

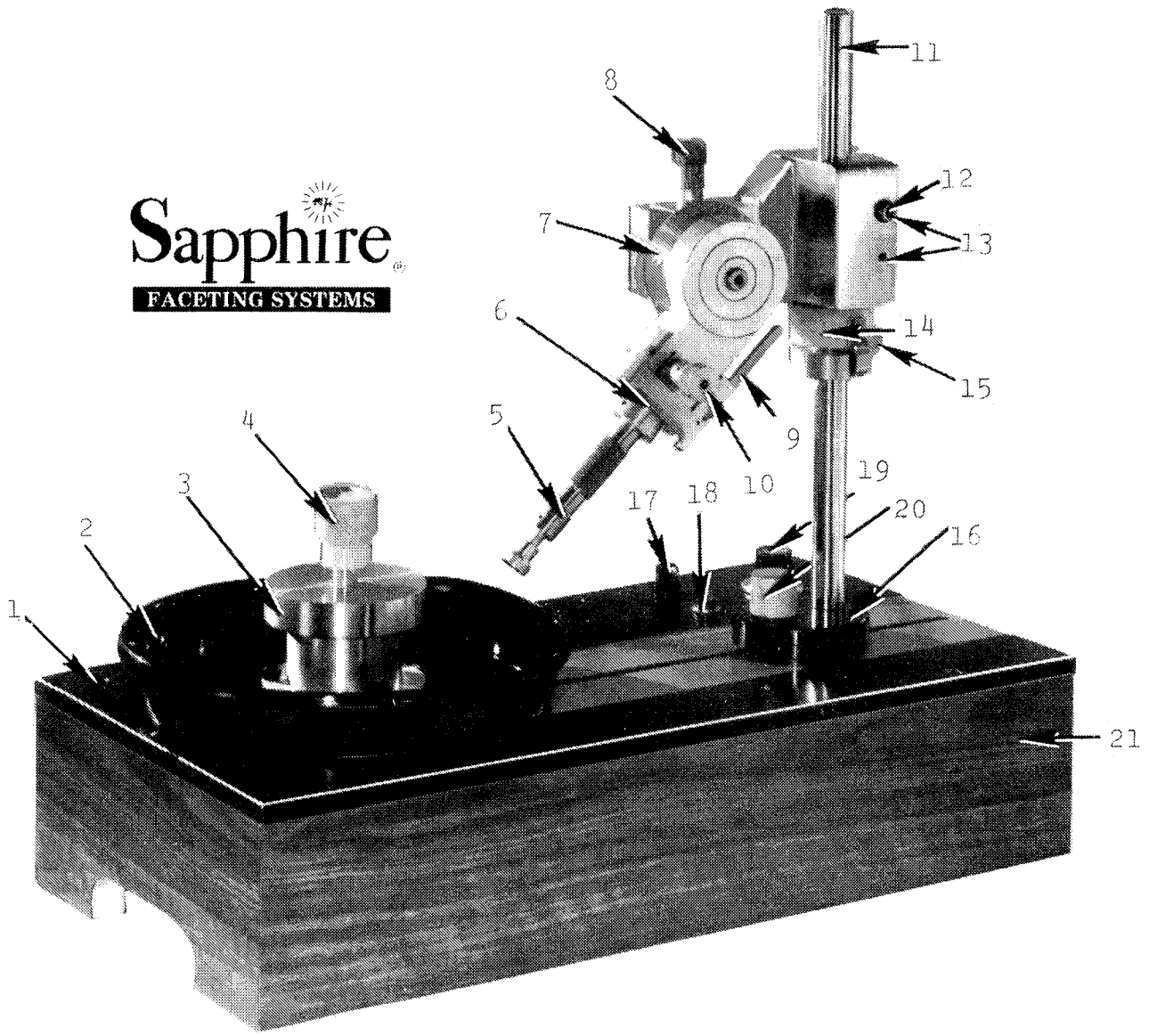
ARROW  
PROFILE  
COMPANY

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**Sapphire**®  
**FACETING SYSTEMS**

**OWNER'S MANUAL**

**Sapphire**  
 FACETING SYSTEMS



- |                                |                                     |
|--------------------------------|-------------------------------------|
| 1. Baseplate                   | 11. Faceting head mast              |
| 2. Splash pan                  | 12. Protractor stop pin             |
| 3. Master lap assembly         | 13. Audio/Visual signal connections |
| 4. Lap locking nut             | 14. Micro-height adjustment knob    |
| 5. Hand chuck                  | 15. Faceting head lock nut          |
| 6. Index gear                  | 16. Mast base                       |
| 7. Protractor scale            | 17. 4 amp fuse holder               |
| 8. Protractor adjusting knob   | 18. Pilot light                     |
| 9. Index gear trigger and lock | 19. Switch and speed control knob   |
| 10. Cheater adjusting knob     | 20. Mast base locking knob          |
| 21. Custom crafted base        |                                     |

The Sapphire Faceting Machine is a precision instrument constructed of materials selected to give many years of trouble-free use. Before unpacking and assembling the faceting machine, please read your owner's manual.

After unpacking check the packing list for contents of items shipped. Report any missing items to the Arrow Profile Company. Any apparent damage or losses caused by shipping should be reported immediately to the carrier.

## ASSEMBLY INSTRUCTIONS

### A. Faceting Head and Post

1. Remove the splash pan (2) by lifting straight up. This will expose a round hole in the keyway slot of the machine base. There are no fasteners on the splash pan, however, it has been designed to fit tightly.
2. Note the small guide pin and the round nut located on the bottom of the faceting mast base (16). Place the faceting head mast so that the small guide pin will enter the keyway slot while the round nut enters the round hole on the machine base. Then slide the faceting head and mast into position and tighten the knurled knob.
3. Replace the splash pan.
4. Place the faceting head onto the mast and secure it by tightening the knurled knob (15).

### B. Splash Ring

The plastic splash ring is snugly attached by merely pressing it into the inside diameter of the lap pan. A notch can easily be cut into the splash ring to accommodate the faceting head for preforming and girdling. This notched side can be stored by flipping the ring over and setting it on the inside of the splash pan. If further modifications are desired, additional rings can be obtained from the factory.

### C. Drain Hose

The plastic drain hose is attached by pressing it over the metal nipple which is attached to the splash pan and protrudes under the machine base. During faceting, waste water should be drained into any suitable container such as a used plastic gallon milk jug.

## OPERATING INSTRUCTIONS

### General

The Sapphire Faceting Machine operates on a 110 Volt, 60 cycle alternating current only. The motor and solid state motor control are protected by a 4 amp fuse.

The lap table is turned "on" or "off" and the RPM of the table is adjusted by the single knob mounted on the base (19). The red indicator light (18) located adjacent to the speed control knob will glow when the unit is on. The speed of the lap table is continuously variable from 40 to 1200 RPM.

### Master Lap Assembly

The master lap assembly (3) was designed to facilitate the changing of laps. The nut used to secure the laps (4) has been constructed with left handed threads (the reverse of normal) to prevent loosening during operation. It is made of delrin which will help to minimize damage if a stone is accidentally hit against it. The nut is designed with a hole to accommodate a dop which can be inserted and used to increase leverage in the event that the nut is over tightened. To remove, be sure to turn to the right (the reverse of normal).

### Height Adjustment

The faceting head assembly is locked into position on the mast by tightening the knurled nut (15). Coarse height adjustments are made by loosening this nut and raising or lowering the faceting head assembly to the desired height on the mast.

When making coarse height adjustments, it is strongly recommended that the left hand be put under the faceting head while the right hand is used to loosen the nut. This two-handed action will serve to prevent damaging the dopped stone should the faceting head, as a result of its weight, drop on the faceting head mast when the knurled knob is released.

Fine height adjustments are made with the micro-height adjustment knob (14). This knob raises the faceting head when turned to the right and lowers the head when turned to the left.

### Angular Adjustment

Angular adjustments from 0° to 90° are made with the protractor adjustment knob (8). A complete revolution of this knob in a clockwise direction will lower the protractor setting 5°, while a complete revolution counterclockwise will raise the protractor setting 5°. The knob is calibrated so that settings on the protractor can be made accurately to 1/4° with an easy estimation to 1/8°.

Quick adjustments to the nearest 5° can be made by holding the hand chuck (5) in the left hand while grasping the protractor adjustor with the right hand and pulling the adjusting knob and stem to the right. When this is done, the gear mechanism will be disengaged allowing the protractor angle to be quickly adjusted within 5°. The adjusting knob and stem should then be allowed to snap back in place and adjusted to give the exact angle desired.

### Protractor Indicator Stop

The protractor stop (12) prevents downward movement after the protractor is set at the desired angle. The protractor stop pin can be released or neutralized by pushing the slide stop toward the front of the unit until it is clear of the protractor stop pin.

### Sapphire Hand Chuck

The Sapphire Hand Chuck (5) employs a special cone point allen head screw which acts with the keyways in Sapphire dops to insure positive registration and alignment throughout the complete grinding and polishing process.

The hand chuck can be removed at any time from the hand chuck arbor for close inspection of the stone and replaced without any deviation in the stone alignment. Because of this unique feature of the Sapphire Faceting System, many Sapphire users own more than one hand chuck permitting two stones to be cut without one being finished first, or allowing two or more to share the same unit without first completing a stone.

The hand chuck is easily removed by locking out the index gear trigger (9) and sliding it off the hand chuck arbor.

### Dop Installation using the Standard Hand Chuck

1. Loosen the three set screws at the end of the hand chuck.
2. Slide dop into the chuck so that the dop keyway is lined up with the cone point set screw located toward the center of the hand chuck.
3. Adjust the cone point set screw to engage keyway, but at a depth to allow dop to move in and out of chuck freely.
4. Rotate dop slightly in a clockwise direction to take up slack of keyway with cone point set screw.
5. Tighten the two set screws at the end of the hand chuck.
6. Do not alter the adjustment of the cone point set screw until the stone is completed.

### Split Collet Hand Chuck

This accessory hand chuck employs a split collet to lock the dop. A cone point is inside the hand chuck for dop alignment with keyed dops.

As described above for the standard hand chuck, the Split Collet Hand Chuck can also be easily removed at any time without changing the stone alignment. First lock out the index gear trigger, then slide off the hand chuck which is secured on the shaft by a detent ball.

### Dop Installation using the Split Collet Hand Chuck

Keyed dops are installed in the hand chuck by loosening the collet until the dop slides into the chuck. Insert the dop until the keyway slides past the registration and alignment cone point. Turn the dop in a clockwise direction until the slack is taken up. Then tighten the collet nut.

### Index Gear<sup>o</sup>

The index gear (6) provides the rotational adjustment for the Sapphire System. The unit is shipped with a 96 tooth index gear as standard equipment. The index gear may be changed at any time by removing the screw at the rear of the index gear after the hand chuck has been removed from the hand chuck arbor. Index gears can be obtained with 64, 72, 80 and 96 teeth.

## Cheater

The Sapphire System provides precise fractional rotational adjustment, to split the settings of the index gear. It operates by adjusting the dopped stone in a plane which does not alter the alignment of the angle or height of the stone over the surface of the lap.

The Cheater adjusting knob (10) should be set at zero until it is time to either cut or polish a stone on a particular side of a facet. A complete revolution of the cheater adjusting knob clockwise will move the hand chuck and dop  $5^\circ$  in a clockwise direction when looking at the face of the index gear. A complete revolution of the knob counterclockwise will move the cheater  $5^\circ$  in a counterclockwise direction. As with the protractor adjustor, the knob is calibrated so that settings can be made accurately to  $1/4^\circ$  with an easy estimation to  $1/8^\circ$ .

## Free Wheeling

To preform stones using this system, the index gear trigger (9) should be locked-out, making the hand chuck free wheeling. This is done by simply lifting up on the index trigger and sliding the lock-out pin into position.

## Preforming

The following steps are to be followed when preforming or cutting the girale configuration of a stone.

To preform a round stone:

1. Set the protractor at  $90^\circ$ .
2. Lock out the index gear trigger.
3. Rotate the splash pan until the slot is in line with the mast.
4. Place the dop through the slot.
5. Adjust the height.
6. Grind the stone, rotating the hand chuck until the stone is round.

To preform a square, rectangular or octagon stone:

1. Set the protractor at  $90^\circ$ .
2. Rotate the splash pan until the slot is in line with the mast.

3. Place the dop through the slot.
4. Adjust the height.
5. Set the index gear trigger to the proper setting.
6. Grind until the proper depth is obtained for each setting.

#### 45° Adapter

The 45° adapter is used to grind the table on a gemstone. The 45° angle of the adapter and a 45° setting on the protractor accomplishes the 0 degree setting called for in faceting instructions and required for cutting and polishing the table. First set the protractor at 45°, then set the index gear and cheater at 0. Next insert the shank of the 45° adapter loosely into the hand chuck. With the protractor set at 45° and against the stop, raise the head until the flat base of the 45° adapter is just above the lap. Lower the 45° adapter to the lap making sure that the base of the adapter is flat and parallel by allowing its shank to slide partially out of the hand chuck. When completely flat on the lap and in full contact with the surface of the lap, tighten the hand chuck. Insert the dop with stone into the 45° adapter and tighten nut. Move the micro-height adjustment (14) close to its upper limit. Raise the head until the stone just touches the lap. Cut the table by lowering the head with the micro-height adjuster until the stone just touches the lap. All grinding and polishing should be accomplished without removing the dopped stone from the 45° adapter.

#### Using the Sapphire Transfer Fixture

The Sapphire transfer fixture has been designed and manufactured to be used in conjunction with the keyway dops.

You will note on examination of the transfer fixture that it incorporates a "V" groove with spring-loaded cone shaped guide pin. Aligning the keyway of the dop with the guide pin of the "V" groove retains the original alignment of the stone from the first faceting operation, through the transferring procedure, to the finished faceted stone.



Further examination of the transfer fixture will reveal two separate sets of tapped holes, either of which set can be used for securing the holding clamp. The selection of either "side-clamping" or "top-clamping" is left to the discretion of the faceter. In the following procedure the clamps have been secured by use of the top-mounted tapped screw holes.

The following dopping hints are offered:

As a first step in the transferring procedure, the faceted end of the stone should be cleaned in alcohol to remove any surface oil film that might have been introduced by handling. Next, the faceted end of the stone should be dipped into a solution of alcohol and shellac and allowed to dry. (Dissolve 4-5 flakes of shellac into 2 fluid ounces of alcohol.)

Discard any dop wax that has become overheated or allowed to flame, since the ingredients will have become charred reducing the holding characteristic of the wax.

#### Transfer Procedure

Mount the dop with gemstone attached, to one side of the transfer fixture. Place the dop keyway over the guide pin, with the stone side to center of the fixture. Exert sufficient downward pressure on the clamp to keep the dop in place in the "V" groove. Tighten the clamp screw to a degree that will permit sliding the dop along the "V" groove under the clamp without disturbing the alignment.

1. Fill the hollow "cup" of a clean dop with dop wax and allow to set.
2. Insert the new dop in the opposite side of the transfer fixture. Align the dop keyway and guide pin, making wax contact with the faceted end of the gemstone in the opposite dop. Tighten the clamp screw firmly.
3. Grasping the wooden mounting block, rotate the transfer fixture applying heat uniformly around the shank of the dop to which the stone is to be transferred, until wax becomes plastic.
4. While the wax is still plastic push the dop with the gemstone along the "V" groove until the stone is set firmly into the wax of the new dop. Tighten the clamp screw.

5. Using a pre-heated knife blade, build up the surface between gemstone and dop with wax and finish by firming the wax seal around the stone with your finger.
6. Allow the dop to cool while still secured in the transfer fixture.
7. Hold the transfer fixture firmly in place on a plane surface. Simultaneously loosen both clamping screws.
8. Separate the original dop from the gemstone by applying heat to the shank of that dop.

The procedure outlined above is workable, but with experience the faceter may find variation that are more useful to his individual needs.

### General Maintenance

The Sapphire Faceting Unit is a precision instrument and must be treated as such. It has been designed to be as simple and problem free as possible. The unit is nearly all metallic and all the parts exposed to water have been plated or coated with electro-deposited epoxy to give years of trouble-free service. Good faceting practices require the frequent wiping of water spots and dust from the machine.

To protect the accuracy of the faceting head, the base should be kept clean and free of abrasives - this is particularly important around the sliding area. Covering the machine when not in use is also suggested.

The motor and master lap contain sealed bearings and require no lubrication. An occasional drop of oil on the threads of the micro-height adjustor and a light film of petroleum jelly on the faceting mast is recommended.