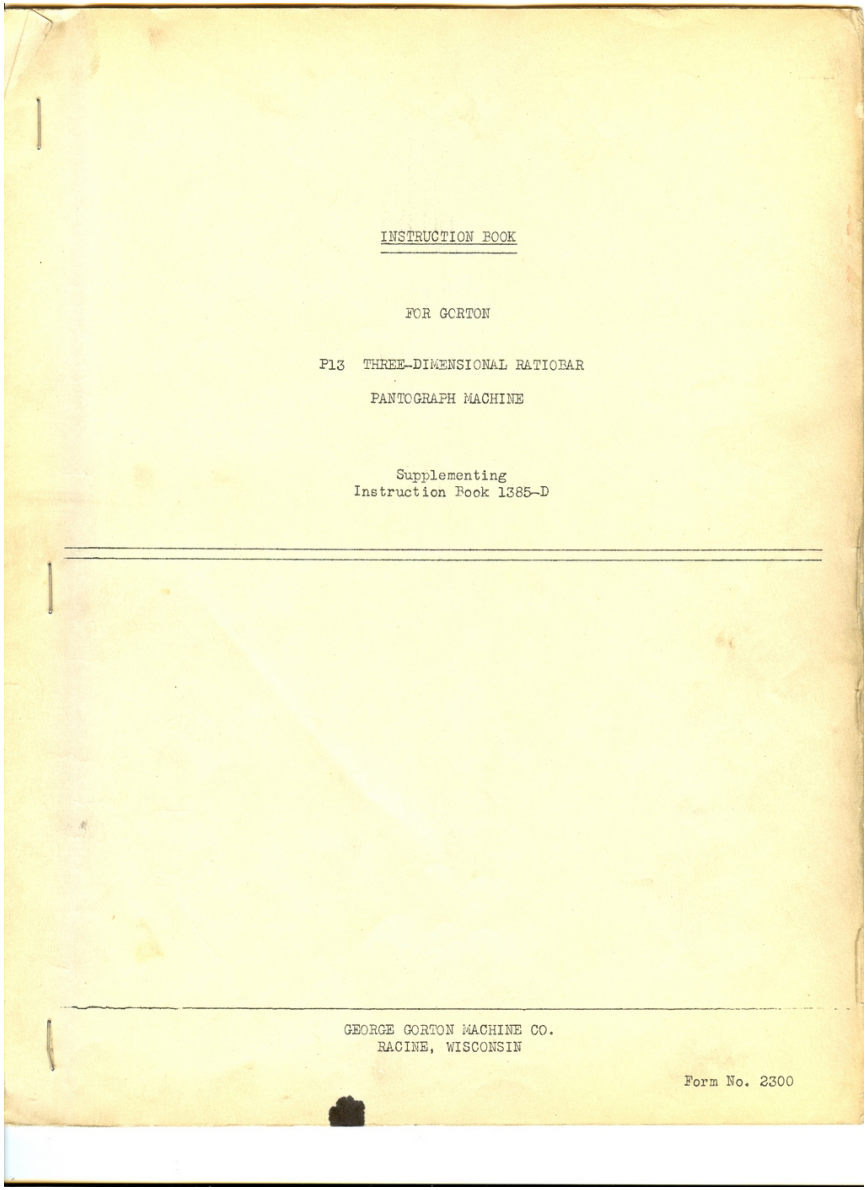
Photo 1



INSTRUCTION BOOK

FOR GORTON

P13 THREE-DIMENSIONAL RATIOBAR

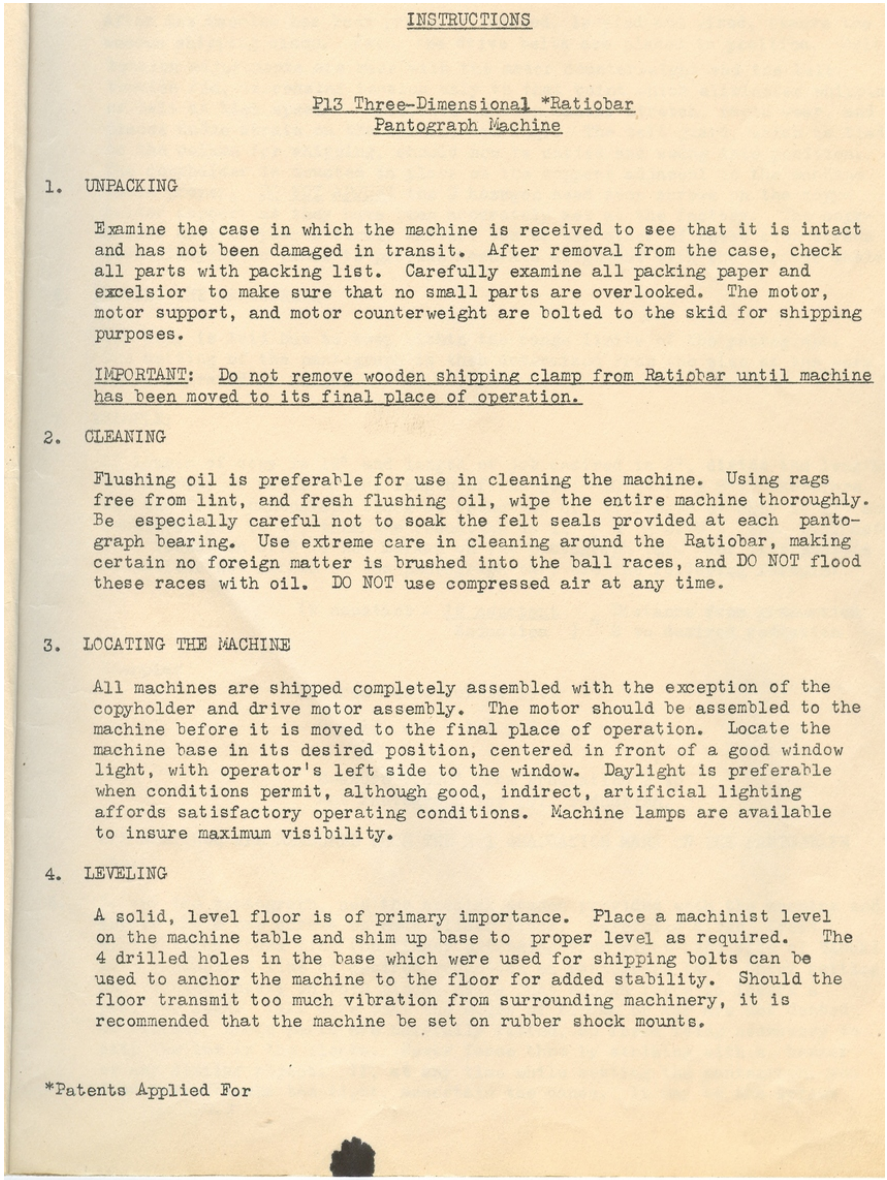
PANTOGRAPH MACHINE

Supplementing
Instruction Book 1385-D

GEORGE GORTON MACHINE CO.
RACINE, WISCONSIN

Form No. 2300

Photo 2



INSTRUCTIONS

P13 Three-Dimensional *Ratiobar
Pantograph Machine

1. UNPACKING

Examine the case in which the machine is received to see that it is intact and has not been damaged in transit. After removal from the case, check all parts with packing list. Carefully examine all packing paper and excelsior to make sure that no small parts are overlooked. The motor, motor support, and motor counterweight are bolted to the skid for shipping purposes.

IMPORTANT: Do not remove wooden shipping clamp from Ratiobar until machine has been moved to its final place of operation.

2. CLEANING

Flushing oil is preferable for use in cleaning the machine. Using rags free from lint, and fresh flushing oil, wipe the entire machine thoroughly. Be especially careful not to soak the felt seals provided at each pantograph bearing. Use extreme care in cleaning around the Ratiobar, making certain no foreign matter is brushed into the ball races, and DO NOT flood these races with oil. DO NOT use compressed air at any time.

3. LOCATING THE MACHINE

All machines are shipped completely assembled with the exception of the copyholder and drive motor assembly. The motor should be assembled to the machine before it is moved to the final place of operation. Locate the machine base in its desired position, centered in front of a good window light, with operator's left side to the window. Daylight is preferable when conditions permit, although good, indirect, artificial lighting affords satisfactory operating conditions. Machine lamps are available to insure maximum visibility.

4. LEVELING

A solid, level floor is of primary importance. Place a machinist level on the machine table and shim up base to proper level as required. The 4 drilled holes in the base which were used for shipping bolts can be used to anchor the machine to the floor for added stability. Should the floor transmit too much vibration from surrounding machinery, it is recommended that the machine be set on rubber shock mounts.

*Patents Applied For

Photo 3

5. PUTTING INTO SERVICE

After the machine has been properly located, leveled and wired, remove the wooden shipping clamp. Next, the drive belts are placed in position. Belt tension adjustments are made with the motor counterweight and the belt tension rod, increasing tension only to that point which eliminates whipping of belt at high speeds. Excessive tension causes stretch, rapid wear, and places undue strain on the spindle bearings. The belt guard, which is tied to the column for shipping, should now be untied and swung into position. The copyholder is mounted in place on the support adjacent to the machine table proper. DO NOT ADJUST the 2 hexagon head stop screws on the copy-holder support as they have been accurately set at the factory. The copy-holder must be placed firmly against one or the other of these stop screws when clamping in place to provide accurate alignment with the machine table.

6. SETTING THE PANTOGRAPH

The copy is laid out to keep within the range limits of the pantograph. The setting of the pantograph is then determined from the size of the work to be engraved or milled.

7. EXAMPLE:

If length of copy is 10" and length of job desired is 2", divide the length of the copy or model by the length of the job: 10" ÷ 2" = 5". Therefore, set the front pantograph block at reduction 5. If length of copy is 11" and length of job is 4", then the reduction is 11" ÷ 4" = 2.75". You will note that reduction 2.75 is not marked on the pantograph bar. For intermediate reductions not marked on the pantograph bar, use the following formula:

$$\left(9 \text{ constant} - \frac{18 \text{ constant}}{\text{Reduction}}\right) = \text{Distance from graduation 2 to desired reduction}$$

Example:

Desired reduction is 10:1

$$9 - \frac{18}{10} = 9 - 1.8 = 7.2$$

Measure 7.200" from graduation 2 to set Pantograph for 10:1 reduction.

ALL SETTINGS ARE MEASURED FROM THE 2:1 GRADUATION MARK ON THE PANTOGRAPH BAR.

8. To set the pantograph, use the special wrench provided with the machine and loosen the 2 cap screws on each slider block. Carefully align front slider block index line (on finger extending from right-hand side of block) with graduation line of desired reduction on pantograph bar. Check setting and tighten screws on both blocks using just enough force to insure a positive lock. Take care that the edges of blocks or bar are not dented or nicked. These parts are carefully fitted, no force being necessary to slip the bar in the blocks. Never force them by striking with a hammer or any similar object. If, at any time while setting the pantograph, you find these blocks too tight, ascertain the cause. It may be the screws

Photo 4

haven't been loosened sufficiently, or the slides have become gummed with oil.

9. TRACING STYLUS, CUTTERS, COPYHOLDERS AND MASTERS

For selection and use, see Pantograph Instruction Book and Parts Catalog.

10. CUTTER SPINDLE

Spindle bearings are not manually adjustable, but automatically take up normal wear. Proper lubrication will prevent excessive wear and increase operating efficiency. The spindle is quickly removable; and, should repair or replacement be necessary, we suggest the spindle be returned to us for overhaul, which will be done promptly at a nominal cost. This will make the spindle as accurate as new.

11. To remove cutter spindle, first remove belt; next, push feed lever, which extends toward operator from top of spindle, to the left as far as it will go; then, disengage lock pin located in center of cutter head casting (acorn nut) by pulling out and turning one quarter turn. Grasp spindle pulley with one hand and push hinged bolt to right; then swing hinged cap to left and lift spindle free.

12. The P13 cutter spindle is, with minor variations, identical to the 3-U cutter spindle. See Instruction Book and Parts Catalog, 1385-D, pages 8 and 9, for assembly and parts drawings; also, Pantograph Bulletin, 1580-D, page 5.
IMPORTANT--When ordering Repair Parts, give serial number of machine found on pad on front of Ratiobar casting.

13. TABLE, SADDLE AND KNEE

Construction and operation of the P13 table, saddle and knee are identical with the 3-U with the exception of the copyholder bracket. Each unit is provided with a gib and adjusting screws. To tighten gibs, turn adjusting screws, applying equal pressure at all points. When properly adjusted, all play will be eliminated; feed screws should have a smooth, free feel. If feed screw operation is stiff or jerky too much pressure has been applied to gib. The table and saddle feed screws are each provided with thrust bearing adjustments to eliminate any play that may develop after a number of years' operation. Table, saddle and knee feed screws are each provided with micrometer dials graduated to thousandths of an inch. They are of the slip-type for setting to zero for quick, accurate adjustments. IMPORTANT: After machine has been set up for operation, but before taking a cut, make sure the table, saddle, knee and copyholder have been locked. The table lock screw has a knurled head and is located on the right hand side of table. The lever extending from the bottom of the saddle casting is on the saddle lock screw. On the right hand side of the knee is the knee lock screw. The copyholder has a clamp lever located on the support bracket just below the copyholder.

14. SETTING THE CUTTER AND STYLUS FOR THREE-DIMENSIONAL WORK

Each machine is equipped with a special 3-dimensional Cutter-Stylus

Photo 5

Alignment Gage, and bears the serial number of the machine with which it must be used. These gages are not interchangeable between different machines. Each Cutter-Stylus Gage has been accurately set for each machine and adjustments sealed. DO NOT change the adjustments.

15. The Cutter-Stylus Gage is used to align the cutter point and the stylus point with the Ratiobar pivot center.

16. To set the cutter to the proper position, first insert the cutter without tightening the collet nut. Next, mount the Cutter-Stylus Gage on the 2 locating pins provided on the cutter head casting. Lower the cutter by moving the spindle feed lever to the extreme left. With the thumb and forefinger draw down the cutter until it contacts the Cutter-Stylus Gage. Then tighten the cutter in the spindle. A final check is made to assure proper setting. If the cutter has shifted slightly, it can be returned to the proper setting by means of the knurled adjustment located at the top of the spindle. After this adjustment has been made, lock with jam nut, located immediately below it. It may be helpful to insert a thin sheet of paper between the cutter point and the Cutter-Stylus Gage button to prevent damaging the cutter during this set up. Now, move spindle feed lever to extreme right and remove gage.

17. A similar procedure is followed in setting the tracing stylus with the exception that the tracing spindle has a built-in spring which moves the stylus downward automatically when the clamp is released. On completion of the set up, clamp the tracing spindle, remove the Cutter-Stylus Gage, and the machine is ready for operation.

18. After the cutter and stylus have been set, the next step is to adjust the counterbalance spring tension. This adjustment varies for different pantograph ratio settings. First, release the pivot center lock by loosening the large, knurled clamp located at pivot center. This clamp is located directly above the square tool shelf. Swing down and away from the upper casting, and at the same time, swing down the 2-dimensional stop plate. This readies the machine for 3-dimensional operation. The smaller, knurled knob located at the pivot center is the counterbalance spring adjustment. It should be set so a slight downward pressure is required to keep the tracing stylus in contact with the model or master.

19. The main counterbalance spring on the left-hand side of the machine has been adjusted at the factory but may require additional adjustment from time to time.

20. ENLARGING

On the P13 it is also possible to enlarge work. Working from a small master or model, it will produce work several times larger than the model. The minimum enlargement ratio is 2:1, and while the machine is capable of enlarging at ratios similar to those used for reducing, it is not practical to use ratios much greater than 3:1. As the enlarging ratio is increased, operation of the pantograph becomes more difficult because of the reverse leverage.

21. To prepare the machine for enlarging work, it is necessary to transpose the

Photo 6

cutter spindle and tracer spindle. First, remove the metal shield from bottom of the Ratiobar by removing the 6 round head screws on the rear and 2 on the bottom at the extreme left. DO NOT TAMPER WITH THE 10 SET SCREWS WITH LOCK NUTS ON REAR SIDE OF RATIOBAR. Remove the hexagon nut from the pantograph stud, located on top of the tracer head casting. Next, remove 4 cap screws from bottom of tracer head casting. Then lower casting by gently withdrawing stud from pantograph arm. Loosen 2 hexagon head cap screws on each pantograph block and slide the pantograph to the right to remove lower block; move to the front to remove upper block.

22. Remove cutter spindle head assembly in same manner as tracer spindle assembly Mount the tracer spindle assembly in place of the cutterhead assembly. The lower pantograph block will now be mounted on the stud on top of the tracer spindle assembly. The pantograph is re-mounted, and the tracer spindle assembly is slid into place, completing the operation. Extreme care must be exercised during this transposition, making sure proper adjustments have been made. The last step is to replace the metal shield on the bottom of the Ratiobar. This must be in place at all times to prevent foreign matter from entering the ball tracks.

23. USE OF FORMING GUIDE

Work of uniform curvature can also be engraved and milled on the Gorton P13 3-Dimensional Pantograph Machine without the necessity of a 3-dimensional model. The machine may be operated either 2 or 3-dimensionally on forming guide work. For this type of work a hardened steel forming guide is used with flat copy or master template.

24. The forming guide should be the exact opposite of the work and preferably made of hardened tool steel. For instance, if the work is convex, the forming guide should be concave. Before using, its contour should be matched precisely with the part to be engraved or milled. This is done with the use of lamp black, mechanics' blue, etc.

25. The L-shaped forming guide bracket is shipped mounted on the machine in a reverse position. It must be removed and remounted so the leg extends out over the spindle or toward the front of the machine. The guide itself is then fastened to this bracket with the 4 cap screws supplied.

26. Assuming that the work is secured to the work table and the master or template is on the copyholder, the general procedure is as follows:
a) Check to see that cutter point and former point (extending up from top of Spindle Feed Bracket Casting) are approximately the same size, especially on work having a small radius.
b) Lock spindle floating movement with plunger located on front of spindle housing, and locate work in relation to master template.
c) Release spindle floating movement by pulling out plunger and turning a quarter-turn. Next, release set screw which locks vertical motion of the former point. This set screw is located on the upper front of the spindle feed bracket. The former point should now be in contact with the forming guide.
d) Extreme care should be exercised in locating the forming guide in exact relation to the work.
e) Insert the proper tracing style and cutter.

Photo 7

CAUTION: When using a flat master, BE SURE the two-dimensional stop plate is swung into position against the stop pin, and is securely clamped with the large, knurled knob.

27. The making of forming guides can be avoided in many cases through the use of adjustable forming guides, described in our Small Tools and Accessories Catalog. They save the expense of making hardened guides from solid steel blocks.

28. Forming guides may be made by turning on a lathe, shaping on a planer, milling with a form cutter, or by hand with a file or hand grinder. For additional information on forming guide work refer to pages 27 and 28 of Pantograph Instruction Book and Parts Catalog, 1385-D.

29. LUBRICATION

Correct Oils and Greases for Efficient Performance.

30. Thorough research and tests have proven oils and greases recommended herein give maximum operating efficiency to this machine. Only high quality oils and greases should be used.

31. HIGH SPEED SPINDLE

For lubricating the high speed spindle, use a pure mineral oil, such as Gargoyle Velocite Oil 3 or equivalent, with viscosity rating of approximately 80 seconds S. U., at 100° F. Avoid using gum-forming household types of oils, which may cause bearing failure from gum deposits within the bearings. Oil twice a day through the openings at top of spindle.

32. OIL HOLES AND OIL CUPS

For all other oil holes and oil cups, use a medium machine oil, such as Gargoyle Vactra Oil Heavy Medium X. Oil cups on idler pulleys should be filled twice each day.

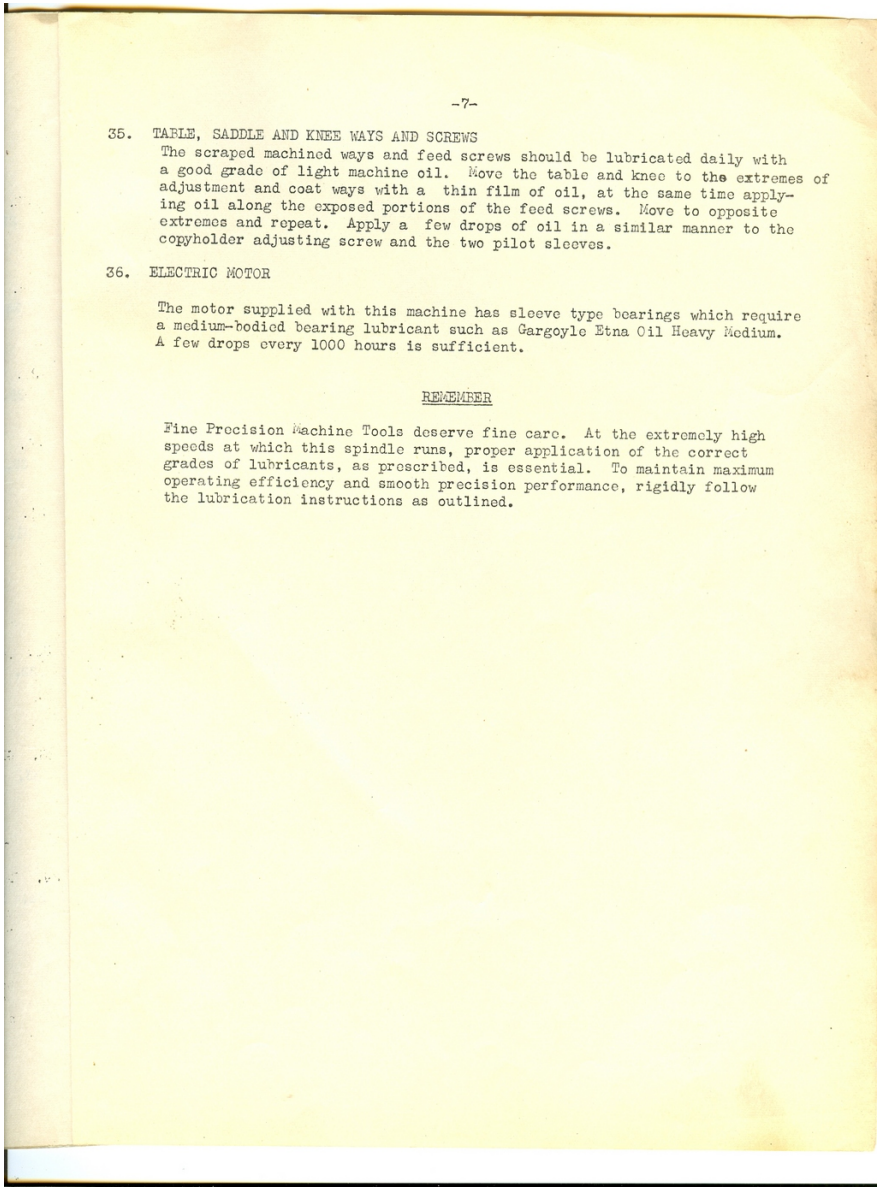
33. GREASE CUPS AND PANTOGRAPH BEARINGS

Use a high grade ball bearing grease of medium consistency equivalent to Gargoyle Grease BRB No. 2. Be sure grease cup is wiped clean before removing to refill. Grease cup on intermediate drive pulley should be given one turn each week. Pantograph bearings should be filled once a year.

34. RATIOBAR BALL TRACKS

Wipe off ball tracks once a week with clean cloth free from lint. Remove all foreign particles. Apply a few drops of oil to a clean cloth and carefully wipe over the ball tracks to prevent rusting. Note! The ball tracks are provided with graphite wipers which both wipe and lubricate the ways. Do not under any circumstances apply more than just a light film of oil as outlined; otherwise the graphite wipers become soft, gathering chips and foreign matter.

Photo 8



35. TABLE, SADDLE AND KNEE WAYS AND SCREWS

The scraped machined ways and feed screws should be lubricated daily with a good grade of light machine oil. Move the table and knee to the extremes of adjustment and coat ways with a thin film of oil, at the same time applying oil along the exposed portions of the feed screws. Move to opposite extremes and repeat. Apply a few drops of oil in a similar manner to the copyholder adjusting screw and the two pilot sleeves.

36. ELECTRIC MOTOR

The motor supplied with this machine has sleeve type bearings which require a medium-bodied bearing lubricant such as Gargoyle Etna Oil Heavy Medium. A few drops every 1000 hours is sufficient.

REMEMBER

Fine Precision Machine Tools deserve fine care. At the extremely high speeds at which this spindle runs, proper application of the correct grades of lubricants, as prescribed, is essential. To maintain maximum operating efficiency and smooth precision performance, rigidly follow the lubrication instructions as outlined.