The 8-31B Engine Mount construction can be completed with common hand tools and a
1/4" Drill Motor. A STAND MOUNTED DRILL MOTOR IS BETTER, if available, to obtain
perpendicular holes. As suggested in the opening page, refer to the "B-80
Construction and Tooling Manual" for proper drilling procedures.

**ALL HOLES** to be drilled in your Engine Mount will be 1/4" or less in diameter, and
not over 1/4" deep. All holes to be drilled will have their diameters listed on the
drawing, or will be noted as follows:

1/4" diameter --- "A"  
3/16" diameter --- "B"

**HARDWARE SELECTION AND PLACEMENT**

All hardware is identified on the Packing List by a **PART NUMBER**, with sizes. All
hardware placement is identified on the drawings by this **PART NUMBER**. A flat washer
is installed under **ALL** attaching nuts, unless instructed otherwise in the steps.
All Castellated Nuts are safetied with a Cotter Pin.

**RECOMMENDED TORQUE VALUES**

<table>
<thead>
<tr>
<th>Dia. Bolts</th>
<th>Bolts in Shear</th>
<th>Bolts in Tension</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/16</td>
<td>12-15 inch lbs.</td>
<td>25 inch lbs.</td>
</tr>
<tr>
<td>1/4</td>
<td>30-40 inch lbs.</td>
<td>60 inch lbs.</td>
</tr>
<tr>
<td>3/8</td>
<td>115-145 inch lbs.</td>
<td>240 inch lbs.</td>
</tr>
</tbody>
</table>

**USE THESE VALUES CONSISTENTLY UNLESS INSTRUCTED OTHERWISE IN THE PROCEDURE!**

**8-31B ADVANTAGES**

Your 8-31B Engine Mount is tailored to obtain the most desirable aerelastic,
dynamic, and static features of the Mac "AX" engine. It is so designed that the
centerline of the engine is at 3 degrees negative to the Keel tube, which gives
greater propeller and rotor tip clearance; a definite aid under extreme landing
loads. Another welcome addition is the incorporation of a shouldered liner which
provides internal bumper stops, thereby eliminating the need for external bumper
pads, and also prevents damage to isolation mounts when exposed to erratic starts
and rough engine idle at lower rpm's.

Read carefully the following text before starting any modification or fabrication
of parts. Locate and identify all package parts. After assembly completion, be
sure to erase all pencil lay-out lines and re-check all steps to make sure your
Engine Mount is installed correctly.
<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Description</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-30A</td>
<td>1</td>
<td>1/4-28 x 2-9/16 Grip Bolt</td>
<td>-011,-017 Installation</td>
</tr>
<tr>
<td>4-31A</td>
<td>6</td>
<td>1/4-28 x 2-11/16 Grip Bolt</td>
<td>-015,-013,-014 Installation</td>
</tr>
<tr>
<td>4-34A</td>
<td>1</td>
<td>1/4-28 x 3-1/16 Grip Bolt</td>
<td>-013,-016 Installation</td>
</tr>
<tr>
<td>4-35A</td>
<td>2</td>
<td>1/4-28 x 3-3/16 Grip Bolt</td>
<td>-013,-016,-020 Installation</td>
</tr>
<tr>
<td>6-31</td>
<td>2</td>
<td>3/8-24 x 2-9/16 Grip Bolt</td>
<td>-015 to Engine Mount Lugs</td>
</tr>
<tr>
<td>4750</td>
<td>1</td>
<td>1/4 x 3/4 Flat Washer</td>
<td>Under Nut of 4-6A &amp; -019</td>
</tr>
<tr>
<td>310-6</td>
<td>2</td>
<td>3/8-24 Castellated Nut</td>
<td>Attaching Nuts, Pins, Washers</td>
</tr>
<tr>
<td>380-3-3</td>
<td>2</td>
<td>3/32 x 3/4 Cotter Pin</td>
<td></td>
</tr>
<tr>
<td>960-616</td>
<td>4</td>
<td>3/8 x 5/8 Flat Washer</td>
<td></td>
</tr>
<tr>
<td>364-428</td>
<td>22</td>
<td>1/4-28 Lock Nut</td>
<td></td>
</tr>
<tr>
<td>960-416</td>
<td>22</td>
<td>1/4 x 1/2 Flat Washer</td>
<td></td>
</tr>
</tbody>
</table>

**81B-H3 ENGINE ISOLATION MOUNTING HARDWARE**

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>8-81B-012</td>
<td>6</td>
<td>Conical Isolation Insert Mounts</td>
</tr>
<tr>
<td>-012A</td>
<td>3</td>
<td>Aluminum Shouldered Isolation Liners</td>
</tr>
<tr>
<td>-022</td>
<td>10</td>
<td>5/32 x 3/8 x 1-1/4 Flat Spacer Washers</td>
</tr>
</tbody>
</table>
2. Lay out and drill the following parts.

- 0.01 Arm tube (layout and drill both sides)
- 0.06 Fork flange (2)
- 0.07 Rear face plate

FACTORY-DRILLED

DRILL BOTH 2" SIDES

-004 1/8 - 0.05

ARK "X" JD
4. Center the -003 Lower Plate with bend up, on the bottom of -001 Arm Tube. Flush the -003 Plate tapered end with "X" marked end of -001 Tube. Clamp in this position and transfer all holes from -001 to -003. Remove and drill -003.

5. Locate -004, -005 Front and Rear Ears on bottom, side 3, "X" end of -001 Arm tube. Rotate ears to assure the punch marks are on the same side. Locate ears with a 1/4 bolt through the (4) locating holes in -001 tube.

Center the pre-drilled holes in ear and tube. Check fit of second retention bolt. If slightly mis-aligned, run a 1/4 drill or ream through assembly.

B. CONSTRUCTION, LOWER KNEE AND MOUNT ASSEMBLY

1. Lay out and drill, one "A" hole, 66-1/2" from the front end of the Keel tube on the top edge of sides "2" and "4" if you have not already done so. See drawing No. 41-1 included with the 8-41 Airframe Materials.

2. Locate -013 Yoke Tube and number all sides as shown below. Lay out and drill.
-019 VERTICAL KNEE

-021 Brace
9. Locate -014 Yoke Plate on Side (2) of -013 Yoke Tube with top of -014 overhanging -013 Tube by 1/8". Side (4) of -013 should be facing out, with Side (1) on top. The 5 degree bend of -014 is located away from the tube side.

6. Clamp and transfer punch the (6) "A" holes through Yoke tube to Plate. Remove and drill.

7. Locate a -015 Mount Ear on each end of Side No. (2) of the -013 Yoke Tube, by bolting through the in-board "H" holes of tube and "A" hole in ears. Set the T-81-1 Tool Gauge on top Side #1 of Yoke Tube and locate with (2) 3/8" bolts through ears and strip Gauge. Flush ends of T-81-1 with ends of -013 Yoke Tube, clamp and transfer (2) "A" hole locations to each ear, through Yoke Tube. Remove and drill. (Note: locating tool gauge will center ears and establish the correct angle.)

8. Repeat Step No. 7 procedure for the (2) -015 Ears located on Side No. 4 of Yoke Tube.

13. Transfer (3) "A" Mast holes to -018 Mast Gusset, (2) "A" Vertical Knee holes to -017 Keel Gusset, and (3) "A" Vertical Knee to -014 Yoke Plate holes -- as shown in preceding drawing. Remove Knee assembly and drill all holes.

14. Temporarily re-assemble knee structure on airframe with pushed-through bolts. Locate the opposite -018 gusset on -016 Knee, and clamp gusset assembly to Mast. Remove (1) bolt at a time from previously drilled gusset and transfer punch through Mast (3) "A" hole locations. Remove gusset and drill all holes.

15. Center the -020 Knee Brace Angle under Horizontal Knee and against -014 Yoke Plate as shown on Step No. 12 drawing. Transfer (4) "A" holes, remove and drill.

16. Attach the drilled end of -021 Mast to Keel Brace Angles to the bottom bolt of Mast Gusset. Center Brace on top hole of -017 Keel Gusset, and transfer-punch, remove and drill (1) "A" hole in each angle.