCRAFT: C105	FIN	PREPARED BY: S. YOUNG	DATE: SEPT. 14/55
		CHECKED BY	DATE

BAY 92-112

COMPUTE THE SHEAR FLOWS IN THE SECTION FOR A TORQUE ACTING AT THE SHEAR CENTRE.

METHOD FROM J. Ae. Soc. AUG 1946 NUMERICAL TRANSFORMATION PROCEDURES FOR SHEAR FLOW CALCULATION

THE INITIAL CELL ESTIMATES ARE

$$q_T' = \frac{2A}{\Sigma r}$$

$$q_{Ta}' = \frac{2A_a}{\Sigma r_a} = \frac{2 \times 15.1}{308.6} = .0979$$

$$q_{Tb}' = \frac{2A_b}{\Sigma r_b} = \frac{2 \times 63.1}{406.6} = .310$$

$$q_{Tc}' = \frac{2A_c}{\Sigma r_c} = \frac{2 \times 102.2}{397.0} = .515$$

$$q_{Td}' = \frac{2A_d}{\Sigma r_d} = \frac{2 \times 39.1}{202.4} = .387$$

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

REPORT No. 7/0583/17
SHEET No. 5-20

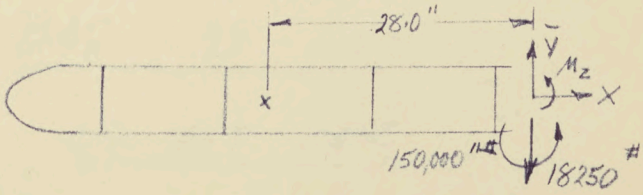
AIRCRAFT:		PREPARED BY	DATE
C105	FIN	S. YOUNG	SEPT. 14/55
		CHECKED BY	DATE

BAY 92-112

d		·1435	·1278	·1325	·1205	·1132	·210	
d TRANSFORM		·1278	·1435	·1205	·1325	·210	·1132	
q_T'	1ST APPROX	·0979	·310		·515		·387	
	2ND "	·0445	·0125	·0682	·0374	·0438	·1081	
	3RD "	·0115	·0057	·0107	·0097	·0122	·0170	
	4TH "	0023	0015	0029	0020	0019	0046	
	5TH "	0006	0003	0005	0005	0005	0008	
q_T		·1568	·4123		6230		·5175	
ITERATE		·0592	·0200	·0825	·0497	·0586	·1310	
$+ q_T'$	1ST APPROX	·0979	·310		·515		·387	
q_T		·1571	·4125		·6233		·518	
A		15·1	63·1		102·2		39·1	
2A q_T		4·75	52·0		127·5		40·5	

$J = \Sigma 2A\, q_T = 224.8$

APPLIED TORQUE AT SHEAR CENTRE:



$M_z = +150000 - 18250 \times 28.0'' = -361,000$ IN-#

FACTOR FOR TORQUE $q_J' = \frac{361000}{224.8} = 1610$

FORM 1319A

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

REPORT No. 7/0583/17
SHEET No. 5-21

AIRCRAFT:		PREPARED BY	DATE
C105	FIN	S. YOUNG	SEPT. 14/55
		CHECKED BY	DATE

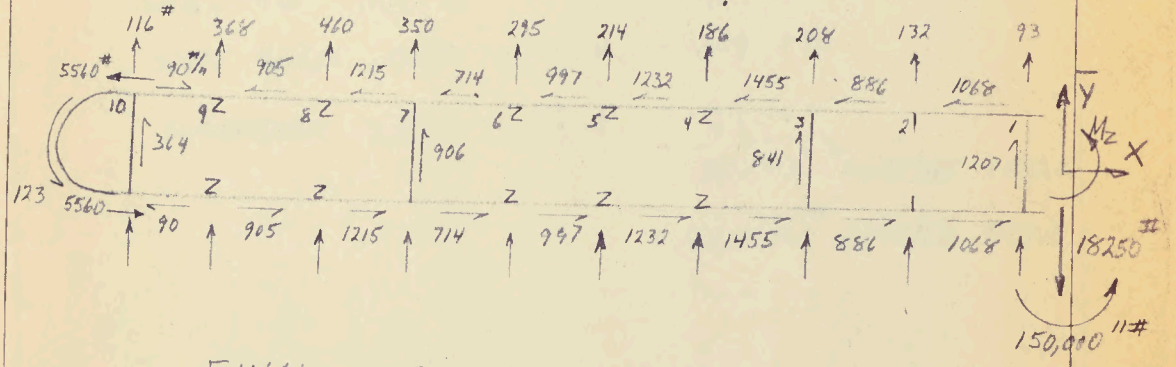
BAY 92 - 112

BY INSPECTION, THE TORQUE q's ARE +VE.

$q_{T_A} = .1571 \times 1610 = 253$ $\qquad$ $q_{T_C} = .6233 \times 1610 = 1003$

$q_{T_b} = .4125 \times 1610 = 664$ $\qquad$ $q_{T_d} = .518 \times 1610 = 834$

THE FINAL SECTION q's ARE SUM OF THE ASSUMED BENDING q_o, SHEAR CORRECTION q_s', AND TORQUE CORRECTION q_T'.



FINAL SHEAR FLOWS

BAY 92 - 112

C.P. AFT CASE

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

REPORT No. 7/0583/17
SHEET No. 5-22

AIRCRAFT: C105	FIN	PREPARED BY: S. YOUNG	DATE: SEPT. 14/55
		CHECKED BY	DATE

BAY 92-112

CHECK THE VERTICAL SHEAR BALANCE.

SKIN SHEAR = 2 x 199 = 398
WEB & NOSE SHEAR = 13176
SLOPE SHEAR $2\Sigma P_V$ = 4844
+18418 # REACTIVE SHEAR
& −18250 # APPLIED SHEAR

CHECK H.L. TORQUE BALANCE.

SKIN TORQUE = 2 x 109935 = +219,870
WEB & NOSE TORQUE = −242,600
SLOPE SHEAR TORQUE = $2\Sigma P_V \cdot X$ = −149,270
SWEEPBACK TORQUE = $2\Sigma P_S \cdot Y$ = +23,500
−148,500 "# REACTIVE TORQUE
+150,000 "# APPLIED TORQUE

FRM 1310A

BAY 92 - 112

SHEAR & TORQUE BALANCE CHECK

A. V.

AIRCR
WEIGH
C. G.

ITEM	1 MID BAY 7	2 ITEM	3 $\Delta\bar{Y}$	4 q	5 SHEAR	6	7	8	9	10 ITEM
F	1.57	F-N-F	3.14	123	- 386					F-N-F
9	1.93	F-9	.36	- 90	+ 32					F-9
8	2.19	9-8	.26	905	- 235					9-8
7	2.31	8-7	.12	1215	- 146	$\frac{1}{2}\Sigma$ SKIN SHEAR = +199				8-7
6	2.45	7-6	.14	714	- 100	Σ WEB NOSE SHEAR = +13176				7-6
5	2.42	6-5	-.03	997	+ 30					6-5
4	2.33	5-4	-.09	1232	+ 111					5-4
3	2.20	4-3	-.13	1455	+ 189					4-3
2	2.07	3-2	-.13	886	+ 115					3-2
1	1.88	2-1	-.19	1068	+ 203					2-1
		1-1	3.76	1207	+4540					1-1
		3-3	4.40	841	+3700					3-3
		7-7	4.62	906	+4180					7-7
		F-F	3.14	364	+1142					F-F

FORM 1543

A. V. ROE CANADA LIMITED

MALTON, ONTARIO

TECHNICAL DEPT. (AIRFRAME)

AIRCRAFT - - C105

WEIGHT - -

C. G. POSITION -

REPORT NO. - 7/0583/17

SHEET - - 5-23

DATE - - SEPT. 14/55

PREPARED BY - S. YOUNG

7	8	9	10	11	12	13	14	15	16	17	18	19
			ITEM	2A	$\frac{2A}{q}$	$\frac{2Aq}{q}$						
			F-N-F	136·2	123	22900						
			F-9	22·6	-90	-2035						
			9-8	24·2	905	21900						
KIN SHEAR = +199			8-7	18·0	1215	21900	$\frac{1}{2}$ Σ SKIN	TORQUE = 109,935				
5 SHEAR = +13176			7-6	20·0	714	14280	Σ WEB NOSE	TORQUE = -242600				
			6-5	11·5	997	11480						
			5-4	10·0	1232	12320						
			4-3	9·3	1455	13520						
			3-2	9·3	886	8250						
			2-1	7·8	1068	8320						
			1-1	13·2	1207	-15900						
			3-3	57·3	841	-48200						
			7-7	159·5	906	-144500						
			F-F	156·2	364	-56900						

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

REPORT No. 7/0583/11
SHEET No. 6-0

AIRCRAFT:		PREPARED BY	DATE
C105	FIN	S. YOUNG	SEPT. 23/55
		CHECKED BY	DATE

BAY 112 - 137

SECTION 6

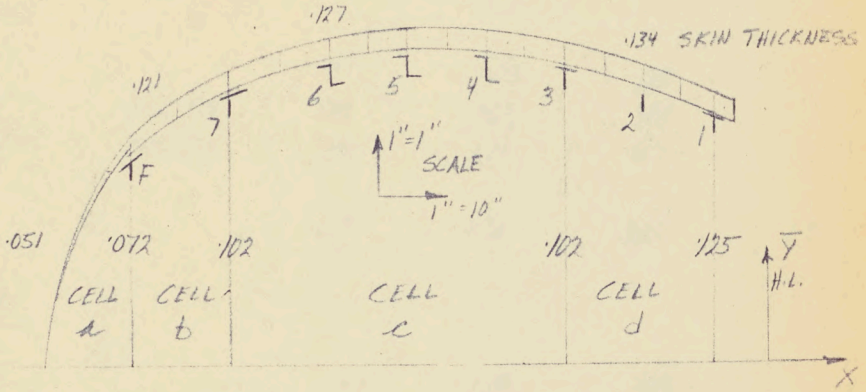
FORM 1319A

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

REPORT No. 7/0583/17
SHEET No. 6-1

AIRCRAFT: C105	FIN	PREPARED BY: S. YOUNG	DATE: SEPT. 22/55
		CHECKED BY	DATE

STA 137 SECTION PROPERTIES



ITEM	SPAR CAP A	CAP $\bar{Y}$	X
1	·117	1·03	− 3·5
2	·117	1·19	− 8
3	·378	1·70	− 13·
4	·128	1·56	− 18
5	·128	1·58	− 23·
6	·128	1·52	− 28·
7	·365	1·52	− 34·6
F	·352	1·13	− 41.
N		0	− 46·5

FORM 1319A

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

REPORT No. 7/0583/17
SHEET No. 6-2

AIRCRAFT: C105	FIN	PREPARED BY: S. YOUNG	DATE: SEPT. 22/55
		CHECKED BY	DATE

STA 137 SECTION PROPERTIES

ITEM 1	b x t	A	$\bar{y}$	$A\bar{y}$	$A\bar{y}^2$
SPAR		.117	1.03	.120	
AFT SKIN	1.5 x .134	.201	1.63	.328	
FWD SKIN	2.25 x .134	.302	1.71	.517	
Σ		.618	1.56	.965	1.51

ITEM 2					
SPAR		.117	1.19	.139	
AFT SKIN	2.25 x .134	.201	1.82	.366	
FWD SKIN	2.5 x .134	.335	1.90	.637	
Σ		.653	1.75	1.142	2.00

ITEM 3					
SPAR		.378	1.70	.642	
AFT SKIN	2.5 x .134	.335	1.98	.664	
FWD SKIN	2.5 x .127	.317	2.04	.648	
Σ		1.030	1.90	1.954	3.71

ITEM 4					
SPAR		.128	1.56	.200	
AFT. SKIN	2.5 x .127	.317	2.07	.657	
FWD SKIN	2.5 x .127	.317	2.10	.666	
Σ		.762	2.0	1.523	3.05

FORM 1319A

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

REPORT NO. 7/0583/17
SHEET NO. 6-3

AIRCRAFT:		PREPARED BY	DATE
C105	FIN	S. YOUNG	SEPT. 22/55
		CHECKED BY	DATE

STA 137 SECTION PROPERTIES

ITEM 5	b×t	A	$\bar{Y}$	$A\bar{Y}$	$A\bar{Y}^2$
SPAR		·128	1·58	·202	
AFT SKIN	2·5×·127	·317	2·10	·666	
FWD SKIN	2·5×·127	·317	2·10	·666	
Σ		·762	2·02	1·534	3·10

ITEM 6					
SPAR		·128	1·52	·195	
AFT SKIN	2·5×·127	·317	2·06	·653	
FWD SKIN	3·3×·127	·419	2·00	·838	
Σ		·864	1·95	1·686	3·29

ITEM 7					
SPAR		·285	1·52	·555	
AFT SKIN	3·3×·127	·419	1·90	·797	
FWD SKIN	3·2×·121	·388	1·75	·678	
Σ		1·172	1·72	2·020	3·48

ITEM F					
SPAR		·352	1·13	·398	
AFT SKIN	3·2×·121	·388	1·55	·601	
FWD SKIN	3·0×·051	·153	1·25	·191	
Σ		·893	1·33	1·190	1·58

$\frac{1}{2} I = \Sigma A \bar{Y}^2 = 21.72$

$\therefore I = 43.4 \text{ IN}^4$

RM. 1319A

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

REPORT No. 7/0582/17
SHEET No. 6-4

AIRCRAFT: C105	FIN

PREPARED BY	DATE
S. YOUNG	SEPT. 22/58
CHECKED BY	DATE

BAY 112 - 137 SECTION PROPERTIES

DETERMINE BAY PROPERTIES BY AVERAGING STA. 112 & 137 (SIMILAR TO BAY 92-112)

CELL AREAS

$A_d = 2(A_{1-2} + A_{2-3} - \frac{1}{2} X_2 \bar{Y}_2 + X_1 \bar{Y}_1) = 2A_{1-2} + 2A_{2-3} - X_2 \bar{Y}_2 + X_1 \bar{Y}_1$

$= 7.5 + 8.2 + 13.0 \times .81 - 3.5 \times 1.64 = 35.6 \square''$

$A_c = A_{3-4} + A_{4-5} + A_{5-6} + A_{6-7} - X_5 \bar{Y}_5 + X_6 \bar{Y}_6$

$= 8.5 + 9.9 + 11.6 + 19.2 + 34.6 \times 1.96 - 13.0 \times 2.01 = 90.9 \square''$

$A_b = A_{7-8} + A_{8-1} - X_8 \bar{Y}_8 + X_1 \bar{Y}_1$

$= 21.7 + 15.2 + 44.0 \times 1.42 - 34.6 \times 1.96 = 32.2 \square''$

$A_a = 11.0 \square''$ STA 112

$A_a = 10.8 \square''$ STA 137

7/0582/35 1-15

$A_a = 12.4 \square''$

A. V. ROE
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AIRCRAFT -
WEIGHT -
C. G. POSITION

BAY 112-137

$$2A = X_i Y_{i+1} - X_{i+1} Y_i$$

ITEM	1 STA 137 X	2 137 $\bar{Y}$	3 STA 112 X	4 112 $\bar{Y}$	5 MID X	6 BAY $\bar{Y}$	7	8 $X_i \bar{Y}_{i+1}$	9 $-X_{i+1} Y_i$	10 ITEM	11 2A
1	-3·5	1·56	-3·5	1·81	-3·5	1·64		-5·55	13·1	1-2	7·5
2	-8·	1·75	-8·	1·99	-8·	1·87		-16·1	24·7	2-3	8·2
3	-13·	1·90	-13·	2·12	-13·	2·01		-27·7	36·2	3-4	8·5
4	-18·	2·00	-18·	2·26	-18·	2·13		-39·1	47·2	4-5	9·9
5	-23·	2·02	-23·	2·32	-23·	2·17		-49·2	60·2	5-6	11·6
6	-28·	1·95	-28·	2·33	-28·	2·14		-55·0	74·2	6-7	17·2
7	-34·6	1·72	-34·6	2·20	-34·6	1·96		-57·8	79·2	7-8	21·7
8	(-40·6)	(1·35)	-46·6	1·98	-40·6	1·67		-57·7	73·2	8-F	15·8
F	-41·	1·33	-47·0	1·50	-44·0	1·42					
N	-46·5	0	-53·3	0	-49·9	0					

NOTE : ITEM 8 VALUES, STA 137 ARE ASSUMED.

FORM 1543

A. V. ROE CANADA LIMITED

MALTON, ONTARIO

TECHNICAL DEPT. (AIRFRAME)

AIRCRAFT - - C105

WEIGHT - -

C. G. POSITION -

REPORT NO. - 7/0583/117

SHEET - - 6-5

DATE - - SEPT. 22/55

PREPARED BY - S. YOUNG

7	8	9	10	11	12	13	14	15	16	17	18	19
	$\bar{x}$ $\bar{z}_{m}$	$-\bar{x}_{m}$	ITEM	2A		ITEM	L	t	$\frac{t}{L}$		CELL	A_c
	-50.6	13.1	1-2	7.5		1-2	4.5	.139	32.4		a	280.4
	-16.1	24.1	2-3	8.2		2-3	5.	.139	36.0		b	228.2
	-27.7	36.1	3-4	8.5		3-4	5.	.132	37.9		c	405.2
	-39.1	47.7	4-5	9.9		4-5	5.	.132	37.9		d	202.4
	-49.2	60.1	5-6	11.6		5-6	5.	.132	37.9			
	-58.0	74.1	6-7	17.2		6-7	6.6	.132	50.0			
	-57.8	79.1	7-8	21.7		7-8	6.0	.125	48.0		CELL	A
	-57.7	73.1	8-F	15.8		8-F	3.4	.125	27.2		a	12.4
					13.0-11.2 11.6-13.1	F-N.F	12.3	.051	241.		b	32.2
						1-1	3.28	.125	26.2		c	90.9
						3-3	4.02	.102	39.4		d	35.5
						7-7	3.92	.102	38.4			
						F-F	2.84	.072	39.4			

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

REPORT No. 7/0583/117
SHEET No. 6-6

AIRCRAFT:		PREPARED BY	DATE
C105	FIN	S. YOUNG	SEPT 23/55
		CHECKED BY	DATE

BAY 112 - 137 SECTION PROPERTIES

CELL TRANSFORMATION FACTORS

$$d = \frac{r_{WEB}}{r_{CELL}} \qquad \text{i.e.} \quad r_{a\,b} = \frac{r_{F-7}}{r_a}$$

$$r_{b-a} = \frac{r_{F-1}}{r_b}$$

$$r_{a-b} = \frac{39.4}{280.4} = .1405$$

$$r_{b-a} = \frac{39.4}{228.2} = .173$$

$$r_{b-c} = \frac{38.4}{228.2} = .168$$

$$r_{c-b} = \frac{38.4}{405.2} = .0947$$

$$r_{i-d} = \frac{39.4}{405.2} = .0973$$

$$r_{d-c} = \frac{39.4}{202.4} = .1945$$

FORM 1319A

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

REPORT No. 7/0583/17
SHEET No. 6-7

AIRCRAFT:		PREPARED BY	DATE
C105	FIN	S. YOUNG	SEPT. 22/55
		CHECKED BY	DATE

STA 137

LOADING 7/0583/38 3-14

C.P. AFT CASE

ULTIMATE SHEAR OUTB'D = 15,250 #

SHEAR INB'D = 12,250 #

B.M. = 350,000 11 #

H.L. TORQUE OUTB'D = 55000 11 #

H.L. TORQUE INB'D = 110,000 11 #

$f = \frac{350000}{43.4}\bar{y} = 8070\bar{y}$ $P = 8070 A\bar{y}$

ITEM	$\bar{y}$	$A\bar{y}$	f	P
1	1.56	.965	12590	7780
2	1.75	1.142	14120	9220
3	1.90	1.954	15320	15750
4	2.00	1.523	16120	12300
5	2.02	1.534	16290	12380
6	1.95	1.686	15720	13590
7	1.72	2.020	13880	16300
8	(1.35)	0	0	0
F	1.33	1.190	10720	9600

FORM 1319A

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

REPORT No. 7/0583/117
SHEET No. 6-8

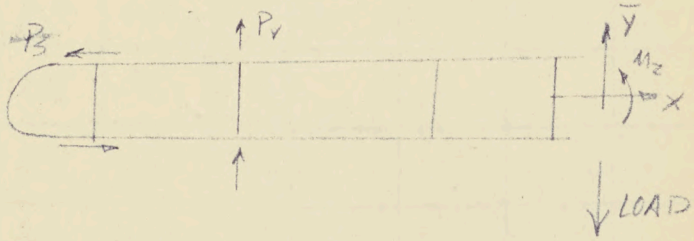
AIRCRAFT: C105	FIN	PREPARED BY: S. YOUNG	DATE: SEPT. 22/55
		CHECKED BY	DATE

BAY 112 - 137

SLOPE & SWEEPBACK SHEARS

$$P_V = \frac{\bar{Y}_{112} - \bar{Y}_{137}}{112-137} P_{CAP} = \frac{\Delta \bar{Y}}{-25} P_{CAP}$$

$$P_S = \frac{X_{112} - X_{137}}{-25} P_{CAP}$$



2 SKINS $\Sigma P_V = 2 \times 2022 = +4044$ #

2 SKINS $\Sigma P_V \cdot X = 2 \times -55732 = -111,464$ "#

FRONT SPAR $\Sigma P_S \cdot \bar{Y} = 2 \times 4460 = +8920$ "#

FORM 1319A

BAY 112 - 137

SLOPE ⅄ SWEEPBACK SHEAR

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AIRCRAFT -
WEIGHT -
C. G. POSITIO

ITEM	1 $\bar{Y}_{112}$	2 $\bar{Y}_{137}$	3 ΔY	4 P_{CAP} STA 112	5 P_v	6 X	7 $P_v \cdot X$	8	9 X_{112} X_{137}	10 P_3	11 $\bar{X}$
1	1·81	1·56	·25	10450	104	−3·5	−364				
2	1·99	1·75	·24	14000	134	−8·	−1073				
3	2·12	1·90	·22	20500	180	−13·	−2340				
4	2·26	2·00	·26	16200	167	−18·	−3045				
5	2·32	2·02	·30	16650	200	−23·	−4600				
6	2·33	1·95	·38	18750	288	−28	−8060				
7	2·20	1·72	·48	23450	454	−34·6	−15700				
8	1·98	1·35	·63	16250	409	−40·6	−16600				
F	1·50	1·33	·17	12380	84	−47·0	−3950		−6	2·70	1·50
Σ					+2022		−55732				

FORM 1643

HEAR

A. V. ROE CANADA LIMITED

MALTON, ONTARIO

TECHNICAL DEPT. (AIRFRAME)

AIRCRAFT - - C105

WEIGHT - -

C. G. POSITION -

REPORT NO. - 7/0583/17

SHEET - - 6-9

DATE - - SEPT. 22/55

PREPARED BY - S. YOUNG

6	7	8	9	10	11	12	13	14	15	16	17	18	19
	$P_v.X$		X_{112} K_{37}	P_5	$\bar{7}$	$P_5.7$							
5	- 364												
	-1073												
	-2340												
	-3045												
	-4600												
	-8060												
4	-15700												
6	-16600												
0	-3950		-6	2970	1.50	+4460							
	-55732					4460							

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

REPORT No. 7/0883/17
SHEET No. 6-10

AIRCRAFT: C105	FIN	PREPARED BY: S. YOUNG	DATE: SEPT. 22/55
		CHECKED BY	DATE

BAY 112-137

COMPUTE THE BENDING SHEAR FLOW q_0, CORRECTIVE SHEAR q'_s, AND CORRECTIVE TORQUE q'_T IN MANNER SIMILAR TO BAY 92-112.

ITEM AREAS ABOUT H.L.

F-R-F $2A = 2A_0 - 2\bar{X}_1\bar{Y}_1 = 2\times 12.4 - 2\times -44.0\times 1.42$
$= 24.8 + 125. = 149.8$

1-1 $2A = 2\bar{X}_1\bar{Y}_1 = 2\times 3.5\times 1.64 = 11.5$

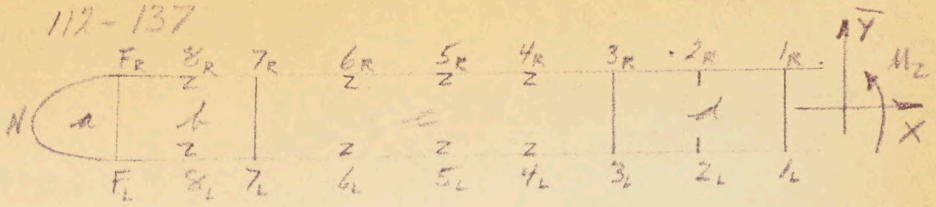
3-3 $2A = 2\bar{X}_3\bar{Y}_3 = 2\times 13.\times 2.01 = 52.3$

7-7 $2A = 2\times 34.6\times 1.96 = 135.5$

F-F $2A = 2\times 44.0\times 1.42 = 125.$

FORM 1319A

BAY 117 - 137



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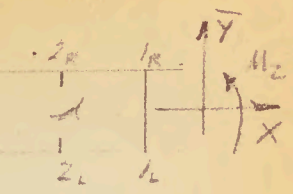
AIRCRAFT

WEIGHT

C. G. POSI

ITEM	1	2	3	4	5	6	7	8	9	10	1
	P_{112}	$-P_{137}$	$P_{112}-P_{137}$ ΔP	$\frac{P_{112}-P_{137}}{112-137}$ $\frac{\Delta P}{\Delta 25}$		ITEM	f_0	x	$\frac{x}{f_0}$	$2A$	$2A$
1_R	10430	-1780	2650	-106		F_L-N-F_R	0	241	C	149.8	0
2_R	14040	-9220	4780	-191		F_R-8_R	111	27.2	30[illegible]	15.8	17[illegible]
3_R	20500	-15750	4750	-190		8_R-7_R	701	48.0	36[illegible]0	21.7	16[illegible]
4_R	16200	-12300	3900	-156		7_R-6_R	1055	50.0	52[illegible]0	19.2	20[illegible]
5_R	16650	-12380	4270	-171		6_R-5_R	1270	37.9	46[illegible]0	11.6	14[illegible]
6_R	18750	-13590	5360	-215		5_R-4_R	1441	37.9	54[illegible]0	9.9	142
7_R	23650	-16300	7350	-294		4_R-3_R	1597	37.9	60[illegible]0	8.5	13[illegible]
8_R	16250	0	16250	-650		3_R-2_R	1787	36.0	64[illegible]0	8.2	14[illegible]
F_R	12360	-9600	2780	-111		2_R-1_R	1978	32.4	64[illegible]0	7.5	14[illegible]
						1_L-1_R	2084	26.2	54[illegible]0	11.5	-24
						3_L-3_R	0	39.4	C	52.3	C
						7_L-7_R	0	38.4	C	125.5	C
						F_L-F_R	0	39.4	C	125.	C
						Σ					

FORM 1543



A. V. ROE CANADA LIMITED

MALTON, ONTARIO

TECHNICAL DEPT. (AIRFRAME)

AIRCRAFT - C105

WEIGHT -

C.'G. POSITION -

REPORT NO. - 7/6582/17

SHEET - 6-11

DATE - SEPT 23/56

PREPARED BY - S. YOUNG

6	7	8	9	10	11	12	13	14	15	16	17	18	19
EM	f_0	Δ_0	Σf_0	$2A$	$2Af_0$	$\Sigma 2Af_0$			SHEAR CORRECTION f_S	TORQUE CORRECTION f_T	f (9+15+16)		
$1-F_R$	0	241	0	149·8	0				-82	190	108		
$-B_R$	111	272	30[illegible]	15[illegible]	1752				-579	521	53		
7_R	101	480	36[illegible]0	21·7	16520				-579	521	703		
6_R	1055	500	52[illegible]0	19·2	20250				-1293	697	459		
5_R	1270	37·9	4[illegible]0	11·6	14720				-1293	697	674		
4_R	1441	37·9	54000	9·9	14280				-1293	697	845		
3_R	1597	37·9	60[illegible]0	8·5	13550				-1293	697	1001		
2_R	1787	38·0	64[illegible]0	8·2	14650				-1787	583	583		
1_R	1978	32·4	64000	7·5	14810	2×110532			-1787	583	774		
-1_R	2054	262	54000	11·5	-24000	-240000			-1787	583	880		
3_L	0	39·4	0	52·3	0				+494	+94	588		
7_R	0	39·4	0	13[illegible]	0				+714	-176	538		
$-F_L$	0	39·4	0	12[illegible]	0				+497	-331	166		
Σ						197064							

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

REPORT No. 7/0583/17
SHEET No. 6-12

AIRCRAFT:		PREPARED BY	DATE
C105	FIN	S. YOUNG	SEPT. 23/58
		CHECKED BY	DATE

BAY 112-137

SHEAR LOAD ACTING AT SHEAR CENTRE

1ST APPROXIMATION $q_s' = \frac{\Sigma q_o r}{\Sigma r}$

$\Sigma_a q_o r = 0$

$\Sigma_b q_o r = 2(3320 + 36700) = 79,440$

$\Sigma_c q_o r = 2(52700 + 48100 + 54600 + 60500) = 431,800$

$\Sigma_d q_o r = 2(64300 + 64000) + 54600 = 311,200$

$\Sigma_a r = 280.4$ $\quad \Sigma_c r = 405.2$

$\Sigma_b r = 228.2$ $\quad \Sigma_d r = 202.4$

$q_{s_a}' = 0$

$q_{s_b}' = \frac{79440}{228.2} = 348$

$q_{s_c}' = \frac{431\,800}{405.2} = 1065$

$q_{s_d}' = \frac{311,200}{202.4} = 1535$

FORM 1319A

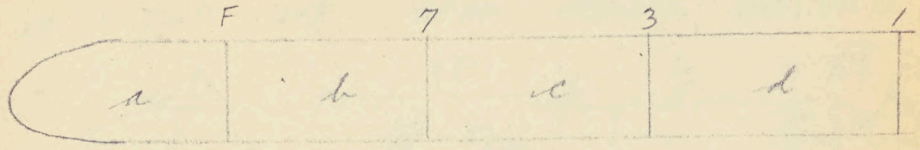
A. V. ROE CANADA LIMITED
MALTON - ONTARIO
TECHNICAL DEPARTMENT (Aircraft)

REPORT NO. 7/0583/17
SHEET NO. 6-13

AIRCRAFT: C105	FIN

PREPARED BY	DATE
S. YOUNG	SEPT. 23/55
CHECKED BY	DATE

BAY 112 - 137



d	.1405	.173	.168	.0947	.0973	.1945
d TRANSPOSE	.173	.1405	.0947	.168	.1945	.0973

q'_s 1ST APPROX	0		348		1065		1535	
2ND "	48.9		0	179.0	33.0	149.2	20.7	
3RD "	25.1		8.5	30.6	17.0	20.1	35.4	
4TH "	5.5		4.3	6.2	3.1	3.5	7.2	
5TH "	1.5		.9	1.2	1.0	.7	1.4	
q'_s	81.0		578.7		1293.2		1786.0	
ITERATE	81.5		140	217.5	54.9	173.5	252.	
q'_s 1ST APPROX	0		348		1065		1535	
q'_s	81.5		579.5		1293.4		1787	
ITERATE	81.5		141	217.	54.9	173.5	252.	
q'_s 1ST APPROX	0		348		1065		1535	
q'_s	81.5		579.1		1293.4		1787	

BY INSPECTION, q'_s IS NEGATIVE TO BALANCE THE SECTION

$q'_{s_a} = -82$ $\quad$ $q'_{s_c} = -1293$

$q'_{s_b} = -579$ $\quad$ $q'_{s_d} = -178.7$

AM 1319A

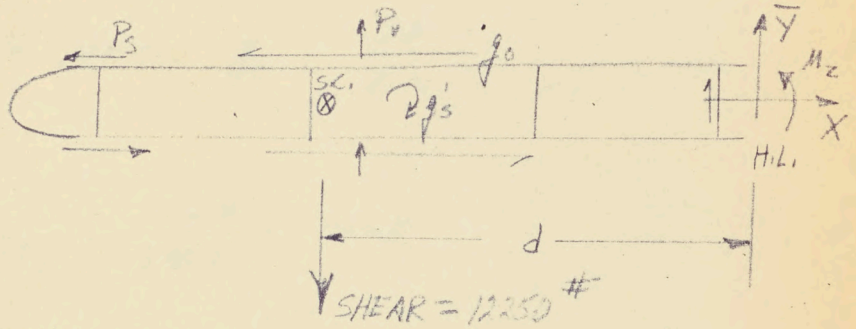
A. V. ROE CANADA LIMITED
MALTON - ONTARIO
TECHNICAL DEPARTMENT (Aircraft)

REPORT No. 7/0583/17
SHEET No. 6-14

AIRCRAFT: C105	FIN	PREPARED BY: S. YOUNG	DATE: SEPT. 23/55
		CHECKED BY	DATE

BAY 112-137

DETERMINE THE SHEAR CENTRE POSITION.



ABOUT H.L.

$$\Sigma M_z = +Sd + \Sigma 2A q_o + \Sigma P_s \cdot X + \Sigma P_s \cdot \bar{Y} + 2A q_s' = 0$$

$$12250\,d + 197{,}064 - 111{,}464 + 8920 - 2\times 12.4\times 82 - 2\times 32.2\times 579$$
$$- 2\times 80.9\times 1293 - 2\times 35.5\times 1787 = 0$$

$$12250\,d + 197{,}064 - 111{,}464 + 8{,}920 - 2{,}035 - 37{,}300$$
$$- 235{,}500 - 126{,}800 = 0$$

$$d = \frac{307{,}115}{12250} = 25.05"$$

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

REPORT No. 7/0583/17
SHEET No. 6-15

AIRCRAFT: C105	FIN	PREPARED BY: S. YOUNG	DATE: SEPT. 23/55
		CHECKED BY	DATE

BAY 112 - 137

TORSIONAL SHEAR FLOW, q'_T

- 1ST APPROX $q'_T = \frac{2A}{\Sigma \frac{s}{t}}$

$$q'_{T_a} = \frac{2 \times 12{\cdot}4}{28{\cdot}04} = {\cdot}0885$$

$$q'_{T_b} = \frac{2 \times 32{\cdot}2}{228{\cdot}2} = {\cdot}2825$$

$$q'_{T_c} = \frac{2 \times 90{\cdot}9}{405{\cdot}2} = {\cdot}449$$

$$q'_{T_d} = \frac{2 \times 35{\cdot}5}{202{\cdot}4} = {\cdot}3505$$

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

REPORT No. 7/0593/117
SHEET No. 6-16

AIRCRAFT: C105	FIN

PREPARED BY	DATE
S. YOUNG	SEPT. 23/55
CHECKED BY	DATE

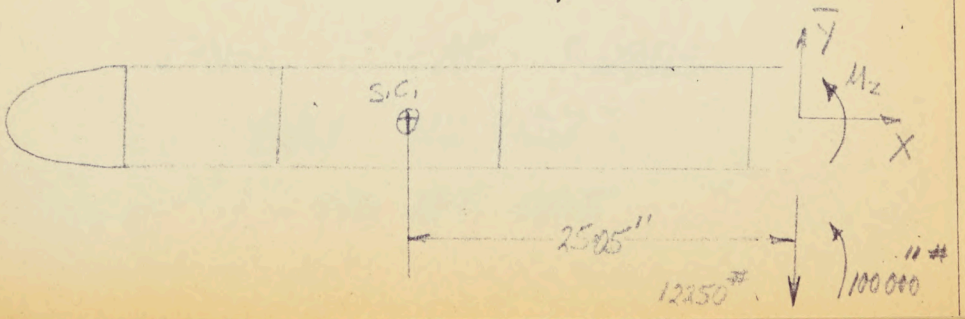
BAY 112-137

d	.1405	.173	.168	.0947	.0973	.1945
d TRANSPOSE	.173	.1405	.0947	.168	.1945	.0973

q'_T 1ST APPROX.	.0885	.2825	.449	.3505	
2ND "	.0397	.0153 .0755	.0267 .0341	.0875	
3RD "	.0127	.0069 .0102	.0086 .0085	.0118	
4TH "	.0024	.0022 .0029	.0016 .0011	.0033	
5TH "	.0007	.0004 .0005	.0005 .0003	.0005	
	.1440	.3964	.5304	.4536	
ITERATE	.0557	.0249	.0891	.0375 .0442	.1020
q'_T 1ST APPROX	.0885	.2825	.449	.3505	
q'_T	.1442	.3965	.5307	.4535	

A	12.4	32.2	90.9	35.5
$2A\,q'_T$	3.58	25.55	965	32.2

$$J = \Sigma\, 2A\, q'_T = 157.8$$



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

REPORT No 7/0583/17
SHEET No 6-17

AIRCRAFT: C105	FIN

PREPARED BY	DATE
S. YOUNG	SEPT. 23/55
CHECKED BY	DATE

BAY 112-137

AT SHEAR CENTRE;

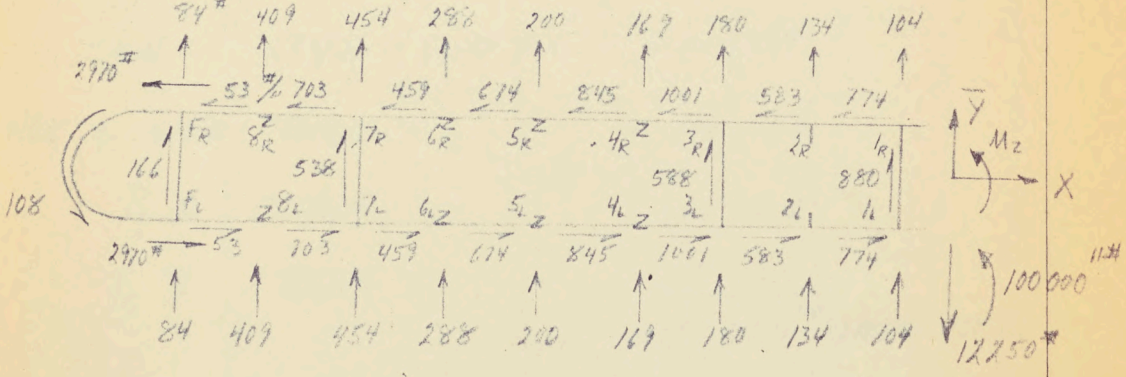
$M_Z = 4100000 - 12250 \times 25.05'' = -207,000''\#$

FACTOR ON q_1' VALUES $= \frac{207000}{1578} = 1313$

$q'_{T_a} = .1442 \times 1313 = 190$ $\qquad$ $q'_{T_c} = .5307 \times 1313 = 697$

$q'_{T_b} = .3965 \times 1313 = 521$ $\qquad$ $q'_{T_d} = .4535 \times 1313 = 583$

ADD THE BENDING SHEAR FLOW q_0, CORRECTIVE SHEAR q_s', AND CORRECTIVE TORQUE q_1' FOR FINAL SECTION SHEAR FLOWS.



FINAL SHEAR FLOWS

BAY 112-137

C.P. AFT CASE

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

REPORT No. 7/0583/11
SHEET No. 6-18

AIRCRAFT:		PREPARED BY	DATE
C105	FIN	S. YOUNG	SEPT. 23/55
		CHECKED BY	DATE

BAY 112-137

CHECK THE VERTICAL SHEAR BALANCE

SKIN SHEAR = 2 x 275 = +550

NOSE & WEB SHEAR = +7525

P_V SHEAR = +4044

+12,119# REACTIVE SHEAR

−12,250# APPLIED SHEAR

CHECK THE H.L. TORQUE BALANCE

SKIN TORQUE = 2 x 60,207 = +120,414

NOSE & WEB TORQUE = −118,420

$P_t \cdot X$ TORQUE = −111,464

$P_s \cdot Y$ TORQUE = +8,920

−100,550# REACTIVE TORQUE

+100,000# APPLIED TORQUE

N 1319A

BAY 112-137

SHEAR & TORQUE BALANCE CHECK

A. V. ROE
TECH

AIRCRAFT
WEIGHT
C. G. POSITIO

ITEM	1 MID BAY $\bar{y}$	2 ITEM	3 $\Delta\bar{y}$	4 q	5 SHEAR	6	7	8	9	10	11 ITEM
F	1·42	F-N-F	2·84	108	-307						F-N-F
8	1·67	F-8	·25	53	-13						F-8
7	1·96	8-7	·29	703	-203						8-7
6	2·14	7-6	·18	459	-83						7-6
5	2·17	6-5	·03	674	-20	½Σ SKIN SHEAR = +275					6-5
4	2·13	5-4	-·04	845	34	Σ WEB & NOSE SHEAR = +7525					5-4
3	2·01	4-3	-·12	1001	120						4-3
2	1·87	3-2	-·14	583	82						3-2
1	1·64	2-1	-·23	774	178						2-1
		1-1	3·28	880	2890						1-1
		3-3	4·02	588	2360						3-3
		7-7	3·92	538	2110						7-7
		F-F	2·84	166	472						F-F

FORM 1543

CE CHECK

A. V. ROE CANADA LIMITED

MALTON, ONTARIO

TECHNICAL DEPT. (AIRFRAME)

AIRCRAFT - - C105

WEIGHT - -

C. G. POSITION -

REPORT NO. - 7/0583/117

SHEET - - 6-19

DATE - - SEPT 23/55

PREPARED BY - S. YOUNG

6	7	8	9	10	11	12	13	14	15	16	17	18	19
					ITEM	2A	1	2A 1					
					F-N-F	149·8	108	16150					
					F-8	15·8	53	837					
					8-7	21·7	703	15250					
					7-6	19·2	459	8830					
Σ SKIN SHEAR = + 275					6-5	11·6	674	7820	½ Σ SKIN TORQUE = + 69,207				
WEB 1 NOSE SHEAR = + 7525					5-4	9·9	845	8380	2 WEB 1 NOSE TORQUE = − 118,420				
					4-3	8·5	1001	8500					
					3-2	8·2	583	4780					
					2-1	7·5	774	5810					
					1-1	11·5	880	−10120					
					3-3	523	588	−30800					
					7-7	135·5	538	−72900					
					F-F	125	166	−20750					

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

REPORT No. 7/25R2/17
SHEET No. 7-0

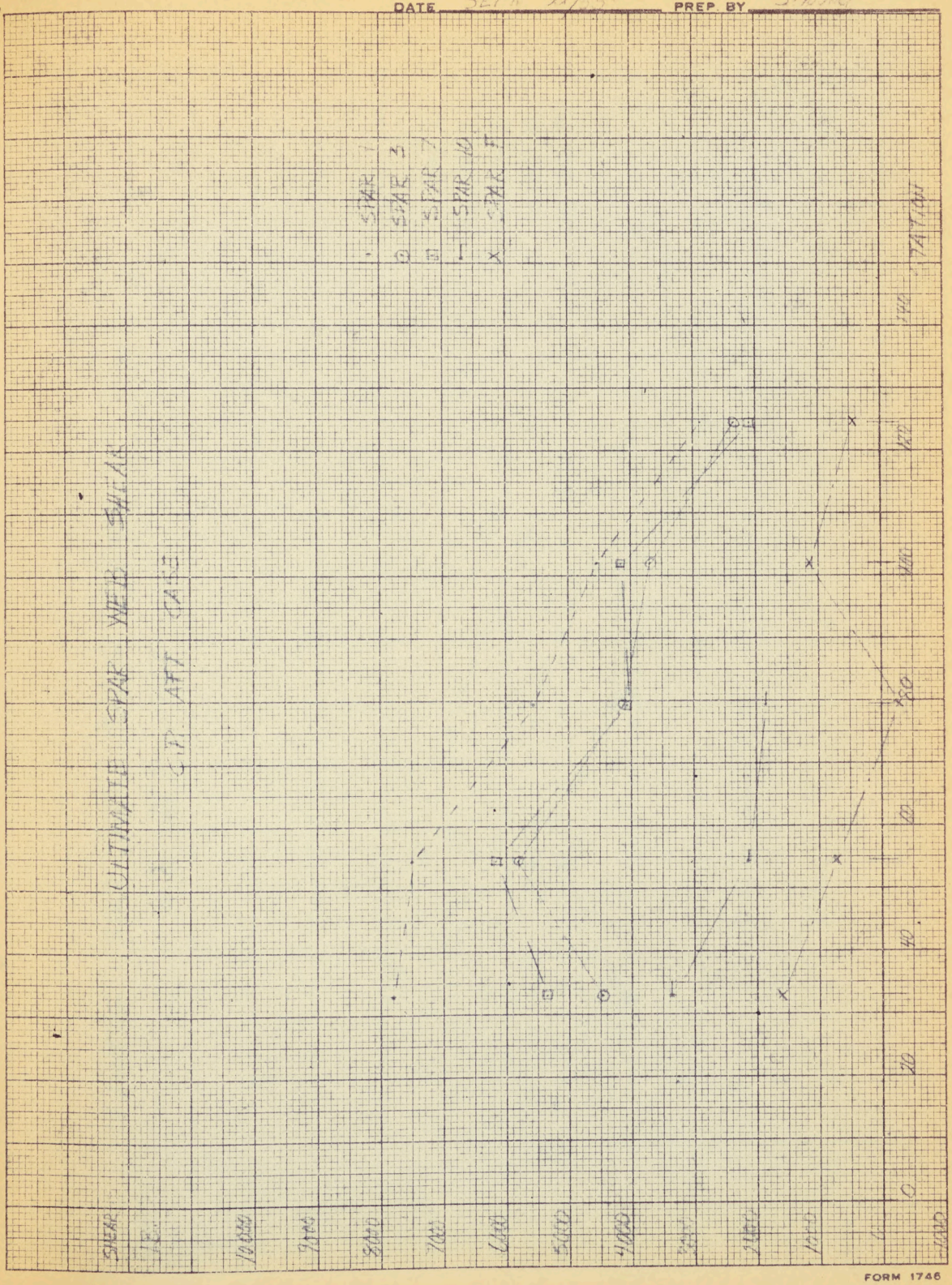
AIRCRAFT:		PREPARED BY	DATE
C105	FIN	S. Woods	SEPT 23/55
		CHECKED BY	DATE

SPANWISE WEB SHEAR

SECTION 7

AIRCRAFT "C105 COMPONENT FIN SHEET No. 7-1 REPORT No. 7/0582/101

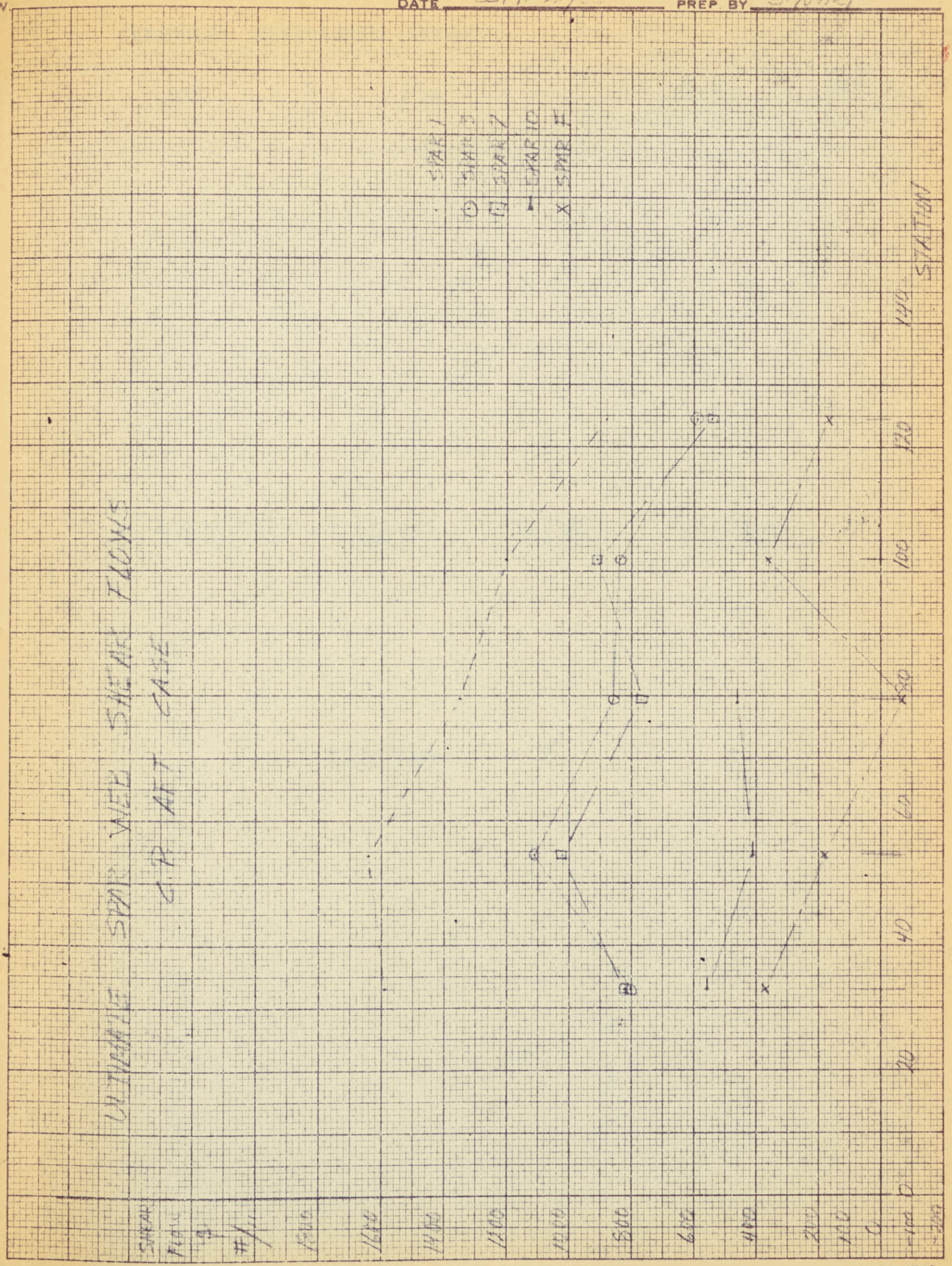
A. U. W. DATE SEPT 22/55 PREP. BY S. YOUNG



FORM 1746

AIRCRAFT C105 COMPONENT FIN SHEET No. 7-2 REPORT No. 7658-12

A. U. W. DATE SEPT. 22/55 PREP. BY S. IRVING



FORM 1746

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

REPORT No. 7/0583/17
SHEET No. 8-0

AIRCRAFT:		PREPARED BY	DATE
C105	FIN	S. YOUNG	SEPT. 23/55
		CHECKED BY	DATE

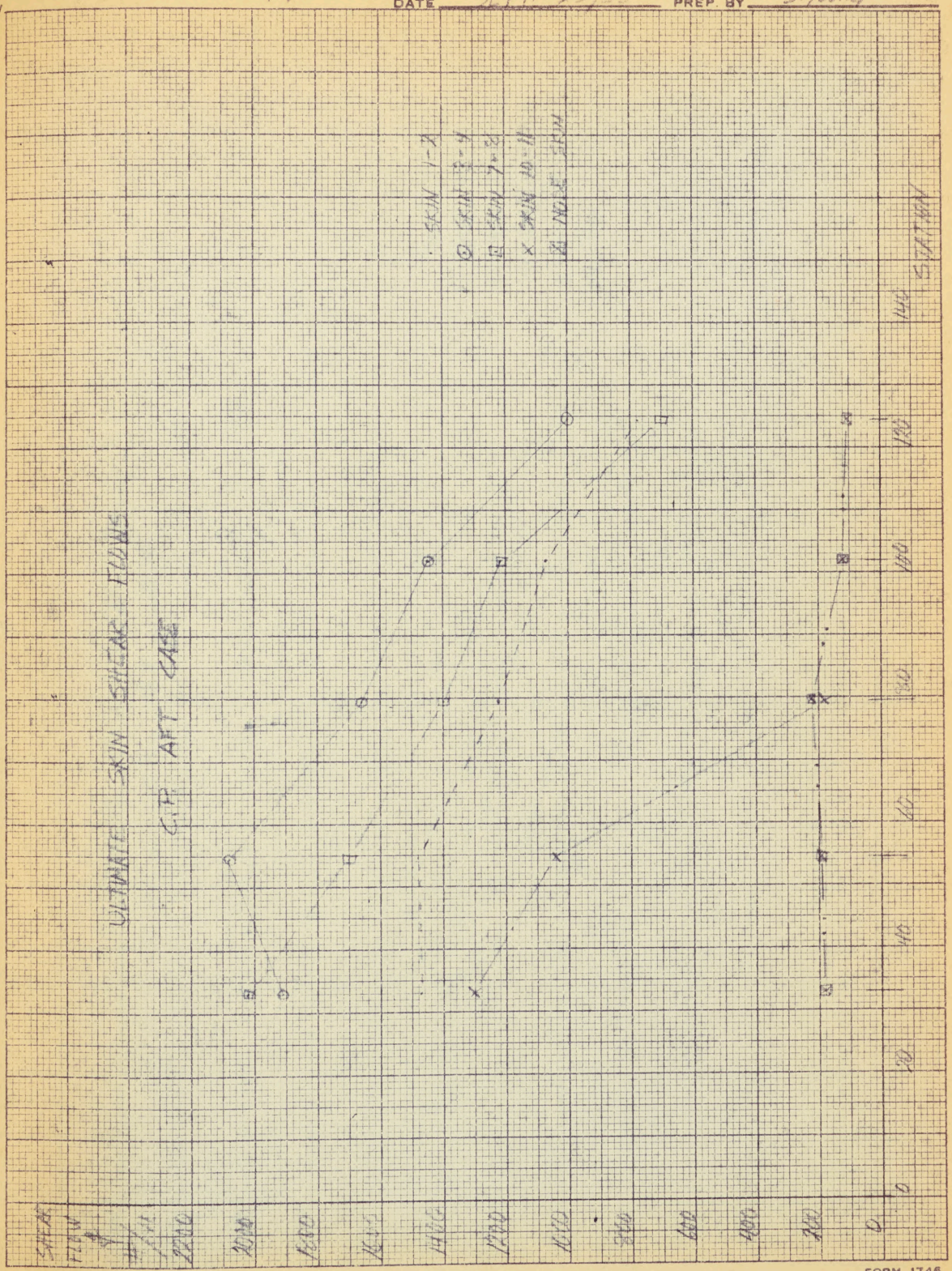
SPANWISE SKIN SHEAR FLOWS

SECTION 8

RM 1319A

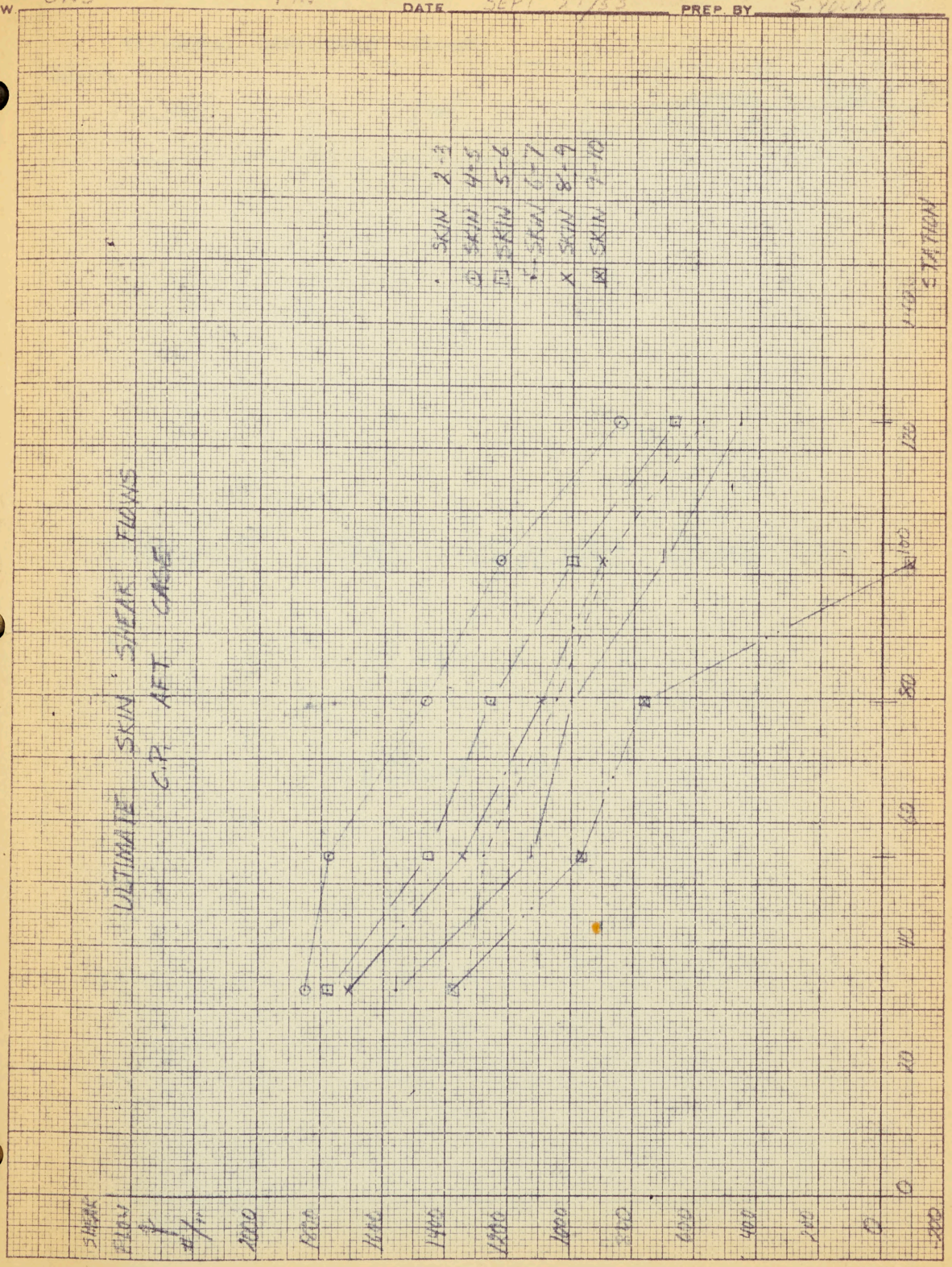
AIRCRAFT C105 COMPONENT FIN SHEET No. 8-1 REPORT No. 7/6589-117

A. U. W. DATE SEPT. 23/55 PREP. BY S. YOUNG



FORM 1746

AIRCRAFT C105 COMPONENT FIN SHEET No. 8-2 REPORT No. 7/5492.02
A.U.W. DATE SEPT 27/55 PREP. BY S. YOUNG



10 × 10 to the inch, 6th lines accented.
MADE IN U. S. A.

FORM 1746

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

REPORT No. 7/2582/17
SHEET No. 9-0

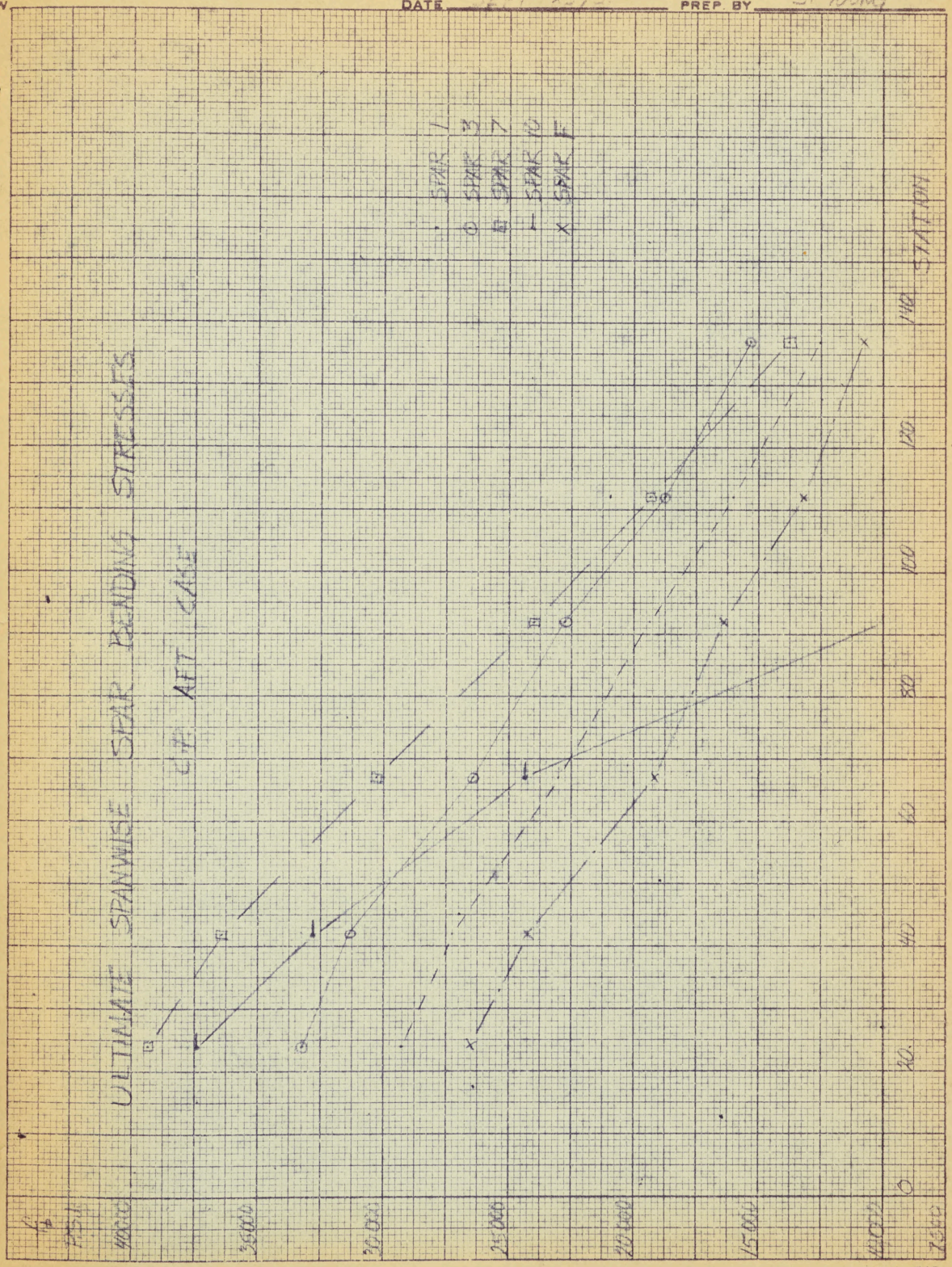
AIRCRAFT:		PREPARED BY	DATE
C 105	FIN	S. YOUNG	SEPT. 23/58
		CHECKED BY	DATE

SPANWISE SPAR BENDING STRESSES

SECTION 9

M 1319A

AIRCRAFT C105 COMPONENT FIN SHEET No. 9-1 REPORT No. 7/0583/11
A. U. W. DATE SEPT 23/55 PREP. BY S. YOUNG



FORM 1746