TM TOOLMASTER

Edition : 2.0
Date: (02/26)

Instruction Manual

UNIVERSAL D BIT GRINDER
TM-U3

Order Code: (G1975)

MACHINE DETAILS

MACHINE	Universal Grinder
MODEL NO.	TM-U3
SERIAL NO.	
DATE OF MANF.	

IMPORTED BY

AUSTRALIA

HARE&FORBES MACHINERYHOUSE

www.machineryhouse.com.au

NEW ZEALAND

MACHINERYHOUSE

www.machineryhouse.co.nz

NOTE:
This manual is only for your reference. At the time of the compiling of this manual every effort to be exact with the instructions, specifications, drawings, and photographs of the machine was taken. Owing to the continuous improvement of the TOOLMASTER machine, changes may be made at any time without obligation or notice. Please ensure the local voltage is the same as listed on the specification plate before operating any electric machine.

SAFETY SYMBOLS:
The purpose of safety symbols is to attract your attention to possible hazardous conditions

⚠WARNING ***Indicates a potentially hazardous situation causing injury or death***

⚠CAUTION ***Indicates an alert against unsafe practices.***

Note: Used to alert the user to useful information

NOTE:
In order to see the type and model of the machine, please see the specification plate. Usually found on the back of the machine. See example (Fig.1)

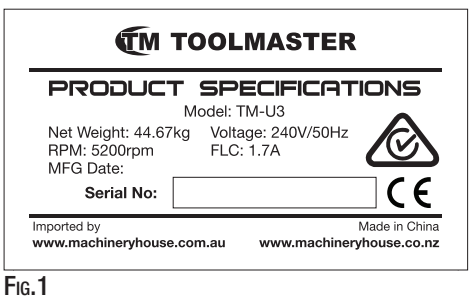


FIG.1

CONTENTS

1.1 SPECIFICATIONS

Order Code	G1975
MODEL	**TM-U3**
Taper Angle (deg)	0 - 180
Relief Angle (deg)	0 - 45
Negative Angle (deg)	0 - 26
Collet Type	5C
Spindle Speed (rpm)	5200
Motor Power (W)	370
Voltage / Amperage (v / amp)	240 / 10
Nett Weight (kg)	52

1.2 INCLUDED ACCESSORIES

- Wheel dresser with diamond (Mounted on machine)
- Wheel flange (Mounted on machine)
- Diamond wheel (Mounted on machine)
- 4, 6, 8, 10, 12, 16mm, 1/4", 3/8", 1/2" & 5/8" 5C collets
- Aligning finger (Mounted on machine)
- End mill grinding attachment
- Drill bit grinding attachment
- Lathe tool grinding attachment

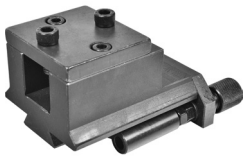
5C Collets

Drill Grinding Attachment

End Mill Grinding Attachment

Tools

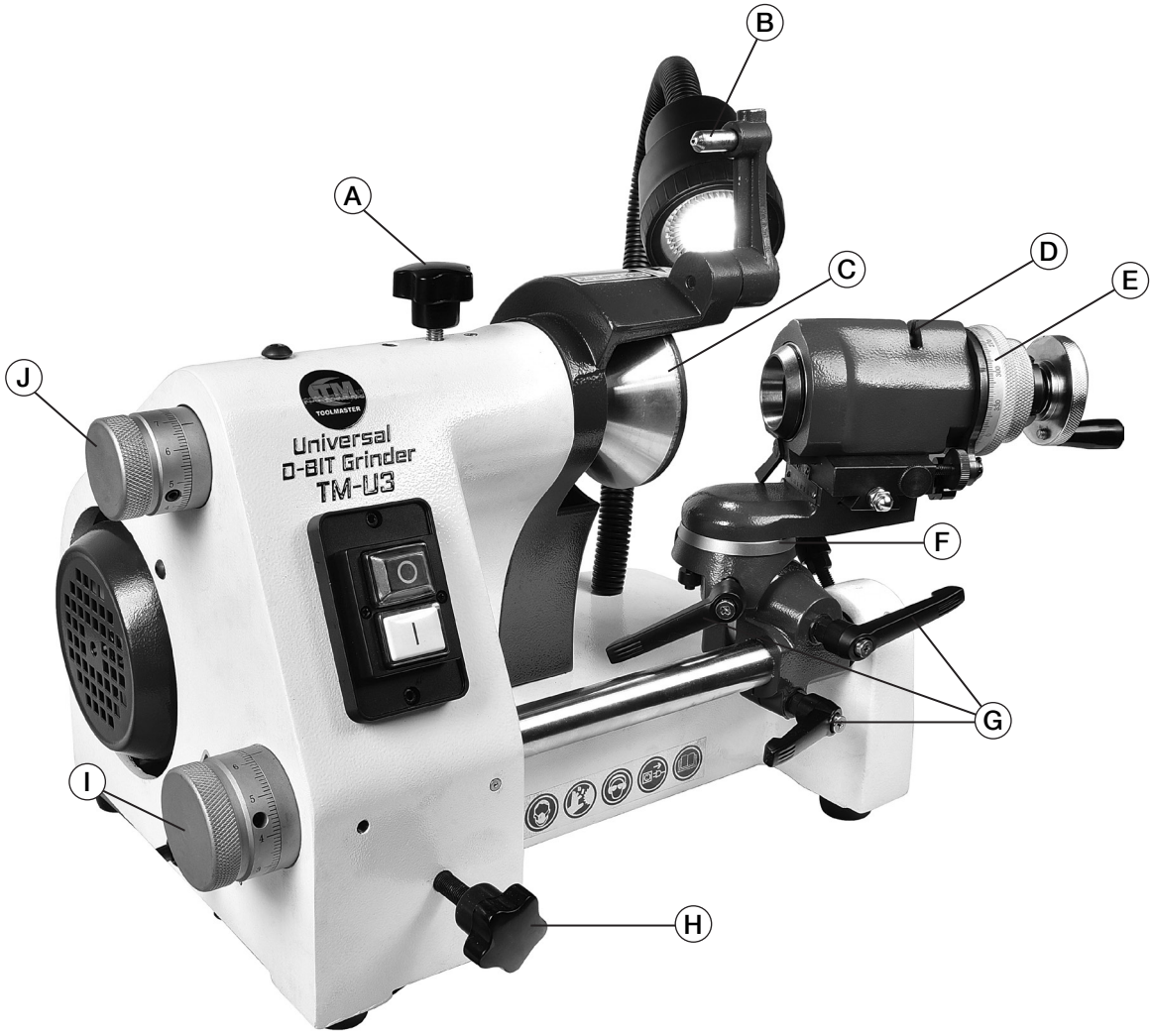
Grinding Wheel



Lathe Tool Grinding Attachment

1.3 IDENTIFICATION

Become familiar with the names and locations of the controls and features shown below to better understand the instructions when mentioned later in this manual.



A	Clamping screw of the shaft that moves the grinding wheel	**F**	Scale (Point angle)
B	Diamond Dress\er	**G**	Clamping levers
C	Diamond Wheel	**H**	Hand wheel tilts the bottom shaft towards the grinding wheel
D	Bayonet locking	**I**	Handwheel to move the tool holder closer to the wheel
E	Rotary Scale (Point angle)	**J**	Handwheel moves the grinding wheel towards the cutter

2.1 GENERAL SAFETY REQUIREMENTS

DO NOT use this machine unless you have read this manual or have been instructed in the use of this machine in its safe use and operation

WARNING

This manual provides safety instructions on the proper setup, operation, maintenance, and service of this machine. Save this manual, refer to it often, and use it to instruct other operators. Failure to read, understand and follow the instructions in this manual may result in fire or serious personal injury—including amputation, electrocution, or death.

The owner of this machine is solely responsible for its safe use. This responsibility includes, but is not limited to proper installation in a safe environment, personnel training and authorization to use, proper inspection and maintenance, manual availability and comprehension of the application of the safety devices, integrity, and the use of personal protective equipment.

The manufacturer will not be held liable for injury or property damage from negligence, improper training, machine modifications or misuse.

Safety glasses must be worn at all times in work areas. Earmuffs should be worn if the work area is noisy.

Sturdy footwear must be worn at all times in work areas.

Gloves should **NOT** *be worn when operating machinery. Should only be worn when handling the material.*

Long and loose hair must be contained with a net or under a hat.

OWNER'S MANUAL. Read and understand this owner's manual before using the machine.

DISCONNECT POWER FIRST. If using power, always disconnect the machine from power supply before making adjustments, or servicing the machine. This prevents any risk of injury from unintended startup or contact with live electrical equipment

TRAINED OPERATORS ONLY. Operators that have not been trained have a higher risk of being seriously injured. Only allow trained or supervised people to use this machine. When the machine is not being used, disconnect the power to the machine to prevent unauthorized use—especially around children. Make the workshop safe.

CAUTION!

It is impossible to cover all possible hazards. All workshop environments are different. These are designed as a guide to be used to compliment training and as a reminder to users prior to equipment use. Always consider safety first, as it applies to the individual working conditions.

2.1 GENERAL SAFETY REQUIREMENTS Cont.

WEARING PROPER APPAREL Do not wear clothing, apparel or jewelry that can become entangled in moving parts. Always tie back or cover long hair. Wear non-slip footwear to avoid accidental slips, which could cause loss of operating control.

HEARING PROTECTION. Always wear hearing protection when operating or observing loud machinery. Extended exposure to this noise without hearing protection can cause permanent hearing loss.

REMOVE ADJUSTING TOOLS. Tools left on machinery can become dangerous projectiles upon startup. Never leave hex keys, wrenches, or any other tools on machine. Always verify removal before starting!

USE CORRECT TOOL FOR THE JOB. Only use the tool for its intended purpose. Do not force the machine or its attachments to do a job for which they were not designed. Never make unapproved modifications. Modifying the machine or using it differently than intended may result in malfunction or mechanical failure that can lead to personal injury or death!

AWKWARD POSITIONS. Keep proper footing and balance at all times when operating machine. Do not overreach! Avoid awkward hand positions that make operating control difficult. This could increase the risk of accidental injury

GUARDS & COVERS. Guards and covers reduce accidental contact with moving parts or flying debris. Make sure they are properly installed, undamaged, and working correctly.

DUST PROTECTION. Only use safety equipment that has been approved by an appropriate standards agency. Breathing protection must be NIOSH-approved for specific hazards in the work area.

FORCING MACHINERY. Do not force the machine. It will do the job safer and better at the rate for which it was designed.

NEVER STAND ON MACHINE. Serious injury may occur if the machine is tipped or if the cutting tool is unintentionally contacted

STABLE MACHINE. Unexpected movement during operation greatly increases risk of injury or loss of control. Before starting, verify machine is stable and if using a mobile base it is locked in position.

UNATTENDED OPERATION. To reduce the risk of accidental injury, turn the machine OFF and ensure all moving parts have completely stopped before walking away. Never leave the machine running while unattended.

MAINTAIN WITH CARE. Follow all maintenance instructions and lubrication schedules to keep the machine in good working condition. A machine that is improperly maintained could malfunction, leading to serious personal injury or death.

CHECK DAMAGED PARTS. Regularly inspect the machine for any condition that may affect the safe operation. Immediately repair or replace damaged or parts that are incorrectly fitted before operating.

CHILDREN & BYSTANDERS. Keep children and bystanders at a safe distance from the work area. Stop using machine if they become a distraction.

USE PROPER EXTENSION CORD. Make sure any extension cord being used is in good condition and the right amperage for the machine. Your extension cord must also contain a ground wire and plug pin. Always repair or replace extension cords if they become damaged.

WARNING!

DO NOT operate any machine before it is fully assembled and all guards have been fitted and secured. Failure to do so may cause death or injury.

2.2 SPECIFIC SAFETY FOR "D" BIT GRINDERS

DO NOT use this machine unless you have been instructed in its safe use and operation and have read and understood this manual

Safety glasses must be worn at all times in work areas.

Long and loose hair must be contained.

Gloves must **NOT** *be worn when using this machine.*

Sturdy footwear must be worn at all times in work areas.

Close fitting/protective clothing must be worn.

Dust masks must be worn when using abrasive grinding wheels.

PRE-OPERATIONAL SAFETY CHECKS.

- ✓ Locate and ensure you are familiar with all machine operations and controls
- ✓ Ensure all guards are fitted, secure and functional. Do not operate if guards are missing or faulty.
- ✓ Check workspaces and walkways to ensure no slip/trip hazards are present.
- ✓ Ensure the wheel is secure and is not damaged and that the work piece is secured and safe.
- ✓ Check that the wheel is running true and are not glazed or loaded.
- ✓ Check for cracks in the wheel and report any you find.

OPERATIONAL SAFETY CHECKS

- ✓ Stand to the side of the wheel when starting up.
- ✓ Let the wheel gain maximum speed before starting to grind.
- ✓ Only one person may operate this machine at any one time.
- ✓ Slowly move the workpiece across the face of the wheel in a uniform manner.

ENDING OPERATIONS AND CLEANING UP

- ✓ Switch off the machine when work is completed.
- ✓ Clean up and absorb any coolant spills immediately.
- ✓ Leave the machine in a safe, clean and tidy state.

DON'T

- × Use faulty equipment. Immediately report any suspect machinery.
- × Hold workpiece with gloves, cloth, apron or pliers.
- × Grind non-ferrous metals.
- × Hold small objects by hand.
- × Never leave the machine running unattended.
- × Bend down near the machine while it is running.
- × Never force the workpiece against a wheel.

POTENTIAL HAZARDS AND INJURIES

- ❑ Hot metal.
- ❑ Sharp edges and burrs.
- ❑ Eye injuries.
- ❑ Sparks.
- ❑ Wheels 'run on' after switching off.
- ❑ Hair/clothing getting caught in moving machine parts.

WARNING!

Machines are safeguarded to protect the operator from injury or death with the placement of guards. Machines must not be operated with the guards removed or damaged.

3. POWER SUPPLY

3.1 ELECTRICAL INSTALLATION

Place the machine near an existing power source. Make sure all power cords are protected from traffic, material handling, moisture, chemicals, or other hazards. Make sure there is access to a means of disconnecting the power source. The electrical circuit must meet the requirements for 240V.

NOTE : The use of an extension cord is not recommended as it may decrease the life of electrical components on your machine.

ELECTRICAL REQUIREMENTS

Nominal Voltage..... 240V
Cycle..... 50 Hz
Phase..... Single Phase
Power Supply Circuit.....10 Amps
Full Load Current..... 86 Amps

(Full load current rating is also on the specification plate on the motor.)

3.2 FULL-LOAD CURRENT RATING

The full-load current rating is the amperage a machine draws when running at 100% of the output power. Where machines have more than one motor, the full load current is the amperage drawn by the largest motor or a total of all the motors and electrical devices that might operate at one time during normal operations.

Full-Load Current Rating for this machine at 240V is 1.86 Amps

It should be noted that the full-load current is not the maximum amount of amps that the machine will draw. If the machine is overloaded, it will draw additional amps beyond the full-load rating and if the machine is overloaded for a long period of time, damage, overheating, or fire may be caused to the motor and circuitry.

This is especially true if connected to an undersized circuit or a long extension lead. To reduce the risk of these hazards, avoid overloading the machine during operation and make sure it is connected to a power supply circuit that meets the requirements.

4. OPERATION

4.1 ON / Off - Switch

The switch is provided with an ON and OFF buttons in order to switch on the grinding machine for burins.

NOTE: After PRESSING THE OFF button or the ON / OFF switch, the grinding machine coasts for about 30 seconds.

4.2 USING THE TOOLHOLDER

The tool which needs to be ground is clamped in the collet chucks (30). The collet chuck is tightened by means of the crank (31).

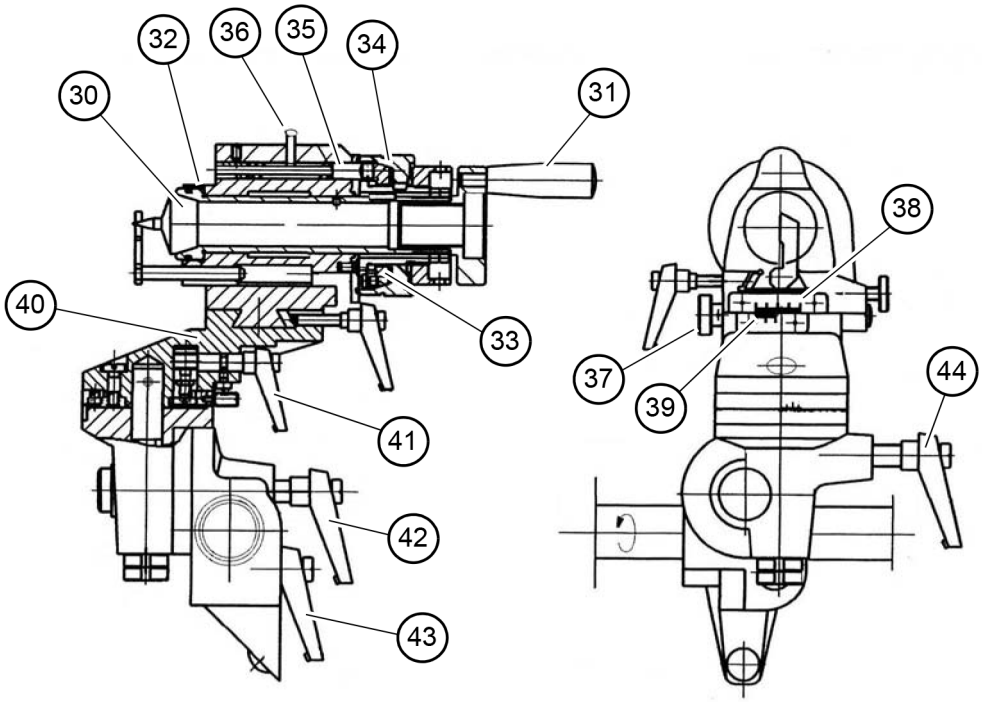
The fine adjustment of the bushing (32) in which collet chuck is located (30) is moved in and in or out direction using the knurled screw (33) on the carriage.

The division of the scale disc (34) are in steps of 15°. The bolt (35) which fixes the scale disc (34) is held by means of the bayonet locking (36). The scale disc (34) can be freely moved when the bayonet locking (36) is cammed in. It is possible to adjust the upper part of the support by means of the screw (37). Read the values from the scale (38) and from the vernier scale (39) for exact settings.

If both values of the scale (38) with (39) are set to 0 the grinding machine for cutters is in the basic setting.

In order to move the slewing arm (40) at an angle of up to 90° it is necessary to release the clamp lever (41).

It is possible to tilt the slewing arm (40) at an angle of up to 40° by means of a clamping lever (42). It is necessary to tighten the lever (43) in order to fix the tool holder on the shaft. The clamping lever (44) secures the shaft.

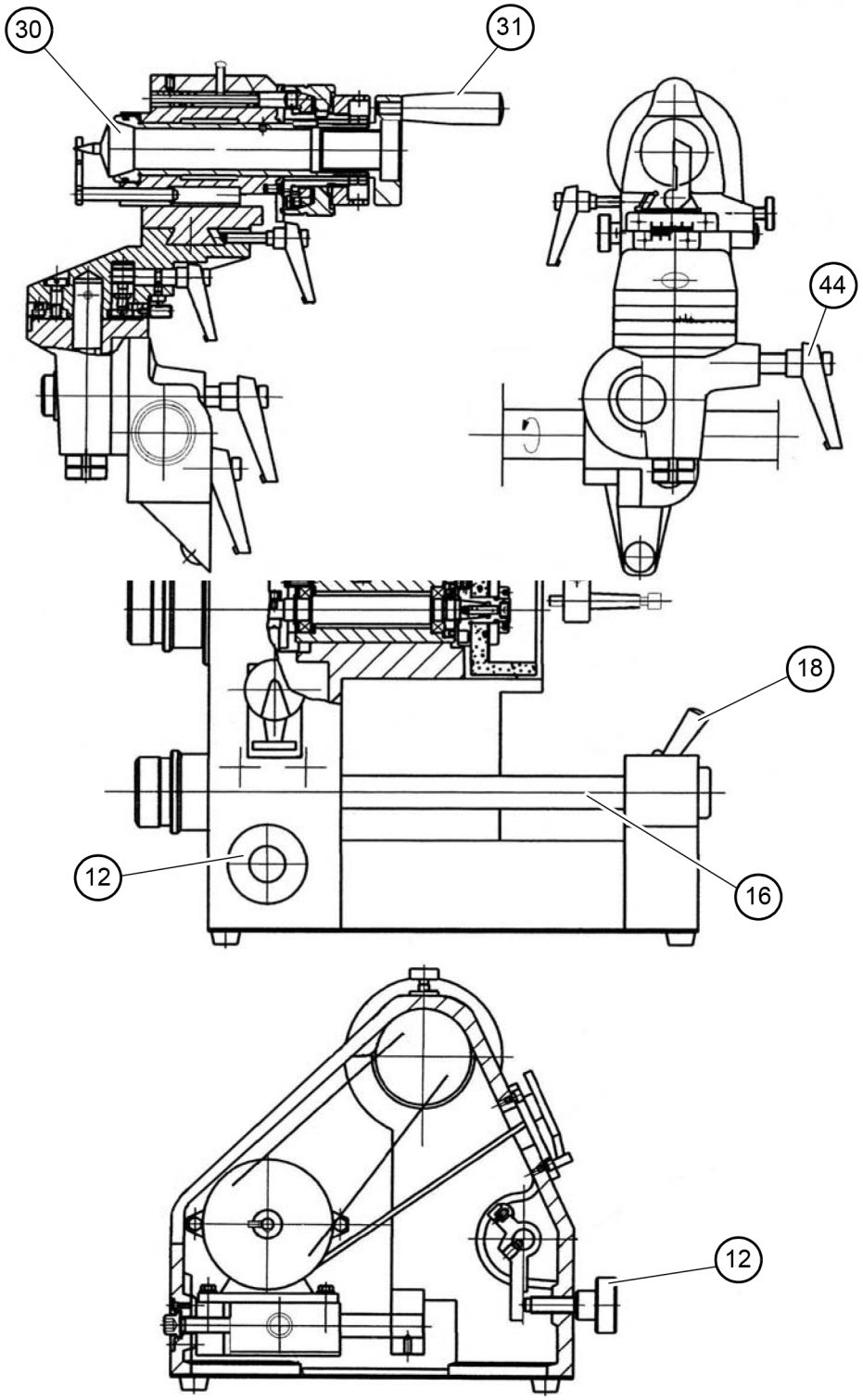


4.3 SETTING THE SHAFT SHOULDER

Clamp the tool in the collet chuck (30) and release the lever (18) in order to be able to move the shaft (16).

The stop of the shaft (16) is set for the tool carrier by means of the handwheel (12). If the handwheel (12) is turned, the shaft rotates to the stop.

Clamp the clamping lever (44) in order to control the rotation movement.

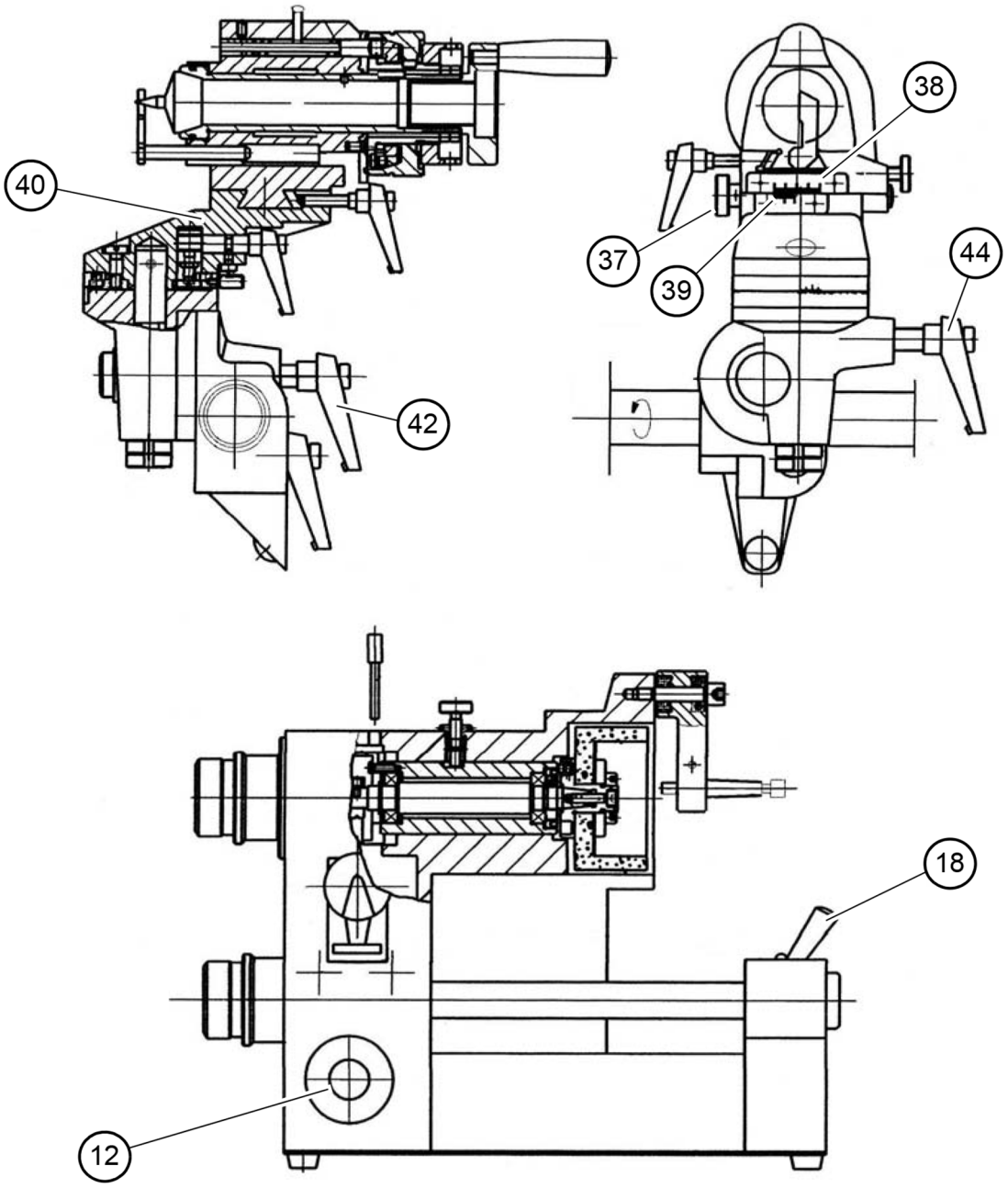


4.4 GRINDING ANGLES

Set the upper part of the support by means of the scale (38) and the vernier (39). Both values must be set to 0.

Release the clamping lever (42) and then tilt the slewing arm (40) at an angle of 0 degree. Then, release the clamping lever (18) in order to be able to move the shaft.

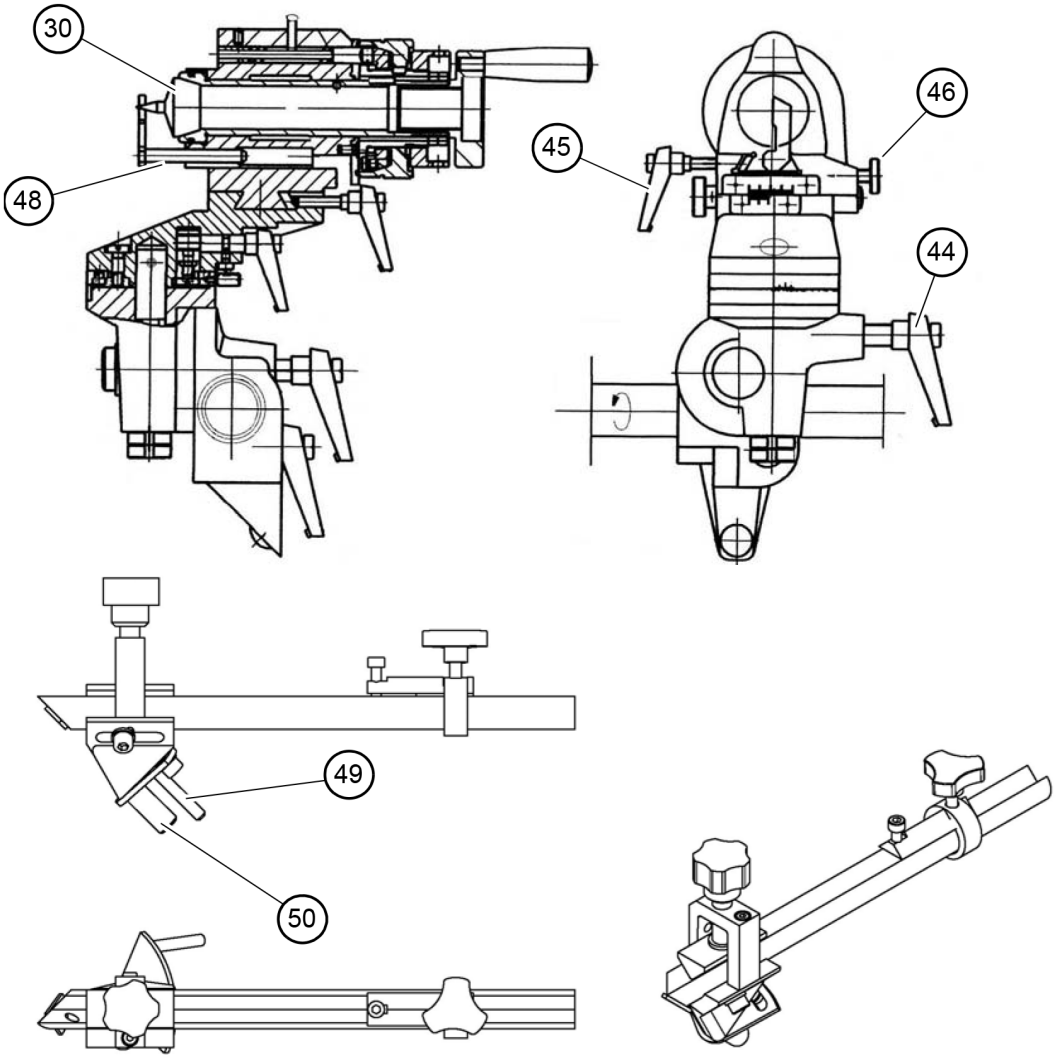
Set the slewing arm (40) to the desired angle by releasing the lever (44). Turn the handwheel (12) in order to set the stop.



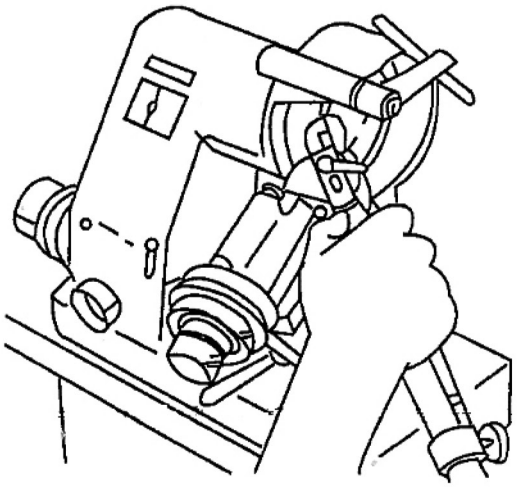
4.5 DRILL GRINDING ATTACHMENT

When using the drill grinding attachment it is not necessary to disassemble the already existing grinding device for the single edge milling cutter.

Pull the stop (48) out of the bushing and introduce (49). (50) is fixed in the collect chuck (30).



4.5 DRILL GRINDING ATTACHMENT Cont.



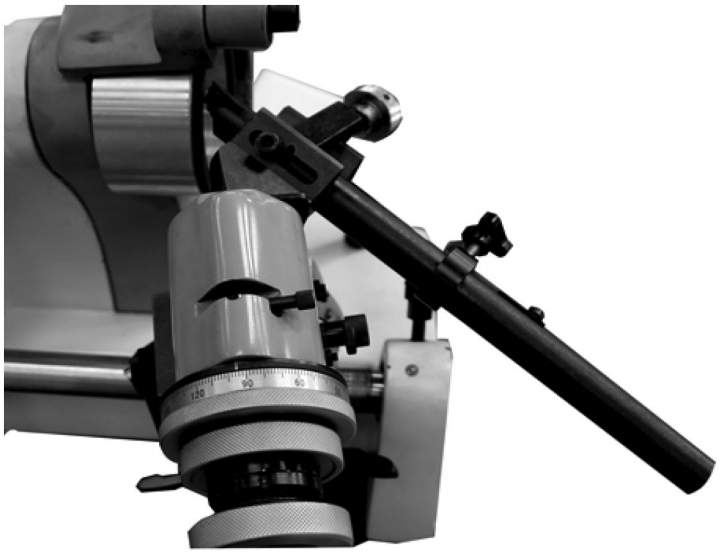


Fig.1

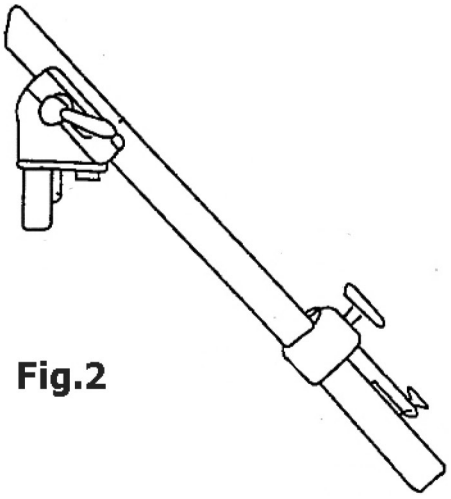


Fig.2

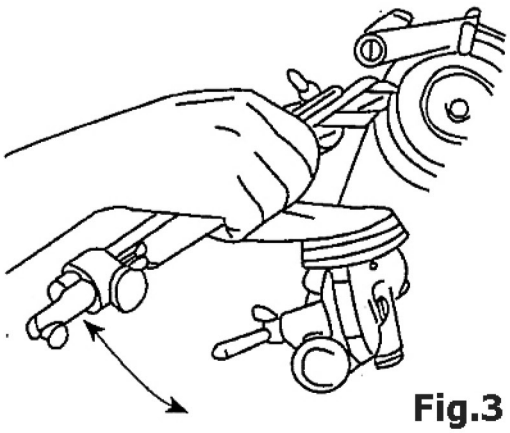
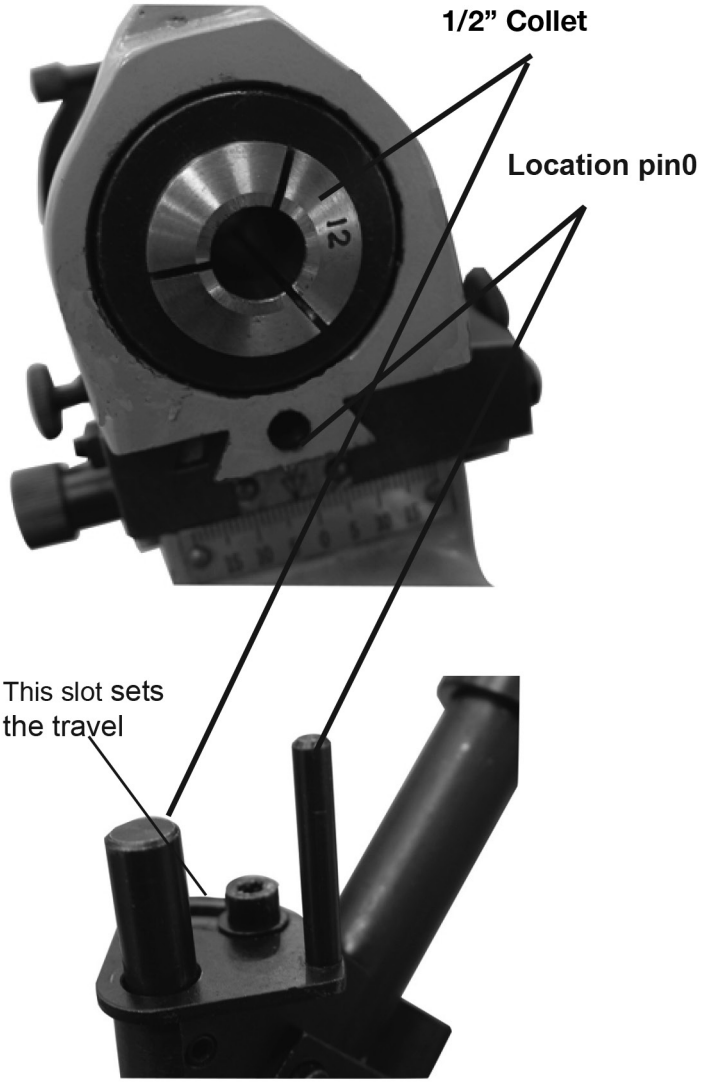


Fig.3



4.6 TURNING TOOL GRINDING ATTACHMENT

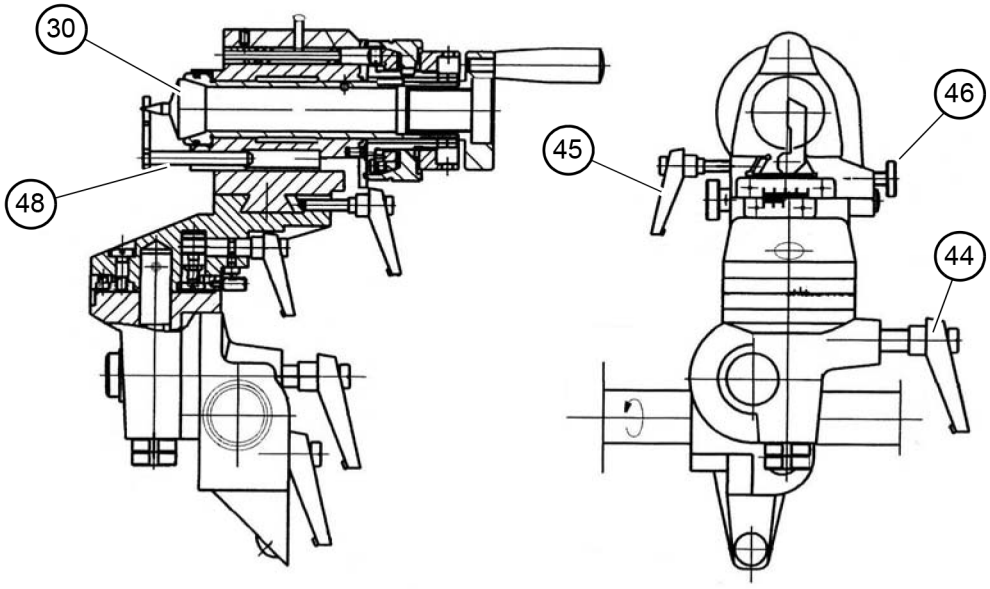
In order to assemble the turning tool grinding device it is necessary to remove the grinding device for single edge milling cutters.

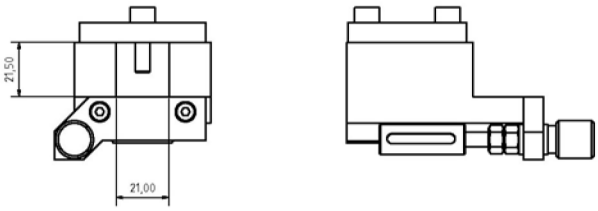
To remove the mounted grinding device follow the steps below:

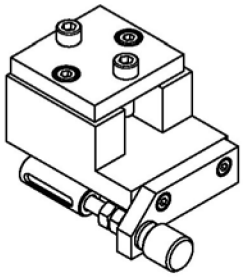
1. Release the clamping lever (45) and the knurled screw (46).

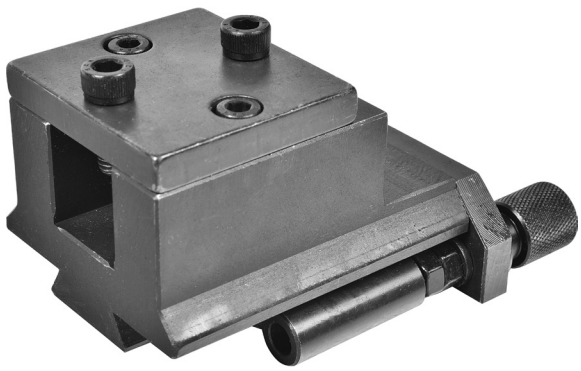
2. Pull the grinding device off the dovetail guide.

Make sure that the brass gib does not fall down. If required reset the gib for the devices.









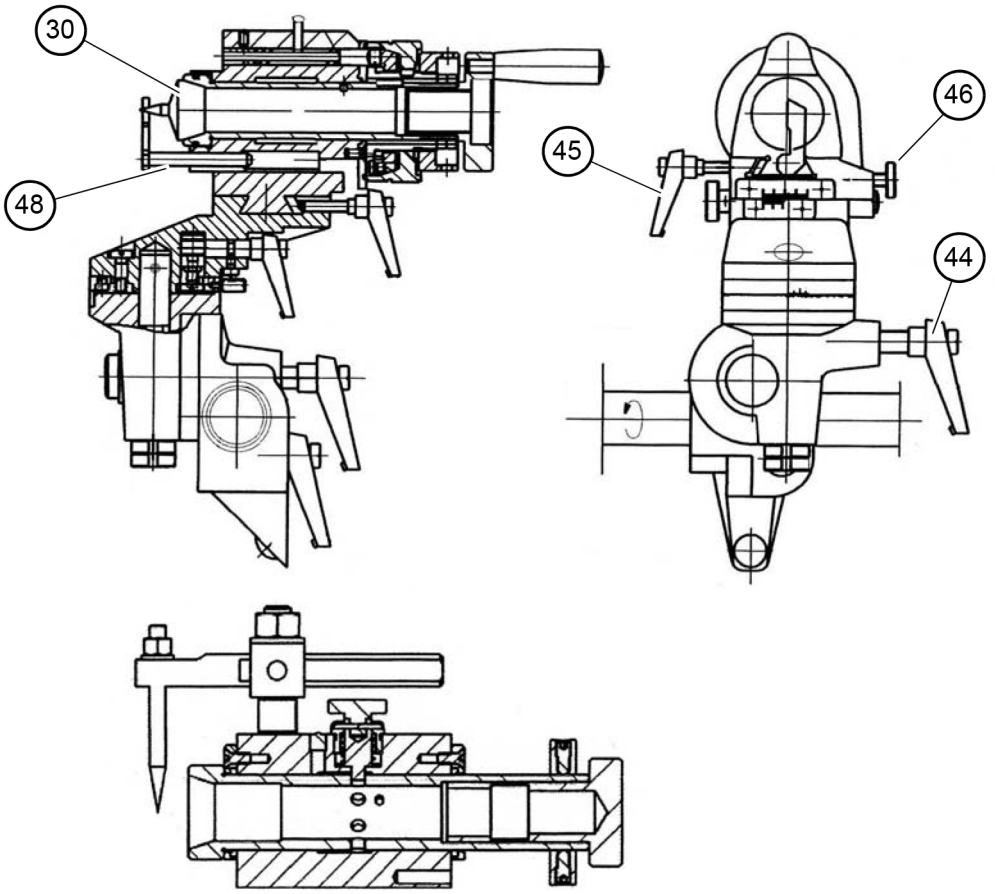
4.7 END MILL GRINDING ATTACHMENT

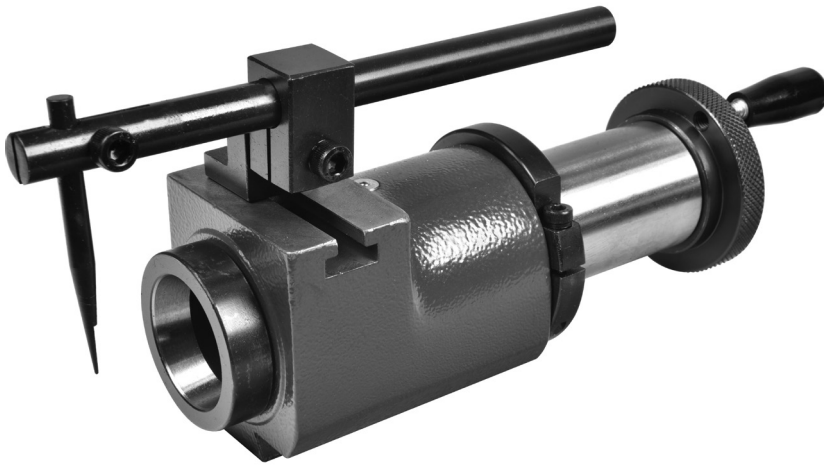
In order to assemble the end mill grinding attachment it is necessary to remove the grinding device for single edge milling cutters.

To remove the mounted grinding device:

1. Release the clamping lever (45) and the knurled screw (46).
2. Slide the grinding device off the dovetail guide, then slide the end mill griding attachment.

Make sure that the brass gib does not fall down. If required reset the gib for the devices.





4.7 END MILL GRINDING ATTACHMENT Cont.

Milling cutters must be sharpened occasionally to keep them in good operating condition. When grinding milling cutters, care must be exercised to maintain the proper angles and clearances of the cutter.

Improper grinding can result in poor cutting edges, lack of concentrically, and loss of form in the case of formed tooth cutters. Milling cutters cannot be sharpened by offhand grinding. A tool and cutter grinding machine must be used.

Sharpening The Ends of End Mills and Slot Drills

Select the suitable collet to hold the shank of the End Mill or Slot Drill. Put collet into the sleeve,and then rotate the sleeve to lock it firmly as Figure 1.

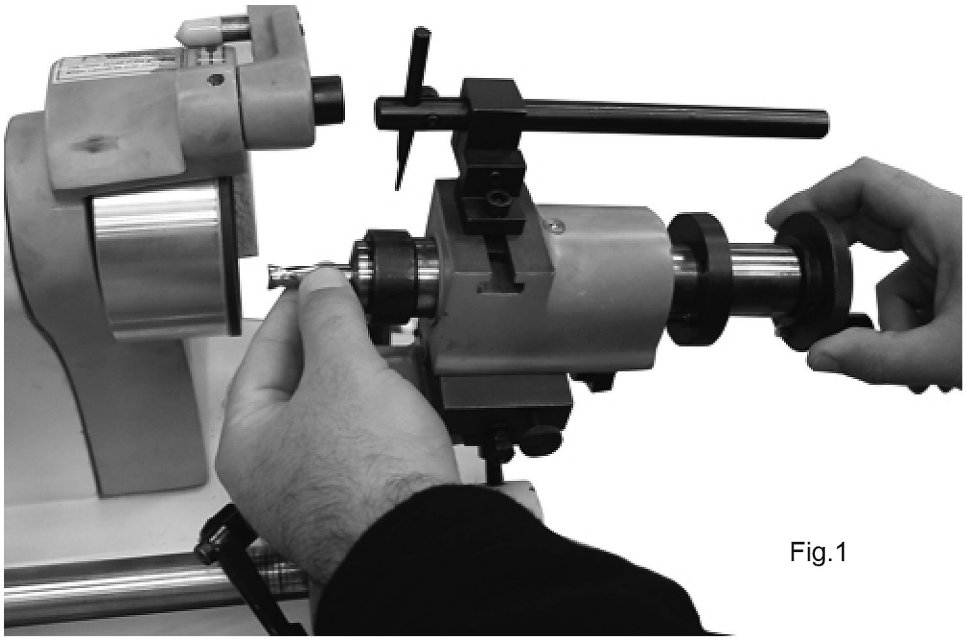


Fig.1

Loosen the positioning screw of the tooth rest,and then adjust the tooth rest to the position where the cutter will not-touch the pointer when the sleeve is pulled all the way back as in Fig.2.

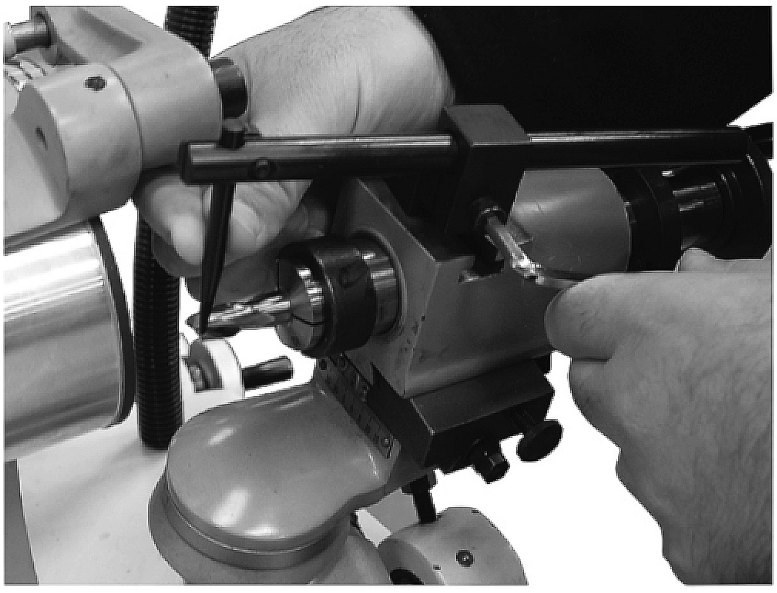


Fig.2

4.7 END MILL GRINDING ATTACHMENT Cont.

Locate the tooth rest into the outer edge of the cutter blade, and position it as close as possible to the end of the cutters cutting edge to be ground making sure that there is clearance and the finger will not touch the grinding wheel.

Move the tooth rest until the tooth rest's point and the cutter's centre are on the same line horizontally (Fig.1)

Release the handle and tilt the endmill grinding attachment down to the angle required for the cutter relief.

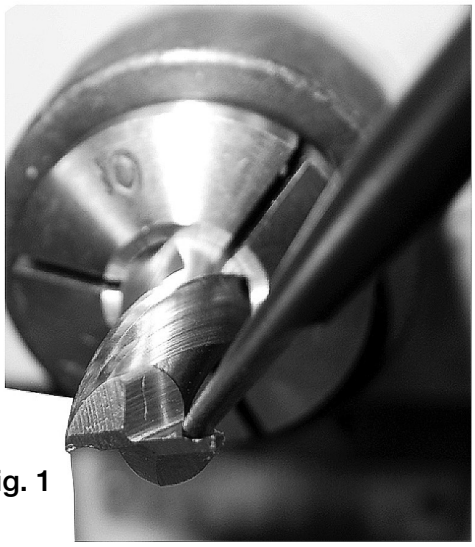


Fig. 1

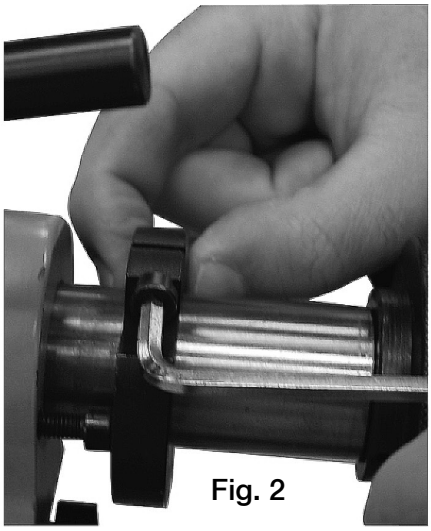


Fig. 2

Adjust the collar on the endmill grinding attachment so that when the cutter is pushed forward to a stop the tooth rest's tip is about 0.5mm from the end of the cutter. (Fig.2)

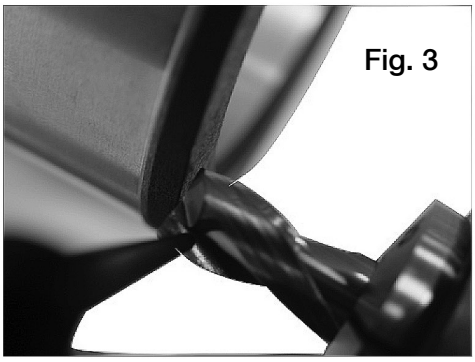


Fig. 3

Adjust the end mill grinding attachment and the wheel so that when the fixture spindle is pushed up against the stop and the collar the cutter is nearly touching the wheel. (Fig.3)
Adjust the wheel in so that it just touches the cutter by using the adjustment knob at the end of the grinding wheel spindle. (Fig.4)
Move the cutter across the face of the wheel using the adjustment screw (Fig.5)
Withdraw the spindle holding the cutter so that the cutter clears the tooth rest and rotate 180 degrees. Move the spindle back and locate the cutter on the tooth rest and take the same cut.

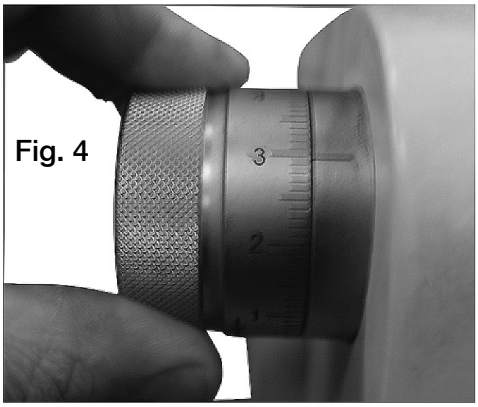
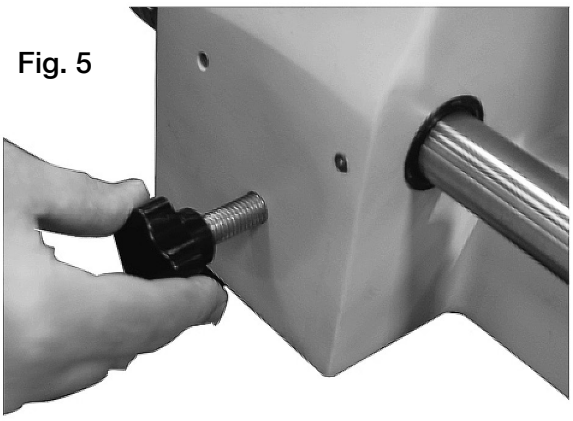


Fig. 4

Fig. 5

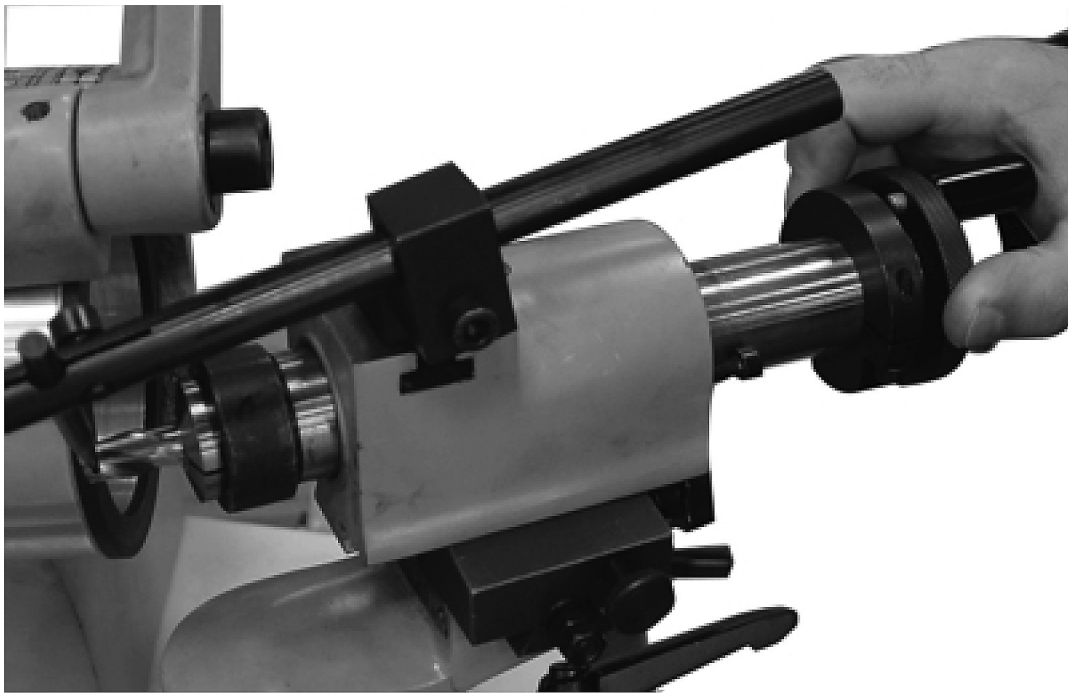


4.7 END MILL GRINDING ATTACHMENT Cont.

Sharpening The Sides of End Mills and Slot Drills

Set the tooth rest into the outer edge of the cutter blade, and position it as close as possible to the edge to be ground making sure that there is clearance and the finger will not touch the grinding wheel. Move the tooth rest until the tooth rest's up-most point and the cutter's center are on the same line horizontally

Pull the sleeve slightly backwards, so that the cutter clears the wheel. Move the sleeve forward and let it rotate naturally against the tooth rest as you move it forward and back being sure to never let the cutter part from the tooth rest. Don't force the cutter to rotate.



When the flute is ground pull the cutter back away from the grinding wheel and off the tooth rest, and then rotate the sleeve to the next blade.

Push the cutter forward to the start point making sure that the flute is located on the tooth rest and repeat the grinding process as before.

After all the blades are ground, tum off the motor when finished.

4.8 WHEEL DRESSING

NOTE ! Diamond wheels should not be dressed.

If using abrasive wheels, wheel trueing and dressing should be performed at regular intervals. For abrasive wheels, dressing is done by means of a diamond set into a tip of a rod. The diamond dresser is attached to an arm. The in feed is done by the main spindle feed knob. The diamond tool assembly is supported by the wheel guard. (see Fig. I and 2) Wheel truing and dressing is particularly necessary when the wheel has become hardened or when sharp corners has been worn off. Wheels in this

condition result in poor surface finish and overheating of the cutting tools.

Dressing:

1. Loosen clamping grub screw that holds the diamond dresser. Move the diamond dresser away from the wheel so it clears the wheel. Swing the dressing attachment in front of the wheel.
2. Set diamond, dresser 1 mm away from the wheel. Lock the clamping grub screw.
3. Turn Feed screw until the dressing diamond contacts the wheel. The maximum cut should be around 0.2mm.

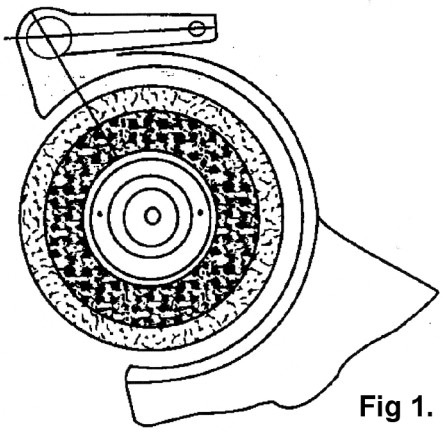


Fig 1.

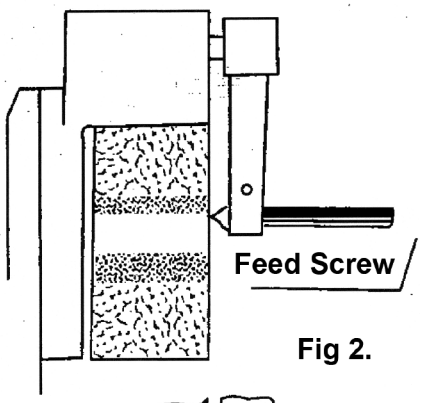


Fig 2.

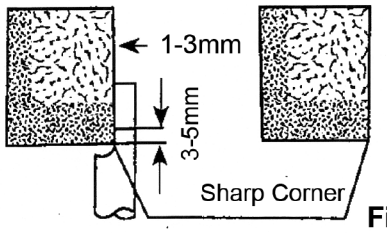


Fig 4

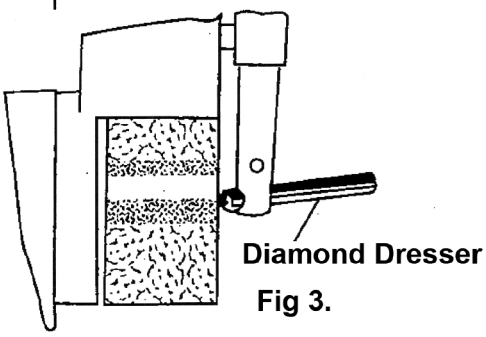


Fig 3.

WARNING.

When operating a grinder it is important to wear appropriate safety gear to protect yourself from injury. This includes safety glasses or goggles, or a face shield to protect your eyes from flying debris.

5. MAINTENANCE

It is very important that regular maintenance of the equipment is carried out. The operators need to follow the daily maintenance procedures.

For optimum performance from this machine, the maintenance schedule listed below and in this section must be followed.

5.1 SCHEDULE

The type and extent of wear depends to a large extent on the individual usage and service conditions.

Regularly cleaning of the grinding machine of grinding dust. Removing the grinding dust from the slideways which can lead to wear. If necessary - use compressed air to clean the grinding machine of grinding dust.

If the slideways appear to be loose, fasten the gib adjustment screws accordingly.

Lubricate the nipples at regular intervals.

WARNING!
Check if the cup wheels are damaged or have cracks before mounting them. If a new cup wheel is damaged or shows cracks it must NOT be mounted in any way.

Spare Parts Section
UNIVERSAL GRINDER
TM-U3

Order Code: (G1975)
Edition : 2.0
Date: (01/25)

The following section covers the spare parts diagrams and lists that were current at the time this manual was originally printed. Due to continuous improvements of the machine, changes may be made at anytime without notification.

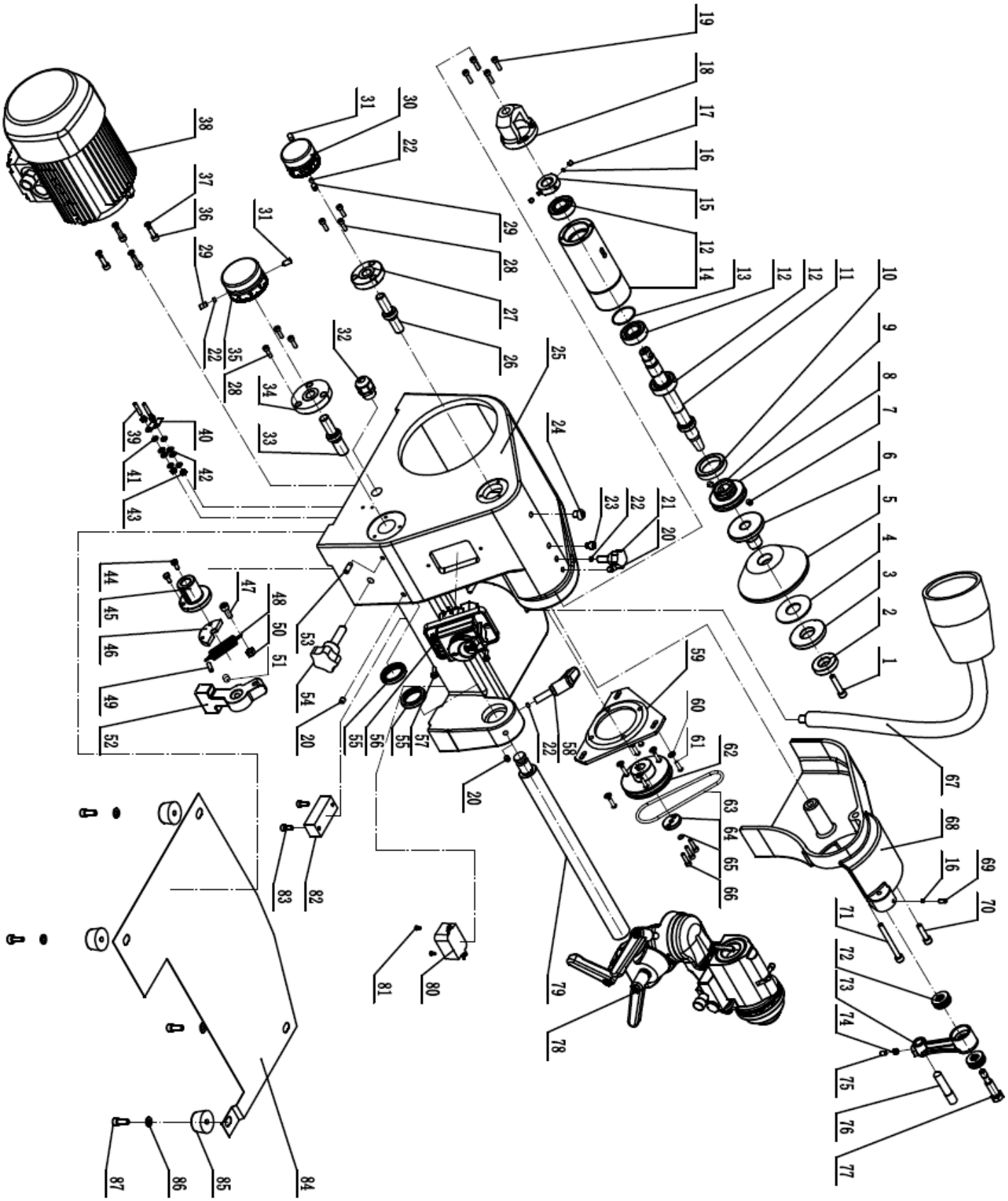
HOW TO ORDER SPARE PARTS

1. Have your machines model number, serial number & date of manufacture on hand, these can be found on the specification plate mounted on the machine.
2. A scanned copy of your parts list/diagram with required spare part/s identified.

NOTE: SOME PARTS MAY ONLY BE AVAILABLE AS AN ASSEMBLY

3. Go to www.machineryhouse.com.au/contactus and fill out the inquiry form attaching a copy of scanned parts list.

SPARE PARTS DIAGRAM

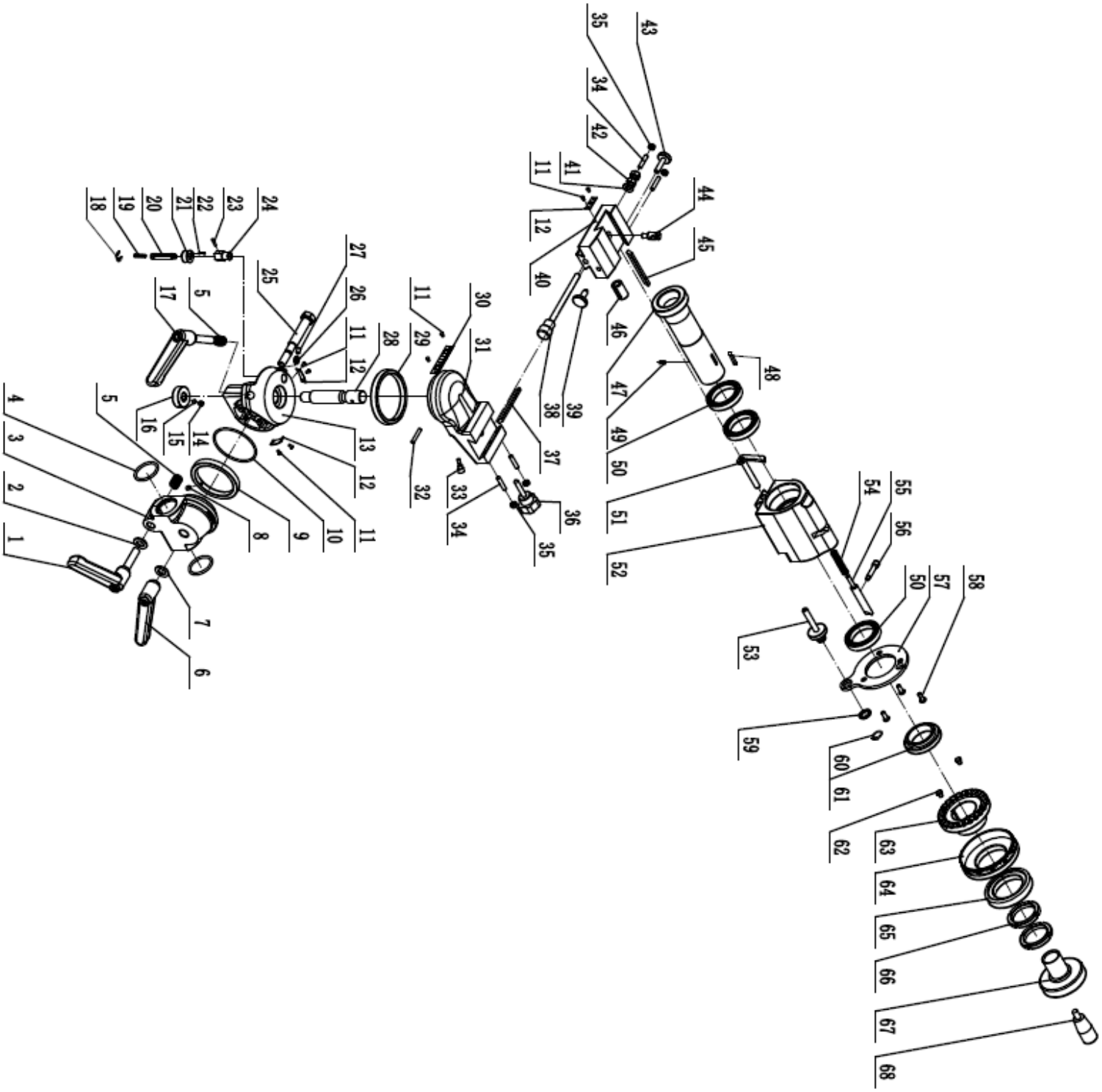


SPARE PARTS LIST

Part No.	Description	QTY
1	Hexagon socket head cap screw M6x30	1
2	Grinding wheel lock nut	1
3	Grinding wheel retainer	1
4	Felt pad Ø20x Ø50x2	1
5	Bowl type resin diamond grinding wheel	1
6	Grinding wheel seat	1
7	Hexagon socket head cap screw M6x30	2
8	Pulley	1
9	Wire ring (outer diameter Ø27.5x Ø1)	1
10	Bearing retainer	1
11	Connecting shaft	1
12	Rolling bearing 6003-2RZ (Ø35x Ø17x10)	3
13	O-ring Ø47(outside diameter) x Ø2	1
14	Shaft sleeve	1
15	Lock Nut	1
16	Copper pad Ø4x2	2
17	Hexagon socket set screw with concave point M5x6	2
18	Connection seat	1
19	Hexagon socket head cap screw M4x16	4
20	Pressure fitting oil cup outer	1
21	Star shaped plum handle (with screw) M8x20	
22	Copper pad Ø6x3	1
23	Spindle locating pin	1
24	Hexagon socket flat head screw M8x10	1
25	Host	1
26	Spindle connecting rod	1
27	Small fixed base	1
28	Hexagon socket head cap screw M4x14	3
29	Hexagon socket flat set screw M6x10	1
30	Copper pad Ø5x3	1
31	Small scale knob	1
32	Hexagon socket set screw M6x12	1
33	Cable screw connector M16X1.5	1
34	Optical axis connecting rod	1
35	Large fixed base	1
36	Large scale knob	1
37	Motor	1
38	Hexagon socket flat set screw M4x20	2
39	Grounding plate Ø5	2
40	External teeth lock washer	4
41	Flat washer Grade C 4	4
42	1 type hexagon nut M4	4
43	Hexagon head bolt - full thread M4x10	2
44	Optical axis connection seat	1
45	Connection spacer	1

Part No.	Description	QTY
46	Hexagon socket head cap screw M6x20	1
47	Circular hook and loop compression center tension spring	1
48	Type 1 hexagon nut, Grade A and Grade B	1
49	Elastic straight pin straight groove light 4x18	1
50	Hexagon socket set screw M8x10	1
51	Bracket	1
52	Connecting seat locating pin	1
53	Star shaped plum handle tip (with screw) M10X1x39	1
54	Skeleton oil seal Ø25x Ø35x6	2
55	DZ05 Switch Assembly	1
56	Hexagon socket head cap screw M4 × 12	2
57	Adjustable fixed handle external thread DM8x25	1
58	Motor board	1
59	Standard spring washer 5	4
60	Flat washer Grade C 5 (white zinc plated)	4
61	Hexagon socket flat round head screw M5x16	4
62	Motor pulley	1
63	PU round belt Ø6x430	2
64	Motor pulley retainer	1
65	Standard spring washer 4	1
66	Hexagon socket head cap screw M4x16	3
67	24VLED hose lamp	1
68	U3 grinding wheel side shield	1
69	Hexagon socket flat set screw M5x10	1
70	Hexagon socket head cap screw M6x25	1
71	Hexagon socket head cap screw M6x60	1
72	Thrust ball bearing 51100	2
73	Grinding wheel dresser	1
74	Ordinary steel wire insert M5-9	1
75	Hexagon socket flat set screw M5x8	1
76	Vajra correction pen Ø10x50	1
77	Finisher Bolt	1
78	Rotary base assembly	1
79	Optical axis	1
80	LED Driver	1
81	Hexagon socket flat round head screw M3x6 (white zinc plated)	2
82	TB-1054 terminal block	1
83	Hexagon socket cylinder head m4×8	2
84	Host Chassis	1
85	Door mat Ø30x Ø25x17	4
86	Flat washer Grade C 6x1.6	4
87	Hexagon socket head cap screw M6x16	4

SPARE PARTS DIAGRAM

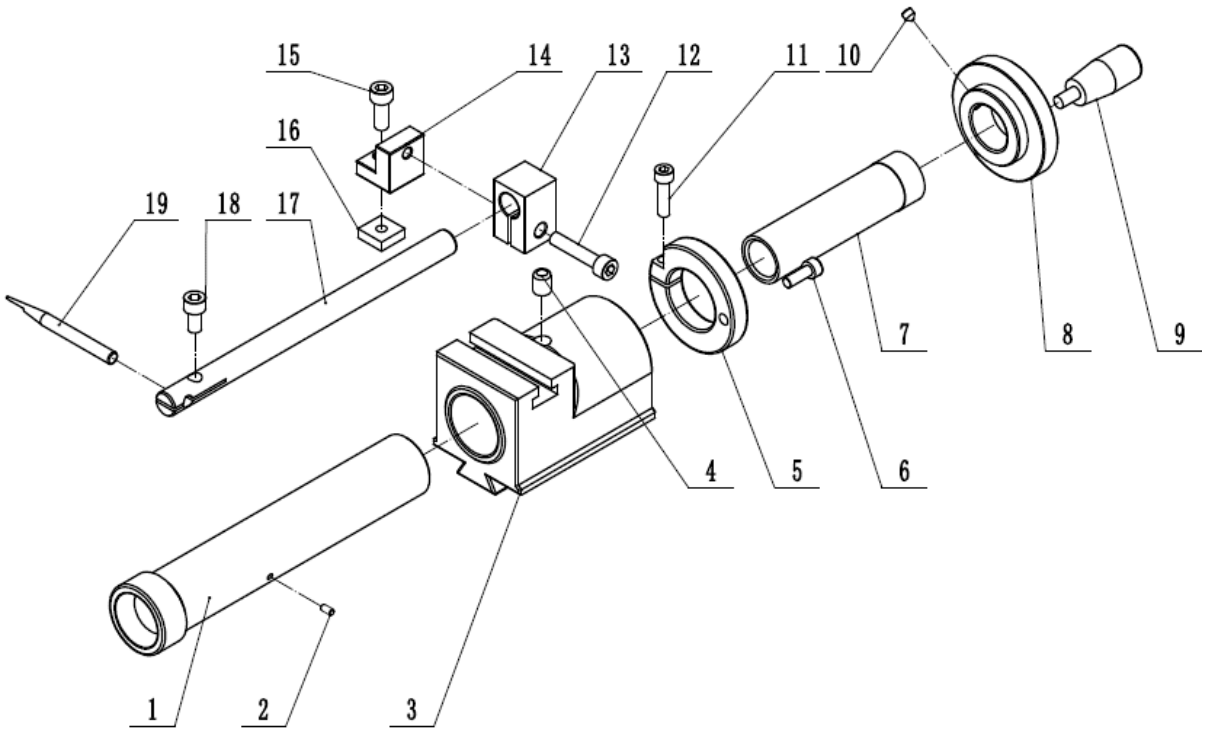


SPARE PARTS LIST

Part No.	Description	QTY
1	Adjustable fixed handle external thread M8x32	1
2	Flat washer Grade C 8	1
3	Fixed Base	1
4	O-ring ø 30 (outer diameter) x ø 2.4	2
5	Ordinary steel wire insert M8-10	1
6	Adjustable fixed handle (internal thread) M8	1
7	Gasket% c18x% c8.5x3	1
8	Hexagon socket flat set screw M4×5	1
9	Fixed base scale ring	1
10	O-ring Ø54 (outside diameter) xØ1.9	1
11	Half round head rivet 2x4	4
12	Fixed seat identification (18x7x0.5)	2
13	Ordinary steel wire insert M8-13	1
14	Rotary seat	1
15	Hexagon socket set screw with cylindrical point M5x5	1
16	Copper pad Ø4x2	1
17	Swivel seat lock nut	1
18	Adjustable fixed handle tip external thread M8x44	1
19	Split retaining ring 6	1
20	Rotary seat locating pin spring	1
21	Rotary base locating pin rod	1
22	Rotary base locating pin base	1
23	Straight pin A type 2×8	1
24	Straight pin A type 2×10	1
25	Rotary seat positioning eccentric seat	1
26	Swivel Seat Bolt	1
27	Ordinary steel wire insert M4-8	1
28	Hexagon socket flat set screw M4 × 6	1
29	Rotary base connecting rod	1
30	Rotary dial	1
31	Upper slide scale label (44x10x0.5)	1
32	Sliding seat	1
33	Elastic straight pin - straight groove - light 3X22	1
34	Cross adjustment knob	1
35	Hexagon socket set screw M4×20	4
36	1 type hexagon nut M4	4
37	Star shaped plum handle (with screw) M5x25	1
38	Lower stopper	1
39	Upper slide adjusting bolt	1
40	Thread sleeve fixing bolt	1
41	Upper slide	1
42	Flat washer Grade C 6	1
43	1-type hexagon nut M6	2
44	Lower stopper iron locking bolt	1
45	Sliding base locating pin	1

Part No.	Description	QTY
46	Upper stopper	1
47	Thread sleeve	1
48	Collet sleeve	1
49	Ordinary flat key type A 3×16	1
50	Elastic straight pin - straight groove - light 3X8	1
51	Rolling bearing 61806-2RZ (Ø42x Ø30x7)	3
52	Positioning axis	1
53	Slide	1
54	Sliding seat adjusting bolt	1
55	Stop pin spring	1
56	Stop pin	1
57	Stop pin bolt	1
58	Fixed plate	1
59	Hexagon socket flat round head screw M4×10	3
60	Circlip spacer	1
61	Circlip for shaft A type 10	1
62	Indexing tooth locating pin	2
63	Indexing gear spacer ring	1
64	Indexing tooth	1
65	Indexing gear scale ring	1
66	Indexing locking ring	3
67	Round nut locking ring	2
68	Collet handwheel	1
69	Bakelite rotary handle M6x34	1

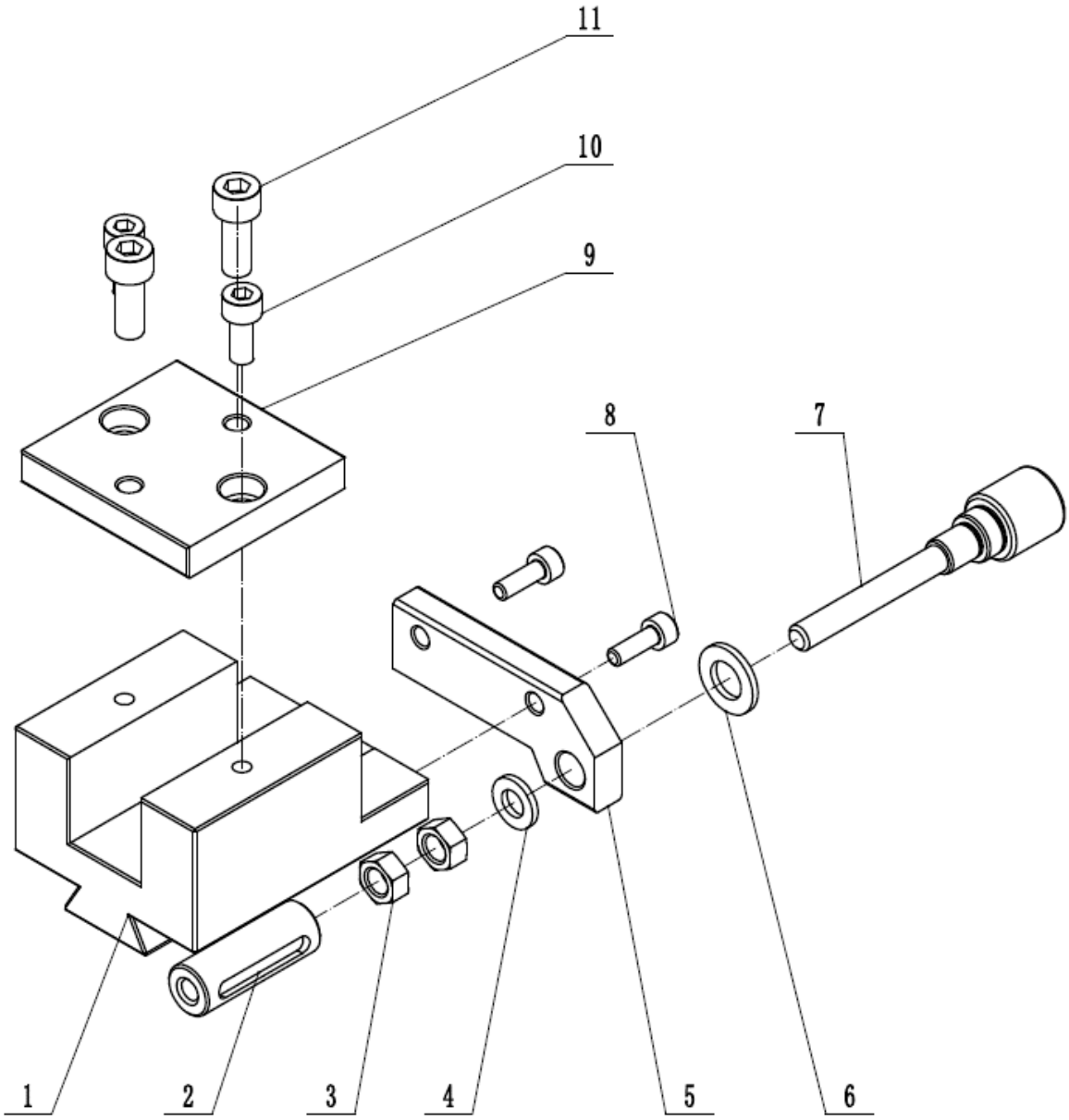
MILL ATTACHMENT DIAGRAM



Part No.	Description	QTY
1	Milling cutter collet sleeve	1
2	Elastic straight pin - straight groove - light 3X8	1
3	Milling cutter base	1
4	Pressure matched oil filling cup 8	1
5	Retaining ring	1
6	Hexagon socket head cap screw M5×14 (12.9)	1
7	Handwheel shaft	1
8	Milling cutter handwheel seat	1
9	Bakelite rotary handle M6x34	1
10	Hexagon socket set screw M5×5	1

Part No.	Description	QTY
11	Hexagon socket head cap screw M5×20	1
12	Hexagon socket head cap screw M6×30	1
13	Lower support block	1
14	Upper support block	1
15	Hexagon socket head cap screw M6×16	1
16	Milling cutter cushion block	1
17	Support rod	1
18	Hexagon socket head cap screw M6×12	1
19	Milling cutter positioning rod	1
	Hexagon socket head cap screw M5×20	1

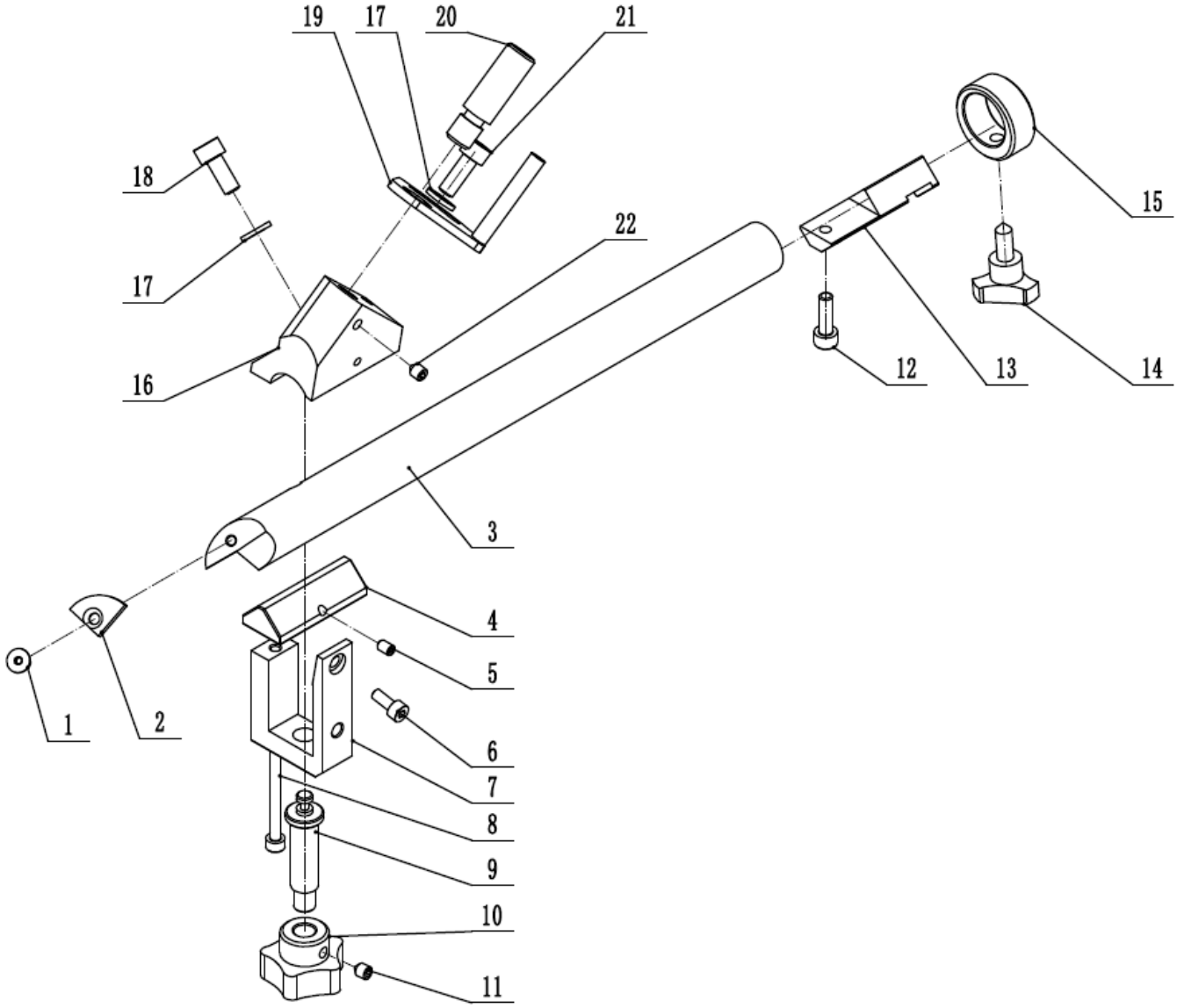
TURN ATTACHMENT DIAGRAM



Part No.	Description	QTY
1	Tool holder	1
2	Turning tool thread sleeve	1
3	1-type hexagon nut M6	2
4	Plain washer - Grade C 6	1
5	Turning tool support plate	1
6	Plain washer - Grade C 8	1

Part No.	Description	QTY
7	Turning tool adjusting bolt	1
8	Hexagon socket head cap screw M4×12	2
9	Pressing plate	1
10	Hexagon socket head cap screw M5×12	2
11	Hexagon socket head cap screw M6×16	2

TURN ATTACHMENT DIAGRAM Cont.



Part No.	Description	QTY
1	Hexagon socket countersunk head screw M4×8	1
2	Spacer	1
3	Drill rod	2
4	Drill press plate	1
5	Hexagon socket flat set screw M4×6	1
6	Hexagon socket head cap screw M4×10	1
7	Drill support	1
8	Hexagon socket head cap screw M4×40	1
9	Pressing plate adjusting rod	1
10	Optical hole star handle	1
11	Hexagon socket head cap screw M5×6	1

Part No.	Description	QTY
12	Hexagon socket head cap screw M5×16	1
13	Pressing plate	1
14	Triangular rubber head handle tip M6x15	1
15	Eccentric sleeve	1
16	Bit seat	1
17	Flat washer Grade C 6	2
18	Hexagon socket head cap screw M6×14	1
19	Rotary plate	1
20	Bit locating pin	1
21	Hexagon socket head cap screw M6×16	1
22	Hexagon socket set screw M5×6	1

NOTES:

ENVIRONMENT PROTECTION

Recycle unwanted materials instead of disposing of them as waste. All tools, accessories and packaging should be sorted, taken to a recycling centre and disposed of in a manner which is compatible with the environment. When the product becomes completely unserviceable and requires disposal, drain any fluids (if applicable) into approved containers and dispose of the product and fluids according to local regulations.

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