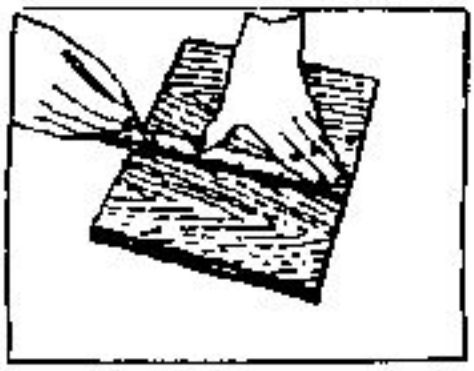
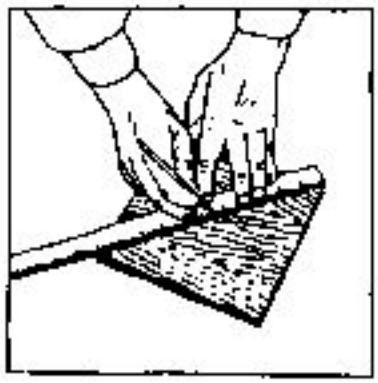
MAKING THE TAILGATE (Mirror Cell)

(Please Note: Many find the following simple mirror cell <u>too</u> simple. . .
The solution is to purchase a commercial spring-loaded mirror cell. Google for options!)

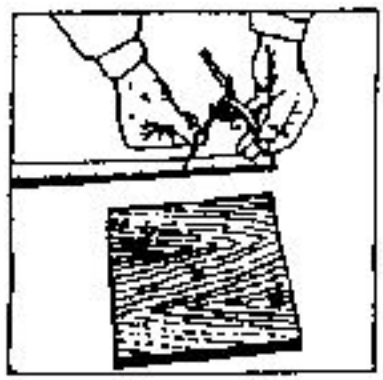


The tailgate should be a square with the same width as the objective mirror. (e. g. a 10" mirror in a 12" tube gets a 10" square tailgate--you will soon "lop off" the corners.)

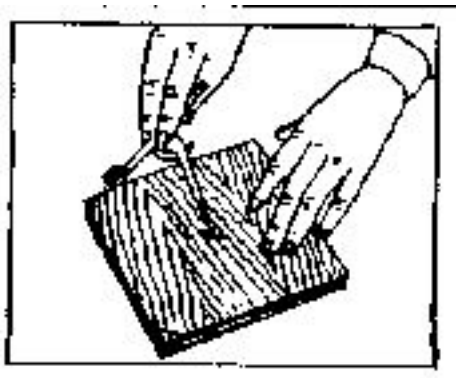
Cutting out the tailgate.



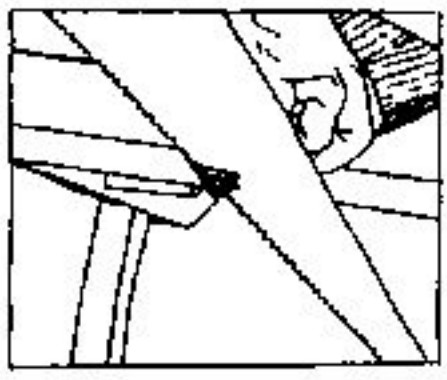
Finding the center of the tailgate.



Set the compass for the radius OF THE INSIDE OF THE TUBE. (<u>Not</u> the radius of the mirror.)

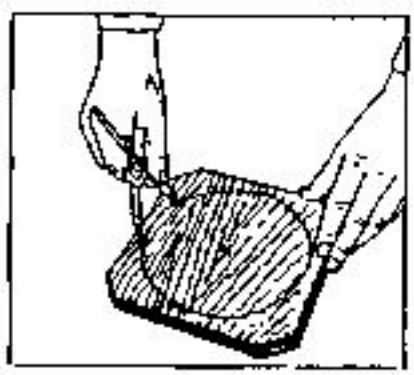


Drawing a circle with the compass point at the center of the tailgate. <u>Only the very corners of the wood will be touched by the pencil.</u>



Sawing off the corners of the tailgate at the pencil marks. Now the tailgate should fit inside the telescope tube. (Plane or sand to fit if necessary.)

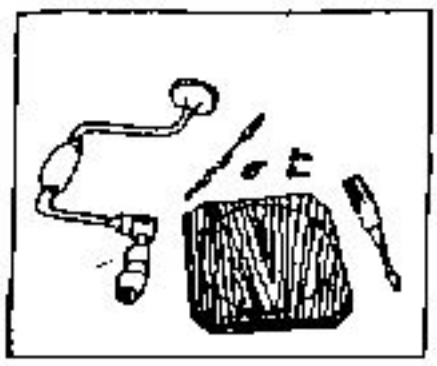
Drawing a <u>second</u> circle for the placement of the tailgate bolts.



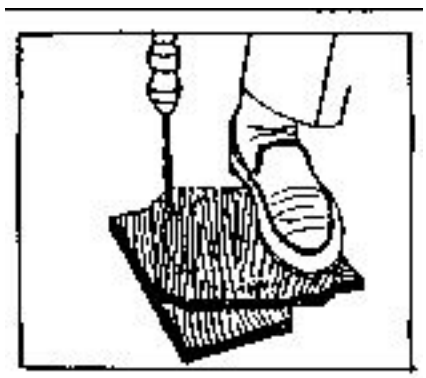
This circle should be 2" smaller than the diameter of the objective mirror.
(e. g. for a 10" mirror, we need an 8" diameter circle.)

Dividing the circle into six equal segments (the radius of the circle you just drew).

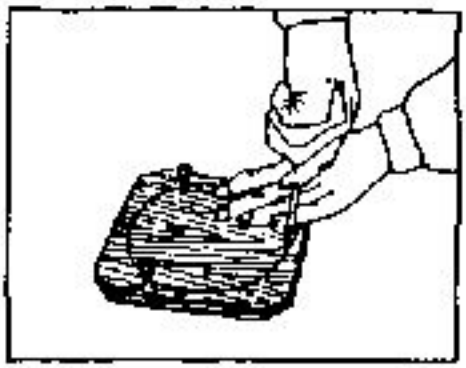
Marking the circle at each of the six points.



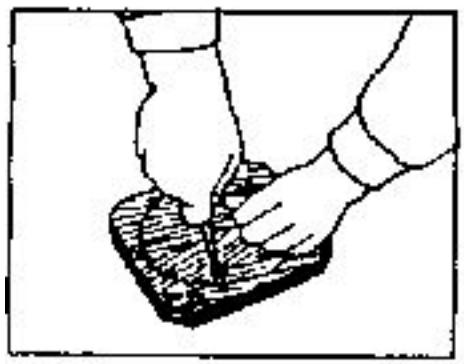
Of the six marks on the circle, we choose three (every other one) for our equilateral triangle. *We want two of our three marks to be towards two of our "cut-off" corners.* One bolt is placed at each of the three angles.



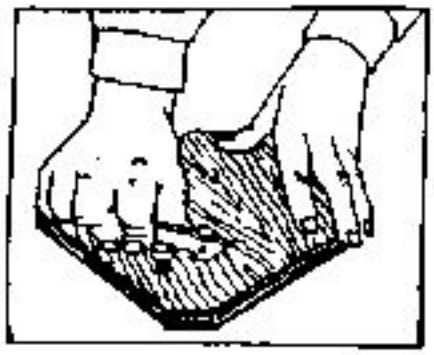
Drilling bolt holes. (A power drill also works well, if available).



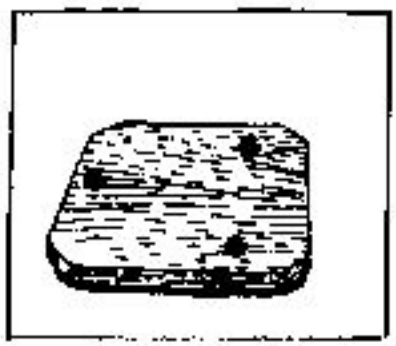
The bolt holes should be one sixteenth of an inch smaller than the bolts (5/16"), so that the bolts will fit snugly.



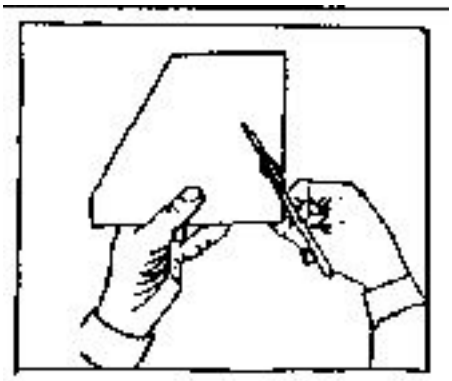
Screwing in the tailgate bolts. The bolts should be threaded right through the wood.



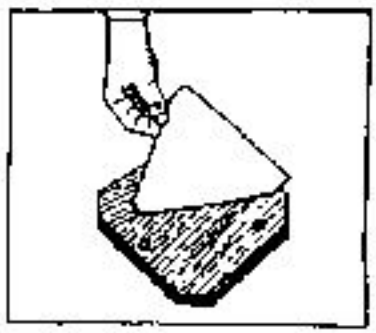
The bolts should be quite snug and difficult to turn.



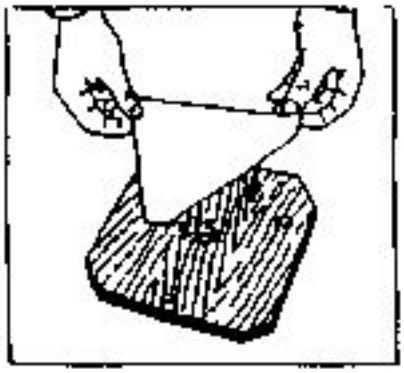
The view from the other side: tailgate bolts poking through the wood.



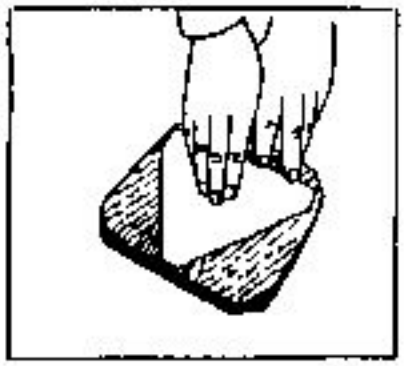
Now we cut a piece of thin (e. g. cereal box) cardboard into a triangle which will cover the protruding bolts.



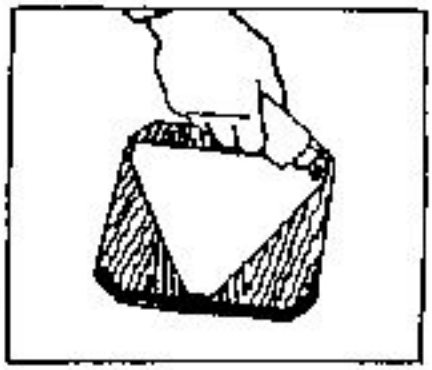
The cardboard should cover all three of the bolts where they come through the wood.



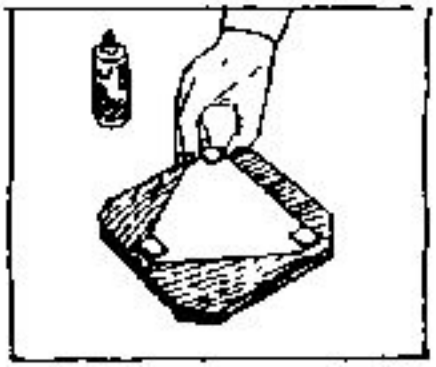
Gluing the cardboard in place.
(Apply glue at the center of the cardboard only!!!)



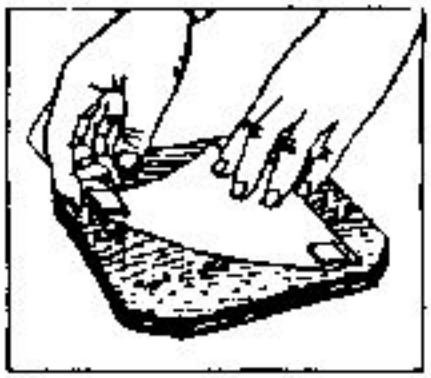
Letting the glue set.



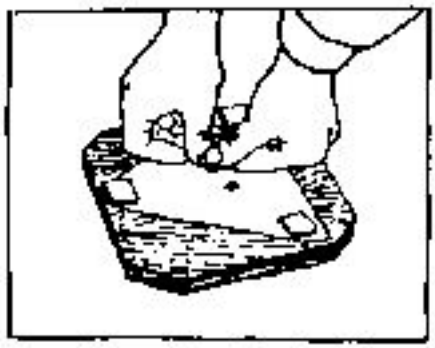
Now we apply glue to the cardboard at the three places where the bolts poke through the wood...



...and glue the squares of Masonite (about 1" square) onto the cardboard directly over the protruding bolts.

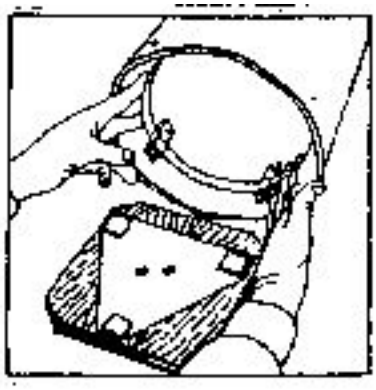


This cardboard protects the mirror from the tailgate bolts if the telescope
is dropped on its end. This cardboard must be floppy so as to allow alignment of the objective.

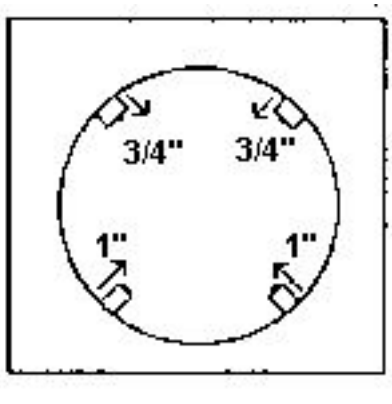


Fixing the position of the cardboard with two thumbtacks.
(Double-check first to make sure each Masonite square covers its protruding bolt!)

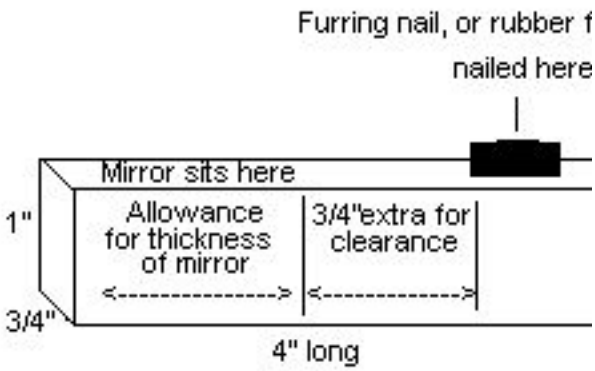
MOUNTING THE MIRROR IN THE TUBE



We use four mounting blocks to mount the mirror in the telescope tube. When the mirror is installed, it should rest on the two bottom blocks, but clear the two top blocks. Furring nails, or rubber furniture glides, are placed at the ends of each of the mounting blocks to prevent the mirror from rolling out of the front end of the tube. After you have installed the mounting blocks and the mirror, check to make sure that the mirror cannot get past the furring nails, or furniture glides. If it does, you will have to increase the height of the mounting blocks as necessary.



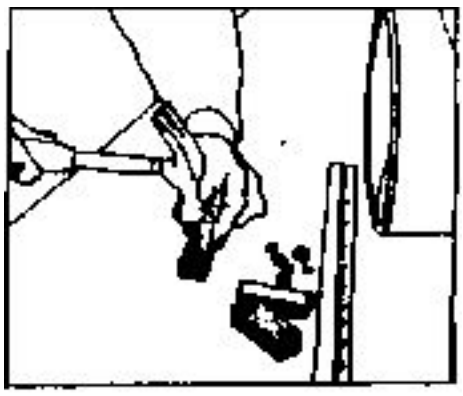
The mirror mounting blocks are designated PART F in the plywood cutting plans.
The mounting blocks are screwed in place inside the telescope tube. The mirror sits on the two bottom blocks and should just clear the top blocks—under no circumstances should the mirror be pinched or squeezed between the blocks.
If the blocks are cut from 3/4" plywood and are 1" wide (they should be about 4" long), we will probably have to place two blocks with the 3/4" side "up" and two blocks with the 1" side "up" in order for the mirror to fit nicely (see diagram above).

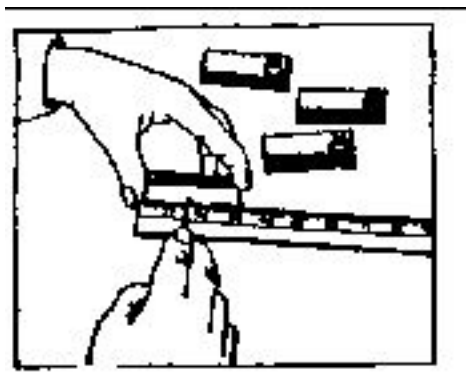


Wood Mounting Block

A furring nail (or rubber furniture glide), is hammered into each block before the blocks are screwed into the telescope tube. The furring nails prevent the mirror from rolling out the front end of the telescope tube. To determine the placement of the furring nail, allow room on the block for the width of the mirror, plus an extra 3/4" for clearance. Please note: the drawing at left is for bottom blocks (1" high); for top blocks, they should be turned 90-degrees and only be 3/4" high before nailing furring nails or rubber furniture glides on.

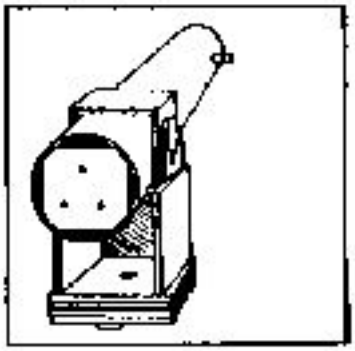
INSTALLING THE MOUNTING BLOCKS



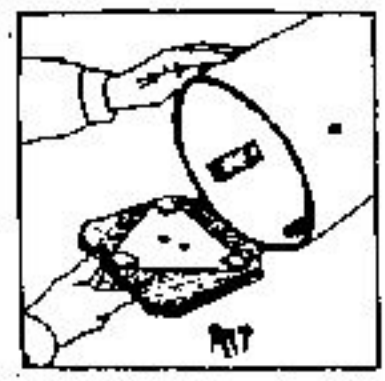


A furring nail should be hammered into one end of each of the mounting blocks (allow necessary clearance—see previous figure above) before the blocks are screwed into the tube.

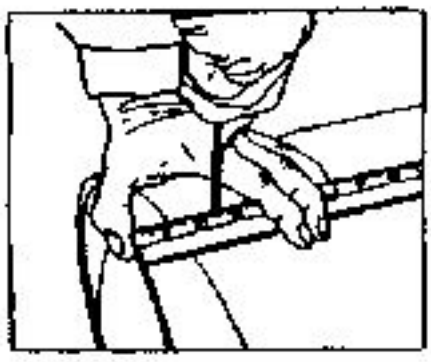
Preparing the blocks for installation in the telescope tube. A pilot hole for the screw may be made in each block (on the side of the block without the furring nail). 2" from the end (i. e. the end without the furring nail).



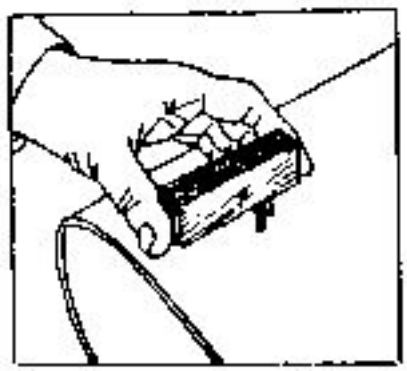
It is convenient to have the eyepiece hole on either the right side (shown), or the left side, depending on which of your eyes is "dominant." To determine which eye is dominant, simply hold your fist up to your eye and imagine this to be an eyepiece--which eye do you instinctively use? If it is your left eye, mount your tailgate so the eyepiece hole is on the right; vice-versa if it is the right eye. This will be more comfortable if, in the future, you decide to mount a Telrad, Quikfinder (1X finding aids), or a finder scope. The eyepiece may be positioned horizontal (as depicted), or canted up about 30-45-degrees; the latter helps insure your eyepiece doesn't fall out accidentally, and usually lends itself to more comfortable viewing.



Mounting blocks are attached to the tube with screws so that the four corners of the tailgate (when installed) will butt up against all four blocks. Please see previous note to determine where you want your eyepiece to be positioned. You also want two collimating bolts to be at the bottom; one on top--as illustrated above and previous.

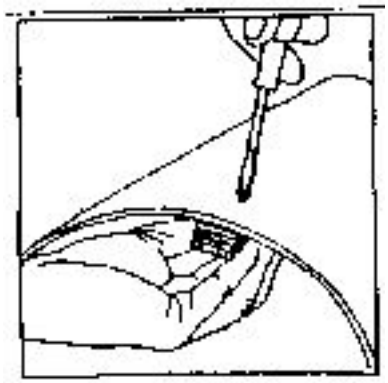


Preparing to screw the mounting blocks into the tube. Pilot holes for each of the screws may be made in the main tube 3" from the rear end.

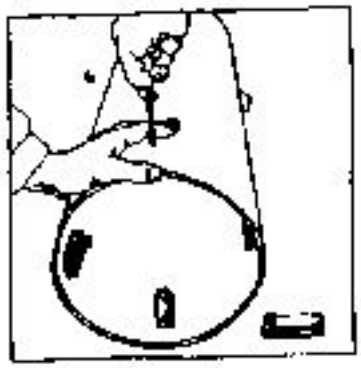


This gives the ends of the blocks 1" clearance from the rear end of the telescope tube, and leaves adequate space for installing the tailgate.

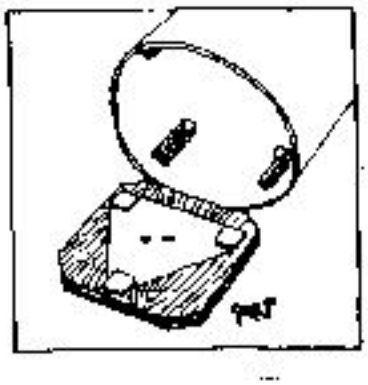
INSTALLING THE TAILGATE



Screwing one of the mounting blocks securely in place.



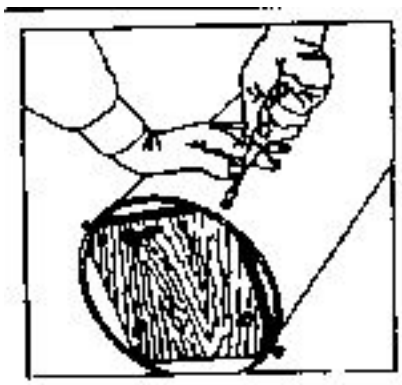
Screwing in the other three blocks.



All four blocks are installed. Time to put in the tailgate.

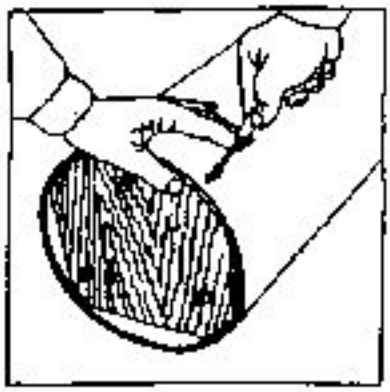
The tailgate should butt snugly against <u>all four blocks</u> so that it won't rock when pushed alternately on opposite corners. If it <u>does</u> rock; try gluing cardboard to the end of the offending block.

Making pilot holes for the four tailgate screws. The screws go through
the cardboard tube and into the wood.

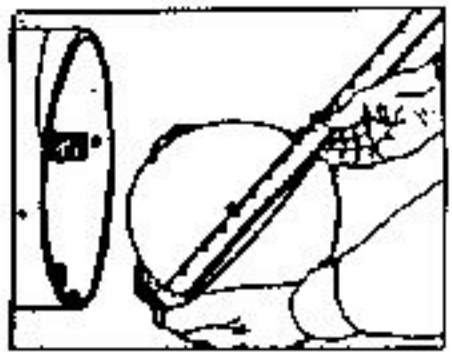


Screwing in the tailgate at all four corners.
(Check the fit of the tailgate before installing the mirror).

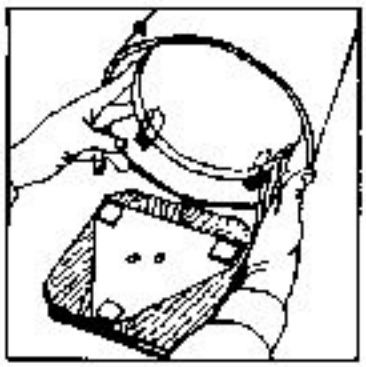
INSTALLING THE MIRROR



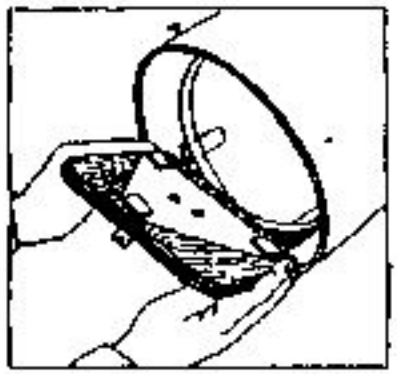
When the tailgate is snug, we are ready to install the mirror.
(Of course, you will have to remove the tailgate again).
CAUTION: HANDLE YOUR MIRROR INDOORS OR IN THE SHADE!!!



Carefully place a sticker or decal at the exact center of the mirror. This sticker will be used later to align both the diagonal mirror and the objective mirror.



Installing the mirror--very carefully!



After installing the mirror, close up the tailgate...

and screw the tailgate in.

Now we are ready to build the tube box and rocker.