Longitudinal movement of the spindle is controlled by a special cam mounted on the tool spindle cam carrier, in place of the cam ordinarily used to operate the fifth position tool spindle. The chuck is opened and closed by an adjustable cam on an extension of the regular cam carrier. To countersink the bushing, as shown, the burring spindle is moved forward and the chuck closed on the piece before it is severed from the bar. After the piece is cut off, the spindle drops back far enough to allow the countersink arm to swing into position, in front of the piece which is held in the burring chuck. The countersink arm is also independently operated from a special cam fastened to the carrier which opens and closes the burring chuck. The piece is then moved forward into the countersink which is held stationary in the arm. Dropping the spindle back again allows the arm to be swung out of the way. The chuck is then opened and the continued backward movement of the spindle ejects the finished piece. NOTE - Two special cams are required, one for the swing arm and the other to move the burring spindle.

After the tools and tool holders have been determined for each position and the rise on the cam determined for each position, select a cam for each operation. Choose from the list of standard cams which has a rise nearest the amount that the tool must be fed.

Selecting the cams for this job, we would use a 1/4 drill cam in the first position with the block set at .96. Which would give a rise of .229 plus .010 for approach. The forming in the first and second positions requires a rise of .0665, since we want to start our drills first and a light feed on the tools laps the edge away, a 3/32 rise cam has been selected. We should start our first drill in the first position with a point of 100 included angle. Then thin the point to have a minimum of thrust. In the second and third position we need a rise of .294 plus .010 for a total of .304. Use a drill point of 110° included in the second position and 120° included in the third, also thin these points. Always start a drill on the corners to have a true running hole, set the block location accordingly.

Location of the cam lever block is found by dividing the amount that the tool must be fed by the rise on the cam selected. For example, we need .294 plus .010 equals .304 feed for each drill operation. A 3/8 rise cam is the nearest to this, therefore, we divide .304 by 3/8 which equals .81 the location of the cam lever block. Recommended range of the block setting is from .8 to 1.2. In the third position we have listed a special cam to do the drilling operation. This is necessary for the third position drill to clear on the index, also in this position the dropback on the cam must be less so the collar on the tool spindle does not come back and hit the bronze tool spindle bearing.

CAUTION - Form and cutoff cams (6" diameter) can be used in place of turn and drill cams. However, turn and drill cams (7-1/2" diameter) cannot be used in place of form and cutoff cams.

Now to determine our threading. Note the threading portion is .375 of an inch long with 24 pitch threads. .375 x 24 equals 9 threads in the piece. With 9 threads in a piece and 3 threads minimum lead it is a total of 12 threads and it takes 6 revolutions to cut one thread