Ultra Tec

OWNERS MANUAL

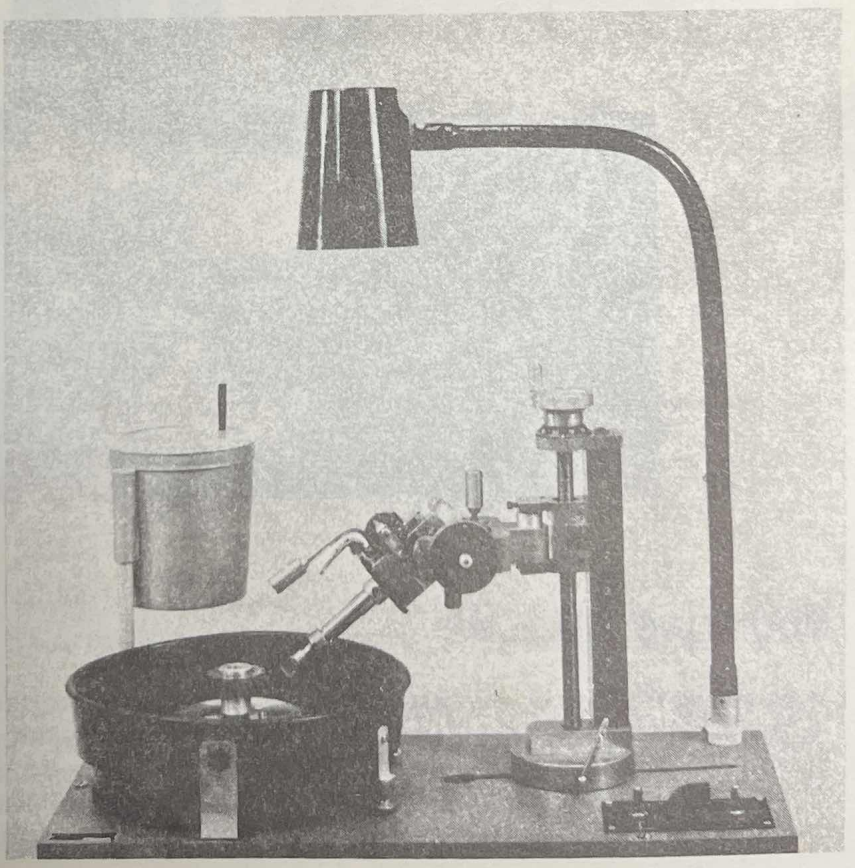
ABOUT YOUR ULTRA TEC

The ULTRA TEC that you have purchased is the result of years of development and research. Over the years, it has been upgraded, through testing and consumer experience, so that ULTRA TEC now stands as the world's finest faceting unit.

In using your Ultra Tec, keep in mind that it is a highly precision device, in which manufacturing tolerances are maintained within thousandths and ten-thousandths of an inch. The Ultra Tec, nonetheless, is a rugged machine that will provide you with many years of fulfilling use. There are no urgent cautions, in regard to the use of the Ultra Tec, since it has been designed as a low-maintenance machine. Your Ultra Tec has been built and calibrated by trained craftsmen – and the warranty card that you received with your machine shows the results of the final test for accuracy, and the signature of the person who performed the testing. Normal minimal care will give you many hundreds of faceted gems from a problem-free unit.

As with any electro-mechanical device, there can be occasional problems – and if you experience one, re-read the owner's manual for the function involved, to assure that you are performing the operation correctly. If you still experience a problem, communicate with your dealer or with the factory. Word-of-mouth recommendations from Ultra Tec owners have been an important factor in our growth, and we sincerely want you to join the growing group of satisfied Ultra Tec owners.

Most of all, enjoy your Ultra-Tec – that's what it is all about.



SETTING UP

In unpackaging your unit, you will find the following equipment: The base, the head, a kit of 12 dops, a dop chuck, wrenches, a drain hose, a transfer block, and a 45° / 90° table block.

The Ultra Tec can be used as a portable machine, its low profile allowing convenient table top use, or it may be mounted permanently into a workbench or desk. For permanent mounting, the cutout dimensions are 8-1/2 inches by 18-1/2 inches; use the same screws and shock mounts that hold the machine to the wooden base.

MOUNTING THE HEAD

The head mounts simply. Slip the nut through the keyhole, fig. 1, and slide the head back into the slot. The head is locked into any desired position along the slot by turning the head lock handle clockwise, until it becomes snug. The nut which slips under the plate may be adjusted so that the handle locks in a convenient position, as shown in Figure 1.

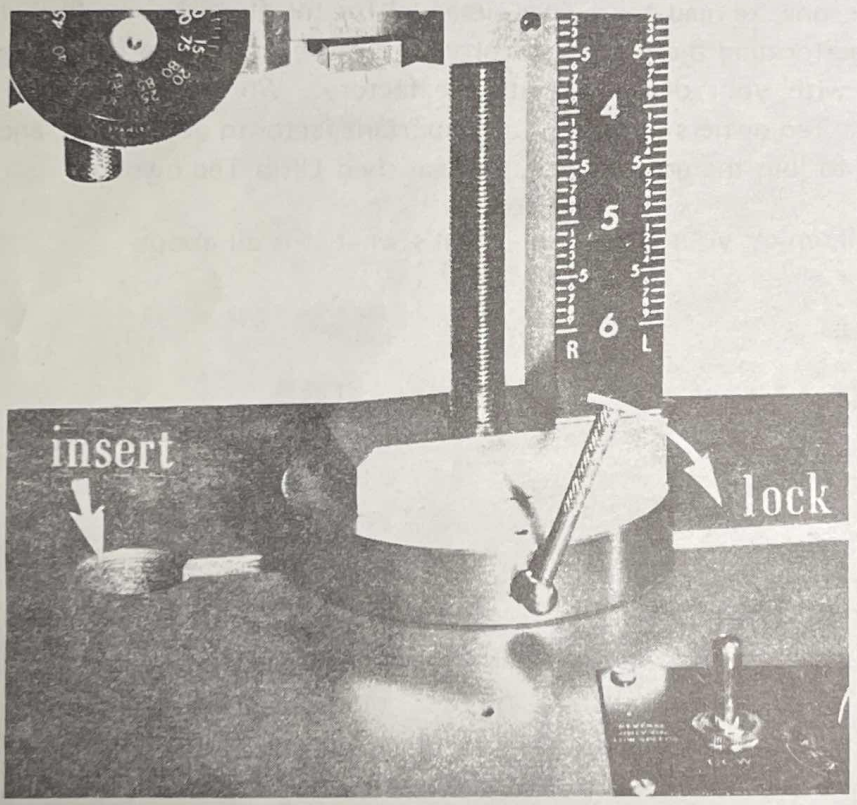


Figure 1.

MOUNTING THE LAMP

If you have purchased an Ultra Tec lamp, it mounts onto the stud already assembled in the base, in the corner behind the head. The lamp mounting lock has snap-on design. Pull back the nylon ring, place the lamp onto the stud, and release the ring. It will snap down into position, holding the lamp securely. The lamp can be rotated on the stud, by retracting the nylon ring and moving the lamp to the desired position.

MOUNTING THE WATER TANK

The water tank post slips freely into the hole in the corner behind the splash pan. On the back of the machine base is a pre-installed set screw – tighten that set screw against the post, using the wrench provided. Tighten this securely since the post should not rotate – the water tank does. Place the water tank onto the post, position it, and it is ready.

The flow rate is adjusted by turning the valve stem, and the water shuts off with an easy pressure. Do not overtighten the valve.

The tank fits snugly enough on the post so that it will not vibrate out of position, but loose enough for you to rotate it to the position you wish.

THE DRAIN HOSE

The drain hose presses onto the metal nipple under the splash pan. The drain arrangement may be permanent or temporary, depending on the facetor's workshop arrangement. If a shorter hose length is desired, the hose can be cut with a sharp blade.

THE BASIC CONTROL FEATURES OF THE ULTRA TEC

All faceting machines have four fundamental characteristics that require control: (A) rotational angle, (B) axial angle, (C) height, (D) flatness.

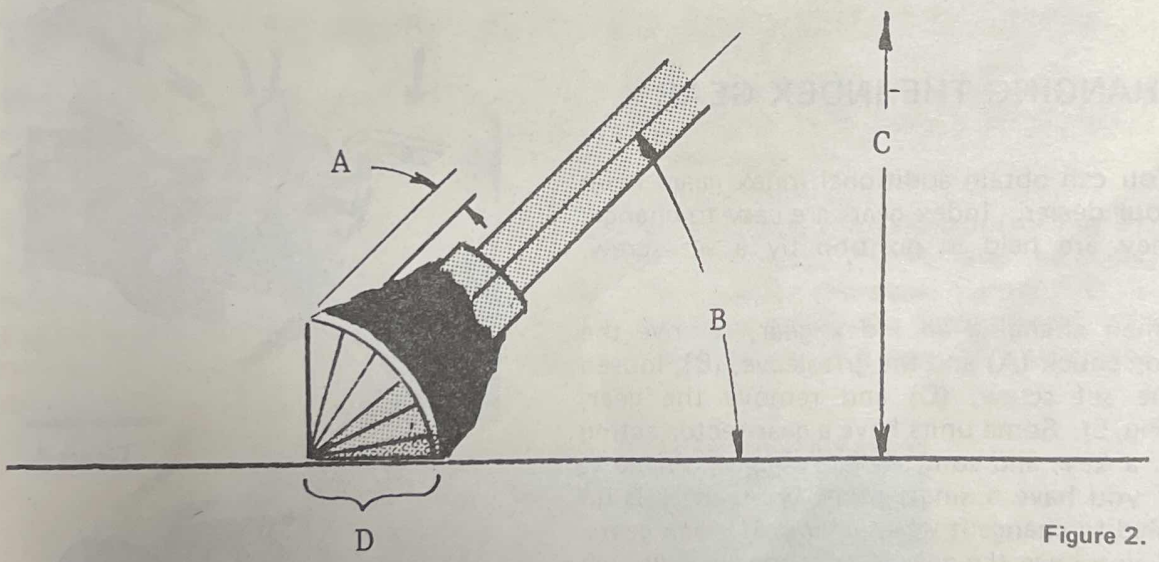


Figure 2.

The ingenuity, precision, and quality of the faceting machine in accomplishing these basic features are what determine the beauty and accuracy of the faceted gem.

The Ultra Tec is designed with another feature that almost makes the "basic" list: Repeatability. That is, every position of the gem can be exactly recorded and repeated so that the various steps in the faceting process can be performed with exact control of the position of the gem. Recording of all faceting information will assist in cutting gems in a minimum of time.

We suggest that you read the following subjects and practice the settings so that you may become familiar with the controls.

CONTROL OF THE ROTATIONAL ANGLE – INDEXING

Your Ultra Tec is supplied with an assembled index gear (see fig. 3). You have many exact rotational positions on the index gear.

The index position is changed by lifting the pawl (A) and rotating the spindle to the desired position.

For free wheeling of the spindle, the index gear can be disengaged, which is useful in grinding the gem girdle. This is done by lifting the pawl (A) and holding it in the raised position by engaging the latch, (B) (Fig. 4). The latch is spring loaded, and is released by lifting again on the pawl, allowing the latch to snap back.

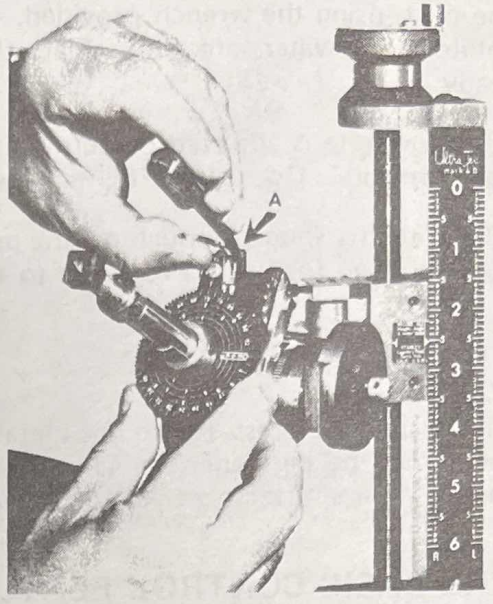


Figure 3.

CHANGING THE INDEX GEAR

You can obtain additional index gears from your dealer. Index gears are easy to change, they are held in position by a set screw.

When changing an index gear, remove the dop chuck (A) and the grit sleeve, (B), loosen the set screw, (C) and remove the gear, (Fig. 5). Some units have a gear sector acting as a key, and some have a single point key. If you have a single point type, there is no need to change it when changing index gears. If you have the gear sector, however, (which is shown in figure 5), remove the screw in the gear sector and remove the sector. Install the new sector on the dowel pin and insert the screw. Install the new gear on the spindle shaft. Before tightening the set screw, latch into the free wheeling position and check for rotational freedom and lack of end play. Be sure the set screw is seated in center of flat on the shaft.

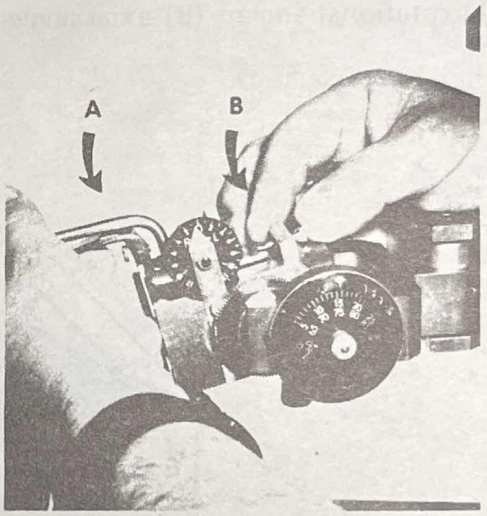


Figure 4.

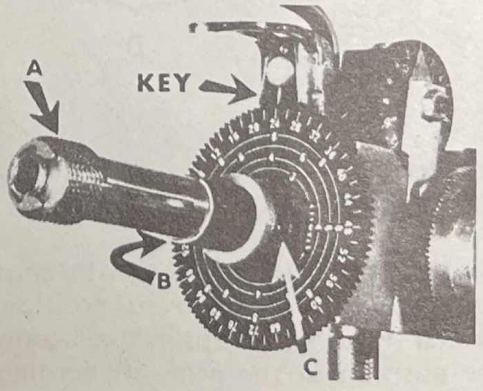


Figure 5.

THE INDEX VERNIER (CHEATER)

The index vernier is for making very slight angular adjustments to the indexing mechanism when a stone is being polished (Fig. 6). Before starting a stone, make sure the cheater is in its mid position and reading zero. The letters "R" and "L" refer to the left or right of the facet when it is raised to the inspection position. Example: if corrections are needed on the right side of the facet, rotate the cheater dial one or two lines toward the "R" side, reverse if the corrections are needed on the "L" side. Always return to zero when the need for corrections are satisfied.

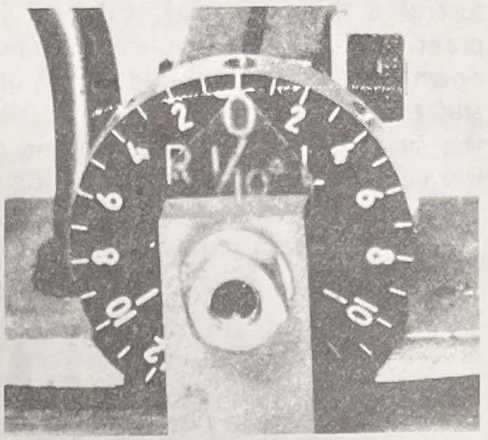


Figure 6.

CONTROL OF THE AXIAL ANGLE

THE ANGLE DIAL (PROTRACTOR)

The angle dial provides extreme accuracy. It is geared in a 6:1 ratio, providing spacings between degree marks that are equivalent to those on a 9 inch diameter standard protractor.

THE ANGLE STOP and the ANGLE FINE ADJUSTMENT CONTROL

The angle stop is used to set the desired axial angle. The sensitivity of the Ultra Tec is such that the stop is sufficient to provide a precise angle. The absence of friction in the faceting head makes any indicating devices unnecessary.

The angle stop works in conjunction with the fine adjusting angle control (see Fig. 7). To change the angle, loosen lock nut on stop ("A" in Figure 7). To raise the angle, hold end of stop ("B" in Figure 7) against the bottom of the fine angle control ("C" in Figure 7), lift dop spindle, slipping the nylon clutch to obtain the desired angle. To reduce the angle, push down on the spindle. Tighten the lock nut, "A", when the desired angle is set.

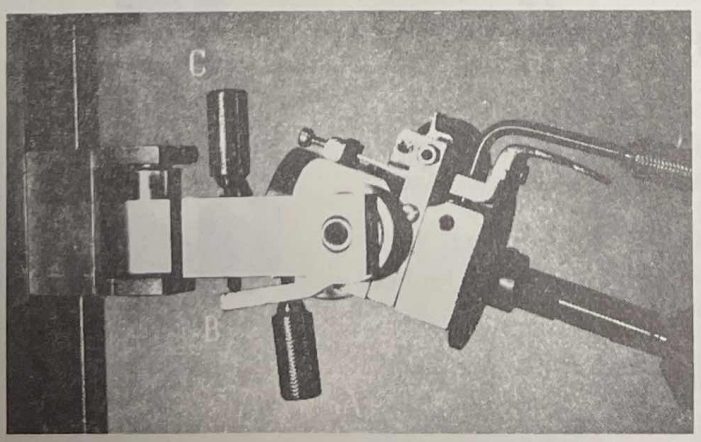


Figure 7.

READING THE ANGLE

Figure 8a shows the angle dial in a 40° position; figure 8b shows 40-1/4°, – working just as a simple vernier scale. It is a good idea to get the feel of the angle dial by practicing a bit. To duplicate the position shown in figure 8b, set the angle by pushing down on the dop spindle so the dial reads 40°. Use the fine adjusting angle control and accurately set as near as possible to 40-1/4° – slightly beyond 40°. Now notice the small numbers 1, 2 and 3 and associated lines. With the fine control, set dial so the line under No. 1 exactly coincides with the nearest line on the dial. This happens to be number 45, but disregard the numbers on the dial when reading the vernier. The angle setting is now set at 40-1/4° – as shown in Figure 3. To read 1/2° use the No. 2 line and align it with the nearest line on the dial, for 3/4° use No. 3 line.

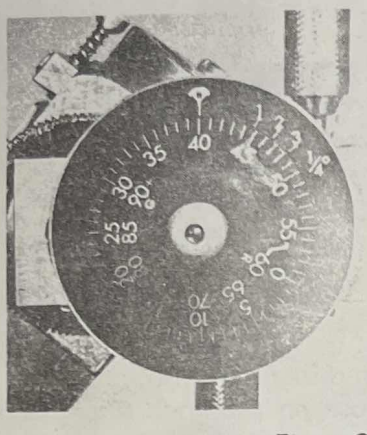


Figure 8a.

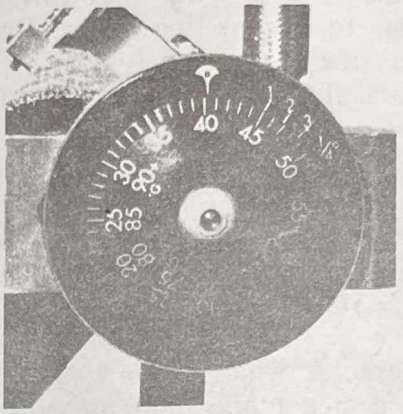


Figure 8b.

In reading the angle dial, you will see that some of the angle readings "overlap". This is the result of the 6:1 advantage. A very little practice will eliminate any confusion, since the overlapping angles (see Figure 9) are, for example, 30° and 90°, and 10° and 70°, etc., hardly a possible cause of error.

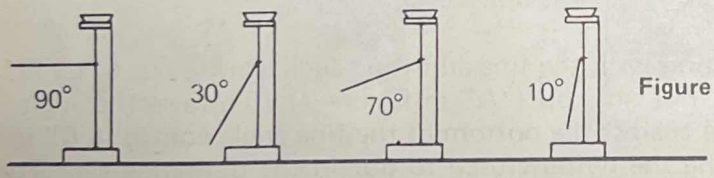


Figure 9.

CONTROL OF HEIGHT

The Ultra Tec vertical column is calibrated over its entire length, and is read like a micrometer, to three decimal places.

The reading in Figure 10a is 1.234. This is obtained by reading 1.2 from the column, and +.034 from the dial.

The reading in Figure 10b is 1.525. When you are faceting, these readings, as well as the angular settings, should be recorded.

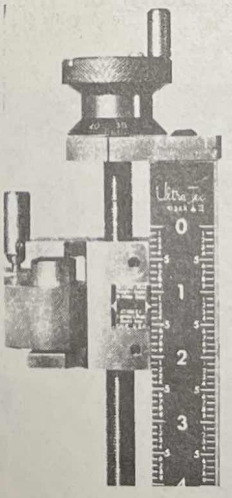


Figure 10a.

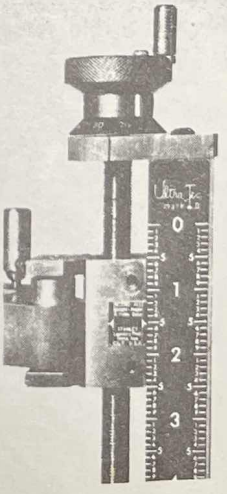


Figure 10b.

CONTROL OF FLATNESS

This control is built into your Ultra Tec. The flatness of the master platen is better than .0003 per inch – and your machine's tested calibration results appear on your warranty card.

Usually, laps are suitably flat for their intended purpose. Should you suspect the flatness of your lap, however, the following is a simple procedure used for evaluating flatness. Insert a short pencil into the 45°/90° block, set angle to 45° and lock. Place the lap on the spindle, turn on the motor, lower the vertical control so the pencil can be swept slowly across the lap. Lower the vertical as pencil is ground away. After several sweeps across the lap, stop and inspect. A flat lap will show a very even mark, a badly warped lap will show an uneven pattern. Polishing laps can also be tested except they do not wear away the pencil so fast. The important lap is the one used next to the polishing operation. The pencil will not harm the laps. All laps that are used for stock removal will be difficult to read but flatness is not as important on these.

OTHER OPERATING FEATURES OF THE ULTRA TEC

SPEED CONTROL

The variable speed control is standard on all Ultra Tec's. The face of the speed control plate is self-explanatory, including a dial for speed selection. There is a switch which controls clockwise (CW) or counter clockwise (CCW) operation of the lap. During faceting, always have the lap running away from the gem, and not into it, Figure 11.

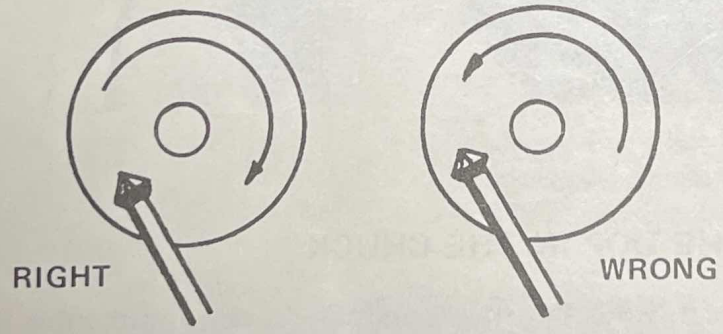


Figure 11.

THE 45°/90° TABLE BLOCK

Your Ultra Tec is shipped with the 45°/90° table block in position, and the head has been calibrated with it in place. It inserts and removes in the same way as a regular dop chuck (see Figure 12).

When a subsequent alignment is needed, a method is described on page 14.

THE DOP CHUCK

The Ultra Tec provides a keyed dop chuck, which assures exact alignment of the gem in relation to the lap.

To remove the chuck (or the 45°/90° table block), (see Figure 12) slide the grit-guard forward, insert eccentric tool in the hole in dop spindle with long end of handle at about a 90° angle from the spindle. The 1/8" pin on end of the tool must engage in end of the chuck. Turn the handle toward the front of the spindle to loosen the taper fit. Remove the tool and pull the chuck out. To tighten chuck in the spindle, reverse the procedure.

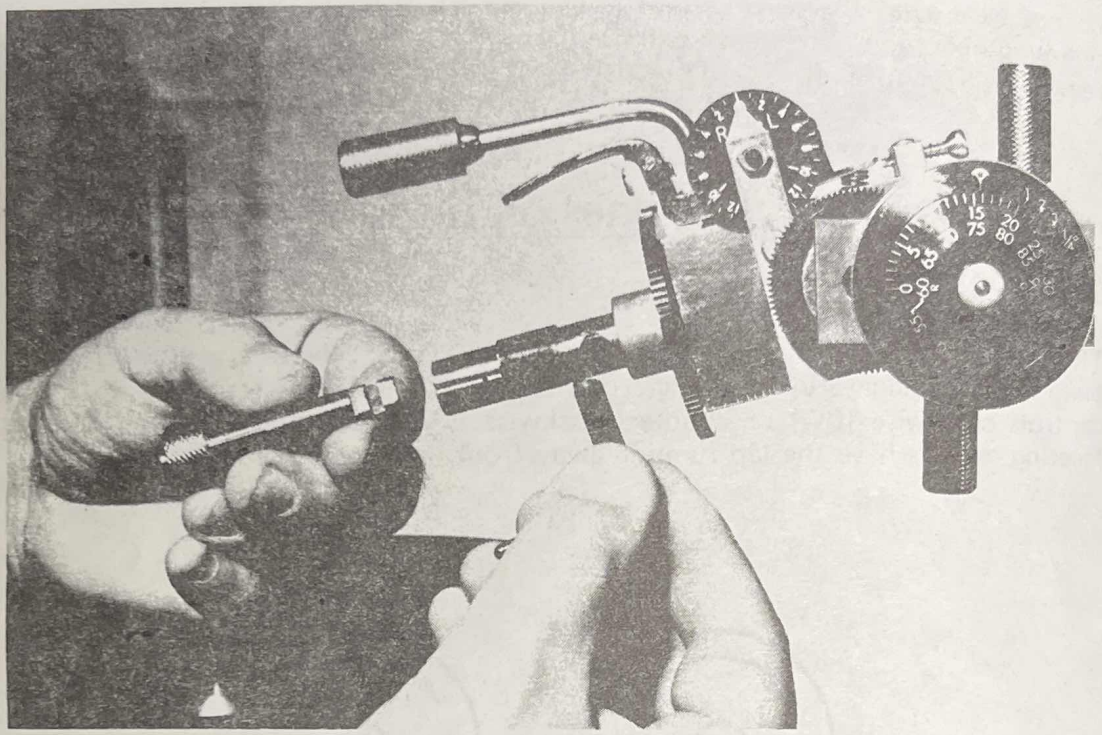


Figure 12.

HOLDING THE DOP IN THE CHUCK

The dop is inserted into the chuck, and the set screw in the ring is tightened. This actuates the split collet, holding the dop firmly (note that this is a true split-collet system which provides on-center alignment and that the dop is not contacted by the set screw). Once a dopped gem is inserted into a chuck and faceting commences, the dop is not removed from its chuck until that operation is complete.

If it is desired to remove the gem before completion, it is essential that it can be replaced into the machine at the exact rotational position and depth. This is what the Ultra Tec keyed dop chuck permits.

In the event the gem is removed – to facet another one, to share use of the Ultra Tec, or whatever reason – the chuck and dopped gem are removed as a unit. When the unit is replaced, it is done at the same machine settings, and the resulting alignment is precisely the same as prior to removal.

THE SPLASH GUARD

The splash guard is molded of Urethane rubber and is resistant to all normal lapidary fluids.

With the drain hose attached, adequate fluids may be used assuring cleanliness to the lap and to prevent heat damage to the gem.

When the head is used at an angle at which the rim of the splash guard would interfere with the spindle, the rim of the splash guard is pressed down and the hold down clips engaged. When the operation is complete, the clips are released and the splash guard returns to its natural position.

The splash guard may easily be removed for cleaning. Simply press out rubber buttons from brackets and lift out complete splash guard, including the drain fitting. To re-insert, wet buttons and press back into brackets.

LAP SPINDLE AND PLATEN

The lap spindle is stainless steel. The platen, or master lap, is permanently attached to the spindle and both are machined as one unit. The spindle has precision ball bearings, permanently lubricated. The platen has a removable pin to drive the lap. If you use a flat bottomed lap, the pin may be removed – or your laps drilled to fit. To drill a hole in the bottom of the lap, place the lap on the spindle, and oscillate the lap so that the pin makes a mark on the lap. At that spot, drill a 1/4" hole nearly through the lap. Caution should be taken not to drill the hole completely through.

THE SAFETY NUT

The use of the lap hold down safety nut prevents damage to a gem which is accidently bumped. The Urethane rim of the nut assures a positive grip with no projections, and no tools are required for its use.

STARTING OUT TO FACET

If you are a new facetor, some lessons, even a few of them, will go a long way in helping you, or you can use one of the several available books which include faceting instructions. Your dealer can advise you in regard to the availability of faceting lessons and can recommend instruction books.

This owner's manual is not a faceting instruction book – we feel that even your beginning efforts deserve more thorough instruction than this could provide. But, perhaps a few tips are in order:

- always record your settings.
- start with good but inexpensive material, preferably quartz. Your early efforts probably will be successful but this approach is easy on the nerves.
- double check everything before you begin a cut: is your stone firmly dopped? – are your machine settings correct? – are you prepared with pencil and paper to record your settings?
- do not start the machine with the gem on the lap.
- strive for perfection – that is what faceting is about.

DOPPING AND TRANSFERRING

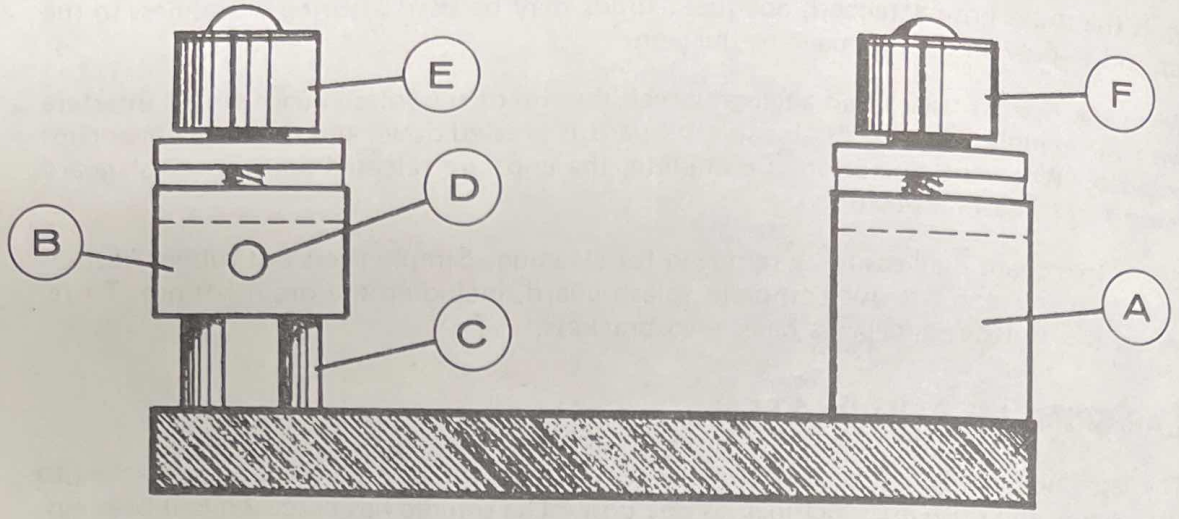


Figure 13.

The Ultra Tec Transfer Fixture may be used with a conventional alcohol flame or the electric soldering iron available with the Dop and Transfix Kit. The Transfer Fixture has two vee blocks. One vee block (A), is solid, providing an excellent heat sink. The other vee block (B), is mounted on stainless steel pins, (C), which act as a thermal barrier.

INITIAL DOPPING

1. Place the dop in the small vee block, (B), gem-mounting end out.
2. Heat the dop (see note 1 on page 13), and melt the wax onto the dop.
3. Stand the Transfer Fixture on end, block (A) down, and press the gem material into the wax.
4. Allow to cool — the initial dopping is complete.

TRANSFERRING

1. Place gem-dop in vee block (A), and the new dop in vee block (B). Adjust the positions of the dops in relation to each other and tighten the clamp knob, (E), holding the new dop (see note 2). Remove the gem-dop from vee block (A).
2. Heat the new dop, in the vee block, (B), and apply wax.
3. Replace the original gem-dop into vee block, (A), and lightly clamp. Slide the original gem-dop so that the gem forms a good bond with the new waxed dop in vee block (B), and tighten the clamp (F), in vee block (A).
4. Stand the Transfer Fixture on end, block (A), down, and allow to cool. The transfer operation is complete.

NOTES

1. When using the soldering iron to heat the dop, place the point of the soldering iron in hole (D). This hole goes through the vee block, but it is usually more convenient to have the soldering iron in the rear of the Transfer Fixture.

2. When tightening the clamp knobs, (E) (F), it is never necessary to clinch down very tightly to prevent movement of the dop. You may wish to try this out, to get used to a "tight" clamping and a "sliding" clamping.

3. You may find it desirable, when handling the cool dop (the large vee block side), to use a damp cloth. This will assist in cooling.

Three areas that could cause problems are the following: No. 1 – not enough heat involved in making the transfer, causing the stone to fall off later. No. 2 – too much heat, causing the back side of the stone to become too hot; this will not cause any particular problem unless the original dopping was faulty. If the joint was not parallel, the heat and pressure could cause a shift in the stone with the result that frequent use of the cheater is required. The most overlooked source of trouble can be caused by the gem material itself.

Sapphires and other high density materials are excellent conductors of heat and the back side of the stone can become too hot and cause the problem indicated in No. 2 above. Small sapphires are usually the most difficult. An expedient that usually works is the generous use of wet tissues, also constant probing with a pencil point to test for the softening point of the wax, then allowing to cool before re-heating.

MAINTAINING AND ADJUSTING YOUR ULTRA TEC

- Your Ultra Tec is a precision instrument and should be covered when not in use, or stored in a clean place.

- All bearings are lubricated and permanently sealed. It is not necessary to lubricate bearings.

- The drive mechanism does not normally require adjustment. The lap spindle is attached to a tapered disc, which is driven by a urethane tapered cone. The rubber shock mounts on the motor can be compressed more or less for any adjustment that may be necessary.

- Clean the tapered hole in the spindle occasionally with a "Q" tip or tissue because any lint or dirt will prevent the chuck from seating properly. This also applies to the dop sticks and the 1/4" hole in the chuck. A very light coating of vaseline on the dop shafts will prevent sticking in the chuck.

- To protect the accuracy of the facet head, keep the base clean and free of abrasives, especially around the sliding area. The smooth tooling plate surface allows easy cleaning.

- Clean the riser screw by holding a cloth around the threads as the screw is turned. When lubrication is necessary, use grease – never oil.

- The cheater adjusting screw should be oiled once a year. If the cheater screw feels too loose, it may be tightened by tightening the set screw in the rear of the index latch rocker.

• ALIGNMENT OF THE 45°/90° TABLE BLOCK

A method to adjust the two axis which relate to the table block is as follows: Place a polishing lap on the platen. Verify that both the index gear and the cheater are set at zero. Insert the table block into the spindle. Obtain a rectangular piece of slick paper from a magazine, about 2" x 3", and place it on the lap. Set the angle dial at 44 and lower the height control until the block contacts the paper. Press down on the block so that it squares itself on the paper – then lock the set screw. This sets the index angle.

After releasing the pressure, an attempt at moving the paper will tell you if corners are square to the lap. If the paper pivots in one of the corners, loosen the screw and re-perform the operation.

To verify the axial angle, set the angle dial at 46, and verify that the paper is held evenly by the rear edge of the table block. Using the fine adjustment knob, approach 45 until attempts to move the paper indicate that the face of the table block is flush with the lap. Whatever the angle dial reads at this point is the setting for all table facets. This method can also be used for the 90° position.

CAUTION: If the cheater or index is changed, the index axis must be re-adjusted.

• HORIZONTAL AXIS ADJUSTMENT

To adjust the horizontal axis proceed as follows: Set the angle about 55°, place a lap on the spindle with any type of gem material in the chuck. Run the lap at 5 or 6 on the control, lower the stone to the lap and sweep across the lap from one side to the other. If the stone does not touch equally, adjust the Allen screws (Figure 14). Tightening either of the three screws will raise the side tightened or conversely, loosening any screw will lower that side. If it is satisfactory on both sides but either low or high in the middle, adjust the front screw accordingly. The screws are very responsive so caution should be taken not to over-correct. The adjustment should only be made with a lap that has been previously tested for flatness and the machine mounted in permanent position. This is a delicate operation and you may prefer to return the facet head for a complete recalibration which is performed for a nominal amount.

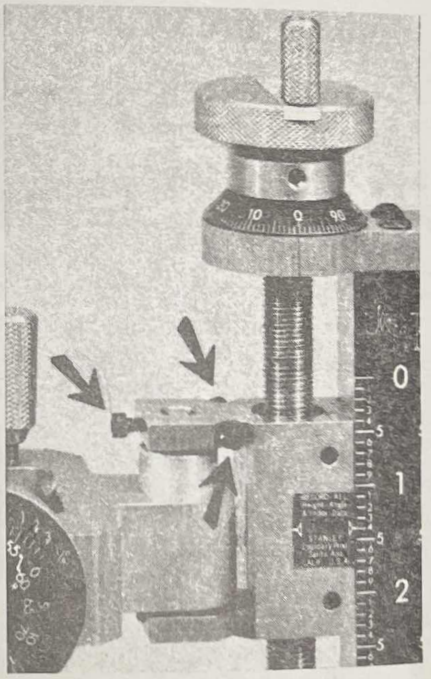


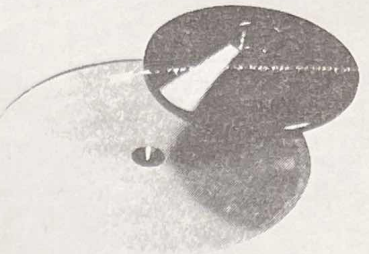
Figure 14.

• MOTOR SPEED CONTROL

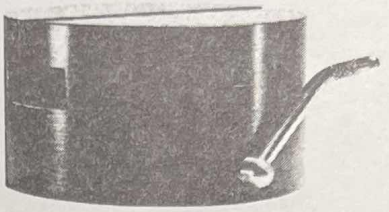
The motor speed control is designed to operate our special motor. Do not alter or add to the circuit. If, for any reason, the motor or motor control has been disconnected, be sure that leads are reconnected before plugging in the power cord.

To make your Ultra Tec more enjoyable, ask your dealer about —

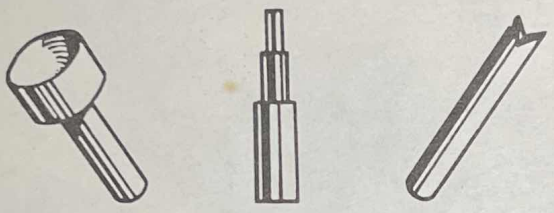
The Facet Saw. The facet saw saves time, saves laps, and saves material. A 6" diameter .012 inch thick diamond saw and precision adaptor mount on master platen. This permits the facetor to rough form the gem quickly, without rough grinding on a lap — and to save the cut-away gem material. Pays for itself quickly. Precision adaptor assures no-wobble performance of saw.



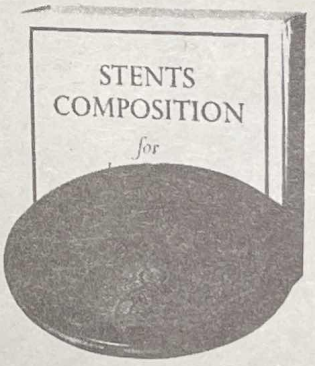
The Two Inch Base. The Two Inch Base provides an increased height with no sacrifice in rigidity of the head. Perpendicularity and parallelism are maintained to exceedingly close tolerance. The Two Inch Base fits directly to the Ultra Tec head, and is assembled and removed with ease. It is black hard-anodized for resistance to wear.



Dops — Ultra Tec makes 27 different dops! From small 2mm sizes, ranging to 19mm.



Stents Dopping Compound. Stents Composition has proven itself to be a superior dopping compound.



Read your warranty. In any correspondence please include the serial number of your unit; it appears under the base of the head, and on the name plate. We encourage you to send us your comments and ideas.

Enjoy your faceting.