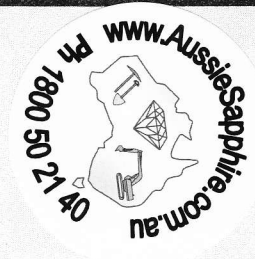
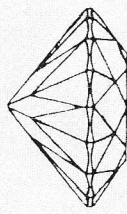


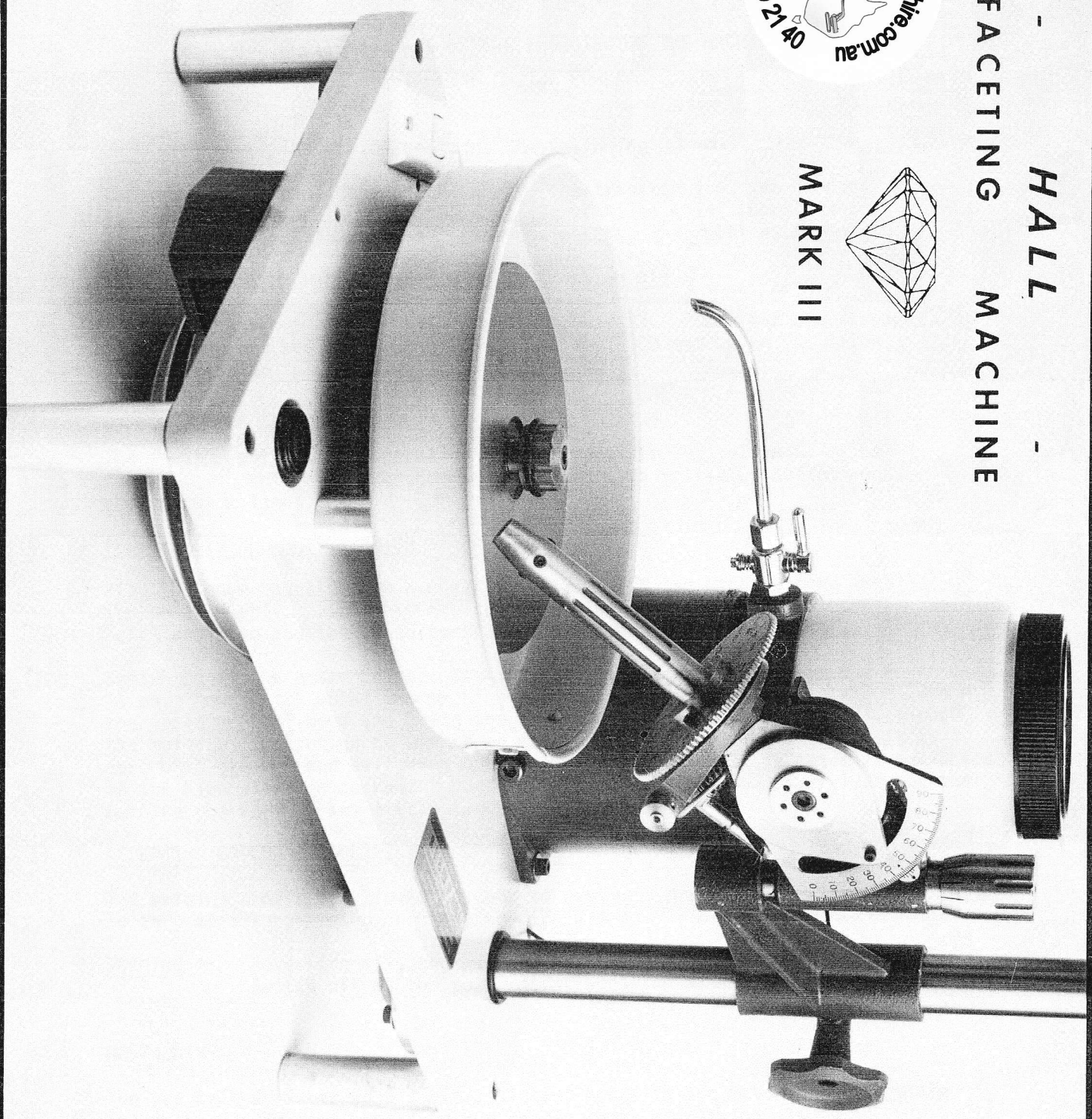
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HALL
FACETING MACHINE



MARK III



HALL MARK V FACETING MACHINE

- INSTRUCTIONS -

READ INSTRUCTIONS 3 - 5 BEFORE PLUGGING IN THE MACHINE AND SWITCHING ON THE POWER

- 1) UNPACKING - The carton contains the following :

The faceting machine, the power supply, the transfer jig, set of dops, 45° angle dop, flat top dop, "D" dop, set of Allen keys, lubricating oil and grease, drain tube, set of index wheels, Instructions.

- 2) SETTING UP THE MACHINE [Refer also Instruction 37]

Set the machine up where it is intended to use it. Place the power supply in a convenient position close to the machine. Do not cover it; allow air circulation to cool it.

- 3) POWER SUPPLY

The power supply is for operating the machine from 240 Volt A.C. mains supply. It contains a transformer, rectifier, 15 Volt D.C. outlet and an indicator light.

- 4) PLUGGING IN AND SWITCHING ON

Plug the power supply into a power point and plug the machine cord into the power supply. See that the switch on the machine is in the central "off" position and the speed control knob is turned back to zero (0).

Switch on at the power point. The indicator light will show that the power is on. Now switch on at the machine and turntable will slowly rotate. Turn the speed control knob and bring the machine up to the desired speed. Though the motor will start up at any speed setting, it is advised to return it to zero each time before switching on. The voltage regulator is not then subjected to the high starting current. Don't switch off and on unnecessarily. Let the machine run as it draws little current.

- 5) REVERSING OR CHANGING DIRECTION OF ROTATION

The machine should be allowed to come to rest and the control returned to zero before reversing or changing direction.

WARNING : Reversing at speed will burn out the electronic circuit.
Switch off at the power point when the machine is not in use.

- 6) BELT DRIVE

The vee belt drive is adjustable. Slotted holes in the motor mounting plate allow this. The belt should be run fairly loose as tension places an unnecessary load on the motor. If the machine is not to be used for a long period of time, it is advisable to remove the belt. Otherwise, the belt will get a kink around the small pulley which will make starting up again difficult and cause a noise until it settles in.

7) SPEED RANGES

Two speed ranges are provided by means of step pulleys. These are 50-1,000 r.p.m. on the high range and 25-500 r.p.m. on the low range. Change the belt on the pulleys to select the desired range. The lower range will give the greater torque.

8) WATER BOTTLE

The water bottle will swivel on its base to allow the drip tube to be swung out of the way for fitting or removing lap plates. The bottle and its base will lift off to allow cleaning out. Though it will do no harm avoid spilling water onto the motor beneath.

9) FITTING THE DRAIN TUBE

To fit the plastic drain tube supplied, slide it up through the hole in the base plate and push it over the fitting on the splash tray. Drop the other end into a bucket or pass it outside the wall.

10) POSITIONING THE HEAD

To do this loosen the clamp wheel on the sliding arm and move the whole head up or down the post and to or away from the lap plate to the desired position. It is best to set the angle first and with the dop arm resting on the stop pin, position the head with the gem stone just clear of the lap plate. Then tighten the clamp wheel.

11) MICRO HEIGHT ADJUSTMENT

This is the large graduated knob on the vertical adjustment spindle. It provides approximately 12 mm of height adjustment. Make sure that enough down adjustment is allowed for before cutting a row of facets.

12) MICRO ANGLE ADJUSTMENT

The adjustment knob is scribed with an '0' (zero) line. This is the centre of the adjustment. With the knob set at '0', turning the knob away from the operator raises the dop arm and increases the angle setting. Turning towards the operator lowers the dop arm and decreases the angle.

This adjustment should be tensioned so that it does not move from its setting on its own accord. A tensioning screw is provided and is illustrated in Fig. 3.

13) SETTING THE ANGLE

Set the micro angle adjustment at '0'. Now swing the dop arm clear of the lap plate and down until contact is made with the stop pin. Then loosen the large wing nut at the back of the head. Swing the dop arm up or down until the desired angle is indicated by the pointer. Set as accurately as possible, then tighten the wing nut. Make the necessary corrections with the micro adjustment to get the exact setting. Use a magnifier if necessary.

14) THE VERNIER SCALE

The vernier scale reads directly to $.1^\circ$. The whole angle is read off the main scale and the decimal fraction off the vernier scale. The protractor scale is adjusted to align the whole number with the zero (.) on the vernier scale. The protractor is then advanced until the decimal line on the vernier scale lines up with a main scale division. This is illustrated in Fig. 1. Use the micro adjustment for this.

15) ANGLE STOP

The angle micro-adjustment also operates as a stop when cutting with the indicator light.

16) DIAL GAUGE

The dial gauge is used for cutting facets to the same setting without using the stop.

NOTE : The angle stop and the dial gauge are used independantly.
You cannot cut using both at the same time.

17) ANGLE STOP INDICATOR LIGHT

This indicator light fitted on the base plate is operated by electrical contact of the stop pins. Its use is optional.

18) CUTTING TO THE STOP

The dop arm is swung down and the facet cut until the stop pins make contact. At this point the indicator light will come on.

Any pressure beyond this point will cause deflection of the head and over cutting. The dial gauge will not read this deflection.

19) CUTTING TO THE DIAL GAUGE

After the angle has been accurately set as described in (14) the dial gauge is zeroed by rotating the scale until the pointer is on the '0'. Note where the pointer on the revolution counter scale is (e.g. between 2 & 3). Now turn the micro-adjustment screw to the '0' setting.

In cutting the facet the dop arm is swung down and the facet cut while watching the small needle of the revolution counter. In the example above, when the needle passes the 'z' attention is switched to the larger scale and cutting continued until the needle reaches the zero ('0'). The facet is then cut to the desired angle.

Pressure beyond this point will cause over cutting and will be indicated on the dial gauge. The indicator light does not operate.

20) INDEX WHEEL

Four index wheels are supplied with the machine. 64, 72, 80 & 96 teeth. The wheels are secured on the arm by two screws and located by a dowel pin.

21) SETTING INDEX AT ZERO

Always start cutting with the index wheel correctly set at zero. To do this set the index pin in the 96, 80, 72 or 64 tooth depending on which wheel is used. Adjust the index cheater until it is reading zero (0). It is possible to set the cheater at several zero positions, but the correct one is as set with the special 'D' dop.

INDEXING

When indexing, depress the pawl sufficiently to lift the index pin clear of the teeth in the index wheel. Do not skid the pin over the teeth. The tooth selected relates directly with the facet being cut. If when the pawl is depressed and released, the index pawl spindle turns, moving it from the zero setting, then it has to be re-tensioned. To do this, loosen the grub screw in the collar on the right hand end of the spindle. Press the collar and the graduated knob together and retighten the grub screw. This is illustrated Fig. 3. If it still creeps the thread may need greasing.

23) FREE WHEELING

Depress the pawl and slip the catch back into the slot. The dop arm will now free wheel. To engage the pin again, just depress the pawl and the catch will release. When released make sure that the catch is free of the pawl and not preventing the pin from engaging properly.

25) DOPS

The dops are made with a stainless steel stem and a brass head. They are in three forms, flat, cone and vee. As the stainless steel is a poor conductor of heat, the brass head heats up and cools down quickly. A bevel is cut on the end of the stem for location purposes.

Fig. 4 shows a cross section of the end of the dop arm illustrating how the dops are located. If you look at the dops you will notice that the bevel on the end is concave. This is done intentionally to give a positive two point contact on the locating pin in the dop arm.

NOTE : The bevelled end of the dop and the pin in the dop arm are for locating the dop only. It is not intended to act as a wedge to prevent the dop turning in the chuck. The chuck should be tightened sufficiently to stop the dop turning. Do not interfere with the locating bevel on the dop. It is cut in a special set up. We ourselves would not attempt to file it by hand.

26) LOCATING AND LOCKING DOPS IN DOP ARM

Swing the dop arm to a vertical position. Insert the dop, and with a light pressure on top, rotate it until it drops down and locates on the offset pin. Still maintaining a light pressure, tighten the grub screw. No great tension is required.

Warning Do not tighten this screw without a dop in place as it will collapse the collet sleeve and prevent insertion of the dops.

SETTING THE 45° ANGLE DOP (FIG. 5)

Insert the angle dop in the chuck and locate and lock as explained for ordinary dops. It will be necessary to lock this dop more securely. Tighten the grub screw. Do not apply a twisting force to it to check if it is located properly. This will damage the locating points. Set the angle accurately at 45°. Locate the index pin in the 64, 72, 80 or 96 tooth depending on which index wheel is used. Set the index cheater at zero.

Fit the large flat top dop in the angle dop and clamp. Position the head so that while the dop arm rests on the stop pin the flat top dop touches the master plate. It should sit flat.

If not, adjust the angle index cheater and the height adjustment until it does. The flat top dop can now be removed and the dop holding the stone inserted in the angle dop. Of course it will be necessary to readjust the height. If it is necessary to adjust the index cheater to cut the table, it must be returned to the zero setting for cutting the facets.

28) CUTTING THE GIRDLE

First remove the removable section of the splash tray. Set the protractor angle at 90°. Position the head so that the gem stone reaches over the edge of the lap plate. Free wheel the index wheel. Rotate the dop arm, sweep the dop across the edge of the lap, and lower the height adjustment until the stone is cut round to the required diameter. Rotate the dop arm with an even pressure, otherwise the stone may cut out of round.

29) TRANSFER JIG

Study the transfer jig and you will see that it has two sliding brass blocks which slide in the vee groove of the jig, are held in by spring pressure and can be clamped by the wing nuts and plates. These blocks have an offset locating pin to locate the dops in correct location to each other, so that after transfer the pavilion and crown facets line up with each other.

Loosen the clamps and slide the brass blocks out. Locate the dops in the blocks the same as in the dop arm, except they are locked in place with a small grub screw. Replace the blocks in the jig and tighten the clamps sufficiently to hold them securely in the vee, but still allow them to slide. Execute the waxing operation.

When the wax is set, loosen the clamps, slacken off the grub screw and slide the blocks off the dops. The release of the first dop can now be done.

It is possible that you may work out a different technique and procedure for this transfer operation.

30) LAP PLATES (Supplied by us)

It is strongly advised that to prevent the risk of contamination only one face of the lap plate should be used. If, however, it is intended to use both sides, the following is suggested.

Cut 150mm diameter paper discs. Place one of these on the master plate under the lap. Whenever a lap is turned over or another fitted discard this disc and use a new one. This will prevent diamond getting onto the master plate surface and being picked up by another lap.

After machining, the copper lap plates have a surface of fine machining grooves, which are unavoidable. When diamond is applied to the plate, some of it rests in the grooves where it lies loose and inoperative. Rolling with a hardened steel roller will not flatten down the highs. However, they will wear down with use.

suggested that these hills and valleys be eliminated to a certain extent before setting the diamond. Scrub over the surface with about 220 silicon carbide paper until the surface of the plate is smooth. Then wash the plate thoroughly.

When rolling in the diamond do not use unreasonable force. It requires very little pressure to inbed diamond in copper. Excessive pressure causes the surface of the copper to expand and bow up. Excessive pressure on the stone when cutting does the same. It is the speed of the lap and the amount of diamond that determines the rate of cutting, not the pressure.

In the event of the laps becoming bowed or contaminated they can be remachined. It is recommended that they be returned to us for this operation.

31) FITTING THE LAP PLATES

The master plate and the back of the lap plate should be wiped clean before placing the lap. The clamp screw should be tightened by hand only sufficient to prevent slipping when spinning. Over tightening of this screw will bow the lap plates.

32) SETTING DOP ARM LOCATING PIN PARALLEL WITH MASTER PLATE (See Fig. 6)

It is necessary to have the locating pin in the dop arm parallel with the master plate. The effect of not having this parallel is illustrated. After transfer the pavilion facets will not line up with the crown facets and a considerable amount of adjustment of the index cheater is required to correct it.

The special 'D' dop is supplied to check this. The machine is checked and set with this dop on assembly. The 'D' dop is fitted into the chuck, located and locked. With the angle set at approximately 45° the dop is lowered onto the master plate. The straight edge should sit flat on the plate with the index pin in the 96 tooth and the index cheater at '0'. If the cheater has to be altered slightly, the new setting is where it must be set before cutting the facets, or the cheater can be reset.

To do this refer to Fig. 10. With the index pin in the 96 tooth, the index cheater set at '1' and the angle at approximately 45°, loosen the screw as indicated at (1). Now press the 'D' dop down hard on the master plate or turn the whole assembly until there is straight line contact of the dop on the plate (2). Now tighten the screw (3). Tension as explained in (22).

When a different index wheel is fitted it may be necessary to reset the cheater at '0'. This is due to slight variations in each wheels location.

It must be pointed out that even though the dop arm is set with the 'D' dop, it may be necessary to 'cheat' a little after transfer to align the facets perfectly.

33) ADJUSTING THE MASTER PLATE (Fig. 7)

Fit the 'D' dop into the collet, locate and lock. Set the index at 96 and the index cheater at '0'. Set the angle at approximately 45°. Adjust the head height and position so that the 'D' dop just clears the master plate. Lower with the vertical height adjustment until the straight edge of the dop touches the plate. It should make straight line contact, if set as in instruction (32). Swing the dop arm over to the opposite side of the plate. The 'D' dop should make similar contact. To do this using the dial gauge, turn the angle micro-adjustment screw so that the stop pins are out of contact. Then swing the arm from one side of the plate to the other and note the indicator reading when the 'D' dop is touching the plate. However, it must be pointed out that the dial gauge is capable of reading to a degree of accuracy to which it is impracticable to build the machine.

If it is necessary to make an adjustment, the master plate can be tilted. It is mounted on three resilient rings around the holding down screws. To tilt the plate loosen or tighten the nut on No. 1 screw. This will raise or lower the edge of the plate at this point.

Next drop the head down and set the angle at 90°. Adjust the 'D' dop down on the master plate. There should be straight line contact. If not it may be necessary to adjust screw No. 2.

NOTE : It is advised to first use the machine as it has been set at the factory. As the cutter becomes more experienced he may want to make finer adjustments

CARE OF THE MACHINE

Always keep the machine clean and oiled. Do not allow an accumulation of stone residue and polishing compound to build up.

Keep the master plate clean. Do not bruise it or allow foreign matter to become embedded in it. This will cause run-out of the lap plates.

When the machine is not in use swing the dop arm to the vertical position and release the stop pin plate clamp. This releases the tension on the spring. A ball detent holds the dop arm in the vertical position.

Do not remove the post, the main spindle housing or the vernier scale. Special equipment is used to set these. Do not use unreasonable force on any part of the machine.

35) LUBRICATION (Grease and oil supplied)

Motor : This is fitted with permanently lubricated ball bearings

Main Spindle : Permanently lubricated ball bearings require no attention

Post : An occasional smear of light oil so that the slide arm moves up and down freely

Vertical Adjustment Spindle : Lubricate periodically with light oil. Lift the head a little on the spindle and add a couple of drops of oil through the hole in the top of the adjustment knob. Absence or presence of oil at the bottom of the spindle will indicate adequate lubrication.

Vertical Adjustment Knob : Lubricate the thread with a smear of grease if it becomes harsh to turn.

Pivot Bearing : Permanently lubricated ball bearing requires no attention.

Stop Pin Plate : Loosen the wing nut sufficiently to allow the stop pin plate to come away to allow a few drops of oil behind it

Micro-Angle Adjustment : An occasional drop of oil in the oil hole provided.

Index Pawl & Spindle : This will require a periodical smear of grease on the thread and bearing surfaces. It will be necessary to remove the spindle to do this. Pull off the dop arm. Remove the collar on the right hand end of the spindle and screw it out. Apply grease to the bearing surfaces and the thread. When replacing, tension the index pawl spindle as in Instruction (22).

Dop Arm : Periodically remove the dop arm and add some oil to the hollow inside of the spindle. Apply a little grease to the groove that the balls fit into.

COLLET CHUCK : Periodically apply a little grease to the thread and the tapered end of the collet sleeve. Do not allow this to become harsh to turn.

36) FAILURE OF THE ELECTRONIC SPEED CONTROL

In the event of failure the electronics should be returned to us for replacement. If, however, you have the services of someone familiar with electronics who can repair it, Fig. 8 shows the circuit diagram.

MOUNTING THE CONTROL BOX

Remove the two screws in the base plate behind the splash bowl and fit the two chrome plated supports. Mount the control box between them and secure. The cord from the control box is plugged into the power supply. The leads from the motor are plugged into the sockets on the underside right hand side of the control box. They can be plugged in either way depending on which direction of rotation is required when the switch is operated.

Plug the lead from the contact pins on the faceting head into the socket on the front of the control box.

38) OPERATING OFF 12 VOLT CAR BATTERY

When operating off a 12 volt car battery only use the cable adaptor supplied by us. Take care that the correct clips are connected to the battery terminals. The positive clip is marked.

WARNING : Reversing the polarity will cause the electronic circuitry to burn out.

39) POWER SUPPLY LIGHT AND ANGLE STOP LIGHT

If either of these are not operating it is probably a loose bulb. Unscrew the cover and screw the bulb down using the short piece of plastic tubing supplied.

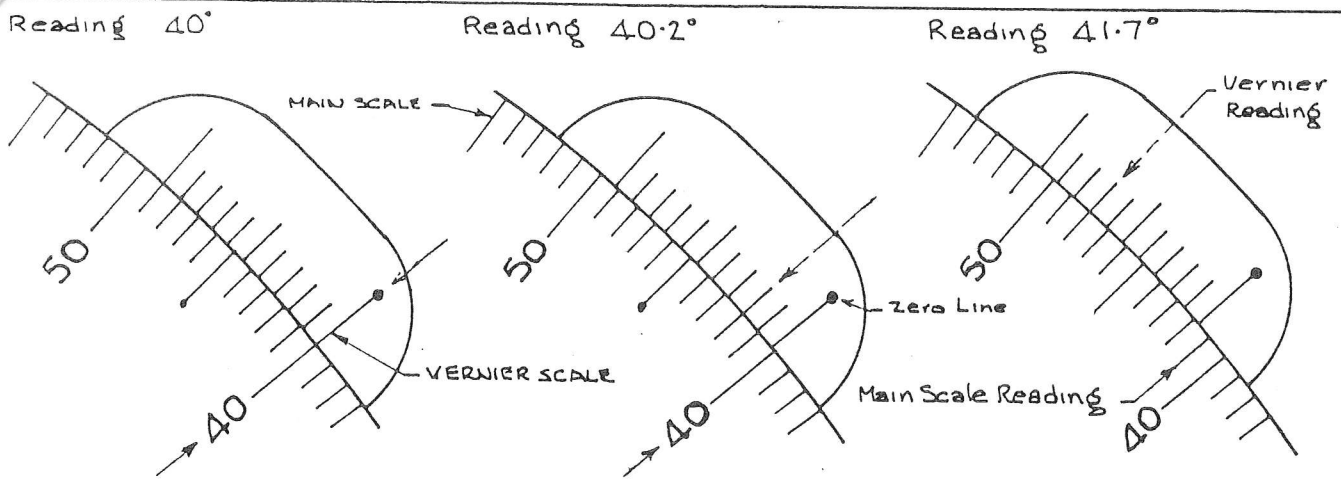


FIG. 1. SETTING THE VERNIER

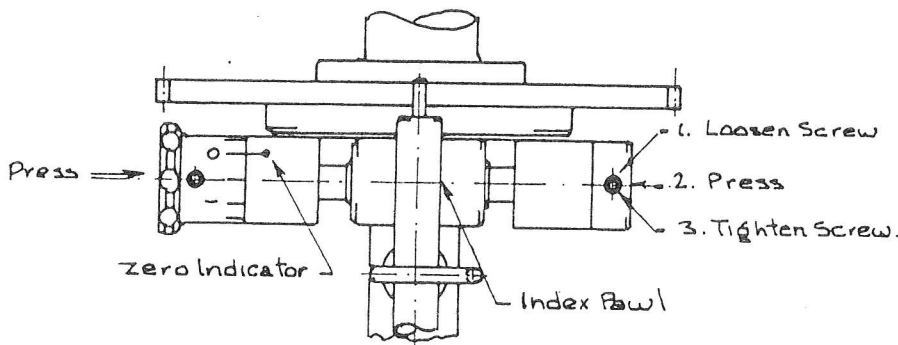


FIG. 2. TENSIONING INDEX PAWL

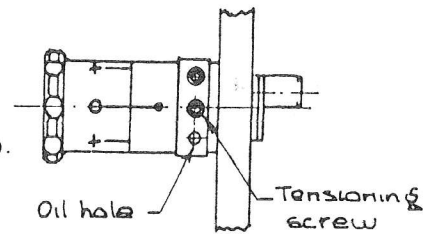


FIG. 3. MICRO-ANGLE ADJ.

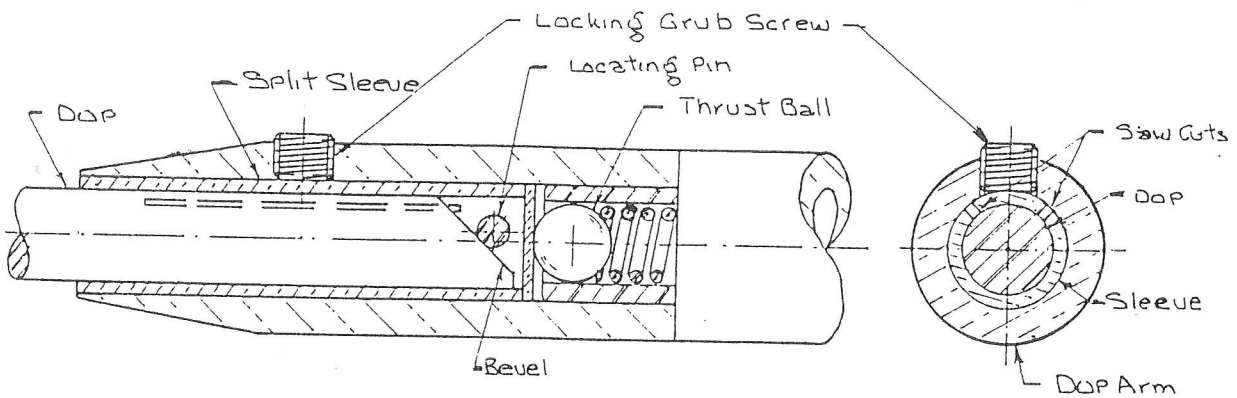
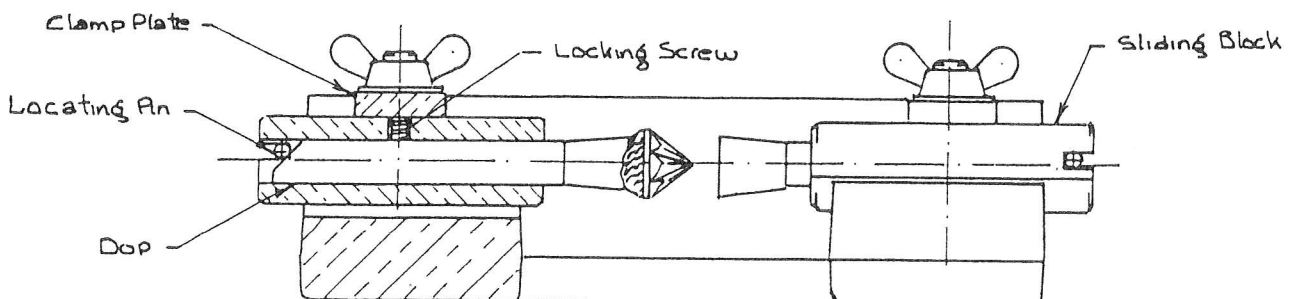


FIG. 4. DOP LOCATION AND LOCKING



LOCATING DOPS IN TRANSFER JIG

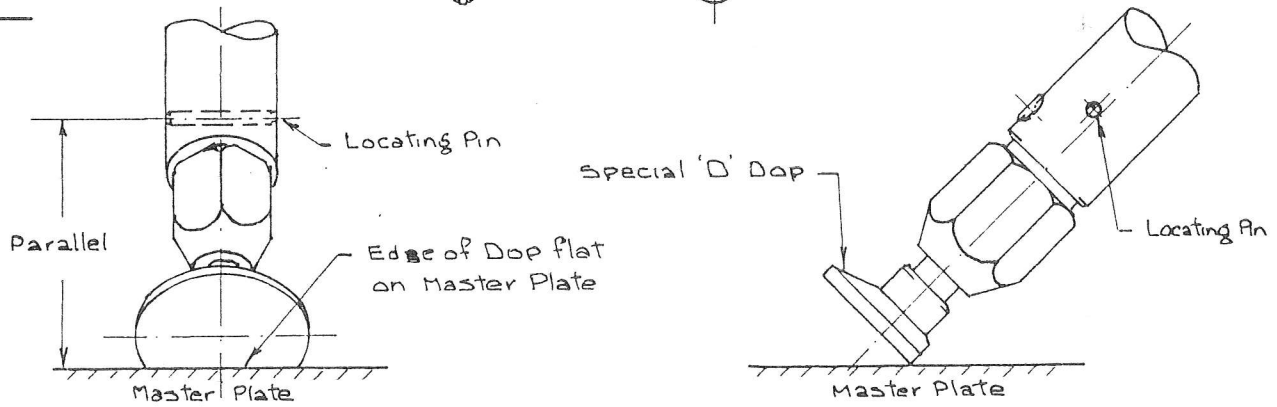
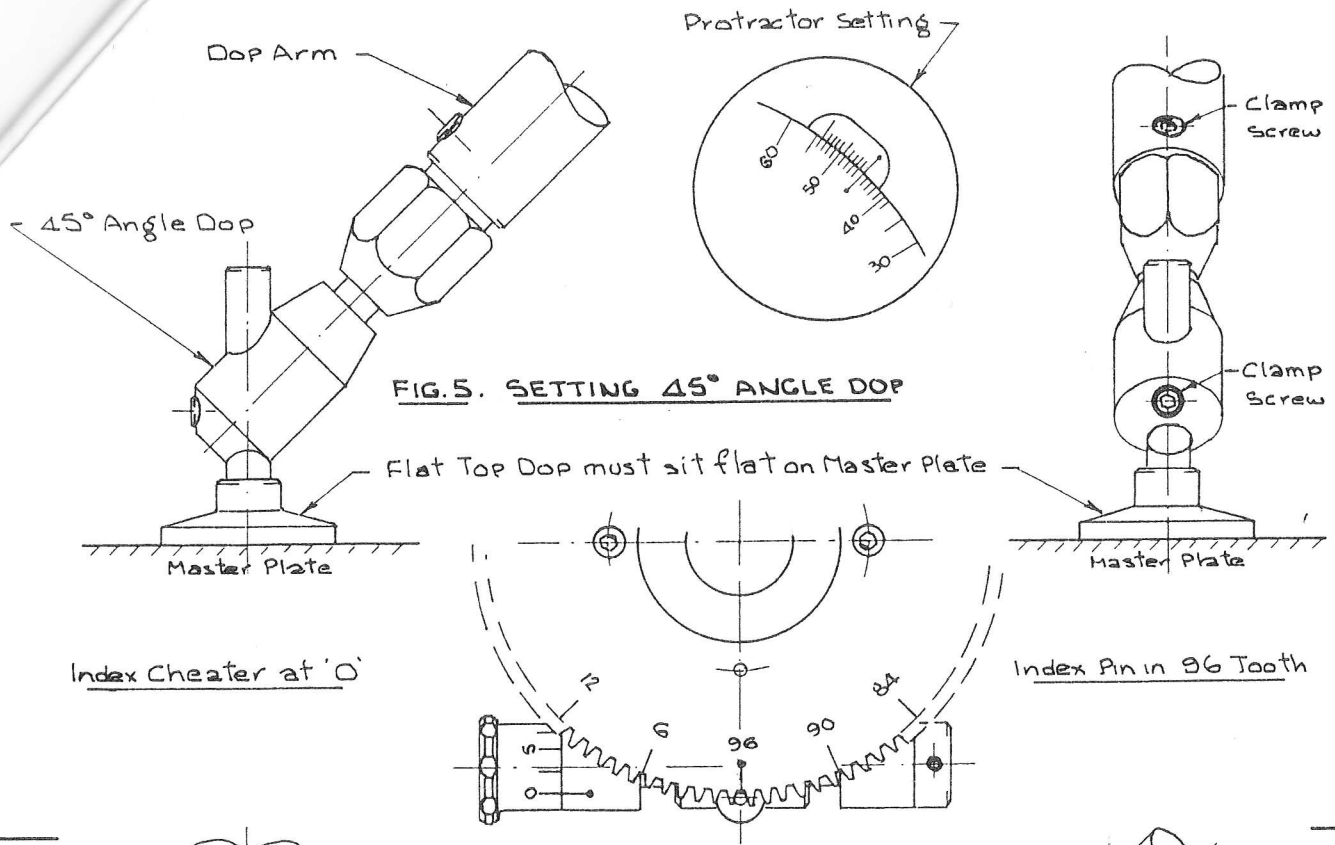
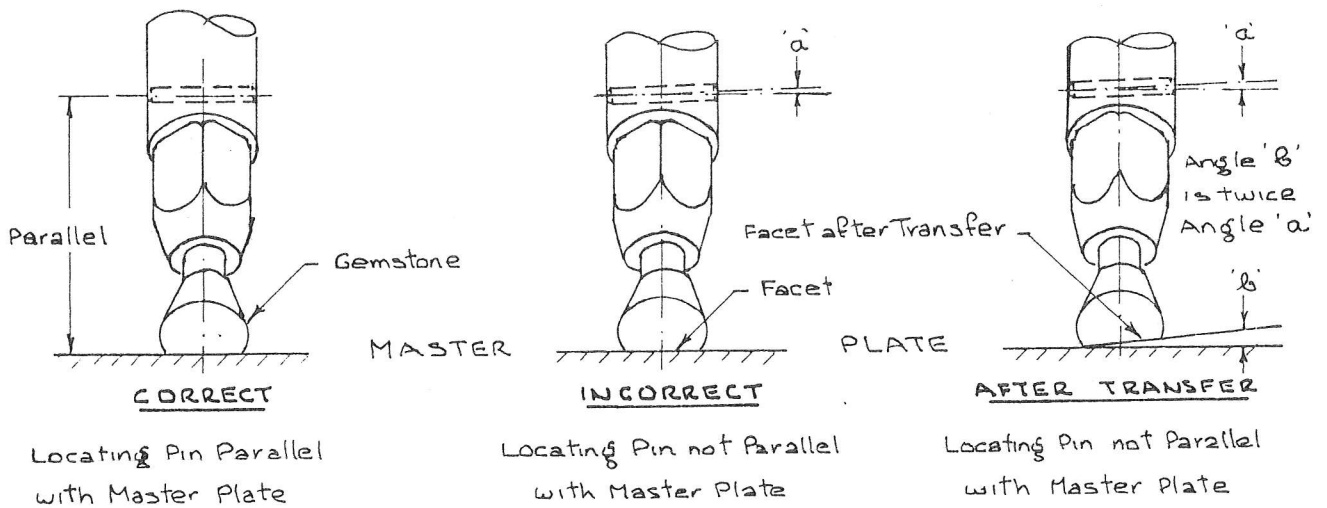


FIG. 6. SETTING DOP ARM LOCATING PIN PARALLEL WITH MASTER PLATE



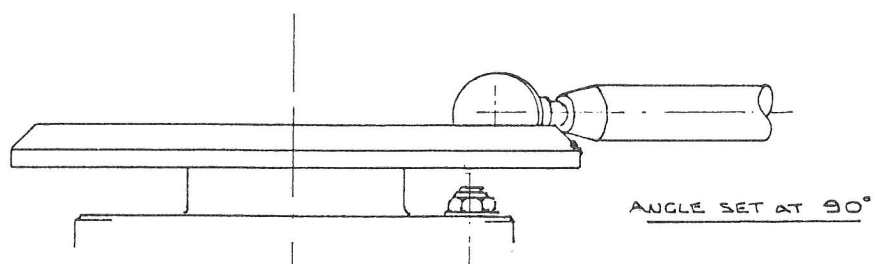
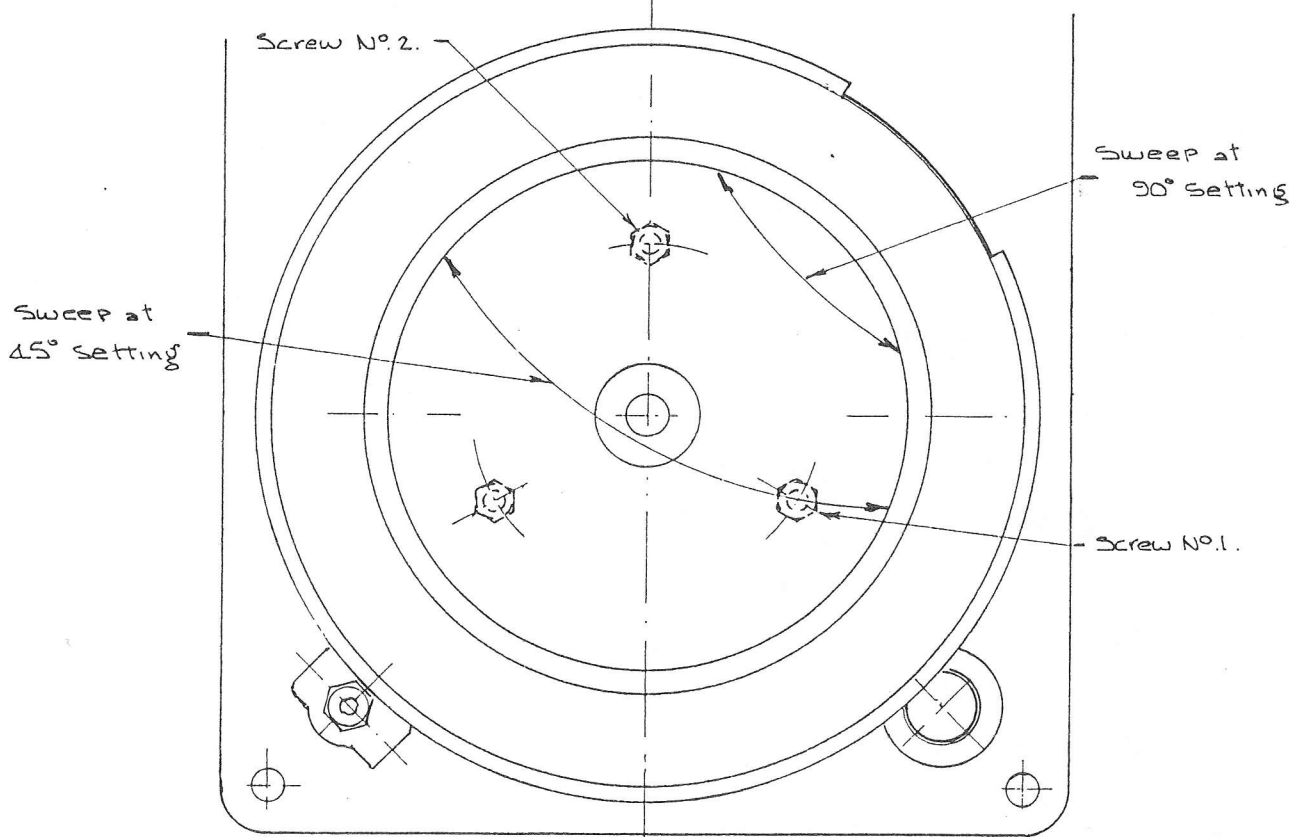
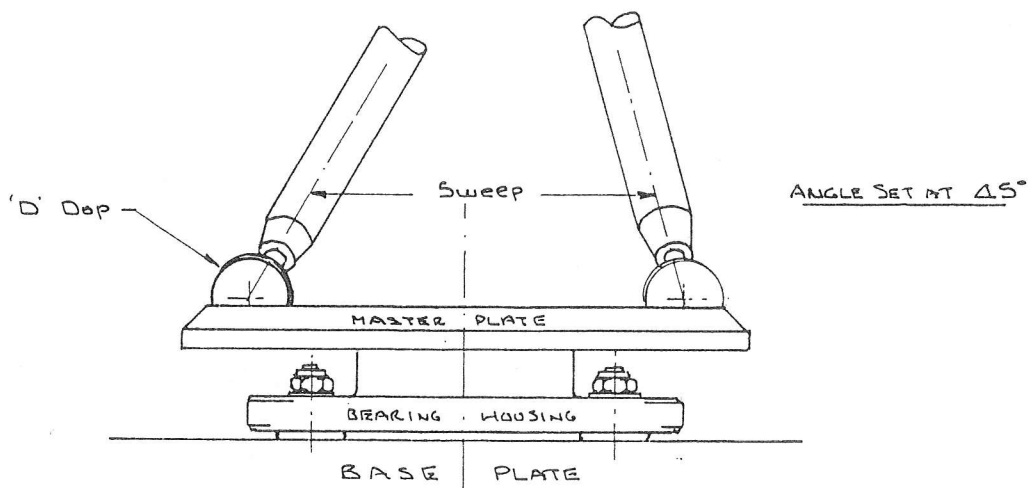


FIG. 7. ADJUSTING MASTER PLATE