TECHNICAL REPORT

A. V. ROE CANADA LIMITED
MALTON - ONTARIO

UNCLASSIFIED

TECHNICAL DEPARTMENT (Aircraft)

AIRCRAFT: C 105

REPORT No. 7/0510/12

FILE No.

No. OF SHEETS: 210

TITLE: Duct and Engine Bays

~~CONFIDENTIAL~~

UNCLASSIFIED

PREPARED BY: E. Augustine, C. Burrell, C. Gundesen — DATE

CHECKED BY: J. Andrews — DATE

SUPERVISED BY: A Goodrich — DATE Oct. 56

APPROVED BY — DATE

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

FORM 1316A

AVRO AIRCRAFT LIMITED
MALTON - ONTARIO
TECHNICAL DEPARTMENT

REPORT No 7/0510/12
SHEET No 1-1

AIRCRAFT		PREPARED BY	DATE
C 105	Duct and Engine Bays	C. Burrell	Sept.'56
		CHECKED BY	DATE

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SUMMARY

This report contains an eleven redundant analysis of the C 105 Duct and Engine Bays. Stresses and deflections for the structure under the action of fifteen unit loads are computed.

This data is ready for use in the complete aeroplane analysis and for use in detail stressing of the the component.

AVRO AIRCRAFT LIMITED
MALTON · ONTARIO
TECHNICAL DEPARTMENT

REPORT No. 7/0510/12
SHEET NO 1-2

AIRCRAFT:		PREPARED BY	DATE
C 105	Duct and Engine Bays	C. Burrell	Sept856
		CHECKED BY	DATE

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9. Computer Program
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11. Energy Matrix
12. Redundant Matrix
13. Static Determinant Matrix
14. Stresses
15. Deflections

FORM 1310A

Introduction

This report contains an overall analysis of the C 105 Duct And Engine Bays for both externally applied aeroplane loads and internal joining loads. The structure considered extends from stations 485.00in to 742.50in.

Stresses and deflections due to unit loads are predicted from a strain energy analysis based on a method developed in Avro Stress Report GEN/1090/336 which permits the handling of a large number of redundants.

Since this component analysis is to be joined to the rest of the aeroplane, no consideration could be given to alternate methods of solution. Simularly, the requirements of joining have determined the degree of detail to be considered.

SPECIAL FEATURES

In all, fifteen loads are considered as acting on these bays, representing inertia, engine, air, and internal structure loads.

Five redundancies are eliminated in the preliminary sub-problems solving for the coefficients of the frames. In the main problem, six more redundancies are considered to make a total of eleven.

The main frames have been considered separately under the action of three distinct types of statically determinant loads and one redundant load. These are a triple over the

frame, a side force balanced by side skin shears, and a balanced shearing set of loads, plus a redundant load applying a horizontal force to the top outboard points of the frame.

A simplified procedure for calculating the frame energy has been established. This calls for establishing a Zab by computor and desk calculator.

This 3 by 3 matrix is then modified for the effect of lumping the adjacent secondary light frames to the main frames. This result is introduced into the C_{ik} of the main problem.

For a detailed explanation of the frame operations the reader is referred to section four of this report.

The shear panels have been computed by taking the vertical load as acting on the side projection of the side walls and the fore and aft loads as acting on the plan projection of the bottom skins. This neglects a local stress required to balance the panels, which would, however, contribute little to the strain energy. Then the stress at any point

$$\tau_{x\delta} = \tau_m \cdot \frac{h_1 \cdot h_2}{h^2}$$

$\tau_{x\delta}$ = stress at projected length "h"
τ_m = shear stess quoted
h_1 h_2 = projected length at the two ends.

The frames are completely balanced in themselves as between the concentrated loads and the resulting shears.

The longerons have been considered as axially loaded members with cross sectional areas as supplied by the Duct and Engine Bays Section of the Stress Office. The Inner Longeron is considered to consist of all the elements[Bottom Longeron, Torque Box, etc,] of the actual structure that can take axial load and is located in this region.

Rib 4 areas have been calculated from verbal data supplied by the Wing Group of the Stress Office. At this date the P S 13 installation had not been sufficiently well defined to provide data in report form.

CALCULATIONS

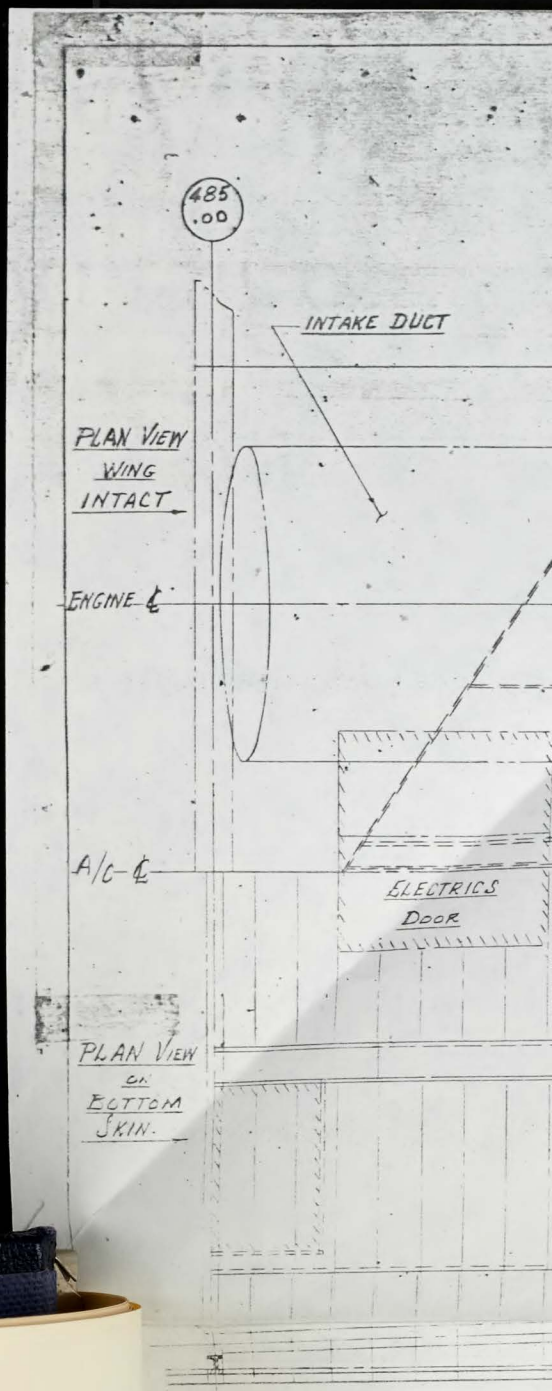
From the geometry data, the coefficients of the C_{ik}, K_{ip}, and T_{ia} matrices are calculated. These matrices are shown as "dummy" matrices on pages 2-5 and 2-6. When these matrices are completed, they are operated on, using the computor, according to Type Programme No. 1 of Avro Report GEN/1090/334.

The final results of the computor operations are quoted as the S_{ia} and Z_{ab} matrices. The S_{ia} matrix gives the stress at each stress point in kips per square inch per kip of unit applied load. The Z_{ab} matrix expresses the

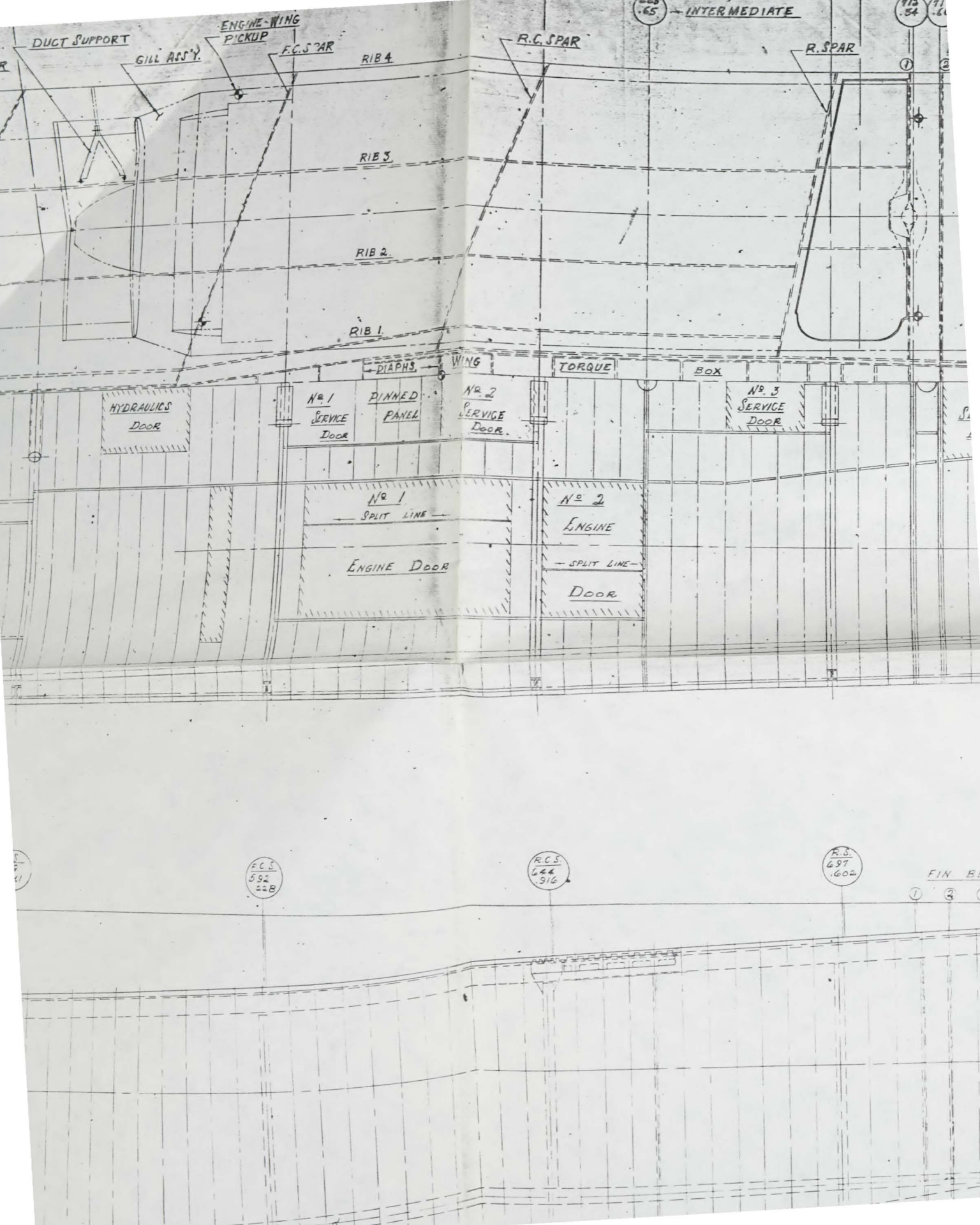
relationship between the deflection in inches at each load point due to the individual unit loads of one kip. These matrices are displayed in settions 14 and 15 of this report.

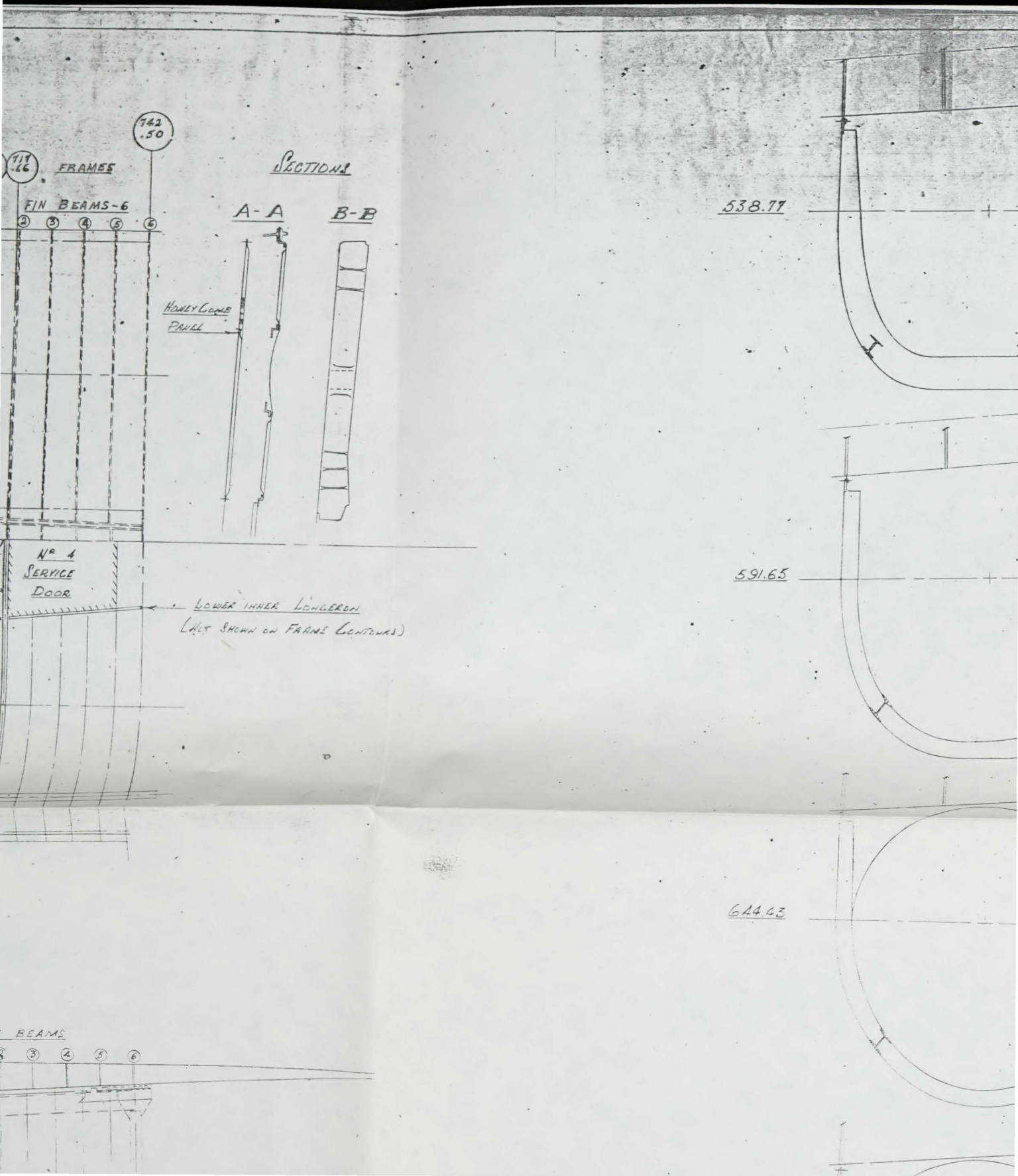
APPENDIX ONE

Since the original analysis, it has been decided to take load 14 by differential bending of fin and lower longeron rather than by twisting of the fin beam box. Appendix one makes this adjustment.

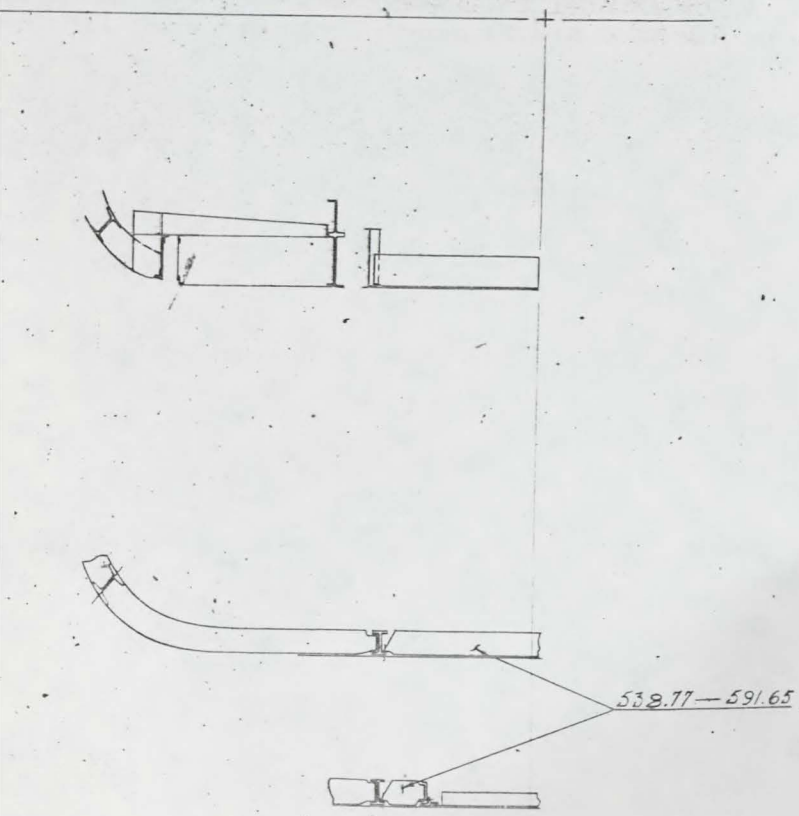

485
.00
INTAKE DUCT
PLAN VIEW
WING
INTACT
ENGINE ℄
A/C ℄
ELECTRICS
DOOR
PLAN VIEW
OF
BOTTOM
SKIN.
WING PROFILE
AT
FUSE. SIDE


PLAN VIEW
WING
INTACT
ENGINE ℄
A/C ℄
ELECTRICS
DOOR
PLAN VIEW
OF
BOTTOM
SKIN.
WING PROFILE
AT
FUSE. SIDE


INTERMEDIATE
DUCT SUPPORT
GILL ASS'Y.
ENGINE-WING PICKUP
F.C.SPAR
RIB 4
R.C. SPAR
R. SPAR
RIB 3
RIB 2
RIB 1
DIAPHS.
WING
TORQUE
BOX
HYDRAULICS DOOR
No 1 SERVICE DOOR
PINNED PANEL
No 2 SERVICE DOOR
No 3 SERVICE DOOR
No 1 SPLIT LINE
ENGINE DOOR
No 2 ENGINE SPLIT LINE DOOR
F.C.S. 592 228
F.C.S. 644 316
R.S. 697 602


742
.50
717
.66
FRAMES
FIN BEAMS-6
2
3
4
5
6
SECTIONS
A-A
B-B
HONEY COMB
PANEL
Nº 1
SERVICE
DOOR
LOWER INNER LONGERON
(NOT SHOWN ON FRAME CONTOURS)
538.77
591.65
644.43
BEAMS

ONS



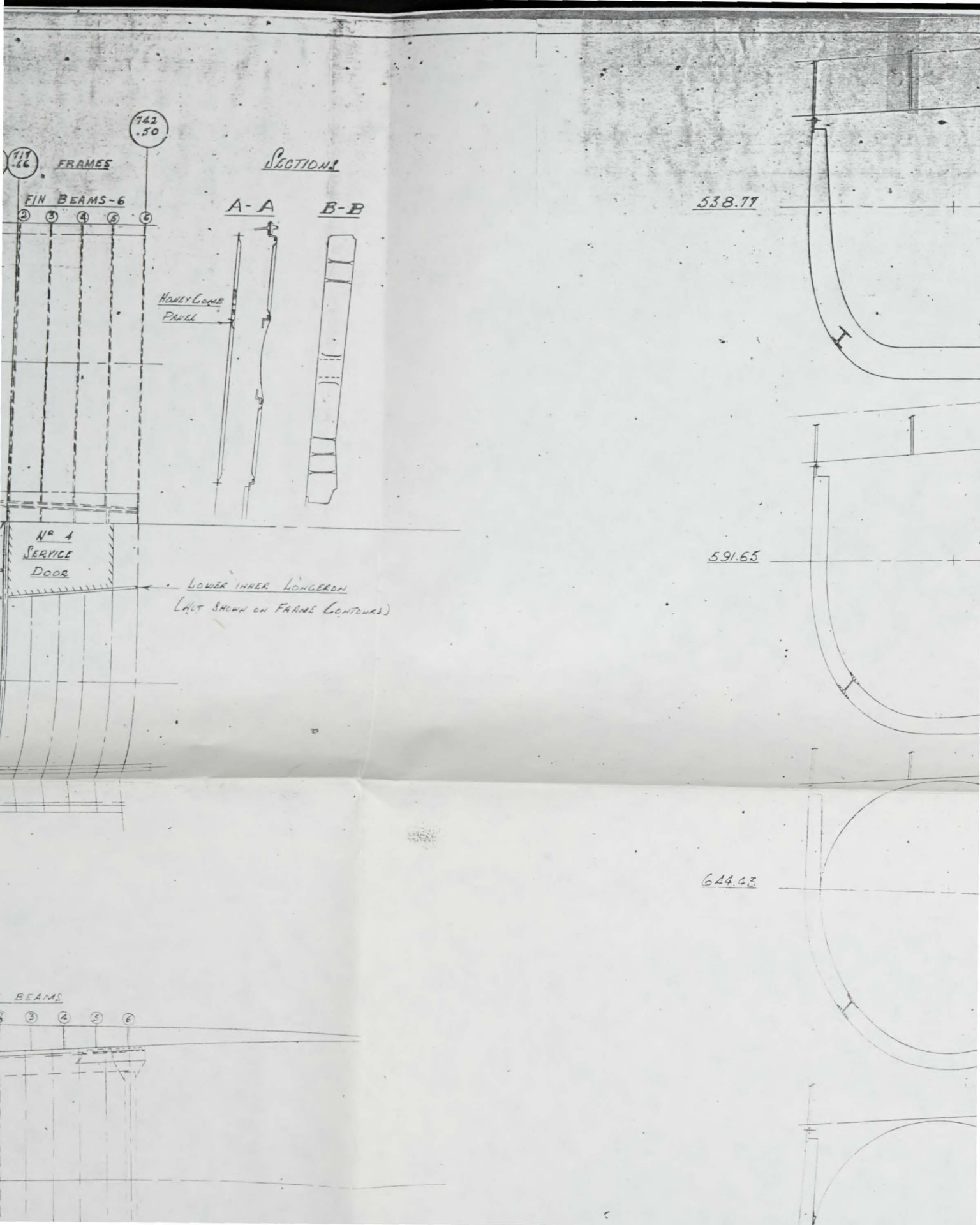
538.77 — 591.65

591.65 — 644.43

SERVICE DOOR

PANNED PANEL

663.65 — 691.28

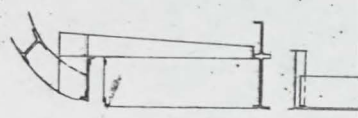

742 .50
717 .66
FRAMES
FIN BEAMS-6
2 3 4 5 6
SECTIONS
A-A
B-B
HONEY COMB PANEL
Nº 1 SERVICE DOOR
LOWER INNER LONGERON
(NOT SHOWN ON FRAME CONTOURS)
538.77
591.65
644.63
BEAMS
3 4 5 6

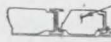
SECTIONS

538.77

591.65

644.43





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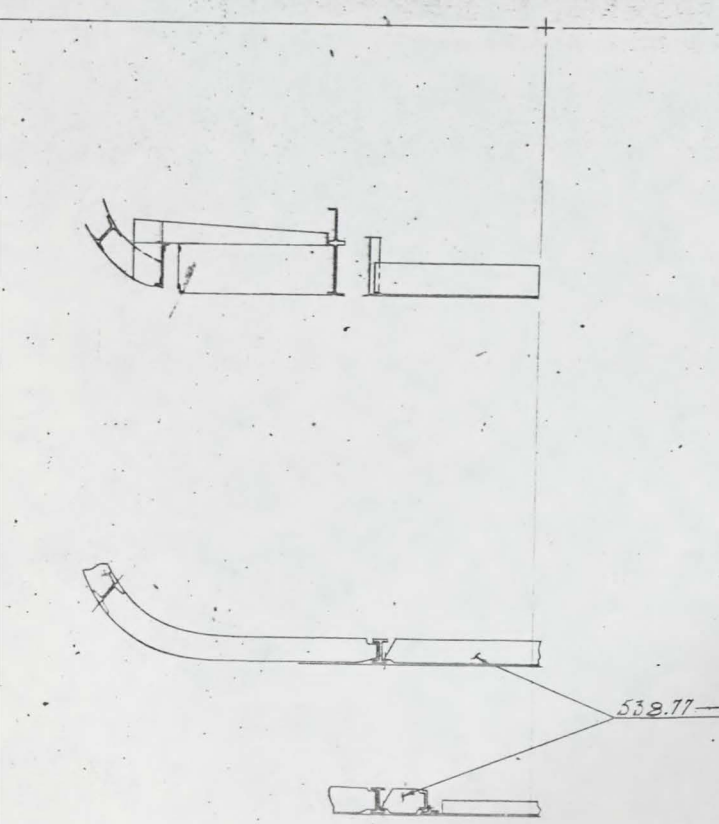
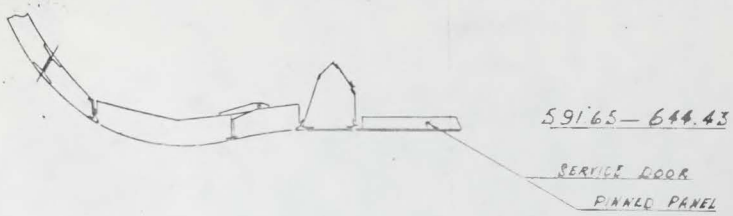
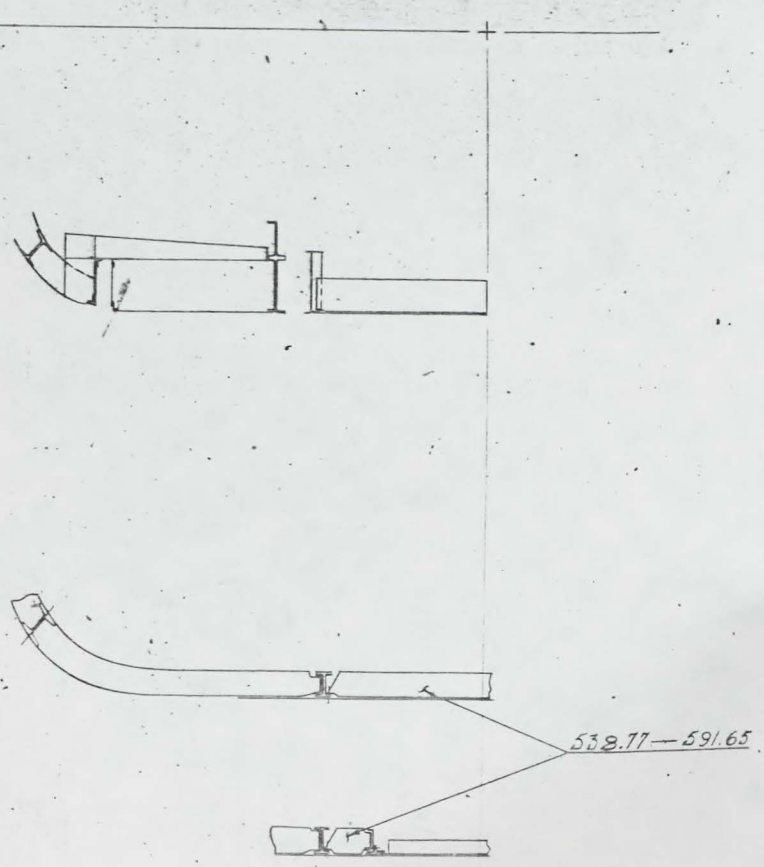
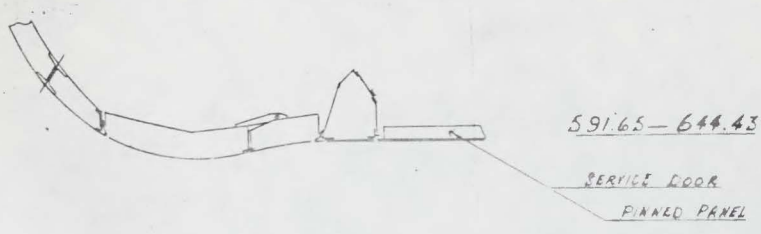

538.77 — 591.65


591.65 — 644.43
SERVICE DOOR
PANELED PANEL

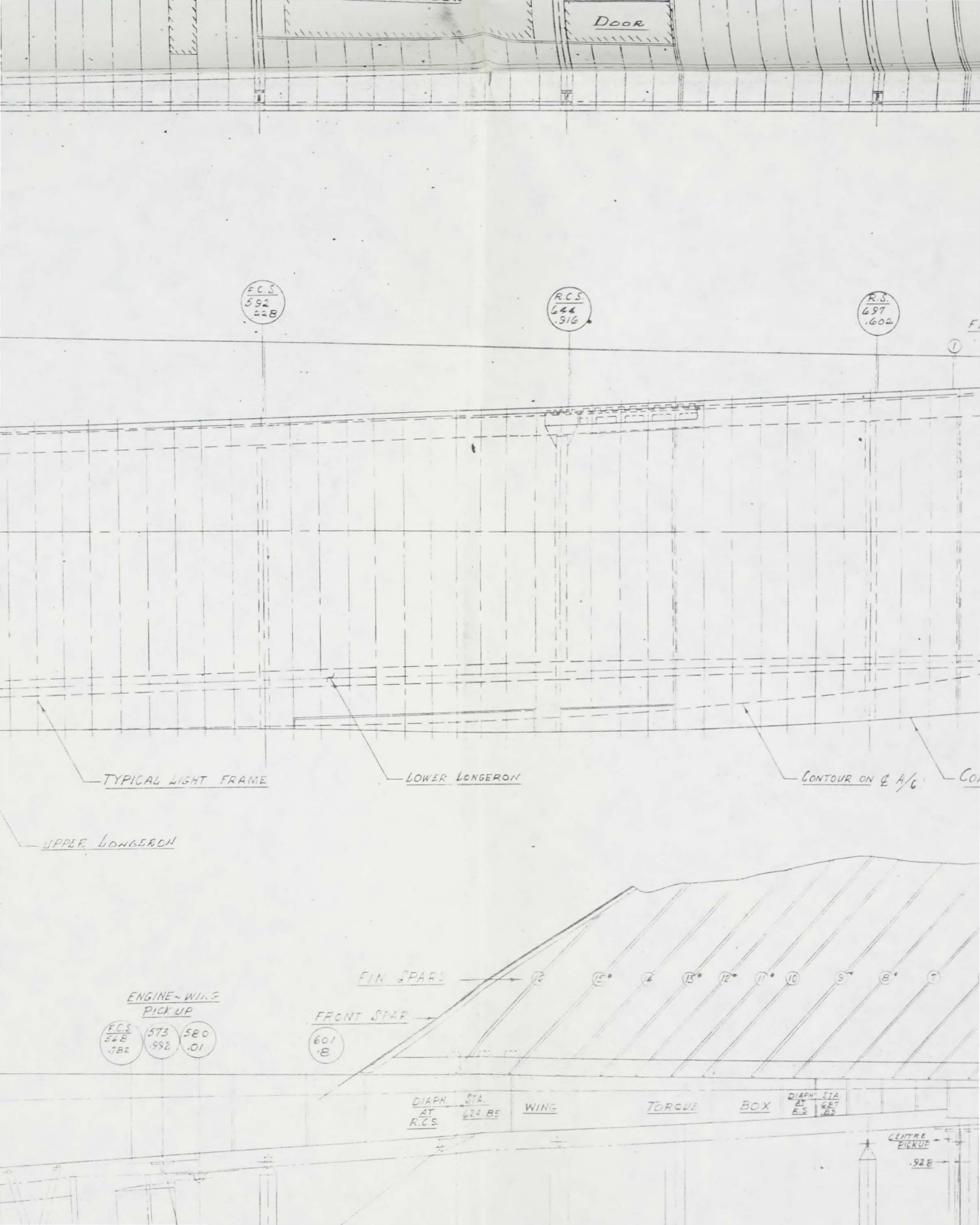

663.65 — 697.28

ONS

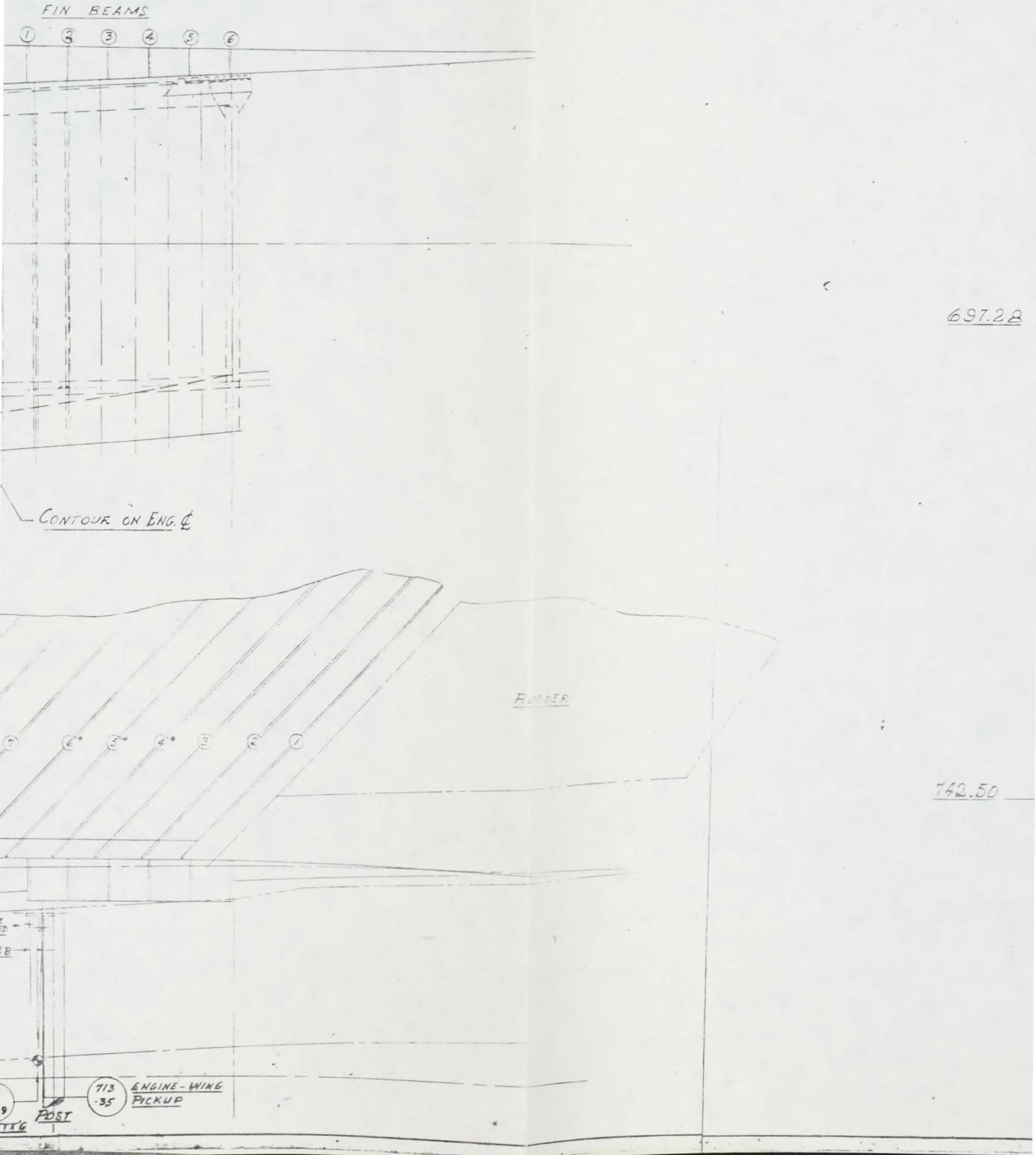

538.77 — 591.65

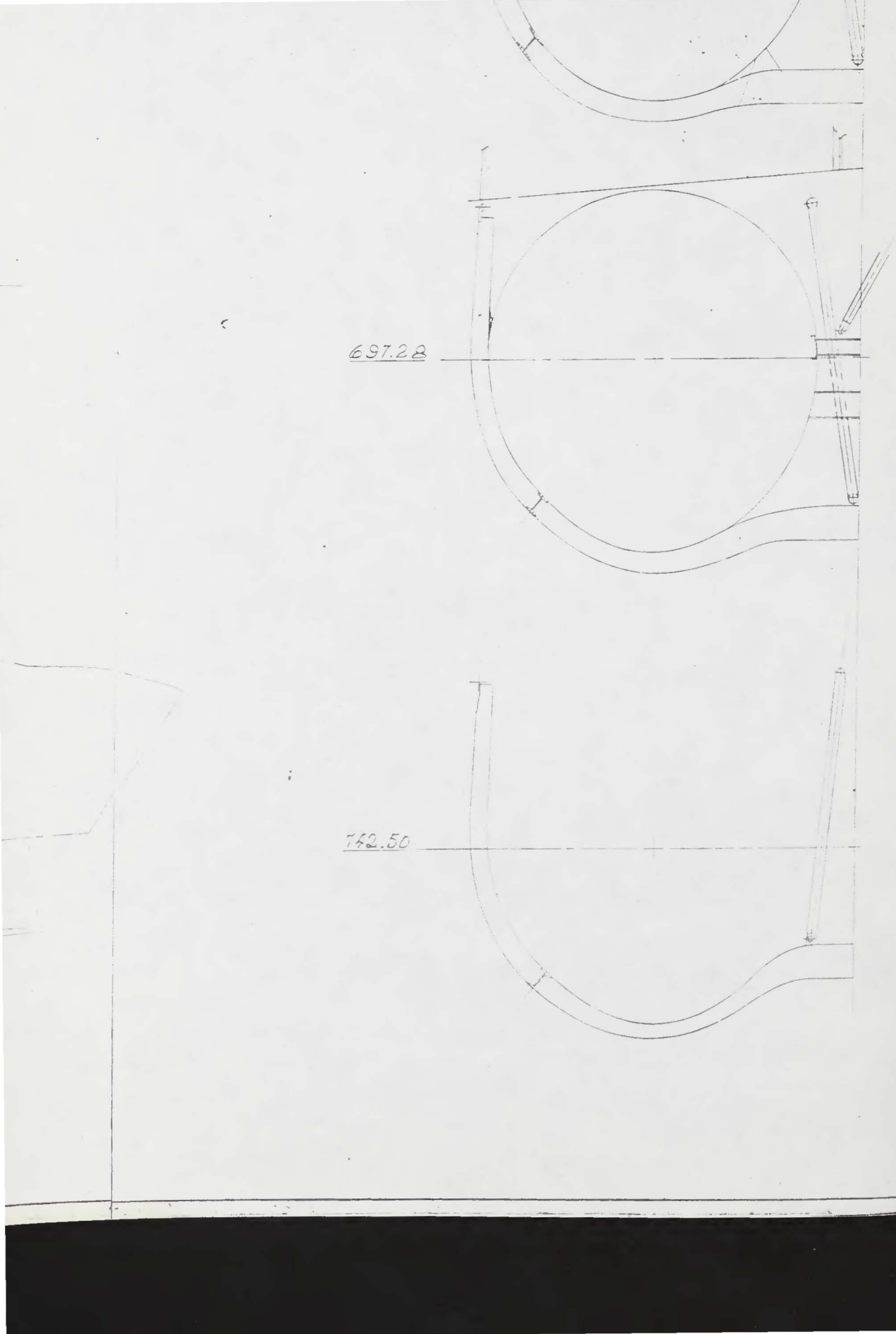

591.65 — 644.43
SERVICE DOOR
PANELD PANEL

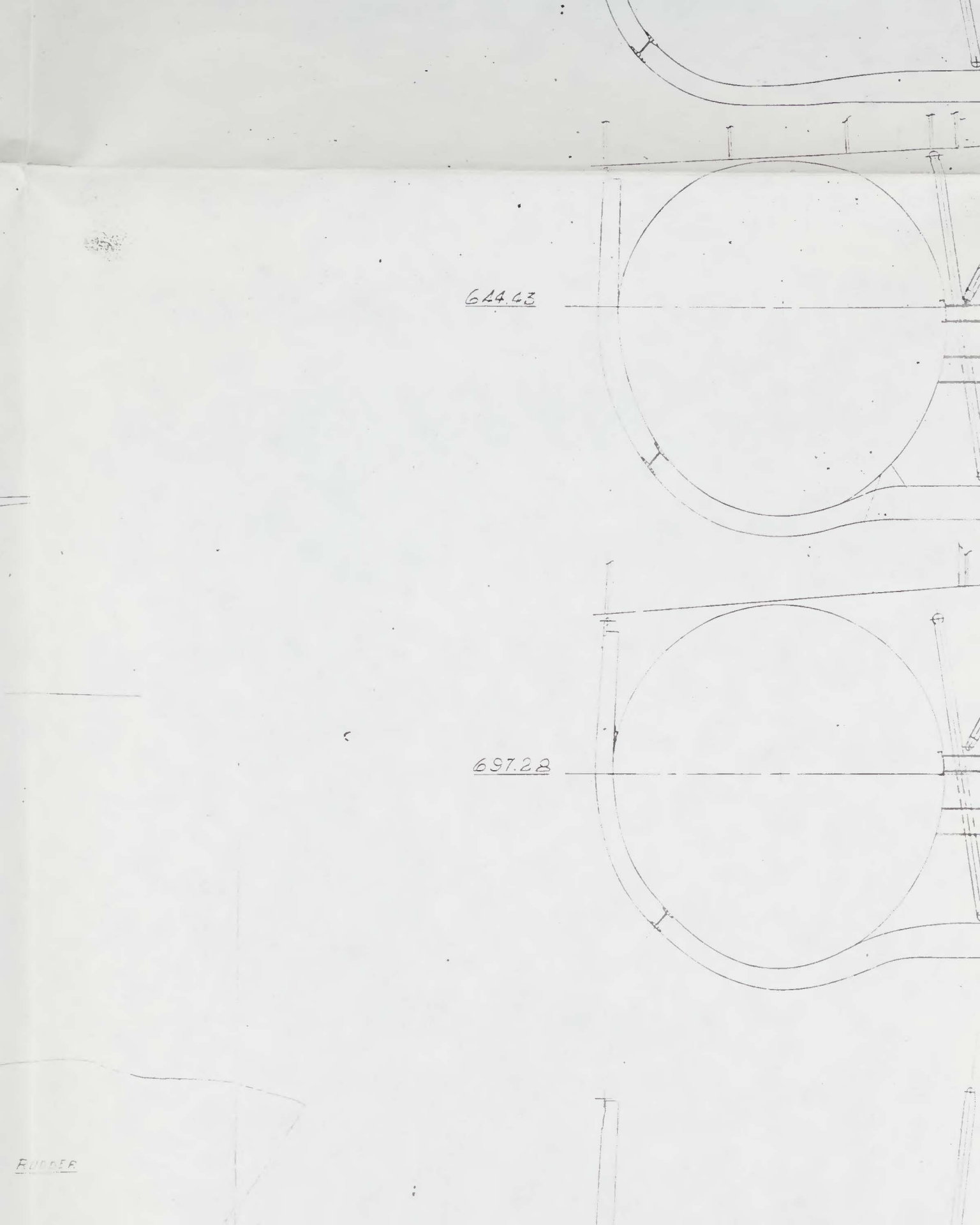

663.65 — 69728


DOOR
F.C.S. 592 228
R.C.S. 644 .916
R.S. 697 .602
TYPICAL NIGHT FRAME
LOWER LONGERON
CONTOUR ON ℄ A/C
UPPER LONGERON
FIN SPARS
FRONT SPAR
ENGINE-WING PICK UP
F.C.S. 546 .782
573 .992
580 .01
601 .8
DIAPH AT R.C.S.
STA. 624.85
WING
TORQUE
BOX
DIAPH AT R.S.
STA 697.82
CENTRE PICK UP
.928


R.C.S. 644 .916
R.S. 697 .602
FIN BEAMS
1
2
3
4
5
6
CONTOUR ON ℄ A/C
CONTOUR ON ENG. ℄
LONGERON
STA. 624.85
WING
TORQUE
BOX
DIAPH. AT R.S.
STA. 687 .82
CENTRE PICKUP
.928
624 .85
ENGINE - WING PICKUP
VEE
POST
VEE
712 .469
ENG. FTG
POST
713 .35
ENGINE - WING PICKUP


FIN BEAMS
1
2
3
4
5
6
697.28
CONTOUR ON ENG. ℄
RUDDER
7
6
5
4
3
2
1
742.50
713
·35
ENGINE - WING
PICKUP
POST


697.28
742.50


644.43
697.28
RUDDER

538.77 — 591.65

591.65 — 644.43

SERVICE DOOR

PINNED PANEL

663.65 — 697.28

717.36 — 743.5

663.65 — 697.28

717.36 — 742.5

PREPARED BY

CHECKED BY

SUPERVISED BY

DATE JULY

538.77 — 591.65

591.65 — 644.43

SERVICE DOOR
PANELED PANEL

663.65 — 691.28

717.36 — 742.5

663.65 — 691.28

717.36 — 742.5

SHEET 7-4

PREPARED BY E. AUGUSTINE J. E. ANDREWS	G/A DUCT & ENGINE BAYS
CHECKED BY	J-75 ENGINE VERSION
SUPERVISED BY	REPORT No. 7/0510/12
DATE JULY, 1956	SCALE ~ 1/10

PANEL PANEL

663.65 — 691.28

717.36 — 742.5

SHEET F-2

PREPARED BY E. AUGUSTINE J.E. ANDREWS	G/A DUCT & ENGINE BAYS.
CHECKED BY	J-75 ENGINE VERSION
SUPERVISED BY A Goodrich	REPORT No. 7/0510/12
DATE JULY, 1956	SCALE ~ 1/10

AVRO AIRCRAFT LIMITED
MALTON - ONTARIO
TECHNICAL DEPARTMENT

REPORT NO 7/0211
SHEET NO 3-5

AIRCRAFT:	
C105	Duct & Engine

PREPARED BY	DATE
GB	May '56
CHECKED BY	DATE

Skin Thicknesses

For P.S. 13 Installation

Ref. Dwg 7-0153-50 Sht 2 " Aft of 697 ~~is~~ Side Skin Thickness

.064 - Possibly Reduced Between 735" & 742 - Fwd

of 697" - Side Skin Thickness as for J75 A/c

Bottom Skins as for J75 A/c.

For J75 Installation

Side: .051"-485" To 697" except between Upper & Lower

Longerons where it is .102

Bottom .032

* According to K Weights - No reduction, use .064

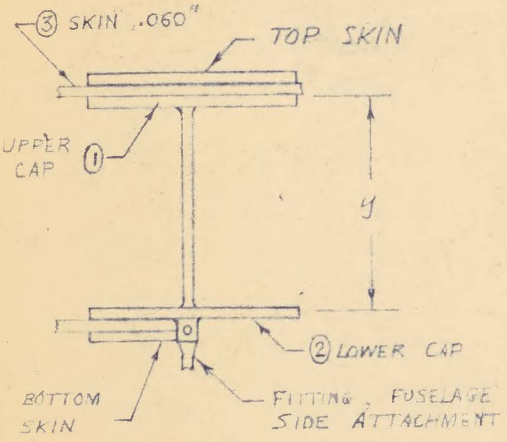
RM 1318A

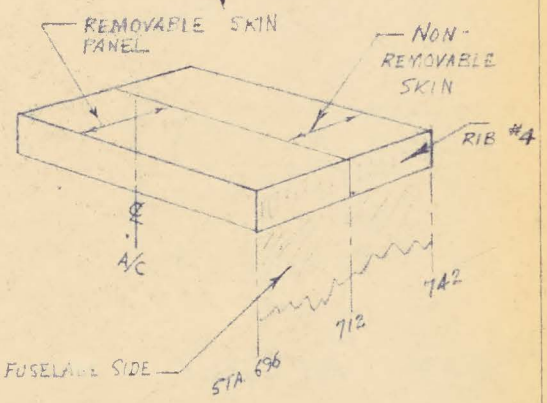
AVRO AIRCRAFT LIMITED
MALTON · ONTARIO
TECHNICAL DEPARTMENT

REPORT NO. 7-0510-12
SHEET NO. 3 of 5

AIRCRAFT		PREPARED BY	DATE
C 105	DUCT & ENGINE BAY	J. E. ANDREWS	JUNE '56
		CHECKED BY	DATE
		P.	

RIB #4 SECTION PROPERTIES





ASSUMPTIONS:

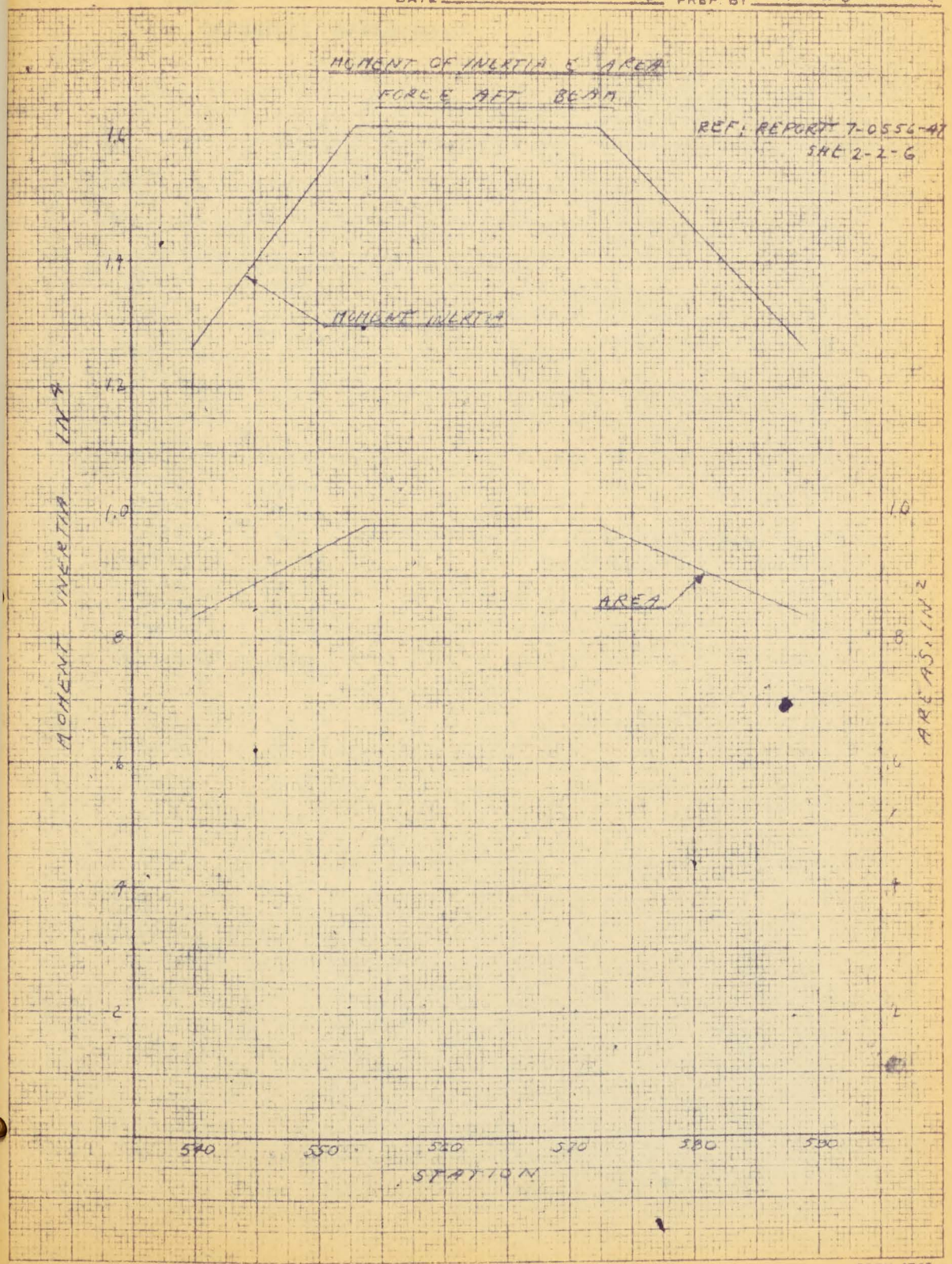
1) SKIN AREA OF TOP HAS A 2-INCH WIDTH OF 0.060 IN. THICKNESS; SKIN AREA OF BOTTOM HAS A 1 INCH WIDTH OF 0.060 IN. THICKNESS.
2) AREA LOCALLY AT STATION 696 IS COMPOSED OF STEEL SPLICE STRAPS WITH AN EQUIVALENT AREA OF 0.849 INS.^{2} ASSUMED ACTUAL CONTOUR WITH REMAINDER OF ITEM ① AT 0.225 SQ. INS.
3) REFERENCE: P. MacKENZIE

STA.	ITEM	A	y	Ay	Ay^2	$\bar{y} = \frac{\Sigma Ay}{\Sigma A}$	$I = Ay^2 - \bar{y}\Sigma Ay$	$A_B^* = \frac{4I}{h^2}$
696	T.S.	.120	6.5	.780	5.070		14.576	
	1	.225	6.5	1.463	9.506		−5.006	.906 "
	2	.600	0	0	0			
	B.S.	.060	0	0	0			
	Σ	1.005 "	13.0	2.243	14.576	2.232	9.570 "	
712	T.S	.120	5.2	.624	3.245			
	1	.225	5.2	1.165	6.084		9.329	
	2	.810	0	0	0		−2.633	.991 "
	B.S.	.060	0	0	0			
	Σ	1.215 "	10.4	1.789	9.329	1.472	6.696 "	
742	T.S.	.120	3.5	.420	1.470		4.226	
	1	.225	3.5	.788	2.756		−1.668	.835 "
	2	.470	0	0	0			
	B.S.	.060	0	0	0			
	Σ	.875 "	7.0	1.208	4.226	1.381	2.558 "	

* A_B (BENDING AREA) IS THE TOTAL AREA LOCATED AT THE OUTER FIBRE OF THE RIB SUCH THAT $A_B \times (\frac{h}{2})^2 = I$

AFT C105 COMPONENT FORE & AFT BEAM SHEET NO 7-0 REPORT NO: 7-0556-47

DATE JUNE 4 -56 PREP. BY R. BOUCHER



FORM 1746

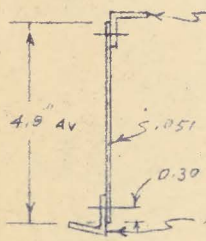
AVRO AIRCRAFT LIMITED
MALTON - ONTARIO
TECHNICAL DEPARTMENT

REPORT No. 2/0512/12
SHEET No. 3-11

AIRCRAFT:		PREPARED BY	DATE
C 105		L Gundason	JUNE 56
		CHECKED BY	DATE

SECTION AREAS OF DIVE BRAKE BEAMS

DIVE BRAKE BEAM OUTB'D DWG 7-1056-751



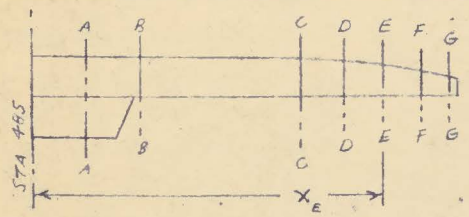
5 ANGLE 0.9 x 0.9 x .125
AREA = 0.21 "²

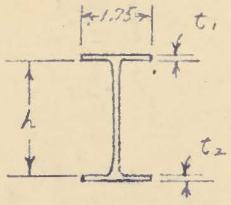
AREA OF WEB ALLOWING FOR BUCKLING = (30 x .051 + 0.6).051
= 0.11 "²

5 ANGLE 1.0 x 1.0 x 0.110
AREA = 0.21 "²

TOTAL AREA = 0.53 "²

JACK BEAM - DIVE BRAKE DWG 7-1056-797





SEC	AREA UPPER CAP	AREA LOWER CAP	AREA EXTRA CAP	AREA WEB	X	TOTAL AREA
AA	1.75 x .225	1.75 x .275	1.25 x .2	0.1 x 7.8	7.4	2.20
BB	1.75 x .35	1.75 x .45		0.1 x 3.7	14.67	1.77
CC	1.75 x .35	1.75 x .45		0.1 x 3.7	34.27	1.77
DD	1.75 x .35	1.75 x .40		0.1 x 3.13	39.17	1.62
EE	1.75 x .27	1.75 x .29		0.1 x 2.58	44.07	1.24
FF	1.75 x .20	1.75 x .20		0.1 x 2.00	48.91	0.90
GG	1.75 x .10	1.75 x .15		0.1 x 1.66	52.	0.60

JACK BEAM - DIVE BRAKE DWG 7-1056-793

AREA AT ENDS = 1.83 x 0.1 x 2 + 5.7 x .1 = 0.936 "²

AREA AT (X = 34 & X = 39) = 1.83 x (.25 + .18) + 5.5 x .1 = 1.34 "²

FORM 1319A

AVRO AIRCRAFT LIMITED
MALTON ONTARIO
TECHNICAL DEPARTMENT

REPORT No. 7/0510/13
SHEET No. 4-10

AIRCRAFT	DUST & ENGINE BAY
C-105	ANALYSIS

PREPARED BY	DATE
E. ANGASTHE	4/JUNE/56
CHECKED BY	DATE

ENERGY CALCULATIONS — IDENTICAL WITH THOSE FOR HEAVY FRAMES. SECTION PROPERTIES USED ARE OBTAINED BY FACTORING GUESSED PROPERTIES (REF. PG. 7-4 FLWG.) BY FACTORS EQUAL TO NUMBER OF LIGHT FRAMES ASSUMED EFFECTIVE (REF. SHEET 4-7).

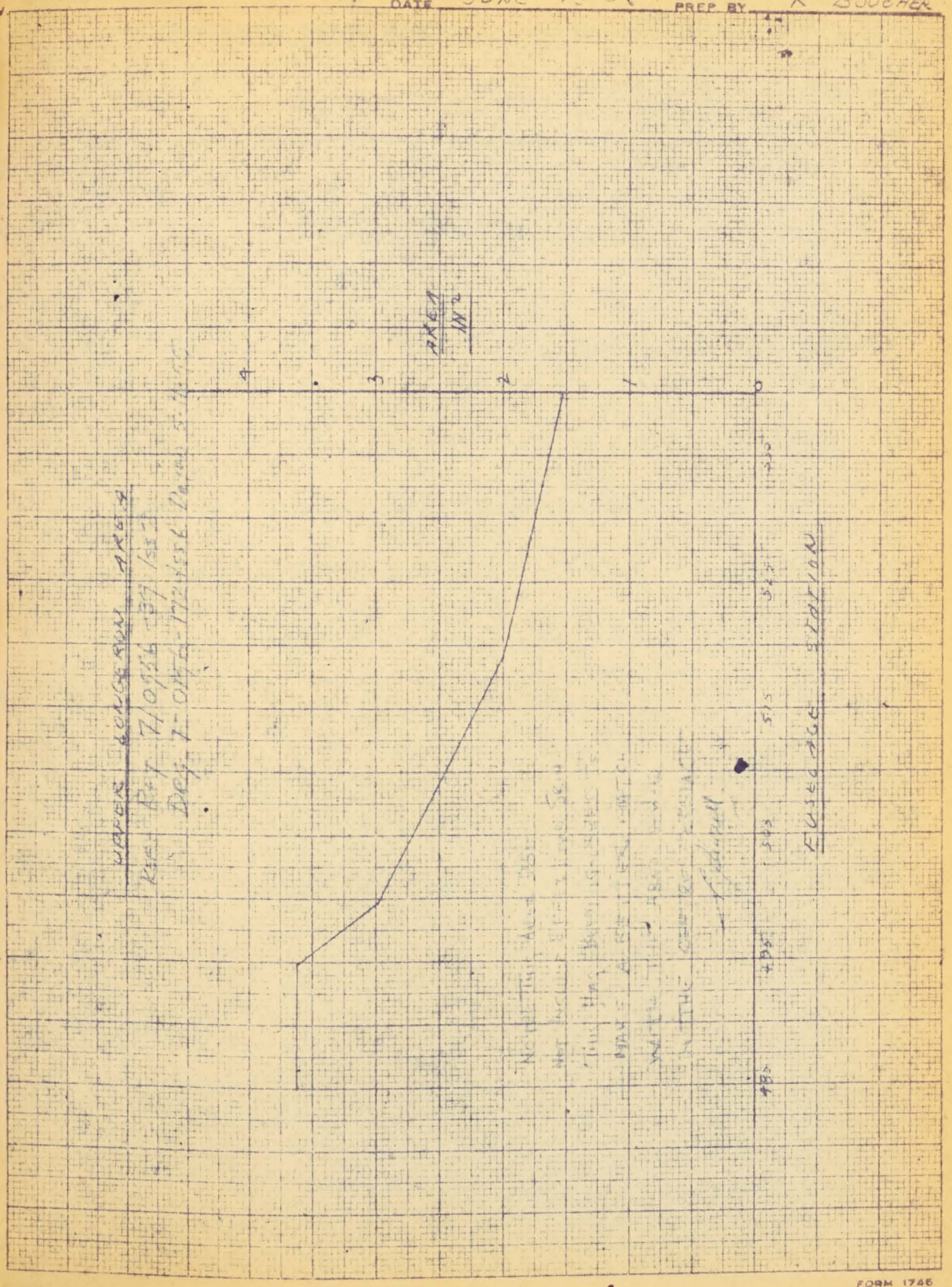
d_{33} IS CALCULATED FOR SMEARED LIGHT FRAMES AT THE 5 LOCATIONS (REF. SHEET)

$$d_{33} = \overline{T_{3i}} \cdot C_{ik} \cdot T_{i3}$$

THE VALUES d_{33} SO CALCULATED (EXCLUDING THE ONE FOR STATION 712.34) ARE COMBINED WITH THE MAIN FRAME GUESS MATRIX T_{MM} TO GIVE THE CORRECTED GUESS MATRIX T_{MM}^*. (REFERENCE PROGRAM SHEET).

FORM 13194

CRAFT C 105 COMPONENT UPPER LONGERON SHEET NO 3-13 REPORT NO 7105/12
W DATE JUNE 12-56 PREP BY R BOUCHER



FORM 1746

AVRO AIRCRAFT LIMITED
MALTON · ONTARIO
TECHNICAL DEPARTMENT

REPORT No. 7/0510/12
SHEET No 4-5

AIRCRAFT:		PREPARED BY	DATE
C-105	DUCT & ENGINE BAY ARRANGEMENT	E. ANDERSON	14/FEB/56
		CHECKED BY	DATE

C_{IA} - CONSTANTS ARE CALCULATED FROM THE ASSISTANCE FORMULA INDICATED BELOW.

$\Delta S_{(1,2)}$ (TYP)

M_1 I_1 [(1,2)] M_2 I_2 [(2,3)] M_3 I_3 [(3,4)]

$C_{IA} = \frac{1}{2A}$ (MOMENT)

	M_1	M_2	M_3
M_1		$\frac{\Delta S_{12}}{2 I_{12}}$	
M_2	$\frac{\Delta S_{12}}{2 I_{12}}$	$\frac{1}{I_2}(\Delta S_{12} + \Delta S_{23})$	$\frac{\Delta S_{23}}{2 I_{23}}$
M_3		$\frac{\Delta S_{23}}{2 I_{23}}$	

$I_{(1,2)} = \frac{I_1 + I_2}{2}$ (MEAN I BETWEEN STATIONS)

S_1 A_1 [(1,2)] S_2 A_2 [(2,3)] S_3 A_3 [(3,4)]

$C_{IA} = \frac{1}{2A}$ (DUCT AREA)

	S_1	S_2	S_3
S_1		$\frac{\Delta S_{12}}{2 A_{12}}$	
S_2	$\frac{\Delta S_{12}}{2 A_{12}}$	$\frac{1}{A_2}(\Delta S_{12} + \Delta S_{23})$	$\frac{\Delta S_{23}}{2 A_{23}}$
S_3		$\frac{\Delta S_{23}}{2 A_{23}}$	

$A_{(1,2)} = \frac{A_1 + A_2}{2}$ (MEAN A BETWEEN STATIONS)

AVRO AIRCRAFT LIMITED
MALTON · ONTARIO
TECHNICAL DEPARTMENT

REPORT No 7/650/13
SHEET No 4-8

AIRCRAFT		PREPARED BY	DATE
C-105	DUCT & ENGINE BAY ANALYSIS.	E. BUCKSTONE	11/JUNE/53
		CHECKED BY	DATE

T 1a CALCULATIONS —

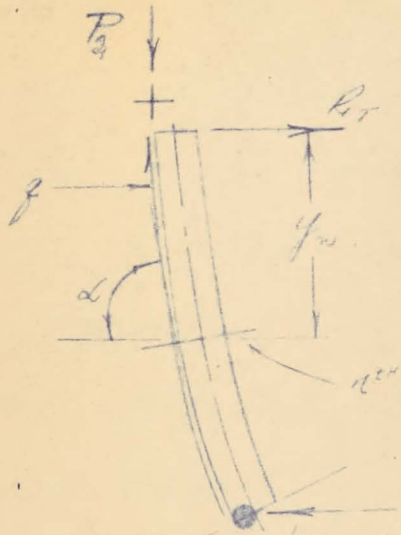
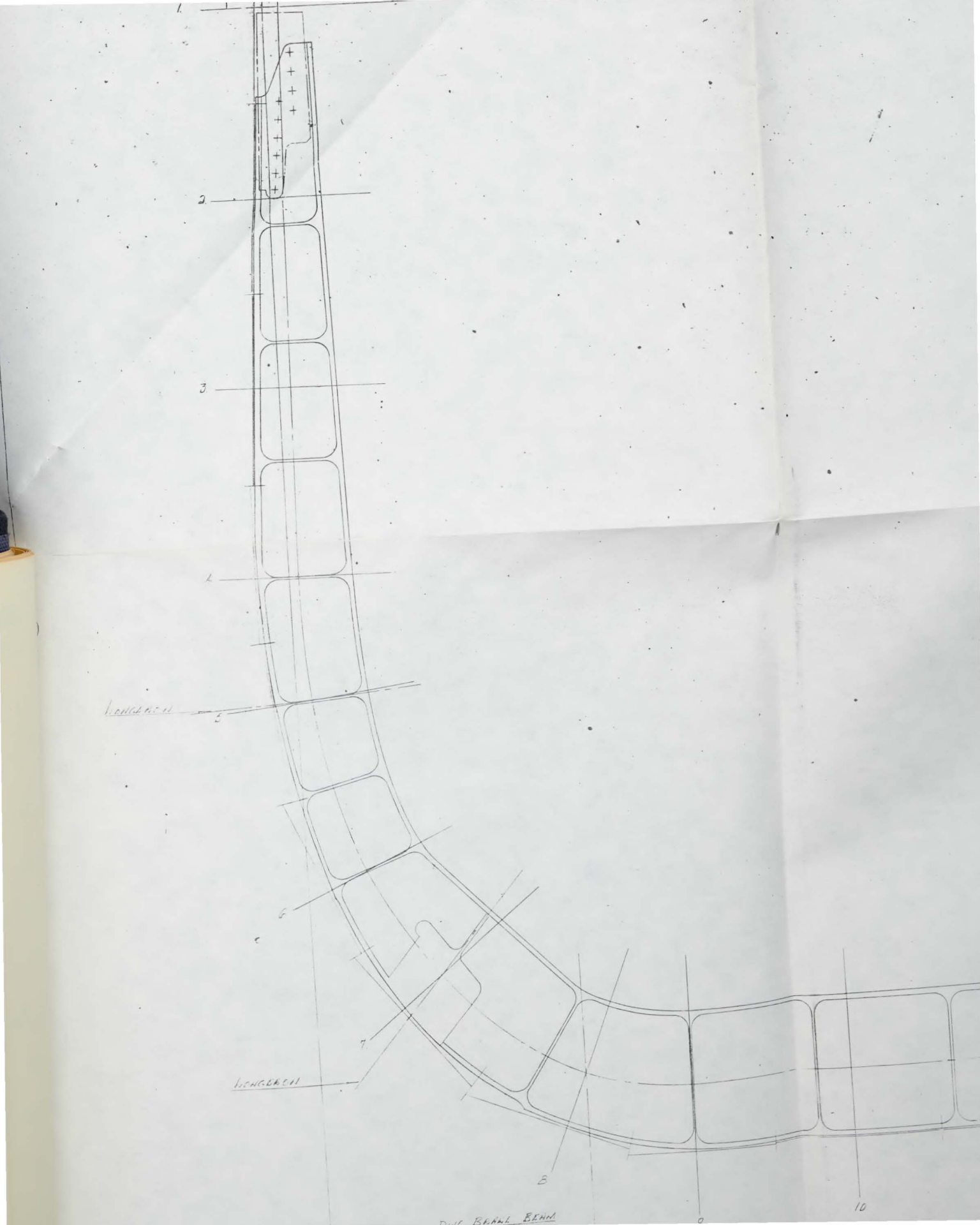


FIG. 4

THE CUT DIFFERENCE BETWEEN THE LOADING ON A LIGHT FRAME - AS INDICATED IN FIG. 4 ABOVE - & THAT ON A HEAVY FRAME IS THAT OF MAINTAINING EQUIL-IBRIUM - & CALCULATING BEING MAINTAINED IN THIS CASE BY R_T & R_B RATHER THAN BY INTEGRAL FORCES AT CUT #7 AT THE LOWER JUNCTION (CUT #7 OCCURS AT JUNCTION FOR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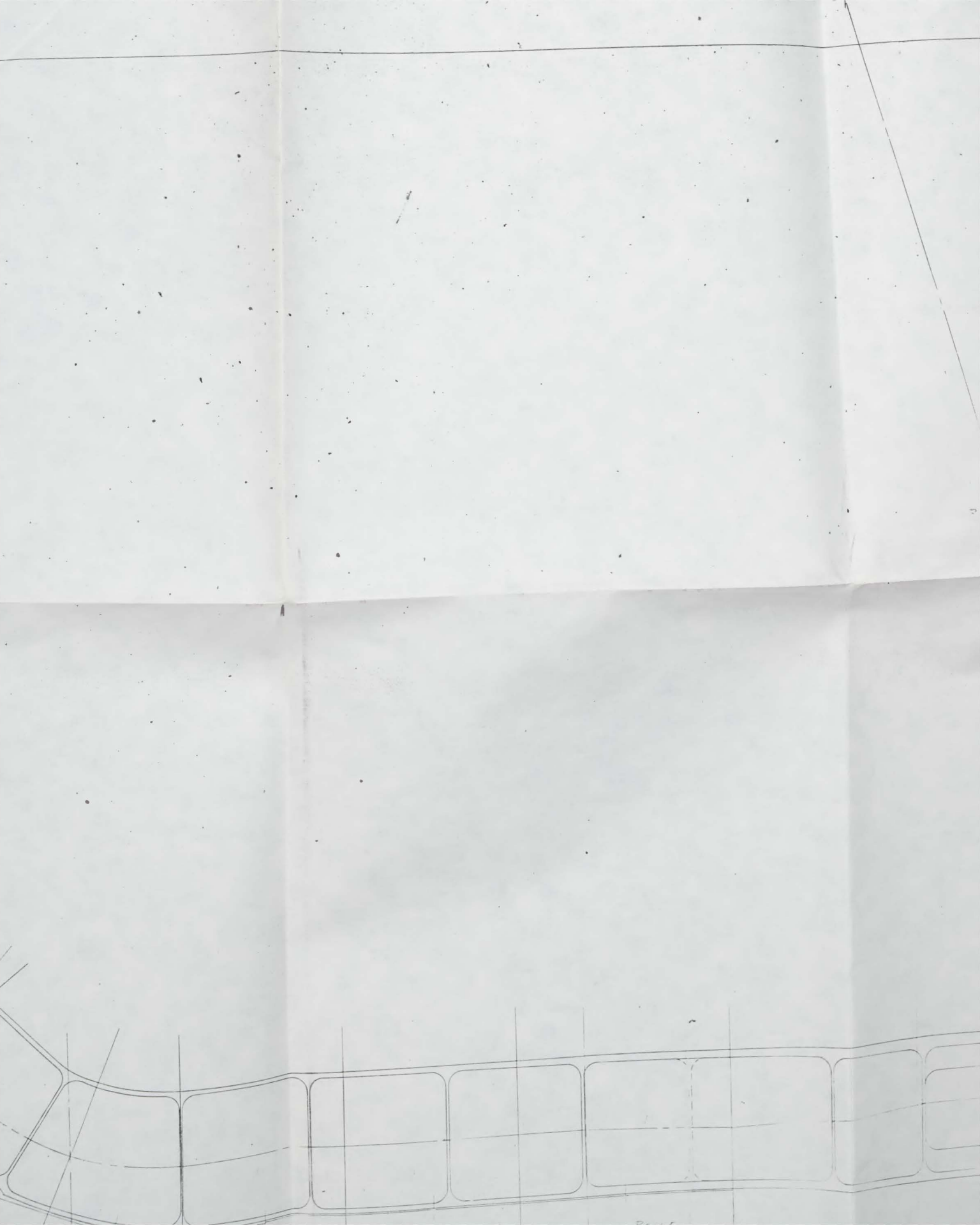

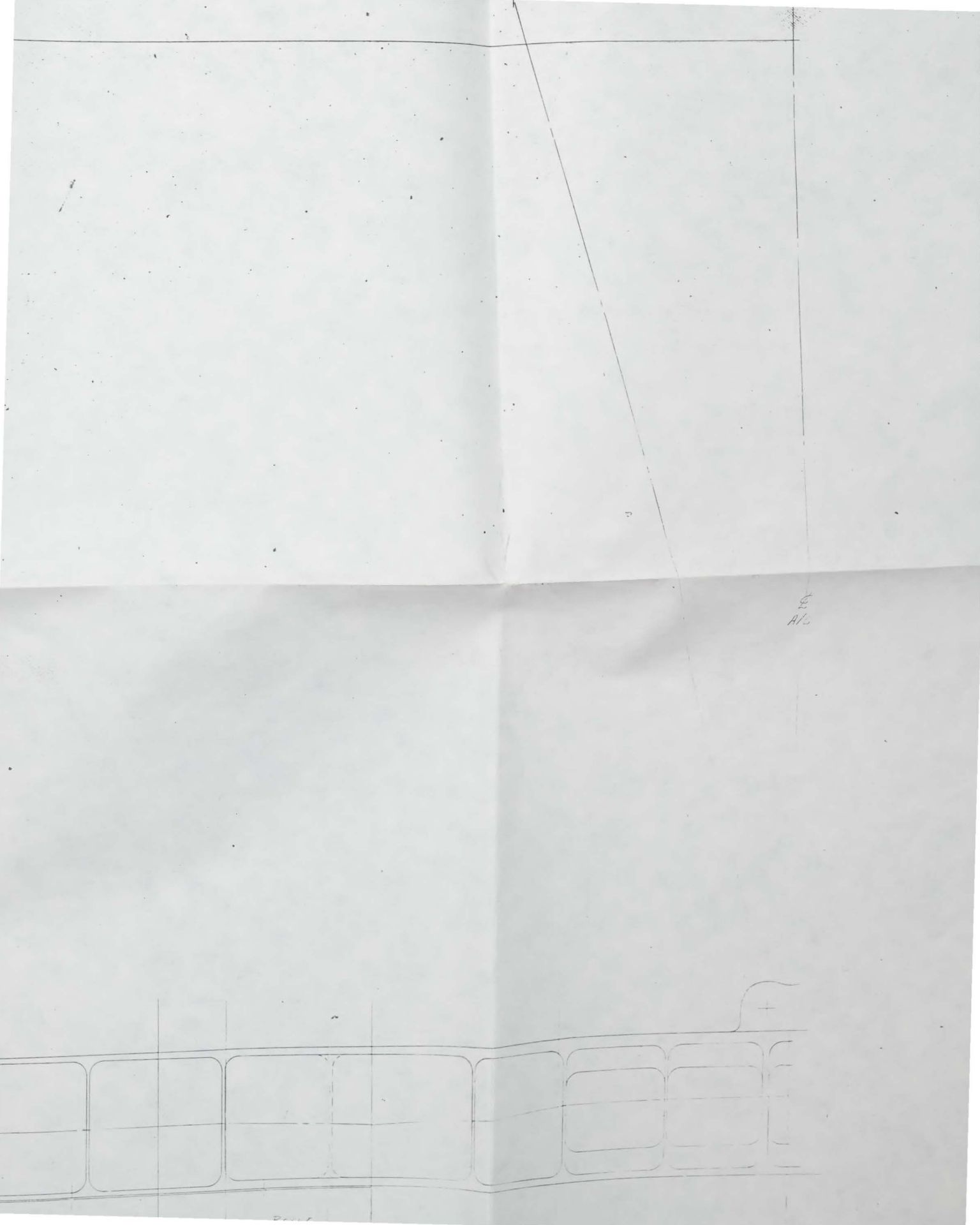

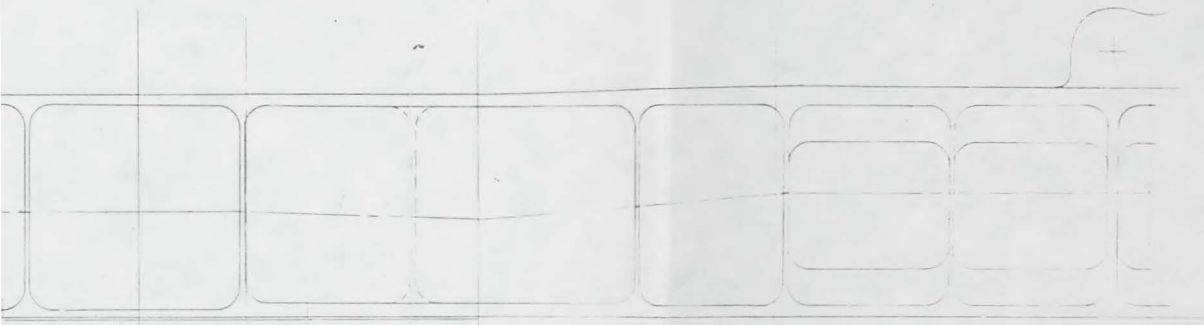
DIVE BRAKE
BEAM
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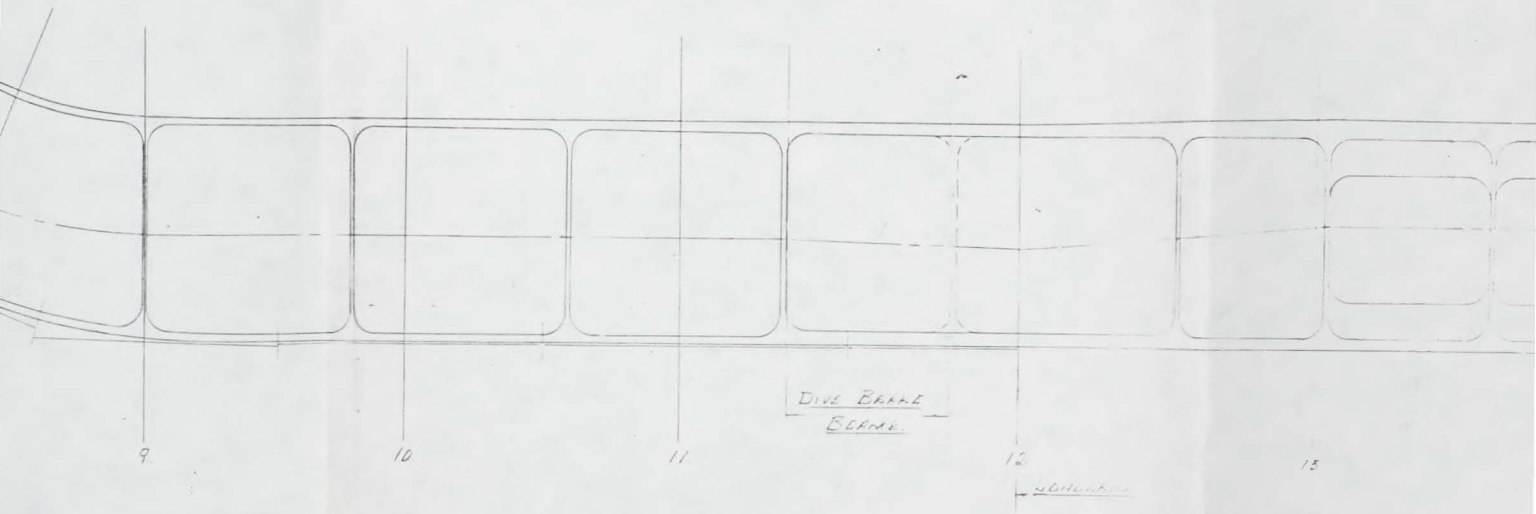
DIVE BRAKE
BEAM
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℄
AIL

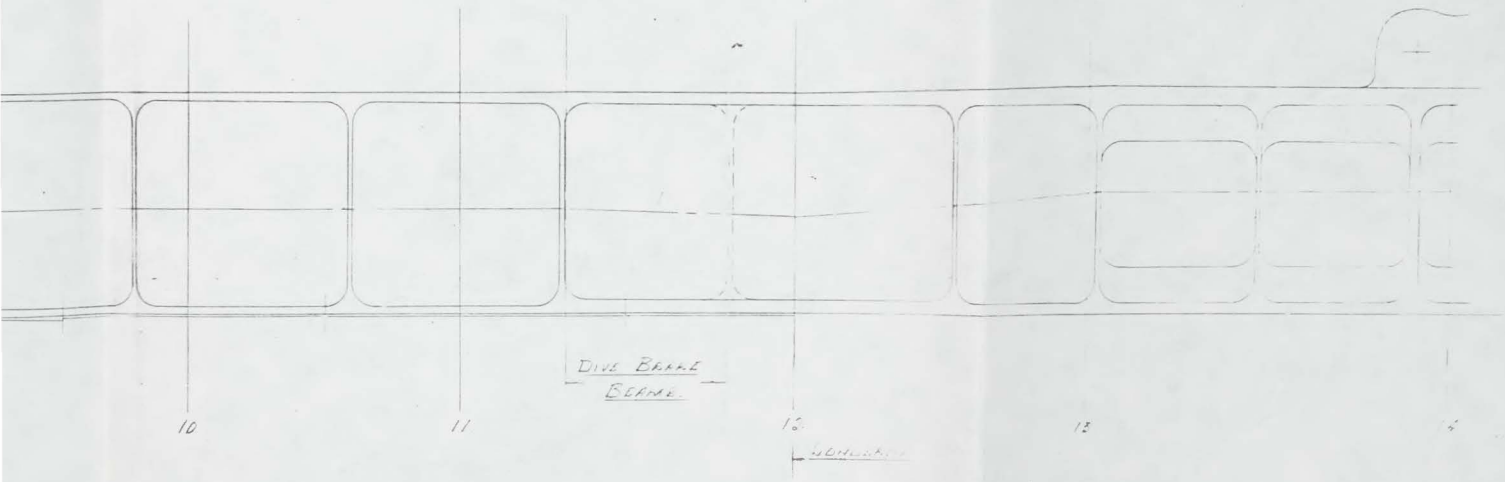
DIVE BRAKE
BEAMS

11 12 13 14

SHEET E-1

PREPARED BY - E. AUGUSTINE
CHECKED BY - [illegible]
SUPERVISED BY - [illegible]
DATE - 11/MAY/1946

[illegible]
DRAWN BY - [illegible]
TRACED BY - [illegible]
REVISED [illegible]
SCALE - 1/4
FILE DRAWING - [illegible]


DIVE BRAKE
BEAMS
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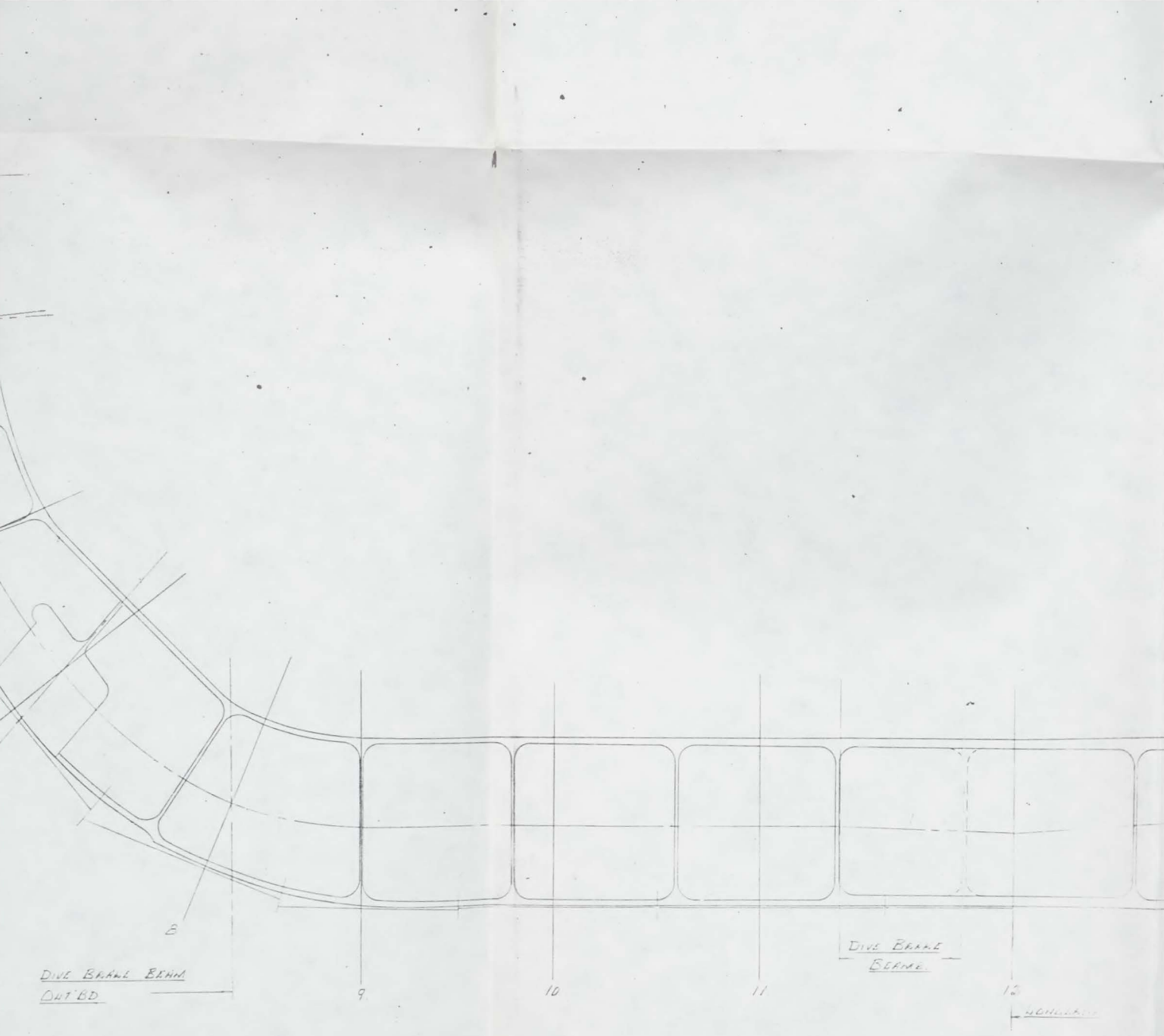
8
DIVE BRAKE BEAM OUTBD
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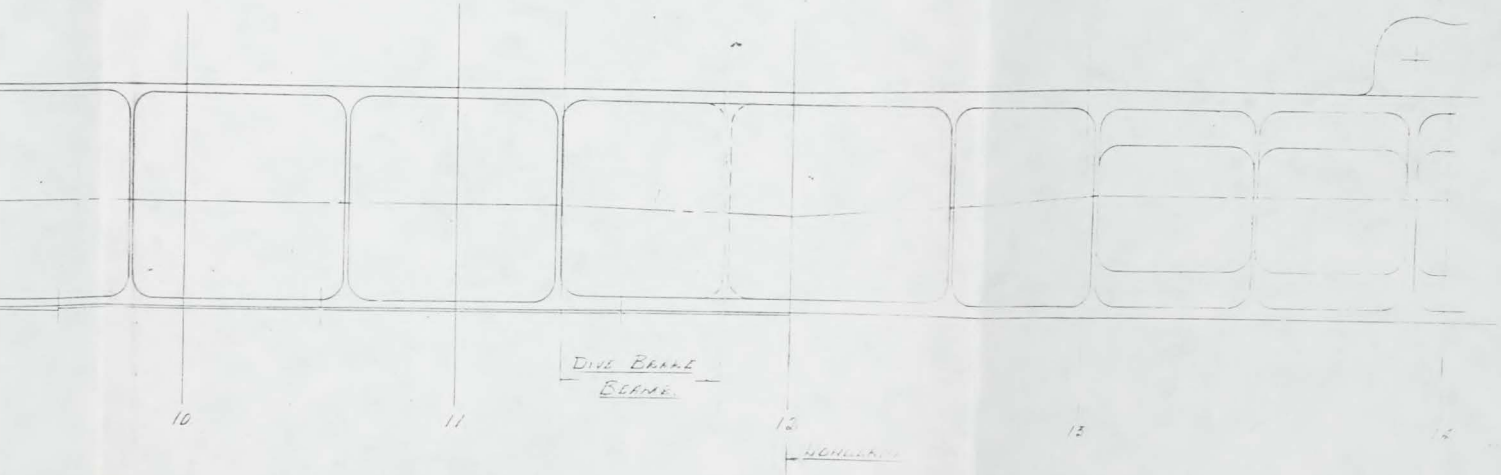
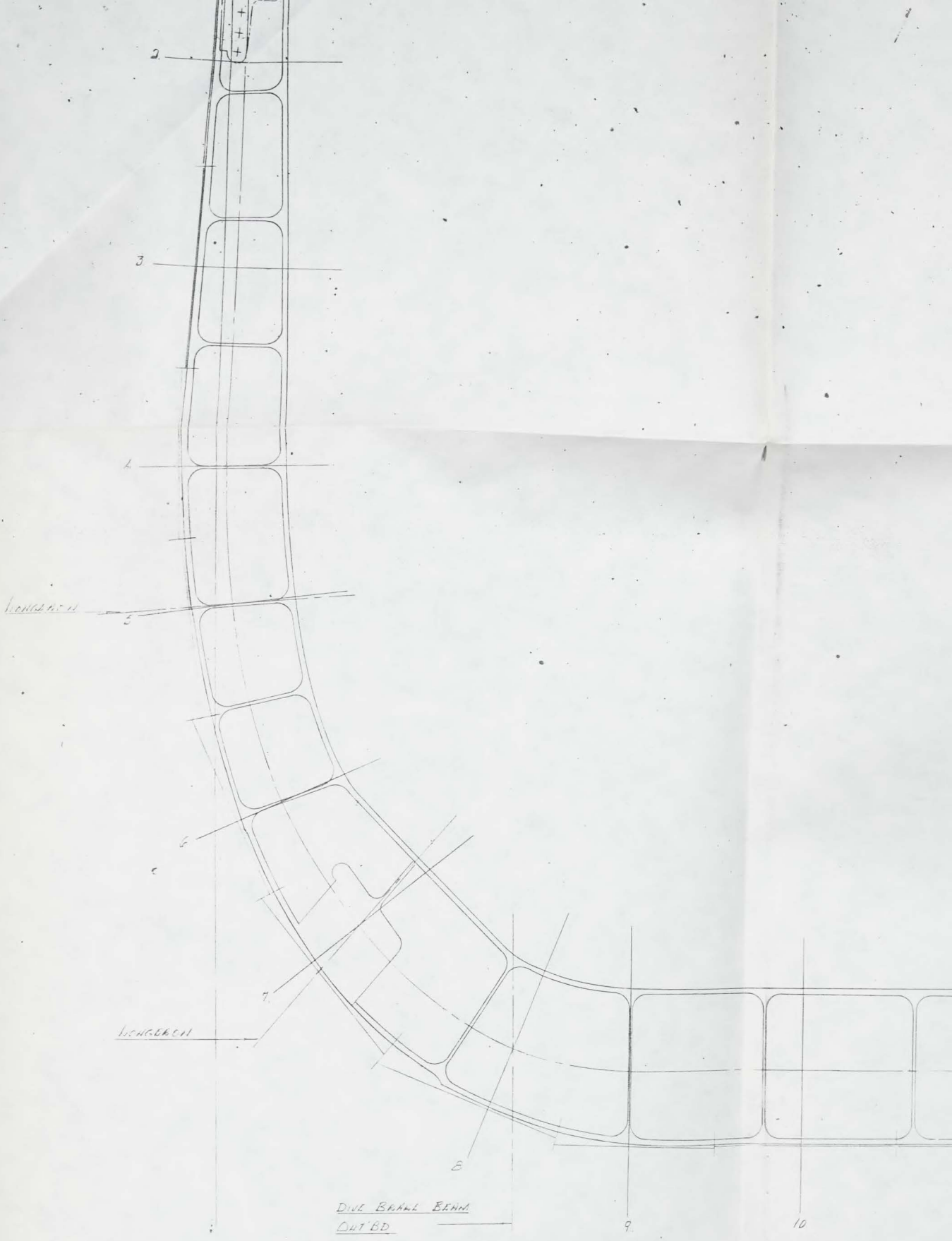
DIVE BRAKE BEAMS



PREPARED BY - E. HUGHES
CHECKED BY -
SUPERVISED BY -
DATE - 11/MAY/1956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LONGITUDINAL
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DIVE BRAKE BEAM
OUTBD
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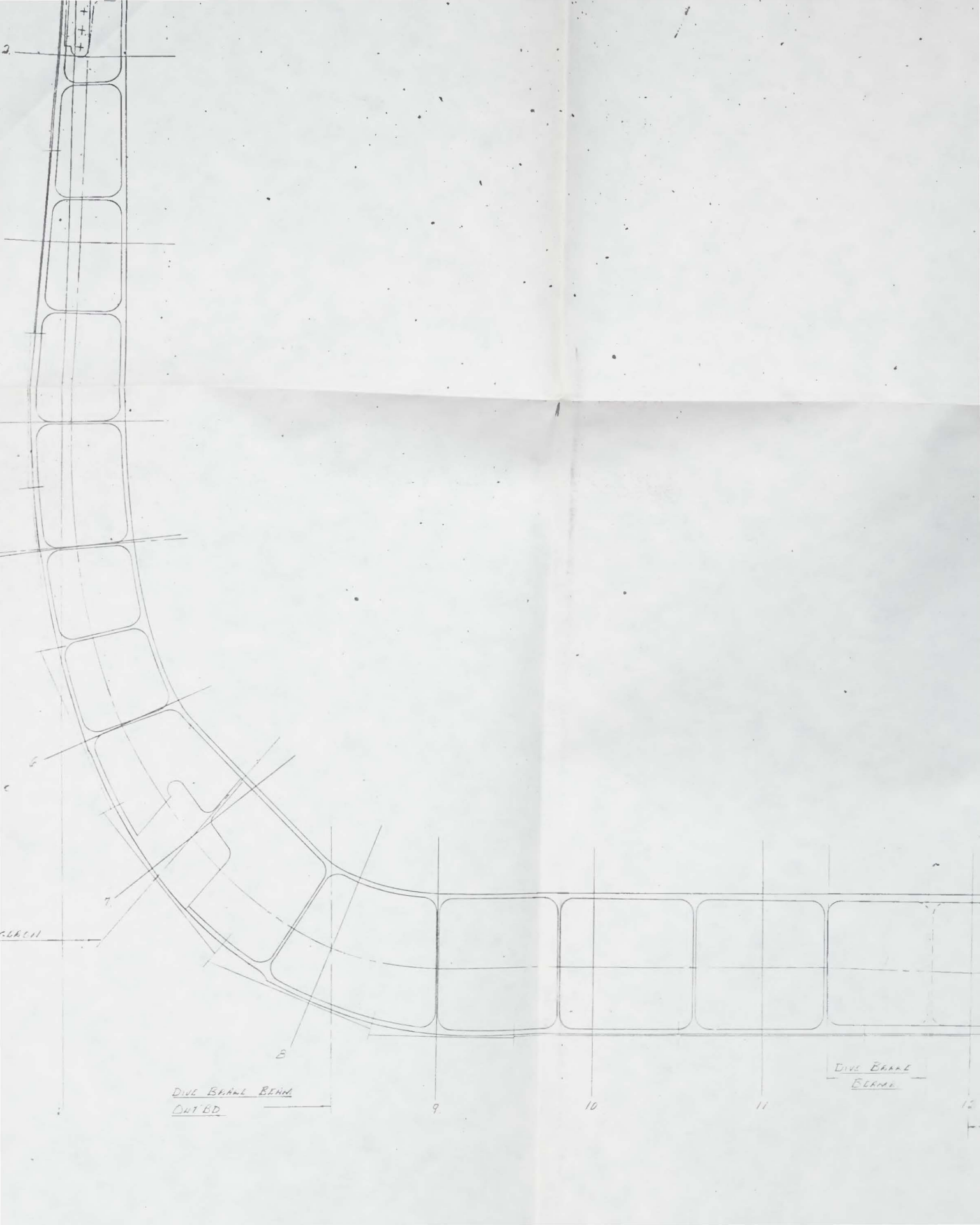
DIVE BEAM BEHIND OUTBD
DIVE BEAM BEHIND
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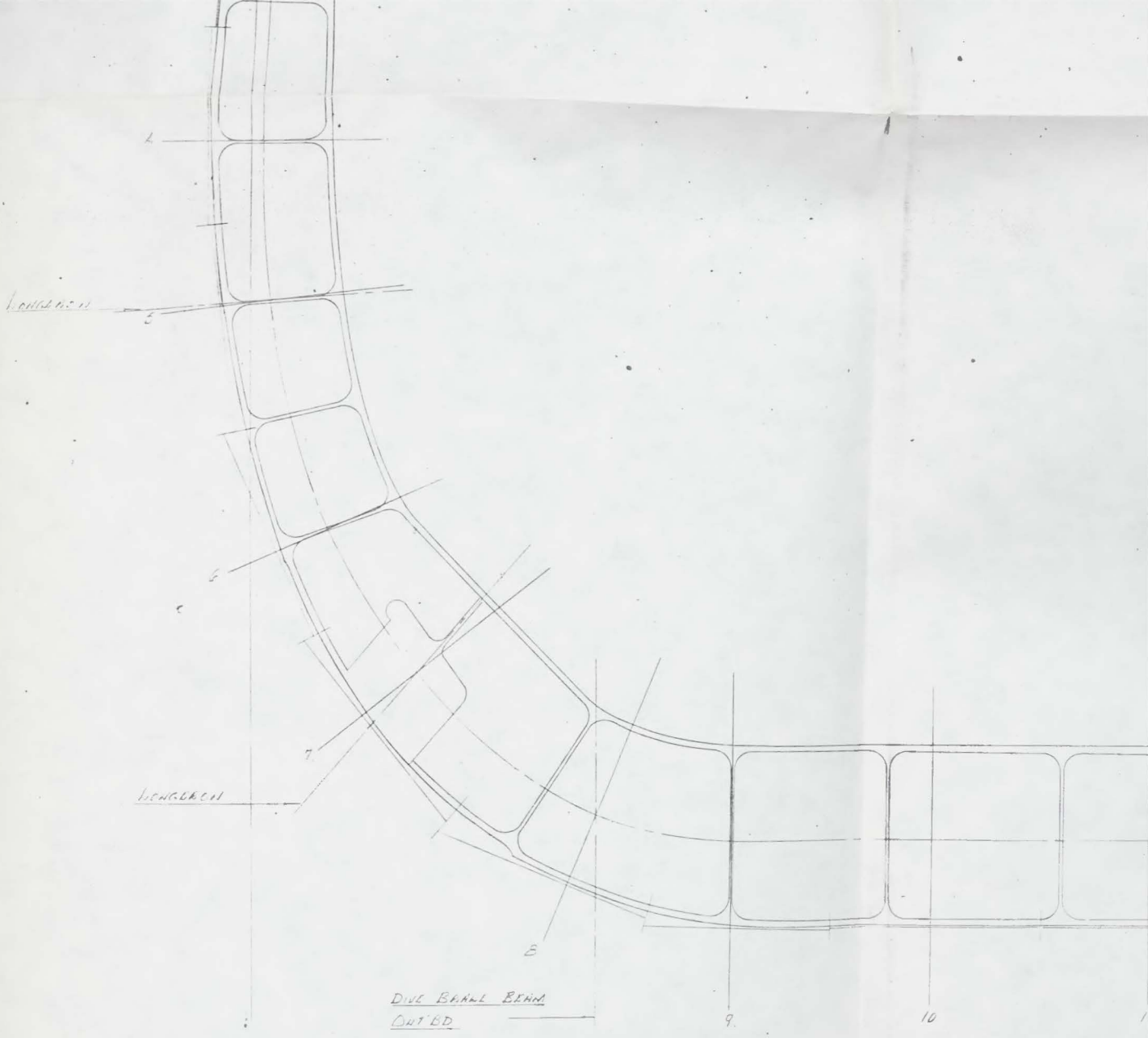
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LONGERON
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DIVE BRAKE BEAM
ONT'BD
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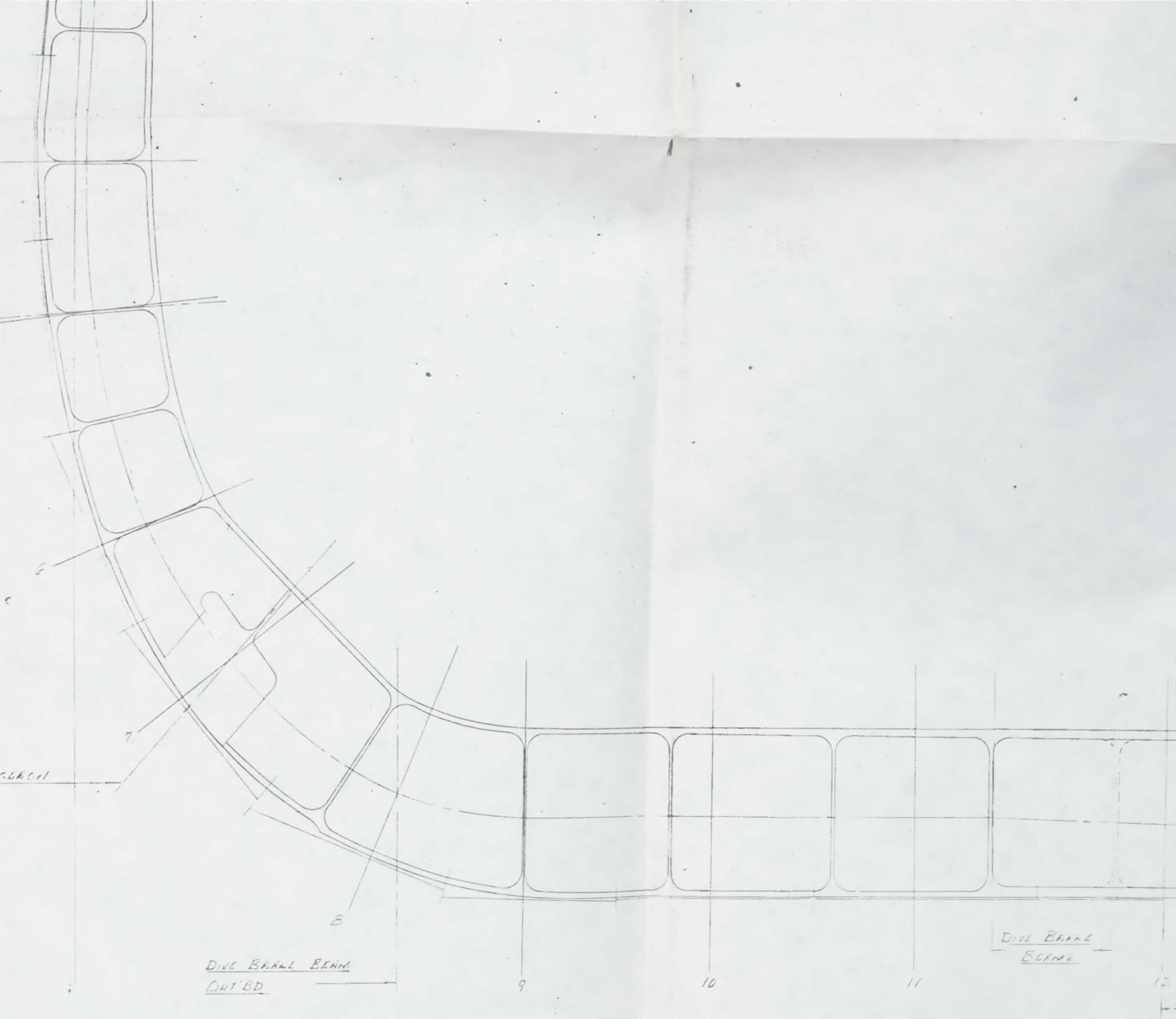
6
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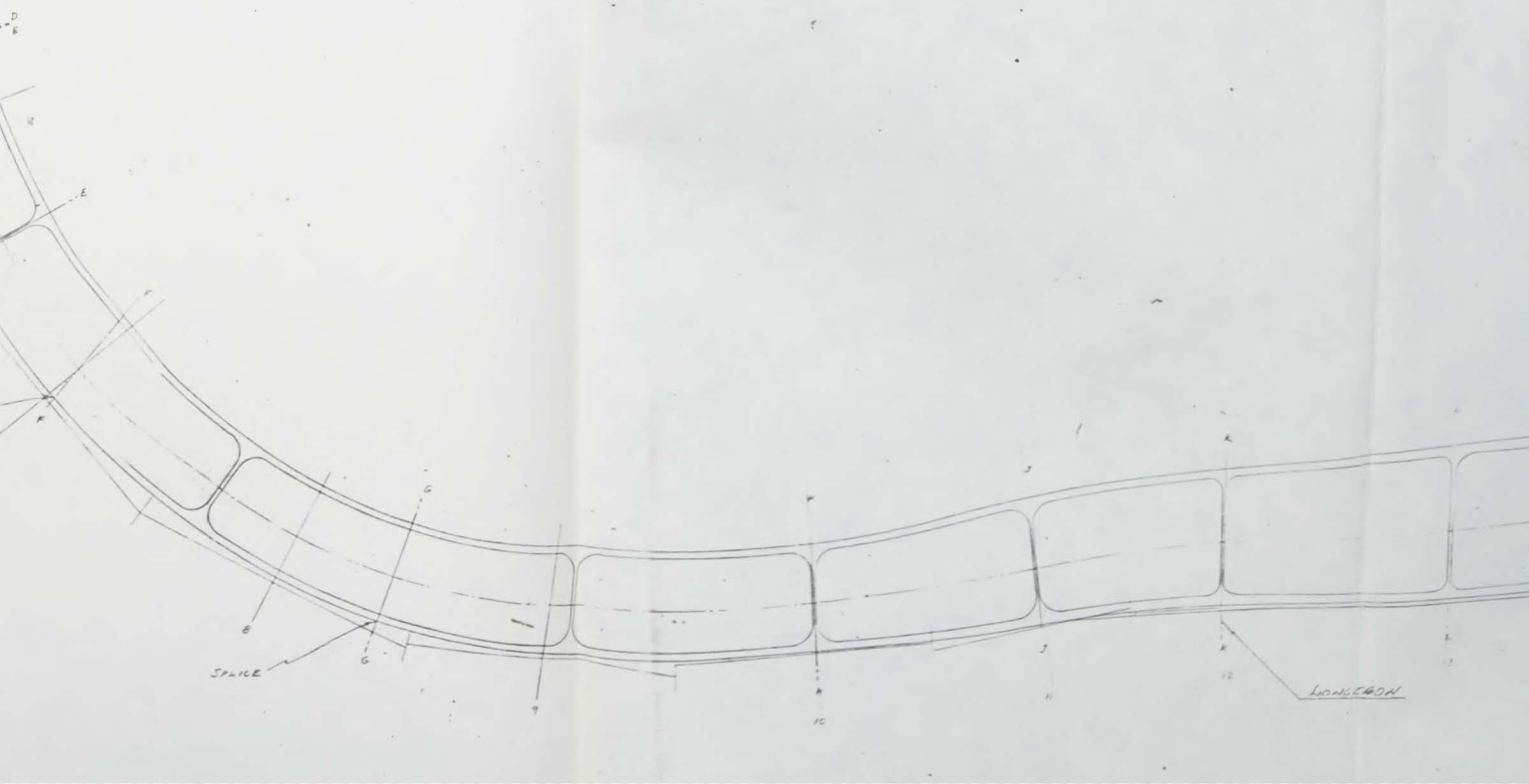
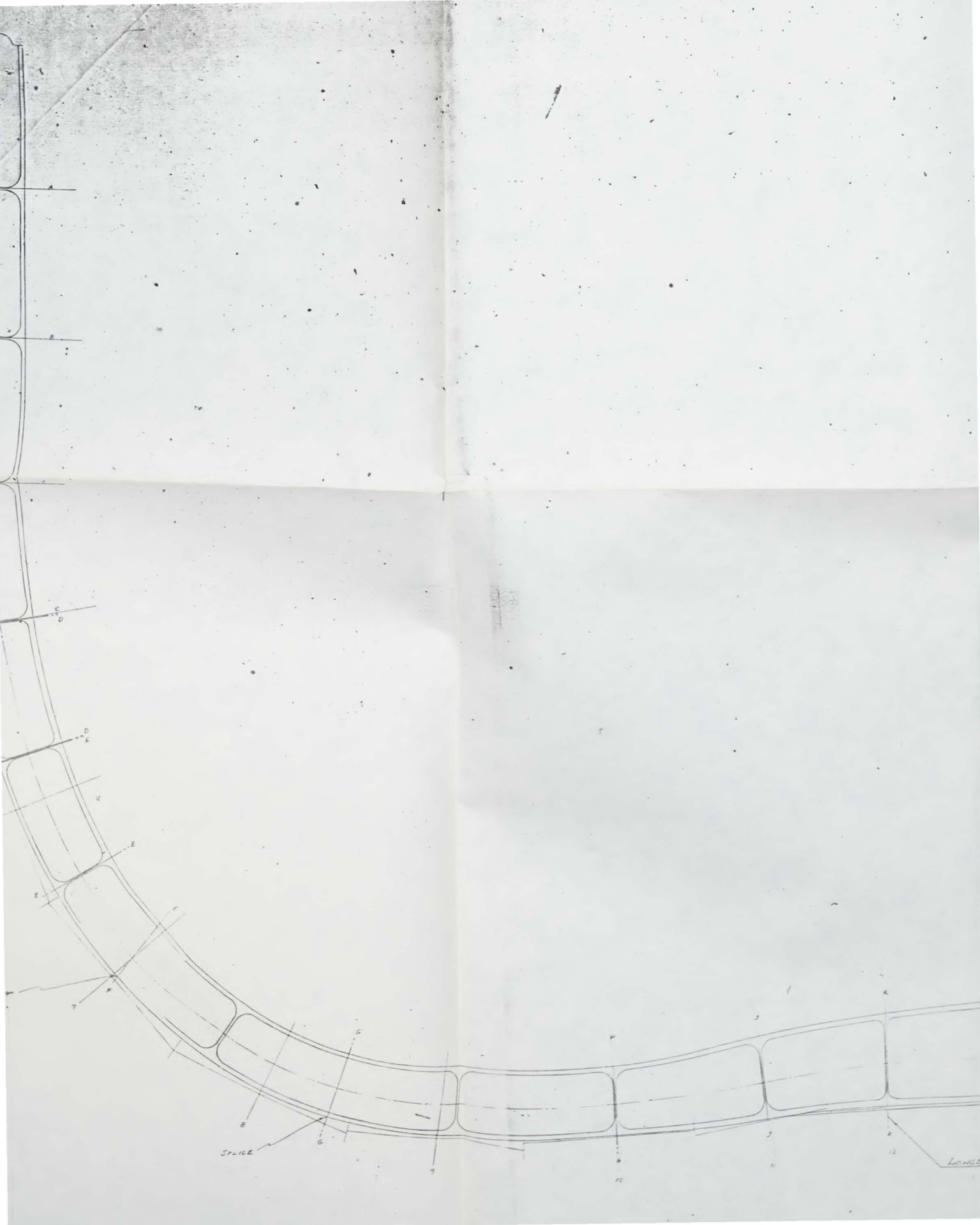
11
DIVE BRAKE BEAM OUT'BD
DIVE BRAKE BEAM


SPLICE
LONGEON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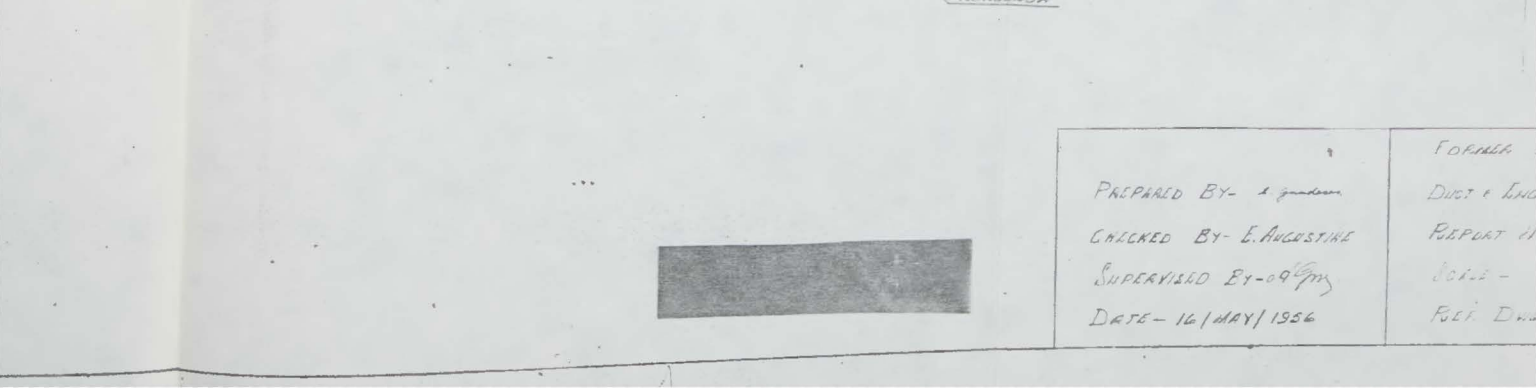


PREPARED BY- [illegible]

CHECKED BY- E. AUGUSTINE

SUPERVISED BY- [illegible]

DATE- 16/MAY/1956

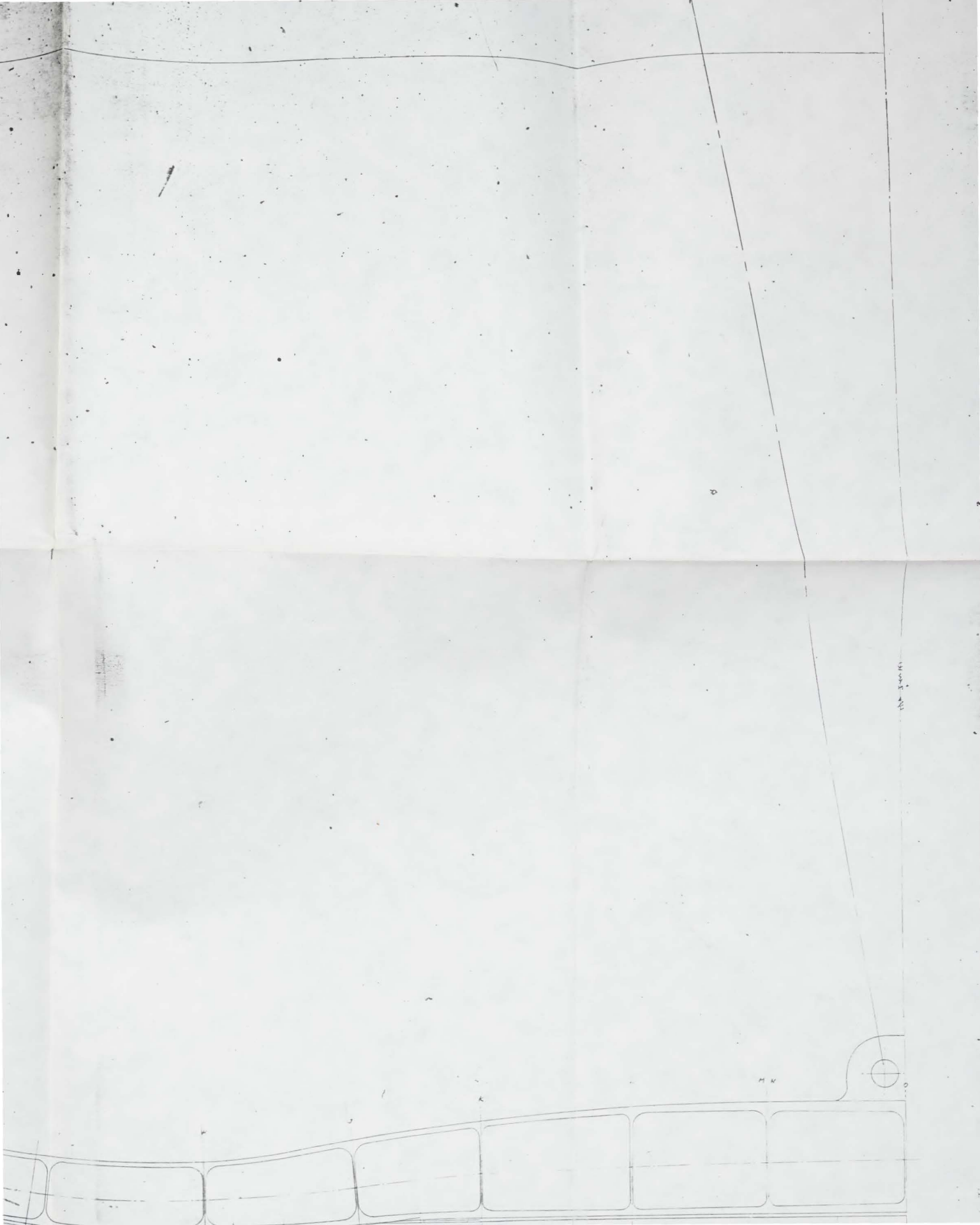
FORMER

[redacted]

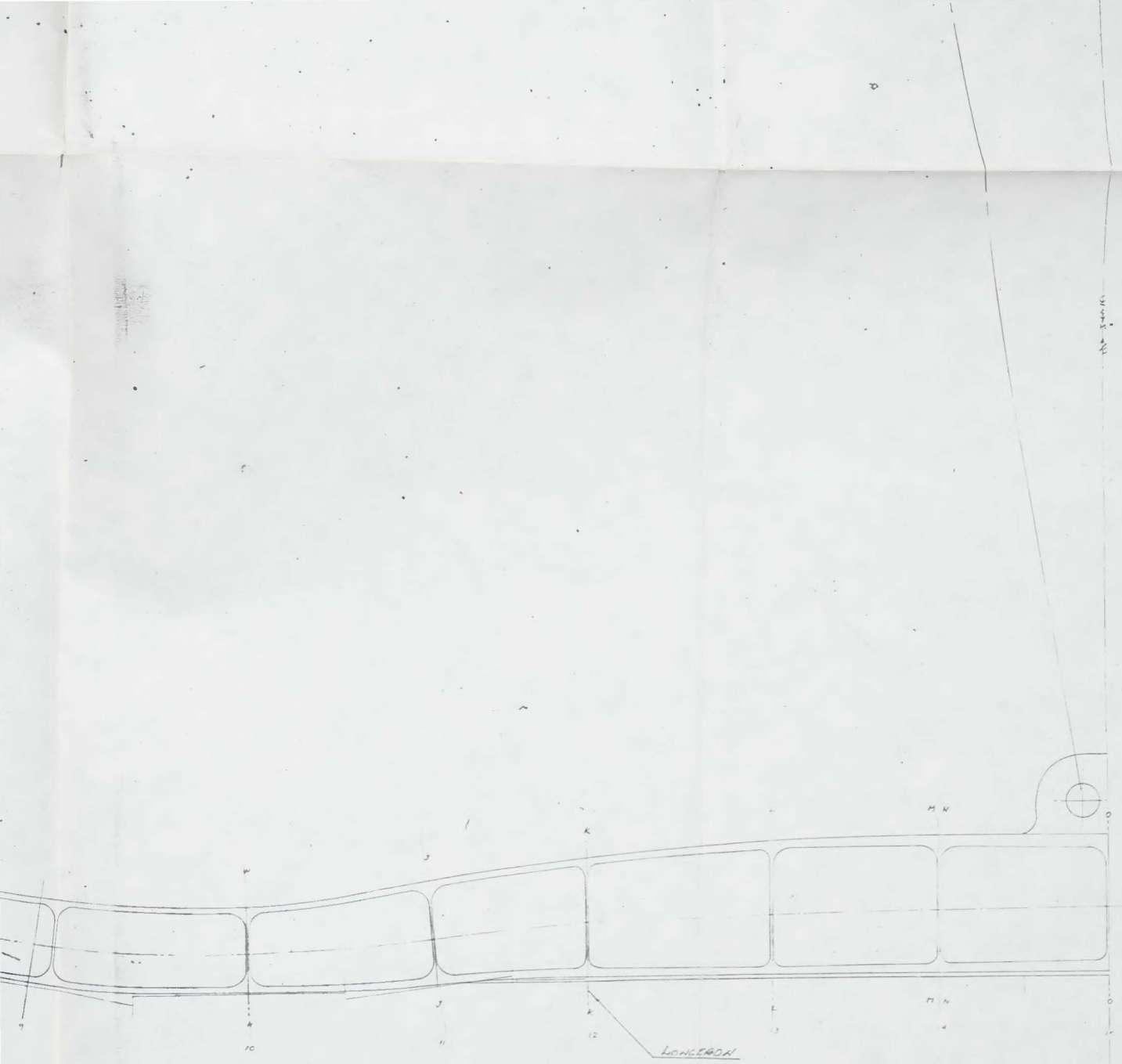
SHEET 5-2

PREPARED BY- S. Gunderson
CHECKED BY- E. ANGUSTINE
SUPERVISED BY- [illegible]
DATE- 16/MAY/1956

FORMER 591.65
DUCT & ENGINE BAY ANALYSIS
REPORT NO 7/0510/12
SCALE - 1/2
REF. DWGS.- 7-1058- 397 401




SPLICE
LONGERON



PREPARED BY- L. Gunderson

CHECKED BY- E. AUGUSTINE

SUPERVISED BY- O.G.

DATE- 16/MAY/1956

FORMER 591.65

DUCT & ENGINE BAY

REPORT No 7/05

SCALE - 1/2

REF. DWG. - 4-10


430' TO WING ℄
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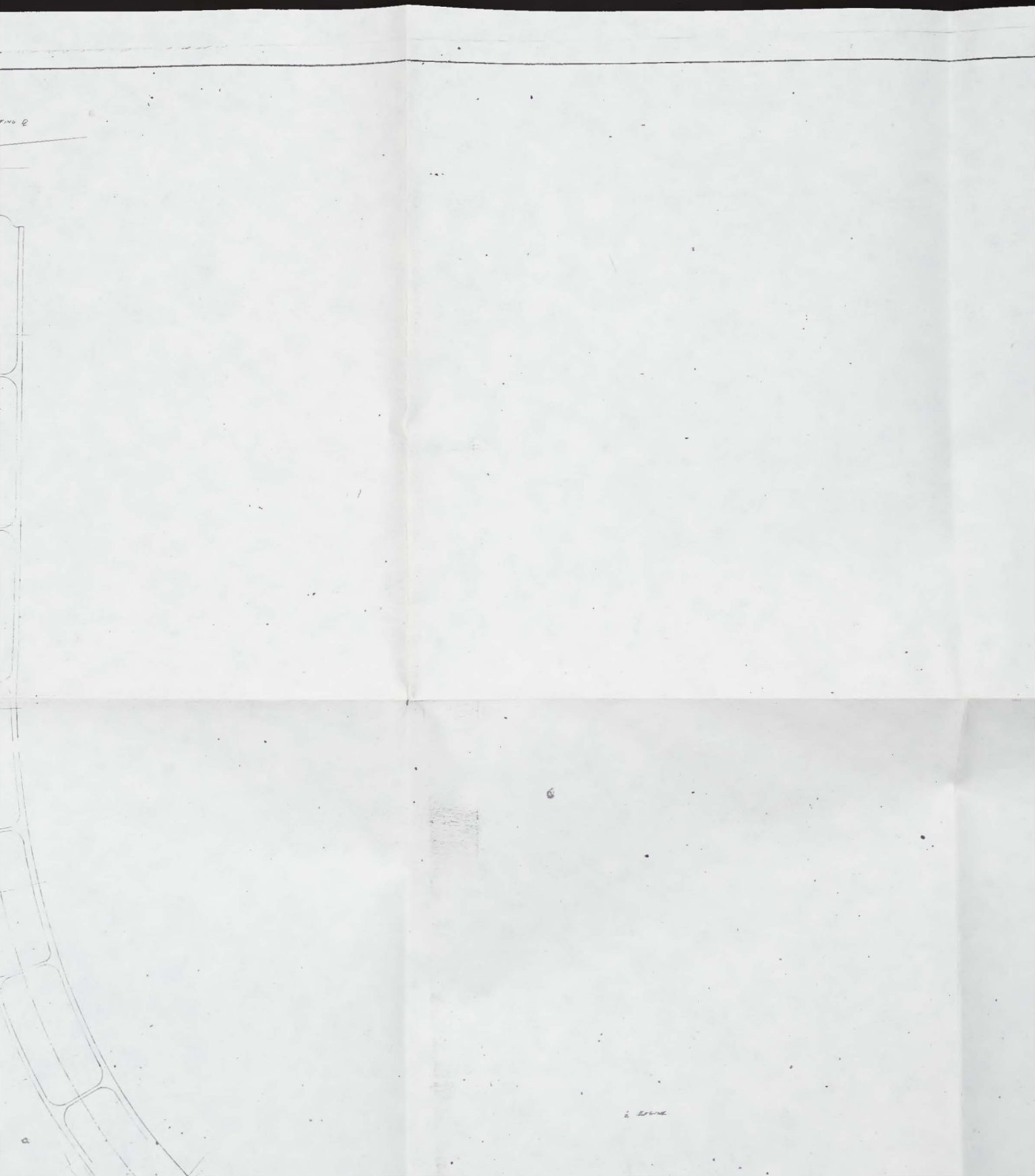
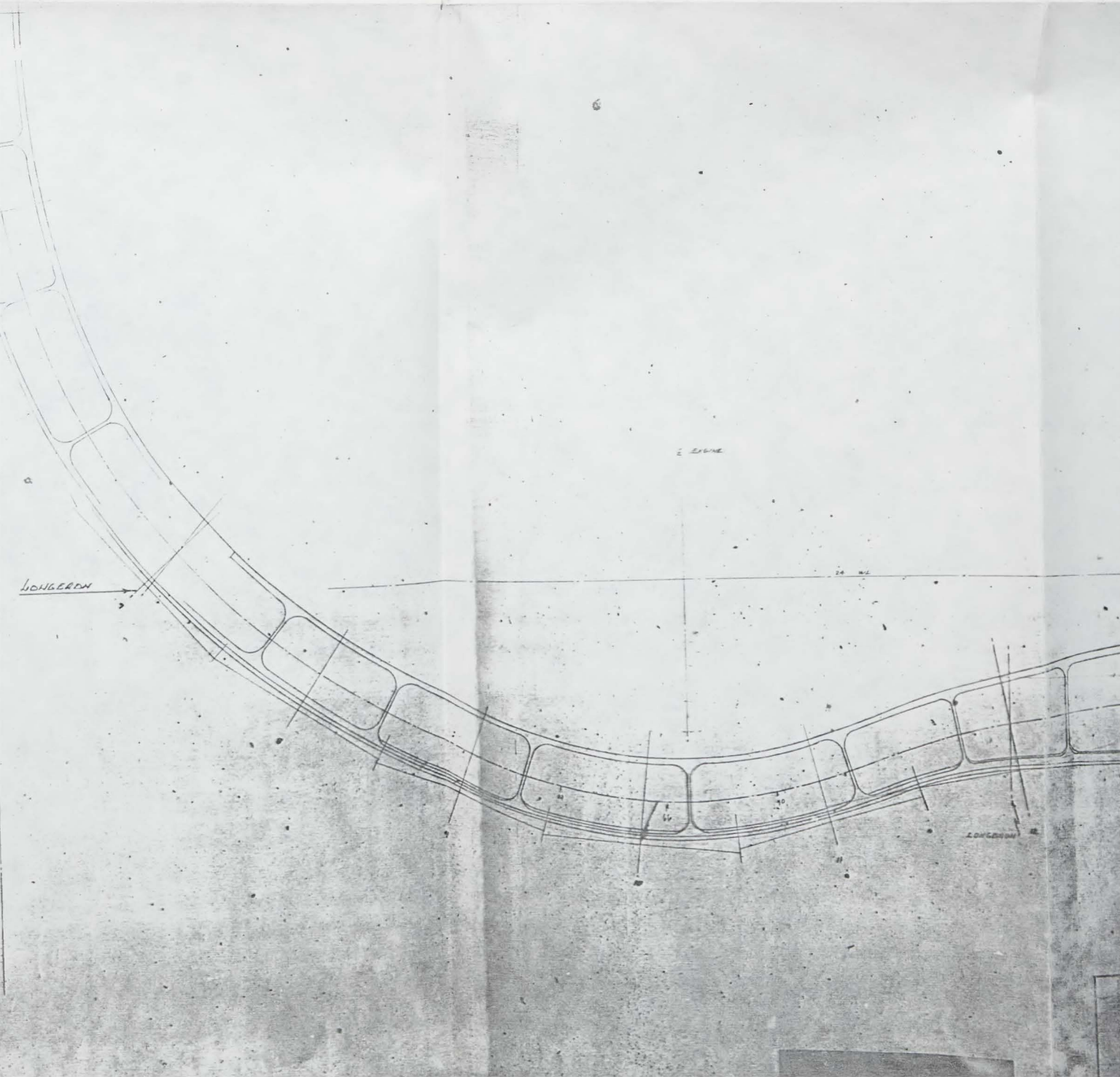
480" TO WING ℄

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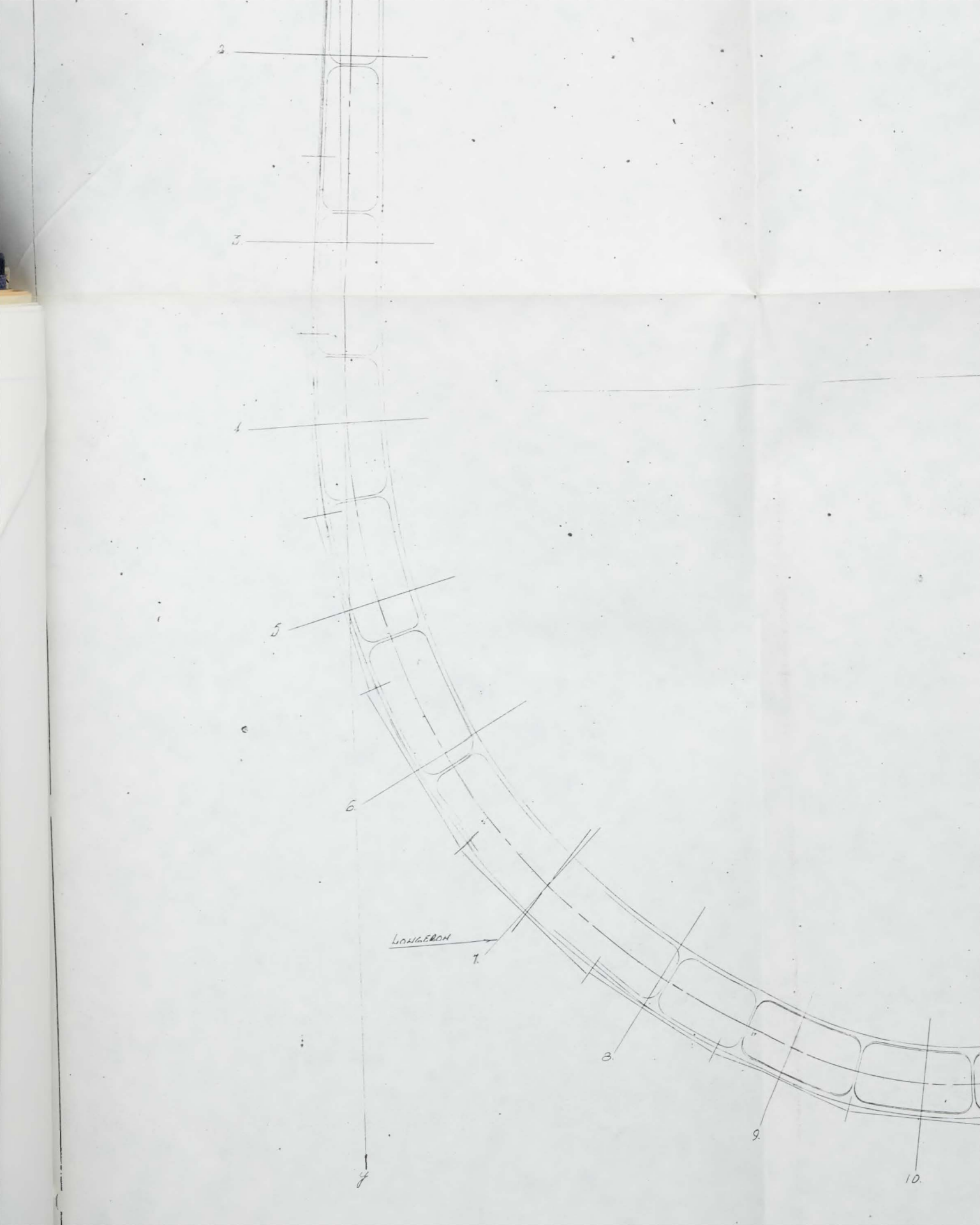
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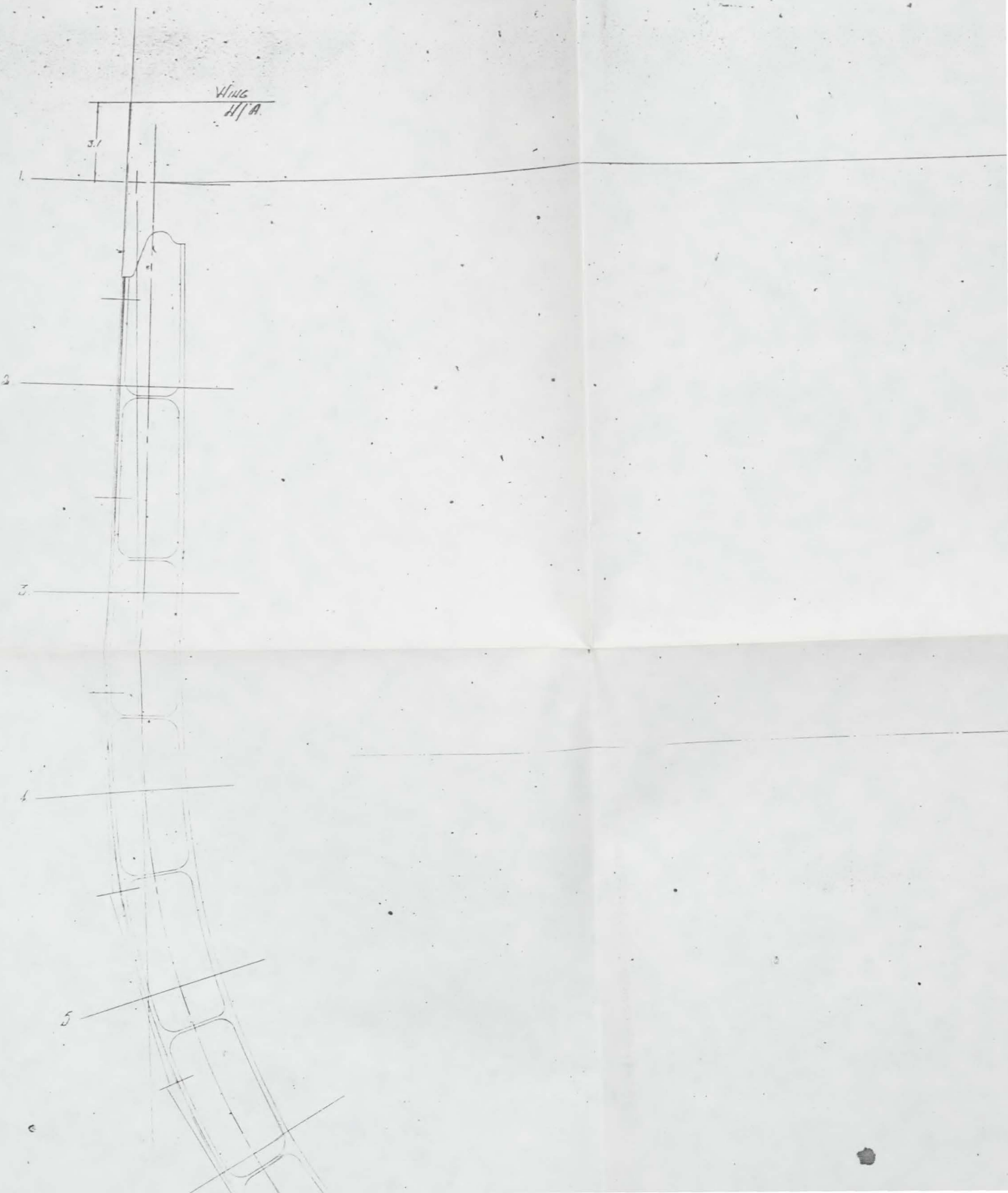
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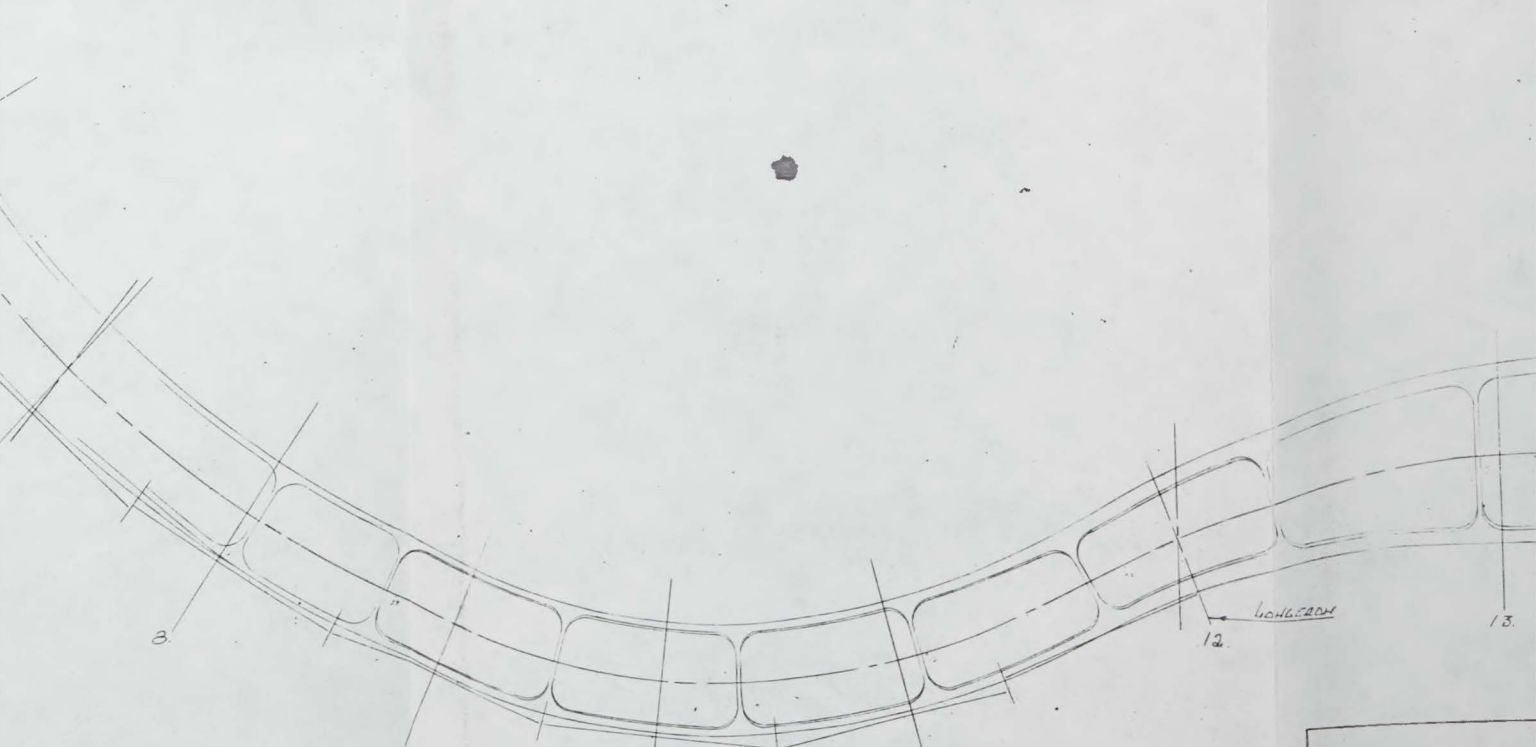
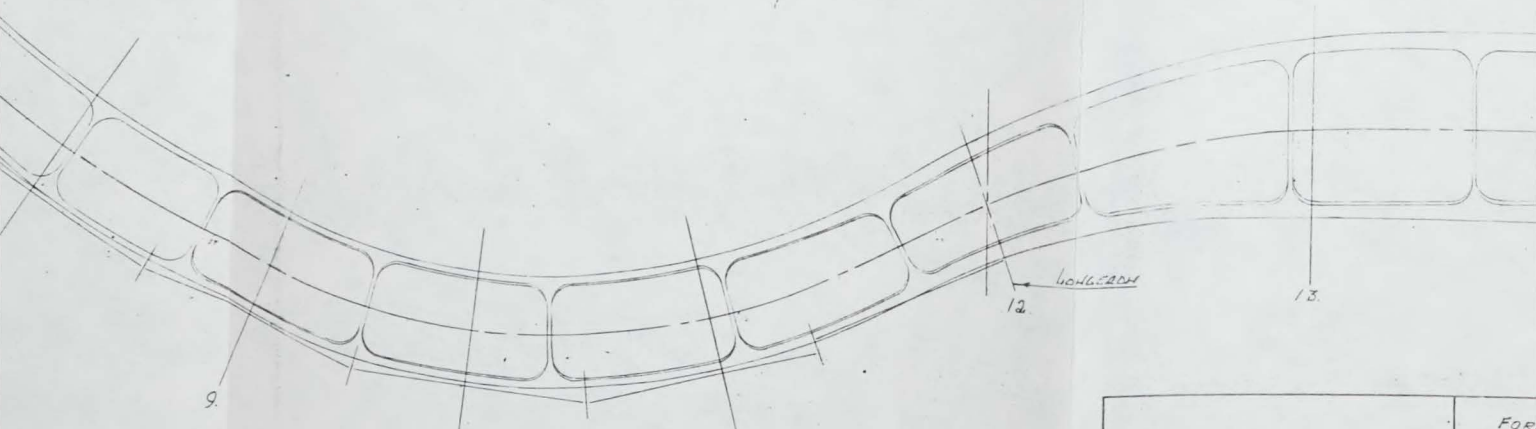


PREPARED BY & Sgn

CHECKED BY E. Aug

SUPERVISED BY Off

A/c E



PREPARED BY B Gardner

CHECKED BY E. AUGUSTINE

SUPERVISED BY C.A. Gardner

DATE

FOR

DUC

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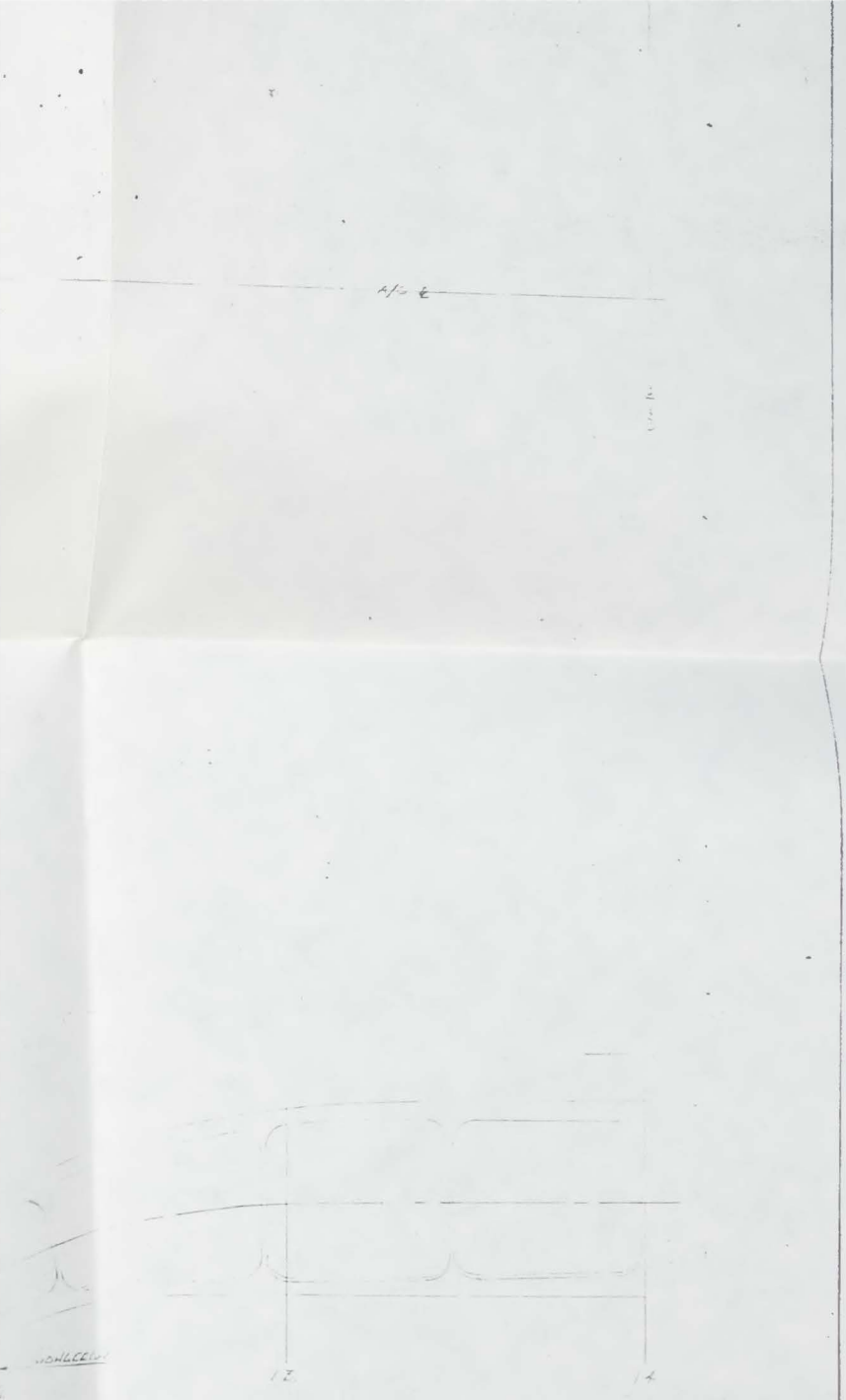
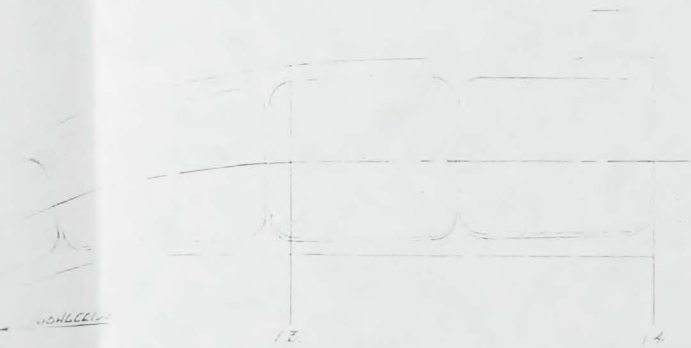
SCA

REF



SHEET 5-4

PREPARED BY S Gardiner	FOEHER 647.28
CHECKED BY E. ANGUSTINE	DUCT & ENGINE BAY ANALYSIS
SUPERVISED BY	REPORT NO V/0510/12
DATE	SCALE 1/2
	REF DWGS T-1058-1051 1053



SHEET 5-A

SHEET 5-A

FOFIMER 697.28

DUCT & ENGINE EAY ANALYSIS

REPORT NO 7/0510/12

SCALE 1/2

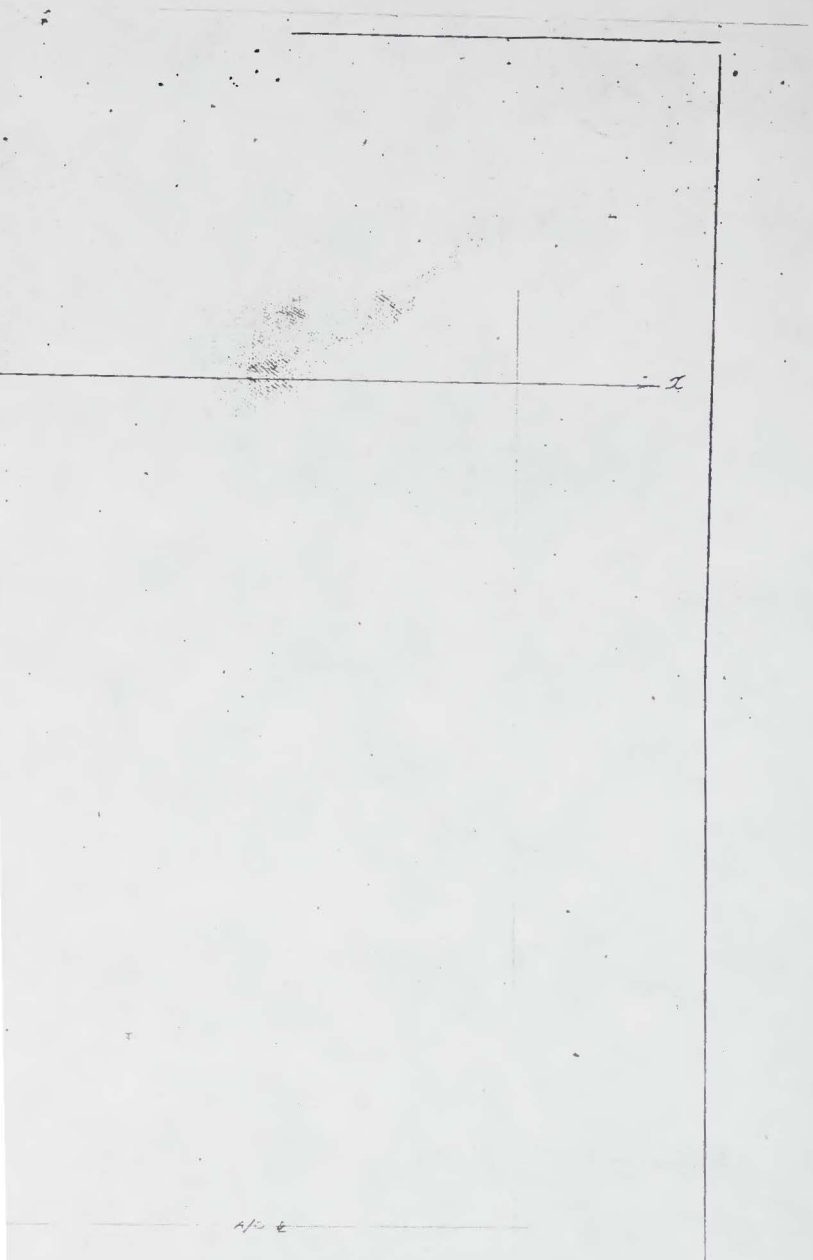
REF DWGS 7-1058-1051
1053

PREPARED BY S Gordon

CHECKED BY E. ANGUS

SUPERVISED BY C.A. G

DATE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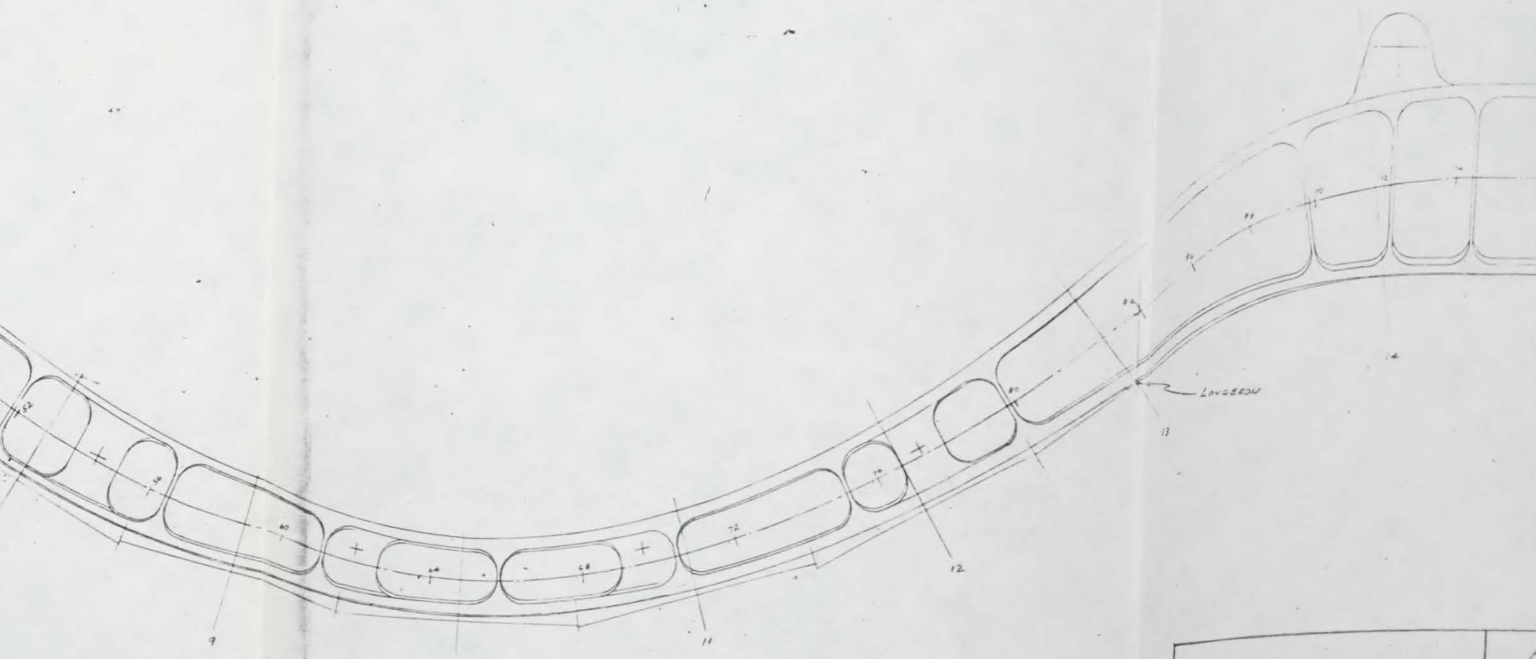

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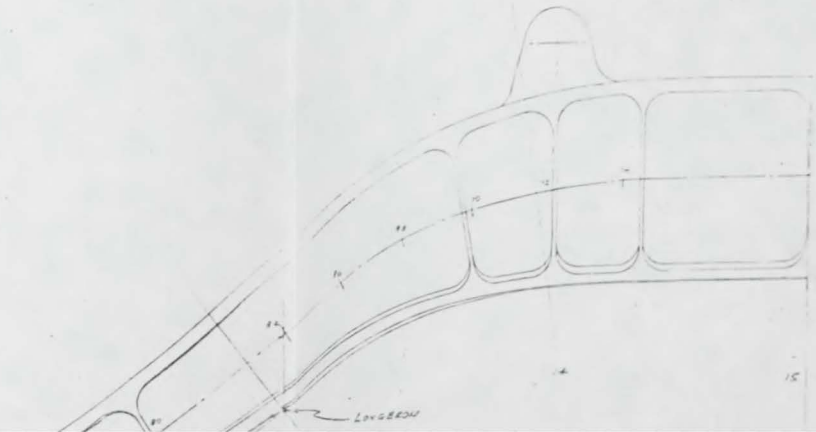
PREPARED BY L. Gunderson

CHECKED BY E. WAGNER INC

SUPERVISED BY A. Gray

DATE — 23/MAY/1956

A/C 2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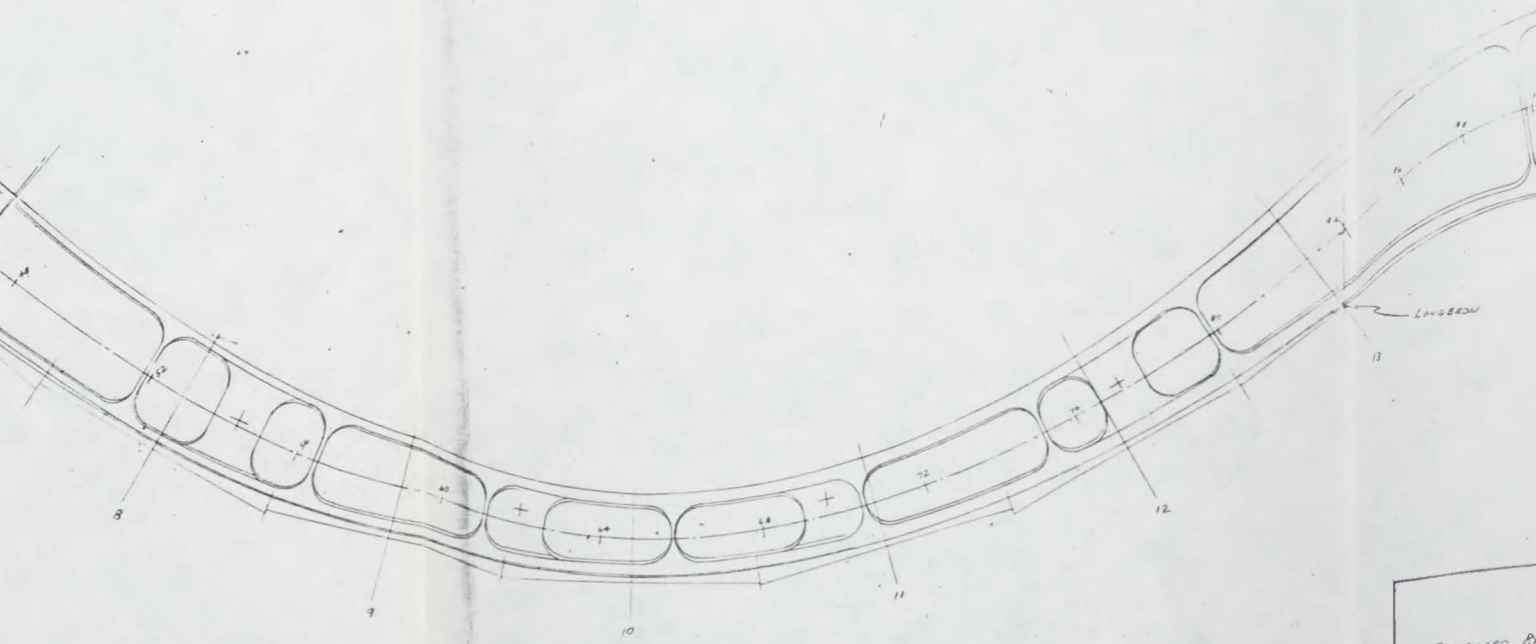

PREPARED BY

CHECKED BY

SUPERVISED

DATE —


A/C 2
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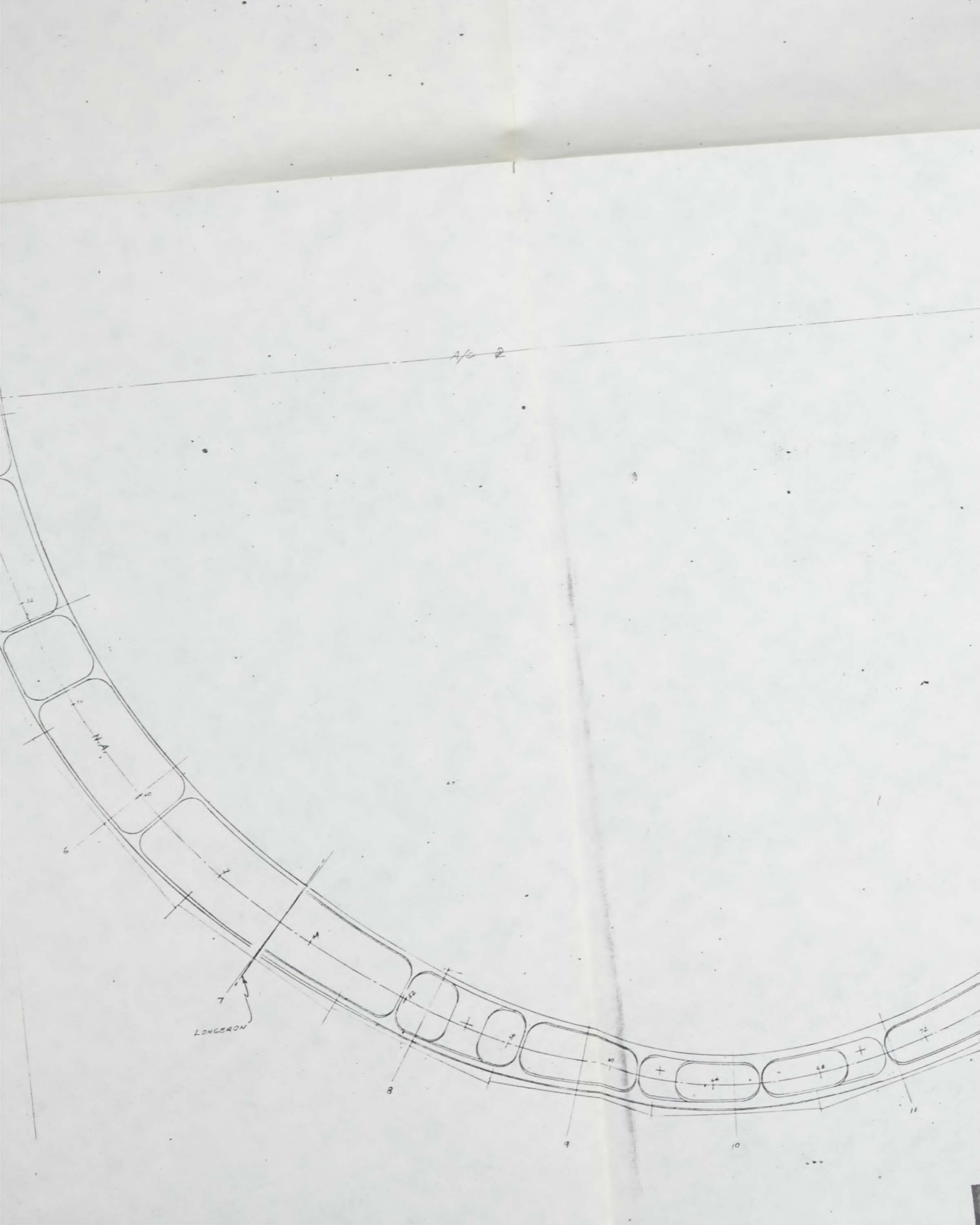
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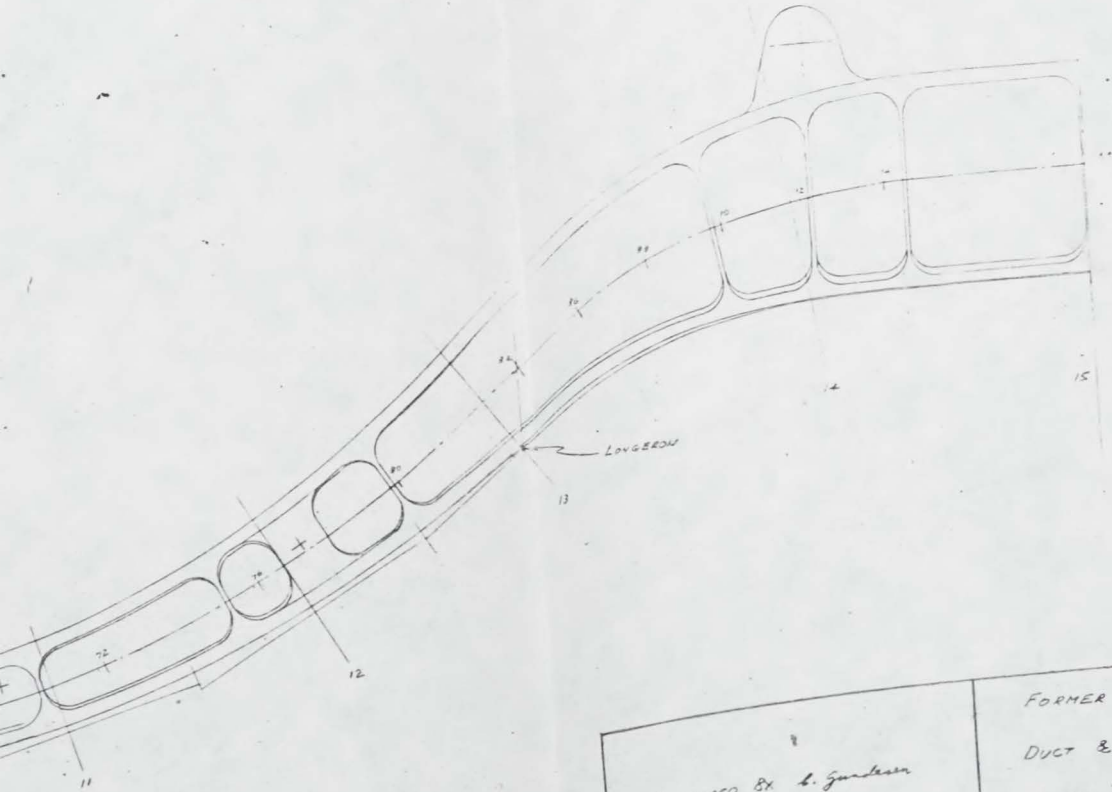
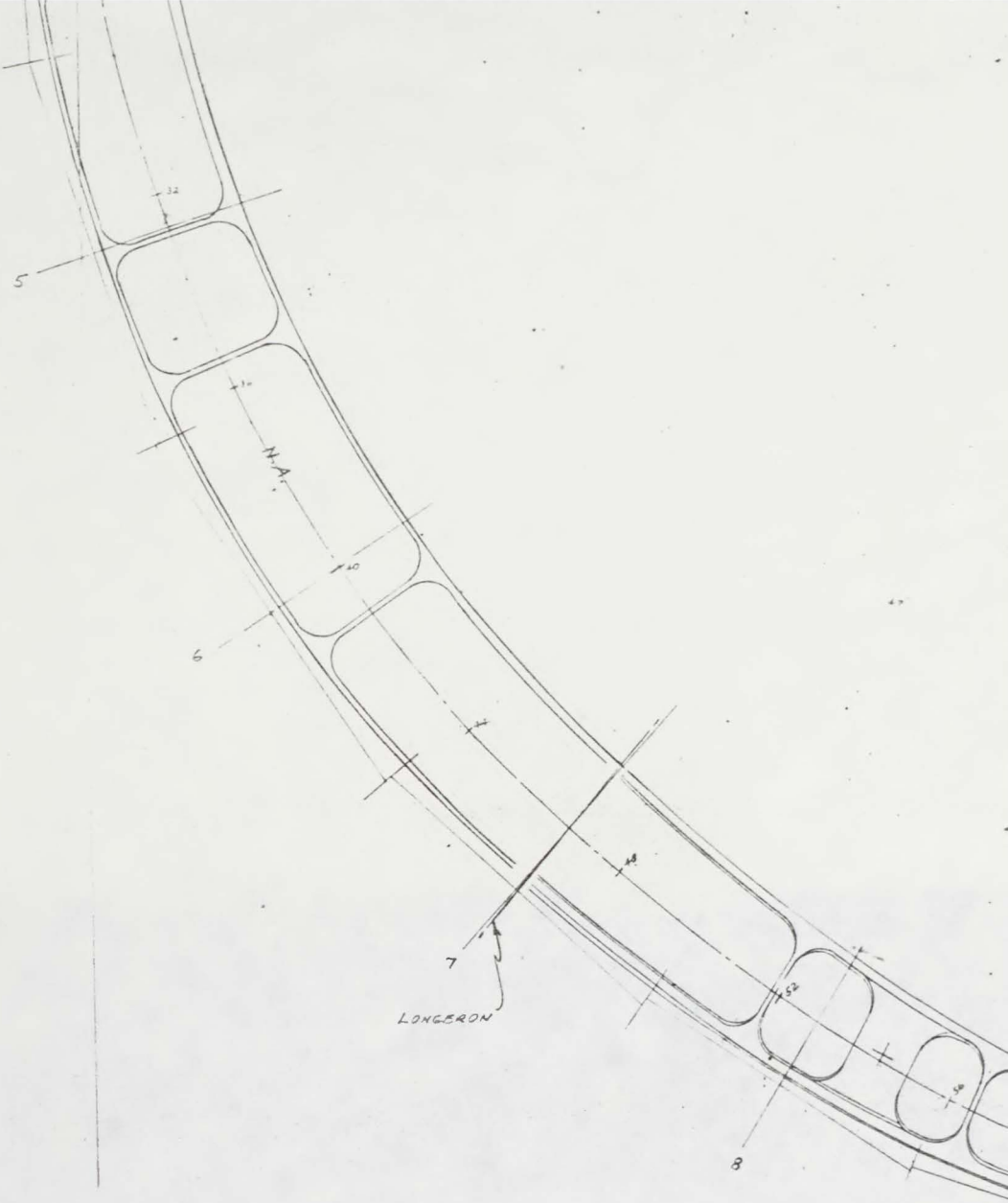


SHEET 5-5

PREPARED BY L. Gunderson	FORMER 742.50
CHECKED BY E. AUGUSTINE	DUCT & ENGINE BAY ANALYSIS
SUPERVISED BY A. Gray	REPORT NO 7/0510/12
DATE — 23/MAY/1956	SCALE 1/2
	REF DWG — 7-1058-23 29


A/S 2
B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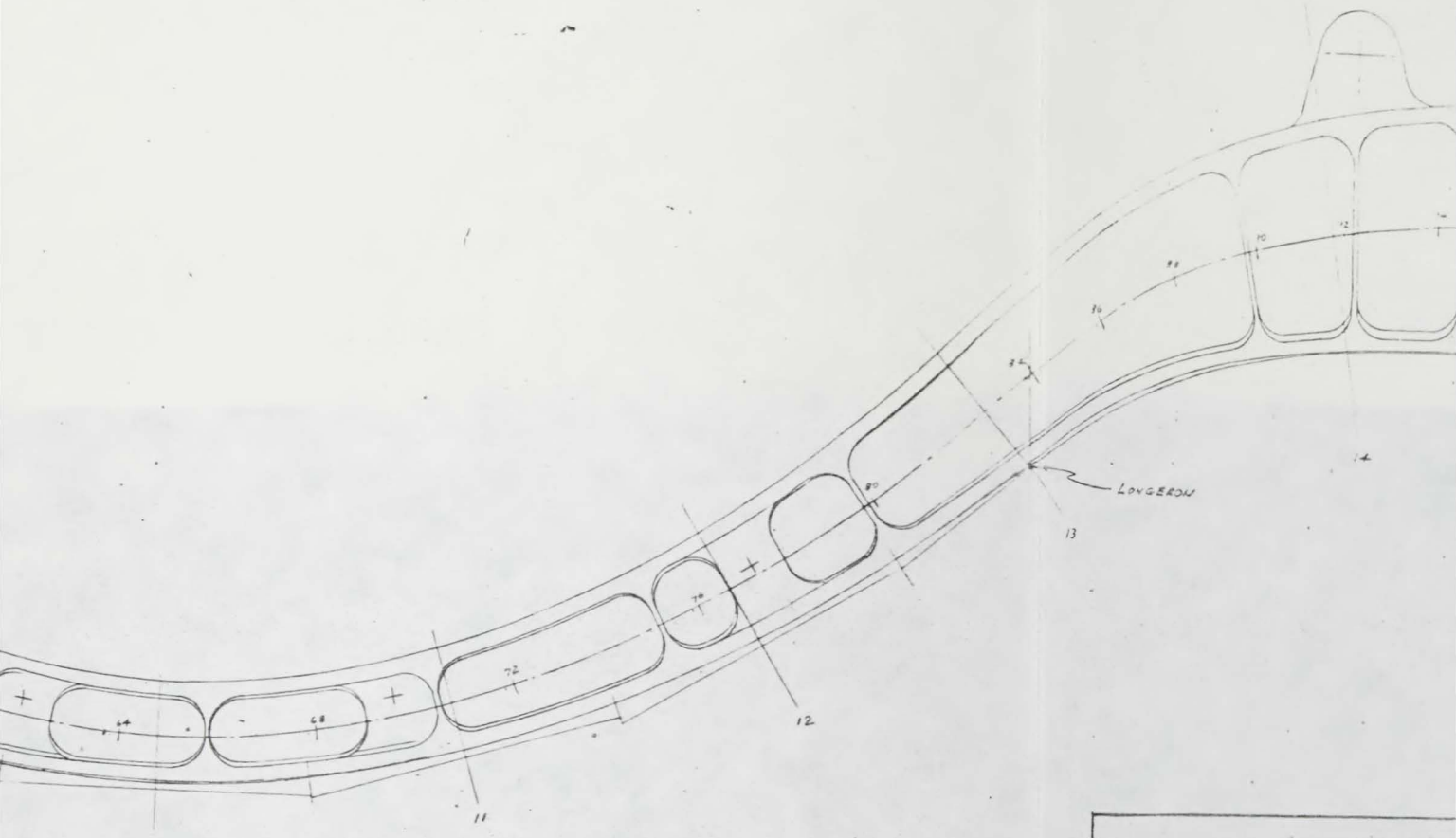
N.A.
LONGERON



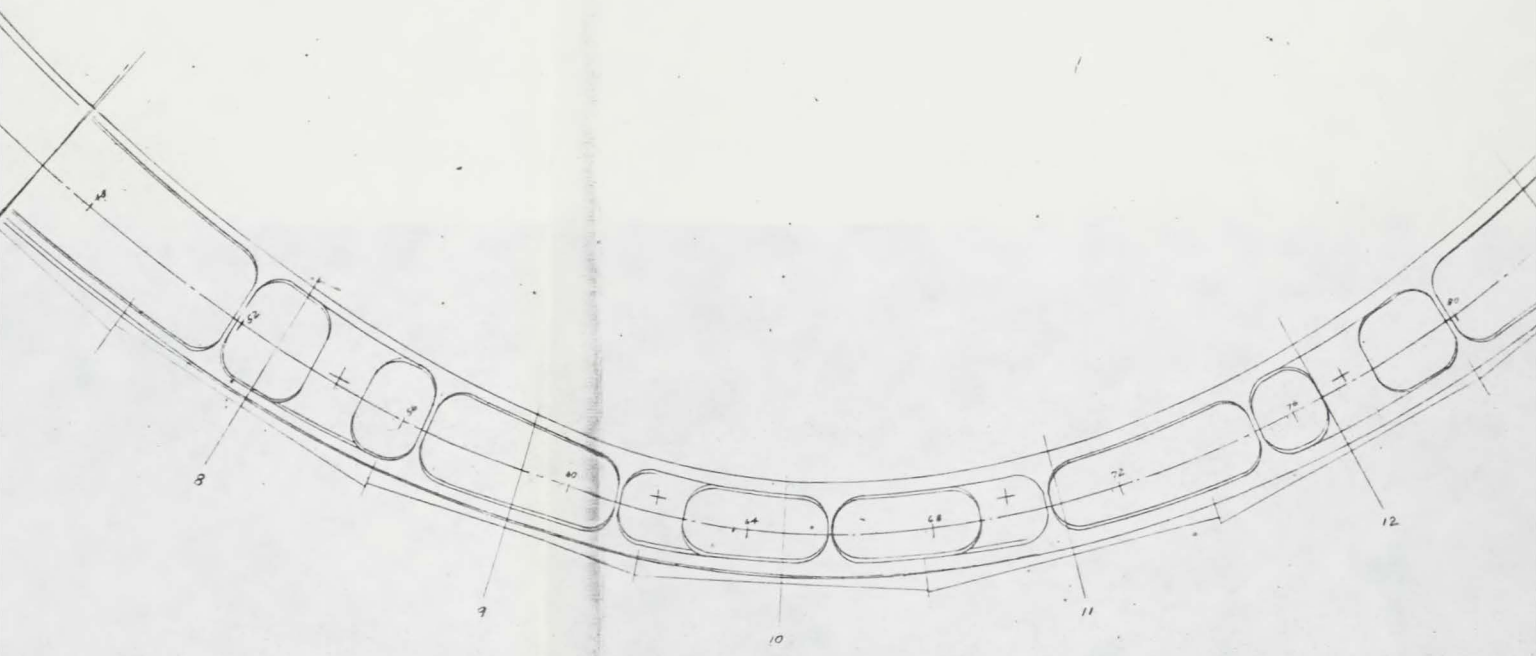
PREPARED BY L. Gunderson

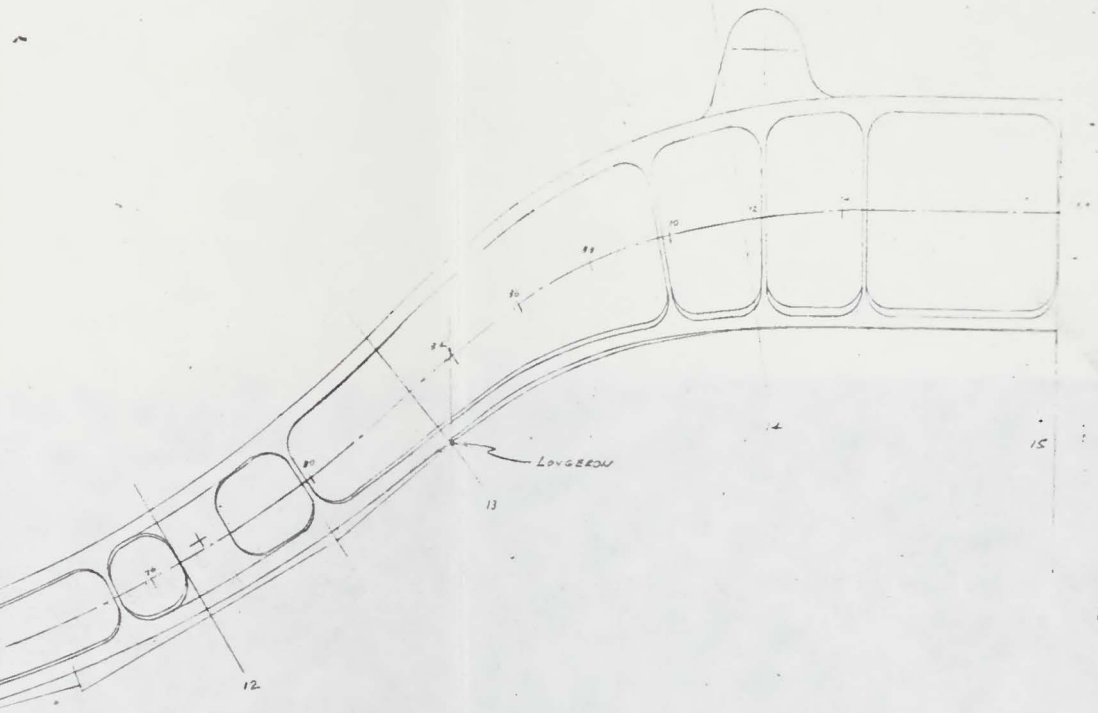
CHECKED BY E. AUGUSTINE

SUPERVISED BY A. Gray

DATE — 23/MAY/1956

A/C 2

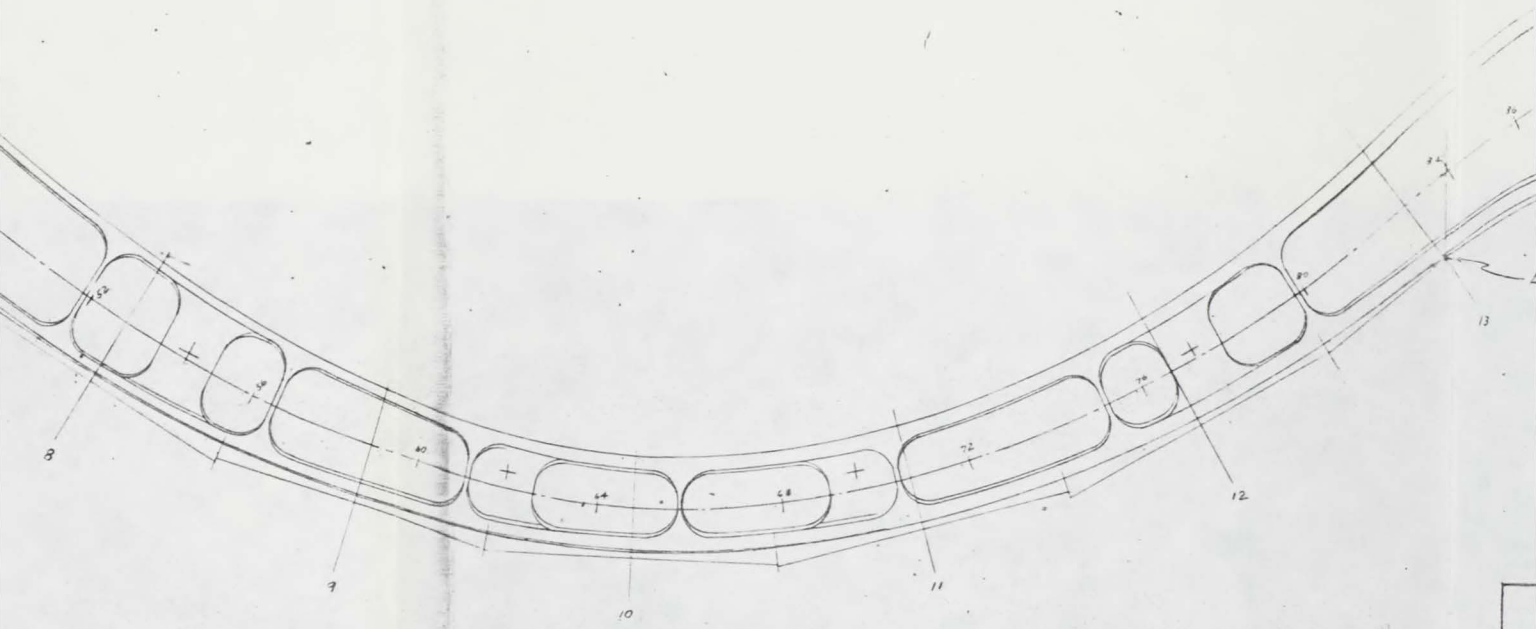




SHEET 5-5

PREPARED BY L. Sanderson	FORMER 742.50
	DUCT & ENGINE BAY ANALYSIS

A/C 2



AVRO AIRCRAFT LIMITED
MALTON ONTARIO
TECHNICAL DEPARTMENT

REPORT No. 2/0510/12
SHEET No 6-41

AIRCRAFT:		PREPARED BY	DATE
C-105	DUCT & ENGINE BAY ANALYSIS	E. Hillcoat MAY/1956	
		CHECKED BY	DATE
		L Gundersen	

FORMER 697.28 — DIRECT LOAD

T_{6a} ($\bar{z}$: 15 ~ 28) (SET #4)

	1	2	3	4	6 HOOP Stress
Grid in Stress	7.959397	6.999228	1.937641	3.792266	16.816537
15	−.047978	.998848	−.918120	−.015931	.016819
16	−.047978	.998848	−.756660	−.047978	.146417
17	−.047978	.998848	−.575200	−.077665	.276005
18	−.034897	.999391	−.435946	−.111204	.487140
19	−.263031	.964787	−.266334	−.137874	.822724
20	−.484810	.894620	−.081303	−.156573	1.121554
21	−.697770	.716302	.070914	−.013306	1.391700
22	−.819153	.573276	.130634	.087067	1.610429
23	−.912545	.406937	.145687	.214753	1.780732
24	−.991445	.135546	.158110	.538943	1.809023
25	−.974379	−.244451	.155397	.682861	1.587668
26	−.917060	−.398747	.146247	.821762	1.486321
27	−.999339	−.037260	.159351	.999339	2.118549
28	1.000000		.159474	1.000000	2.159474

AVRO AIRCRAFT LIMITED
MALTON ONTARIO
TECHNICAL DEPARTMENT

AIRCRAFT		REPORT No. 7/0510/12
C105	DUCT & ENGINE BAY ANALYSIS	SHEET No. 6-44
		PREPARED BY: L. Gendeson — DATE: MAY 56
		CHECKED BY: J. Andrews. — DATE:

FORMER 742.50 — FIRST LOAD. (SET #5)

Tia (?: 16 ~ 30)

		1	2	3	4	CHECK SUM
CHECK SUM		8.915025	5.849814	7.668484	4.941914	18.138469
	16	-.052336	.998630	-.916 119	-.003273	.026904
	17	-.052336	.998630	-.751 091	-.009819	.185884
	18	-.052336	.998630	-.586 063	-.016 366	.343865
	19	.061049	.998135	-.423 722	-.022 786	.614676
	20	.309017	.951 057	-.246 573	-.027 946	.985555
	21	.551 937	.833 886	-.051 453	-.031 038	1.303334
	22	.737 277	.675 590	.096 065	.018 702	1.537634
	23	.843 391	.537 300	.149 100	.162 637	1.692428
	24	.949 699	.313 164	.167 894	.343 346	1.774103
	25	.999 048	.043 619	.176 618	.498 691	1.717976
	26	.970 296	-.241 922	.171 535	.612 337	1.513246
	27	.874 620	-.484 810	.154 621	.688 832	1.233263
	28	.788 011	-.615 661	.139 309	.740 909	1.052568
	29	.987 688	-.156 434	.174 609	.989 688	1.995551
	30	1.000 000	0	.176 786	1.000 000	2.176786

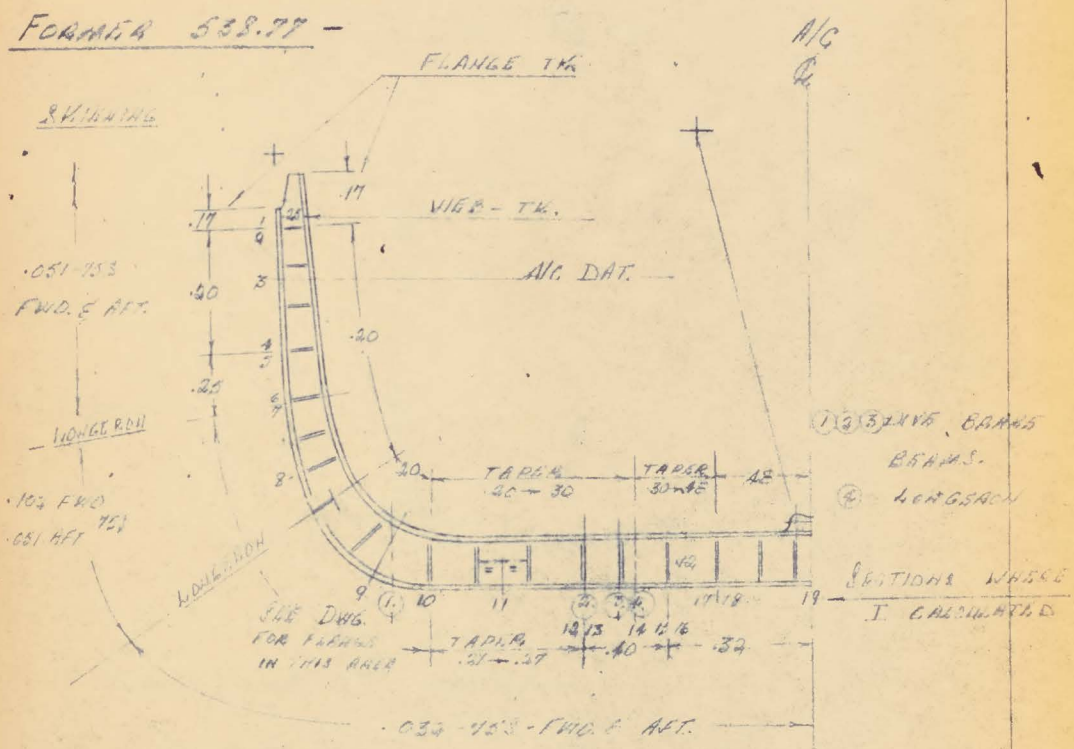
AVRO AIRCRAFT LIMITED
MALTON · ONTARIO
TECHNICAL DEPARTMENT

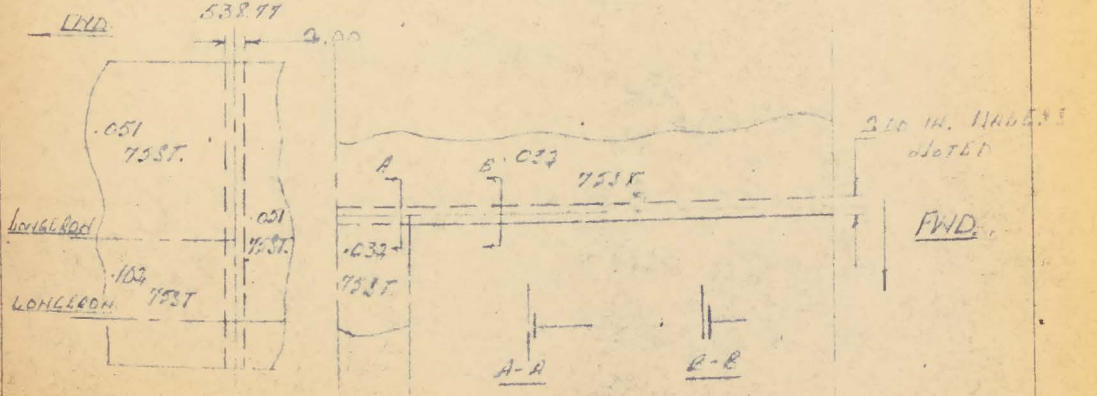
REPORT No. 7/650/12
SHEET No. 6-43

AIRCRAFT:		PREPARED BY	DATE
C-105	DUCT & BRACING BAY AURORA ONT.	E. ANGHSTIHE	26/APR/52
		CHECKED BY	DATE

SECTION PROPERTIES

FORMER 538.77 –





SIDE SKINNING

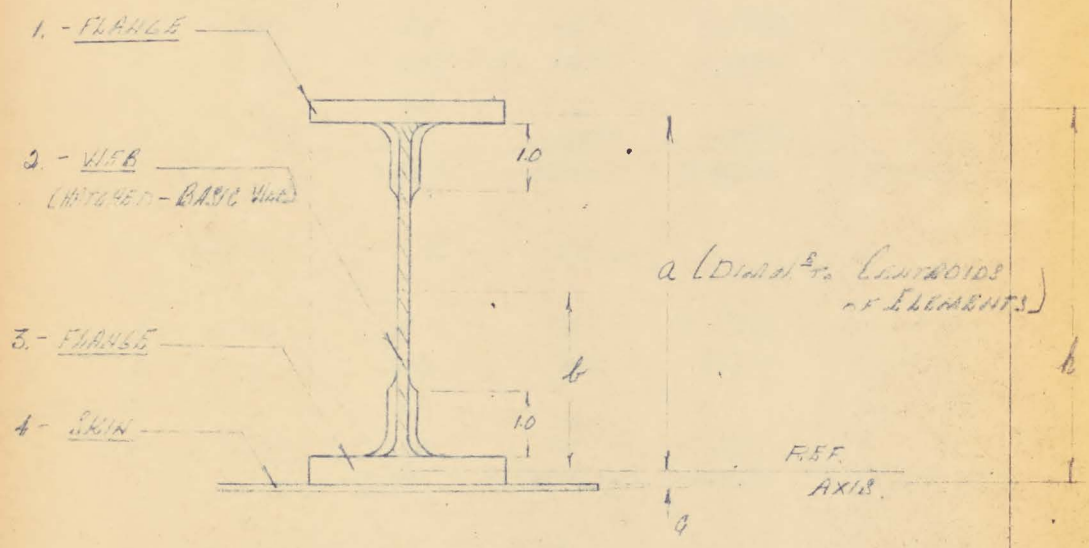
BOTTOM SKINNING

AVRO AIRCRAFT LIMITED
MALTON ONTARIO
TECHNICAL DEPARTMENT

AIRCRAFT.	REPORT No. 7/05/10/17
C-105	SHEET No. 6-44
DUST & FLANGE BOX DESIGN & STRESS	PREPARED BY: E. AHGUSTINE — DATE: 26/APR/56
	CHECKED BY — DATE

FORMER 538-77

TYPICAL SECTION



- FLANGE AREAS NEGLECTED
- DIAG. LOADING DEFINING SKIN NEGLECTED.
- FLANGE BOLTS IGNORED.

AVRO AIRCRAFT LIMITED
MALTON · ONTARIO
TECHNICAL DEPARTMENT

REPORT NO 7/8510/12
SHEET NO 6-26

AIRCRAFT:		PREPARED BY	DATE
C-102	DART & ORENDA ENG. AIRFLOW	F. HIGGINSON	4/6/54
		CHECKED BY	DATE

Station

	Elem.	y	ΔA	$y\Delta A$	$y^2\Delta A$	I_o
1 (h = 2.14)	1	2.75	.24	.935	2.57125	.00082
	2	1.375	.645 (2.58)	.886875	1.21946	.35778
	3	0	.34			.00082
	4	.1105	.14	.01541	.00171	
			1.465	1.826641	3.79242	.35942

$\bar{y}$ = 1.25304 ; I = 1.92446

2 (h = 2.92)	1	2.72	.4	1.088	2.95936	.00135
	2	1.36	.353 (2.53)	.34374	.46610	.13824
	3	0	.4			.00135
	4	.1355	.14	.01757	.00221	
			1.193	1.41331	3.42767	.13694

$\bar{y}$ = 1.18553 ; I = 1.28896

3 (h = 3.45)	1	3.28	.4	1.31200	4.30336	.00135
	2	1.64	.308 (3.08)	.50512	.82844	.24338
	3	0	.4			.00135
	4	.1355	.14	.01757	.00221	
			1.248	1.83469	5.13539	.24608

$\bar{y}$ = 1.46975 ; I = 2.92545

4 (h = 3.45)	1	3.75	.4	1.5	5.625	.00135
	2	1.875	.355 (3.55)	.66563	1.24805	.34459
	3	0	.4			.00135
	4	.1355	.14	.01757	.00221	
			1.295	2.18320	6.87526	.34729

$\bar{y}$ = 1.68573 ; I = 3.68770

AVRO AIRCRAFT LIMITED
MALTON ONTARIO
TECHNICAL DEPARTMENT

REPORT No. 7/3510/12
SHEET No 6-27

AIRCRAFT:	DUCT & ENGINE BAY AIRFLOW
C-105	

PREPARED BY	DATE
E. ANGUSTUS	1/MAY/56
CHECKED BY	DATE

SECTION

	FLAP	y	ΔA	$y\Delta A$	$y^2\Delta A$	I_{oo}
	1	5.265	.40	2.106	11.08809	.00133
9	2	2.6500	.503(.503)	1.33295	3.53233	1.06053
(h=5.5)	3	0	.54			.00328
	4	.151	.075	.01133	.00171	
			1.518	3.42762	14.62212	1.06514

$\bar{y}$ = 2.25798 ; I = 7.94798

	1	5.615	.40	2.246	12.61127	.00133
10	2	2.81	.541(.54)	1.52021	4.27159	1.31950
(h=5.82)	3	0	.44			.00154
	4	.171	.061	.00835	.00161	
			1.43	3.75582	16.88741	1.32337

$\bar{y}$ = 2.62787 ; I = 8.33139

	1	5.7315	.474	2.71779	15.51665	.00222
11	2	2.8615	.573(.573)	1.56896	4.48958	1.57366
(h=5.96)	3	0	.48			.00230
	4	.136	.061	.00838	.00128	
			1.5715	4.27157	20.00951	1.57816

$\bar{y}$ = 2.71849 ; I = 9.79245

	1	5.69	.54	3.0726	17.48309	.00328
12	2	2.845	.542(.542)	1.54197	4.38696	1.32683
(h=5.96)	3	0	.54			.00328
	4	.151	.061	.01042	.00157	
			1.691	4.60417	21.87162	1.33337

$\bar{y}$ = 2.72275 ; I = 10.66901

AVRO AIRCRAFT LIMITED
MALTON - ONTARIO
TECHNICAL DEPARTMENT

REPORT NO. 7/5704-2.
SHEET NO. 6-48

AIRCRAFT:		PREPARED BY	DATE
C-105	DUCT FLOW ANALYSIS	E. AUGUSTINE	1/6/1956
		CHECKED BY	DATE

Section	Elem.	y	ΔA	yΔA	y²ΔA	I₀
	1	5.625	.54	3.0375	17.08594	.00338
13	2	2.845	.534(5.34)	1.5050	4.28173	1.23363
(L=5.96)	3	0	.80			.01067
	4	.216	.069	.0149	.00322	
			1.938	4.5574	21.37089	1.24958

$\bar{y} = 2.35232$; $I = 12.04.00$

	1	5.61	.60	3.36600	18.88326	.00450
14	2	4.23	.536(5.36)	1.48858	4.21468	1.21276
(L=5.96)	3	0	.80			.01067
	4	.216	.069	.0149	.00322	
			1.975	4.83968	23.09916	1.22793

$\bar{y} = 2.42590$; $I = 12.58451$

	1	5.65	.80	4.52	25.5380	.01067
15	2	2.825	.525(5.25)	1.4833	4.18984	1.20585
(L=6.05)	3	0	.80			.01067
	4	.216	.069	.0149	.00322	
			2.194	5.98823	29.73106	1.22719

$\bar{y} = 2.72987$; $I = 14.61415$

	1	5.67	.80	4.536	25.71058	.01067
16	2	2.825	.6396 (533)	1.80687	5.10441	1.61949
(L=6.05)	3	0	.64			.00346
	4	.176	.067	.01214	.00218	
			2.1486	6.34673	31.00743	1.63302

$\bar{y} = 2.95389$; $I = 13.77041$

FORM 194

AVRO AIRCRAFT LIMITED
MALTON · ONTARIO
TECHNICAL DEPARTMENT

REPORT No. 7/05.7/13
SHEET No. 6-A2

AIRCRAFT		PREPARED BY	DATE
C-105	Drag & Engine Cowl Arrangement	E. AUGUSTUS	1/MAY/55
		CHECKED BY	DATE

STATION

	ALLM.	y	Δx	yΔx	y²Δx	I_{oo}
	1	5.81	.96	5.5776	32.41286	.01843
17	2	4.865	.6492 (5.4)	1.85976	5.33841	1.58340
(L=6.21)	3	0	.64			.00376
	4	.176	.061	.01214	.00214	
			2.3102	7.47543	37.73671	1.60737

$\bar{y}$ = 3.20310 ; I = 15.53977

	1	5.81	.96	5.57760	32.40286	.01843
18	2	4.865	.7692 (5.4)	4.40376	6.31377	3.17684
(L=6.21)	3	0	.64			.00376
	4	.176	.061	.01214	.00214	
			2.43820	7.75943	38.73177	3.20073

$\bar{y}$ = 3.18646 ; I = 16.16619.

	1	5.81	1.2	6.972	40.50732	.03504
19	2	4.865	.7692	3.74376	6.31377	3.17684
(L=6.21)	3	0	.80			.00483
	4	.176	.061	.01214	.00214	
			2.2583	7.16262	46.82325	3.20671

$\bar{y}$ = 3.22867 ; I = 19.44232

AVRO AIRCRAFT LIMITED
MALTON - ONTARIO
TECHNICAL DEPARTMENT

AIRCRAFT		REPORT No	7/105/12
		SHEET No	6-2
C-105	DUST & STRESS BAY ANALYSIS	PREPARED BY	DATE
		E. ANGLESTEAD	14/JUNE/56
		CHECKED BY	DATE

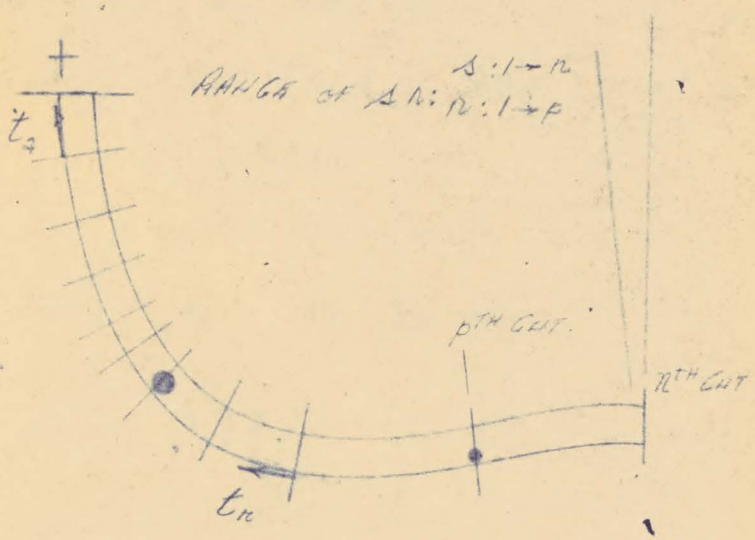
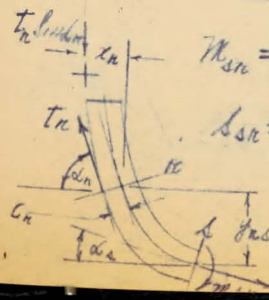


FIG. 5

FOR ENGINEERING, VERTICAL COMPONENTS OF t_n ARE RESOLVED AT THE HINGES. MOMENT & DIRECT LOAD COEFFICIENTS FOR THE p INDEPENDENT LOADS ARE THEN CALCULATED AS INDICATED BY THE FORMULAE (5 FIGS.) BELOW — GIVING THE MATRICES $M_{\Delta n}$ (MOMENT) & $S_{\Delta n}$ (DIRECT LOAD).

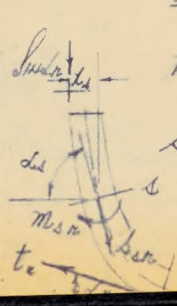
$\Delta > n$



$M_{\Delta n} = (y_{n\Delta} \cos\alpha_n + b_n \sin\alpha_n - c_n)\, t_n$

$S_{\Delta n} = \cos\alpha_n \cdot \cos\alpha_\Delta \cdot t_n$

$n > \Delta$



$M_{\Delta n} = t_\Delta \cdot \sin\alpha_n\, t_n$

$S_{\Delta n} = -\sin\alpha_n \cdot \sin\alpha_\Delta\, t_n$

AVRO AIRCRAFT LIMITED
MALTON · ONTARIO
TECHNICAL DEPARTMENT

AIRCRAFT		REPORT No. 7/65/10/12	
		SHEET No. 6-3	
C-105	DUCT & ENGINE BAY ANALYSIS	PREPARED BY	DATE
		E. AUGUSTINS	14/JUNE/56
		CHECKED BY	DATE

FINALLY, THE t_n ARE EXPRESSED IN TERMS OF THE GROUPS P_2, P_3 $(a: 3, 4)$ FROM THE CONDITIONS GIVEN BELOW.

APPLYING THESE CONDITIONS, GIVES —

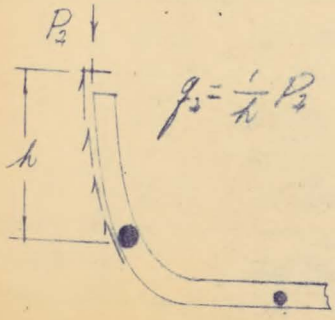
- FOR GROUP P_2: $t_n = f_3 \cdot \Delta s$

- FOR " P_3:
$$t_n = -f_3' \Delta s \quad (n: 1 \to 6)$$
$$t_7 = f_3' b_1 + f_3 b_7$$
$$t_n = f_3 \Delta s \quad (n: 8 \to p)$$

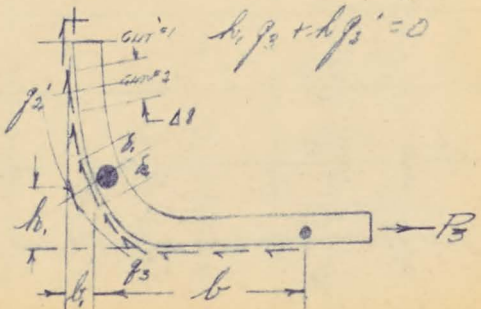
- FROM WHICH —

$$T_n = A_{na} \cdot P_a \quad (\text{REF. SHEET})$$

CONDITIONS —



$$b f_3 + b_1 f_3' = P_3$$
$$h_1 f_3 + h f_3' = 0$$



h, h_1, b, b_1 — DEFINED AS SUM OF COMPONENTS OF Δs IN VERT. & HORIZ. DIRECTIONS.

FORM 1704A

AVRO AIRCRAFT LIMITED
MALTON - ONTARIO
TECHNICAL DEPARTMENT

REPORT No. 7/0510/12
SHEET No. 6-7

AIRCRAFT:	DUCT & ENGINE BAY ANALYSIS	PREPARED BY	DATE
C-105		E. AUGUSTINE	MAY/1956
		CHECKED BY	DATE
		E Gunderson	MAY 56

FORMAT 697.28

CUT	Δ3	x	y	α	Sinα	Cosα	C
1	7.75	.69	0	92.75	.998848	-.047978	1.10
2	7.75	.45	8.00	92.75	.998848	-.047978	1.22
3	7.75	.25	16.00	92.75	.998848	-.047978	1.28
4	7.75	.10	23.86	88.00	.999391	.034899	1.50
5	7.75	1.41	31.46	74.75	.964787	.263031	1.50
6	7.75	3.81	38.00	61.00	.874620	.484810	1.50
7	3.875 3.875	8.16	43.78	45.75	.716302	.697790	1.50
8	6.50	12.97	47.90	35.00	.573576	.819157	1.50
9	6.50	18.70	51.23	24.00	.406737	.913545	1.50
10	6.50	24.41	52.80	9.50	.130526	.991445	1.50
11	6.50	30.85	52.44	-13.00	-.224951	.974370	1.50
12	5.95	38.60	49.12	-23.50	-.398749	.917060	1.50
13		47.70	46.98	-2.25	-.039260	.999229	
14		57.10	46.93	0	0	1/.000000	

AVRO AIRCRAFT LIMITED
MALTON ONTARIO
TECHNICAL DEPARTMENT

REPORT No. 7/0570/12
SHEET No. 6-2

AIRCRAFT:		PREPARED BY	DATE
C-105	AISA FORMAT 328.44	E. ANGLETWIG	MAY/1956
		CHECKED BY	DATE
		L Gardner	

	1	2	3	4	5	6	7	8	9	10	11	12
1	—	—	1	1	—	1	1	1	1	1	1	1
2	—	—	1	1	—	1	1	1	1	1	1	1
3	1	1	1	1	—	1	1	1	1	1	1	1
4	1	1	1	1	—	1	1	1	1	1	1	1
5	1	1	1	1	—	1	1	1	1	1	1	1
6	—	—	1	1	—	1	1	1	1	1	1	1
7	—	—	1	1	—	1	1	1	1	1	1	1
8	—	—	1	1	—	1	1	1	1	1	1	1
9	—	—	1	1	—	1	1	1	1	1	1	1
10	—	—	1	1	—	1	1	1	1	1	1	1
11	—	—	1	1	—	1	1	1	1	1	1	1
12	—	—	1	1	—	1	1	1	1	1	1	1
13	—	—	1	1	—	1	1	1	1	1	1	1
14	—	—	1	1	—	1	1	1	1	1	1	1

AVRO AIRCRAFT LIMITED

TECHNICAL DEPARTMENT (Aircraft)

REPORT No. 7/6510/12

SHEET No 6-11

AIRCRAFT	PREPARED BY	DATE
C-105	L. AUGUSTINE	MAY/1956
	CHECKED BY	DATE
	L Gundersen	MAY 56

FORMA 52 Q1.65

	1	2	3	4	5	6	7	8	9	10	11	12
1	— .801038	746973	.746978	.746986	.746950	.702508	.526860	.550410	.151879	0	— .028474	0
2	— .746951	— .730485	.490515	.490534	.415433	.466286	.685678	.550410	.098268	0	— .080824	0
3	— .082451	— 1.065633	— .040432	.319251	.319077	.749135	.346687	.152481	.098688	0	— .038098	0
4	— .436191	— .325076	— .376178	— .560021	— .138731	.131134	.108800	.086744	.086113	0	— .019063	0
5	— .725034	— .717412	— .649431	— .437178	— .302554	.374699	.310858	.699855	.078600	0	— .028388	0
6	— .132786	— .119222	— .822755	— .529111	— .172286	.370188	.572742	.762702	.360348	0	— .328686	0
7	— .491140	— .452228	— .450132	— .781225	— .786777	.821627	.088761	.624223	.085865	0	— .080824	0
8	— .450323	— .725687	— .700480	— .825745	— .413456	.534421	.102292	.742825	.103628	0	— .041760	0
9	— .820776	— .850910	— .824113	— .824782	— .773615	.530917	.555783	.636457	.094761	0	— .041760	0
10	— .822182	— .824688	— .841170	— .825080	— .777402	.457447	.558784	.845754	.047491	1 — .841	1 — .821	0
11	— .870776	— .825910	— .629714	— .435805	— .732418	.305394	.555783	.624223	.047491	1 — .841	1 — .821	0
12	— .843464	— .824688	— .799451	— .824782	— .696722	.118965	.570120	.549344	.047491	1 — .841	1 — .821	0
13	— .829220	— .849785	— .782222	— .824782	— .696722	.550446	.570120	.549344	.047491	1 — .841	1 — .821	0
14	— .824670	— .825852	— .781657	— .824782	— .696722	.550446	.570120	.549344	.146845	1 — .841	1 — .821	0
15	— .810446	— .801691	— .776403	— .824782	— .696722	.550446	.570120	.549344	.050120	1 — .841	1 — .821	0

AVRO AIRCRAFT LIMITED
MALTON - ONTARIO

TECHNICAL DEPARTMENT

REPORT No. 7/05/10/12
SHEET No. 6-12

AIRCRAFT:		PREPARED BY	DATE
C-105	S2N FORMER 37165	E. AUGUSTINE	MAY/1956
		CHECKED BY	DATE
		L. Gardeau	MAY/1956

1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
2	.000747	.000747	.000747	.000747	.000747	.000747	.000747	.000747	.000747	.000747	.000747	.000747	.000747	.000747	.000747	.000747	.000747	.000747	.000747	.000747	.000747	.000747	.000747	2
3	.000747	.000747	.000747	.000747	.000747	.000747	.000747	.000747	.000747	.000747	.000747	.000747	.000747	.000747	.000747	.000747	.000747	.000747	.000747	.000747	.000747	.000747	.000747	3
4	.000213	.000213	.000213	.000213	.000213	.000213	.000213	.000213	.000213	.000213	.000213	.000213	.000213	.000213	.000213	.000213	.000213	.000213	.000213	.000213	.000213	.000213	.000213	4
5	.000258	.000258	.000258	.000258	.000258	.000258	.000258	.000258	.000258	.000258	.000258	.000258	.000258	.000258	.000258	.000258	.000258	.000258	.000258	.000258	.000258	.000258	.000258	5
6	.018238	.018238	.018238	.018238	.018238	.018238	.018238	.018238	.018238	.018238	.018238	.018238	.018238	.018238	.018238	.018238	.018238	.018238	.018238	.018238	.018238	.018238	.018238	6
7	.022426	.022426	.022426	.022426	.022426	.022426	.022426	.022426	.022426	.022426	.022426	.022426	.022426	.022426	.022426	.022426	.022426	.022426	.022426	.022426	.022426	.022426	.022426	7
8	.046710	.046710	.046710	.046710	.046710	.046710	.046710	.046710	.046710	.046710	.046710	.046710	.046710	.046710	.046710	.046710	.046710	.046710	.046710	.046710	.046710	.046710	.046710	8
9	.051845	.051845	.051845	.051845	.051845	.051845	.051845	.051845	.051845	.051845	.051845	.051845	.051845	.051845	.051845	.051845	.051845	.051845	.051845	.051845	.051845	.051845	.051845	9
10	.053236	.053236	.053236	.053236	.053236	.053236	.053236	.053236	.053236	.053236	.053236	.053236	.053236	.053236	.053236	.053236	.053236	.053236	.053236	.053236	.053236	.053236	.053236	10
11	.051946	.051946	.051946	.051946	.051946	.051946	.051946	.051946	.051946	.051946	.051946	.051946	.051946	.051946	.051946	.051946	.051946	.051946	.051946	.051946	.051946	.051946	.051946	11
12	.053336	.053336	.053336	.053336	.053336	.053336	.053336	.053336	.053336	.053336	.053336	.053336	.053336	.053336	.053336	.053336	.053336	.053336	.053336	.053336	.053336	.053336	.053336	12
13	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	13
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	

FORM 1319A

AVRO AIRCRAFT LIMITED
MALTON, ONTARIO
TECHNICAL DEPARTMENT

AIRCRAFT: C105

REPORT No. 21,310

SHEET No. 6-13

PREPARED BY: [illegible] DATE: MAY 56

CHECKED BY: [illegible] DATE: 31 MAY 56

i / K	1	2	3	4	5	6	7	8	9	10	11	12
1	-.310 959	.699 041	.699 041	.699 894	.685 948	.629 156	.522 240	.388 899	.253 709	.073 170	-.175 266	-.127 565
2	-.669 461	-.700 658	.479 342	.479 927	.470 364	.431 421	.358 107	.266 674	.173 970	.050 173	-.120 182	-.087 473
3	-1.077 681	-1.108 879	-1.120 329	.239 964	.235 182	.215 711	.179 054	.133 337	.086 985	.025 087	-.060 091	-.043 737
4	-1.480 669	-1.511 866	-1.523 316	-1.450 000	0	0	0	0	0	0	0	0
5	-1.870 572	-1.901 769	-1.913 219	-1.319 983	-.874 856	.665 108	.552 082	.411 122	.268 204	.077 351	-.185 281	-.134 855
6	-2.229 597	-2.260 794	-2.272 244	-1.200 262	.492 808	1.051 442	2.200 868	1.638 932	1.069 192	.308 358	-.738 621	-.537 596
7	-2.546 753	-2.577 950	-2.589 401	-1.094 503	1.920 979	3.707 970	3.517 478	3.877 879	2.529 817	.729 605	-1.747 652	-1.272 007
8	-2.794 302	-2.825 500	-2.836 950	-1.011 955	2.643 989	5.781 465	6.667 100	5.182 398	4.418 119	1.274 196	-3.052 132	-2.221 457
9	-2.964 394	-2.995 592	-3.007 042	-.955 236	3.291 935	7.206 171	8.831 216	7.884 676	4.916 372	1.902 410	-4.556 916	-3.316 695
10	-3.053 365	-3.084 563	-3.096 013	-.925 567	3.630 861	7.951 401	9.963 216	9.298 124	6.580 736	1.937 068	-6.196 905	-4.510 341
11	-3.029 197	-3.058 395	-3.069 845	-.934 243	3.531 177	7.732 216	9.630 275	8.882 440	6.114 782	1.439 307	-7.379 383	-5.698 520
12	-2.913 105	-2.944 302	-2.955 752	-.972 337	3.096 555	6.776 567	8.178 652	7.067 835	4.053 004	1.728 251	-11.509 945	-8.737 862
13	-2.862 337	-2.893 536	-2.904 986	-.989 267	2.903 168	6.351 347	7.532 746	6.263 309	3.178 756	-2.692 932	-12.449 049	-7.691 640
14	-2.857 105	-2.888 303	-2.899 753	-.991 012	2.883 231	6.307 510	7.466 158	6.180 162	3.085 776	-2.792 390	-12.545 864	-9.789 945

AVRO AIRCRAFT LIMITED
MALTON - ONTARIO

TECHNICAL DEPARTMENT

REPORT No 7/ES10/12

SHEET No 6-15

AIRCRAFT:		PREPARED BY	DATE
C-105	MACH FORMAT 697.28	E. AUGUSTINE	MAY/1955
		CHECKED BY	DATE
		L. Gardner	

	1	2	3	4	5	6	7	8	9	10	11	12
1	— .40745	— .64218	1/2 .68285	— .66350	— .66703	— .60385	.47685	.52007	.38062	.01065	— .13216	— .37513
2	— .77861	— .77018	1/2 .44165	— .44.1Mb	— .34654	— .31577	.22486	.23800	.18203	.03837	— .10433	— .17743
3	1/2 .17344	1/2 .65242	1/2 .30085	1/2 .24010	1/2 .24111	1/2 .21155	.17670	.14244	.10164	.03262	— .09288	— .09869
4	1/2 .35555	1/2 .53442	1/2 .30435	1/2 .20001	1/2 .09477	1/2 .07962	.05160	.05238	.04636	.01055	— .03995	— .03675
5	1/2 .92085	1/2 .84060	1/2 .84238	1/2 .13462	1/2 .33402	1/2 .68210	.56725	.64037	.44357	.13736	— .32144	— .46962
6	1/2 .42952	1/2 .20958	1/2 .18576	— .96592	1/2 .20116	1/2 .83202	.72111	.65000	.47868	.47304	— .85706	— .51226
7	1/2 .51177	1/2 .48711	1/2 .46311	— .10.4773	1/2 .20033	1/2 .63404	.54004	.63080	.37777	.06502	— .25800	— .35992
8	1/2 .40841	1/2 .66940	1/2 .46.1756	— .56089	1/2 .91163	1/2 .62031	.47.1999	.52.1381	.32.1.1.1	.05.1.1.1	— .20.1.1.1	— .18.1.1.1
9	1/2 .86708	1/2 .64.1.1.1	1/2 .54.1.1.1	— .46.1.1.1	1/2 .54.1.1.1	1/2 .46.1.1.1	.39.1.1.1	.43.1.1.1	.29.1.1.1	.04.1.1.1	— .16.1.1.1	— .14.1.1.1
10	1/2 .94033	1/2 .91.1.1.1	1/2 .87.1.1.1	— .32.1.1.1	1/2 .32.1.1.1	1/2 .27.1.1.1	.23.1.1.1	.25.1.1.1	.17.1.1.1	.02.1.1.1	— .09.1.1.1	— .08.1.1.1
11	1/2 .97671	1/2 .90.1.1.1	1/2 .87.1.1.1	— .40.1.1.1	1/2 .40.1.1.1	1/2 .33.1.1.1	.28.1.1.1	.30.1.1.1	.21.1.1.1	.03.1.1.1	— .11.1.1.1	— .10.1.1.1
12	1/2 .91.1.1.1	1/2 .84.1.1.1	1/2 .71.1.1.1	— .32.1.1.1	1/2 .32.1.1.1	1/2 .26.1.1.1	.22.1.1.1	.24.1.1.1	.17.1.1.1	.02.1.1.1	— .09.1.1.1	— .08.1.1.1
13	1/2 .69.1.1.1	1/2 .64.1.1.1	1/2 .54.1.1.1	— .24.1.1.1	1/2 .24.1.1.1	1/2 .20.1.1.1	.17.1.1.1	.18.1.1.1	.13.1.1.1	.02.1.1.1	— .07.1.1.1	— .06.1.1.1
14	1/2 .69.1.1.1	1/2 .63.1.1.1	1/2 .61.1.1.1	— .29.1.1.1	1/2 .29.1.1.1	1/2 .24.1.1.1	.20.1.1.1	.22.1.1.1	.15.1.1.1	.02.1.1.1	— .08.1.1.1	— .07.1.1.1

FORM 1318A

AVRO AIRCRAFT LIMITED
MALTON ONTARIO

TECHNICAL DEPARTMENT

REPORT No 3/3510/12

SHEET No 6-16

AIRCRAFT:		PREPARED BY	DATE
C-105	2 SK FORM 54 697.32	E. AUGUSTINE	MAY/1956
		CHECKED BY	DATE
		G Saunders	

	1	2	3	4	5	6	7	8	9	10	11	12
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
12	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

AVRO AIRCRAFT LIMITED
MALTON · ONTARIO

TECHNICAL DEPARTMENT

REPORT No. 16510/13

SHEET No. 6-18

AIRCRAFT:		PREPARED BY	DATE
C-105	SAI6 FORMER 925.50	E. Andreiko	28/MAY/56
		CHECKED BY	DATE
		L. Jenkinson	MAY 56

	1	2	3	4	5	6	7	8	9	10	11	12	13
1	—	—	—	—	—	—	—	—	—	—	—	—	—
2	—	—	—	—	—	—	—	—	—	—	—	—	—
3	—	—	—	—	—	—	—	—	—	—	—	—	—
4	—	—	—	—	—	—	—	—	—	—	—	—	—
5	—	—	—	—	—	—	—	—	—	—	—	—	—
6	—	—	—	—	—	—	—	—	—	—	—	—	—
7	—	—	—	—	—	—	—	—	—	—	—	—	—
8	—	—	—	—	—	—	—	—	—	—	—	—	—
9	—	—	—	—	—	—	—	—	—	—	—	—	—
10	—	—	—	—	—	—	—	—	—	—	—	—	—
11	—	—	—	—	—	—	—	—	—	—	—	—	—
12	—	—	—	—	—	—	—	—	—	—	—	—	—
13	—	—	—	—	—	—	—	—	—	—	—	—	—
14	—	—	—	—	—	—	—	—	—	—	—	—	—
15	—	—	—	—	—	—	—	—	—	—	—	—	—

AVRO AIRCRAFT LIMITED
MALTON · ONTARIO
TECHNICAL DEPARTMENT

REPORT No. 7/0510/12
SHEET No. 6-24

AIRCRAFT:		PREPARED BY	DATE
C-105	DUCT & ENGINE BAY AERODYNAMICS	E. AUGUSTINE	MAY/1956
		CHECKED BY	DATE
		L Gordon	MAY/1956

FOR MACH 59.65 —

SOLVE FOR f_2, f_2', f_3 —

$A = 49.055596$

$A_1 = 7.840575$

$b_1 = 5.160402$

$b = 33.722288$

$$f_2 = \frac{1}{49.055596} P_2 = .020385303\, P_2$$

$$33.722288\, f_3 + 5.160202\, f_2' = P_3$$

$$7.840575\, f_3 + 49.055596\, f_2' = 0$$

$$f_3 = .030397442\, P_3$$

$$f_2' = -.004858844\, P_3$$

AVRO AIRCRAFT LIMITED
MALTON · ONTARIO
TECHNICAL DEPARTMENT

REPORT No. 7/C370/13
SHEET No. C-24

AIRCRAFT:	
C-105	DUCT & ENGINE BAY ANALYSIS

PREPARED BY	DATE
E. AUGUSTINE	MAY/1956
CHECKED BY	DATE
L. Gundason	MAY/1956

FORMER 521.65

$$T_{T_n}/_{P_3} = -.00485844\ \Delta S_i\ P_3$$
$n: 1 \to 6$

$$T_{T_n}/_{P_3} = .03039742\ \Delta S_i\ P_3$$
$n: 8 \to 12$

$$T_{T_7}/_{P_3} = (-4.20 \times .00485844 + 4.13 \times .03039742)\ P_3$$
$$= .10483194\ P_3$$

$A_{n4} =$

1	.031337
2	.056438
3	.080851
4	.080851
5	.085716
6	.090422
7	.104834
8	.250475
9	.244617
10	.233431
11	.182335
12	.080749

AVRO AIRCRAFT LIMITED
MALTON ONTARIO
TECHNICAL DEPARTMENT

REPORT No 7/STD/13
SHEET No 6-27

AIRCRAFT	
C105	Dust & Smoke Dept. Aerodynamics

PREPARED BY	DATE
L. Gunderson	MAY 56
CHECKED BY	DATE
F. Angus & Tuns	May/1956

FORMER 644

$T_n) P_3 = -.00499990 \Delta s_i \cdot P_3$
$n: 1 \to 6$

$T_n) P_3 = .03101386 \Delta s_i \cdot P_3$
$n: 8 \to 12$

$A_{n4} =$

1	-.0387492
2	
3	
4	
5	
6	-.0387492
7	.1008041
8	.2248505
9	
10	
11	.2248505
12	.1163020

AVRO AIRCRAFT LIMITED
MALTON · ONTARIO
TECHNICAL DEPARTMENT

AIRCRAFT:	
C-105	Duct & Engine Bay Analysis

REPORT No. 7/2510/13
SHEET No 6-29

PREPARED BY	DATE
E. Augustus	[illegible] 1956
CHECKED BY	DATE
L Gardner	

FORMER 647.38 —

$T_{H_2}/P_2 = .07083351 \cdot A_{H_2} \cdot P_2$

$A_{H_2} =$

1	.161460
2	.161460
3	.161460
4	.161460
5	.161460
6	.161460
7	.080730

FORM 1108A

AVRO AIRCRAFT LIMITED
MALTON ONTARIO
TECHNICAL DEPARTMENT

REPORT No. 7/0510/12
SHEET No 6-40

AIRCRAFT:		PREPARED BY	DATE
C-105	DUCT & ENGINE BAY ANALYSIS	E. AUGUSTINE	MAY/1956
		CHECKED BY	DATE
		L Gundersen	MAY 56

FORMER 697.28 —— MOMENT

T60 (2:1~14) (SET #4)

		1	2	3	4	CHECK SUMS.
CHECK SUMS		508.50	245.00	6.340009	3.480773	2663592.36
	1		.69	.513325	.035052	.194553
	2	8 .00	.45	.052147	.078527	7 .680669
	3	16 .00	.25	.430103	.134230	15 .454127
	4	23 .86	.10	.952383	.203767	23 .021376
	5	31 .46	.21	.914522	.411509	29 .754787
	6	38 .00	.81	.470588	.846025	34 .559437
	7	43 .78	.16	.250624	.374965	37 .244989
	8	47 .90	.99	.901357	.811481	37 .648538
	9	51 .23	.70	.438106	.197863	36 .155767
	10	52 .80	.41	.688481	.984303	34 .060784
	11	52 .44	.85	.631071	.664875	29 .875746
	12	49 .12	.60	.101616	.959717	8 .661897
	13	46 .98	.70	.960241	.099719	5 .892348
	14	46 .93	.10	.952364	.189719	14 .561954

AVRO AIRCRAFT LIMITED
MALTON · ONTARIO
TECHNICAL DEPARTMENT

REPORT No. 7/0510/12
SHEET No. 6-36

AIRCRAFT:		PREPARED BY	DATE
C-105	DUCT & ENGINE BAY ANALYSIS	E. AUGUSTINE	MAY/1956
		CHECKED BY	DATE
		L Gundersen	

FORMER 591.65 — MOMENT

T22 (2:1 ~ 15) (SET #2)

CHECK SUMS		1 536.940 000	2 $\bar{2}$90.690 000	3 $\bar{2}$.796 803	4 13.546 076	CHECK SUMS 256.999 273
	1	.	$\bar{.}$750000	.534185	.053840	$\bar{.}$171 995
	2	8 .520000	$\bar{.}$500000	.043501	.108799	8.202 300
	3	14 .920000	$\bar{.}$320000	$\bar{.}$369560	.164346	14.424 786
	4	21 .260000	$\bar{.}$140000	$\bar{.}$818577	.428461	20.529 882
	5	27 .400000	$\bar{.}$400000	$\bar{1}$.134808	.365797	26.230 989
	6	35 .000000	$\bar{4}$.050000	$\bar{1}$.087438	.747710	32.610 472
	7	42 .000000	$\bar{3}$.620000	$\bar{.}$600119	1 .322161	37.102 042
	8	46 .800000	$\bar{11}$.600000	$\bar{.}$095204	4 .060160	37.164 956
	9	49 .100000	$\bar{18}$.780000	.146734	2 .495950	32.962 684
	10	49 .510000	$\bar{36}$.420000	.189867	2 .227387	25.502 249
	11	49 .100000	$\bar{32}$.960000	.146734	1 .495028	17.761 762
	12	48 .560000	$\bar{38}$.550000	.087931	.817864	11.117 795
	13	48 .520000	$\bar{44}$.980000	.069745	.627964	4.087 809
	14	48 .320000	$\bar{50}$.920000	.054166	.477864	$\bar{2}$.167 970
	15	48 .120000	$\bar{56}$.900000	.043647	.377865	$\bar{8}$.358 488

AVRO AIRCRAFT LIMITED
MALTON · ONTARIO
TECHNICAL DEPARTMENT

REPORT No. 7/450/12
SHEET No. 6-35

AIRCRAFT		PREPARED BY	DATE
C105	DUCT & FUEL BAY ANALYSIS.	E. AUGUSTINE	NOV/1956
		CHECKED BY	DATE
		L Gardner	

FORWARD 538.22 in. DIRECT LOAD

Tea (L = 15 → 28) (SET #1)

	1	2	3	4	CHECK SUMS
CHECK SUMS	7.903367	7.132360	2.193659	4.016404	16.858472
15	-.054396	.998630	-.875113	-.029249	0.047932
16	-.052336	.998630	-.672546	-.061380	0.212368
17	-.052336	.998630	-.514445	-.091141	0.340708
18	1	1.000000	-.374340	-.118153	0.509527
19	.121869	.992546	-.242203	-.141494	0.730968
20	.406737	.913545	-.093764	-.153939	1.070581
21	.615661	.788011	.019637	-.090135	1.333169
22	.917060	.398749	.074135	.123416	1.513360
23	.999048	.043619	.080763	.342621	1.466051
24	1	1.000000	.080840	.537649	1.618489
25	1	1.000000	.080840	.756014	1.836854
26	1	1.000000	.080840	.935945	2.016785
27	1	1.000000	.080840	1	2.080840
28	1	1.000000	.080840	1.000000	2.080840

AVRO AIRCRAFT LIMITED
MALTON - ONTARIO
TECHNICAL DEPARTMENT

REPORT NO. 7/0510/12
SHEET NO. G-31

AIRCRAFT:	
C105	DRIFT & LANDING GEAR ANALYSIS

PREPARED BY	DATE
L. Gunderson	MAY 56
CHECKED BY	DATE
E. AUGUSTINE.	

FORMER 742.50 —

SOLVE FOR β_2, β_2', β_3 —

$$h = \sum_{1}^{7} \Delta S \times \sin\alpha = 47.264\,862$$

$$h_1 = \sum_{1}^{13} \Delta S \times \sin\alpha = 1.347\,423$$

$$b = \sum_{1}^{13} \Delta S \times \cos\alpha = 34.204\,953$$

$$b_1 = \sum_{1}^{7} \Delta S \times \cos\alpha = 8.355\,738$$

$$\beta_2 = \frac{1}{h} \times P_2 = \underline{0.021\,157\,4}$$

$b \times \beta_3 + b_1 \beta_2' = P_3$, $h_1 \beta_3 + h \beta_2' = 0$.

$\therefore$ $34.204\,953\,\beta_3 + 8.355\,738\,\beta_2' = P_3$ ——— (1)

$1.347\,423\,\beta_3 + 47.264\,862\,\beta_2' = 0$ ——— (2)

MULT (1) BY $\frac{47.264\,862}{8.355\,738}$

SUBT (2)

$193,482\,875\,\beta_3 + 47.264\,862\,\beta_2' = 5.656\,575\,P_3$

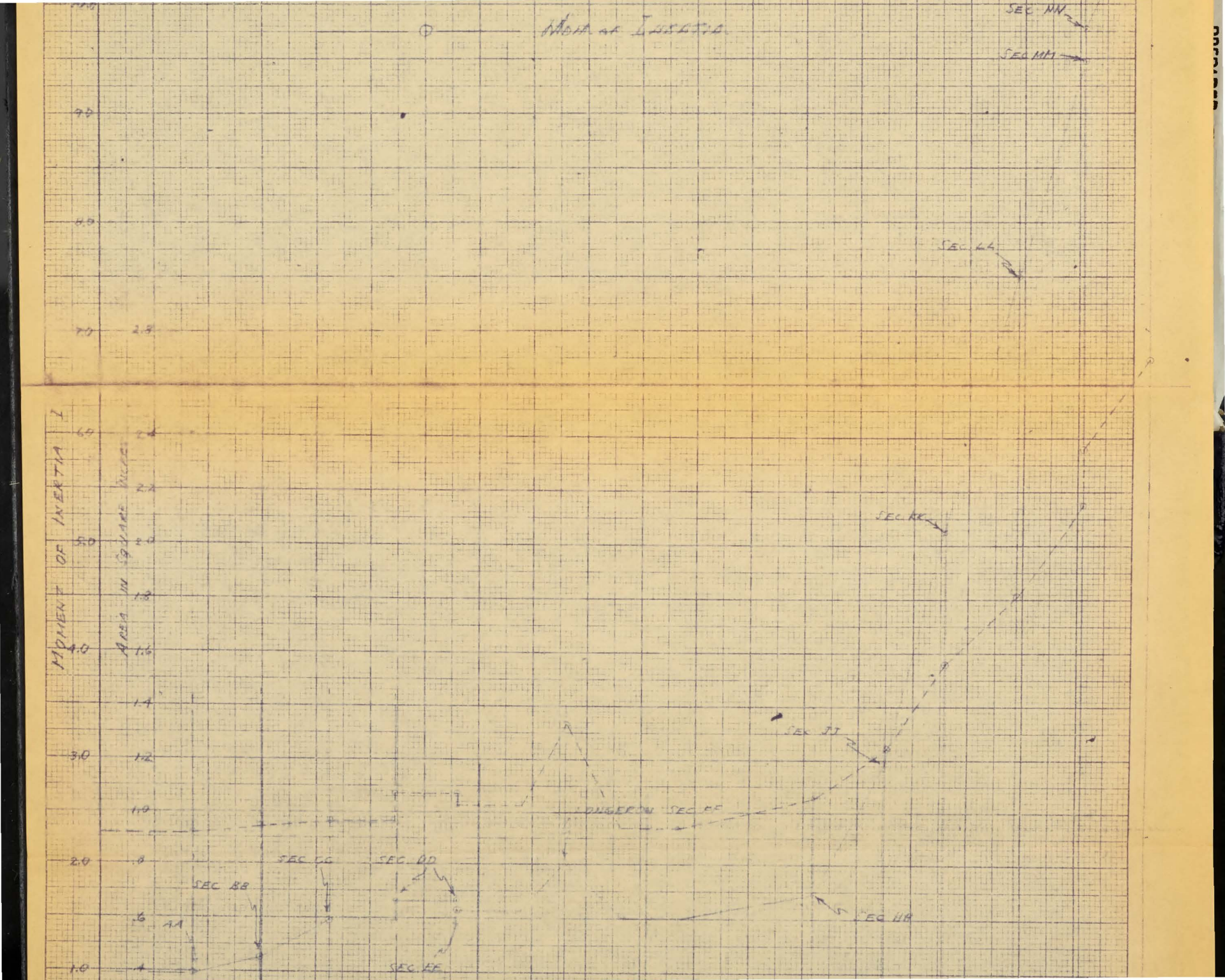
$-1,347\,423\,\beta_3 - 47.264\,862\,\beta_2' = 0$

$192,135\,472\,\beta_3 = 5.656\,575\,4\,P_3$

$\beta_3 = \underline{0.029\,440\,55\,P_3}$

SOLVING FOR β_2' IN (2)

$\beta_2' = \underline{-0.000\,839\,30\,P_3}$


MOMENT OF INERTIA I
AREA IN SQUARE INCHES
SEC NN
SEC MM
SEC LL
SEC KK
SEC JJ
SEC HH
SEC GG
SEC DD
SEC BB
SEC AA
SEC FF
LONGER ON SEC FF

AVRO AIRCRAFT LIMITED
MALTON · ONTARIO

TECHNICAL DEPARTMENT

REPORT No. 7/8510/13

SHEET No. 7-16

AIRCRAFT:		PREPARED BY	DATE
C-105	DUCT & ENGINE BAY ANALYSIS	E. AUGUSTINE	9/JUNE/53
		CHECKED BY	DATE
		J. E. ANDREWS	13/JUNE/56

LIGHT FRAMES - 644.43 - C.I.A.

	1	2	3	4	5	6	7	8	9	10	11	12	13
1	.078396	.037912											
2	.037912	156436	.037376										
3		.037376	135617	.031202									
4			.031202	113453	.027765								
5				.027765	.109637	.027054							
6					.027054	.108963							
7							.021140	.006570					
8							.021140	.019662	.006667				
9							.006570	.019662	.013106	.000985			
10								.006570	.013106	.000985	.000394		
11									.006667	.000985	.000394	.000394	
12										.000394	.000394	.000394	.000394
13												.000394	.000394

FORM 319A

INTERMEDIATE FORMERS ~ 591.65 ~ Cik

	1	2	3	4	5	6	7	8	9	10	11	12	13
1	.110001	.053557											
2	.053557	.181804	.036896										
3		.036896	.140953	.030832									
4			.030832	.107672	.024609								
5				.024609	.101496	.029235							
6					.029235	.117314							
7							.119862	.059931					
8							.059931	.208883	.044510				
9								.044510	.178181	.042293			
10									.042293	.158129	.037590		
11										.037590	.165386	.046270	
12											.046270	.185673	.046567
13												.046567	.093133

AIRCRAFT C ~ 105

AERO AIRCRAFT LIMITED
MALTON ONTARIO
TECHNICAL DEPARTMENT

DUCT & ENGINE BAY ANALYSIS

REPORT No. 7851/12
SHEET No. 7-15

		DATE
PREPARED BY	J.E. ANDREWS	18/JUNE/'56
CHECKED BY	E. [illegible]	[illegible]
		DATE

PREPARED BY J.E. ANDREWS DEC

PREPARED BY L.E. ANDREWS REF

AVRO AIRCRAFT LIMITED
MALTON · ONTARIO
TECHNICAL DEPARTMENT

REPORT No 7/0510/12
SHEET No 6-53

AIRCRAFT:		PREPARED BY	DATE
C105	DUST & ENGINE BAY ANALYSIS	L Gunderson	
		CHECKED BY	DATE
		F. AUGUSTINE	24/MAY/1956

FORMER 538.77

SECTION PROPERTIES

CUT	ΔS (N.A)	I	I_m	A	A_m
1		1.91		1.463	
	8.00		1.91		1.3275
2		1.91		1.192	
	8.00		2.305		1.218
3		2.70		1.244	
	8.00		3.20		1.270
4		3.70		1.296	
	5.16		3.925		1.343
5		4.15		1.390	
	7.58		4.440		1.430
6		4.73		1.470	
	5.40		5.395		1.480
7		6.06		1.490	
	7.36		7.005		1.504
8		7.95		1.518	
	4.54		8.150		1.474
9		8.35		1.430	
	7.13		8.925		1.488
10		9.50		1.546	
	7.13		9.910		1.5965
11		10.32		1.647	
	8.95		11.460		1.821
12		12.60		1.995	
	8.36		14.025		2.1475
13		15.45		2.300	
	10.15		17.450		2.569
14		19.45		2.838	

PREPARED BY J.E. ANDREWS REF

AVRO AIRCRAFT LIMITED
MALTON · ONTARIO
TECHNICAL · DEPARTMENT

REPORT No 2/0510/12
SHEET No 6-57

AIRCRAFT:		PREPARED BY	DATE
C-105	DIST. ENGINE BAY ANALYSIS.	E. ALIGHIERI	MAY/1956
		CHECKED BY	DATE
		J. E. ANDREWS	JUNE '56

FORMER 644.42 —

SECTION PROPERTIES —

CUT	$\Delta\rho$ (K/A)	I	I_m	A	A_m
1	6.82	.75	.875	.90	.915
2	7.78	1.00	1.15	.93	.955
3	7.74	1.30	1.40	.98	.98
4	7.42	1.50	1.55	.98	.995
5	7.38	1.60	1.60	1.01	1.01
6	7.33	1.60	1.56	1.01	1.01
7	7.07	1.52	1.485	1.01	1.01
8	6.89	1.45	1.535	1.01	1.045
9	6.96	1.62	1.71	1.08	1.16
10	6.59	1.80	2.14	1.24	1.31
11	7.46	2.48	3.34	1.38	1.365
12	9.31	4.20	6.66	1.35	1.785
13	9.26	9.14	11.25	2.22	2.725
14		13.38		3.23	

FORM 1319A

FORMER 538.77 C.L.K. (SET #1)

AVRO AIRCRAFT LIMITED
MALTON, ONTARIO
TECHNICAL DEPARTMENT

AIRCRAFT: C105

DUCT & ENGINE BAY ANALYSIS

REPORT NO. 7/0510/12
SHEET NO. 6-67

PREPARED BY: L. Goodban — DATE: MAY 56
CHECKED BY: E. HIGHSMITH — DATE: 25/5/56

	15	16	17	18	19	20	21	22	23	24	25	26	27	28
15	.173594	.095656												
16	.095656	.426121	.104256											
17		.104256	.408309	.099787										
18			.099787	.322359	.060986									
19				.060986	.290967	.084138								
20					.084138	.280315	.057915							
21						.057915	.271865	.077676						
22							.077676	.248865	.048890					
23								.048890	.259074	.076058				
24									.076058	.292819	.070889			
25										.070889	.309943	.078014		
26											.078014	.275450	.061792	
27												.061792	.255486	.062713
28													.062713	.113538
5 .886645	.269250	.626033	.612552	.483332	.436091	.422368	.407456	.375431	.384022	.439766	.458846	.415256	.379991	.176251

PREPARED BY I F ANDREWS REF

PREPARED BY L.E. ANDREWS REF

AVRO AIRCRAFT LIMITED
MALTON - ONTARIO
TECHNICAL DEPARTMENT

REPORT No. 7/DS10/12
SHEET No. 6-63

AIRCRAFT:		PREPARED BY	DATE
C-105	Dust & Engine Bay Ahead 913	E. Augustine	May/1956.
		CHECKED BY	DATE
		L. Gunderson	

FORMULA 5 21.4.5 — C.G. (Nest #3)

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |

PREPARED BY L.E. ANDREWS REF

AVRO AIRCRAFT LIMITED
MALTON - ONTARIO
TECHNICAL DEPARTMENT

REPORT No. 2/0510/12
SHEET No. 6-64

AIRCRAFT:		PREPARED BY	DATE
C-105	Duct & Engine Bay Airflows	F. Augustine	29/Apr/55
		CHECKED BY	DATE
		L. Gardiner	

FORMULA: $\frac{\text{Total Pressure}}{\text{Dynamic Pressure}} = \frac{P_t}{q}$

	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
10																					237224
11																					442546
12																					770042
13																					643613
14																					618200
15																					684017
16																					730703
17																					722861
18																					760275
19																					731727
20																					636499
21																					459491
22																					368827
23																					329251
24																					242363
25																					181164
26																					
27																					
28																					
29																					
30																					

(Test No. 2)

FORM 1118A

PREPARED BY L.E. ANDREWS REF

AVRO AIRCRAFT LIMITED
MALTON · ONTARIO
TECHNICAL DEPARTMENT

REPORT No. 7/0510/12
SHEET No. 6-65

AIRCRAFT		PREPARED BY	DATE
C-105	Dust & Erosion Rig Analysis	E. AUGUSTINE	MAY/1956
		CHECKED BY	DATE
		L.E.A.	

FORMULA C.P.H. No. — C.105 (DUST #3)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	.272317	.154807	.107588	.083755	.044706	.018926	.009563	.005370	.003637	.002448	.001655	.001119	.000757	.000512
2	.134509	.065576	.107384	.082844	.044774	.018926	.009563	.005370	.003637	.002448	.001655	.001119	.000757	.000512
3	.066178	.107384	.082755	.044706	.018926	.009563	.005370	.003637	.002448	.001655	.001119	.000757	.000512	.000346
4	.032844	.082844	.044706	.018926	.009563	.005370	.003637	.002448	.001655	.001119	.000757	.000512	.000346	.000234
5	.016286	.044774	.018926	.009563	.005370	.003637	.002448	.001655	.001119	.000757	.000512	.000346	.000234	.000158
6	.008082	.018926	.009563	.005370	.003637	.002448	.001655	.001119	.000757	.000512	.000346	.000234	.000158	.000107
7	.004013	.009563	.005370	.003637	.002448	.001655	.001119	.000757	.000512	.000346	.000234	.000158	.000107	.000072
8	.001992	.005370	.003637	.002448	.001655	.001119	.000757	.000512	.000346	.000234	.000158	.000107	.000072	.000049
9	.000989	.003637	.002448	.001655	.001119	.000757	.000512	.000346	.000234	.000158	.000107	.000072	.000049	.000033
10	.000491	.002448	.001655	.001119	.000757	.000512	.000346	.000234	.000158	.000107	.000072	.000049	.000033	.000022
11	.000244	.001655	.001119	.000757	.000512	.000346	.000234	.000158	.000107	.000072	.000049	.000033	.000022	.000015
12	.000121	.001119	.000757	.000512	.000346	.000234	.000158	.000107	.000072	.000049	.000033	.000022	.000015	.000010
13	.000060	.000757	.000512	.000346	.000234	.000158	.000107	.000072	.000049	.000033	.000022	.000015	.000010	.000007
14	.000030	.000512	.000346	.000234	.000158	.000107	.000072	.000049	.000033	.000022	.000015	.000010	.000007	.000005
CHECK SUM	.716024	.697587	.524137	.484587	.478386	.435198	.430905	.452455	.401486	.342079	.264184	.154399	.099895	.037036

FORM 1193A

FORMER 742.5 – C2k (SET # 5)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1	.483516	.136646														.620162
2	.136646	.340548	0.068975													.546169
3		.068975	.252986	.055267												.377228
4			.055267	.194864	.045247											.295378
5				.045247	.169772	.040626										.255645
6					.040626	.151223	.036982									.228831
7						.036982	.144078	.035657								.216717
8							.035657	.145005	.036606							.217268
9								.036606	.151111	.039270						.226987
10									.039270	.162853	.038147					.240270
11										.038147	.144322	.033322				.215791
12											.033322	.125731	.022103			.181156
13												.022103	.083533	.015094		.120730
14													.015094	.038865	.007744	.061703
15														.007744	.014090	.021834
	.620162	.546169	.377228	.295378	.255645	.228831	.216717	.217268	.226987	.240270	.215791	.181156	.120730	.061703	.021834	3 .826369

AIRCRAFT: C 105

ALRO AIRCRAFT LIMITED
MALTON ONTARIO

TECHNICAL DEPARTMENT

DUCT & ENGINE BAY ANALYSIS

REPORT NO. 11/0510/12

SHEET NO. 6-69

PREPARED BY: J. E. ANDREWS — DATE: 1/JUNE/56

CHECKED BY: E. KINGHAM — DATE:

PREPARED BY J. E. ANDREWS REF

AVRO AIRCRAFT LIMITED
MALTON - ONTARIO
TECHNICAL DEPARTMENT

REPORT No 7/0510/12
SHEET No 6-70

AIRCRAFT: C-105

Duct & Engine Bay Analysis.

PREPARED BY: F. Augustine — DATE: 4/June/56
CHECKED BY: J. E. ANDREWS — DATE: JUNE '56

FORM 5913A

FORMER 742.5 – C.G.B. (SET # 5)

	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
16	.096108	.059411														.156114
17	.059411	.274443	.066564													.401418
18		.066564	.272139	.067548												.426251
19			.067548	.249661	.060562											.377779
20				.060562	.336652	.058831										.356045
21					.058831	.227218	.053809									.339858
22						.053809	.204187	.045561								.302357
23							.045561	.168638	.040709							.254704
24								.040709	.160756	.037766						.241231
25									.037766	.156746	.038069					.234581
26										.038069	.148904	.035934				.222907
27											.035934	.141041	.033555			.210530
28												.033555	.155747	.043937		.233439
29													.043937	.149567	.032288	.225792
30														.032288	.063051	.095339
	.156114	.401418	.426251	.377779	.356045	.339858	.302357	.254704	.241231	.234581	.222907	.210530	.233439	.225792	.095339	4 .078345

AVRO AIRCRAFT LIMITED
MALTON - ONTARIO
TECHNICAL DEPARTMENT

REPORT No. 7/25 0/12
SHEET No. 6-72

AIRCRAFT	
C-105	DUST & GUSTS RAT ANALYSIS

PREPARED BY	DATE
F. AUGUSTINE	30/JUNE/56
CHECKED BY	DATE
J.E. ANDREWS	26/JUNE/56

Z_{uv} CALCULATIONS (REF. PROGRAM SHEET C-71)

FORMULA 528.77 (REF. 71)

H_{w1} =

.603314
.031750
.013421

$\frac{H_{uv}}{H_{11}}$ =

.386700	.020185	.008537

$\frac{H_{w1} \cdot H_{1v}}{H_{11}}$ =

.235235	.012278	.005193
.012278	.000641	.000271
.005193	.000271	.000116

H_{uv} =

.423734	.021918	.009833
.021918	.001607	.000975
.009833	.000975	.001253

Z_{uv} =

.198699	.005060	.008026
.005060	.000968	.000174
.008026	.000174	.001737

AVRO AIRCRAFT LIMITED
MALTON · ONTARIO
TECHNICAL DEPARTMENT

REPORT No 7/STR/12
SHEET No 6-76

AIRCRAFT:		PREPARED BY	DATE
C-105	DUST & ENGINE FAI	E. RHEAUME	23/JUNE/56
		CHECKED BY	DATE
		J.E. ANDREWS	26/JUNE/56

FORMSA 743.50 (SAT. #5).

H_{ui}

$\bar{1}.920448$
$.082553$
$\bar{1}.125253$

$\frac{H_{ir}}{H_{ii}} =$

$\bar{1}.435113$	$.021488$	$\bar{2}.041008$

$\frac{H_{ui} H_{ur}}{H_{ii}} =$

$.E.6413$	$\bar{1}.039346$	$.078754$
$\bar{1}.039347$	$.001856$	$\bar{2}.003795$
$.078755$	$\bar{3}.003795$	$.007597$

$H_{ur} =$

$\bar{1}.185094$	$\bar{2}.054216$	$.160871$
$\bar{2}.054216$	$.014870$	$\bar{3}.004339$
$.160871$	$\bar{3}.004339$	$.031161$

$Z_{ur} = Z_{ur}^{*} =$

$.371655$	$\bar{1}.014870$	$.089116$
$\bar{1}.014870$	$.002921$	$\bar{2}.000544$
$.089116$	$\bar{2}.000544$	$.023768$

FORM 1108A

PREPARED BY J.E. ANDREWS REF

AVRO AIRCRAFT LIMITED
MALTON - ONTARIO
TECHNICAL DEPARTMENT

REPORT No. 7/C-105/12
SHEET No. 7-1

AIRCRAFT:	DUST & ENGINE BAY
C-105	AIRFRAME

PREPARED BY	DATE
E. AUGUSTINE	13/JUNE/38.
CHECKED BY	DATE

7 LIGHT FRAME CALCULATIONS.

REFERENCE SHEET 4-6

FIG. 7-1 BELOW SHOWS THE RANGE OF FUSELAGE DUST AND ENGINE BAY WHICH SECTION PROPERTIES OF LIGHT FRAMES HAS CONSTANT.

SECTION PROPERTIES OF TYPICAL FRAMES & COMPUTATIONS RELATING TO THE REQUIREMENTS ARE GIVEN ON THE FOLLOWING SHEETS.

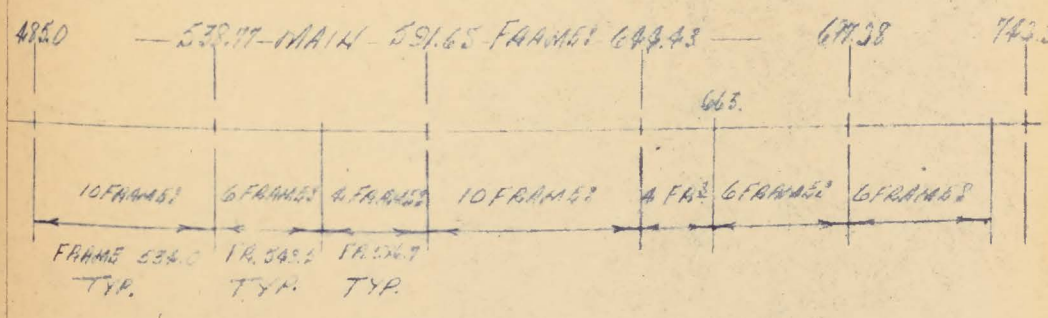
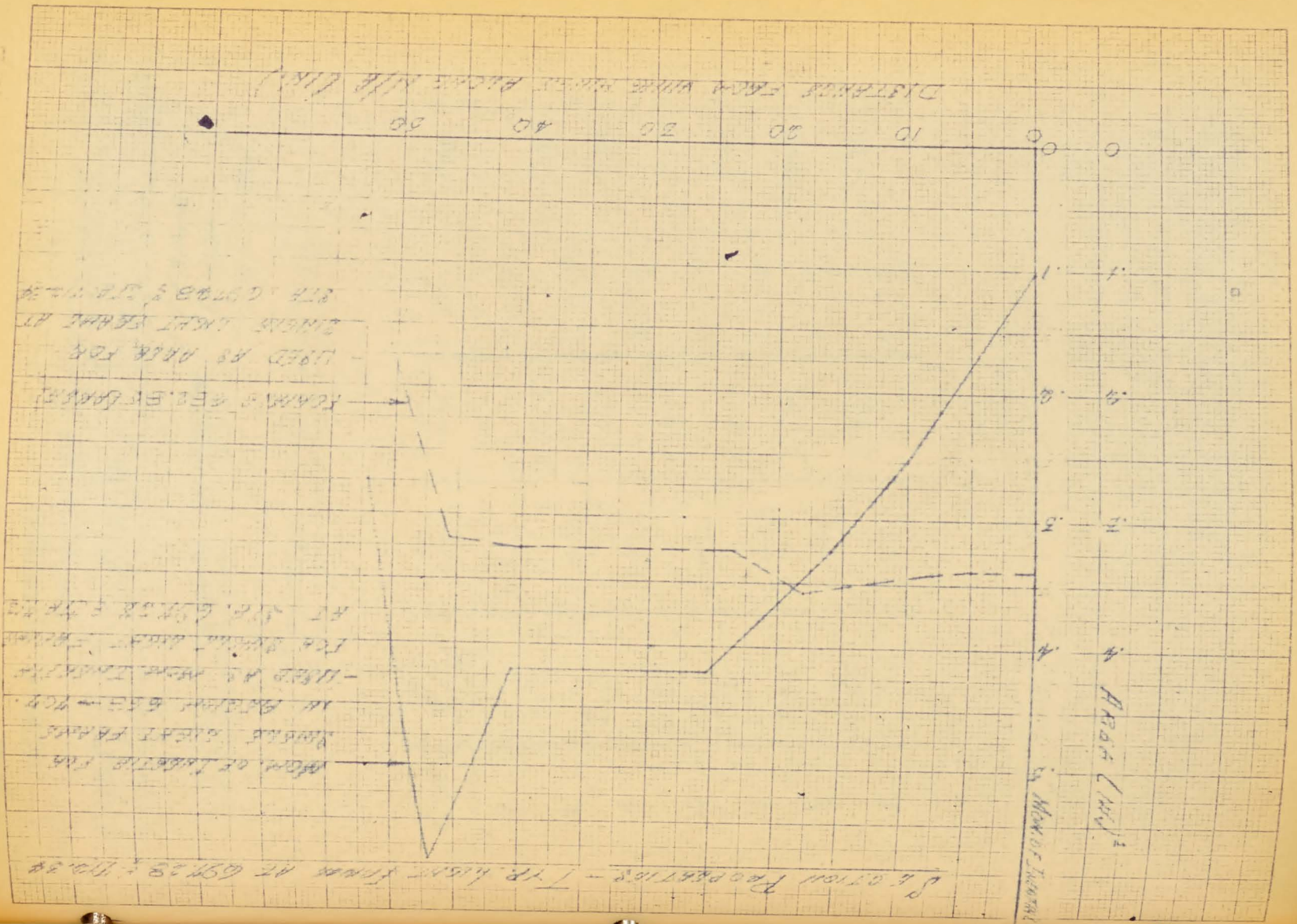


FIG. 7-1

FORM 1318A



MATRIX PREPARED BY J.E. ANDREWS REF

AVRO AIRCRAFT LIMITED
MALTON - ONTARIO
TECHNICAL DEPARTMENT

REPORT No 7/6510/12
SHEET No 7-10

AIRCRAFT		PREPARED BY	DATE
C-105	DUCT & ENGINE BAY ANALYSIS	J. E. ANDREWS	18/JUNE/56
		CHECKED BY	DATE
		E. AUGUSTINE	18/JUNE/56

LIGHT FRAMES - 591.65 (7 FRAMES ASSUMED EFFECTIVE)

SECTION PROPERTIES.

CUT	Δs (H/A)	I	I_m	A	A_m
1		2.4675		2.2645	
	8.55		2.5340		2.2645
2		2.6005		2.2645	
	6.85		2.7318		2.2645
3		2.8630		2.2645	
	6.36		3.2743		2.3870
4		3.6855		2.5095	
	6.14		3.9603		2.5927
5		4.2350		2.6758	
	7.80		4.2350		2.6758
6		4.2350		2.6758	
	7.85		4.2350		2.6758
7		4.2350		2.6758	

AVRO AIRCRAFT LIMITED
MALTON · ONTARIO
TECHNICAL DEPARTMENT

REPORT No. 7/0510/12
SHEET No. 8-1

AIRCRAFT:	Frame Lumping	PREPARED BY	DATE
		Alex. Grzedzielski	April 1956
		CHECKED BY	DATE

8

Z_{ik} bare frames, elastic matrix,

$D_{ik} = Z^{-1}_{ki}$, bare frames, stiffness matrix,

d_{ik} added stiffness matrix, expressing additional half frames,

z_{ik} corrections to Z_{ik}.

Derivations:

$$D_{ik}\, Z_{kl} = \delta_{il} \tag{1}$$

$$(D_{ik} + d_{ik})(Z_{kl} + z_{kl}) = \delta_{il} \tag{2}$$

Combining (1) and (2)

$$(D_{ik} + d_{ik})\, z_{kl} = - d_{ik}\, Z_{kl} \tag{3}$$

$$D_{ik}\, z_{kl} = - d_{ik}\, (Z_{kl} + z_{kl}) \tag{4}$$

(4) is solved for $z_{..}$ and the result is substituted in (3)

$$z_{kl} = - Z_{km}\, d_{mn}\, (Z_{nl} + z_{nl}) \tag{5}$$

$$(D_{ik} + d_{ik})\, Z_{km}\, d_{mn}\, (Z_{nl} + z_{nl}) = d_{in}\, Z_{nl}$$

Remembering (1)

$$(d_{in} + d_{ik}\, Z_{km}\, d_{mn})\, z_{nl} = - d_{ik}\, Z_{km}\, d_{mn}\, Z_{nl}$$

After the indices are rearranged

$$(d_{ik} + d_{im}\, Z_{mn}\, d_{nk})\, z_{kl} = - d_{im}\, Z_{mn}\, d_{nk}\, Z_{kl} \tag{6}$$

In the particular case $i, k = 1, 2, 3$ and $d_{ik} = \begin{cases} d & \text{if } i = k = 2 \\ 0 & \text{if } i \neq k \neq 2 \end{cases}$

$$z_{2i} = - \frac{d\, Z_{22}}{1 + d\, Z_{22}}\, Z_{2i}$$

finally

$$Z_{2i} + z_{2i} = \frac{Z_{2i}}{1 + d\, Z_{22}} = Z^{*}_{2i}$$

AVRO AIRCRAFT LIMITED
MALTON · ONTARIO
TECHNICAL DEPARTMENT

AIRCRAFT: C105	Duct and Engine Bays	REPORT NO 7/0510/12	
		SHEET NO 9-1	
		PREPARED BY	DATE
		C. Burrell	Sept '56
		CHECKED BY	DATE

COMPUTOR PROGRAM

In outline, the computor program is as follows;

1. Calculate five sets of frame data

$$T_{ai} \cdot C_{ik} \cdot T_{kb}$$

as instructed on page 6-71 of this report.

2. Calculate the main problem according to Type Program No. 1 of GEN/1090/334 up to the end of step 10.

Given: C_{ik}, T_{ia}, and K_{ip}

$i,k = 1$ to 51
$a,b = 1$ to 15
$p,q,r = 1$ to 6

Kip MATRIX

PREPARED BY J. E. ANDREWS
CHECKED BY C. Burrell.
SUPERVISED BY A. Goldsmith

REPORT No. 7/0510
PAGE No. 9-2
DATE

	1	2	3	4	5	6	CHECK SUM
1							
2	.039527						.039527
3	+.509970						+.509970
4	.890052						.890052
5							
6							
7	-.149339	+.544115					.605220
8	+.285714						+.285714
9	+.040917	-.047895					.006978
10	-.527908	+.516788					.011120
11		-1.062566					1.062566
12							
13							
14	+.584600	-.088230	+.514172				+.010542
15		+.462963					+.462963
16		-.047835	-.051489				.003594
17		-.516788	+.511060				.005728
18			.566872				.566872
19							
20							
21		+.544115	-1.028343	+.508372			+.025144
22			+.408163				+.408163
23			+.051489	-.042474			-.009015
24			-.511059	+.525427			+.014368
25				-1.625450			-1.625450
26							
27						+.871760	+.871760
28			+.514171	-1.107130			-.592959
29				+.573066			+.573066
30				-.046508			-.046508
31				+.049155		+.216418	+.265573
32				-.611285			-.611285
33				-.995997			-.995997
34						-1.000000	-1.000000
35							
36				+.426517		-.130845	+.295672
37				-.055777		+.167998	+.112221
38				+.035109		-.105747	-.070638
39				-.619195			-.619195
40							
41							
42							
43							
44					+1.000000		+1.000000
45							
46					-1.000000		-1.000000
47						+.528240	+.528240
48				+.597758			+.597758
49	-.019764						-.019764
50							
51						-3.838294	-3.838294
CHECK SUM	-1.205385	.599603	-.158708	2.387412		-3.690470	-8.041578

Issue: 2
Reason: 13 Jan 82
Checked: LH

PREPARED BY J. E. ANDREWS
CHECKED BY C. Burrell
SUPERVISED BY A Fredricks

REPORT No. 7/0510/12
PAGE No. 9-2
DATE

9-2

Tia MA

	1	2	3	4	5	6	7	8	9
1	-.738618								
2	-.254449	+.384467							
3									
4									
5									+1.00
6	-.632662	-.345058	-.666667	-.333334	-.632662	+.284046	+.480171	+.284046	
7									
8	-.560224	-.305550							
9	-.234499	-.127891	-.260917	-.130459	-.247607	+.111168	+.185450	+.111168	
10									
11									
12									
13			+1.000000						
14									
15	-.616052	-.335999	+.324582	+.162291	+.308026	-.138294	-.230631	-.138294	
16	-.243078	-.132576	-.128072	-.135231	-.256666	+.115239	+.192238	+.115239	
17									
18									
19									
20				+1.000000					
21									
22	-.276534	-.150823	-.145698	-.291397	+.553066	-.248312	-.414232	-.248312	
23	-.252137	-.137517	+.132844	+.265688	-.256777	+.115285	+.192318	+.115285	
24									
25									
26									
27	+.632662	-.345058	-.333333	-.666666	+.590152	-1.284046	-1.480171	-1.284046	
28									
29					+1.171914	-.526154	-.877459	-.526154	
30					-.833329	+.374140	+.623947	+.374140	
31					+2.168213	-.314136	-.308772	-.314136	
32									
33									
34					-6.785642				
35									
36						-.398625	-.795136	-.398625	
37						+.511815	-1.020916	+.511815	
38						-.322165	-.318827	-.322165	
39									
40									
41							-.520833		
42							+.714286		
43									
44									
45								+1.000000	
46									
47						+1.000000		+1.000000	
48									
49	+.353402	-.192234							
50					+13.166557				
51									
CHECK SUM	-2.822189	-1.613655	+.470279	+.453686	+15.945245	-.720039	-1.536735	+.279961	+1.00000

TRIX

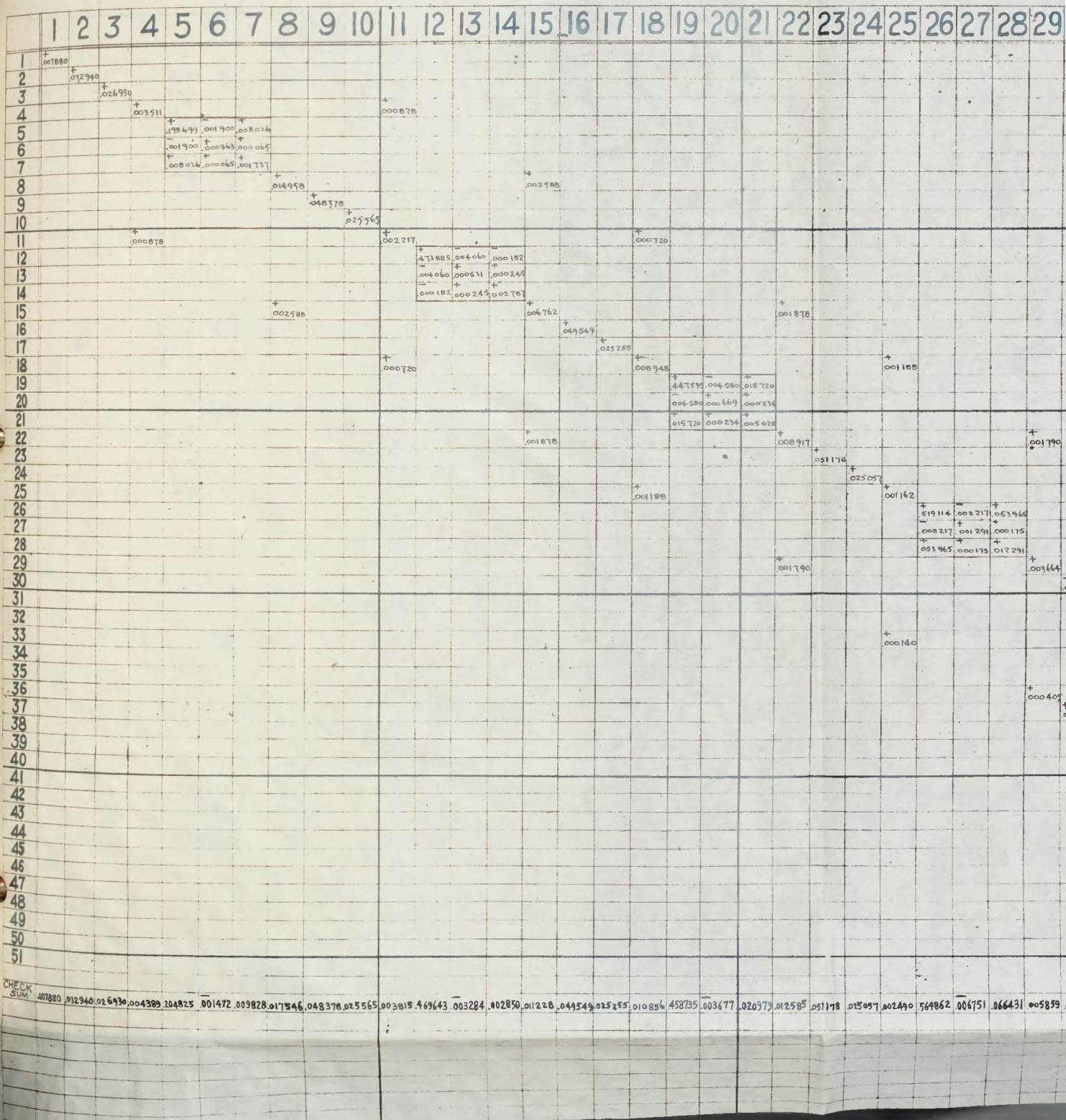
PREPARED BY J. E. ANDREWS
CHECKED BY C. Burrell
SUPERVISED BY A Goldsmith

REPORT No. 7/0510/12
PAGE No. 9-2
DATE

9-2

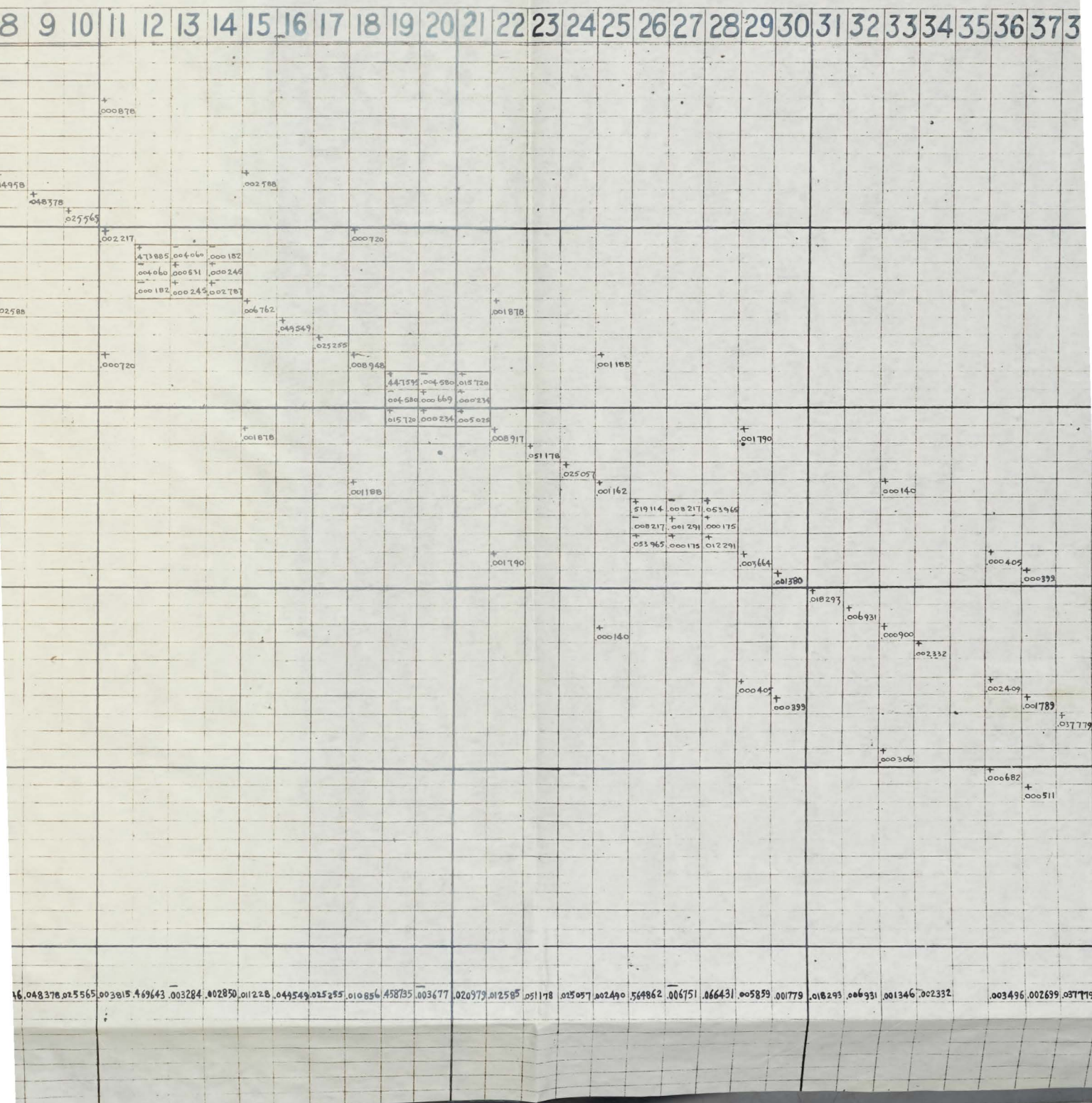
6	CHECK SUM		1	2	3	4
	.039527	1	.738618			
	+.509970	2	.254449	+.384467		
	.890052	3				
		4				
		5				
	.605220	6	-.632662	-1.345058	-.666667	-.333
	+.285714	7				
	.006978	8	-.560224	-.305550		
	.011120	9	-.234499	-.127891	-.260917	-.130
		10				
	1.062566	11				
		12				
		13			+1.000000	
	+.010542	14				
	+.462963	15	-.616052	-.335999	+.324582	+.162
	.003594	16	-.243078	-.132576	-.128072	-.135
	.005728	17				
	.566872	18				
		19				
		20				+1.000
	+.025144	21				
	+.408163	22	-.276534	-.150823	-.145698	+.291
	+.009015	23	-.252137	-.137517	-.132844	+.265
	+.014368	24				
	1.625450	25				
		26				
+.871760	+.871760	27	+.632662	+.345058	-.333333	-.666
	.592959	28				
	+.573066	29				
	.046508	30				
+.216418	+.265573	31				
	.611285	32				
	.995997	33				
1.000000	1.000000	34				
		35				
-.130845	+.295672	36				
+.167998	+.112221	37				
-.105747	.070638	38				
	.619195	39				
		40				
		41				
		42				
		43				
00	1.000000	44				
		45				
00	1.000000	46				
+.528240	+.528240	47				
	+.597758	48				
	.019764	49	+.353402	+.192234		
		50				
3.838294	3.838294	51				
3.690470	8.041578	CHECK SUM	-2.822189	-1.613655	+.470279	+.453

C_{ik} MATR


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29
CHECK SUM .007880 .032940 .026930 .004389 .204825 .001472 .009828 .017546 .048378 .025565 .003815 .469643 .003284 .002850 .011228 .049549 .025255 .010856 .458735 .003677 .020979 .012585 .051178 .025057 .002490 .564862 .006751 .066431 .005859

C_{ik} MATRIX

PREPARED
CHECKED
SUPERVIS



C_{ik} MATRIX

PREPA
CHECK
SUPE

5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	3
.198693	.001900	.008026				.000878																										
.001900	.000363	.000065																														
.008026	.000065	.001737																														
			.014958							.002588																						
				.048378																												
					.025565																											
						.002217							.000720																			
							.473885	.004060	.000182																							
							.004060	.000831	.000243																							
							.000182	.000243	.002787																							
			.002588							.006762							.001878															
											.049549																					
												.025255																				
						.000720							.008948								.001188											
														.447595	.004580	.015720																
														.004580	.000669	.000234																
														.015720	.000234	.005025																
										.001878							.008917								.001790							
													.001188					.051178											.000140			
																			.025057													
																				.001162												
																					.519114	.008217	.053966									
																					.008217	.001291	.000175									
																					.053965	.000175	.012291									
																	.001790							.003664								
																									.001380							
																										.018293						
																				.000140							.006931					
																												.000900					
																													.002332			
																								.000407								.0024
																									.000399							
																												.000306				.0006

.389 .104825 .001472 .009828 .017546 .048378 .025565 .003815 .469643 .003284 .002850 .011228 .049549 .025255 .010856 .458735 .003677 .020979 .012585 .051178 .025057 .002490 .564862 .006751 .066431 .005859 .001779 .018293 .006931 .001346 .002332 .003

C_{ik} MATRIX

PREPARED BY: C. Burrell.
CHECKED BY J. Andrews
SUPERVISED BY A. Gyde...

REPORT No
PAGE No. 9
DATE

HALF S...

16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
		.000720				.001878																										
9549	.025255																															
		.008948							.001188																							
			.447595	.004580	.015720																											
			.004580	.000669	.000234																											
			.015720	.000234	.005025																											
						.008917							.001790																			
							.051178																									
		.001188						.025057										.000140														
									.001162																							
										.519114	.008217	.053966																				
										.008217	.001291	.000175																				
										.053965	.000175	.012291																				
						.001790							.003664	.001380							.000405	.000399										
									.000140							.018293																
																.006931																
																	.000900															
																		.002332														
																					.002409					.000682						
														.000405								.001789					.000511					
															.000399								.037779									
																								.014625								
																	.000306								.000628							
																				.000682						.001122						
																					.000511						.000802					
																												.117510	.080621	.040310			
																												.080621	.120962	.060481			
																												.040310	.060481	.030240			
																															.371655	.014870	
																															.014870	.002921	
																															.082116	.000548	

.049549 .025255 .010856 .458735 .003677 .020979 .012585 .051178 .025057 .002490 .564862 .006751 .066431 .005859 .001779 .018293 .006931 .001346 .002332 .003496 .002699 .037779 .014625 .000934 .001804 .001313 .238441 .262064 .131031 .438901 .012493

HALF SIZE

C. Burrell.
J. Andrews
BY A. Gyderson

REPORT No. 7/0510/12
PAGE No. 9-3
DATE

39	40	41	42	43	44	45	46	47	48	49	50	51	CHECK SUM
													.007880
													.032940
													.026930
													.004389
													.204825
													−.001472
													.009828
													.017546
													.048378
													.025565
													.003815
													.469643
													−.003284
													.002850
													.011228
													.049549
													.025255
													.010856
													.458735
													−.003677
													.020979
													.012585
													.051178
													.025057
													.002490
													.564862
													−.006751
													.066431
													.005859
													.001779
													.018293
													.006931
	+ .000306												.001346
													.002332
		+ .000682											.003496
			+ .000511										.002699
779	+ .014625												.037779
	+ .000628												.014625
													.000934
		+ .001122											.001804
			+ .000802										.001313
				+ .117510	+ .080621	+ .040310							.238441
				+ .080621	+ .120962	+ .060481							.262064
				+ .040310	+ .060481	+ .030240							.131031
							+ .371655	− .014870	+ .082116				.438901
							− .014870	+ .002921	− .000544				−.012493
							+ .082116	− .000544	+ .023564				.105136
										+ .033915			.033915
											+ .001414	+ .000347	.001761
											+ .000347	+ .001394	.001741
9	.014625	.000934	.001804	.001313	.238441	.262064	.131031	.438901	−.012493	.105136	.033915	.001761	.001741	3.438297

AVRO AIRCRAFT LIMITED
MALTON - ONTARIO
TECHNICAL DEPARTMENT

REPORT No. 7/0510/12
SHEET No. 10-10

AIRCRAFT:		PREPARED BY	DATE
		CMS	May/56
		CHECKED BY	DATE
		K. HUGHES	June/56

Fin Beams - Torque Boxes

$\overline{T}_{ia}$ Kip

i	a = 1	p = 1	p = 2	C_{ic}	
					Per Panel
1	1.0	.4	.8	1.6950	$\frac{6.18 \times 57.5999}{4,000 \times .105}$
2	1.0	.4	-.2	3.3900	
3	1.0	-.6	-.2	3.3900	
4	0	0	1.0	1.8675	$\frac{2 \times 5.5 \times 57.5999}{4,000 \times .095}$
5	0	1.0	0	1.8675	
6	1.0	-.6	-.2	1.8675	

$q = \frac{T}{2A}$; $T = q \cdot 2A = 2 \cdot 5.5 \times 30.90 = 339.90$ In Kip

$G = 4,000$ K.S.I

THEN OPERATE ON THESE THREE MATRICES ACCORDING TO TYPE PROGRAM #1 - AVRO REPORT GEN/1090/334

ADDING TORQUE STIFFNESS DUE TO TORSION BOX:

$$Q = \frac{3E}{L^3}\left\{V_0(I) + \phi(I_y)\right\} \quad : \text{AS BEFORE}$$

$$T = \frac{3E}{L^3}\left\{V_0(I_y) + \phi(I_y^2)\right\} + \frac{GJ}{L}\phi$$

$$= \frac{3E}{L^3}\left\{V_0(I_y) + \phi\left[(I_y^2) + \frac{GL^2J}{3E}\right]\right\}$$

SAY $(\bar{I_y^2}) = (I_y^2) + \frac{G}{3E}JL^2$

$$V = \frac{1}{2}\frac{L^3}{3E}\,\frac{Q^2(\bar{I_y^2}) - 2QT(I_y) + T^2(I)}{(I)(\bar{I_y^2}) - (I_y)^2}$$

THEN PUTTING $Q = P_1 + P_2$ & $T = P_1y_1 + P_2y_2$

$$V = \frac{1}{2}\frac{\frac{L^3}{3E}}{(I)(\bar{I_y^2}) - (I_y)^2}\left\{(P_1^2 + 2P_1P_2 + P_2^2)(\bar{I_y^2}) - 2(P_1+P_2)(P_1y_1 + P_2y_2)(I_y) + (P_1y_1 + P_2y_2)^2(I)\right\}$$

$$= \frac{1}{2}\cdot\frac{\frac{L}{3E}}{(I)(\bar{I_y^2}) - (I_y)^2}\cdot\begin{vmatrix} P_1 & P_2 \end{vmatrix}\begin{vmatrix} (\bar{I_y^2}) - 2y_1(I_y) + y_1^2(I) & (\bar{I_y^2}) - y_1y_2(I_y) + y_1y_2(I) \\ (\bar{I_y^2}) - y_1y_2(I_y) + y_1y_2(I) & (\bar{I_y^2}) - 2y_2(I_y) + y_2^2(I) \end{vmatrix}\begin{vmatrix} P_1 \\ P_2 \end{vmatrix}$$

AVRO AIRCRAFT LIMITED
MALTON - ONTARIO
TECHNICAL DEPARTMENT

REPORT No. 7/0510/12
SHEET No. 10-14

AIRCRAFT:	
C105	Duct & Engine Bays

PREPARED BY	DATE
CB	May 56
CHECKED BY	DATE
E. Augustus	14/June/56

Fin Beam
J75. Data.

Beam No	1 & 2	3	4	5	6	Combined	Total
3kb	1.440	2.040	2.155	2.265	2.780	1.860	
I_o	38.4	22.6	22.6	22.6	15.6	121.8	
$I_i = I_o/3kb$	26.67	11.08	10.49	9.98	5.61		63.82

P.S.13 Data - Assumed From Above

Beam No	I_i	Dist To Beam No 1 y_i	$I_i y_i$	$I_i y_i^2$
1	9.98	-	-	-
2	10.49	6.07	63.61	386.13
3	11.08	12.19	135.06	1,646.38
4 & 5	26.67	21.31	569.14	12,179.62
6	5.61	30.90	173.35	5,356.52
TOTAL	63.85		941.96	19,568.63

$$I_y^2 = I_y^2 + \frac{G}{E} \cdot J \cdot L^2$$

$$= 19,568 + \frac{1}{3 \times 10 \times 10^3} \times 57.5^3$$

$$= 92,720$$

AVRO AIRCRAFT LIMITED
MALTON · ONTARIO
TECHNICAL DEPARTMENT

REPORT No. 7/05/10/12
SHEET No. 10-16

AIRCRAFT:		PREPARED BY	DATE
C105	ENGINE BAYS	[illegible]	MAY '56
		CHECKED BY	DATE
		E. AUGUSTINE	15/JUNE/56

BUT $\begin{vmatrix} L_1, L_2 & L_3 \end{vmatrix} \cdot \begin{vmatrix} 1 & \\ & 1 \\ .5 & \end{vmatrix} = \begin{vmatrix} P_1 & P_2 \end{vmatrix}$

$L_1 = P_1$

$L_2 + .5 L_3 = P_2$ *

THEN $\begin{vmatrix} P_1 & P_2 \end{vmatrix} \begin{vmatrix} A & B \\ B & C \end{vmatrix} \begin{vmatrix} P_1 \\ P_2 \end{vmatrix}$ TRANSFORMS TO

$$\begin{vmatrix} L_1 & L_2 & L_3 \end{vmatrix} \cdot \begin{vmatrix} A & B & .5B \\ B & C & .5C \\ .5B & .5C & .25C \end{vmatrix} \begin{vmatrix} L_1 \\ L_2 \\ L_3 \end{vmatrix}$$

$$\begin{vmatrix} L_1 & L_2 & L_3 \end{vmatrix} \begin{vmatrix} .117510 & .080621 & .040310 \\ .080621 & .120962 & .060481 \\ .040310 & .060481 & .030240 \end{vmatrix} \begin{vmatrix} L_1 \\ L_2 \\ L_3 \end{vmatrix} = 2V.$$

* THIS ASSUMES L_3 DISTRIBUTED TO POINT P_2 & TO OBCD EDGE IMMEDIATELY - LOCAL CHANGES OF EFFECTIVE ASSUMED TO HAVE NEGLIGIBLE EFFECT ON STRAIN ENERGY - AT LEAST FOR THIS APPROXIMATION

FORM 1318A

AVRO AIRCRAFT LIMITED
MALTON · ONTARIO
TECHNICAL DEPARTMENT

REPORT No. 7/0510/12
SHEET No. 11-2

AIRCRAFT:		PREPARED BY	DATE
C105	DUCT & ENGINE BAYS	C.B.	JUNE '56
		CHECKED BY	DATE

LOWER & INBOARD BOOMS

The lower longeron extends continously from station 485" To 742.5".

The Inboard longeron is composed of the Dive Brake Beams, Inboard Longeron, Torque Box, etc of the actual aeroplane. Discontinuities of these members which sustain local torques & moments have been neglected.

However, it was not deemed advisable to neglect the severe changes of cross-section which occurs along the length of these beams. (See P.3-12)

Rather than introduce two stress points at each frame, the energy in the beam calculated for each length of them accounted to be related to the area & stress of the outside point forward of each frame.

Boom Energy

Ref: Gen/1030/311 Pg 302

E = 10,000 KSI.

$$2V = \frac{L}{E}\left[\frac{\sigma_1^2 A_1^2}{3\left(\frac{3}{4}A_1+\frac{1}{4}A_2\right)} + \frac{2\,\sigma_1\sigma_2\,A_1A_2}{3\left(A_1+A_2\right)} + \frac{\sigma_2^2 A_2^2}{3\left(\frac{1}{4}A_1+\frac{3}{4}A_2\right)}\right]$$

AVRO AIRCRAFT

TECHN

AIRCRAFT -

WEIGHT -

C. G. POSITION

Stress Points	1 Area Fwd ↑ Aft ↓ 1.992	2 Length	3 Length / 7	4 .75 A_1 + .25 A_2	5 $A_1 + A_2$	6 .25 A_1 + .75 A_2	7 $\frac{A A_1 (K) L}{A A_2 3E}$	8 $\frac{A_1^2 K^2 A_2^2 L_4}{(A)^{2E} 6}$	9 Area Ratio Correction Factor	10 Stress Points	11 Area Fwd ↑ Aft ↓ 3.36
8	3.500 2.970		1.818037	2.76750		3.10000		.0149580	$\frac{3.50}{2.97}$ = 1.178451	4	1.000 .820
		52.6974	17.562467		5.130		.0025882		$\frac{3.50}{2.97}$ = 1.17845		
15	2.160 2.500			2.48750		2.36250		.0067623	$\frac{2.16}{2.50}$ = .8640	11	.820 1.520
		52.6874	"		4.9500		.0018776		.8640		
22	2.450			2.27375		2.46250		.0089173	1.0	18	1.520 .680
		52.6075	17.562500		4.195		.0017898		1.0		
29	1.745			1.69875		1.92125		.0036640	1.0	25	.545
		14.7370	4.912333		3.305		.0204046		1.0		
36	1.560			1.4700		1.60625		.0024086	1.0	33	.600
		30.1600	10.053333		2.760		.0006819		1.0		
41	1.200					1.29000		.0011222	1.0	40 30	.620 2.454
50	2.450			2.08550				.001414	1.0		
NOTE: SEE PAGE 3-7		14.7370	4.912333		3.442		.000347		1.0	37	1.215
51	.992			.95300		1.35650		.001394	1.0		
			10.0533		1.828		.000456		1.0	42	.875

FORM 1843

AVRO AIRCRAFT LIMITED

TECHNICAL DEPT. (AIRFRAME)

REPORT NO. - 7/0510/12

SHEET - - 11 - 3

AIRCRAFT - - 105

DATE - - May '56

WEIGHT - -

C. G. POSITION -

CHECKED J. A. BURRELL JUNE '56. J. AHRENS

PREPARED BY - B Gunderson

9	10	11	12	13	14	15	16	17	18	19
AREA RATIO CORRECTION FACTOR	Stn. No.	Area FWD ↑ AFT ↓	Length	Length	.75 A + .25 A	A + A	.25 A + .75 A	A A (K) L / A + A	A L K² + A L²	AREA RATIO CORRECTION FACTOR
3.50/2.97 = 1.17845	4	1.000 / .820			.820		1.32750		.0035113	1.219512
3.50/2.97 = 1.1784			52.6874	17.5625		1.640		.0008781		1.219512
2.16/2.50 = .8640	11	.820 / 1.520			1.520		.820		.0022170	.537474
.8640			52.6874	"		3.040		.0002201		"
1.0	19	1.520 / .680			.64625		1.520		.0089482	2.23529
1.0			52.6875	"		1.225		.0011877		"
1.0	25	.545			.55875		.57875		.0011625	1.0
1.0			14.7370	4.91233		1.145		.0001403		1.0
1.0	33	.600			.60500		.58625		.0008799	1.0
1.0			30.1600	10.05333		1.220		.0003065		1.0
1.0	40	.620					.61500		.0006284	
	30	2.454			2.14425				.001380	
1.0			14.7370	4.91233		3.669		.000399		
1.0	37	1.215			1.13000		1.52475		.001789	
1.0			30.1600	10.0533		2.090		.000511		
1.0	42	.875					.960		.000802	

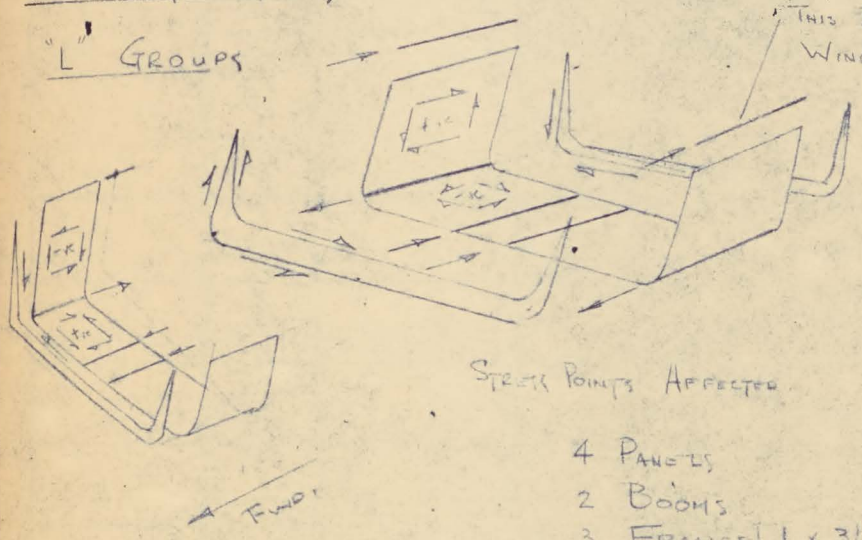
AVRO AIRCRAFT LIMITED
MALTON ONTARIO
TECHNICAL DEPARTMENT

REPORT No. 7/0510/12
SHEET No. 12-2

AIRCRAFT:		PREPARED BY	DATE
C105'	DUCT & ENGINE BAY	C.B	May '56
		CHECKED BY	DATE

REDUNDANT GROUPS

"L" GROUPS

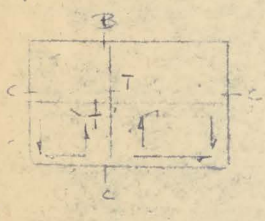


STRESS POINTS AFFECTED

4 PANELS
2 BOOMS
3 FRAMES (1 x 3)
9

"TRIPLE"

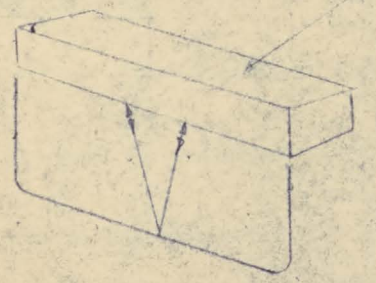
BETWEEN UPPER BEAM & SIDE WALLS.



STRESS POINTS AFFECTED

2 PANELS
3 BOOMS
3 FRAMES (1 x 3)
8

POST



STRESS POINTS AFFECTED

1 FIN BEAM
0 PANEL
1 FRAME (1x1)
2

AVRO

TEC

AIRCRAFT

WEIGHT

C. G. POSITI

Loads & Shear Flows due to "L" Type Redundants.

Redundant	1	2	3	4	5	6	7	8	9	10	11
	Z Lower Lonn	Z Inner Lonn	Load To Induce Unit Load in ① ② Kips.	Stn Aft	Stn	Stn Fwd.	Lonn Aft ③ ⑤	Lonn Fwd ④ ⑥	Shear Flow K. /in −ve	Aft Lonn/w +ve	Fwd K/in +ve
1	51.00	57.30	−.890052	592.2281	537.5407	485.000	52.6874	54.5407	−.002083	+.002083	+.016319
2	50.10	57.50	−.871394	644.7188	592.2281	537.5407	52.4907	54.4674	−.002083	+.002083	+.016083
3	49.20	57.10	−.861646	697.1885	644.7188	592.2281	52.4697	52.6815	−.002083	+.002083	+.016258
4	48.00	55.20	−.866170	749.6582	697.1885	644.7188	52.4697	52.6815	−.002083	+.002083	+.016081
7	48.50	54.00	−.889143	802.1280	749.6582	697.1885	52.4697	52.6815	−.002083	+.002083	+.016081
					712.3400		30.1600	14.7770	−.006943	+.006943	+.046081
									−.002083		+.016081

FORM 1543

FLOW, DUE TO

REDUNDANT

AVRO AIRCRAFT LIMITED

TECHNICAL DEPT. (AIRFRAME)

AIRCRAFT - - C105

WEIGHT - -

C. G. POSITION -

REPORT NO. - 7

SHEET - - 1

DATE - - M

CHECKED BY

PREPARED BY -

4	5	6	7	8	9	10	11	12	13	14	15	16	17	
									Y					
	531.547		52.6874	54.5407			+.016319		57.539	53.6000	18.0000	30.9		
									"			28.66	+.94+11489	
	644.185								"			27	+.514172	
	69	614	14.787	52.815					"	19				
	712.340			14.787	.0069113								+1.938595	
													+.19	

AVRO AIRCRAFT LIMITED

TECHNICAL DEPT. (AIRFRAME)

AIRCRAFT - - C107

WEIGHT - -

C. G. POSITION -

REPORT NO. - 7/0510/12.

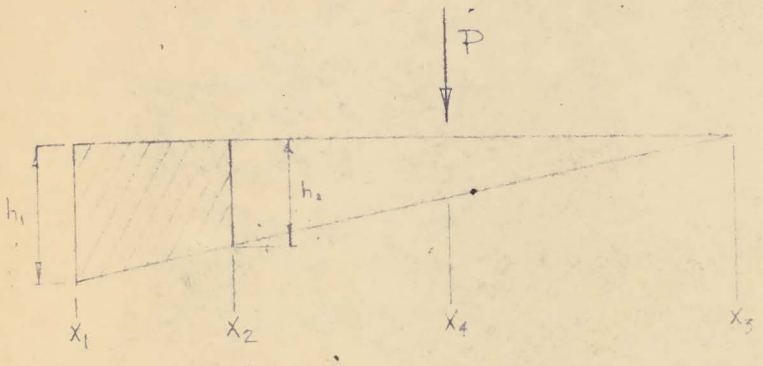
SHEET - - 12-3

DATE - - May '56

CHECKED BY

PREPARED BY -

8	9	10	11	12	13	14	15	16	17	18	19
	Shear in Fus. K/IN -ve	Fus. Wing Aft Lug K/IN +ve	Shear in Fus. Fwd K/IN +ve	Fus. Wing Aft Lug K/IN -ve	"Y" w/wing Constant	Diagonal Lower Lug	Diagonal Inboard Lug	Y Aft Lug (3-1) (3-2) +ve (1) (2) -ve (3)	Fus. Fwd Lug (3) Fwd & Aft	Fus. Aft Lug (1) (2)	Fus. Lug Centre (1)+(2) Centre
407	-	+	+ .016319	- .016837	57.0399	53.6000	18.5000	30.8	+ .5647	+ .5845	- 1.149
3774	-	+	+ .016537	- .016537	"			28.64	+ .5471	+ .5441	- 1.088
3,4	-	+	+ .016	- .016	"			27.0	+ .514172	+ .514171	- 1.028343
815	-	+	+ .016	- .060	"	49.8		26.9	+ .5	+ 1.821098	- 2.330
770	- .006	+	+	- .020	"				+ 1.938595	+ .892	- 2.706
	-		+						+ .079		
		+		- .019							- 1.107
		+		- .198						+ 597	
		+									



RATIO OF SHEAR LOAD TAKEN BY THE WEB

$$Q = \frac{X_4 - X_3}{X_2 - X_3} \cdot P$$ i.e. Distributing load to X_2 & X_2 ; shear @ X_3 Taken by axial forces

$$\tau_{mw} \cdot \frac{h_1 h_2}{h_2^2} = \tau_{x_2} \qquad \tau_{mw} = \tau_{x_2} \cdot \frac{h_2}{h_1} = \frac{Q}{h_2 t} \cdot \frac{h_2}{h_1} = \frac{Q}{h_1 t}$$

$$\therefore \tau_{mw} = \frac{X_4 - X_3}{X_2 - X_3} \cdot \frac{1}{h_1 t} \cdot P$$

But $\frac{X_2 - X_3}{h_2} = \frac{X_1 - X_3}{h_1}$ i.e. X_3 defined by extending boom to their point of intersection

$$X_3 = \frac{X_1 h_2 - X_2 h_1}{h_2 - h_1}$$

FORM 1318A

2	8	527	*
3	8	6803	
4	8	11873	*
6	8	284046	
7	8	9310	
8	8	3811	
9	8	109545	
10	8	16363	
11	8	48123	*
14	8	33481	*
15	8	117327	*
16	8	116606	
17	8	15448	*
18	8	8826	*
21	8	43691	*
22	8	241957	*
23	8	120449	
24	8	61929	*
25	8	166966	
27	8	1269684	*
28	8	121730	
29	8	585019	*
30	8	378917	
31	8	3145538	*
32	8	62791	
33	8	102308	
34	8	121380	*
36	8	445234	*
37	8	501136	
38	8	328032	*
39	8	63603	
44	8	1633410	*
45	8	1000000	
46	8	163410	
47	8	1007017	
48	8	61401	*
49	8	265	*
51	8	82062	*

400596

2	9	16185	*
3	9	206032	
4	9	364458	*
6	9	1001000	

27	8	1259684	*
28	8	121730	
29	8	585019	*
30	8	378917	
31	8	314558	*
32	8	62791	
33	8	162308	
34	8	21380	*
36	8	445234	*
37	8	521136	
38	8	328032	*
39	8	63603	
44	8	163410	*
45	8	1000000	
46	8	163410	
47	8	1007017	
48	8	61401	*
49	8	253	*
51	8	82062	*

400506

2	9	16185	*
3	9	208032	
4	9	364458	*
5	9	1000000	
7	9	498205	*
8	9	116994	
9	9	19182	
10	9	842358	*
11	9	53850	
14	9	274507	
15	9	63463	*
16	9	423	*
17	9	6305	
18	9	82057	
21	9	6156	
22	9	158011	*
23	9	1479	*
24	9	13406	
25	9	20041	
27	9	100	
28	9	6355	*
29	9	7065	*
30	9	573	
31	9	573	*
32	9	7537	
33	9	12280	
34	9	150	*
36	9	5278	*
37	9	718	
38	9	448	*

	9	16185	*
3	9	20802	
4	9	36445	*
5	9	100000	
7	9	49820	*
8	9	116994	
9	9	19182	
10	9	642358	*
11	9	53850	
14	9	27452	
15	9	23463	*
16	9	423	*
17	9	6305	
18	9	22057	
21	9	6156	
22	9	15801	*
23	9	1479	*
24	9	13406	
25	9	20041	
27	9	100	
28	9	6355	*
29	9	7065	*
30	9	573	
31	9	573	*
32	9	7537	
33	9	12280	
34	9	150	*
36	9	5278	*
37	9	718	
38	9	448	*
39	9	7634	
44	9	1230	*
46	9	1230	
47	9	49	
48	9	7370	*
49	9	8093	*
51	9	575	*

5718.66

5-21
8/6/13

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1															
2		+ 1.000000													
3			+ 1.000000												
4				+ 1.000000											
5															
6						+ 1.000000									
7							+ 1.000000								
8								+ 1.000000							
9															
10															
11															
12															
13													+ 1.000000		
14														+ 1.000000	
17	− .632662	− 1.345058	− .666667	− .333334	− .632662	+ .284046	+ .473845	+ .284046				+ .284046	+ .473845	+ .093235	
16	+ .632662	+ .345058	− .333333	− .666666	+ .632662	− 1.284046	− 1.473845	− 1.284046				− 1.284046	− 1.473845	− 1.093235	
15														1.000000	

AVRO AIRCRAFT LIMITED

TECHNICAL DEPT. (AIRFRAME)

REPORT NO. 710-T10

SHEET - - 13-1

AIRCRAFT - - 105

WEIGHT - -

C. G. POSITION -

DATE - - May

PREPARED BY -

5	6	7	8	9	10	11	12	13	14	15	16	17	18
t	Upper Part	Lower Part	Ratio 6/7			Row x_1	Ref 9 k_2	h_1	h_2	t	Upper Part	Lower Part	Stress 16/17
	2 [illegible] 837	7 69.645 738	317[illegible]	.188718		537 5407	592 2281	51.0	50.1	.051	2687. 057400	6865. 700363	
	2 [illegible] [illegible]		.3706450	.1853 [illegible]							2639. 639740		.384 46
	2 [illegible] [illegible]		.3638532	.1819 [illegible]							2592. 220080		.377 56
	2 [illegible] 418 615		3570614	.1785 [illegible]							2544. 801330		.3706 [illegible]
	2 [illegible] 786 [illegible]		.3512738	.175636							2504 394030		.364 76
	3 [illegible] 264 [illegible]		.3474066	.173703							2477 394030		.360 83
	2617 416 365		.3551617	.177580							2531. 538030		.368 72
						Row	Ref	23					
.051	/	6623. 391539				644 9155	697 6030	49.2	48.7	.051	/	6464. 742928	
	2592 [illegible]		.391374								/		
	2547 801330		.384215								2576. 418750		.390 53
	2531 [illegible]		.382212								2571. 997650		.397 85
	2504. 376030		.378111								2512. 949650		.3964 [illegible]
	2477 376030		.374035								2553 949650		.3950 [illegible]

[illegible]

AVRO AIRCRAFT LIMITED
TECHNICAL DEPT. (AIRFRAME)

AIRCRAFT - - 105
WEIGHT - -
C. G. POSITION -

REPORT NO. -
SHEET - -
DATE - -
CHECKED BY
PREPARED BY -

4	5	6	7	8	9	10	11	12	13	14	15	16	17
− .363 9532		− .351 [illegible]	− .344 466	− [illegible]					− .351 2138	− [illegible]	− .355 617	− .357 9514	− .377 43
− .377 561		− .364 769	− .360 [illegible]	− .364 769					− .364 769	− [illegible]	− .368 722	− .37[illegible]4	
− .391 374		− .378 111	− .374 035	− .378 111					− .378 111	− [illegible]	− .382 212	− .3[illegible] 215	
		− .396 450	− .395 058	− .396 450					− .396 450	− .395 058	− .397 850	− .39[illegible]	
		− .314 136	− .308 772	− .314 136					− .314 136	− .308 772	− .319 5[illegible]		
		− .322 165	− .318 827	− .322 165					− .322 165	− .318 827			
− .181 9266		− .175 6369	− .17[illegible]	− .175 6369					− .175 6369	− [illegible]	− .177 5[illegible]	− .178 [illegible]	− .18[illegible]
	For	Tie	Ma[illegible]										
[illegible]	/	/	/	/					/	/	/		
− .130 453	− .247 607	+ .111 168	+ .1[illegible]5 [illegible]	+ .111 [illegible]					+ .111 168	+ .185 450	+ .036 430		
− .135 231 ✓	− .256 600	+ .115 239	+ .192 238	+ .115 239					+ .115 239	+ .192 2[illegible]	+ .037 825		
+ .265 [illegible]	− .256 777	+ .115 285	+ .192 318	+ .115 285					+ .115 295	+ .192 318	+ .037 840		
	+ 2.168 213	− .314 136	− .308 772	− .314 136					− .314 136	− .308 772	− .319 5[illegible]		
	/	− .322 165	− .318 827	− .322 165					− .322 165	− .318 827	/		
/	/	/	/	/					/	/	/		

AVRO AIRCRAFT LIMITED
MALTON · ONTARIO
TECHNICAL DEPARTMENT

REPORT No. 7/0510/12
SHEET No 13-18

AIRCRAFT:		PREPARED BY	DATE
C105	DUCT & ENGINE BAYS	C.B.	MAY 56.
		CHECKED BY	DATE
		J. E. ANDREWS	JUNE '56

LOADS 6, 8, & 13

SP 36 $\quad \dfrac{-30.1600}{48.50 \times 1.560} = -.398\,625$

37 $\quad \dfrac{30.1600}{48.50 \times 1.215} = +.511\,815$

29 $\quad \dfrac{-(30.1600 + 14.7370)}{48.90 \times 1.745} = -.526\,154$

30 $\quad \dfrac{+30.1600 + 14.7370}{48.90 \times 2.454} = +.374\,140$

15 $\quad \dfrac{47.8910 \times 52.6874}{158.0623 \times 50.10 \times 2.160} = -.138\,294$

22 $\quad \dfrac{.28404875 \times 2 \times 52.6874}{49.20 \times 2.450} = -.248\,312$

LOADS 7 & 14

SP 15 $\quad \dfrac{-74.8740}{158.0623} \times \dfrac{52.6874}{50.10 \times 2.160} = -.230631$

22 $\quad -.47384733 \times \dfrac{2 \times 52.6874}{49.20 \times 2.450} = -.414\,232$

29 $\quad \dfrac{-74.8740}{48.90} \cdot \dfrac{1}{1.745} = -.877\,459$

30 $\quad \dfrac{74.8740}{48.90} \times \dfrac{1}{2.454} = +.623\,947$

2	2	137327
3	2	92126
4	2	160787 *
6	2	1345058 *
7	2	108241 *
8	2	253936 *
9	2	129511 *
10	2	.1877
11	2	199943 *
14	2	40348 *
15	2	248884 *
16	2	129454 *
17	2	38783 *
18	2	.64844 *
21	2	1614
22	2	104134 *
23	2	133034 *
24	2	41068 *
25	2	53802 *
27	2	336755
28	2	22170
29	2	18968
30	2	1839 *
31	2	1047 *
32	2	20833 *
33	2	32967 *
34	2	12360
36	2	15734
37	2	3922 *
38	2	2469
39	2	20495 *
44	2	3410
46	2	3410 *
47	2	4057 *
48	2	19785
49	2	188664
51	2	47441

2	3	1921
3	3	84794 *
4	3	43674
6	3	666667 *
7	3	19626 *
8	3	13891 *
9	3	256260 *

18	2	64844	*
21	2	1614	
22	2	104134	*
23	2	133034	*
24	2	41068	*
25	2	53802	*
27	2	336755	
28	2	22170	
29	2	18968	
30	2	1539	*
31	2	1047	*
32	2	20833	*
33	2	32967	*
34	2	12360	
36	2	15734	
37	2	3922	*
38	2	2469	
39	2	20495	*
44	2	3410	
46	2	3410	*
47	2	4057	*
48	2	19785	
49	2	188664	
51	2	47441	

9998004202

2	3	1921	
3	3	24794	*
4	3	43274	
6	3	666667	*
7	3	19626	*
8	3	13891	*
9	3	256260	*
10	3	46047	*
11	3	147452	
13	3	1000000	
14	3	70360	
15	3	260337	
16	3	126656	
17	3	19801	
18	3	57582	
21	3	13564	
22	3	104237	
23	3	128897	
24	3	36040	
25	3	49104	
27	3	325319	*
28	3	18783	*
29	3	17312	*
30	3	1405	

2	3	1921	
3	3	24794	*
4	3	43274	
6	3	666667	*
7	3	19626	*
8	3	13891	*
9	3	256260	*
10	3	46047	*
11	3	147452	
13	3	1000000	
14	3	70360	
15	3	260337	
16	3	126656	
17	3	19801	
18	3	57582	
21	3	13564	
22	3	104237	
23	3	128897	
24	3	36040	
25	3	49104	
27	3	325319	*
28	3	18783	*
29	3	17312	*
30	3	1405	
31	3	1096	
32	3	18466	
33	3	30089	
34	3	11930	*
36	3	14446	*
37	3	36889	
38	3	23222	*
39	3	18705	
44	3	31200	*
46	3	31200	
47	3	39115	
48	3	180588	*
49	3	940	
51	3	45790	*

656305

7/0510/12
14-2

2	4	1333	
3	4	17201	*
4	4	30021	
6	4	333334	*
7	4	20525	*
8	4	5637	*
9	4	126620	*
10	4	32508	*
11	4	115787	
14	4	38449	
15	4	111842	
16	4	133399	*
17	4	13675	*
18	4	77633	
20	4	1000000	
21	4	58576	
22	4	235509	
23	4	860553	
24	4	46303	
26	4	73875	
27	4	650829	*
28	4	20506	*
29	4	25833	*
30	4	8090	
31	4	2889	
32	4	27556	
33	4	44899	
34	4	33590	*
36	4	22314	*
37	4	6477	
38	4	4077	*
39	4	27913	
44	4	4730	*
46	4	4750	
47	4	7743	
48	4	26946	*
49	4	656	
51	4	90545	*

601980

2	5	2749	
3	5	35473	*
4	5	1912	
6	5	632667	*

15	4	11	3 4 2
16	4	133399	*
17	4	13675	*
18	4	77633	
20	4	1000000	
21	4	58576	
22	4	235600	
23	4	860552	
24	4	46303	
26	4	73275	
27	4	650820	*
28	4	20306	*
29	4	25633	*
30	4	3096	
31	4	3889	
32	4	27556	
33	4	44899	
34	4	83590	*
36	4	22314	*
37	4	6477	
38	4	4077	*
39	4	37913	
44	4	4730	*
46	4	4750	
47	4	7743	
48	4	26946	*
49	4	656	
51	4	90545	*

6019 80

2	5	8749	
3	5	56473	*
4	5	21912	
6	5	632662	*
7	5	44415	*
8	5	19874	*
9	5	239507	*
10	5	81398	*
11	5	242860	
14	5	30736	
15	5	302212	
16	5	249856	*
17	5	58132	*
18	5	195497	
21	5	1138276	
22	5	412303	
23	5	465194	*
24	5	60718	
25	5	357420	
27	5	7234335	
28	5		

2	5	2749	
3	5	35473	*
4	5	6191 2	
6	5	632662	*
7	5	44415	*
8	5	19874	*
9	5	239507	*
10	5	81395	*
11	5	242860	
14	5	30736	
15	5	202212	
16	5	249856	*
17	5	58132	*
18	5	195497	
21	5	118276	
22	5	412303	
23	5	265194	*
24	5	60718	
25	5	357420	
27	5	7234335	
28	5	66124	
29	5	1045903	
30	5	823103	*
31	5	3048778	
32	5	134415	
33	5	219009	
34	5	6255962	*
36	5	24480	*
37	5	76720	*
38	5	48292	
39	5	136154	
44	5	16660	*
46	5	16660	
47	5	173862	*
48	5	131441	*
49	5	1374	
50	5	131665 57	
51	5	2033067	

18700605

11/05/12

143

210	72	*
310	933	
410	1628	*
710	6282	*
810	522	
910	437	
1010	4878	*
1110	8043	
1210	1000000	
1410	9719	
1510	3504	*
1610	403	*
1710	4320	
1810	453	*
2110	4666	*
2210	326	
2310	18	
2410	125	*
2510	877	*
2710		
2810	186	*
2910	309	
3010	25	*
3110	86	
3210	530	*
3510	537	*
3410		
3610	830	
3710	30	*
3810	10	
3910	334	*
4410	40	
4610	50	*
4710		
4810	328	
4910	56	*
5110		

1000918

811	3405	
311	43939	*
411	76686	
711	120660	
611	246174	*
911	41294	
1011	371134	*
1111	1698294	
1411	4028194	
1511	7399454	*
1611	2561194	*
1711	3601654	
1811	3078794	*
1911	1000000	

510	933	
410	1628	*
710	6282	*
810	522	
910	437	
1010	4878	*
1110	8043	
1210	1000000	
1410	9719	
1510	3504	*
1610	403	*
1710	4320	
1810	453	*
2110	4660	*
2210	326	
2310	18	
2410	125	*
2510	877	*
2710		
2810	186	*
2910	309	
3010	85	*
3110	80	
3210	330	*
3510	537	*
3410		
3610	830	
3710	30	*
3810	19	
3910	334	*
4410	40	
4610	50	*
4710		
4810	322	
4910	364	
5110		

1000918

111	3405	
311	13932	*
411	76686	
711	12060	
611	24617	*
911	4129	
1011	37113	*
1111	169829	
1411	402819	
1511	73995	*
1611	35619	*
1711	360165	
1811	307879	*
1911	1000000	
2111	641323	*
2211	231681	
2311	27618	
2411	273278	
2511	13863	*
2711	906	*
2811	270222	
2911	4576	

21		3805	
311		43939	*
411		7056	
711		12060	
611		24617	*
911		4129	
1011		37113	*
1111		169829	
1411		402819	
1511		73995	*
1611		35619	*
1711		360165	
1811		307879	*
1911		1000000	
2111		641323	*
2211		221681	
2311		27618	
2411		273278	*
2511		13363	*
2711		906	*
2811		270222	
2911		4676	
3011		379	*
3111		106	
3211		4988	*
3311		9127	*
3411		1350	
3611		3657	
3711		681	*
3811		489	
3911		50528	*
4411		850	
4611		830	*
4711		443	*
4811		4877	
4911		1702	
5111		5181	

1098992

7/0512/12
14-6

1812	240591	
2112	928126	
2212	173835	*
2312	76972	*
2412	898766	
2512	2109395	*
2612	1000000	
2712	144341	
2812	1654980	*
2912	743684	
3012	60354	*
3112	110291	
3212	793282	*
3312	1892535	*
3412	314870	*
3612	525389	
3712	36285	*
3812	22840	
3912	803547	*
4412	127150	
4612	1271180	*
4712	70528	
4812	775728	
4912	2176	
5112	824734	*

8997495504

813	81	
913	1855	*
4113	1842	
6113	284046	
7113	39	
8113	591	*
9113	111289	
10113	1129	*
11113	4569	
14113	51464	*
15113	140284	*
16113	120534	
17113	52379	*
18113	60564	
21113	40510	*
22113	891920	*
23113	122128	
24113	90103	*
26113	472404	
27113	1263643	*
28113	266831	
29113	69270	

813		61	
913		1855	*
413		1842	
613		284046	
713		39	
813		591	*
913		111289	
1013		1129	*
1113		4569	
1413		514641	*
1513		140284	*
1613		120534	
1713		52379	*
1813		60564	
2113		40510	*
2213		291920	*
2313		122128	
2413		90103	*
2613		472404	
2713		1258643	*
2813		266831	
2913		692704	*
3013		387656	
3113		318369	*
3213		177657	
3313		289466	
3413		46480	*
3613		528661	*
3713		535829	
3813		337280	*
3913		179956	
4413		694850	
4613		305150	
4713		1015246	
4813		173726	*
4913		40	
5113		178288	*

824431

7/05/12
14-7

2514	611299	
2714	1585796	*
2814	35995	
2914	1002877	*
3014	641437	
3114	341957	*
3214	229892	
3314	37457	
3414	926775	*
3614	946653	*
3714	1030482	
3814	324840	*
3914	232866	
4314	994655	*
4414	1570695	
4614	404000	
4714	1972401	
4814	624804	*
4914	99	*
5114	260696	

1417509

215	409	
315	3886	*
415	829	
615	93255	
715	5890	*
815	2962	*
915	37633	
1015	11440	*
1115	34777	
1415	285485	*
1515	60546	*
1615	42075	
1715	406335	*
1815	64086	
2115	12897	*
2215	1876277	*
2315	41301	
2415	57045	*
2515	355128	
2715	949787	*
2015	183704	
2915	2979068	*
3015	13[illegible]969	
3115	2940364	*
3215	133553	
3315	817605	
3415	786379	
3615	1211377	*

C-105 DUCT AND ENGINE BAY ANALYSIS

Zab MATRIX

	1	2	3	4	5	6	7	8	9	10
1	.028496	.008862	-.002228	-.002209	.012151	-.003800	-.005886	-.003441	.000105	.000
2	.008862	.011829	-.000939	-.001059	.006907	-.002197	-.003423	-.001990	.001711	.0000
3	-.002228	-.000939	.006592	.003604	-.001777	-.000073	-.000364	-.000262	.001109	.0040
4	-.002209	-.001059	.003604	.007372	-.004482	.000286	-.000029		.000468	.0000
5	.012151	.006907	-.001777	-.004482	.525329	-.034344	-.041664	-.035352	.000846	.0000
6	-.003800	-.002197	-.000073	.000286	-.034344	.015550	.017327	.014240	-.000391	.0000
7	-.005886	-.003423	-.000364	-.000029	-.041664	.017327	.025526	.018527	-.000642	.0000
8	-.003441	-.001990	-.000262		-.035352	.014240	.018527	.034597	-.000465	.0000
9	.000105	.001711	.001109	.000468	.000846	-.000391	-.000642	-.000465	.194700	-.0000
10	.000015	.000007	-.004073	-.000005	-.000006	-.000003	.000004	.000006	-.000050	.4738
11	-.000060	.000025	-.000213	-.003659	.001859	-.000737	-.001211	-.000687	.000097	-.0000
12	-.003023	-.001571	.001660	.004241	-.055877	.009310	.007433	.017002	-.000344	-.0000
13	-.003082	.001784	-.000451	-.000286	-.036360	.012930	.019728	.054955	-.000539	.000
14	-.004874	-.002838	-.000896	-.000812	-.031181	.018637	.027920	.073537	-.000870	.0001
15	-.001233	-.000700	-.000031	.000197	-.041031	.003282	.007647	.032250	-.000224	.000 00

REPORT. NO 7/051
TABULATED BY BSG
CHECKED BY
SUPERVISED BY
APPROVED BY

CT AND ENGINE BAY ANALYSIS

Zab MATRIX

2	3	4	5	6	7	8	9	10	11	12	13	14	15
008862	.002228	.002209	.012151	.003800	.005886	.003441	.000105	.000015	.000060	.003023	.003082	.004874	.001233
011829	.000939	.001059	.006907	.002197	.003423	.001990	.001711	.000007	.000025	.001571	.001784	.002838	.000700
000939	.006592	.003604	.001777	.000073	.000364	.000262	.001109	.004073	.000213	.001660	.000451	.000896	.000031
001059	.003604	.007372	.004482	.000286	.000029		.000468	.000005	.003659	.004241	.000286	.000812	.000197
006907	.001777	.004482	.525329	.034344	.041664	.035352	.000846	.000006	.001859	.055877	.036360	.031181	.041031
002197	.000073	.000286	.034344	.015550	.017327	.014240	.000391	.000003	.000737	.009310	.012930	.018637	.003282
003423	.000364	.000029	.041664	.017327	.025526	.018527	.000642	.000004	.001211	.007433	.019728	.027920	.007647
001990	.000262		.035352	.014240	.018527	.034597	.000465	.000006	.000687	.017002	.054955	.073537	.032250
001711	.001109	.000468	.000846	.000391	.000642	.000465	.194700	.000050	.000097	.000344	.000539	.000870	.000224
000007	.004073	.000005	.000006	.000003	.000004	.000006	.000050	.473883	.000073	.000010	.000009	.000014	.000005
000025	.000213	.003659	.001859	.000737	.001211	.000687	.000097	.000073	.437513	.014590	.000636	.001062	.000203
001571	.001660	.004241	.055877	.009310	.007433	.017002	.000344	.000010	.014590	.428617	.024694	.031960	.017722
001784	.000451	.000286	.036360	.012930	.019728	.054955	.000539	.000009	.000636	.024694	.096980	.128437	.061218
002838	.000896	.000812	.031181	.018637	.027920	.073537	.000870	.000014	.001062	.031960	.128437	.237843	.014466
000700	.000031	.000197	.041031	.003282	.007647	.032250	.000224	.000005	.000203	.017722	.061218	.014466	.107855

UCT AND ENGINE BAY ANALYSIS

REPORT. NO 7/
TABULATED BY
CHECKED BY
SUPERVISED BY
APPROVED BY

Zab MATRIX

	2	3	4	5	6	7	8	9	10	11	12	13	14	15
6	.008862	-.002228	-.002209	.012151	-.003800	-.005886	-.003441	.000105	.000015	-.000060	-.003023	-.003082	-.004874	-.00123
2	.011829	-.000939	-.001059	.006907	-.002197	-.003423	-.001990	.001711	.000007	.000025	-.001571	.001784	-.002838	-.00070
28	-.000939	.006592	.003604	-.001777	-.000073	-.000364	-.000262	.001109	-.004073	.000213	.001660	-.000451	-.000896	-.00003
9	-.001059	.003604	.007372	-.004482	.000286	-.000029		.000468	-.000005	-.003659	.004241	-.000286	-.000812	.00019
1	.006907	-.001777	-.004482	.525329	-.034344	-.041664	-.035352	.000846	-.000006	.001859	-.055877	-.036360	-.031181	-.04103
0	-.002197	-.000073	.000286	-.034344	.015550	.017327	.014240	-.000391	.000003	-.000737	.009310	.012930	.018637	.00328
6	-.003423	-.000364	-.000029	-.041664	.017327	.025526	.018527	-.000642	.000004	-.001211	.007433	.019728	.027920	.00764
1	-.001990	.000262		-.035352	.014240	.018527	.034597	-.000465	.000006	-.000687	.017002	.054955	.073537	.03225
5	.001711	.001109	.000468	.000846	-.000391	-.000642	-.000465	.194700	-.000050	.000097	-.000344	-.000539	-.000870	-.00022
5	.000007	-.004073	-.000005	-.000006	.000003	.000004	-.000006	-.000050	.473883	-.000073	-.000010	.000009	.000014	.00000
60	.000025	.000213	-.003659	.001859	-.000737	-.001211	-.000687	.000097	-.000073	.437513	.014590	-.000636	-.001062	-.00020
3	-.001571	.001660	.004241	-.055877	.009310	.007433	.017002	-.000344	-.000010	.014590	.428617	.024694	.031960	.01772
2	.001784	-.000451	-.000286	-.036360	.012930	.019728	.054955	-.000539	.000009	-.000636	.024694	.096980	.128437	.06121
4	-.002838	-.000896	-.000812	-.031181	.018637	.027920	.073537	-.000870	.000014	-.001062	.031960	.128437	.237843	.01446
3	-.000700	-.000031	.000197	-.041031	.003282	.007647	.032250	-.000224	.000005	-.000203	.017722	.061218	.014466	.10785

REPORT. NO 7/0510/12 SHEET NO

TABULATED BY BSJ DATE SEPT. 56

CHECKED BY DATE

SUPERVISED BY DATE

APPROVED BY DATE

8	9	10	11	12	13	14	15
-.003441	.000105	.000015	-.000060	-.003023	-.003082	-.004874	-.001233
-.001990	.001711	.000007	.000025	-.001571	.001784	-.002838	-.000700
-.000262	.001109	-.004073	.000213	.001660	-.000451	-.000896	-.000031
	.000468	-.000005	-.003659	.004241	-.000286	-.000812	.000197
-.035352	.000846	-.000006	.001859	-.055877	-.036360	-.031181	-.041031
-.014240	-.000391	.000003	-.000737	.009310	.012930	.018637	.003282
-.018527	-.000642	.000004	-.001211	.007433	.019728	.027920	.007647
-.034597	-.000465	.000006	-.000687	.017002	.054955	.073537	.032250
-.000465	.194700	-.000050	.000097	-.000344	-.000539	-.000870	-.000224
.000006	-.000050	.473883	-.000073	-.000010	.000009	.000014	.000005
-.000687	.000097	-.000073	.437513	.014590	-.000636	-.001062	-.000203
.017002	-.000344	-.000010	.014590	.428617	.024694	.031960	.017722
.054955	-.000539	.000009	-.000636	.024694	.096980	.128437	.061218
.073537	-.000870	.000014	-.001062	.031960	.128437	.237843	.014466
.032250	-.000224	.000005	-.000203	.017722	.061218	.014466	.107855

AVRO AIRCRAFT LIMITED
MALTON - ONTARIO
TECHNICAL DEPARTMENT

REPORT No. 7/0510/12
SHEET No. APPEND 1 SHT 1

AIRCRAFT:		PREPARED BY	DATE
C105	DUCT & ENGINE BAYS	C.B.	Aug 56
		CHECKED BY	DATE

APPENDIX 1

SINCE THE ORIGINAL ANALYSIS, IT HAS BEEN DECIDED THAT THE LOAD (14) SHOULD BE TAKEN BY DIFFERENTIAL BENDING OF FIN & BOTTOM LONGERON. THE SHEAR BEING TAKEN AS FORMERLY, THAT IS, BY THE FIN BENDS.

THE STRESSES & DEFLECTIONS MATRICES WILL BE CORRECTED IN THE FOLLOWING MANNER:

1. STRESSES DUE TO THE BALANCED LOAD SYSTEM SHOWN ON SHT 2 OF THIS APPENDIX WILL BE CALCULATED & ADDED TO THE STRESSES QUOTED IN THE Tia MATRIX FOR LOAD 14.

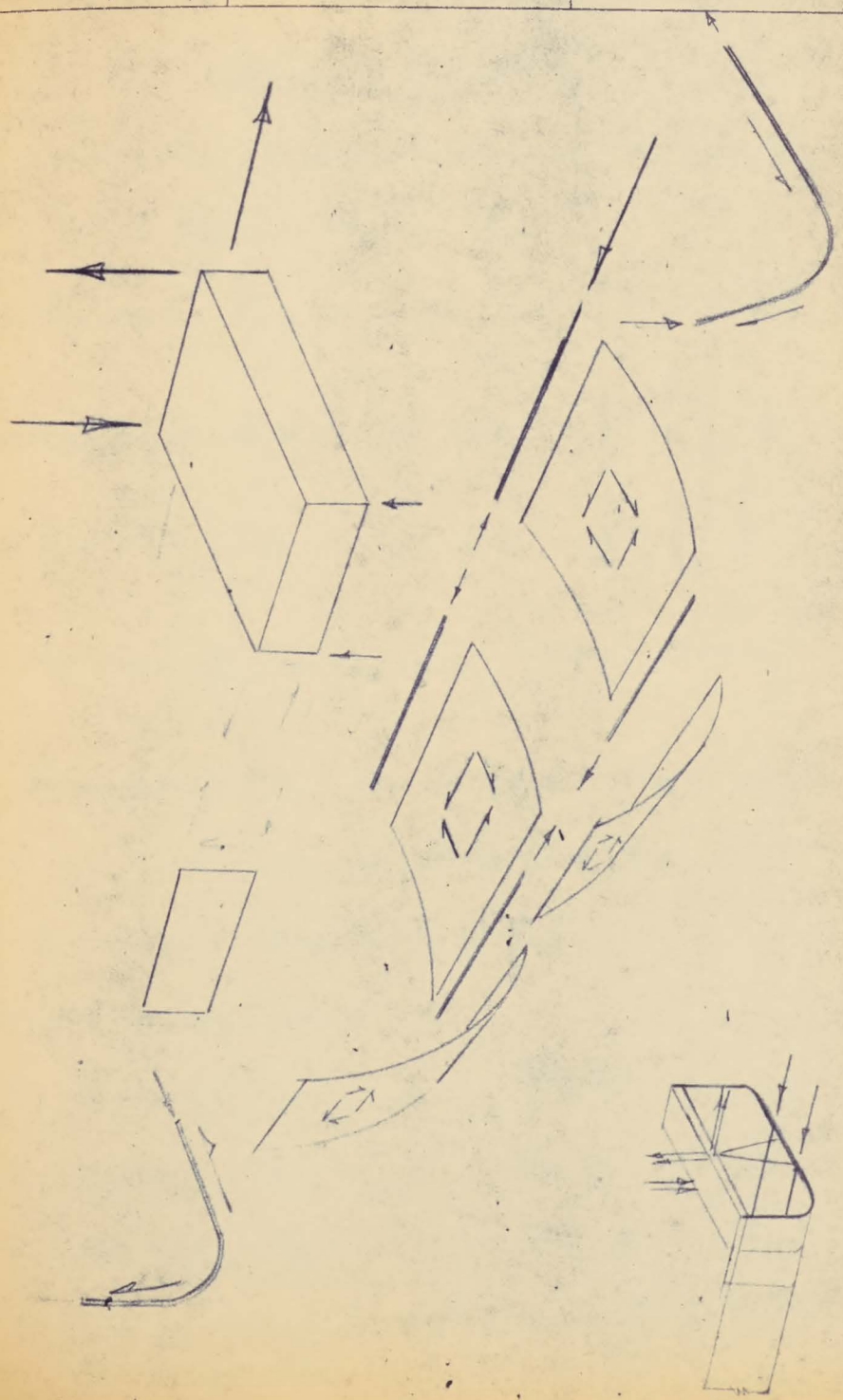
2. NECESSARY COMPUTOR WORK WILL BE PERFORMED ACCORDING TO SHT 3 APPENDIX.

FORM 1518A

AVRO AIRCRAFT LIMITED
MALTON · ONTARIO
TECHNICAL DEPARTMENT

REPORT No. 7/0510/12
SHEET No. Appendix 1 Sht 2

AIRCRAFT:		PREPARED BY	DATE
C105	Duct & Engine Bays	C.B.	Aug '56
		CHECKED BY	DATE



Adjusting Loads.

AVRO AIRCRAFT LIMITED
MALTON, ONTARIO
TECHNICAL DEPARTMENT

REPORT No. 7/0510/12
SHEET No. APPEND 1 Pg 4

AIRCRAFT		PREPARED BY	DATE
C105	DUCT & ENGINE BAY.	C.B	Aug 56.
		CHECKED BY	DATE
		[illegible]	

DUE TO LOADINGS OF P_2 APPEND 1

STRESS IN S.P. 40 $= -\frac{30.00}{49.00} \times \frac{1}{.620} = -.987\,492$

STRESS IN S.P. 33

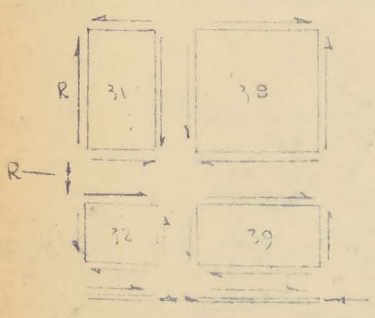
SHEAR FLOW IN 32 & 39 ARE EQUAL THEN BOOM END LOAD FALLS LINEARLY FROM S.P. 40 TO 25

$= -\frac{30.00}{49.00} \times \frac{(712.3400 - 697.6030)}{(742.5000 - 697.6030)} \times \frac{1}{.600} = -.334\,937$

STRESS IN S.Ps 32 & 39

$= +\frac{30.00}{49.00} \times \frac{1}{(742.5000 - 697.6030)} \times \frac{1}{.032} = +.426\,149$

STRESS IN S.P. 31



$R = \frac{30.00}{49.00} \times \frac{48.50 - 14.30}{49.80 - 18.50} \times \frac{6.3}{44.8970}$

SHEAR STRESS IN 31

$= -\frac{R}{48.5} \times \frac{1}{.064} = -.030\,241\,86$

STRESS IN 38

SUMMING LOADS ON BOTTOM EDGE & DIVIDING BY SHEAR AREA.

$= \left(.030\,241\,86 \times .064 \times 14.7370 + \frac{30.00}{49.00}\right) \times \frac{1}{.064 \times 30.16}$

$= +.331\,962\,88$

FORM 1390A

C-105 Duct And Engine Bay Analysis

Z_{ab} MATRIX

	1	2	3	4	5	6	7	8	9
1	.028496	.008862	-.002228	-.002209	.012151	-.003800	-.005886	-.003441	.000105
2	.008862	.011829	-.000939	-.001059	.006907	-.002197	-.003423	-.001990	.001711
3	-.002228	-.000939	.006592	.003604	-.001777	-.000073	-.000364	-.000262	.001109
4	-.002209	-.001059	.003604	.007372	-.004482	.000286	-.000029		.000468
5	.012151	.006907	-.001777	-.004482	.525329	-.034344	-.041664	-.035352	.000846
6	-.003800	-.002197	-.000073	.000286	-.034344	.015550	.017327	.014240	-.000391
7	-.005886	-.003423	-.000364	-.000029	-.041664	.017327	.025526	.018527	-.000642
8	-.003441	-.001990	-.000262		-.035352	.014240	.018527	.034597	-.000465
9	.000105	.001711	.001109	.000468	.000846	-.000391	-.000642	-.000465	.194700
10	.000015	.000007	-.004073	-.000005	-.000006	-.000003	.000004	.000006	-.000050
11	-.000060	.000025	-.000213	-.003659	.001859	-.000737	-.001211	-.000687	.000097
12	-.003023	-.001571	.001660	.004241	-.055877	.009310	.007433	.017002	-.000344
13	-.003082	.001784	-.000451	-.000286	-.036360	.012930	.019728	.054955	-.000539
14	-.005269	-.003069	-.000682	-.000495	-.042081	.011112	.020598	.050477	-.000746
15	-.001233	-.000700	-.000031	.000197	-.041031	.003282	.007647	.032250	-.000224
CHECK SUM	.019398	.016177	.002298	.003944	.254118	.042498	.063571	.179857	.195635

REPORT NO 7/0510/12
TABULATED BY EBG
CHECKED BY
SUPERVISED BY
APPROVED BY

ND ENGINE BAY ANALYSIS

MATRIX

3	4	5	6	7	8	9	10	11	12	13	14	15	CHECK SUM
002228	002209	.012151	003800	005886	003441	.000105	000015	000060	003023	003082	005269	001233	.019398
000939	001059	.006907	002197	003423	001990	.001711	.000007	.000025	001571	.001784	003069	000700	.016177
006592	.003604	001777	000073	000364	000262	.001109	004073	.000213	.001660	000451	000682	000031	.002298
003604	.007372	004482	.000286	000029		.000468	000005	003659	.004241	000286	000495	.000197	.003944
001777	004482	.525329	034344	041664	035352	.000846	000006	.001859	055877	036360	042081	041031	.254118
000073	.000286	034344	.015550	017327	014240	000391	.000003	000737	.009310	.012930	.011112	.003282	.042498
000364	000029	041664	.017327	.025526	.018527	000642	.000004	001211	007433	.019728	.020598	.007647	.063571
000262		035352	.014240	.018527	.034597	000465	.000006	000687	.017002	.054955	.050477	.032250	.179857
01109	.000468	.000846	000391	000642	000465	.194700	000050	.000097	000344	000539	000746	000224	.195635
004073	000005	000006	.000003	.000004	.000006	.000050	.473883	000073	000010	.000009	.000006	.000005	.469721
000213	003659	.001859	000737	001211	000687	.000097	000073	.437513	.014590	000636	.000124	000203	.447155
001660	.004241	055877	.009310	.007433	.017002	000344	000010	.014590	.428617	.024694	.027692	.017722	.492136
000451	000286	036360	.012930	.019728	.054955	000539	.000009	000636	.024694	.096980	.089844	.061218	.320788
000682	000495	042081	.011112	.020598	.050477	000746	.000006	.000124	.027692	.089844	.093175	.058351	.299037
00031	.000197	041031	.003282	.007647	.032250	000224	.000005	000203	.017722	.061218	.058351	.107855	.245105
02298	.003944	.254118	.042498	.063571	.179857	.195635	.469721	.447155	.492136	.320788	.299037	.245105	3.051438

REPORT NO 7/0510/12 SHE
TABULATED BY 684 DA
CHECKED BY DA
SUPERVISED BY DA
APPROVED BY DA

ENGINE BAY ANALYSIS

ATRIX

	4	5	6	7	8	9	10	11	12	13	14	15	CHECK SUM
28	-.002209	.012151	-.003800	-.005886	-.003441	.000105	.000015	-.000060	-.003023	-.003082	-.005269	-.001233	.019398
39	-.001059	.006907	-.002197	-.003423	-.001990	.001711	.000007	.000025	-.001571	.001784	-.003069	-.000700	.016177
92	.003604	-.001777	-.000073	-.000364	-.000262	.001109	-.004073	-.000213	.001660	-.000451	-.000682	-.000031	.002298
04	.007372	-.004482	.000286	-.000029		.000468	-.000005	-.003659	.004241	-.000286	-.000495	.000197	.003944
77	-.004482	.525329	-.034344	-.041664	-.035352	.000846	-.000006	.001859	-.055877	-.036360	-.042081	-.041031	.254118
73	.000286	-.034344	.015550	.017327	.014240	-.000391	.000003	-.000737	.009310	.012930	.011112	.003282	.042498
64	-.000029	-.041664	.017327	.025526	.018527	-.000642	.000004	-.001211	.007433	.019728	.020598	.007647	.063571
62		-.035352	.014240	.018527	.034597	-.000465	.000006	-.000687	.017002	.054955	.050477	.032250	.179857
9	.000468	.000846	-.000391	-.000642	-.000465	.194700	-.000050	.000097	-.000344	-.000539	-.000746	-.000224	.195635
73	-.000005	-.000006	.000003	.000004	.000006	-.000050	.473883	-.000073	-.000010	.000009	.000006	.000005	.469721
13	-.003659	.001859	-.000737	-.001211	-.000687	.000097	-.000073	.437513	.014590	-.000636	.000124	-.000203	.447155
60	.004241	-.055877	.009310	.007433	.017002	-.000344	-.000010	.014590	.428617	.024694	.027692	.017722	.492136
51	-.000286	-.036360	.012930	.019728	.054955	-.000539	.000009	-.000636	.024694	.096980	.089844	.061218	.320788
82	-.000495	.042081	.011112	.020598	.050477	-.000746	.000006	.000124	.027692	.089844	.093175	.058351	.299037
31	.000197	-.041031	.003282	.007647	.032250	-.000224	.000005	-.000203	.017722	.061218	.058351	.107855	.245105
98	.003944	.254118	.042498	.063571	.179857	.195635	.469721	.447155	.492136	.320788	.299037	.245105	3.051438

REPORT NO 7/0510/12 SHEET NO APPEND 1-9
TABULATED BY 689 DATE SEPT 56
CHECKED BY DATE
SUPERVISED BY DATE
APPROVED BY DATE

	8	9	10	11	12	13	14	15	CHECK SUM	
886	-.003441	.000105	.000015	-.000060	-.003023	-.003082	-.005269	-.001233	.019398	
423	-.001990	.001711	.000007	.000025	-.001571	.001784	-.003069	-.000700	.016177	
364	-.000262	.001109	-.004073	.000213	.001660	-.000451	-.000682	-.000031	.002298	
029		.000468	-.000005	-.003659	.004241	-.000286	-.000495	.000197	.003944	
64	-.035352	.000846	-.000006	.001859	-.055877	-.036360	-.042081	-.041031	.254118	
327	.014240	-.000391	.000003	-.000737	.009310	.012930	.011112	.003282	.042498	
526	.018527	-.000642	.000004	-.001211	.007433	.019728	.020598	.007647	.063571	
527	.034597	-.000465	.000006	-.000687	.017002	.054955	.050477	.032250	.179857	
642	-.000465	.194700	-.000050	.000097	-.000344	-.000539	-.000746	-.000224	.195635	
004	.000006	-.000050	.473883	-.000073	-.000010	.000009	.000006	.000005	.469721	
211	-.000687	.000097	-.000073	.437513	.014590	-.000636	.000124	-.000203	.447155	
433	.017002	-.000344	-.000010	.014590	.428617	.024694	.027692	.017722	.492136	
28	.054955	-.000539	.000009	-.000636	.024694	.096980	.089844	.061218	.320788	
698	.050477	-.000746	.000006	.000124	.027692	.089844	.093175	.058351	.299037	
47	.032250	-.000224	.000005	-.000203	.017722	.061218	.058351	.107855	.245105	
571	.179857	.195635	.469721	.447155	.492136	.320788	.299037	.245105	3.051438	