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UNCLASSIFIED
Stress Analysis of Landing Gear XB-36

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USAF Contr. No. W535-ac-22352  

June '49  UnClass.  U.S.  English  30  tables, diagrs

A stress analysis has been made of the landing gear of the XB-36 bomber to determine whether or not the gear meets the requirements of existing criteria. The report is divided into two parts, one of which deals with the main landing gear and the other dealing with the nose gear. Descriptive matter for each gear appears under its respective analysis. Results of the analysis are shown in tables, diagrams, and formulas.

Copies of this report obtainable from CADO
Structures (7)
Stress Analysis of Specific Aircraft (6)  XB-36 (98409)

(1)  Landing gears - Stress analysis (54557);
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ANALYSIS

Crptm

PAGE C

PREPARED

TRANSFFERABLE

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BY FORT WORTH

DIVISION

MODEL R FORT

WORTH, TEXAS

REVISED

19. BLM - 36-002

ESTIMATED

WEIGHT BALANCE

FOR X8-36 AIRPLANE
INTRODUCTION

The purpose of this report is to show that the X-20 landing gear meets all of the requirements of existing criteria for such a gear. It is felt that this purpose can be achieved best by utilizing as far as possible the work which has been done on other gears.

This report is divided into two parts, one of which deals with the main landing gear and the other of which deals with the nose gear. Descriptive matter for each gear appears under its respective analysis.

Page 1-4 gives a list of definitions for all technical terms and symbols used in this report.
**Symbols & Definitions**

1. **Ground Reaction** = Loads which ground applies to the gear at ground contact points.

2. **Ground Loads** = Loads which are applied to the gear structure (i.e. ground reactions less the inertia of items directly resisting ground reaction).  

3. \( V'_R \) = Vertical ground reaction

4. \( D'_R \) = Drag ground reaction

5. \( S'_R \) = Side ground reaction

6. \( \pi' \) = Inertia of items which directly resist ground reaction.

7. \( V_R = V'_R - \pi' \)

8. \( D_R = D'_R - \pi' \)

9. \( S_R = S'_R - \pi' \)

10. Note: If subscript "f" be used instead of "R" the load is for the nose gear.

11. \( V_P = \text{load vector parallel to strut at pt. } "P" \)

12. \( q_P = \text{load vector force or aft of normal to strut at point } "P" \)

13. \( M_P = \text{moment about } V_P \text{ vector at pt. } "P" \)

**V normal & Parallel to ground**
14. $M = \text{moment about vector } \mathbf{d}_p \text{ at pt. } P$

15. $\mathbf{M} = \text{moment about vector } \mathbf{s}_p \text{ at pt. } P$

16. "Equivalent wheel center" is the point of intersection of a horizontal line passing through the two wheel centers and a vertical line which represents the location of the vertical load.

17. $I_w = \text{polar moment of inertia of one wheel} = \text{slug-ft}^2$

18. $V_L = \text{landing velocity} \text{ ft/sec}$

19. $V_p = \text{pre-rotation velocity} \text{ ft/sec}$

20. $\mu = \text{coefficient of friction}$

21. $e = \text{effective rolling radius} \text{ ft}$

22. $W = \text{gross weight of airplane}$

23. $t_1 = \text{time in seconds between ground contact and buildup of maximum vertical load}$

Note: Other symbols used have commonly accepted meaning or are defined by sketches throughout the report.
PART I

MAIN LANDING GEAR

The main landing gear on the XR-3, per Dmp. 236(5), is of the four-wheel type used on the R-36, and is in most respects identical to the R-36A gear. Table I has been included on page 6 to indicate the make-up of the gear.

Although the original XR-3 main gear was of the single-wheel type similar to the one used on the R-36, (Ref. 2), the four-wheel gear is considered as being the final arrangement and no analysis of the single-wheel gear will be shown.

Due to similarities between the XR-3 Airplane and the B-36A Airplane, the same conditions will be investigated for the XR-3 main gear as were investigated for the B-36A main gear. These conditions, which are listed below, are based on AMC-2 Ground Loads Handbook (with errata sheet 49) and Air Technical Service Group Memorandum Report #TSC-S2-42(7)-TM-1 of September 13, 1945.

Landing Conditions

(1) Side-Drift Landing
(2) Two-Wheel Landing with Vertical Reactions
(3) One-Wheel Landing with Vertical Reaction
(4) Two-Wheel Landing with Brakes (Close Down)
(5) Two-Wheel Landing with Inclined Reactions. Has been replaced by \( f_a \), \( f_b \), and \( f_c \).

\( f_a \) Max. Vertical Load
\( f_b \) Spin-in - NOT CRITICAL
\( f_c \) String Peak

(6) Rebound - Not Critical
Discussion of Loads

Because of identical geometry for XB-36 main
rear and B-29A main gear (page 6), it follows
that any change in member loads is a function of
root-loads only. For Condition 1) through 5)5,
Eq. 7, the ratio B is not affected by

a change in landing gross weight or center-of-gravity
location (Ref. 1, 4, 5), and, therefore, no reduction
in landing gross weight results in lesser
member loads. The critical landing gross weight for
the B-29A main gear is 87,550 lb. (Ref. 5), and for the
XB-36 is 93,550 lb. (Ref. 5). Hence all XB-36 main
rear member loads are smaller than corresponding B-29A
main rear center loads for Conditions 1) through
(5a), and for centers which are common to both air-
planes, no further analysis for these conditions
is necessary (see page 6&1).
CONDITION OF DYNAMIC SPRING BACK -- DGW (LESS BOMBS)

\[ V_c = V_{c,\text{max}} = \frac{1.5 \text{NW}}{2} - 1.5(\text{wq}) = 1.5 \times 2.67 \left( \frac{255,271}{2} - 1200 \right) = 486,462^* \]

\[ D_R = 1.5 \frac{F_{h,\text{max}}}{F_{h,\text{max}}} \]

\[ F_{h,\text{max}} = \left[ \frac{2JW(V_c - V_R) \text{MAX} F_{V,\text{max}}}{1-e \times t_1} \right]^{1/2} \]

\[ F_{V,\text{max}} = \frac{NW}{2} = \frac{2.67 \times 255,271}{2} = 340,000^* \text{ LIMIT} \]

\[ V_c = 40.7 \quad V_c = 2.21 \quad V_{c,\text{MAX}} = 0.55 \quad V_R = 1.74 \left( \frac{255,271}{268,000} \right)^{1/2} = 172 \text{ F}_c \]

\[ V_R = 0 \quad t_1 \rightarrow 3 \left( \frac{255,271}{268,000} \right)^{1/2} = 0.295 \text{ REF. --- (3) § (7)} \]

\[ D_R = 1.5 \left[ \frac{2x4 \times 40.7 \times 172 \times 0.55 \times 340,000}{(2.21)^2 \times 0.295} \right]^{1/2} = -128,000^* \]

Below is a comparison of XB-36 ground loads to B-36A ground loads for Condition 5 and 6 --

<table>
<thead>
<tr>
<th>XB-36 DGW (LESS BOMBS)</th>
<th>B-36A DGW (LESS BOMBS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(255,271^*)</td>
<td>(268,000^*)</td>
</tr>
<tr>
<td>[ V_c = 486,462^* ]</td>
<td>[ V_c = 511,920^* ]</td>
</tr>
<tr>
<td>[ D_R = -128,000^* ]</td>
<td>[ D_R = -131,500^* ]</td>
</tr>
</tbody>
</table>

This condition yields highest compressive load in drag strut and since \( \frac{D}{V} \) is not constant for this condition, member loads must be computed.

Note: see p-16 for definition of symbols.
MAIN DRAG BRACE - DYNAMIC SPRING BACK

60-40 DISTRIBUTION WITH 60% ON OUT BD WHEELS

\[ V = V_p = 456,462 \text{ N} \quad D_R = d_p = -128,000 \text{ kN/m} \quad t_p = 0 \]

\[ M_p = 3.125 \times d_p = -400,000 \text{ kNm} \quad M_p = -3.125 \times \frac{d_p}{d_p} = -152,500 \text{ kNm} \]

\[ M_p = V_R \times 4.40 + D_R \times 70.50 = 456,462 \times 4.40 - 128,000 \times 70.50 \]

\[ = 98,000,000 \text{ kNm} \]

LOAD IN MEMBER = 0.040677 \times 456,462 + 0.086158 \times (-128,000) + 0.4458303 \times (-400,000) + 0.02503198 \times (-626,60,000) + 0.00004028 \times (-1525,000)

\[ = 19,850 - 267,500 - 17,900 - 17,300 - 61 = -436,911 \text{ kNm} \]

MEMBER C  MAIN DRAG BRACE

CLEV. PART * 8535-78 (SEE PG. 6)

XB-36 B-36A

LOAD = -436,911 \text{ kNm} \quad \text{LOAD} = 447,240 \text{ kNm}

* REF: --- --- (3) PG 35

COND: 4a
### TABLE I - MAKE-UP OF GEAR

<table>
<thead>
<tr>
<th>MEMBER OR DATA</th>
<th>PART NO.</th>
<th>IDENTICAL TO CORRESPONDING PART OF AIRPLANE LISTED</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAIN DRAUGHT STRUT</td>
<td>CLEV. #8335-78</td>
<td>B-36A YES</td>
</tr>
<tr>
<td>AUX. DRAUGHT STRUT</td>
<td>CLEV. #8335-75</td>
<td>B-36A YES</td>
</tr>
<tr>
<td>SIDE BRACE</td>
<td>CLEV. #8379-94</td>
<td>B-36A YES</td>
</tr>
<tr>
<td>PINION SHAFT</td>
<td>CLEV. #8355-93</td>
<td>B-36A YES</td>
</tr>
<tr>
<td>OUT-BO TRUSS TUBE *</td>
<td>36L044-7</td>
<td>B-36A NO</td>
</tr>
<tr>
<td>IN-BO TRUSS TUBE *</td>
<td>36L044-6</td>
<td>B-36A YES</td>
</tr>
<tr>
<td>GEOMETRY</td>
<td></td>
<td>B-36A YES</td>
</tr>
</tbody>
</table>

* SEE TABLE II AND FOLLOWING PAGES

### TABLE II - MAKE-UP OF TRUSS ASSEMBLY

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTIVE TITLE</th>
<th>XB-36</th>
<th>FOUR-WHEEL GEAR</th>
<th>B-36A</th>
<th>DRAWING NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASSEMBLY</td>
<td>TRUSS ASSEMBLY</td>
<td>36L007</td>
<td>36L407</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>MAIN ASSEMBLY</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>INBOARD TRUSS TUBE</td>
<td>36L004-6</td>
<td>36L044-6</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OUTBOARD TRUSS TUBE</td>
<td>36L004-7</td>
<td>36L040-20</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>BUT (IN BO TRUSS TUBE)</td>
<td>36L043</td>
<td>36L043</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>BUT (OUT BO TRUSS TUBE)</td>
<td>36L043</td>
<td>36L022</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>GATHER FITTING</td>
<td>36L013</td>
<td>36L013</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ALIGNMENT</td>
<td>SLEEVE (IN TRUSS TUBE)</td>
<td>36L040</td>
<td>36L021</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SLEEVE (OUT BO TRUSS TUBE)</td>
<td>36L040</td>
<td>36L4023</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Truss Assembly

The same truss assembly as was used on the X15-2 single-wheel gear is used with the four-wheel gear in order to avoid replacing fittings on the airframe structure. The truss tube on the X15-2 and the B-56A are similar in that, for corresponding tubes, the C.D. and I.D. are identical and their theoretical lengths are the same. The only difference between the X15-2 truss tube assemblies and the B-56A truss tube assemblies is the method of upper-end attachment and the upper end of the outboard truss tube is slightly different (see page 6). The X15-2 utilizes a split sleeve and nut to form a collar-sleeve arrangement (Fig. 6-1), whereas the B-56A truss tube is attached at the upper end by means of a sleeve which is threaded on both C.D. and I.D. and, in effect, a threaded joint.

Tests (Ref. 6) have shown that the X15-2 clamping arrangement is inferior to the threaded joint on the B-56A and for this reason an analysis of the truss tube upper-end attachments is necessary. By inspection, the side-drift landing condition is critical for these members, and loads for this condition will be the only ones calculated.

Side-Drift Landing  

\[ S_{in} = \frac{1}{3} \times \frac{1}{3} \times 2500 \times 200 = 161,456 \]

\[ S_{in} = S'_{in} = \frac{1}{3} \times \frac{1}{3} \times 200 = 161,456 \]

\[ S_{in} = \frac{1}{3} \times \frac{1}{3} \times 250 = 161,456 \]

\[ S'_{in} = S_{in} = \frac{1}{3} \times \frac{1}{3} \times 250 = 161,456 \]
The table below is a summary of critical truss-tube loads for the XB-36 main gear. These loads are ratioed directly from B-36A loads.

### TABLE III

<table>
<thead>
<tr>
<th>ITEM</th>
<th>GROUND LOADS B-36A</th>
<th>GROUND LOADS XB-36</th>
<th>MEMBER LOADS B-36A</th>
<th>MEMBER LOADS XB-36</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S&lt;sub&gt;b&lt;/sub&gt;</td>
<td>S&lt;sub&gt;r&lt;/sub&gt;</td>
<td>S&lt;sub&gt;b&lt;/sub&gt;</td>
<td>S&lt;sub&gt;r&lt;/sub&gt;</td>
</tr>
<tr>
<td>OUT-BOARD TRUSS TUBE</td>
<td>129,680</td>
<td>-126,485</td>
<td>123,300</td>
<td>-126,918</td>
</tr>
<tr>
<td>INBOARD TRUSS TUBE</td>
<td>749,040</td>
<td>1,114,400</td>
<td>712,500</td>
<td>1,019,356</td>
</tr>
</tbody>
</table>

**NOTE:**

Side load acting out gives maximum compression load in outboard tube and maximum tension in outboard tube. Side load acting in gives maximum tension in inboard tube and maximum compression in outboard tube.

Only marginal for clamp collar arrangement will be shown as other items are identical in strength to B-36A truss tubes and, because member loads are lower, no analysis is necessary.

**OUTBOARD TRUSS TUBE**

\[
\begin{align*}
\text{Max Tension Load} &= 657,000 \\
P_e &= 956,000 \quad \text{(Ref. Report FSQ-248, pg 2)} \\
M_S &= \frac{956,000}{657,000} = 1.45 \\
\end{align*}
\]

Other portions of tube assembly are more critical.

(See FSQ-36-149, p 9)

**INBOARD TRUSS TUBE**

\[
\begin{align*}
\text{Max Tension Load} &= 1,079,756 \quad * \\
P_e &= 956,000 \quad \text{(See Ref. Above)} \\
M_S &= \frac{956,000}{1,079,756} = 0.88 \\
\end{align*}
\]

*In view of existing limitations on this airplane, the above margin does not impose additional limitations.*
The XE-7 nose gear is basically the Cleveland Pneumatic Tool Company #7750 gear reworked by Bendix to accommodate provisions for co-operating wheels. No work consisted of removing the entire wheel assembly from above the axle housing by cutting the main piston tube, cleaning out the inside of the main piston tube, and bolting in place Bendix part #6575 per Bendix Div. #6575 by means of a special shoe-pulley arrangement.

Although an analysis has been written by Cleveland Pneumatic Tool Company, (Ref. 15), which covers the original Cleveland part #7750 on the XE-7C with a single-wheel main gear, a supplementary analysis must be made, because examination of material in Reference (2), and in Reference (3), shows that the change from a single-wheel gear to a four-wheel gear causes for some conditions, an increase in ground loads on the nose gear. For the above reasons, new ground loads must be computed for the XE-7C nose gear and margins shown corresponding to those in Cleveland Pneumatic Tool Company Report #7750.
<table>
<thead>
<tr>
<th>DESCRIPTION OF ITEM</th>
<th>WEIGHT</th>
<th>HORIZONTAL</th>
<th>VERTICAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ARM</td>
<td>MOMENT</td>
<td>ARM</td>
</tr>
<tr>
<td>DGW</td>
<td>265,191.2</td>
<td>74.36</td>
<td>19,721,559</td>
</tr>
<tr>
<td>M.G. OLEO</td>
<td>933.6</td>
<td>7830</td>
<td>65,271</td>
</tr>
<tr>
<td>WHEELS, BRAKES, TIRES &amp; ETC.</td>
<td>1724.0</td>
<td>7740</td>
<td>133,438</td>
</tr>
<tr>
<td>LESS GAS IN-BD TANK</td>
<td>36,926.6</td>
<td>69.24</td>
<td>2,556,756</td>
</tr>
<tr>
<td>LESS OIL</td>
<td>5650.0</td>
<td>71.70</td>
<td>405,248</td>
</tr>
<tr>
<td>PLUS GAS IN-BD TANK</td>
<td>39,362.6</td>
<td>69.21</td>
<td>2,724,285</td>
</tr>
<tr>
<td>PLUS OIL</td>
<td>5779.0</td>
<td>71.70</td>
<td>444,354</td>
</tr>
<tr>
<td>DGW (INCL. LG CHANGE — FLIGHT)</td>
<td>(265,191.2)</td>
<td>74.34</td>
<td>(19,699,485)</td>
</tr>
<tr>
<td>EXTEND FLAPS &amp; GEAR</td>
<td></td>
<td>+ 27,306</td>
<td>+ 122,527</td>
</tr>
<tr>
<td>AIRPLANE C.G.</td>
<td></td>
<td>74.34</td>
<td>4.42</td>
</tr>
<tr>
<td>LESS BOMBS</td>
<td>9920.0</td>
<td>- 536,970</td>
<td>- 70,432</td>
</tr>
<tr>
<td>DGW (LESS BOMBS — FLAPS &amp; GEAR DOWN)</td>
<td>(255,271.2)</td>
<td>75.17</td>
<td>(19,189,821)</td>
</tr>
</tbody>
</table>

**NOTE:** WEIGHT DATA ABOVE IS BASED ON REF. (5) & (3)

FUEL & OIL C.G. LOCATIONS FROM REF. (17)
### TABLE I

<table>
<thead>
<tr>
<th>DESCRIPTION OF ITEM</th>
<th>WEIGHT</th>
<th>HORIZONTAL</th>
<th>VERTICAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGW (112 - 500 lb BOMBS)</td>
<td>265,000</td>
<td>72.14</td>
<td>19672.56</td>
</tr>
<tr>
<td>MLG OLEO (WEIGHT SAVING)</td>
<td>833.6</td>
<td>78.30</td>
<td>652.11</td>
</tr>
<tr>
<td>WHEELS, BRAKES &amp; TIRES</td>
<td>1734.0</td>
<td>77.40</td>
<td>1334.38</td>
</tr>
<tr>
<td>LESS GAS CENTER TANK</td>
<td>2757.0</td>
<td>72.95</td>
<td>2153.92</td>
</tr>
<tr>
<td>LESS OIL</td>
<td>4943.0</td>
<td>71.10</td>
<td>2817.12</td>
</tr>
<tr>
<td>PLUS GAS CENTER TANK</td>
<td>31916.0</td>
<td>72.74</td>
<td>2379.56</td>
</tr>
<tr>
<td>PLUS OIL</td>
<td>4112.6</td>
<td>71.10</td>
<td>2948.77</td>
</tr>
<tr>
<td>AGW (INCL. LG. CHANGE — FLIGHT)</td>
<td>265000</td>
<td>72.14</td>
<td>19660.05</td>
</tr>
<tr>
<td>EXTEND LANDING GEAR &amp; FLAPS</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>LESS BOMBS</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>FWD END BAY</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>AFT END BAY</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>AFT END BAY</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>AFT END BAY</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>AGW (112 - 500 lb BOMBS) — LANDING</td>
<td>255080</td>
<td>74.47</td>
<td>18976.27</td>
</tr>
</tbody>
</table>

**NOTE:** WEIGHT DATA ABOVE IS BASED ON REF. (5) & (3)

FUEL & OIL C.G. LOCATIONS FROM REF. (17)
### Table II

<table>
<thead>
<tr>
<th>DESCRIPTION OF ITEM</th>
<th>WEIGHT</th>
<th>HORIZONTAL ARM</th>
<th>VERTICAL ARM</th>
<th>HORIZONTAL MOMENT</th>
<th>VERTICAL MOMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGW (23-2000# BOMBS)</td>
<td>265000</td>
<td>14.19</td>
<td>19687380</td>
<td>4.73</td>
<td>1233143</td>
</tr>
<tr>
<td>MLG OLEO WEIGHT SAVING</td>
<td>883.6</td>
<td>74.30</td>
<td>-65.271</td>
<td>3.10</td>
<td>-2.584</td>
</tr>
<tr>
<td>WHEELS, BRAKES, TIRES, ETC</td>
<td>458.0</td>
<td>17.40</td>
<td>-194.23</td>
<td>4.70</td>
<td>810.5</td>
</tr>
<tr>
<td>LESS GAS CENTER TANK</td>
<td>-11606.0</td>
<td>11.31</td>
<td>-7800.18</td>
<td>3.03</td>
<td>-1171.8</td>
</tr>
<tr>
<td>LESS OIL</td>
<td>-216.0</td>
<td>7.70</td>
<td>3244.25</td>
<td>3.22</td>
<td>-1447.0</td>
</tr>
<tr>
<td>PLUS GAS CENTER TANK</td>
<td>4116.0</td>
<td>7.70</td>
<td>12338.32</td>
<td>2.97</td>
<td>+12075.0</td>
</tr>
<tr>
<td>PLUS OIL</td>
<td>4125.6</td>
<td>7.10</td>
<td>338625</td>
<td>3.22</td>
<td>+15216</td>
</tr>
<tr>
<td>AGW (INCL. L.G. CHANGE - FLIGHT)</td>
<td>265000</td>
<td>(12674.53)</td>
<td>(1246654)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CATTOW FLAPS / GEAR</td>
<td>+27906</td>
<td>+122527</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LESS 2-2000# BOMBS BAY 1</td>
<td>-4100.0</td>
<td>38.73</td>
<td>-158.793</td>
<td>10.00</td>
<td>-41000</td>
</tr>
<tr>
<td>LESS 3-2000# BOMBS BAY 2</td>
<td>-6150.0</td>
<td>94.78</td>
<td>-607497</td>
<td>9.50</td>
<td>-58425.5</td>
</tr>
<tr>
<td>AGW (23-2000# BOMBS) LANDING</td>
<td>254750</td>
<td>14.33</td>
<td>(10835.79)</td>
<td>4.73</td>
<td>(1269735)</td>
</tr>
</tbody>
</table>

**Weight Data Above is Based on Ref (5) & (3)**

Fuel & Oil C.G. Locations from Ref (17)
Fig. 1 - Basic Dimensions

STA C: Horizontal Reference Datum (HRD)

Airplane

Deck Line

Ground Line

24.7 R.R.

Equivalent Wheel Center

956.30 S

Reference Drawings 36L001, 36L5002

\[
\begin{align*}
\sin 10.14'04'' &= 0.2156 \\
\cos 10.14'04'' &= 0.999764 \\
\tan 10.14'04'' &= 0.021620 \\
\sin 11.13'-14'' &= 0.215 \\
\cos 11.13'-14'' &= 0.9997 \\
\tan 11.13'-14'' &= 0.02148
\end{align*}
\]
Fig. 2 Symbols and Dimensions (Nose-Down)
FIG. 3 Sketch showing dimensions used for 3-wheel landing with inclined reactions.
ANALYSIS

H-ýSE

CýEi

PAGE

PREPARED

BY

W. & M

ComUsodte

Vofte

Rkm~rft

REPORT

NO

CHECKED

ay

FORT WORTH DIVISION MODEL X-56

REVISED

ay

FORT WORTH, TEXAS

DATE 5-18-48

COORDINATES OF "EQUIVALENT WHEEL CENTER OF MAIN GEAR"
VRF. (3) POr. 16/17

PLATEANO = 63.53 x TANθ = 63.53 x 0.21620 = 1.37

H = Q - PTanθ = 148.16 - 1.37 = 148.15

Hcosθ = 148.15 x .771166 = 148.12

Hsinθ = 148.15 x .02156 = 3.19

Pcoθ = 1.37

Q = Hsinθ + Pcoθ = 3.13 + 1.37 = 6.54

d = 955.49 - 179.49 - (19.9 - 24.7) sinθ = 77.28

S = 24.7 + Mcosθ = 24.7 + 148.12 = 172.82

X = 18.1

C = X + A = 18.1 + 6.676 = 24.8

N' = C cosθ = 123.76 x 0.771166 = 94.76

J = 24.7...

A' = R' - C = 109.78

K = 19.4...

L = d cosθ = 18.16 = 177.02 = ±14.71 = 72.31

D = 16.2 - 7.74 = 7.46

P' = d - A' = 73.56 - 109.18 = 62.78
3 W.L. L.R. AGW (23-2000 # BOMBS) (OLEO FULLY EXTENDED)

GROUND LOADS - NOSE GEAR:

\[ V_f' = \frac{4Wd}{d} = \frac{4 \times 254.750 \times 103.78}{735.56} = 152,083^* \]

\[ V_f = V_f' - 4(wg) = 152,083 - 4 \times 1317 = 146,807^* \]

\[ D_f = 0.33 \times V_f = 0.33 \times 146,807 = 48,446^* \]

SIDE DRIFT LANDING AGW (33-2000 # BOMBS)

\[ K_f = Wd = \frac{254.750 \times 64.73}{776.28} = 21,899^* \]

\[ S_f' = 0.9 \times 1.5 \frac{Wd}{d} = 2 \times 21899 = 43,798^* \]

\[ S_f' \times Wd = \frac{93,798 \times 1317}{254.750} = 227 \]

\[ S_f = S_f' - 227 = 43,571^* \]

3 W.L. L.R. DGW (NO BOMBS) 255.271 # (OLEO FULLY EXTENDED)

\[ W = 255.271^* \quad Z = 902.04 \quad N = 56.52 \quad P = 955.50 - 902.04 = 53.46 \]

\[ Q = 209.28 - N = 209.28 - 56.52 = 152.76 \]

\[ P_{max} = 56.46 \times 0.816.20 = 1.16 \]

\[ H = Q - P_{max} = 152.76 - 1.16 = 151.60 \]

\[ H_{cos} = 151.60 \times 0.997766 = 151.56 \]

\[ H_{sin} = 151.60 \times 0.02116 = 3.27 \]

\[ P_{cos} = 53.46 = 53.47 \]

\[ P_{sin} = 0.997766 \]

\[ d = \frac{955.50 - 132.42}{104.14 \times 104} = 3.76 \]

\[ d = 131.60 + \frac{P_{cos}}{P_{sin}} = 2.27 + 55.87 = 58.14 \]
ANALYSIS

3W.L.+1/2O. OGW (NO BOMBS) 246.171" (OLEO FULLY EXTENDED)

\[ S = 24.7 + 11 \cos \theta = 24.7 + 11 \times 0.56 = 176.26 \]
\[ X = 0.335 = 0.33 \times 176.26 = 58.17 \]
\[ C = X + d = 58.17 + 9.024 = 114.91 \]
\[ n' = C \cos 18^\circ 16' = 114.91 \times 0.94961 = 109.12 \]
\[ J = 24.7 \times 9.11 \times 18^\circ 16' = 73.4 \]
\[ a' = n' - J = 109.12 - 73.4 = 101.38 \]
\[ K = 19.9 \sin 18^\circ 16' = 6.24 \]
\[ J' = J + k = 737.17 + 7.79 = 744.96 \]
\[ b' = J' - d = 744.96 - 101.38 = 643.58 \]

BENDING IN NOSE STRUT - OGW (LESS BOMBS)

\[ W = 255.271" \]
\[ V_f = 1.9 \times 0.75 \times \frac{NWD}{d} = \frac{3 \times 255.271 \times 56.74}{246.26} = 59.974" \]
\[ D_{f,1/2} = 1.5 \times (d') = 1.5 \times 255.271 = 76.581" \]
\[ D_{f,1/2D} = 0.4 \times V_f = 0.4 \times 59.974 = 22.389" \]

BENDING IN NOSE STRUT - AGW (23'-2000# BOMBS)

\[ W = 244.750" \]
\[ V_f = 1.9 \times 0.75 \times \frac{NWD}{d} = \frac{3 \times 244.750 \times 66.73}{246.28} = 63.620" \]
\[ D_{f,1/2} = 1.5 \times (d') = 1.5 \times 244.750 = 76.425" \]
\[ D_{f,1/2D} = 0.4 \times V_f = 0.4 \times 63.620 = 25.448" \]
SYM METRICAL STATIC THRUST DAW (10,000 # BOMBS) (NEOL-S T A T I C)

\[ H = 0 \quad D = 0 \quad (R E F \ (3) \ P a g e \ 4, S t r u c .) \]

\[ V = \frac{91.086 \times 17.018}{20.011} = V_{44} \times 91.086 \times 17.018 \]

\[ V_{1.2} = 0.18127 V_{44} \]

\[ V_{1.4} = 1.26618 V_{1.2} \]

\[ V_{1.2} + V_{1.4} = V_{R} \]

\[ V_{1.4} = 0.9411 V_{R} \]

\[ V_{44} = 0.884 V_{R} \]

\[ (.55881 - .4411) \times 91.086 = 3.661 \text{ c.g. of vertical load aft of # struts} \]

COORDINATES OF "EQUIVALENT WHEEL CENTER" -

Fus. Sta. = 960.146 + 4.29 \sin 10°19'14" + 9.661 \cos 10°19'14"

Dist. below deck line = (145.09 - 4.29) \cos 10°19'14"

= 176.38

Daw = 265 \, 191 \text{ "} \quad \theta = 891.24 \quad N = 53.04 \quad \text{(See Page 10)}

\[ P = 960.14 - 891.24 \quad 68.90 \quad \theta = 10°14'01" \]

\[ \tan \theta = 68.90 \times 0.0211 \quad = 1.49 \]

\[ Q = 143.38 - 53 \times 0.4 \quad = 143.34 \]

\[ H = Q - P \tan \theta \quad = 143.34 - 1.49 \quad = 141.85 \]

\[ V_{44} = 141.85 \times 0.884 \quad = 3.05 \]
ANALYSIS. NOSE GEAR
PREPARED BY W. BROWN
CHECKED BY L. A. DAVIES
REVISED BY

CONSOLIDATED VALLEYS AIRCRAFT CORPORATION
FORT WORTH DIVISION
FORT WORTH, TEXAS

SYMETRICAL STATIC THRUST OGW (10,000 LBS) (OFFSET STATIC)

\[
\begin{align*}
\% & = \frac{68.90}{.977} = 68.92 \\
\alpha & = \tan^{-1} \frac{P}{L} = 68.92 + 3.05 = 71.97 \\
d & = \frac{960.15 - 173.76}{\cos \theta} = 783.78 \\
b & = d - a = 783.78 - 71.97 = 711.81 \\

783.78 - 779.17 = 8.61 \sim \text{"EQUIVALENT WHEEL CENTER" AFT OF SINGLE WHEEL GEAR AXLE.}

11.17 - 8.61 = 2.56 \sim \text{DISTANCE OF "EQUIVALENT WHEEL CENTER" AFT OF VERTICAL COMPONENT OF THRUST OF INBOARD ENGINES.}

18.67 - 8.61 = 10.06 \sim \text{DISTANCE OF "EQUIVALENT WHEEL CENTER" AFT OF VERTICAL COMPONENT OF THRUST OF CENTER ENGINES.}

26.20 - 8.61 = 17.59 \sim \text{DISTANCE OF "EQUIVALENT WHEEL CENTER" AFT OF VERTICAL COMPONENT OF THRUST FOR OUTBOARD ENGINES.}

THE ABOVE DIMENSIONS ARE IN PART FROM REF. (20) PAGE 152 AND THE THRUST COMPONENTS BELOW ARE FROM REF. (20) PAGE 151

\[
\begin{align*}
T_3 & = 44.1 \text{ \#/ENGINE (LIMIT)} \\
T_v & = 275 \text{ \#/ENGINE (LIMIT)} \\
T_h & = 8418 \text{ \#/ENGINE (LIMIT)}
\end{align*}
\]
SYMMETRICAL STATIC THRUST

Fig. 4

\[ \begin{align*}
D' &= 6 \times 1.5 \times 8418 = 75762 \text{ \# ULT.} \\
V' &= 1.5 \left[ \frac{21.37 \times 265191 + 2 \times 275 \times (1.56 + 10.06 + 17.59)}{783.78} \right] = 53918 \text{ \#} \\
V_f &= \frac{51296 - 1.5(w_f)}{1.5} = 53918 - 1.5 \times 1319 = 51940 \text{ \#} \\
D_f &= 75762 - 1.5 \times 1319 = 73784 \text{ \#}
\end{align*} \]
GROUND TURNING CONDITION
DGW = 265.191"
112 - 500# BOMBS

GROUND CONTACT
PT. ~ MAIN GEAR

GROUND CONTACT
PT. ~ NOSE GEAR

FIG. 5
PLAN VIEW

* REF. PG 20
Ground Turning Condition - D.G.W = 2651.91 kips (10,000 lb. each)

\[ S_f'' = 1.5 \left[ \frac{\sin(19.024') + 3.7798(0.9432) + 4.1(2.56 + 10.06 + 17.59)}{827} \right] \]

\[ = 37.798 \]

\[ S_f' = 37.798 \cos(19.024') = 37.798(0.9432) = 35.651 \text{ kips} (\text{ULT}) \]

\[ D_f' = 37.798 \sin(19.024') = 37.798(0.3322) = 12.556 \text{ kips} (\text{ULT}) \]

\[ V_f' = \frac{2651.91 \times 71.97 + 641.6(111.41 + 179.45 + 187.50) + 275.2(2.56 + 10.06 + 17.59)}{785.78} \times 1.5 \]

\[ = 45.082 \text{ kips} \]

\[ V_f = 45.082 - 1.5(1319) = 43.04 \text{ kips} (\text{ULT}) \]

\[ S_f = 35.651 - 1.5(1319) = 33.673 \text{ kips} (\text{ULT}) \]

\[ D_f = 12.556 - 1.5(1319) = 10.578 \text{ kips} (\text{ULT}) \]

\[ \left( S_f^2 + D_f^2 \right)^{\frac{1}{2}} = 35.250 \text{ kips} \text{ RESULTANT SIDE-LOAD (ULT)} \]
### Table II: Summary of Nose Gear Loads

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>DESCRIPTION</th>
<th>OLEO POSITION</th>
<th>LOADS APPLIED AT</th>
<th>V_4</th>
<th>D_4</th>
<th>S_4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>FULL-IR AGW (29,000 lbm) 29,750</td>
<td>FULLY EXTENDED</td>
<td>6% OF WHEEL</td>
<td>146,607</td>
<td>48,446</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>SIDE DRIFT LANDING</td>
<td>FULLY EXTENDED</td>
<td>GROUND</td>
<td>0</td>
<td>0</td>
<td>±3,511</td>
</tr>
<tr>
<td>7-1</td>
<td>BENDING NOSE STRUT - FORE AGW (29,000 lbm) 29,750</td>
<td>FULLY EXTENDED</td>
<td>6% OF WHEEL</td>
<td>65,620</td>
<td>-26,248</td>
<td>0</td>
</tr>
<tr>
<td>7-1-A</td>
<td>BENDING NOSE STRUT - AFT</td>
<td>FULLY EXTENDED</td>
<td>6% OF WHEEL</td>
<td>65,620</td>
<td>76,425</td>
<td>0</td>
</tr>
<tr>
<td>7-2</td>
<td>BENDING NOSE - AFT AGW (29,000 lbm) 29,750</td>
<td>FULLY EXTENDED</td>
<td>6% OF WHEEL</td>
<td>55,974</td>
<td>76,581</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>REBOUND</td>
<td>FULLY EXTENDED</td>
<td>6% OF WHEEL</td>
<td>-33,120</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>9</td>
<td>SYMMETRICAL STATIC</td>
<td>STATIC</td>
<td>6% OF WHEEL</td>
<td>57,940</td>
<td>73,784</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>SECOND TURNING</td>
<td>STATIC</td>
<td>GROUND</td>
<td>43,104</td>
<td>0</td>
<td>±35,250</td>
</tr>
</tbody>
</table>

* Nose wheel is casted for this condition. Ref. Fig. 22. This load is parallel to axle.
The table below is reproduced from the Cleveland Pneumatic Tool Co. Report #8278 Table I Fig 3.

**Table VIII**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Item</th>
<th>OLEO Position</th>
<th>LOAD Position Applied At</th>
<th>V_y</th>
<th>D_y</th>
<th>S_y</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1 W.I. &amp; 1 R.</td>
<td>Fully 1/6 of Extended Wheel</td>
<td>142,800</td>
<td>47,100</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Side Drift</td>
<td>Fully Extended Ground</td>
<td>0</td>
<td>0</td>
<td>±46,000</td>
<td></td>
</tr>
<tr>
<td>7-1</td>
<td>Bending in Nose - Fore 254,750 G.W.</td>
<td>Fully 1/6 of Extended Wheel</td>
<td>69,000</td>
<td>-21,600</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>7-1-A</td>
<td>Bending in Nose - Art 254,750 G.W.</td>
<td>Fully 1/6 of Extended Wheel</td>
<td>69,000</td>
<td>75,900</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>7-2</td>
<td>Bending in Nose - Art 254,750 G.W.</td>
<td>Fully 1/6 of Extended Wheel</td>
<td>58,100</td>
<td>79,900</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Rebound</td>
<td>Fully 1/6 of Extended Wheel</td>
<td>-33,120</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Symmetrical Static Thrust 254,060 G.W.</td>
<td>Static 1/6 of Ground Wheel</td>
<td>49,505</td>
<td>67,410</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Ground Turning 254,060 G.W.</td>
<td>Static Ground</td>
<td>49,400</td>
<td>0</td>
<td>±35,888</td>
<td></td>
</tr>
</tbody>
</table>

**Applied at Intersection of OLEO and Ground (**)**

OLEO is normal to ground in static & fully extended positions.

\[
\begin{align*}
\alpha & = 60 - 60 \\
\beta & = 60 - 60 \\
\gamma & = 60 - 60 \\
\end{align*}
\]

Distribution for conditions 1, 9 & 10

\[
\begin{align*}
\alpha & = 50 - 50 \\
\beta & = 50 - 50 \\
\end{align*}
\]

Distribution for conditions 7-1, 7-1-A, 7-2, 7-9
MARGINS WHICH ARE SMALLER THAN THOSE SHOWN IN REF.(15) ARE NOT REDUCED.

MARGINS WHICH ARE LARGER THAN THOSE IN REF. (15) ARE REDUCED BELOW.

PART # 8278 - 26 - 2 PLUNGER TUBE COLUMNAR LOADING
CONDITION 1-2-6

\[ M.S. = 1.10 \times \left( \frac{142800}{146807} \right) - 1 = \ldots + 0.07 \]

PART # 8278 - 27 TREADED FLANGE ON ORIFICE PLATE
AT PLUNGER TUBE CONNECTION - COND 1-2-6

\[ M.S. = 1.14 \times \left( \frac{142800}{146807} \right) - 1 = \ldots + 0.11 \]

ALL PARTS OF WHICH ATTACH TO THE STRUT BELOW THE JOINT, JUST ABOVE THE AXLE HOUSING, ARE COVERED BY BENDIX REPORT NUMBER 813, AS THE PARTS ARE SAME AND GROUND LOADS ARE LOWER. (SEE TABLE IX PG. -)

* ALTHOUGH CONDITION 9 YEILDS HIGHER GROUND LOADS THAN THOSE USED IN REF (14), EXAMINATION SHOWS THAT THIS CONDITION IS NOT CRITICAL.

* REF. PGS. 24 & 25
PART #8278-4 PISTON TUBE 21" ABOVE AXLE COND 1-b

\[ M.S. = 1.00(142,800) \div 146,807 - 1 = -0.027 \]

PART #8278-24 PISTON TUBE PLUG BEARING COND 1-a-b

CONTACT AT EDGE OF FLANGE

\[ M.S. = 1.050(142,800) \div 146,807 - 1 = +0.02 \]

* IN VIEW OF EXISTING LIMITATIONS ON THIS AIRPLANE, THE ABOVE MARGIN DOES NOT IMPOSE ADDITIONAL LIMITATIONS.
JUNCTION OF N.L.G. AXLE HOUSING (BENDIX # E11-36) & INNER CYLINDER (C.P.T. # 8275-4).

The N.L.G. Axle Housing (Bendix # E11-36) joins the Axle (Bendix # 69741) & the inner cylinder (C.P.T. # 8275-4). An analysis of the axle appears in Bendix Report # 813. An analysis of the inner cylinder appears in C.P.T. Report # 5278. The axle housing will be analyzed herein.

The Outside Diameter of the housing and the Inside Diameter of the inner cylinder are machined to provide an interference fit (measuring 0.004 inches) on the diameter. The parts are bolted together by means of twelve (12) shear (taper) plugs in combination with bolts and special washers (see next page).

This joint is made necessary by the re-work of the original C.P.T. 8278 gear by Bendix in order to accommodate co-rotating wheels. For convenience a table of nose gear parts is included.

### Table of Nose Gear Parts

<table>
<thead>
<tr>
<th>Hat Used on XB-36 Nose Gear</th>
<th>Drawing Number</th>
<th>Used in Models</th>
<th>Analyzed in</th>
</tr>
</thead>
<tbody>
<tr>
<td>Axle - N.L.G Co-Rotating Wheels</td>
<td>Bendix # E11-36</td>
<td>All</td>
<td>Bendix # 69741</td>
</tr>
<tr>
<td>Bearing Race Inner</td>
<td>103-5-1 67390 TYPEN</td>
<td>All</td>
<td>Bendix # 69741</td>
</tr>
<tr>
<td>Hub</td>
<td>H25-6-12</td>
<td>All</td>
<td>Bendix # 69741</td>
</tr>
<tr>
<td>Inner Act</td>
<td>510.0-1105</td>
<td>All</td>
<td>Bendix # 69741</td>
</tr>
<tr>
<td>Outer</td>
<td>A14-1-115</td>
<td>All</td>
<td>Bendix # 69741</td>
</tr>
<tr>
<td>Flange</td>
<td>11-8-17</td>
<td>All</td>
<td>Bendix # 69741</td>
</tr>
<tr>
<td>Seat</td>
<td>11-8-17</td>
<td>All</td>
<td>Bendix # 69741</td>
</tr>
</tbody>
</table>

FW 446 0-48 UTILITY REPORT SHEET
CHECK IF INNER CYLINDER SECTION TURBO A DF

UPPER PLUGS

CRITICAL CONDITION - I - C (3FL - 2R) 61 - 0 UV D

\[ V_f = 0.6 \times 126,807 \]
\[ = 88,284 \] * 
\[ D_f = 0.6 \times 48,116 \]
\[ = 29,067 \] *

AT SECTION II

\[ S = 88,284 \cos 7.41^\circ + \]
\[ 29,067 \cos 57.41^\circ \]
\[ = 71,536 \] *
\[ V = 88,284 \cos 57.41^\circ - 29,067 \cos 57.41^\circ \]
\[ = 53,500 \] *

\[ N_{t,2} = 88,284 \times 9.75 \times 57.41^\circ \]
\[ = 29,067 \times 9.75 \times 57.41^\circ \]
\[ = 487,650 \] *

\[ N_{l,\bar{u}} = 29,067 \times 4.25 \times 418,000 \]

REMEMBER THE TWO LATTER MOMENTS AND BENDING & TORSION COMPONENTS IN THE TUBE:

\[ N_{t,2} = 418,000 \times 57.41^\circ \]
\[ = 1,183,500 \]
\[ T = 1,285,000 \cos 57.41^\circ + 418,000 \]
\[ = 1,285,000 \]
\[ = 1,239,500 \] **
THE RESULTANT MOMENT IS

\[ M/R = \frac{487.650}{183.200} = 2.664 \]

SECTION PROPERTIES, CALCULATIONS

\[ I = \frac{\pi}{64} (2.87^2 - 0.14^2) \]

\[ = 40.58 \text{ in}^4 \]

\[ A = \frac{\pi}{4} (7.591^2 - 6.937^2) \]

\[ = 6.17 \text{ in}^2 \]

REMOVING EFFECT OF HOLES ON TENSIOMETER SIDE

<table>
<thead>
<tr>
<th>ITEM</th>
<th>A</th>
<th>Y</th>
<th>AY</th>
<th>A/2</th>
<th>I</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hole</td>
<td>6.87</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>-1.2</td>
<td>-1.64</td>
<td>1.82</td>
<td>-1.16</td>
<td>-2.096</td>
<td>-2</td>
</tr>
<tr>
<td>-2</td>
<td>-4.32</td>
<td>3.64</td>
<td>-1.10</td>
<td>-4.012</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>-7.79</strong></td>
<td><strong>0.82</strong></td>
<td><strong>-2.18</strong></td>
<td><strong>-6.118</strong></td>
<td><strong>-46.12</strong></td>
</tr>
</tbody>
</table>

\[ Y = \frac{-7.79}{0.82} = -9.52 \]

\[ I_{xy} = 8.56 - 0.12 - 6.19 - 2.18 = 33.7 \text{ in}^4 \]
ALLOWABLE STRESSES

\[ HT = 20^\circ, 0^\circ \]

\[ D = 20^\circ, 0^\circ \]

\[ E = 24,210 \]

\[ F_E = 24,210 \cdot 0.08 \] (from \( 20^\circ, 0^\circ \))

\[ F_E = 1,937 \]

\[ F_s = 11,800 \] (from \( 20^\circ, 0^\circ \) p 41)

\[ f_E = \frac{972.8}{83.3} = 11.7 \\
\]

\[ f_s = \frac{58.5}{6.89} = 8.6 \]

\[ f_s = \frac{71.25}{5.96} = 12.0 \]

\[ f_s = \frac{61.25}{2.91} = 21.1 \]

\[ R_s = \frac{20^\circ, 0^\circ}{242.0^\circ} = 0.047 \]

\[ R_s = \frac{94.50}{242.0^\circ} = 0.389 \]

\[ R_s = \frac{12.25}{11.8^\circ} = 1.02 \]

\[ R_s = \frac{46.28}{12.8^\circ} = 3.69 \]

\[ 0.5 = \sqrt{\left(0.53\right)^2 + \left(0.361\right)^2} - 1 = \frac{0.1}{0.26} - 1 = \frac{-0.34}{0.26} \]
CHECK OF PLUGS (BEARD 2/7727)

THE MOMENT OF INERTIA OF THE PLUGS ABOUT ANY DIAMETER IS A CONSTANT VALUE WITHIN NARROW LIMITS.

\[
I_1 = \left( \frac{3.494 \times 3}{2} \right)^2 \times 4 + \left( \frac{3.411 \times 0.8}{2} \right)^2 \times 3
\]

\[
= 1222 + 34.50 + 24.45 
\]

\[
= 73.28
\]

REV. 1 LOAD / PULG = 

\[
\text{Total Load} / \text{PULG} = \frac{122,992 \times 2.414}{23,23} = 215.0
\]

\[
\text{Axial Load} / \text{PULG} = \frac{122,992}{23,23} = 5.28
\]

\[
\text{Kf. Total Load (PULG)} = \left( \sqrt{15.0^2 + 215.0^2} \right)^2 = 22,465
\]

Axial Load / PULG

\[
\text{Axial Load} = \text{Load} / \text{PULG} = \frac{122,992}{23,23} = 5.28
\]

\[
\text{Check of Axis} = \frac{5.28}{15.0} = 3.52
\]

\[
N/\text{PULG} = \frac{5.28}{5.28} = 1
\]

\[
\text{But} \quad t = 0.17
\]
REEL - C
2 1 0 6
A. T. I.
5 3 4 1 3
ABSTRACT:

A stress analysis has been made of the landing gear of the XB-36 bomber to determine whether or not the gear meets the requirements of existing criteria. The report is divided into two parts, one of which deals with the main landing gear and the other dealing with the nose gear. Descriptive matter for each gear appears under its respective analysis. Results of the analysis are shown in tables, diagrams, and formulas.