



INSTALLING A NEW SPINNER

A spinner will not necessarily make your airplane faster but it sure will make it look faster.

It's no wonder then that most builders would as soon fly their home-built without upholstery than consider flying it without a spinner - in spite of some anxiety that they might not be able to install it so it rotates without wobbling.

However, there is no need for concern because installing a spinner is no more difficult than fitting the cowl, wheel pants or some of those pesky fiberglass fairings.

It's just that when they look at that large blank spinner they have a bit of a problem in deciding where to begin . . . and how to go about it. Well, friends, here is one way.

Spinners In General

First, be convinced that a large spinner must always be installed with a front bulkhead in addition to the standard back bulkhead. This is to help stabilize and support the weight of the spinner . . . a safety consideration.

Losing a spinner can result in serious damage to the airplane . . . especially if the spinner doesn't completely break away. At the very least, it will destroy much of your cowl even if you are alert and quick enough to shut the engine down in time.

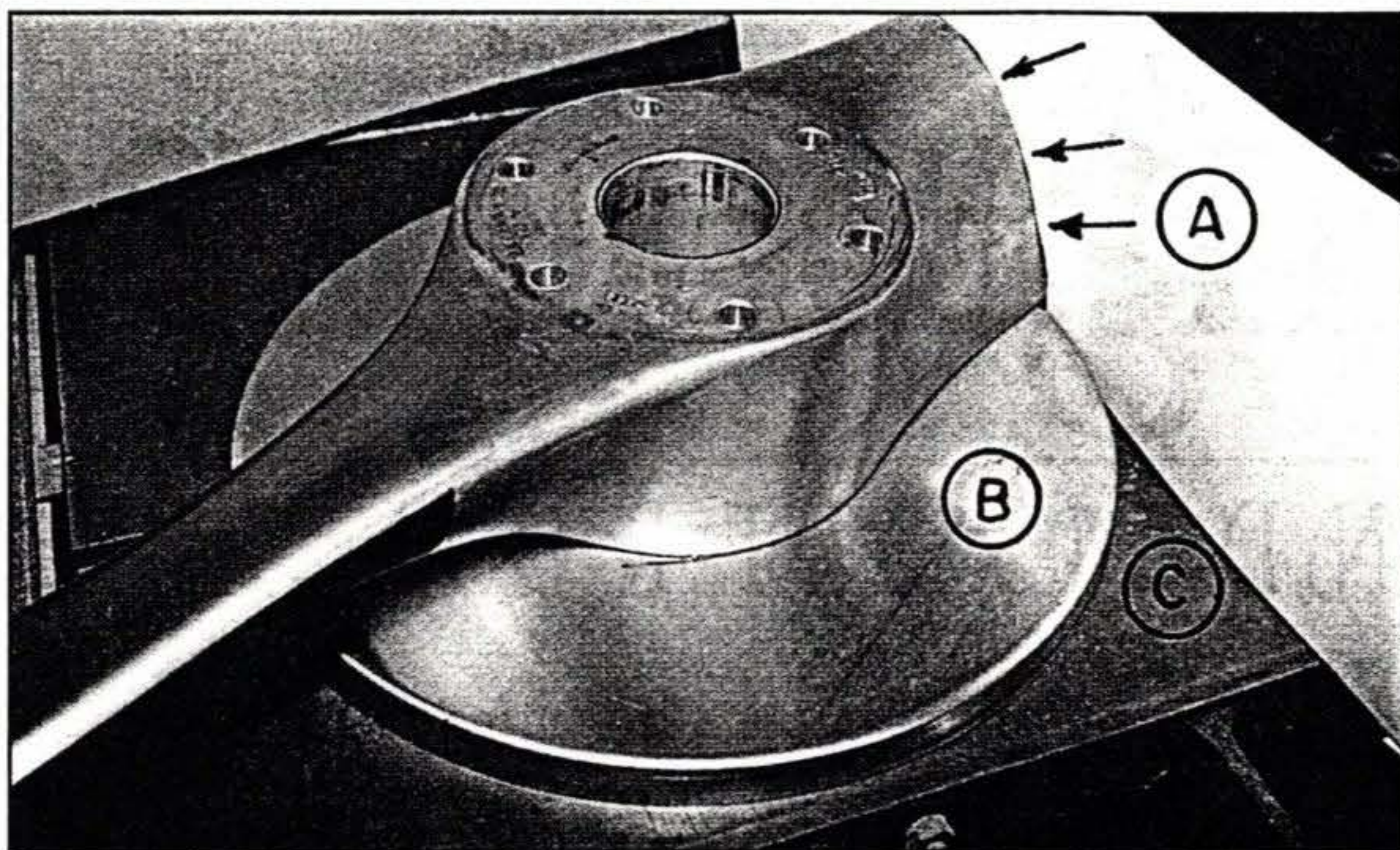
Aluminum dome spinners and matching bulkheads are, typically, spun from .080" soft aluminum. This ensures spinner longevity as the malleable aluminum is less prone to crack than some tempered grades.

A number of kit manufacturers are now furnishing fiberglass spinners with their kits. These have proven to be quite reliable when properly installed, especially when they have additional reinforcement layers of cloth in the area of the back bulkhead.

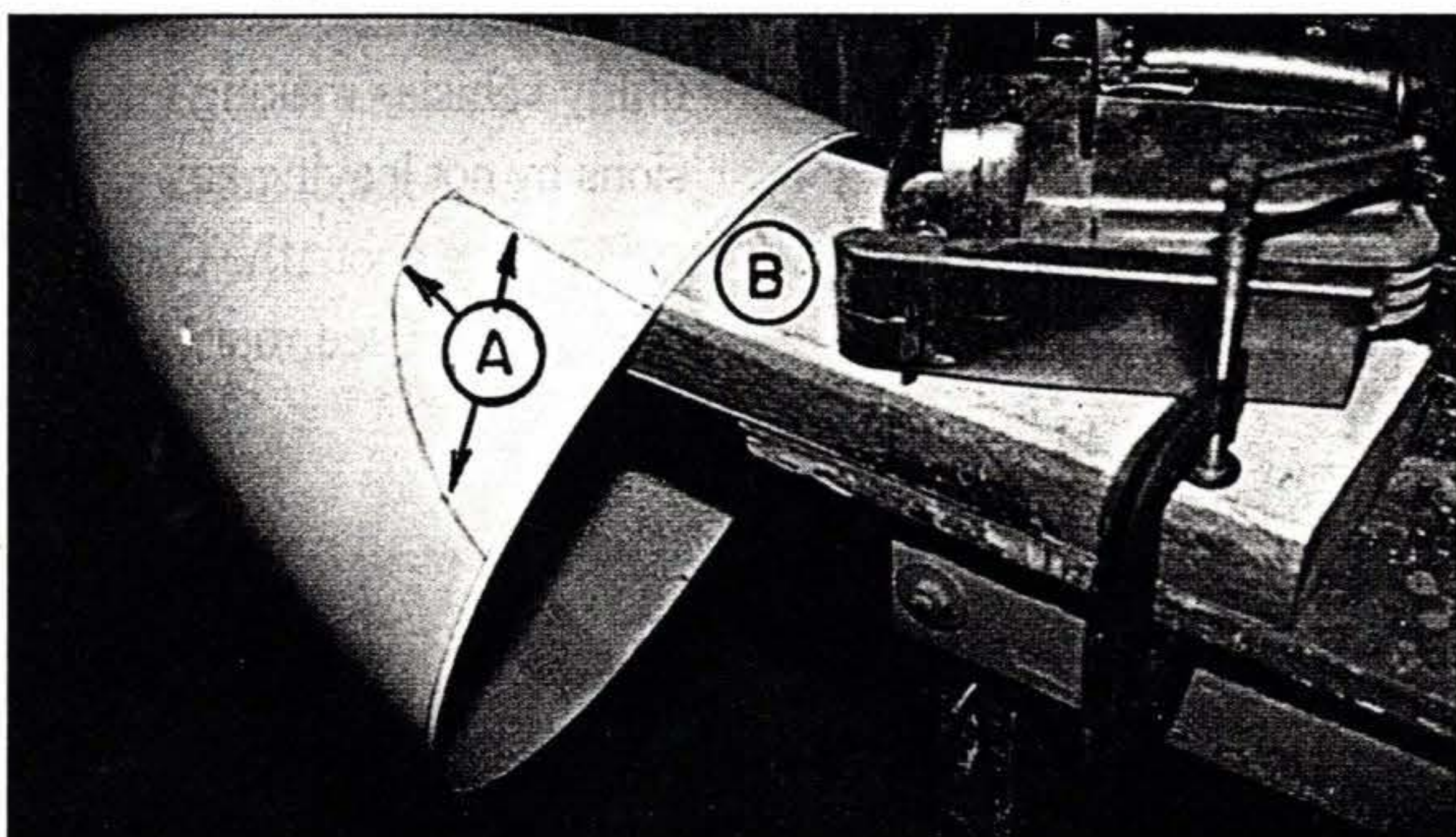
Cutting out the propeller hub (blade) openings, and drilling the spinner dome attachment holes, involves pretty much the same procedures for either a fiberglass or an aluminum spinner.

Cutting Tools You Will Need

You will need a saber saw or a handheld hacksaw blade to make the initial prop hub cutout in the spinner dome.



Make a template (A) to fit around the propeller blade at the point of contact with the back bulkhead (B) which must rest on a level work surface (C).



Trace the propeller blade cut out area (A) onto the spinner shell. (B) is a short 2x4 clamped to the bench as a working support for the spinner.

It may also be possible to use a pair of metal cutting snips, or a nibbler.

However, for the most part, the thickness of the aluminum will be too much for the average tin snips.

If tin snips are used on the somewhat thinner fiberglass spinner shell, be extra careful not to cut too close to the trim line because the snips tend to pulverize the fiberglass along the line of cut.

Another tool I find to be very effective is a rotary file chucked in an air drill. You can also use the rotary file in a handheld electric drill but it will turn at a much lower rpm.

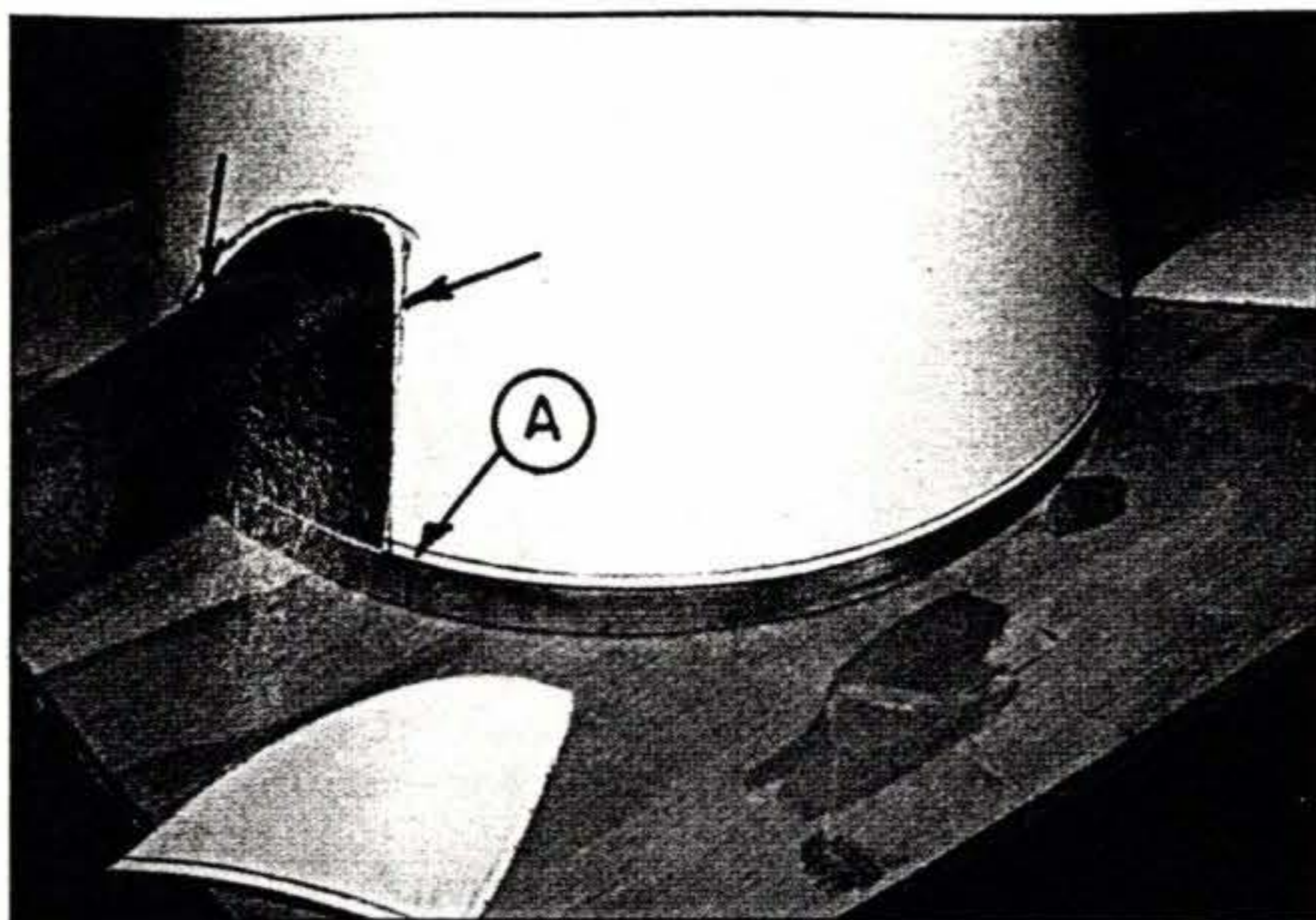
I use the rotary file to enlarge and precisely shape the prop blade cutouts in the spinner . . . but, be careful and

work slowly.

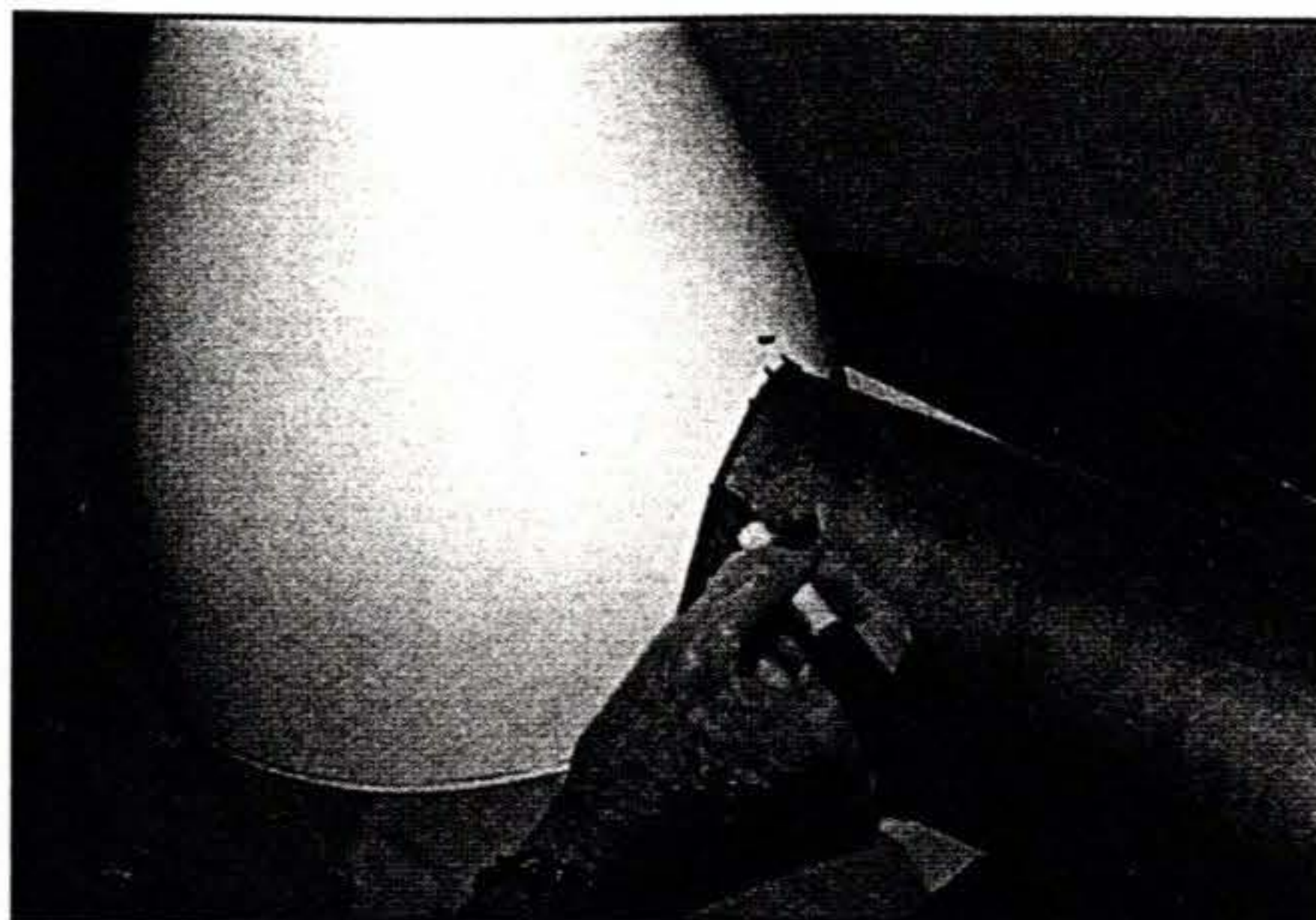
It would be nice to have either a rivet squeezer or a rivet gun for installing the anchor nuts. However, in a pinch you can always use a hammer and a bucking bar.

Preliminary Spinner Checks

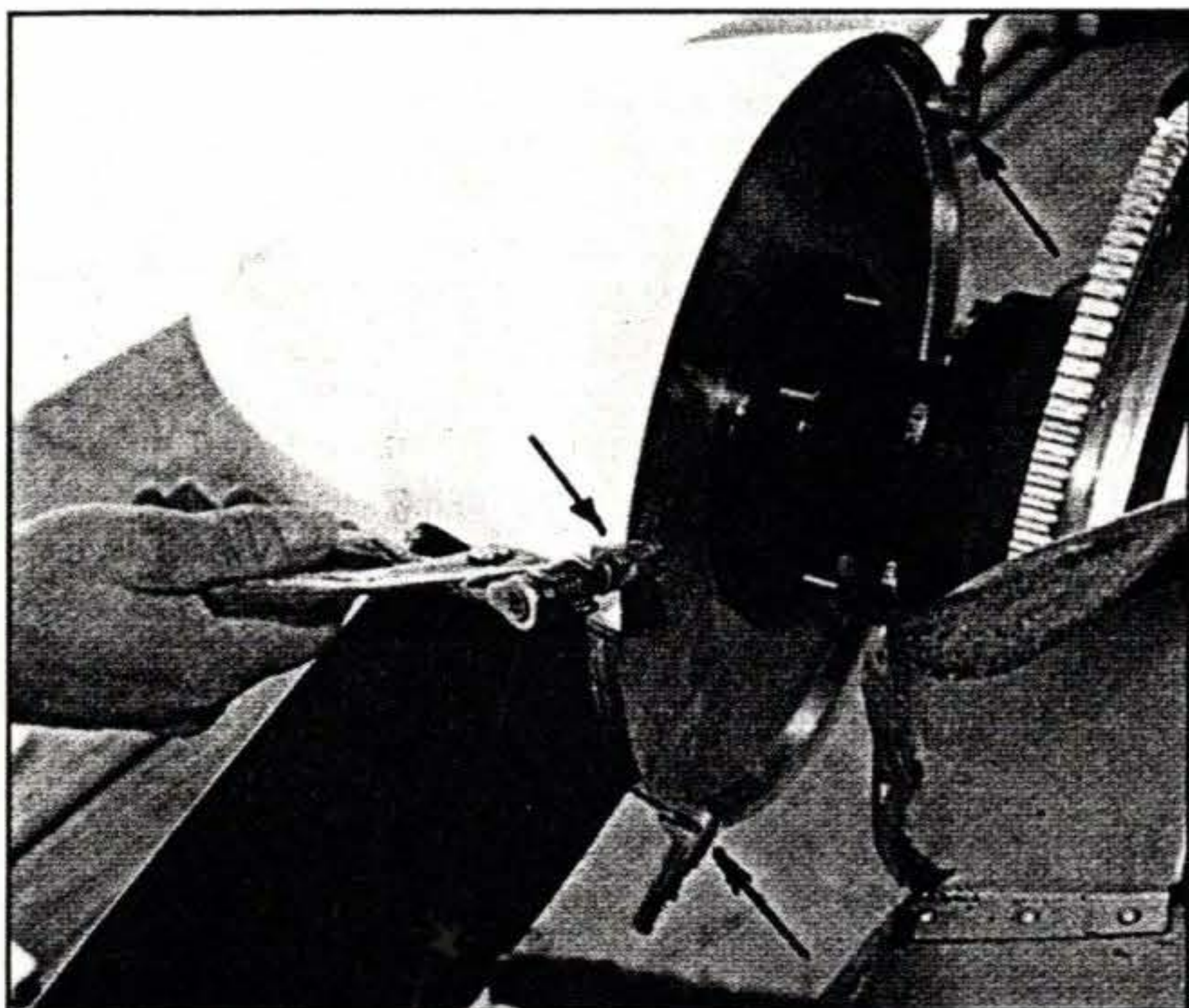
The first determination to make is to see how the spinner fits the back bulkhead. If perfectly matched, the spinner will slip over the bulkhead far enough that it is flush with the bottom of the flange. However, even if the spinner slips slightly beyond that point, you will still be O.K. because the excess spinner edge may be trimmed off later, if necessary.



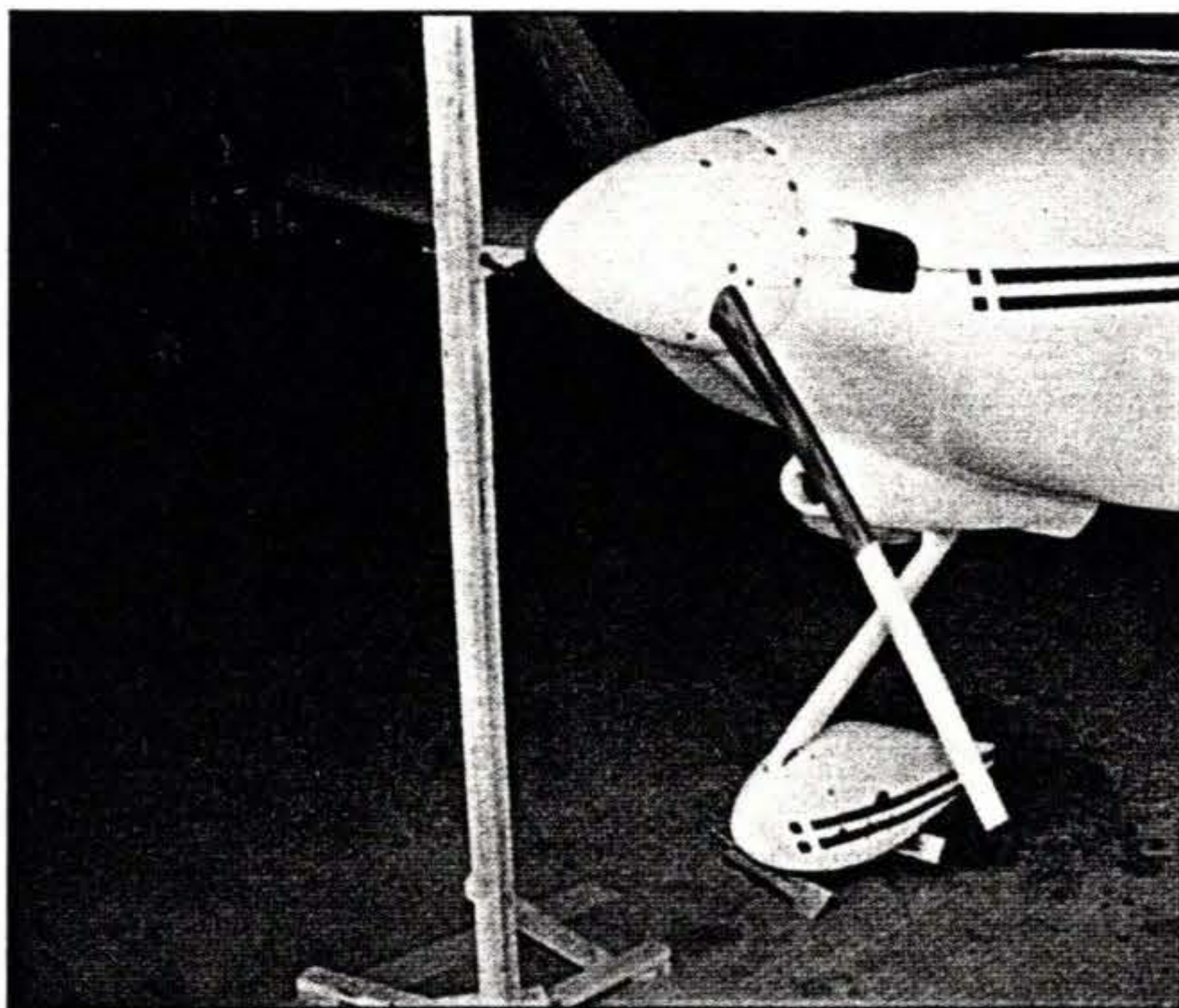
Cut the prop blade openings undersized using a saber saw. Then, slip the spinner over the prop to see where it needs to be trimmed. Note the alignment mark (A).



Trace around the spinner cutout with a marker pen to determine where it needs to be trimmed and how much.



After a good spinner fit is obtained, jam it on tight and clamp it to the back bulkhead with small C-clamps or Cleco shoulder clamps for an alignment check.



This shows how the spinner alignment pointer is used to align the spinner before the attachment screw holes are drilled. The same pointer can be lowered and used to check that the propeller blades track within 1/16" of each other.

Of course, if the rear bulkhead still protrudes, and cannot be made to fit flush with the bottom of the spinner, the bulkhead is simply too big and cannot be used.

For the next check, insert the smaller front bulkhead in the spinner shell to see how far in it will go before fitting snugly against the spinner wall. Measure from this point to the spinner's bottom edge to roughly determine the approximate propeller hub thickness the bulkheads will accommodate.

Unfortunately, a matched spinner/bulkhead kit will fit only one size propeller hub without requiring some adjustment.

For example, a Warnke wood propeller hub is 4-3/8" thick, while a Hegy wood prop I have is only 3" thick. On the other hand, my Sensenich metal prop is 3-1/2" thick.

It is obvious that spacing of the front bulkhead for a particular spinner

can be correct for only one of the propellers . . . maybe none of them.

This can be an unexpected dilemma for anyone who wants to try another propeller from a different manufacturer.

If you are contemplating a propeller change from a wood propeller to a metal prop, for example, you can count on it - you will also have to change spinners unless you don't mind having large gaps in the spinner around the propeller hub.

Bulkhead Alignment and Jigging

Jigging and aligning the predrilled front and rear bulkheads with the propeller hub in preparation for fitting the spinner poses a bit of a problem. The reason being that although the six predrilled propeller bolt holes in the front bulkhead are the same size as the propeller bolts, the predrilled holes in the back bulkhead are not. They are

oversized because they must fit over the drive lugs on the engine (or prop extension). These drive lugs are 5/8" in diameter (3/4" diameter for the larger engines), as are the holes in the back bulkhead.

If you don't have a spare set of drive lugs to use for jigging the back bulkhead, you will have to make a set of temporary bushings to serve as alignment spacers. Use these to automatically center the back bulkhead with the propeller hub and front spinner bolt holes during your spinner fitting preparations. Proceed as follows:

1. First, block your back bulkhead up slightly so that its bottom edge (flange) is about 1/4" above a good level work surface. (No need to use the front bulkhead for the initial fitting that follows; it will only be in the way.)

2. Next, insert the 6 drive lugs, or bushings, in the back bulkhead's

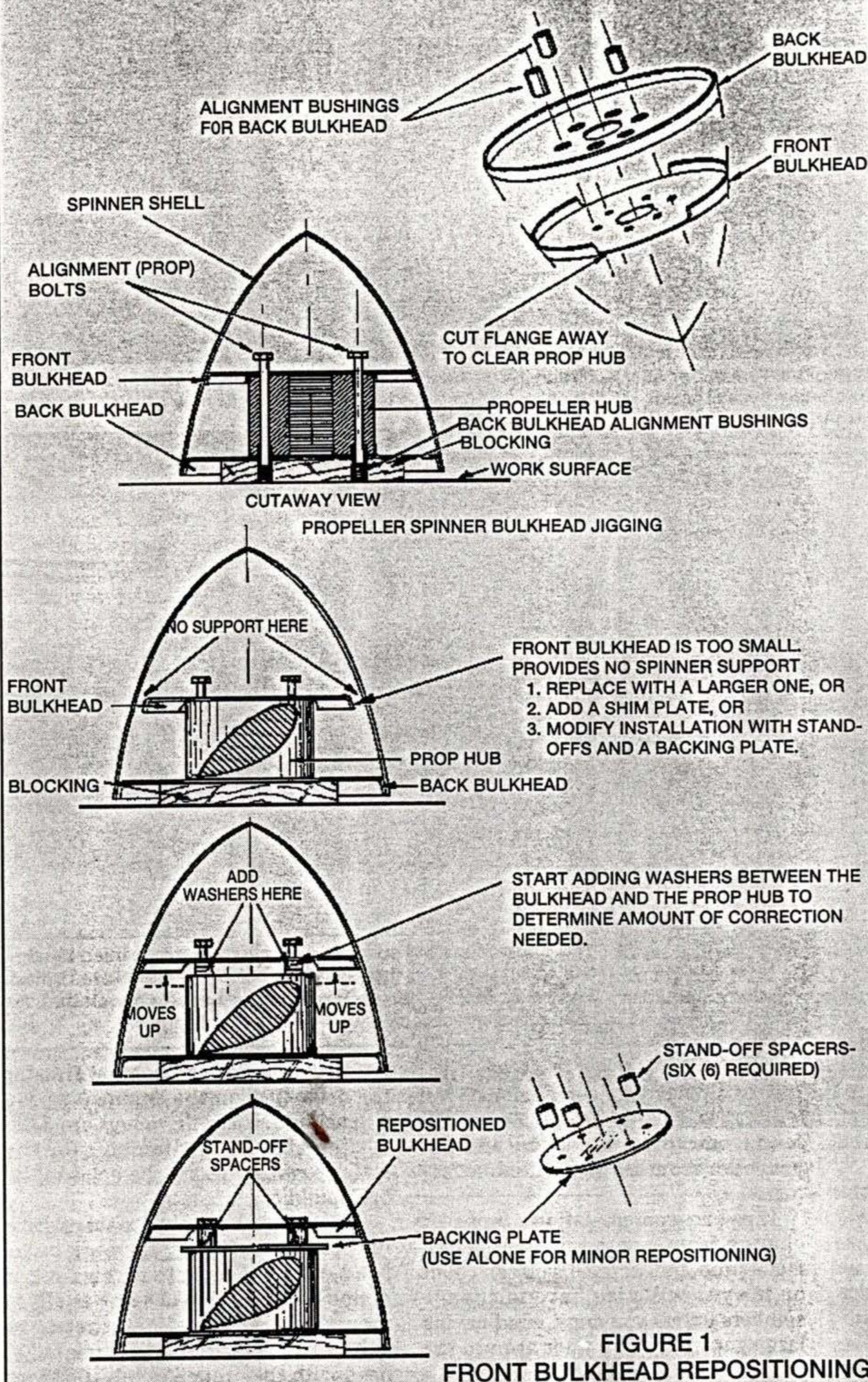


FIGURE 1
FRONT BULKHEAD REPOSITIONING

predrilled holes.

3. Lower the propeller hub in place over the drive lugs.

4. Push the 6 propeller bolts in . . . through the entire assembly.

5. Trace around the propeller hub/blade with a marker onto the back bulkhead to index it for later reference.

Now the back bulkhead is in perfect

alignment with the propeller and you can begin cutting and fitting the spinner.

Making the Blade Cut-Out Template

1. First, position a square against the back bulkhead and the prop hub. Then, make a vertical reference mark

on the flange of the back bulk-head.

2. Next, make an accurate template to use for cutting out the propeller hub opening in the spinner. Most any stiff material (manila folder, aluminum flashing, etc.) you can cut with scissors can be used to make your template for the prop hub cutout.

3. Cut out a rough approximation of the opening in the template material.

4. Refine it up by bridging the gaps with pieces of masking tape. Mark your template, "This Side Up."

5. Establish a reference line anywhere on the spinner by drawing a short line up from its base using a square for alignment.

6. Align the reference lines on the bulkhead and the spinner. Then, position your template against the vertical line drawn on the spinner and trace the cutout outline onto the spinner.

7. Measure around the base of the spinner to a point 180 degrees opposite and trace the same outline on the opposite side of the spinner. Be sure to keep the same template face side up for both tracings. Now, you are ready to cut out the spinner openings.

Making the Blade Cutouts

Clamp a short 2x4 to the end of your workbench as a support for the spinner while you are cutting the openings.

Use a saber saw, cutting well inside the line just to be safe.

After both openings are roughly cut out, the repetitious "trial fit and trim" work begins.

Lower the spinner over the jiggged up propeller/bulkhead to see how it fits. Since your preliminary propeller hub cutouts are undersized, it will not slide down very far before it hits on the propeller hub.

With a "Sharpie" marking pen, trace along the prop hub marking where the spinner hits it.

Remove the spinner and grind away the ink marks with a rotary file.

Replace the spinner on the prop. Mark it again. Trim it again. Repeat the process until you have a perfect fit with approximately 1/16" gap between the spinner and the prop hub.

The spinner must not contact the propeller anywhere!

Does the Front Bulkhead Fit?

Now that the spinner shell fits perfectly, remove it and add the front bulkhead to your propeller jig assembly.

However, you will first have to cut away part of the flange on each side of the bulkhead to allow it to lay flush against the hub. Reassemble your jig assembly by placing the front bulkhead on top of the propeller and reinstalling the bolts to maintain alignment.

Once again, slide the spinner over the prop/bulkhead assembly and see how the front bulkhead fits. But, how can you tell? You can't see inside the spinner.

Well, for one thing, if the spinner shell will not slide down all the way to the bottom edge of the back bulkhead's flange, you will know the front bulkhead is too big.

But what if the spinner dome does slide down and fits perfectly flush with the back bulkhead? Does that mean the front bulkhead is contacting the spinner properly? Not really . . . it could be a sign it is too small and not even touching the spinner. Here's how you can tell.

Remove the front bulkhead and place a spacer washer over each propeller bolt hole. Replace the front bulkhead over the washer spacers and reinstall the spinner dome. If the bottom rim of the spinner still fits flush with the back bulkhead, you know that the front bulkhead is still NOT contacting the spinner shell as it should.

Remove the spinner and front bulkhead again, and add another spacer washer all around. Repeat the process until you detect that the spinner shell



Shown here is how the 832 anchor nuts are held in place with Cleco clamps while you drill the rivet attachment holes. Note the alignment mark on the back bulkhead flange.

will no longer fit flush with the back bulkhead's flange. Measure the total thickness of the spacer washers used and you will know how much the front bulkhead must be moved forward. This can be accomplished by making a special aluminum spacer plate if the correction required is not much more than $3/16$ " or so. Otherwise, it might be better to obtain a larger diameter front bulkhead.

If this problem involves a fiberglass spinner, you can always lay up several layers of fiberglass strips around the inside of the spinner to obtain the correct fit.

Front Bulkhead Modification.

Some RV-6 builders learned that when they replaced a wood propeller with a metal Sensenich prop, their

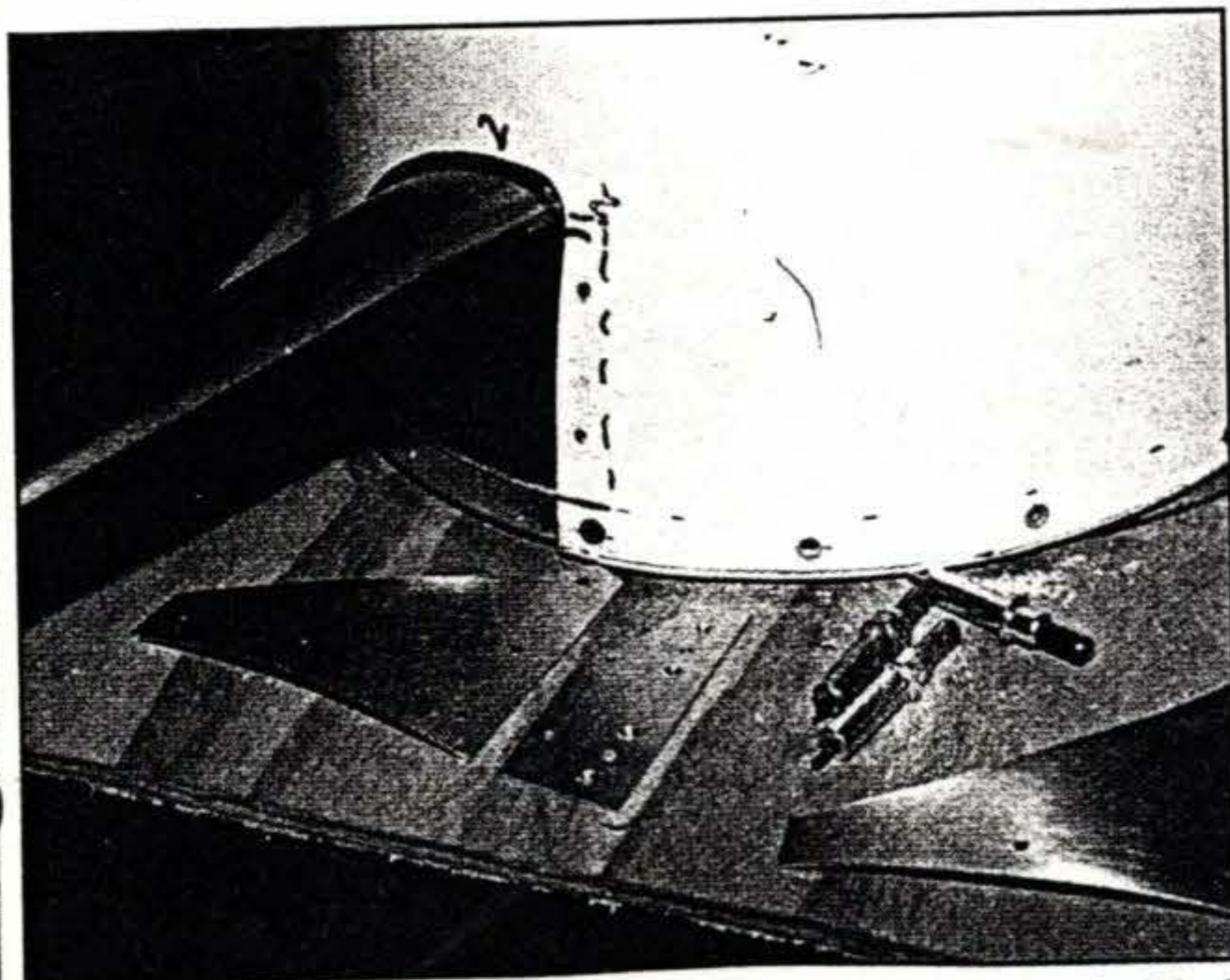
spinner had to be replaced because the propeller blade openings were too big.

They also discovered when fitting the new spinner the front bulkhead diameter was much too small to be used. No replacement bulkhead was available or in the offing. What to do?

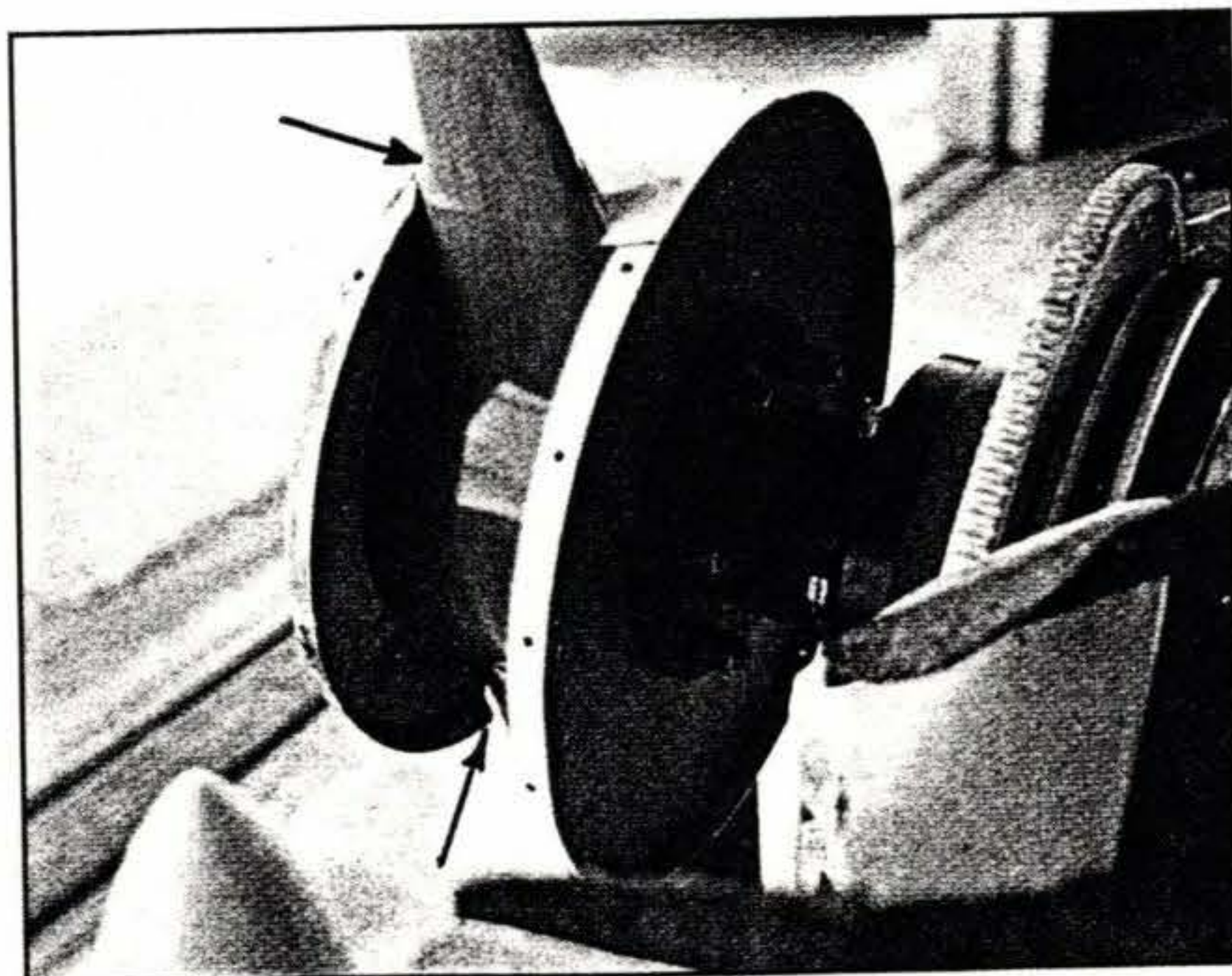
The undersized front bulkhead would have to be moved forward almost an inch before it would contact the spinner shell.

Some bright soul figured that if he turned the front bulkhead over, it would almost fit . . . but not quite. Now, it was slightly too big. Since the front bulkhead flange would now be facing forward he didn't consider that to be a problem but, rather, a solution to the fitting problem.

The front bulkhead flange could be shrunk enough to fit perfectly. This was done in the best metal working



These are the pieces needed to close that large gap behind the propeller.



The front bulkhead flange must be cut away in two places to clear the propeller blades.

WHEN YOU SWITCH FROM A WOOD PROP TO A METAL PROP...

THE THINNER METAL HUB
CHANGES THE LOCATION AND FIT
OF THE FRONT BULKHEAD.

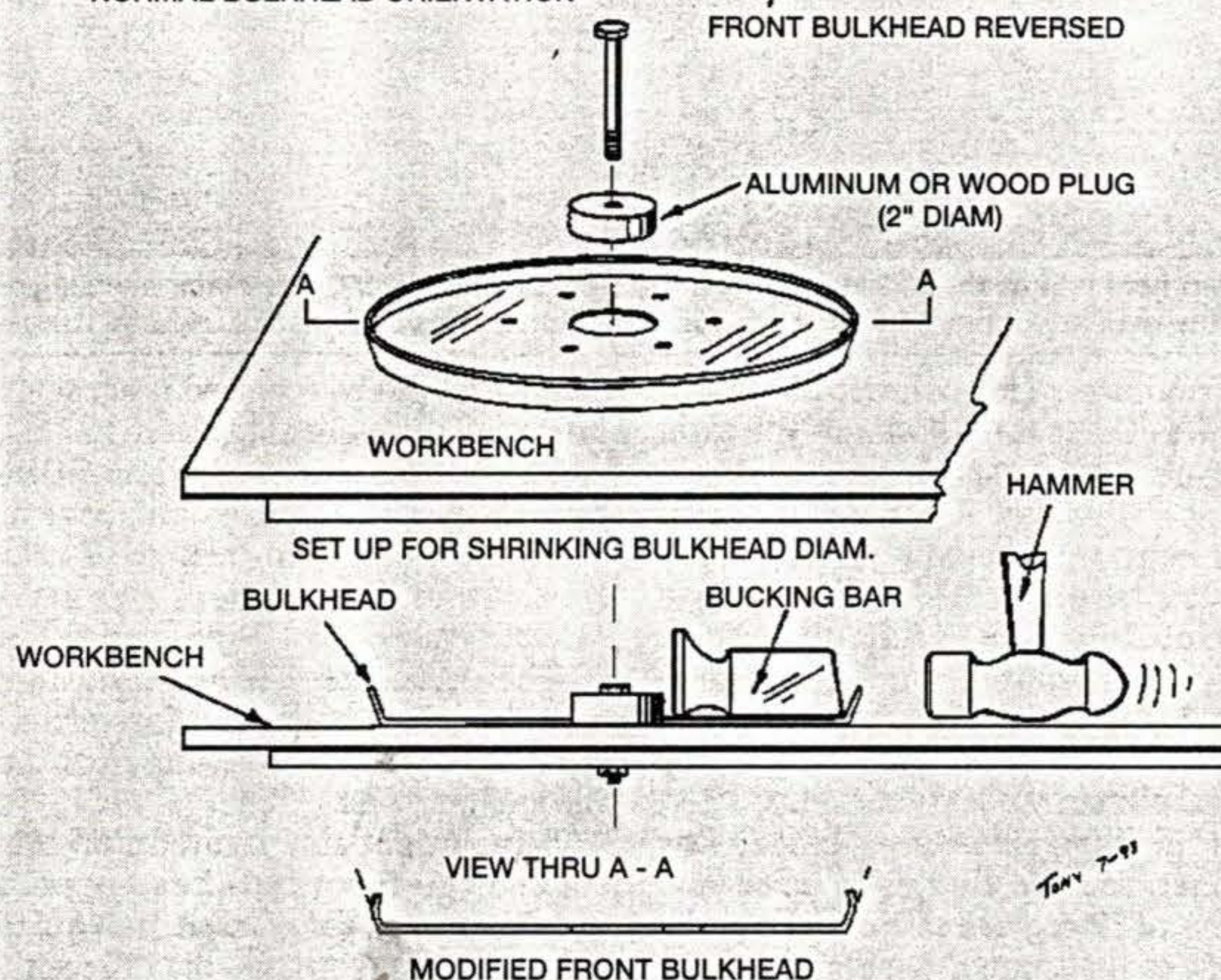
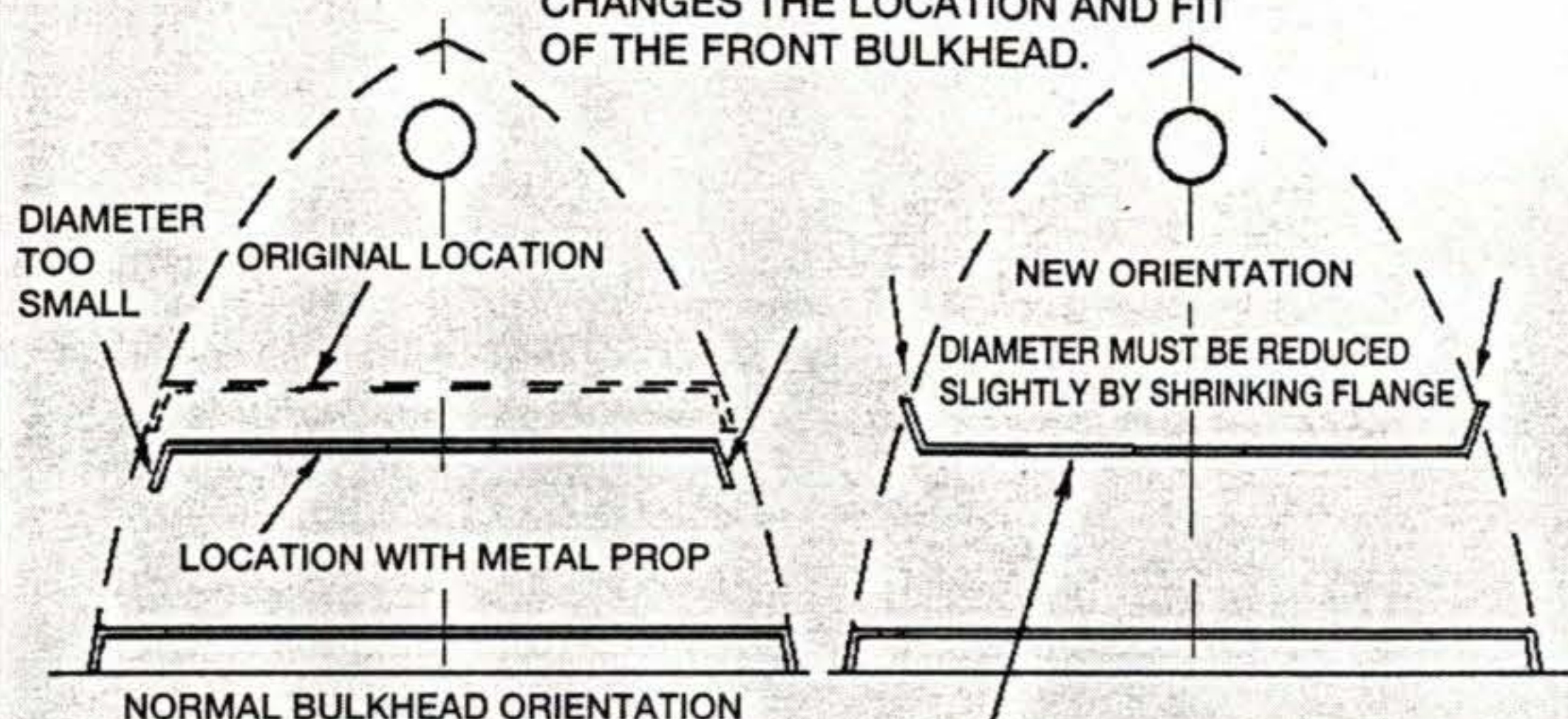
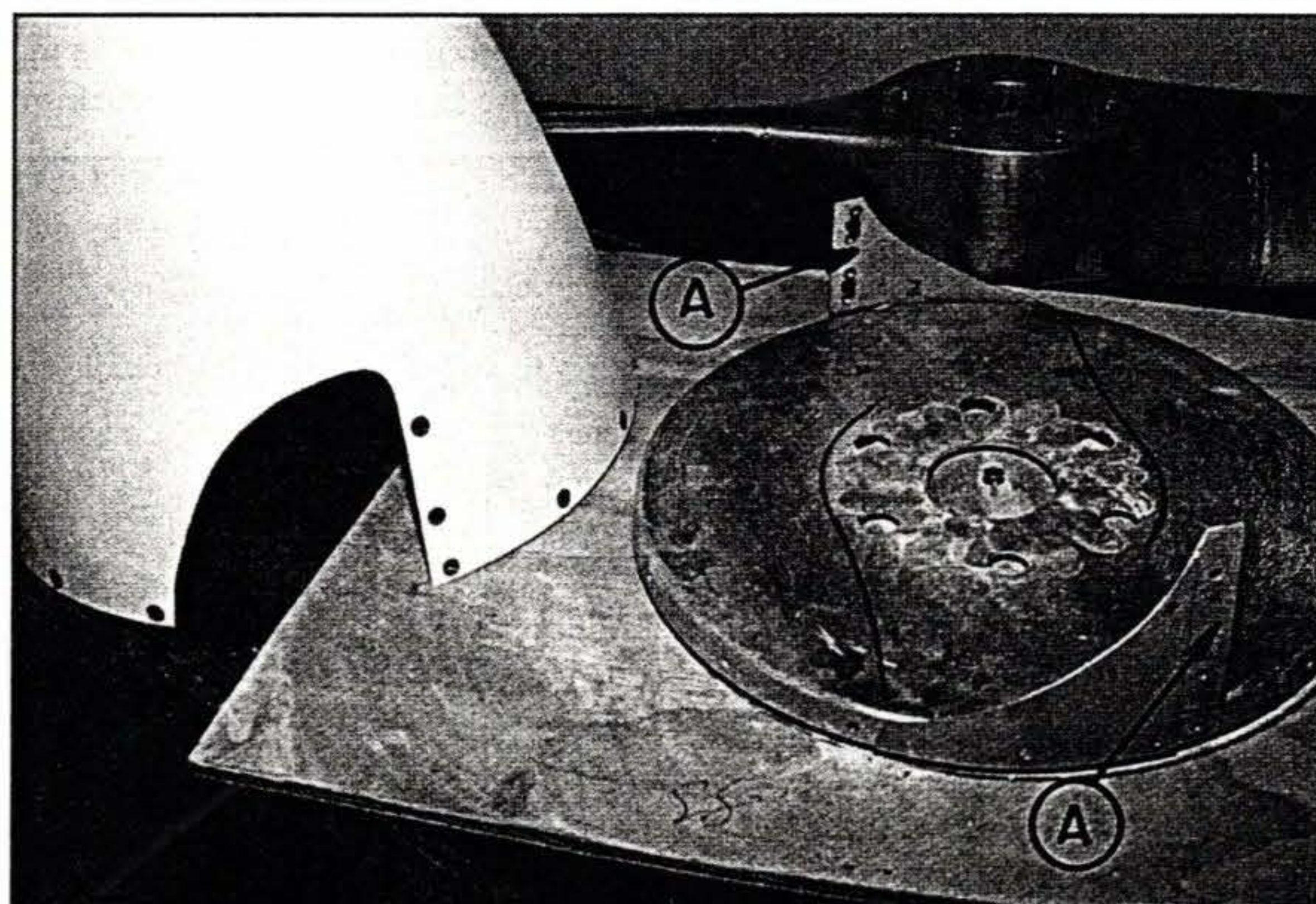


FIGURE 2
FRONT BULKHEAD MODIFICATION



Shown here is how the gap seals are riveted to the back bulkhead. The nut plates (A) permit the spinner to be removed.

tradition using a hammer and back up bucking bar.

Because the front bulkhead becomes hardened during its manufacture, it is a good idea to anneal it before you start banging on it to shrink its diameter. The annealing process is very simple. Use a lighted candle (or acetylene torch) to coat the bulkhead flange area with black soot. Then, with a Bunsen torch or welding torch adjusted to a normal flame, heat the bulkhead flange until the soot is all burned away. Be very careful not to overheat and melt the aluminum by playing the torch too long in one spot.

This leaves the aluminum perfectly annealed and easy to work with a hammer and a back up bucking bar.

Of course, the recontoured flange will not be wide enough for fasteners to be used in the front bulkhead. This is no problem as many builders prefer not to use screw fasteners in the front bulkhead, anyway.

Actually, the installation will now be stronger since parts of the forward facing flange do not have to be cut away to obtain the usual hub contact.

Explanations tend to get too wordy so the photos will do much to clarify some of the procedures.

Finally, Installing the Spinner

It is important that your spinner be installed so it doesn't rotate eccentrically. Aligning the new spinner is easily done on the airplane proceeding as follows:

1. Chock the wheels snugly.
2. Remove the top spark plugs so the propeller will be easier (and safer) to rotate.
3. Install the back bulkhead, propeller, and front bulkhead on the engine using the correct propeller bolts properly torqued.
4. Slip on the newly prepared spinner dome as far as it will go. Its rim should be parallel with the back bulkhead flange. Lightly clamp the spinner in place using several Cleco type shoulder clamps, or small C-clamps.
5. Rotate the propeller slowly with the nose of the spinner almost touching a pointer clamped to some kind of a stand as shown in photo.
6. Readjust the clamped spinner shell so it tracks perfectly as you turn the propeller.

Next, drill 1/8" pilot holes around the spinner for the fasteners, inserting a Cleco in each hole as it is drilled.

Drill the first holes approximately 5/8" either side of the blade cutout edges to allow space for attaching anchor nuts.