DIRECTIONS FOR ALIGNING TITAN
MODELS CS-10, CS-20, CS-50, CS-100 & CS-200 CENTERING MICROSCOPES

The enclosed Centering Microscope has the unique feature of being able to be set for the run out of the spindle of your machine, and this may even be minimized to .0001" or less. Your microscope will, however, have to be initially adjusted, but once this is done, should not have to be reset unless it is dropped, parts replaced, etc. If you are going to use the scope permanently in one jig borer, vertical milling machine, electrical discharge machine, tape controlled machine, etc., which has a taper and uses a collet set-up, we strongly recommend purchasing a collet to be used exclusively with this microscope. It can be fastened to the 1/2" straight shank with a small set-screw so that the same collet may be used with the scope, unless you wish to use this scope in different machines, then different collets would have to be used. This is only necessary if a collet is used and not the 1/2" universal shank.

The actual setting of the microscope is done in the following manner:

1. The microscope is put into the spindle of the machine, or if a collet is used, into the collet, fastened and put into the spindle of the machine.

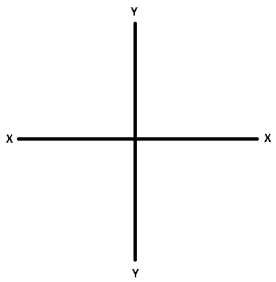
2. A random work piece which has 90 degrees scribed cross-lines should be fastened approximately in the center of the table, or in a position where you can reach it easily. The table carriage is then moved so that the center of the cross-lines on your work piece is brought approximately under the center of the cross-lines of your microscope.

3. The spindle of your machine is then lowered, or your table is raised, until you can see the work piece plainly through the microscope, without any fuzziness, and the image is sharp.

4. The cross-lines and circles in the eyepiece of the microscope may be ever so slightly out of focus. In order to bring these clearly into focus, the knurled ring on the end of the eyepiece should be adjusted by rotating it until you see a good sharp image of the work piece, and the cross-lines and circles of the reticle are also sharp and easy to see. You should now be ready to align your microscope for the run out of your spindle.

5. Re-adjust your table by sighting through the microscope so that the center of the cross-lines on the work piece is directly under the center of the cross-lines of your microscope.

6. Rotate the spindle of your machine so that the eyepiece of the microscope is facing to the right hand side of the machine (standing directly in front of it.) Look through the microscope and adjust your table **only** until the Y-Y line of your microscope is directly in line, parallel, and over the Y-Y coordinate of your work piece. You may have to move your table in our out slightly, depending on what you see when you look through the microscope.



7. After this has been correctly aligned, rotate the spindle 180 degrees so that you are on the other side of the same line (Y-Y coordinate). You again view through the microscope. You may be off a certain distance from the scribed line, if not, your microscope is already adjusted correctly. If more adjustment is necessary, the following steps will have to be taken:

a) Split half the distance between what you are off from the scribed line on your work piece, as compared to what you are off from the scribed line of your microscope. Adjust half or 50% of this difference by using the table of your machine **only.** You can measure this distance easily by using the even spaced master centering circles are off from the scribed line in your microscope; and adjust half or 50% of this difference by using the table of your machine only. You can measure this distance easily by using the even spaced master centering circles located in your microscope reticle in combination with our subdivisions of small dividing lines which are located at 90 degrees, 180 degrees and 360 degrees, all have small even spaced subdivisions.

The distance between these lines depends on the magnification of the microscope you have and are printed on the front of the microscope.

b) You split the other half of the difference by adjusting the reticle through the use of the prism adjusting screws which are located directly underneath the eye tube and on the right side of the microscope body. In order to activate and move the prism which floats between 2 springs and 2 screws, adjust for the run out by adjusting one screw; Do not adjust the one opposite it, at all. This allows the reticle to move in that direction. Or, if you need angular movement, tighten both the screws in the direction you want to go, this will move you at an angle. With these as mentioned above, what you now do is split or cut in half the balance between what your line in your microscope is off, as compared to what the line in the work piece is off, from being directly over each other. Again, use the master centering circles, and subdivision of your main cross lines as mentioned in paragraph.

8. Rotate your microscope 180 degrees and you should be directly over your line of the Y-Y axis in both 180 degree positions. If not, repeat the same procedure as in paragraph 7. Take half the difference, adjust on your table; take the other half of the difference that you are off, or ¼ of your original difference, and split it with your eyepiece. Re-rotate 180 degrees and you should be directly on.

9. Turn the spindle with the microscope 90 degrees so that your eyepiece is directly in front, and you are looking back toward the main spindle housing. Then center the reference lines between the pair of cross lines (the X-X coordinates) perpendicular to those you previously used. Using the same procedure as used in paragraph **7**, you first split half the difference that you are off; and adjust the 3 or 4 screw centering device of the microscope.

10. Double check the entire procedure, re-rotating 90 degrees to the right or left on the Y-Y coordinate; and double check that you are exactly on. Small adjustments may have to be made for minute differences, as were made in paragraphs **7, 8 and 9**; by first taking half your difference, splitting it with the table, then half of what is left or ¼ of the difference; and use your reticle eyepiece adjustments.

11. In cases when anchor guide is available for turning the microscope to exactly 180 degrees for self-checking, such as picking up scribe line adjustment in both directions, it is not essential.

12. Simply what you have done in the previous paragraphs is:
a. Aligned Y-Y axis
b. Aligned X-X axis
c. Double checked the alignment of Y-Y axis
d. Double checked the alignment of X-X axis

13. Most of the work performed with the microscope involves irregular shapes and small holes, where in two (2) directions centralization is required. For this reason, the Titan reticle is adjustable in both directions. This is necessary for quickly picking up holes, circles and prick punch marks.

14. As it is obviously impossible to check from the back of the machine, because of the interference from the main spindle housing, the two (2) positions must be necessary be from left and right to the front, as shown in these directions. If the three (3) positions are correctly in line, the fourth position is automatically self-centered. After you have had your microscope perfectly aligned, do not touch the centering screws unless you are putting the microscope into a new machine, or have dropped it. In some way caused the setting of the reticle to be changed. You can now use your microscope time and time again without going through the initial process.