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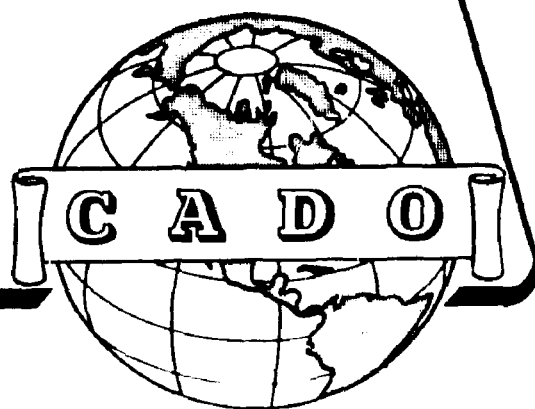
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| <b>AUTHORITY</b>                                                                                                                                                                                                                                        |
| 19990524 - Mr James A. Morrow, Hq<br>AFMC/PAX, Security & Policy Review, Office<br>of Public Affairs.                                                                                                                                                   |

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24000

A.T.I.

49157

UNCLASSIFIED

Control Surfaces - Elevator Rib - Outboard of 373 - Static Test Model XB-36

49157

Riefe, H. C.  
Consolidated Vultee Aircraft Corp., Fort Worth Div., Texas  
(Same)

(None)

FSG-129

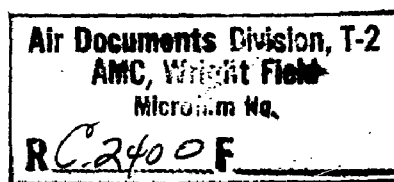
(Same)

May '46    Unclass.    U.S.    English    8    photos, tables, graphs

Static load tests were conducted on three specimens of the hydropressed magnesium alloy elevator rib for the B-36 bomber to determine their ultimate strength. All specimens were made of .025 gage AMC 52S-H, were identical in size, shape of beaded web cutouts, web stiffeners and beaded flanges, but one had a small flange reinforcing angle fastened near the area of the compression reaction attachment. The specimens were loaded at eight specified points with flanges stabilized laterally at, and midway between, the load points. Results showed that all specimens withstood the application and release of the design yield load without showing permanent set. The ultimate test loads varied only from 120 to 129% of the design ultimate load. All specimens failed in a similar manner by crippling of the compression flange near the attachment.

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Design and Details (3)    XB-36 (99409)

(1)  
Structural elements - Strength (90853.8);



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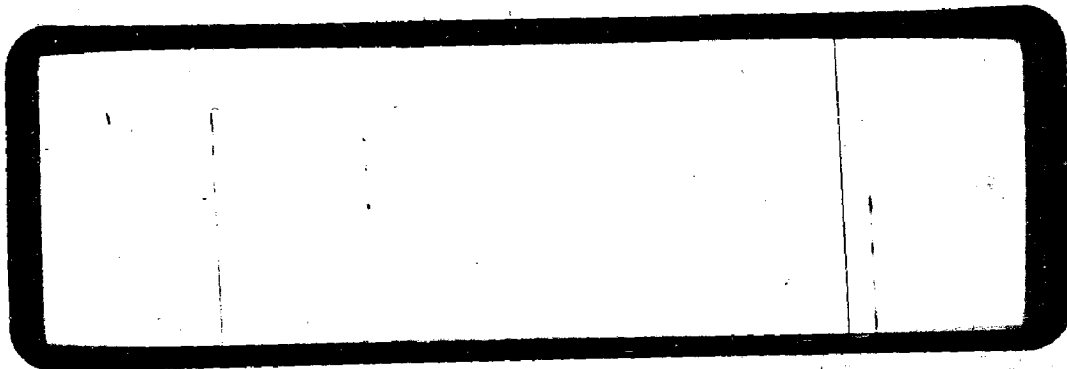
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FORT WORTH DIVISION • FORT WORTH 1, TEXAS





TEST NO. F-533  
MODEL XB-36

REPORT FSG-129  
DATE 5-28-46

TITLE

CONTROL SURFACES - ELEVATOR RIB -  
OUTBOARD OF 372 - STATIC TEST

SUBMITTED UNDER

PREPARED BY: *H. G. Kiefer*

GROUP:

CHECKED BY: *J. J. [unclear]*

REFERENCE:

APPROVED BY: *R. S. Reade*

APPROVED BY: *M. S. Robbins*

NO. OF PAGES 8

NO. OF DIAGRAMS 6

REVISIONS

| NO. | DATE | BY | CHANGE | PAGES AFFECTED |
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ANALYSED BY \_\_\_\_\_  
PREPARED BY \_\_\_\_\_  
CHECKED BY \_\_\_\_\_  
REVIEWED BY \_\_\_\_\_

**Consolidated Vultee Aircraft Corporation**  
FORT WORTH DIVISION  
FORT WORTH, TEXAS

PAGE 1  
REPORT NO. FSG-129  
MODEL F-533 XB-36  
DATE \_\_\_\_\_

**Purpose:-** To determine the ultimate strength of a magnesium alloy hydropressed elevator rib designed for the XB-36 Airplane.

**Summary:-** Three specimens of the hydropressed magnesium alloy elevator rib designed for the XB-36 airplane were static load tested in a like manner. All were made of .025 gage AYC 52S-P, were identical to size, shape of beaded web cut-outs, web stiffeners and beaded flanges, but one had a small flange reinforcing angle fastened near the area of the compression reaction attachment. The specimens were loaded at eight specified points with their flanges stabilized laterally at and midway between the load points. The results of the tests were much the same for all specimens: they withstood the application and release of the design yield load without showing permanent set, the ultimate test loads varied only from 120 to 129% of the design ultimate (330 lbs. total), and all failed in a similar manner by crippling of the compression flange near the attachment.

Witnesses:

W. N. ... AAF  
W. L. ... C. V. A. ...  
...

ANALYSIS \_\_\_\_\_  
PREPARED BY \_\_\_\_\_  
CHECKED BY \_\_\_\_\_  
REVISED BY \_\_\_\_\_

**Consolidated Vultee Aircraft Corporation**  
FORT WORTH DIVISION  
FORT WORTH, TEXAS

PAGE 2  
REPORT NO. FSG-129  
MODEL XB-36 F-533  
DATE 5-28-46

**OBJECT:** To determine the static load strength of each of three magnesium alloy hydropressed elevator ribs designed for the XB-36 airplane.

**DESCRIPTION OF SPECIMEN:** The specimens made of .025 gage AAC52S-H were a beaded flange type with stiffened web and beaded edge cut-outs shown in Fig. 1. No. 1 specimen (Table I) was -7 (with flange reinforcing angle near attachment) and No. 3 was -6, before alteration B was added to the drawing. Spec. No. 2 is the -6 shown in Figure 1.

**SET UP AND PROCEDURE:** The specimens each in turn were tested in a jig designed to provide load distributed as shown in Figure 3. Lateral restraint on the flanges at and midway between load points was provided. Dial gages were used to measure the deflection of the rib at load points. A dynamometer, turnbuckle arrangement, and a whiffletree were used to apply the loads at the points indicated in Figure 3. The test set up is shown in Figure 2.

Load was applied in increments of 10% of the design ultimate up to the design yield and deflection readings taken as shown in Table I. Following this the load was released to note any permanent set after which the rib was reloaded to failure.

**RESULTS:** The results of the test are incorporated in Table I.

**DISCUSSION:** The results of tests on the three specimens followed much the same pattern. No permanent set was noted on any of the specimens after the application and removal of the design yield load of 220 lbs. (total load). The ultimate loads ranged from 400 to 425 lbs. or 120 to 129% of the design ultimate of 330 lbs. (total load). In all the tests a preliminary failure by buckling of web and flange appeared at approximately 110% of the design ultimate load. Final failure was the result of a crippling of the compression flange near the attachment. Figure 4 shows a typical failure.

The flange reinforcing angle incorporated in specimen number one was removed after this specimen had been tested; results from specimens 2 & 3 indicate this angle to be unnecessary.

**CONCLUSION:** The hydropressed magnesium alloy elevator rib (Ref. 36FTW548) designed for the XB-36 airplane withstood its design yield load without permanent deformation and exceeded its design ultimate load by 20 to 29%. It is considered structurally satisfactory for use on the XB-36 airplane. The reinforcing flange angle (ref. specimen #1) is not necessary.

| TABLE I. |       |               |                                 |    |    |    |    |    |     |     |
|----------|-------|---------------|---------------------------------|----|----|----|----|----|-----|-----|
| C        | %ULT. | DYN.<br>READ. | DEFLECTION 10 <sup>-3</sup> IN. |    |    |    |    |    |     |     |
|          |       |               | 1                               | 2  | 3  | 4  | 5  | 6  | 7   | 8   |
|          |       |               | NO. 1                           |    |    |    |    |    |     |     |
|          | 0     | 0             | 0                               | 0  | 0  | 0  | 0  | 0  | 0   | 0   |
|          | 10    | 33            | 6                               | 4  | 4  | 6  | 8  | 10 | 11  | 12  |
|          | 20    | 66            | 14                              | 11 | 13 | 17 | 22 | 27 | 30  | 35  |
|          | 30    | 99            | 22                              | 19 | 24 | 31 | 40 | 49 | 55  | 66  |
|          | 40    | 132           | 25                              | 24 | 31 | 41 | 51 | 62 | 71  | 85  |
|          | 50    | 165           | 27                              | 28 | 37 | 49 | 61 | 75 | 86  | 103 |
|          | 60    | 198           | 29                              | 33 | 44 | 59 | 74 | 90 | 103 | 124 |
|          | 66.7  | 220           | 31                              | 35 | 47 | 62 | 78 | 95 | 109 | 131 |
|          | 0     | 0             | 0                               | 0  | 0  | 0  | 0  | 0  | 0   | 0   |
|          | —     | 400           | ULT. LOAD, 120% OF DUL          |    |    |    |    |    |     |     |
|          |       |               | NO. 2                           |    |    |    |    |    |     |     |
|          | 0     | 0             | 0                               | 0  | 0  | 0  | 0  | 0  | 0   | 0   |
|          | 10    | 33            | 1                               | 1  | 2  | 3  | 3  | 4  | 3   | 6   |
|          | 20    | 66            | 2                               | 4  | 6  | 8  | 9  | 12 | 13  | 18  |
|          | 30    | 99            | 6                               | 7  | 11 | 13 | 17 | 22 | 24  | 31  |
|          | 40    | 132           | 8                               | 10 | 15 | 18 | 22 | 28 | 31  | 40  |
|          | 50    | 165           | 10                              | 12 | 18 | 21 | 26 | 35 | 39  | 50  |
|          | 60    | 198           | 12                              | 15 | 21 | 27 | 34 | 45 | 49  | 63  |
|          | 66.7  | 220           | 13                              | 17 | 24 | 30 | 37 | 49 | 54  | 68  |
|          | 0     | 0             | 0                               | 0  | 0  | 0  | 0  | 0  | 0   | 0   |
|          | —     | 425           | ULT. LOAD, 123% OF DUL          |    |    |    |    |    |     |     |
|          |       |               | NO. 3                           |    |    |    |    |    |     |     |
|          | 0     | 0             | 0                               | 0  | 0  | 0  | 0  | 0  | 0   | 0   |
|          | 10    | 33            | 1                               | 1  | 2  | 2  | 5  | 6  | 7   | 9   |
|          | 20    | 66            | 1                               | 3  | 4  | 6  | 9  | 12 | 16  | 19  |
|          | 30    | 99            | 1                               | 5  | 7  | 9  | 15 | 20 | 25  | 32  |
|          | 40    | 132           | 2                               | 7  | 9  | 12 | 19 | 25 | 32  | 41  |
|          | 50    | 165           | 2                               | 8  | 10 | 15 | 24 | 32 | 41  | 51  |
|          | 60    | 198           | 3                               | 10 | 14 | 21 | 32 | 42 | 53  | 68  |
|          | 66.7  | 220           | 4                               | 12 | 17 | 25 | 37 | 48 | 61  | 78  |
|          | 0     | 0             | 0                               | 0  | 0  | 0  | 0  | 0  | 0   | 0   |
|          | —     | 415           | ULT. LOAD 126% OF DUL           |    |    |    |    |    |     |     |

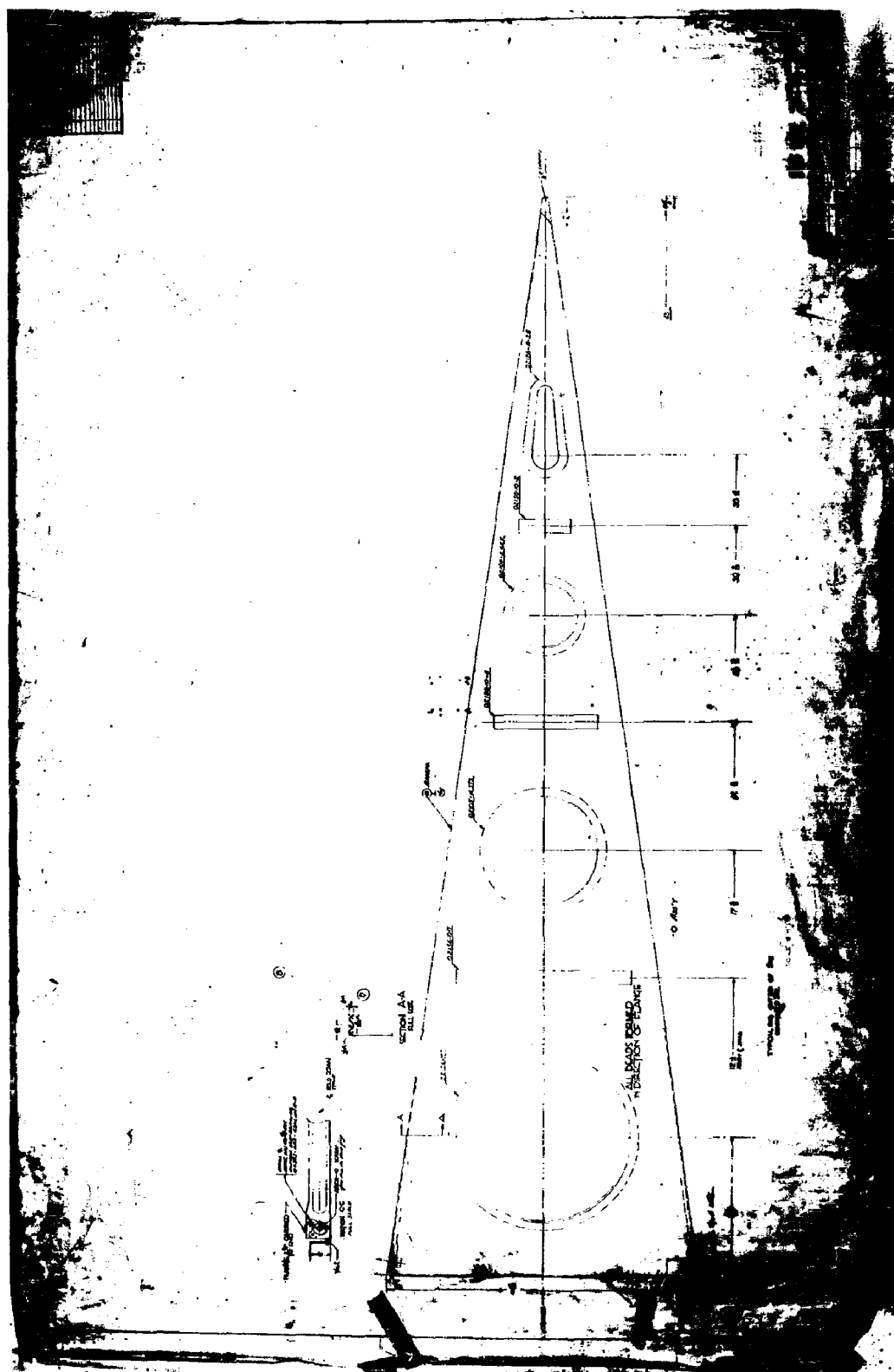
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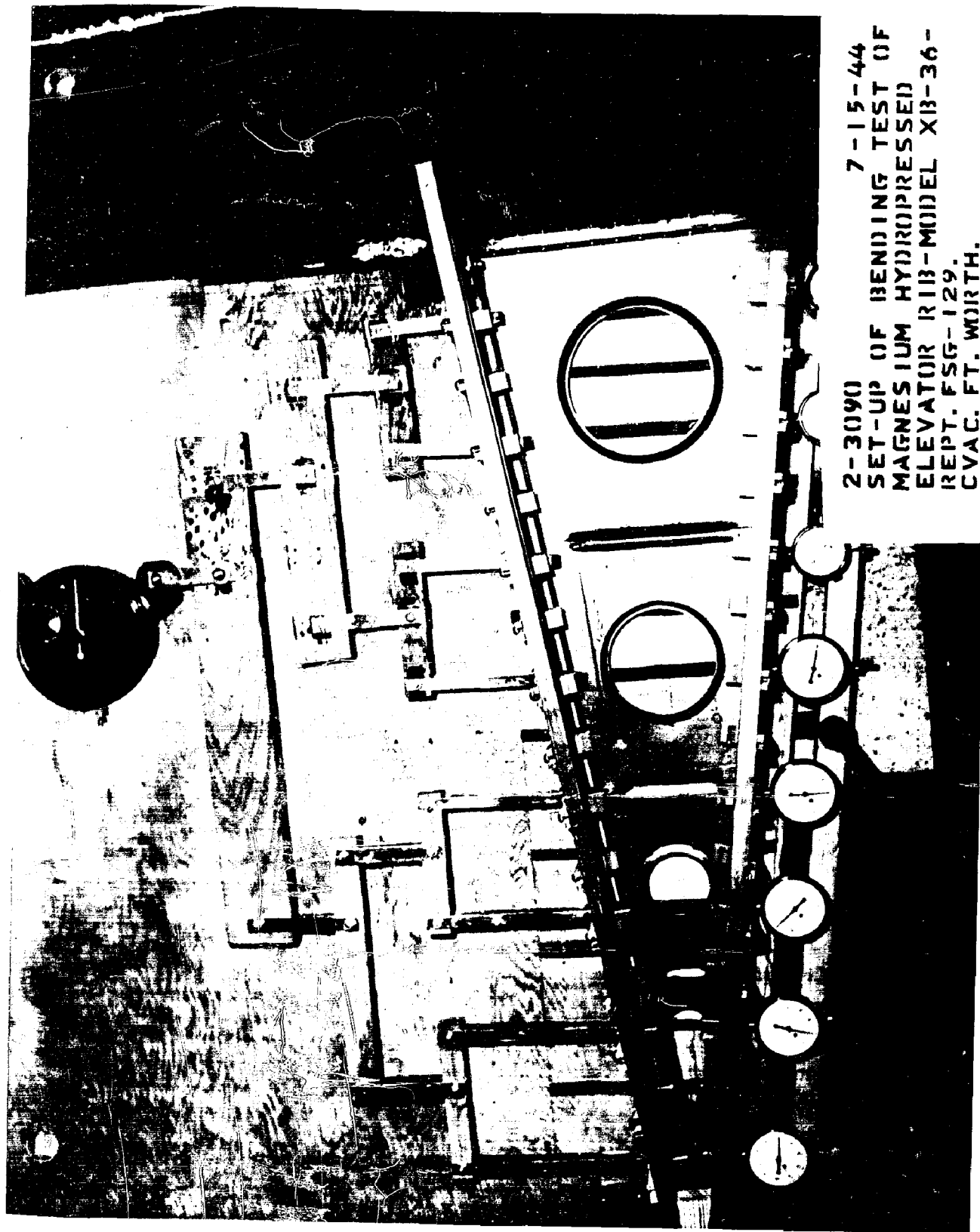
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FORT WORTH DIVISION  
FORT WORTH, TEXAS

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REPORT NO. **FSG-129**  
MODEL **XB-36 F-533**  
DATE **5-28-46**

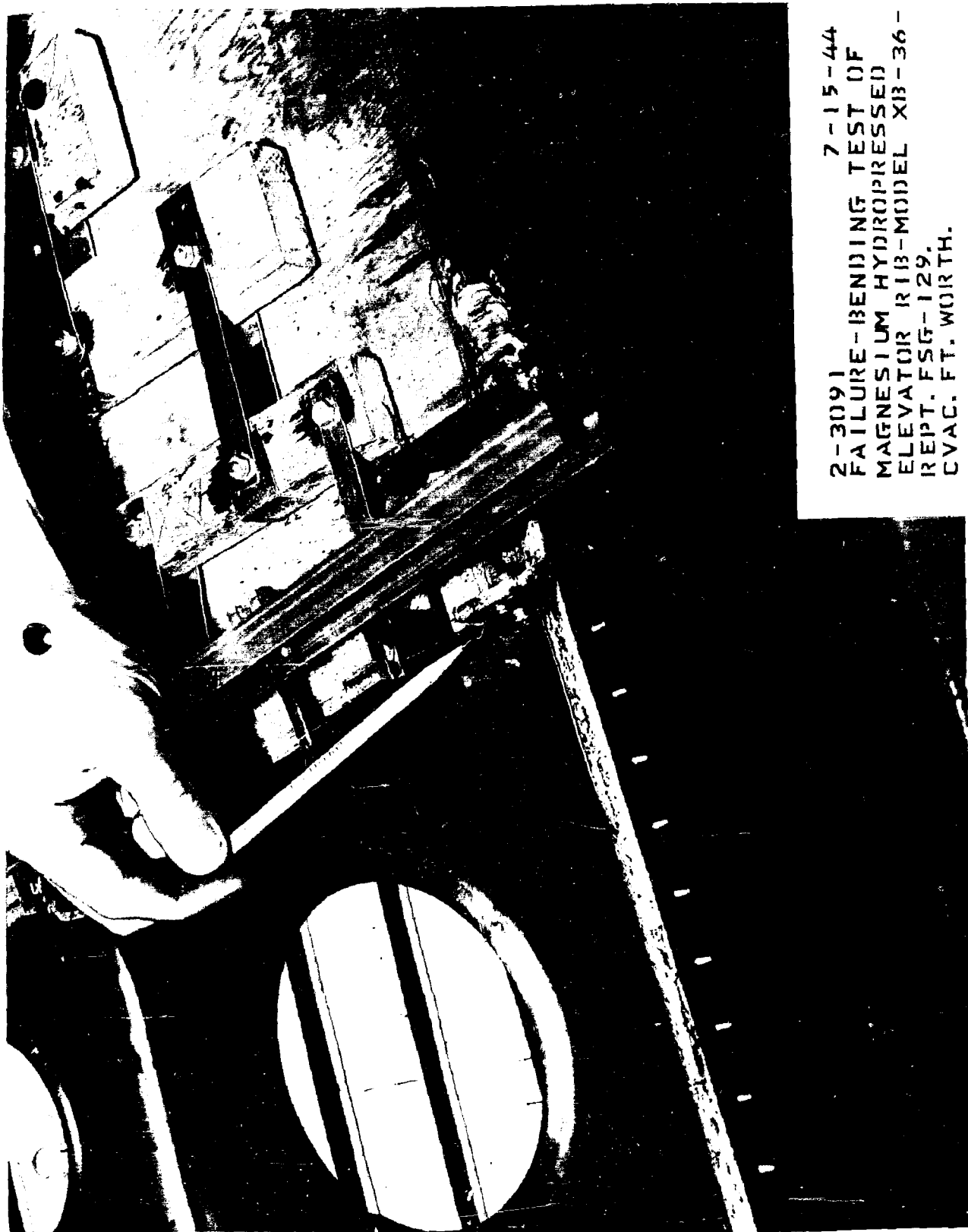
PHOTOGRAPHIC INDEX

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2-3090 7-15-44  
SET-UP OF BENDING TEST OF  
MAGNESIUM HYDROPPRESSED  
ELEVATOR RIB-MODEL XB-36-  
REPT. FSG-129.  
CVAC. FT. WORTH.



2-3091 7-15-44  
FAILURE-BENDING TEST OF  
MAGNESIUM HYDROPRESED  
ELEVATOR RIB-MODEL XB-36-  
REPT. FSG-129.  
CVAC. FT. WORTH.



MINIMUM 2 mm. pins located, can pins used.  
KUNER & EBER CO. N. Y. NO. 36-14

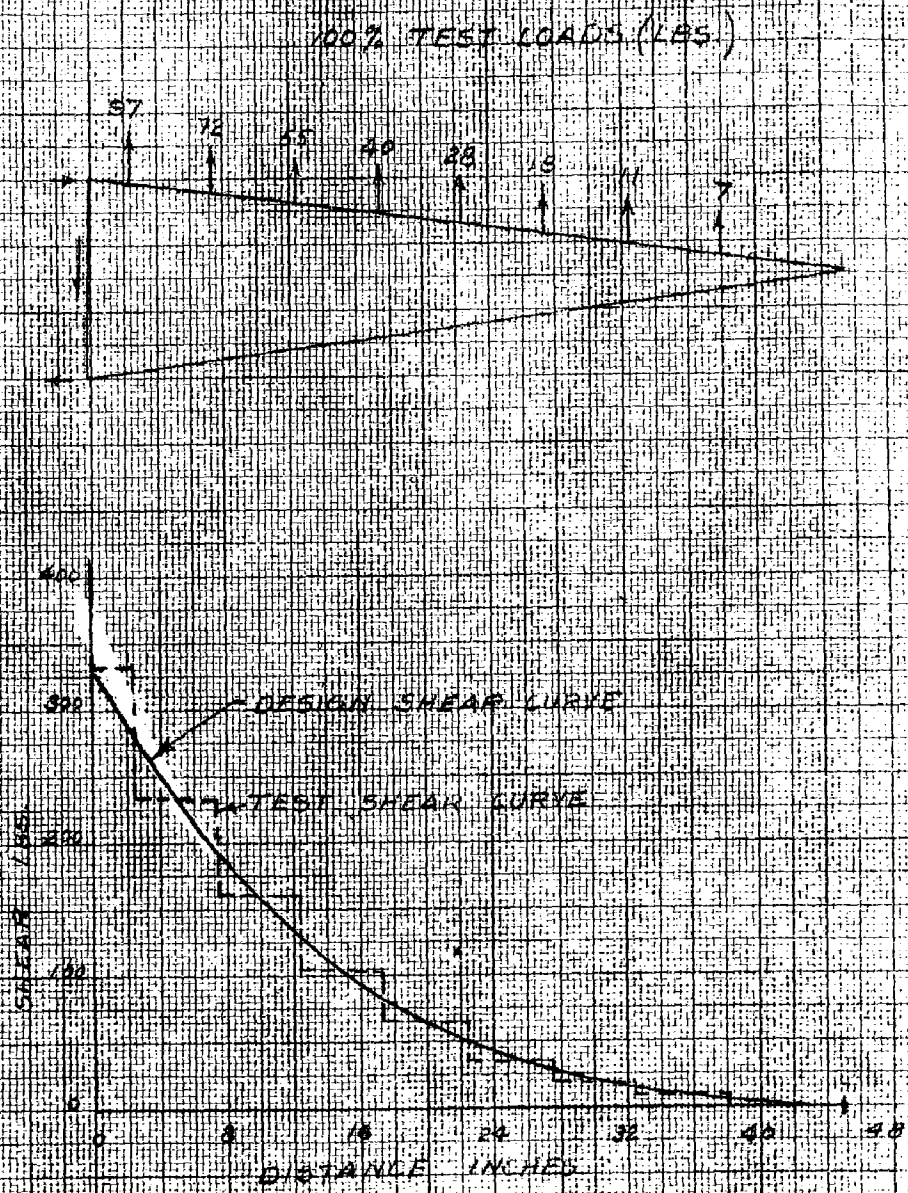


FIGURE 3

|             |        |                                                          |          |
|-------------|--------|----------------------------------------------------------|----------|
| DESIGN BY   | PIERCE | SIMULATED AIR LOADING                                    | NO. 129  |
| DESIGNED BY |        | ENGINEERING DIVISION, AIR FORCE RESEARCH AND DEVELOPMENT | MODEL 36 |
| APPROVED BY |        | TESTING DIVISION, AIR FORCE RESEARCH AND DEVELOPMENT     |          |

REMARKS: ON 11-10-50 CO. REPAIR & JERREY  
 REPAIR WORK: THE JOINTS AND THE JOINTS  
 A. S. W. M. M. M.

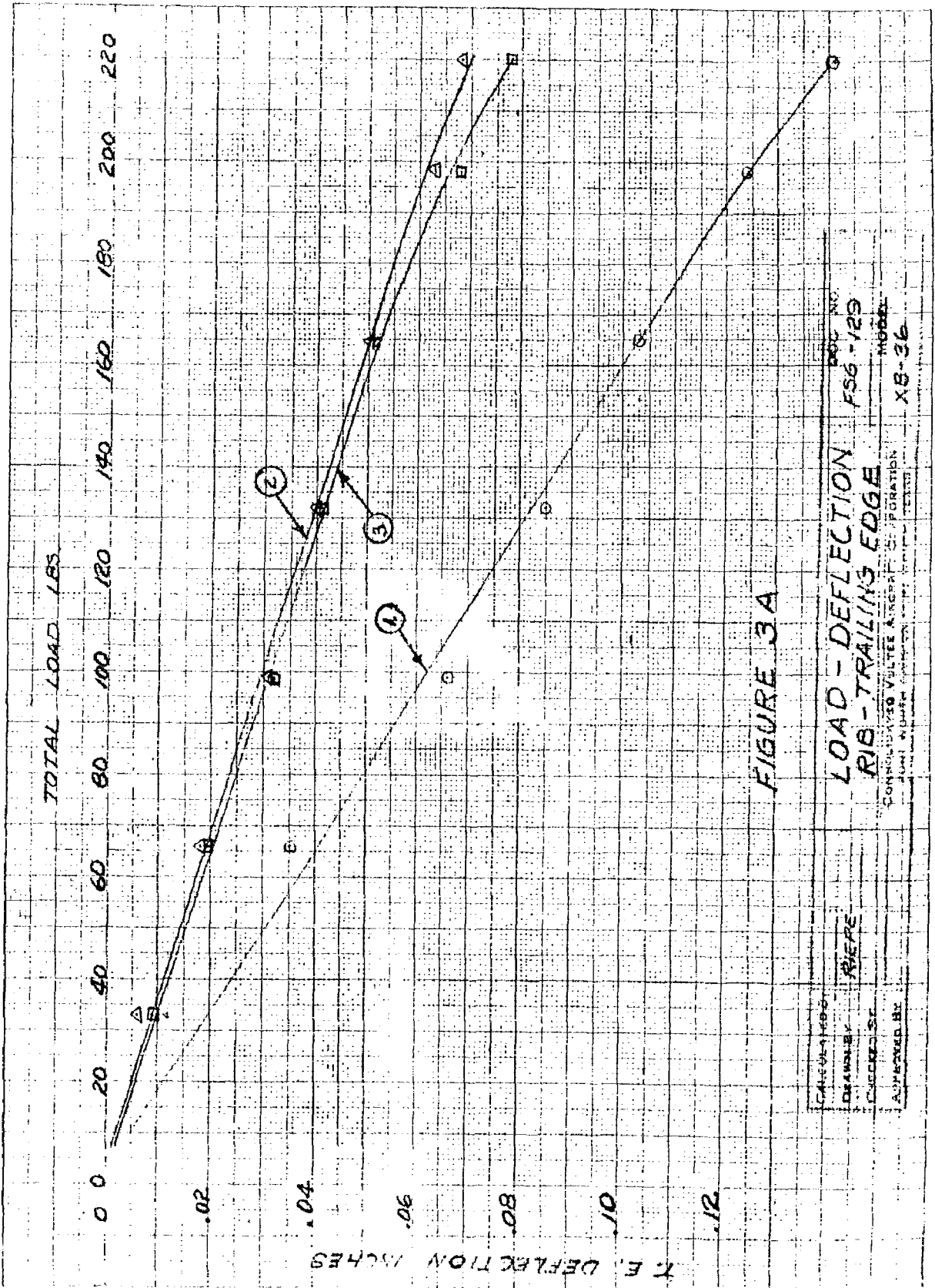


FIGURE 3A

|                                           |             |                                           |             |
|-------------------------------------------|-------------|-------------------------------------------|-------------|
| CALCULATED BY                             | DESIGNED BY | CHECKED BY                                | APPROVED BY |
|                                           | RIERE       |                                           |             |
| LOAD - DEFLECTION                         |             | RIB - TRAILING EDGE                       |             |
| FS6-129                                   |             | X8-36                                     |             |
| CONSTRUCTION VALUE AND REPAIR INFORMATION |             | CONSTRUCTION VALUE AND REPAIR INFORMATION |             |

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