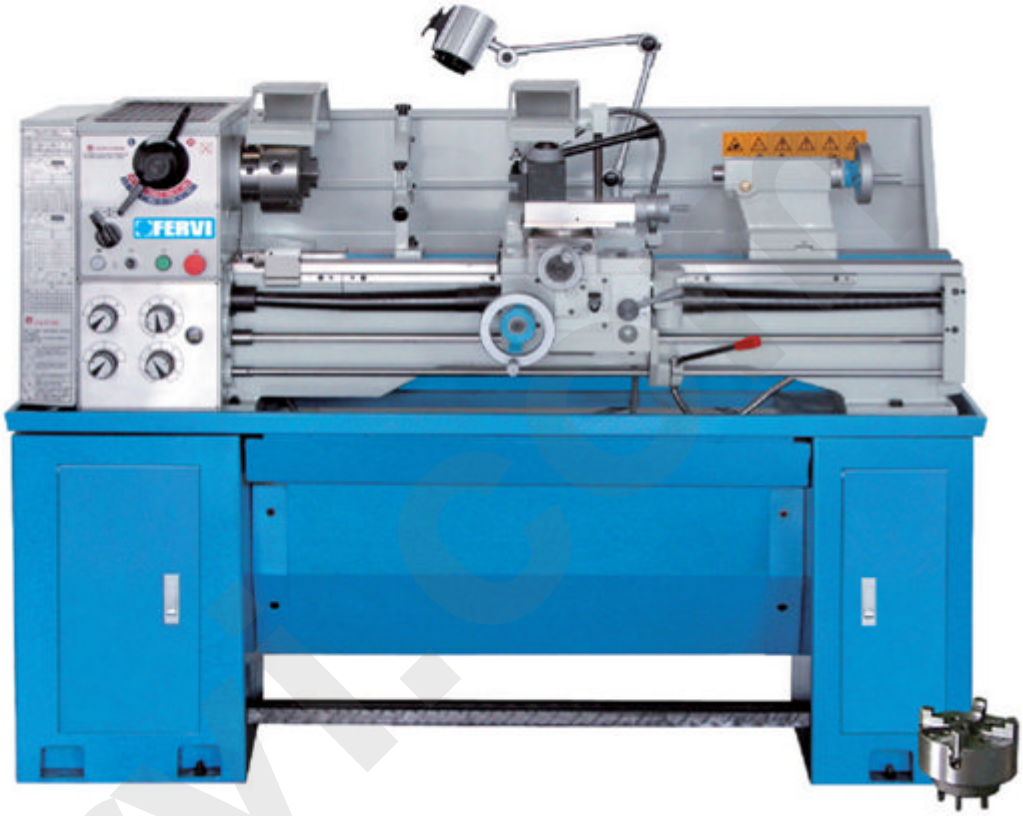
OPERATION AND MAINTENANCE MANUAL



Bench Lathe

Art. T999/230V – T999/230V3A

Art. T999/400V - T999/400V3A

FERVI

PRO SMART EQUIPMENT

TRANSLATION OF THE ORIGINAL INSTRUCTIONS

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PREFACE

Please ensure you have read this manual before operation

TRANSLATION OF THE ORIGINAL INSTRUCTIONS

It is compulsory to read this instruction manual before starting operation. The guarantee of smooth operation and full performance of the machine is highly dependent on the application of all the instructions contained in this manual.

Operator qualifications

The workers responsible for the use of this machine must have all the necessary information and instruction and should be given adequate training in relation to safety regarding:

a) Conditions of use for the equipment;

b) Foreseeable abnormal situations, pursuant to Article 73 of Legislative Decree 81/08.

We guarantee the Machine complies with the specifications and technical instructions described in the Manual on the date of issuance and listed herein; On the other hand, the machine may also be subject to important technical changes in the future, without the manual being updated.

Therefore, contact FERVI for information about modifications that may have been implemented.

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1 GENERAL INFORMATION

This manual is considered an integral part of the machine it was attached to at the time of purchase.

The manufacturer holds all ownership to material and intellectual property of this manual; any disclosure or copying, even partial, of this publication without prior written consent is forbidden.

This manual is designed to provide the knowledge required for the use and maintenance of the **Gear head lathe (Art. T999/230V – T999/230V3A – T999/400V T999/400V3A)** and to provide the operator assigned to the device with a sense of responsibility and knowledge of its possibilities and limitations.

Operators must be properly trained and prepared, so make sure that this manual is read and consulted by the staff responsible for commissioning, operation and maintenance of the machine. This is to make all operations as safe and effective as possible for those who carry out these tasks. Therefore, it is imperative to strictly comply with the requirements in this manual, a necessary condition for safe and satisfactory operation of the Lathe.

Before starting operation, installation and use of the machine, authorized staff must therefore:

- read this technical document carefully;
- know which protections and safety devices are available on the Lathe, their location and how they work.

The buyer is responsible for ensuring that users are properly trained, that they are aware of all the information and instructions in this document and that they are aware of the potential risks of operating the Lathe.

The manufacturer will not be held responsible for any damage to people and/or property caused by non-compliance with any instructions in this manual.

Operators will be held fully responsible for any changes they have made to the machine; the manufacturer will not be held responsible for any damage to persons and/or property resulting from maintenance performed by unqualified personnel and in a manner that differs from the operating procedures shown below.

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The **Gear head lathe** has been designed and built with mechanical guards and safety devices designed to protect the operator/user from possible injury.

It is strictly forbidden to modify or remove guards, safety devices and caution labels. If you do so temporarily (for example, for the purposes of cleaning or repair), make sure that no one can use the machine.

Graphic representation of safety, operational and risk warnings

The following boxes are designed to attract the attention of the reader / user for the **proper** and **safe** use of the machine:

Pay Attention

This highlights behavioural rules to prevent damage to the machine and/or the occurrence of dangerous situations.

Residual Risks

This highlights the presence of dangers that cause residual risks to which the operator must pay attention in order to avoid injury or damage to property.

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2 GENERAL SAFETY WARNINGS

2.1 General safety rules for machine equipment

Follow the instructions contained herein, in addition to the general precautions to be observed while working. Even if the operator is already familiar with the use of manually operated lathes, it is necessary to: In particular:

- **Acquire full knowledge of the machine.**
  For safe operation, this manual must be read carefully in order to acquire the necessary knowledge of the machine and to understand: operation, safety devices and all necessary precautions.
- **Wear appropriate clothing for the job.**
  The operator must wear appropriate clothing to prevent accidents.
- **Maintain the machine with care.**

Risks associated with using the machine

The machine must only be used by personnel who have been specially trained by authorized personnel.

Risks associated with using the Machine

DO NOT underestimate the risks associated with using the machine and concentrate on the work in progress.

Risks associated with using the Machine

Despite the implementation of all the safety devices for safe use of the machine, it is necessary to take note of all the requirements for the prevention of accidents detailed in the various sections of this manual.

Protective equipment for the operator

Before starting any type of work, the operator must wear the appropriate personal protective equipment (PPE) such as goggles, gloves etc. (see section 5.3 of this manual).

1. Always check the efficiency and integrity of the machine.
2. Before connecting the machine to the mains, make sure that the rotating parts are not damaged or badly worn. Make sure that the switch is in the neutral position.
3. Do not start the machine in an enclosed or poorly ventilated area, or in the presence of a flammable and/or explosive atmosphere. Do not use the machine in damp and/or wet locations, or those exposed to rain.
4. Avoid starting accidentally.
5. Before starting the machine, get used to ensuring that no remaining maintenance and service keys are inserted.
6. Keep the workplace tidy and free from obstruction; disorder causes accidents.
7. Make sure that your work environment is forbidden to children, strangers and animals.

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8. Do not perform tasks on the machine other than those for which it was designed. Only use the machine in the manner in which it was intended, as described in this instruction manual.
9. Work without disturbances.
10. Work areas must be well lit.
11. Always wear eye protection and protective gloves while working. If dust is produced, use the appropriate masks.
12. Wear appropriate clothing. Loose clothing, dangling jewellery, long hair, etc.., can get caught in the moving parts, causing irreparable injury.
13. Firmly secure the workpiece before starting the lathe, using the jaws installed on the spindle.
14. Always use the tool in an appropriate manner. Perform only the work for which the tool is made. Do not use the tool for inadequate work.
15. Only use suitable resistance tools in relation to the work that is to be done. This is to avoid risky and unnecessary overloading for the operator, which may be harmful for the life of the tools themselves.
16. Do not pick up moving tools or other moving parts. To stop the moving parts on the machine, always only use the stop command device.
17. Before performing any measurement of the workpiece mounted on the spindle, turn the motor off, unplug it and wait for the spindle to stop.
18. Do not remove the shavings with your hands, even at a standstill. To do this, use tongs or a palette knife.
19. When the work tools need to be replaced or the speed needs to be changed, stop the motor and wait for the spindle to stop.
20. Do not move away from the machine until the tools and other moving parts, have completely stopped.
21. After the work is completed, clean the tool and check its efficiency.
22. Replace worn and/or damaged parts, check that the repairs and protections work properly before operating. Eventually, if necessary, have it checked by Service staff. Use only original spare parts.
23. **Unplug the power cord of the machine from the power outlet when:**
    - the machine is not being operated;
    - it is left unattended;
    - performing maintenance or registration, because the machine does not work properly;
    - the power cable is damaged;
    - the tool is replaced;
    - it is being moved or transported;
    - during cleaning operations.
24. It is recommended that users of this publication, for maintenance and repair, have a basic knowledge of the mechanical principles and procedures inherent in repair technique.
25. **The company safety officer is required to make sure that machine operators have read and understood this manual in its entirety.**
26. **Management is responsible for safety and verification of the company's risk status according to Legislative Decree 81/08.**

2.2 Safety rules for electrical machine equipment

Changes in the Electrical System

1. Do not modify the machine's electrical system in any way. Any attempt to do so may impair the operation of the electrical devices causing a malfunction or accident.
2. Work on the electrical system of the machine must therefore be carried out only by qualified and authorised personnel.
3. If you hear unusual noises, or notice anything unusual, stop the machine immediately. Then, carry out an inspection and, if necessary, perform any repairs as required.

1. The supply voltage must correspond to that stated on the identification plate and in the technical specifications (400 V / 50 Hz or 230 V 50 Hz). **Never use any other type of power supply**.
2. The use of a lifesaving device on the power supply line is recommended. For more detailed information, contact a trusted electrician.
3. The power plug must be a grounded tripolar type plug for T999/400V and a grounded bipolar plug for T999/230V. Any extension cords must be of equal or greater length than the power cord on the machine.
4. Make sure that the power cord does not come into contact with hot objects, wet or oiled surfaces, and/or sharp edges.
5. The power cord should be checked regularly and before each use to check for signs of damage or wear. If these are not in good condition, do not use the machine and replace the cable.
6. Do not use the power cord to remove the plug from the socket or move the machine.

2.3 Technical Assistance

For any problems or concerns, please do not hesitate to contact the dealer who sold the item.

2.4 Other provisions

TAMPERING WITH SAFETY DEVICES IS FORBIDDEN

Check the presence and integrity of protective devices and the proper functioning of safety devices before starting operation.

If any defect is detected, do not use the Gear head lathe!

It is strictly forbidden to modify or remove guards, safety devices, labels and information plates on the machine.

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3 TECHNICAL SPECIFICATIONS

Description (unit of measurement)	T999/230V	T999/400V
Centres distance (mm)	1000	
Spindle hole diameter (mm)	38	
Maximum swing over the bed (mm)	320	
Maximum swing over the cross slide (mm)	198	
Turning diameter over cavity (mm)	470	
Spindle diameter (3 + 3 self centring) (mm)	160	
Spindle connector	Camlock D1-4	
No. of spindle speeds	8	
Spindle speed (r/min)	70 - 2000 RPM	
No. of metric threads	32	
Range of metric threads (mm)	0.44- 10	
No. of inch threads	20	
Range of inch threads (mm)	2 ¼ - 40	
Range of longitudinal feeds (mm)	00.78- 1.044	
Range of transverse feeds (mm)	0.022- 0.298	
Outer diameter of the feed screw (mm)	22	
Guide length (mm)	1390	
Cross carriage travel (mm)	200	
Tailstock sleeve diameter (mm)	32	
Maximum travel of the tailstock sleeve (mm)	80	
Inner taper	CM 5	
Tailstock base length (mm)	165	
Tailstock base width (mm)	125	
Steady rest diameter (mm)	120	
Dimensions (W x D x H) (mm)	1820 x 530 x 1350	
Package dimensions (W x D x H) (mm)	1920 x 840 x 1560	
Weight of machine (kg)	520	
Voltage / power supply frequency (V / Hz)	230/50.	400 / 50
Motor power (W)	1500/1800	
Acoustic pressure level at operator's workstation (dB(A))	84	

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4 DESCRIPTION OF THE MACHINE

The **Gear head lathe (Art. T999/230V e T999/400V)** is a machine tool, with a horizontal axis, for the machining of metallic materials by means of cold chip removal.

The cutting motion is given by the motion of the workpiece, rotating on its own axis, and the feed motion of the tool.

The machine is completely **manually operated**, as it can only execute movements under the direct control of the operator.

4.1 Intended use and field of application

The machine is designed and built to perform the following operations on all types of ferrous metals:

- Cylindrical turning;
- Taper turning;
- Facing;
- Profiling
- Drilling;
- Boring;
- Threading;
- Cutting / Breaking (from bar).

Intended use and materials

The machine has been designed and manufactured for the use specified. Operating the machine other than as intended and non-observance of the technical parameters laid down by the Manufacturer may be dangerous for operators; therefore the former cannot accept any responsibility for resulting damage.

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The lathe is equipped with a support base and must be installed and used on flat surfaces, with ergonomic features and adequate resistance.

The Lathe can operate in closed work environments (production halls, warehouses, etc.), i.e. protected from the weather and where there is no danger of fire or explosion.

The operating temperature range is -20 to +50°C.

The environment must also be sufficiently illuminated so as to ensure operation in maximum safety (at least 200 lux is recommended).

There are two main groups within the Lathe (see figure 1):

- The spindle shaft unit;
- The sliding tool holder unit.

The first is constituted by the spindle, which is made integral with the workpiece, and by the components that transmit motion from the motor to the spindle.

The second is constituted by the components that transmit motion to the slide, which guides the tool in the feeding motion and movement of the workpiece.

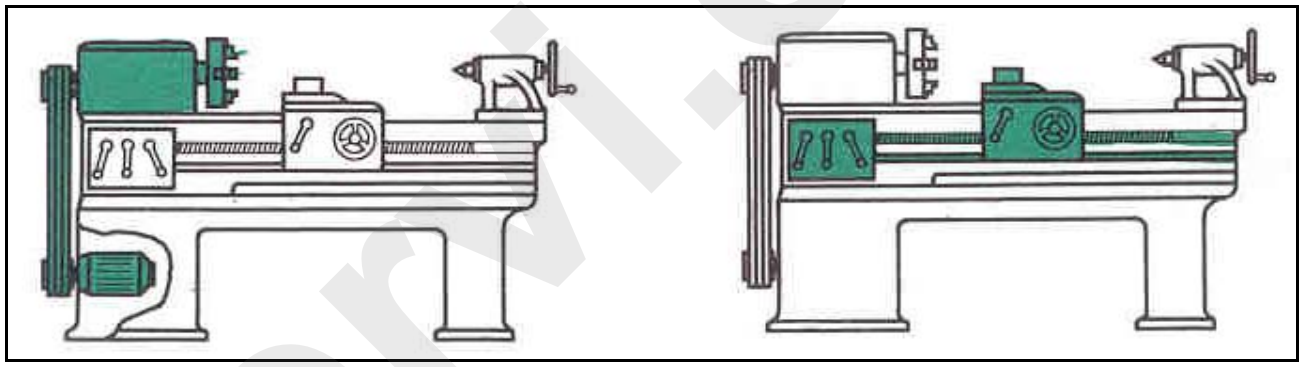

Figure 1 – Typical main groups of the bench lathe.

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4.2 Description of the main parts

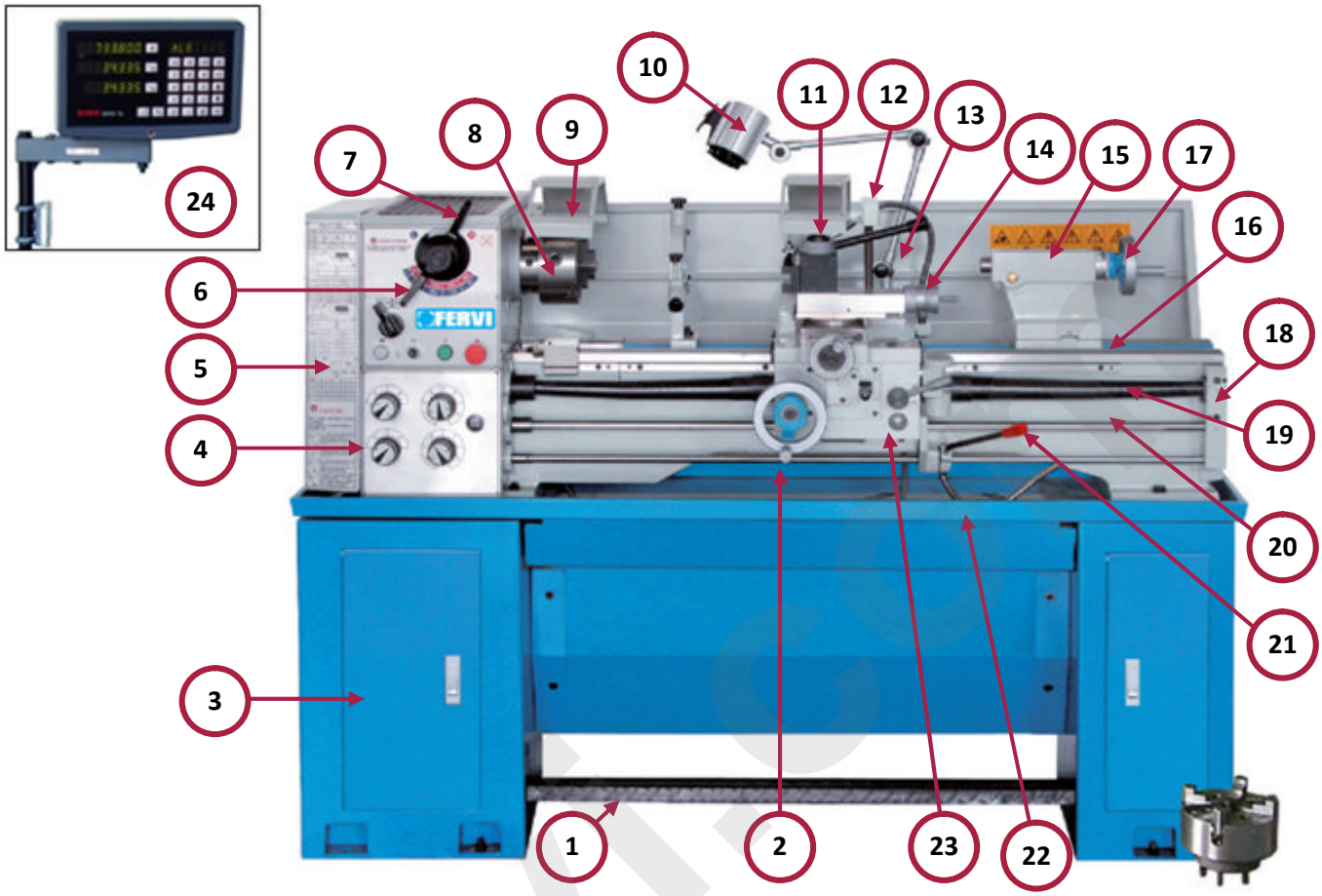

Figure 2 – Main parts of the gear head lathe (Art. T999/230V and T999/400V).

1	Brake	9	Protective device	17	Tailstock handwheel
2	Carriage handwheel	10	Halogen lamp	18	Support bars
3	Workbench	11	Turret	19	Lead screw
4	Speed switches	12	Coolant tube	20	Turning bar
5	Side cover	13	Longitudinal turret travel (mm)	21	Bar for lathe activation
6	Control panel	14	Micrometer	22	Tray
7	Electrical controls	15	Tailstock block	23	Transmission activation lever;
8	3-jaw lathe spindle	16	Guides	24	Digital display

4.2.1 Supporting table

The supporting table (ref. 2 in figure 2) is made of cast iron; the casting has been stabilized to avoid twisting and/or deformation due to the internal stresses in the material. In the upper part there are prismatic guides that ensure the movement and alignment of the drive head with the carriage and the moving head (tailstock). The guides are hardened and ground. Reinforcements ribs have been incorporated that increase rigidity.

4.2.2 Head and spindle

The head is made of high strength cast iron, in addition two internal protrusions which have been introduced that increase rigidity, reducing vibration during high speed machining.

The different spindle speeds are obtained by means of a gear speed change (see also section 4.2.3 of this manual).

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The different spindle speeds are obtained by means of a gear speed change (see also section 4.2.3 of this manual).

The spindle (see figure 3) is installed on the head shaft, and is supported by two precision bearings. It is **self-centring**, with three terminals (jaws) which permit the clamping of the workpiece in a safe and stable way. For the opening / closing of the jaws it is necessary to insert a special key in the housing (square cross-section), on the outer contour of the spindle. For a more detailed explanation on this subject, see section 10 of this manual.

The danger zone, in the vicinity of the spindle, is protected by a moveable interlocking guard (see figure 3), which consists of a tin screen plate with micro-safety switch.

Figure 3 – Spindle

4.2.3 Spindle speed adjustment levers

The panel for the adjustment of the spindle rotation speed (see figure 4), is positioned at the left part of the machine, between the spindle and the feeding speed change gearbox. It is equipped with two levers for selection of the desired rotation speed, depending on the type of processing and the material.

Figure 4 – Speed adjustment lever.

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4.2.4 Feed speed adjustment panel

The panel for the adjustment of the spindle rotation speed (see figure 5), is positioned at the left part of the machine, under the spindle speed adjustment panel. The lathe is provided with gears that can guarantee the considerable availability of feeds and threads (metric and inch). The selection of the steps is made using 4 rotary knob switches which control the gear speed change. There is also a fifth knob for selecting the feed direction of the carriage.

Figure 5 – Speed adjustment.

4.2.5 Tool holder carriage

The carriage sliding along the rails of the bed is used to hold, position and feed the tool. The various parts (see figure 6), are made of cast iron, with hardened and ground guides for greater stability. The carriage is equipped with an independent system that ensures the lubrication of the moving parts.

The handwheels to move the carriage and the levers are easy to reach and easy to use.

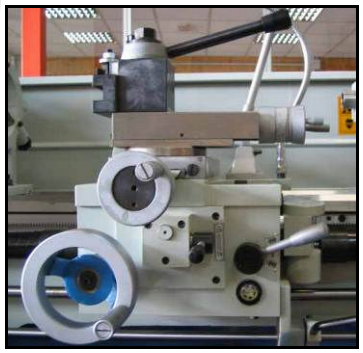

Figure 6 – Tool holder carriage.

4.2.6 Tailstock

The tailstock (see figure 7) is constituted by a cast iron body that ensures rigidity and stability in any conditions of use. The tailstock body is equipped with a locking system on the lathe guides, with a lever. An adjustment screw, allows axial alignment of the tailstock to be achieved. Inside a steel sleeve has been fitted. Movement is applied via a handle equipped with a micrometer.

Figure 7 – Tailstock.

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4.2.7 Steady rest

In the operations of drilling, boring and facing, the tailstock can not be used to secure the work piece.

On the other hand, if the pieces are long and heavy, it is not enough to use only a self-centring spindle, but you must attach one end of the work piece using a tool called a **steady rest** (see figure 8)

They are supplied with two rests: steady rest and follow rest

Figure 8 – Rests.

4.2.8 Electric control panel

Figure A

Figure B

Figure A

WHITE WARNING LIGHT : Indicates the presence of voltage
BLACK SELECTOR : Coolant pump selector
GREEN BUTTON : Gears application button
RED MUSHROOM : EMERGENCY STOP

Figure B

Main switch with safety key

4.2.9 Pedal brake

The machine is equipped with a mechanical brake pedal that slows or stops the rotation of the spindle as required. Releasing the foot stops the braking action.

Figure 9 – Emergency stop.

4.2.10 Rotation reverse lever

Lever for reversing the rotation direction of the electric motor. The lever is located to the right of the tool holder carriage.

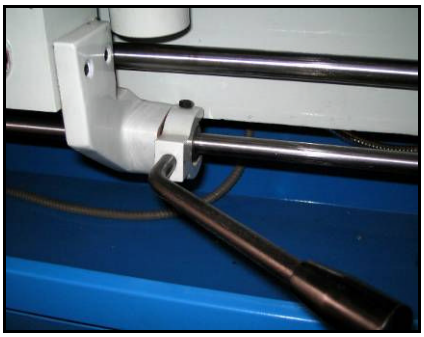

Figure 10 – Reverse lever.

4.3 Identification plate

On the machine, and in particular on the feed speed change gearbox, there is the following identification plate (see Figure 11):

Fabbricante	Fervi S.r.l. Via del Commercio 81 41058 Vignola MO
Marca	FERVI PRO SMART EQUIPMENT
Tipo	TORNIO PARALLELO
Modello	T999/400V
Lotto n°	
Anno	2012
Potenza	1500 W
Tensione	400 V
Frequenza	50 Hz
Velocità	70-2000 giri/min

CE Made in PRC RoHS

Fabbricante	Fervi S.r.l. Via del Commercio 81 41058 Vignola MO
Marca	FERVI PRO SMART EQUIPMENT
Tipo	TORNIO PARALLELO
Modello	T999/400V3A
Lotto n°	
Anno	2012
Potenza	1500 W
Tensione	400 V
Frequenza	50 Hz
Velocità	70-2000 giri/min

CE Made in PRC RoHS

Fabbricante	Fervi S.r.l. Via del Commercio 81 41058 Vignola MO
Marca	FERVI PRO SMART EQUIPMENT
Tipo	TORNIO PARALLELO
Modello	T999/230V
Lotto n°	
Anno	2012
Potenza	1800 W
Tensione	230 V
Frequenza	50 Hz
Velocità	70-2000 giri/min

CE Made in PRC RoHS

Fabbricante	Fervi S.r.l. Via del Commercio 81 41058 Vignola MO
Marca	FERVI PRO SMART EQUIPMENT
Tipo	TORNIO PARALLELO
Modello	T999/230V3A
Lotto n°	
Anno	2012
Potenza	1800 W
Tensione	230 V
Frequenza	50 Hz
Velocità	70-2000 giri/min

CE Made in PRC RoHS

Figure 11 – Identification plate.

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4.4 Pictograms and plates

CAUTION AND WARNING PICTOGRAMS.

The following pictogram has been applied to the side of the electrical panel:

- **Hazard / warning plate.**
  Prohibitive warning for carrying out work on live equipment.
- **Hazard plate.**
- **The removal of safety guards is forbidden.**
- **Electrical hazard symbol**

Figure 12 - Pictograms

5 MACHINE SAFETY DEVICES

5.1 Electrical safety devices

The electrical circuit of the lathe is equipped with a **rotary main switch** with a safety key (see chapter 9.1 of this manual). This prevents the danger of unwanted and/or accidental starts of the machine, since the switch can only be activated through a voluntary action suitable for the given purpose and if a suitable key is available.

The machine is also equipped with an **emergency stop button** (mushroom type). In an emergency, if pressure is applied to the mushroom button, the dangerous functions stop.

The electric control panel is powered by 24V DC voltage; the presence of a **transformer** minimises the the danger of electrocution.

The Lathe's power supply connection must be equipped with a **grounding conductor** according to regulations.

Electric Shock

Improper connection of the Lathe and/or the grounding conductor can result in the risk of electric shock.

The use of a **lifesaving device** on the power supply line is recommended. For more detailed information, contact a trusted electrician.

Check with a qualified electrician if you don't understand the grounding instructions or if you have any doubts about grounding the machine.

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5.2 Mechanical Safety Devices

Protective screens

The screens and guards have the role of protecting the operator by preventing coolant, chips, splinters, tool fragments or even the workpiece, which may detach, from being projected towards the face or torso. The screens are fixed or mobile (see Figure 13).

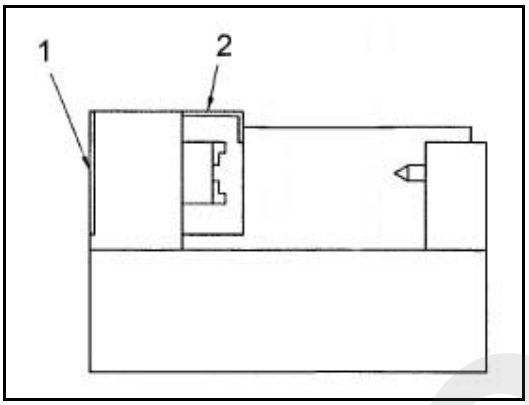

Figure 13 – Position of the protective screens.

LEGEND:

1: Gearbox guard (fixed);

2: Protective screen for the spindle (movable interlocked);

The interlocking movable guards, are equipped with suitable safety switches, connected to the machine's control system (electric circuit), so that the opening of the movable screen causes the motion of the spindle and the dangerous moving parts to stop.

Checking the Safety devices

- Each time the Lathe is used, check that the safety devices function and are positioned properly.
- In case of damage and/or breakage, do not use the machine.

Pedal brake

The machine is equipped with a mechanical brake pedal that slows or stops the rotation of the spindle as required (ref. 1 in Figure 2).

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5.3 Personal Protective Equipment (PPE)

Use of PPE

ALWAYS use appropriate personal protective equipment (PPE) such as (see Figure 14):

- Gloves;
- Goggles or face shields;
- Overalls or aprons;
- Safety shoes.

PROTECTIVE GLOVES	PROTECT YOUR EYES	PROTECTIVE SCREEN	PROTECTIVE CLOTHING	PROTECTIVE SHOES

Figure 14 – Personal Protective Equipment.

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6 FORBIDDEN USES AND HAZARDS

The modes of use specified in this manual as incorrect, ***should never be permitted***, under any circumstances.

Using the machine for turning non-ferrous materials, for unauthorised manoeuvres, its misuse and lack of maintenance can result in serious danger to the safety of the staff, especially the operator, as well as affecting the functionality and the intrinsic safety of the machine itself.

The following actions described, which obviously can not cover the entire range of potential possibilities of "misuse" of the machine, are those which are "reasonably" more predictable and should be considered strictly prohibited.

THE FOLLOWING IS STRICTLY PROHIBITED!

- Supplying the machine with voltage from the mains that is different from that shown on the identification plate (230V, 50 Hz).
- Using the machine for services other than those for which it is intended;
- Using the machine without having read the operating instructions and without due care.
- Using the machine, and in particular carrying out manual loading without the use of appropriate personal protective equipment (PPE) according to the instructions given in this manual.
- Using the machine and, particularly, the tool improperly.
- Picking up moving tools or other moving parts.
- Taking measurements of the workpiece mounted on the spindle, without turning the motor off, unplugging it and waiting for the spindle to stop.
- Removing chips with your hands.
- Replacing the work tools or carrying out the speed change, without stopping the motor, disconnecting the plug and waiting for the machine to stop.
- Modifying and/or tampering with the safety devices of the lathe.
- Using the machine as a support and/or work surface.
- Climbing on the machine.
- Touching the machine with wet and/or damp hands.
- Using the machine when barefoot.
- Exposing the machine to the elements (sun, rain, hail, etc..).
- Using jets of water
- Using the machine without fastening it securely.
- Cleaning and/or maintaining the machine without fastening it securely.
- Installing and using the machine on surfaces that are not sufficiently flat and smooth.
- Installing and using the machine on surfaces that are not hard and strong enough to support its weight.
- Installing and using the machine outdoors.

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- Using the machine in a dark place.
- Allowing untrained personnel to use the machine.
- Operating this machine without being psychophysically fit;
- Allowing untrained and unqualified personnel to carry out maintenance, and without complying with the procedures specified in this manual.
- Performing maintenance operations in insufficient conditions of lighting and/or visibility.
- Performing cleaning and/or maintenance without disconnecting the power plug.
- Changing the machine's electrical system.
- Moving the machine without using suitable lifting equipment.

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7 LIFTING, TRANSPORTATION AND STORAGE IN WAREHOUSE

7.1 Lifting

To lift the Lathe, proceed as follows:

1. To achieve perfect balance, move the tailstock all the way to the end on the right side of the table and securely fix it with the locking lever;
2. At the same time, slide the tool holder carriage until the perfect machine balance is obtained.

Breaking of the guide rails

Make sure that the harnessing accessories are not touching the guide rails and the lead screw, which could be damaged beyond repair.

1. Attach the hook of the lifting equipment (cranes, hoists, etc..) in the centre of harness accessories (between the two side ends) and lift slowly and smoothly.

The manufacturer declines all responsibility for any damage to people and/or objects caused by the improper lifting of the machine performed by unsuitable personnel, with inappropriate lifting means and without following the instructions in this manual.

7.2 Transportation

The transport of the machine can be carried out through the aid of vehicles and/or industrial transportation vehicles, such as trucks, with containers of sufficient size to hold the machine itself. The machine must be suitably anchored to the means of transport (for example, through the aid of ropes).

During transport, the machine must be protected from rain, snow, hail, wind, and any other adverse weather conditions. In this regard, it is advisable to use means of transport with closed compartments (vans, trucks etc.) or possibly covered with tarpaulin.

7.3 Warehouse storage

In the event that the machine is to be stored and unused for some time before being put into service again, proceed as follows:

1. Disconnect the power supply cable;
2. Protect the machined parts (such as the guides, the carriage and the tool holder slides, spindle, the tailstock quill etc..) with protective liquid and/or grease;
3. Store in a dry place, free from dust and contaminating agents. Climatic conditions recommended for storage:

Temperature: - 15° / + 55° C;

Humidity: 95% (non-condensing).

Shock Protection

Make sure the Lathe is protected from knocks and vibrations.

8 ASSEMBLY AND COMMISSIONING

8.1 Identification of the installation site

To install the machine, identify an area that is well lit, away from wet areas and has no sources of vibration nearby.

The lathe must be located so that adequate space is available for the operator, so you can use it to its full potential, and safely adjust, maintain and clean the machine. In this regard, an area of at least two square metres in front of the machine must be kept free.

Installing the Machine

Do not install the Machine outdoors to avoid deformation, loss of function and damage to the electrical control circuit.

8.2 Support base

It is essential that the machine is positioned on a uniform, flat supporting surface that has sufficient strength to support it in any condition which may occur during normal use.

Loss of Stability

Install the Lathe on a solid and strong support surface to avoid it falling over and vibrations;

To ensure stability, excellent results and minimize vibrations, we recommend affixing the machine using the metal feet with threaded stems and rubber base. For the dimensions and the positions of the points of support, where the feet are put, see Figure 15.

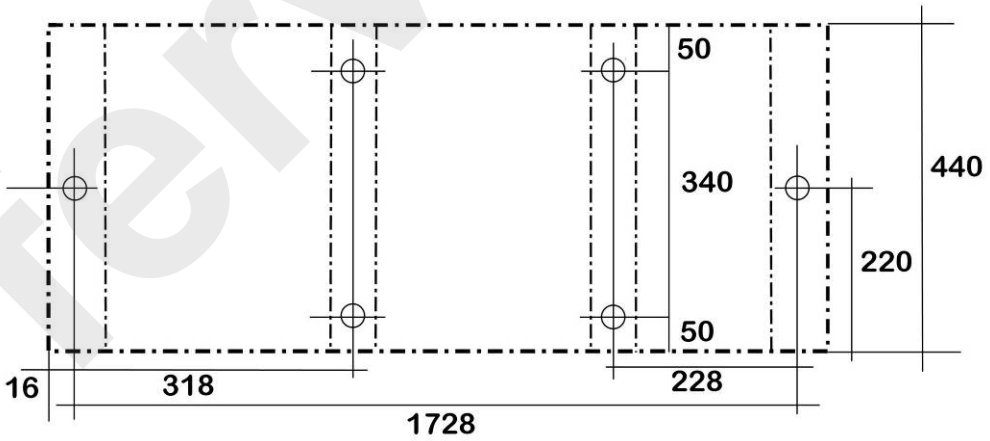

Figure 15 – Dimensions and fastening points.

8.3 Levelling the machine

For this operation, it is recommended to use a precision spirit level (0.001 mm).

8.3.1 Preliminary phase

The preliminary phase serves to eliminate the presence of torsions in the lathe table. Proceed to reset the head by adjusting the relative screws and then locking the tailstock with the relative adjustment screws moving the reference mark to zero.

8.3.2 Transverse levelling of the table

Position the spirit level in a transverse direction on the lathe guides under the spindle and check the bubble.

Position the spirit level in a transverse direction on the table guides under the tailstock and check the bubble.

Repeat these operations frequently and, if necessary, make small corrections by screwing and/or unscrewing the adjustable feet below the pallet.

8.3.3 Levelling the lathe rails

Place the level on the sides of the carriage and move it slowly along its entire length while checking that the bubble does not change.

If the bubble moves, adjust the adjustable feet until it reaches a uniform level throughout the entire course of the carriage.

Periodically check these measurements (at least every six months).

Levelling the machine perfectly is one of the first and most essential steps to carry out before using the machine.

8.4 Operations before starting the machine.

8.4.1 Lubrication and greasing

Before you start the machine, it should be lubricated and greased as described in section 11.1, on "Lubrication".

8.4.2 Connection to the power supply network

Connect the power supply cable to the terminal inside the electrical cabinet. Connect the three phases to the connectors on the body of the terminal and the grounding conductor to the connector on the left side of the terminal itself.

Connection

Ensure the perfect connection of the power cord.

The plant to which the machine is connected must have a suitable system for the automatic disconnection of electric power, for protection against indirect contacts.

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8.4.3 Open circuit test

Manually rotate the hand wheels on the carriage's tool carrier slides and tailstock quills to verify that these move freely and without friction.

Start the machine by turning the main switch to the position I and the activation lever to reverse the rotation of the spindle (see Figure 16) and make sure that the electric motor and spindle are working properly.

Test the operation of the lever for reversing the rotation of the electric motor.

Test the brake pedal, the spindle should slow down and eventually stop.

Test the emergency stop button, the whole machine should stop.

Operate the machine for a few minutes, checking the entire series of spindle speed change gears, starting with low speeds.

Ejection of objects

During the test run, no operator and no other person should be within range of the machine.

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9 DESCRIPTION OF CONTROLS

9.1 Control buttons

9.1.1 Main switch

The main switch with safety key is located on the left side of the electric panel, and it is useful to prevent unauthorised use of the machine.

To power the machine (see Figure 16), in fact, it is necessary to:

- insert the safety key into the lock to the left of the switch (marked R.L.);
- turn the key clockwise and simultaneously turn the main switch to "I", by turning it clockwise.

Figure 16 - Main switch.

Confirm the white power light has turned on, found on the electrical panel (marked POWER).

9.1.2 Electric and control panel buttons and lights

Figure 17 – Electrical and control panel.

The electrical panel has the following controls:

- **RED MUSHROOM :** Emergency button (red mushroom).
- **WHITE WARNING LIGHT :** Indicates the presence of voltage
- **BLACK SELECTOR :** Coolant pump selector
- **GREEN BUTTON** : Gears application button

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9.1.3 Emergency button

Additionally on the electric panel there is a emergency stop switch:

To stop the machine, in cases of emergency, press the red mushroom shaped button. When it is pushed, the motion of the electric motor and other rotating parts is interrupted.

Before you begin work, always make sure that the mushroom button is raised. To restore power to the machine again after an emergency stop, turn the mushroom clockwise and lift it.

Checking the Emergency Button

Before starting any work on the machine, ensure that the emergency stop button functions.

In case of emergency

In an emergency, press the red emergency button to stop the machine.

Risk of abrasion and/or cutting

- After pressing the stop or emergency switch, the spindle will continue to rotate by inertia.
- Do not hold body parts near the moving spindle!

9.2 Levers and control wheels

9.2.1 Spindle speed adjustment knobs

The panel for the adjustment of the spindle rotation speed (see Figure 16), is positioned at the left part of the machine, between the spindle and the gearbox. It is equipped with two levers, marked with colours, letters and numbers, for selection of the desired rotation speed, depending on the type of processing and the material to be processed.

Figure 18 – Speed adjustment knobs.

To select the desired rotation speed, turn the knobs to the corresponding positions, according to the instructions given in this manual or on the rotation speed plate attached directly to the machine (see Figure 16).

Spindle speed adjustment

Before changing the spindle speed, always stop the electric motor of the machine.

9.2.2 Automatic feed speed adjustment knobs

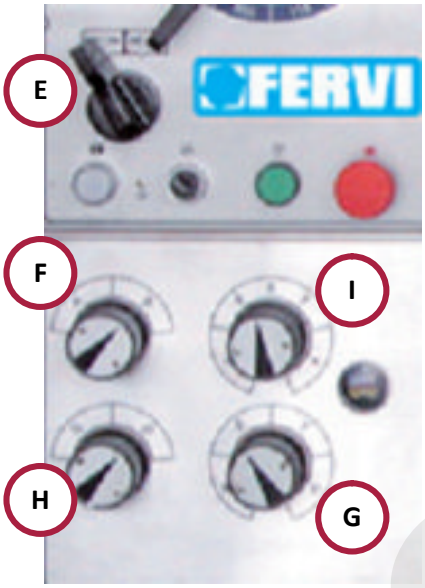

Figure 19 - Feed adjustment knobs.

The panel for automatic feed speed adjustment (see Figure 19), is positioned at the left part of the machine, under the spindle rotation speed adjustment panel.

The different speeds are selected via 4 knob switches which control the gear speed change (ref. **F**, **G**, **H**, **I** in Figure 19). There is also a fifth knob for selecting the feed direction of the carriage (ref. **E** in Figure 19).

Threading

To make a thread:

Operate the knob (I), insert the bar for threading in 4 positions (see Figure 20);

- Position the two knobs (**F**) (**G**) and (**H**) according to the instructions given in this manual or on the rating plate for the feed speed installed directly on the machine

  N.B.: When carrying other machining position the selector I in position 0 (see Figure 20)

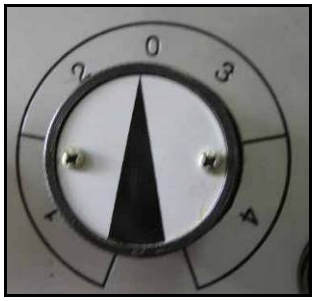

Figure 20 – Close-up of knob

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9.2.3 Adjustment knob / lever of the split casing

The casing adjustment knob and lever for the transfer of motion from the lead screw to the tool holder carriage (see Figure 21), are located at the sides of the tool holder carriage itself.

Figure 21 – Close-up of knob and lever.

By turning the knob or lever 90°, the split casing "closes" on the lead screw, creating a rigid coupling between the two, and allowing the transfer of motion from the lead screw to the tool holder carriage (and to the tool) for the automatic feed for threading operations.

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9.2.4 Levers and handwheels of the carriage and tool holder slides

On the tool holder carriage there are five manual controls (levers and handwheels) for carrying out fine adjustments and feeding (see Figure 22).

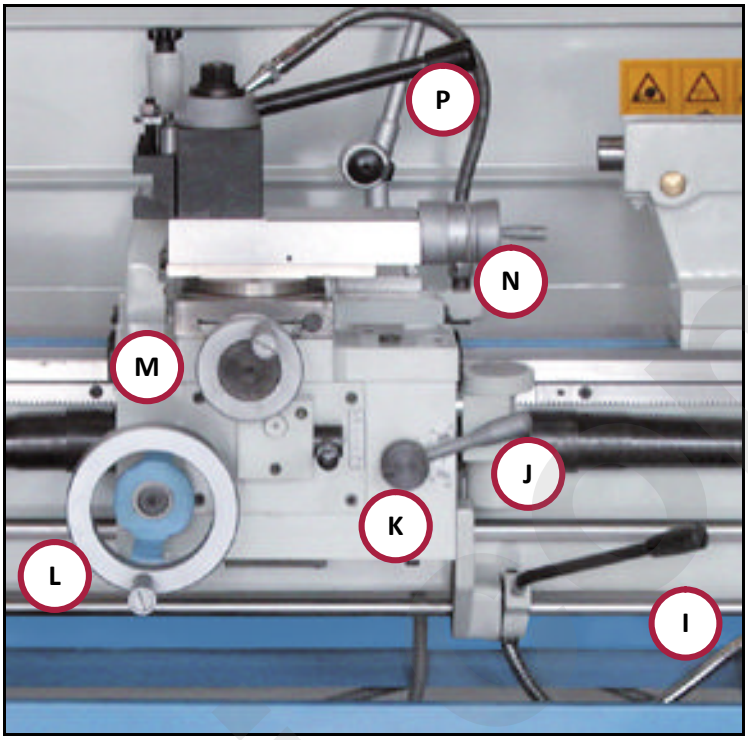


Figure 22 – Lever and handwheel of the carriage.

(I) Split casing lever : See section 9.2.3.

(J) Lever for selection of transverse or longitudinal feeds: The lever selects the type of automatic feed desired. To operate the transverse feed, forward and backward, move the lever to the right (toward the tailstock), to operate the longitudinal feed, left and right, move the lever to the left (toward the spindle).

(K) Handwheel for longitudinal displacement of the tool holder slide: The handwheel allows the quick longitudinal displacement, to the right and left, of the tool holder slide. To move the slide to the left (towards the spindle), turn the handwheel clockwise and vice versa to move the slide to the right (towards the tailstock), rotate the handwheel anticlockwise.

(L) Handwheel for longitudinal movement of the carriage: The handwheel allows the quick longitudinal displacement, to the right and left, of the tool holder carriage. To move the carriage to the right (towards the tailstock), turn the handwheel clockwise and vice versa to move the carriage to the left (towards the spindle), rotate the handwheel anticlockwise.

(M) Handwheel for transversal displacement of the tool holder slide: The handwheel allows the transversal displacement, forward and backward, of the tool holder slide. To move the slide forward (towards the workpiece), turn the handwheel clockwise and vice versa to move the slide backward (towards the operator), rotate the handwheel anticlockwise.

(N) Handwheel for longitudinal displacement of the tool holder slide: The handwheel allows the quick longitudinal displacement, to the right and left, of the tool holder slide. To move the slide to the left (towards the spindle), turn the handwheel clockwise and vice versa to move the slide to the right (towards the tailstock), rotate the handwheel anticlockwise.

(P) Tool locking lever: The lever allows locking of the cutting tool, to the tool holder base (turret).

(Q) Lever for activating and selecting the direction of rotation of the electric motor: The lever selects activation and the direction of rotation of the electric motor and the other rotating parts (spindle). Move the lever down to rotate the spindle clockwise, move the lever up to turn the spindle anti-clockwise. The central location "0", puts the spindle in neutral.

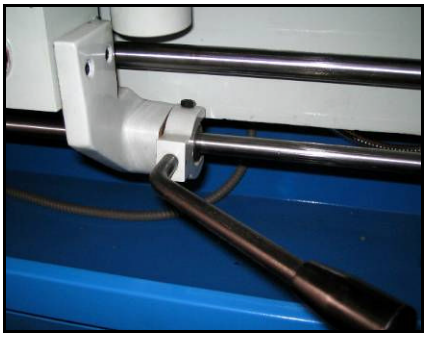


Figure 23 - Close-up of the lever.

9.2.5 Lever and handwheel of the tailstock

On the tailstock there are manual controls (levers, handwheels and screws) which allow fine adjustments and feed adjustments (see Figure 24).

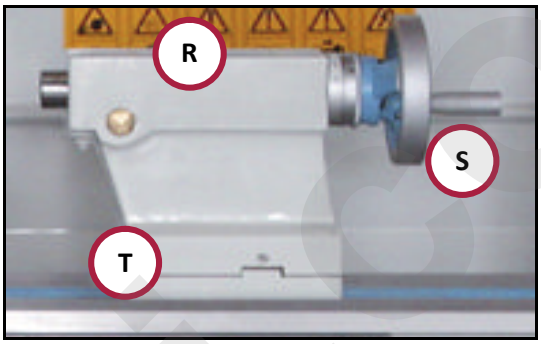


Figure 24 – Lever and handwheel of the tailstock.

(R) Quill locking lever: The lever allows the tailstock quill to be locked (located on the side not visible in Figure 24)

(S) Handwheel for longitudinal movement of the quill: The handwheel allows the quick longitudinal displacement, to the right and left, of the tailstock quill. To move the quill to the left (towards the spindle), turn the handwheel clockwise and vice versa to move the quill to the right, rotate the handwheel anticlockwise.

(T) Tailstock transverse adjusting screw: The screw allows for adjustments to the transverse centring of the tailstock. To move the tailstock forward (away from the operator), turn the screw clockwise and vice versa to move the tailstock backward (towards the operator), rotate the screw anticlockwise.

9.3 Mechanical brake pedal of the spindle

The machine is equipped with a mechanical brake pedal that slows or stops the rotation of the spindle as required (see Figure 25).

Pressing the pedal with your foot, the spindle is immediately braked, while releasing the pedal stops the braking action.

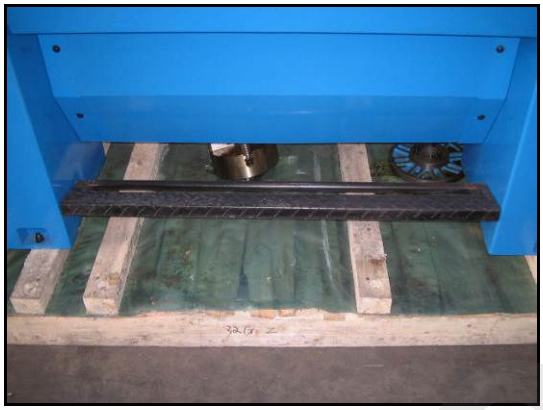
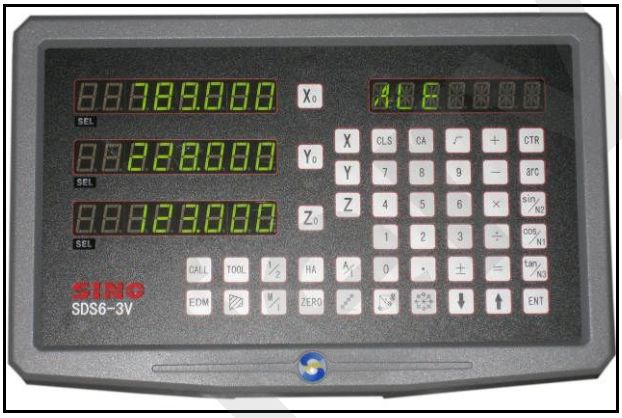


Figure 25 – Pedal Details.

9.4 Digital display

The Gear head lathe 400V3A-T070 is equipped with a digital display that can monitor the dimensions X, Y and Z with a precision of 0.001.

Furthermore it is possible to store different machining depths depending on the X coordinate in which the tool is located.



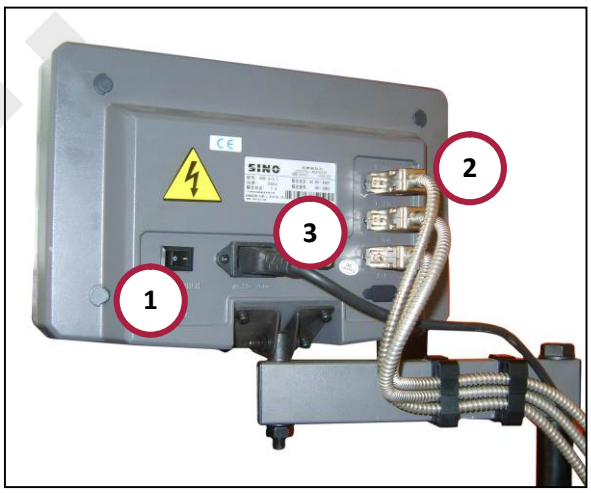


Figure 26 - Close-up of the digital display.

At the front there are all the programming keys of the panel, while at the rear there are

1) on / off switch (I/0);

2) the three data cables, in order from top to bottom X Axis - Y Axis - Z Axis, from the sensors placed on the tool holder carriage;

3) the power supply cable.

At the time of purchase, the display must be installed on the left side of the lathe, using the bracket supplied.

The power cord must be connected to a 230V / 50 Hz plug equipped with a grounding conductor.

Data cable connections

Pay attention to the correct connection of the data cables.
If reversed they can cause erroneous readings by the digital display.

The display can be rotated and tilted to allow the data to be viewed at any time.

Rotation is achieved by simply moving it with one hand, and to adjust the angle, loosen the bolt located just below the power cord, tilt the panel and then retighten the bolt.

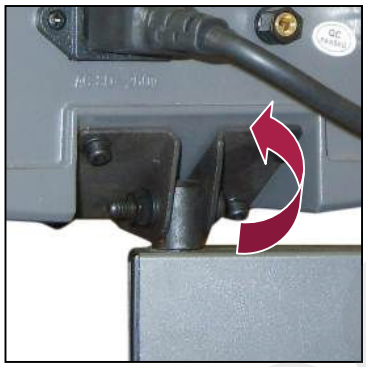


Figure 27 – Panel adjustment

9.4.1 Using the display

When activating the panel, the management system performs a self-diagnostic routine.

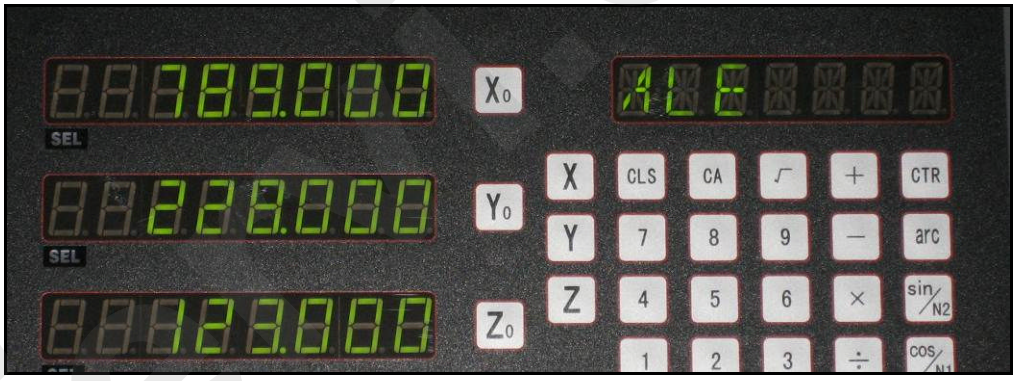
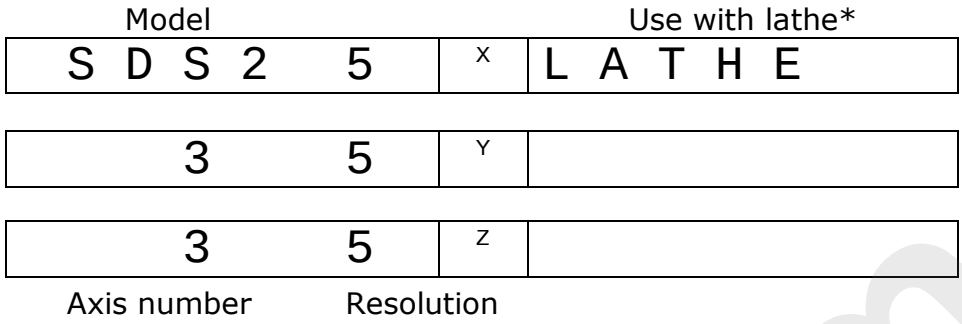


Figure 28 – Close-up of the display

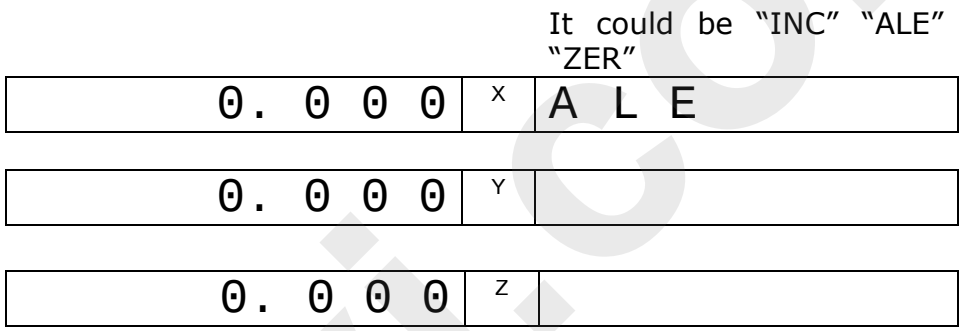
1- Self-test

The display shows the following messages:



* "Lathe" is specified because the panel can be programmed for other tool machines.

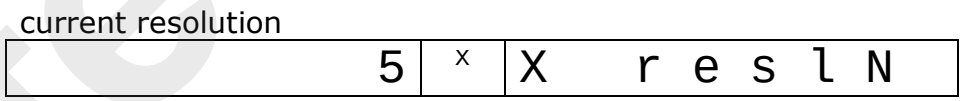
At the end of the self-diagnostic the display shows the following messages:



2 – Setting the system

Pressing the  button during the self-diagnostic process, starts the setting mode, which begins as soon as the first phase has finished.

- Setting the X-axis resolution:



In this way, the desired resolution is set for the X axis, using the numbers on the panel according to the following scheme:

Button	0	1	2	5	7	8	9
Resolution (µm)	10	1	2	5	0.1	0.2	0.5

- After choosing the resolution press the 

button then  to move to the next step.

- **<u>To set the resolution of the Y axes and (Z if used), proceed as described above for the X axis</u>**

- After each setting, press the ENT button and ⇩ to move to the next step.
- Setting the axis linear encoder measuring direction.

1	X	X d i r

- Press the button of the axis which you wish to set (X, Y, Z)
- Press the 0 button for a positive count in the direction of movement from the outside towards the rotation axis.
- Press the 1 button for a negative count in the direction of movement from the outside towards the rotation axis.
- Press the ENT buttons and ⇩ to move to the next step.
- **Perform the above steps to set the measuring direction of the linear encoder of the Y axes (Z if used)**
- After each setting, press the ENT button and ⇩ to move to the next step.
- Setting the list of tools.

0	X	t o o l

- Select the desired machine by pressing the corresponding button.

Button	Machine
0	Multifunction milling machine
1	Universal milling machine
2	Process unloader
3	Lathe

- Press the ENT buttons and ⇩ to move to the next step.
- **As you are using the lathe, select number 3, then the instrument will display only the X and Y dimensions necessary for turning operations**

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- Integration of the Y-axis with the Z axis
- Press the 0 button or the 1 button to change the setting

	Y	N O N E

	Y	I N G R E A T

- After the selection press the ENT and ⇩ buttons to move to the next step.

By integrating the Y and Z dimensions (movements on the same axis) only one dimension (Y-axis) will be displayed, which will vary depending on whether you are operating the handwheel for longitudinal movement of the carriage, or the handwheel for longitudinal movement of the turret.

- Press the ⇩ button twice to activate the auto-diagnostic function. Press CLS to finish the setting process.
  A)

	X	t e s t o f f

3 – RESETTING THE DISPLAY

- You can reset displ of the X, Y and Z axes at any time by pressing the X button, Y or Z and then the CLS button.

3 2 1. 4 5 6	X	

↓

0. 0 0 0	X	

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4- DEFAULT DATA

The default data allows continuous monitoring of the machining in operation.

If, for example, it has a piece as shown in Figure 29/a) and you want to get the piece in Figure 29/b) you can set all the heights in order to precisely control the actual machining.

To set the data, proceed as follows:

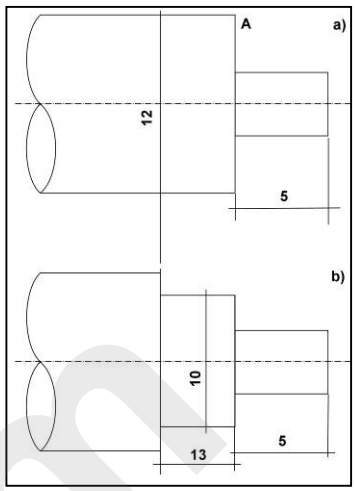

Figure 29 – Example of machining.

- Move the tool to the height A in the Z direction (longitudinal).
- Press the button (Y) to set height 5.

.	Y

↓

- 5. 0 0 0	Y

- Press the (5) button then the (±) button to choose the negative direction of the machining (towards the spindle ←).

If an incorrect value is entered, press (Y) again to enter the correct value.

- Start machining until the display shows -13.

- 1 3. 0 0 0	Y

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5 – Displaying the absolute / relative coordinates

Press the buttons  to move from the relative coordinates "INC" to the absolute coordinates "ALE" and vice versa, on the display of the Y coordinate. Set the D plane as the reference plane, in this way in "ALE" mode (absolute coordinates) on the Y axis 0 will be displayed.

0.	Y

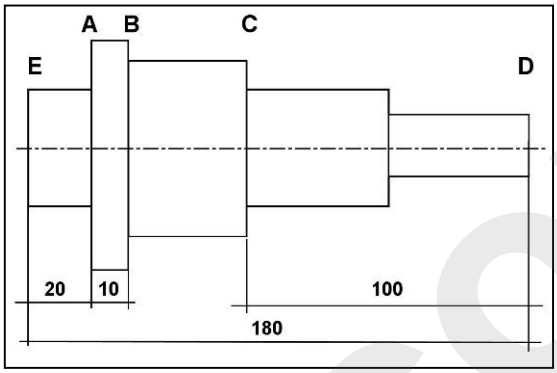


Figure 30 – Viewing absolute / relative.

With reference to Figure 30 , proceed as follows, to switch from absolute coordinates to relative coordinates.

- Bring the cutting tool to the D plane.

0. 0 0 0	X	A L E
0. 0 0 0	Y	

- Move the cutting tool to the C plane.

0. 0 0 0	X	A L E
- 1 0 0. 0 0 0	Y	

- Move the cutting tool to the B plane.

0. 0 0 0	X	A L E
- 1 5 0. 0 0 0	Y	

- Press the  button (to switch to the relative coordinates) then reset the display of Y, by pressing the  and  buttons.

0. 0 0 0	X	I N C
0. 0 0 0	Y	

- Move the cutting tool to the A plane.

0. 0 0 0	X	I N C
- 1 0. 0 0 0	Y	

- Move the cutting tool to the E plane.

0. 0 0 0	X	I N C
- 3 0. 0 0 0	Y	

- Reset the Y display by pressing the  and  buttons.

0. 0 0 0	X	I N C
0. 0 0 0	Y	

- Move the cutting tool to the A plane.

0. 0 0 0	X	I N C
2 0. 0 0 0	Y	

- Press the  button (to switch to the absolute coordinates)

0. 0 0 0	X	A L E

-	1 3 0. 0 0 0	Y	

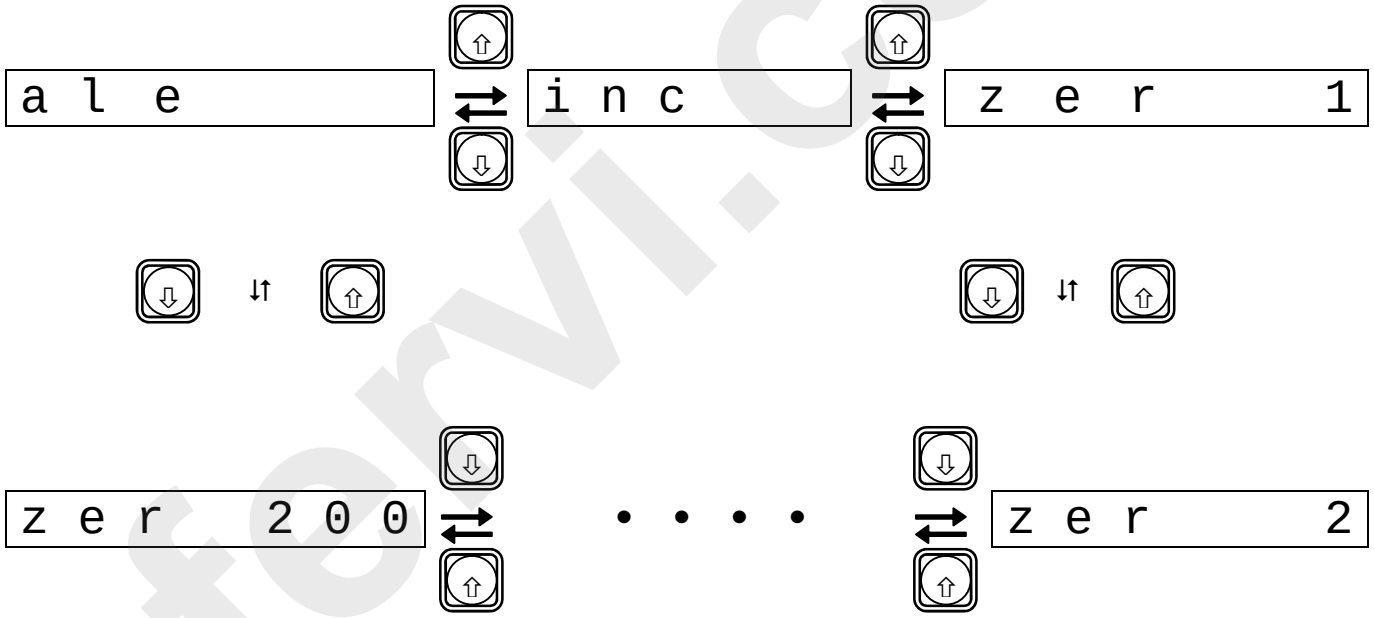
- Move the cutting tool to the D plane.

0. 0 0 0	X	A L E

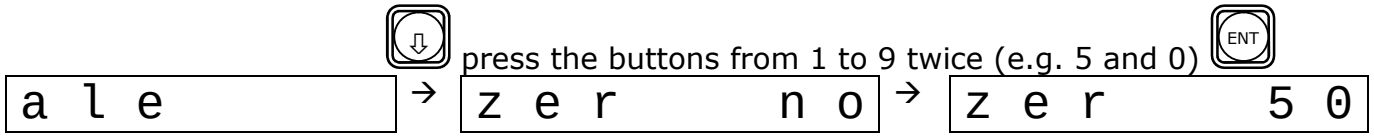
0. 0 0 0	Y	

6 – Viewing stored coordinates

Press the  buttons, as well as switching between the absolute and relative coordinates, it is also possible to view 200 previously stored coordinate values.



With the  button it is possible to directly enter the display menu of the 200 coordinates.



In this way the relative coordinate number 50 is displayed.

7 – Radius / Diameter display

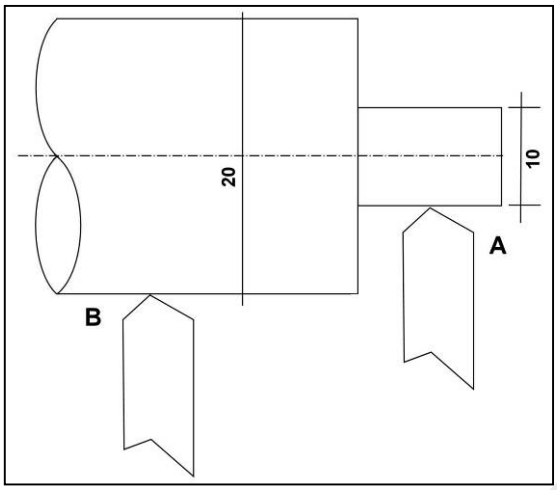


Figure 31 – Radius / Diameter display

The reference for axis X is the axis of spindle rotation (dashed line in Figure 31).

- Move the cutting tool to point A.

5. 0 0 0	X

- Press the X and ½ buttons to switch from viewing the radius to the diameter.

1 0. 0 0 0	X

- Move the cutting tool to point B.

2 0. 0 0 0	X

- Press the X and ½ buttons to switch from viewing the diameter to the radius.

1 0. 0 0 0	X

If the word "DIR" appears this means that on the X-axis the diameter of the workpiece is being displayed. The Y-axes only have one display mode.

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8 – Displaying Metric / Imperial coordinates

The digital panel can also show the coordinates of the X axis in Imperial units (inches), this display is not available for the Y axis

With reference to Figure 32, proceed as follows, to switch from Metric coordinates to Imperial coordinates.

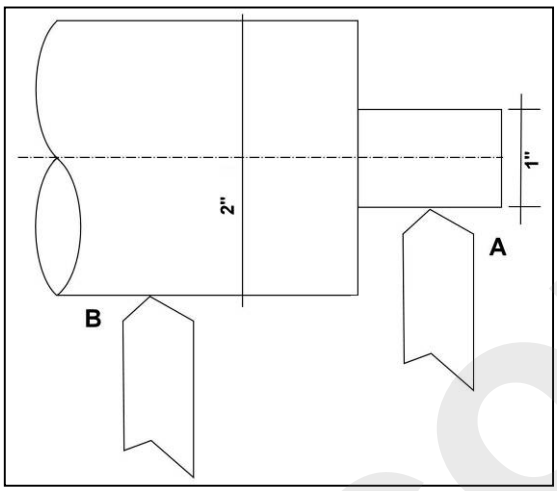

Figure 32 – Displaying Metric / Imperial coordinates.

- Move the tool to point A, the coordinates in Metric units are 25.4 mm.

2 5. 4 0 0	X

- Pressing the M/ button, switches the display to Imperial units 1”.

1. 0 0 0 0 0	X

- Move the tool to point B, the coordinates in Imperial units are 2”.

2. 0 0 0 0 0	X

- Pressing the M/ button, switches the display to Metric units 50.8 mm.

5 0. 8 0 0	X

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9 – Linear error compensation

The linear error compensation function is used for the correction of errors in the transmission system of the lead screw.

The correction factor is expressed as:

$$S = \frac{(L - L')}{(L/1000)} mm/m$$

where

L → is the useful length of the Z axis in mm;

L'→ is the value displayed on the panel in mm;

S → is the correction factor in mm/m.

The correction factor can be positive if the displayed value is less than the actual length, negative if the value displayed is higher.

The compensation range is ± 1.500 mm/m.

Ex. If the useful length of the Y axes is 1000 mm and the panel at the end of travel of the carriage, reads 999.98 mm then S=(1000-999.98)/(1000/1000)=0.02 mm/m.

So to enter the compensation value it is necessary to:

- Select the Y axis by pressing the button 

, pressing the 

button displays the correction factor S previously set.

S 0. 0 5 0	Y

- Enter the calculated value 0.02 by pressing in sequence the keys 0 . 0 2

S 0. 0 2 0	Y

- Press the 

button to confirm the data.

The linear error compensation can be performed by either displaying the absolute coordinates, or displaying the relative coordinates.

10 – Disconnection of the power supply

If the power supply is disconnected or it is necessary to turn off the machine during machining, the panel is able to automatically store the coordinates where the tool is located, the compensation factor currently set and the display mode.

When the machine is turned on again, the display will show the exact data before the interruption, immediately after the initial self-diagnosis phase. If the tool and/or workpiece have not been moved, it is possible to resume machining without problems.

10 OPERATION

Intended use and materials

The Gear head lathe (Art. T999/230V and T999/400V) has been designed and constructed for the machining of metallic materials by means of cold chip removal. Any use and lack of respect for the technical parameters established by the manufacturer may be dangerous to operators; therefore, the manufacturer cannot assume any liability for resulting damages.

Risk of Abrasion and Accident

- Before using the machine, make sure that it is correctly attached to prevent unwanted movement or loss of stability.
- Wear appropriate personal protective equipment (PPE) such as gloves, goggles, overalls or aprons and safety shoes.

Environment of Use

- The lathe can operate in enclosed working environments (production departments, warehouses, etc.), such as those that are protected from the weather and where there is no danger of fire or explosion.
- The operating temperature is within the range of -10 / +50°C.
- The working environment must be sufficiently well lit to ensure maximum operational safety (at least 200 lux).

Working close to the spindle

Before starting work in the vicinity of the spindle, ALWAYS check that the machine is stopped.

It is recommended to not extend the continued use of the machine for more than 10 minutes to avoid overheating the machine (which could damage the motor) and the equipment.

1. Lift the movable protective screen of the spindle.
2. Place the workpiece on the spindle and secure it by tightening the jaws, with the appropriate key.

Insert the key into one of the holes with a square cross-section on the spindle, and to close the jaws, turn it clockwise (see Figure 33).

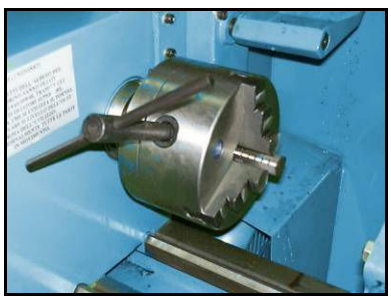

Figure 33 – Spindle key.

Locking the piece

Lock the workpiece onto the self-centring spindle in a stable and secure manner, by tightening the jaws with the necessary force.

3. If necessary, secure the opposite end of the workpiece using the tailstock. To do this, adjust the position of the tailstock and quill, using the appropriate fastening lever and hand wheel (see Figure 24).
4. If necessary, check the eccentricity of the workpiece, using a comparator and by rotating the piece slowly (by hand) after it is fixed between the tips (see Figure 34).

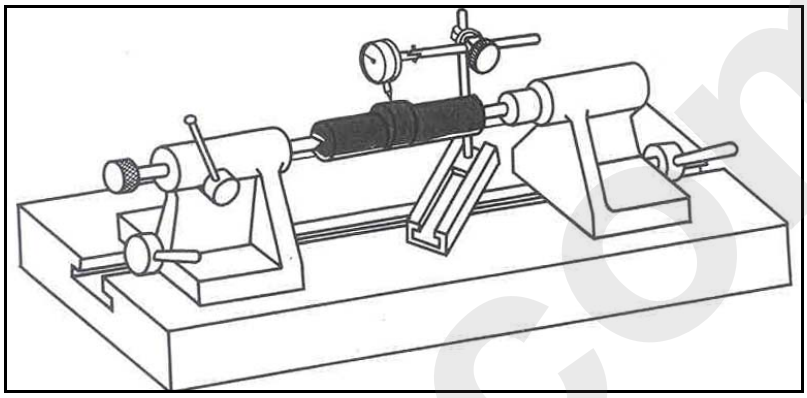

Figure 34 – Checking the eccentricity of the workpiece.

5. Insert the tool on the turret of the tool holder carriage, and secure it with the relative locking lever (ref. l in Figure 22).
6. Adjust the position of the carriage and tool holder slide, using the relative levers and handwheels (see Figure 22).
7. Lower the movable protective screen of the spindle.

Machine operation

Before starting the machine, ALWAYS close the movable protective screen of the spindle. This is to provide adequate protection for the operator, in relation to mechanical hazards in the "danger zone" of the spindle.

8. Set the correct spindle rotation speed, using the knobs on the control panel of the machine (see Figure 18).
9. Turn the main switch to position "I" (see Figure 16) verifying that the voltage warning light has turned on (white, see ref. c in Figure 17).
10. Move the start lever of the electric motor to start the rotation of the spindle, at the same time choosing the direction of rotation.
11. Perform the machining of the workpiece, by moving the tool towards the workpiece, in rotation, using the handwheels that regulate the fine movement of the tool holder slides (ref. m / n in Figure 22). If necessary, move the nozzle of the cooling liquid closer to the area affected by the machining and operate the pump.
12. When finished, move the tool away from the work piece, then stop the rotation of the spindle with the start lever.

Risk of abrasion and/or cutting

- After putting the start lever into the neutral position or pressing the emergency stop switches, the spindle will continue to rotate by inertia. For an immediate stop, you must push the brake pedal beneath the bed of the machine.
- Do not allow body parts near the spindle while in motion!

13. After stopping the rotation of the spindle, lift the mobile protective screen and remove the work piece from the spindle by releasing the jaws with the appropriate key. To do this, insert the key into one of the hollow, square sections on the spindle and turn it anticlockwise.

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10.1Automatic Feed Tool Carriage

Longitudinal feed

The automatic longitudinal feed of the carriage is derived from spindle, which transmits its motion to the grooved bar (see Figure 35).

The longitudinal feed is due to the lower slide that drags the carriage in the direction of the axis of the Lathe. A worm screw B, connected to the grooved bar A, runs along the latter together with the carriage. The worm screw sets in rotation a gear wheel D and the other gears present, including the pinion M which meshes with the rack N, which is moved by dragging the carriage during the rotation of the pinion.

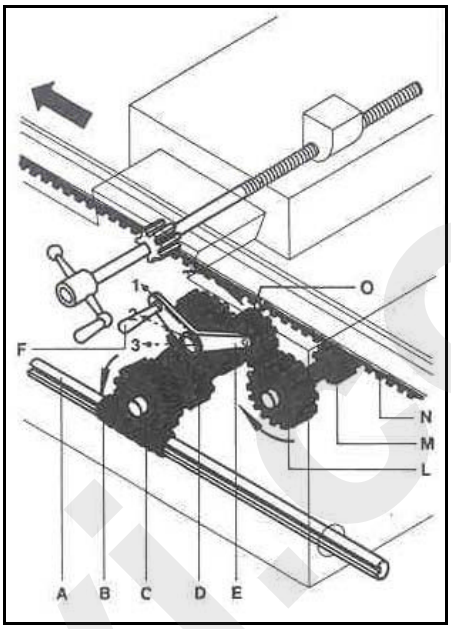

Figure 35 – Longitudinal feed.

Transverse feed

The transverse feed is due to the transverse slide which drags the upper slide and the tool in the perpendicular direction to the axis of the Lathe (see Figure 36). And by moving the lever E to position 3, the idler wheel O meshes with the pinion G integral with the screw H. The screw is coupled to the casing I integral with the transverse slide. The rotation of the screw therefore moves the transverse slide.

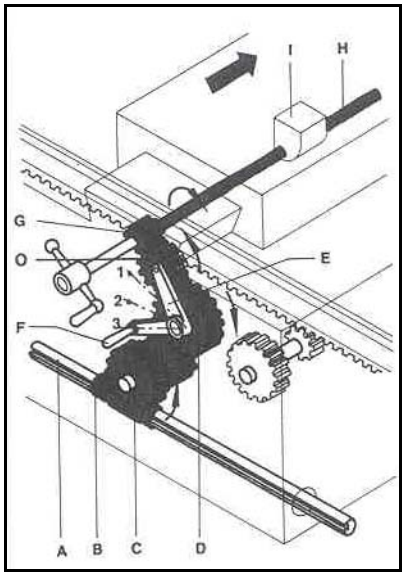

Figure 36 – Transverse feed.

Longitudinal feed for threading:

The automatic longitudinal feed originates in the spindle, which transmits motion to the lead screw connected to the spindle itself by means of gears that allow for the variation in the rotational speed (see Figure 37).

The lead screw, with its rotation motion, exerts a thrust on the fixed casing of the carriage, determining the automatic feed, in a longitudinal direction.

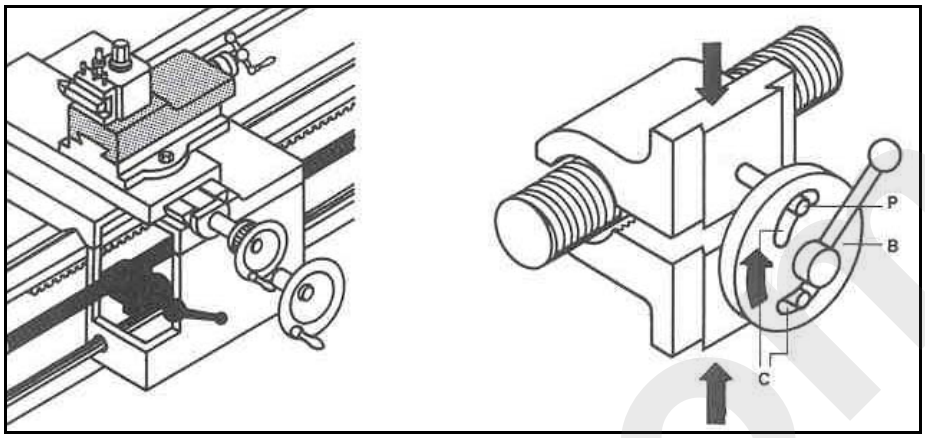

Figure 37 – Longitudinal feed with the lead screw.

The change of feed speed of the **Gear head lathe (Art. LC340/1000)** is mixed: mechanical with knobs for speed selection (see section 9.2.2) and with replaceable gears.

To carry out the replacement of the gears, proceed as described below:

Risk of Crushing

Before replacing the gears, turn off the machine, put the main switch in the "0" position .

1. Open the guard for the feed speed change gearbox, placed on the left part of the machine;
2. Unscrew the fastening nuts and disassemble the gears (see Figure 38);
3. Position the relative gears for the feed desired, check they fit perfectly and tighten the fastening nuts;
4. Close the guard of the gearbox.

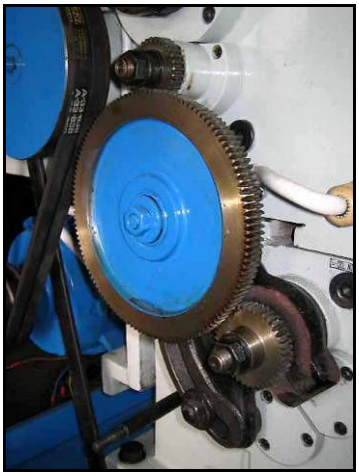

Figure 38 – Gears.

11 MAINTENANCE

Electric shock

Before maintenance or checks, turn off the machine and ALWAYS unplug the power cord. This is so that there is no risk of electric shock.

Regularly clean and take care of the machine to guarantee proper efficiency and a long working life.

Use a compressor to blow off shavings, chips, filings and dust that has accumulated on the floor of the machine and on the workbench at the end of each machining operation.

Working with compressed air

ALWAYS wear the protective goggles when using compressed air.

Check the status of the Lathe and the EC and warning plate; if these are no longer legible request replacements.

Do not use the lathe if there are any defects!!

Daily checks	
1	Check that all moving parts are well **lubricated**.
2	**Clean** the surface of the spindle, the turret and the body of the machine.
3	Check that there are no objects / tools near the moving parts.
4	Check the **operation of the manually operated handwheels**.
5	Check the **wear of the guide rails.**

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11.1 Lubrication

It is good practice to clean the machine, especially the guides, removing all chips produced by the work.

Apply, with a rag or a brush, a thin layer of oil on the guides and on the spindle to prevent corrosion.

The next day, remember to remove the oil before starting the machine.

The perfect efficiency of the lathe is guaranteed over time with the perfect lubrication of its moving parts.

Lubrication

Do not use the machine if oil leaks are detected or if the levels are not perfect.

Lubrication

- Only use the lubricants listed in the table below.
- DO NOT use any types other than those indicated, DO NOT use too much and DO NOT fall below the level indicated by the indicators.

The main gears of the lathe are splash lubricated, the lubricating oil level is signalled by the window (See figure 32).

The other parts that are to be manually lubricated are specified in the following table, together with the type of lubricant and frequency. The lead screw should be lubricated with lithium grease via the grease nipple.

The lubricating oil should be completely replaced after the first week of using the new lathe.

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For proper lubrication of the Lathe, proceed as follows (see Figure 39):

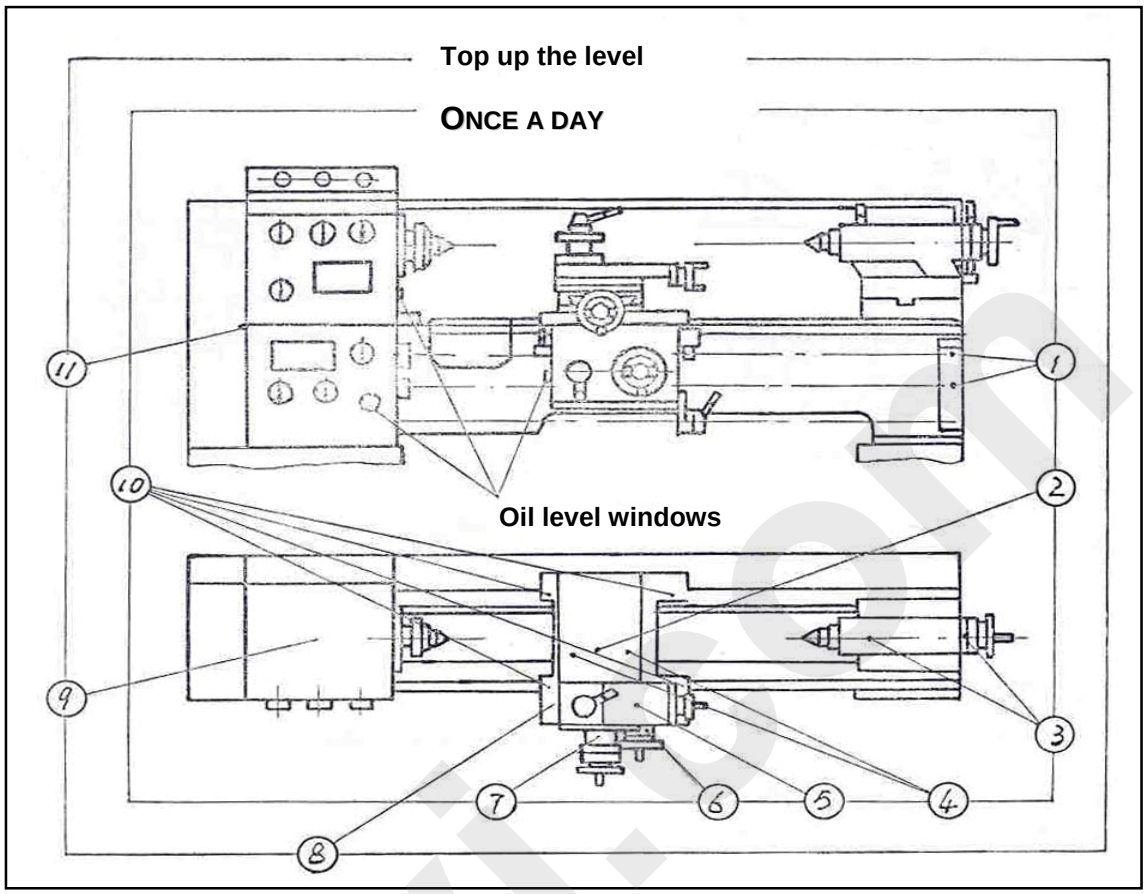

Figure 39 – Lubrication points on the machine.

Ref.	Parts of the machine	Lubrication point	Type of lubricant	Frequency	Replacement frequency
1	Feed shaft and lead screw bearings:	2	Oil	Daily	/
2	Transverse feed casing	1	Oil	Daily	/
3	Tailstock sleeve and hand wheel	2	Oil	Daily	/
4	Transverse slide	2	Oil	Daily	/
5	Longitudinal slide	3	Oil	Daily	/
6	Longitudinal feed handwheel	1	Oil	Daily	/
7	Transverse feed handwheel	1	Oil	Daily	/
8	Tool carriage	1	Oil 20	Level indicator	6 months
9	Spindle gears	1	Oil 20	Level indicator	6 months

Ref.	Parts of the machine	Lubrication point	Type of lubricant	Frequency	Replacement frequency
10	Carriage rails	4	Oil 20	Daily	/
11	Gears for threading	1	Oil 20	Level indicator	6 months

Types of oil recommended
Mobil Vectra No. 2
Shell – Tonna – T68/TX68
Chevron – Vistac – 68X
Esso – Febis – K68

Lubrication

DO NOT disperse used oil into the environment. Notify one of the authorized consortiums for collection and removal of used oil.

11.2Periodic checks

Every 6 months of the machine's life, perform a thorough inspection of operation and wear and precisely level the table.

The gear unit requires no maintenance other than oil changes.

11.3Adjusting the Machine

11.3.1 Adjusting the tension of the motor belts

Make sure the motor belt tension is at an appropriate level. In this regard, make a simple check by pressing down firmly on the individual belts (approximately in the middle), which should move by a maximum of 5 mm.

If the belts are loose or too tight, loosen the belt adjustment system bolts until the correct tension is achieved.

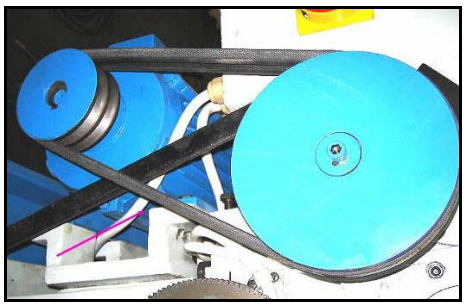

Figure 40 – Drive belts.

Proper belt tension reduces wear and increases the production of the machine.

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11.3.2 Tailstock alignment

When the tailstock is off-axis, it is necessary to correct its position by turning the adjustment screw until aligned with the reference marks on the side plate.

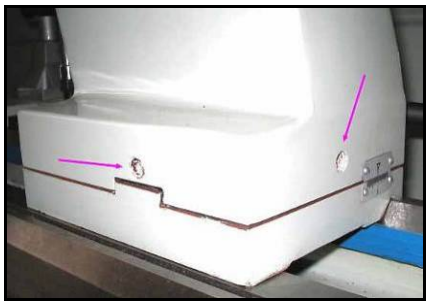

Figure 41 – Adjustment screw.

11.3.3 Spindle alignment

When the spindle rotates off-axis or if particularly heavy machining operations must be carried out, make an adjustment to the bearings.

The bearing that supports the spindle is tapered, to carry out the adjustment, proceed as follows (see Figure 42):

1. Loosen the bearing lock nut;
2. Tighten the bearing adjustment nut;
3. Test the spindle by rotating it, and — by means of a comparator (See Point 4 of Chapter 10) — make sure it rotates perfectly.
4. Re-tighten the bearing locking nut.

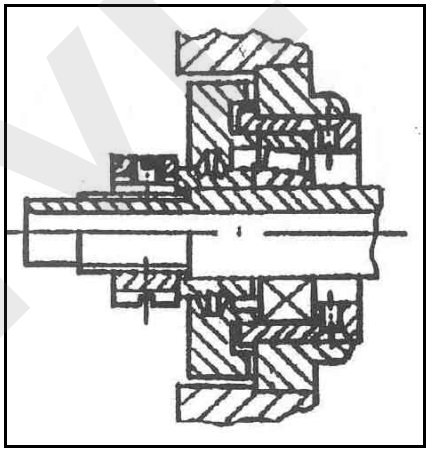

Figure 42 – Spindle alignment.

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11.3.4 Adjusting the slack of the gears

It is very important that there is no abnormal slack between the gears, to avoid breakage or rapid wear of the teeth of the gears themselves.

To reduce and / or adjust the slack , move the gear II and firmly tighten nuts III and IV (see Figure 43)

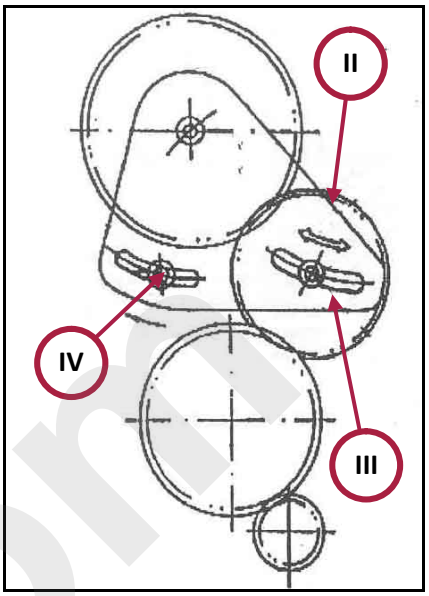

Figure 43 – Gear slack

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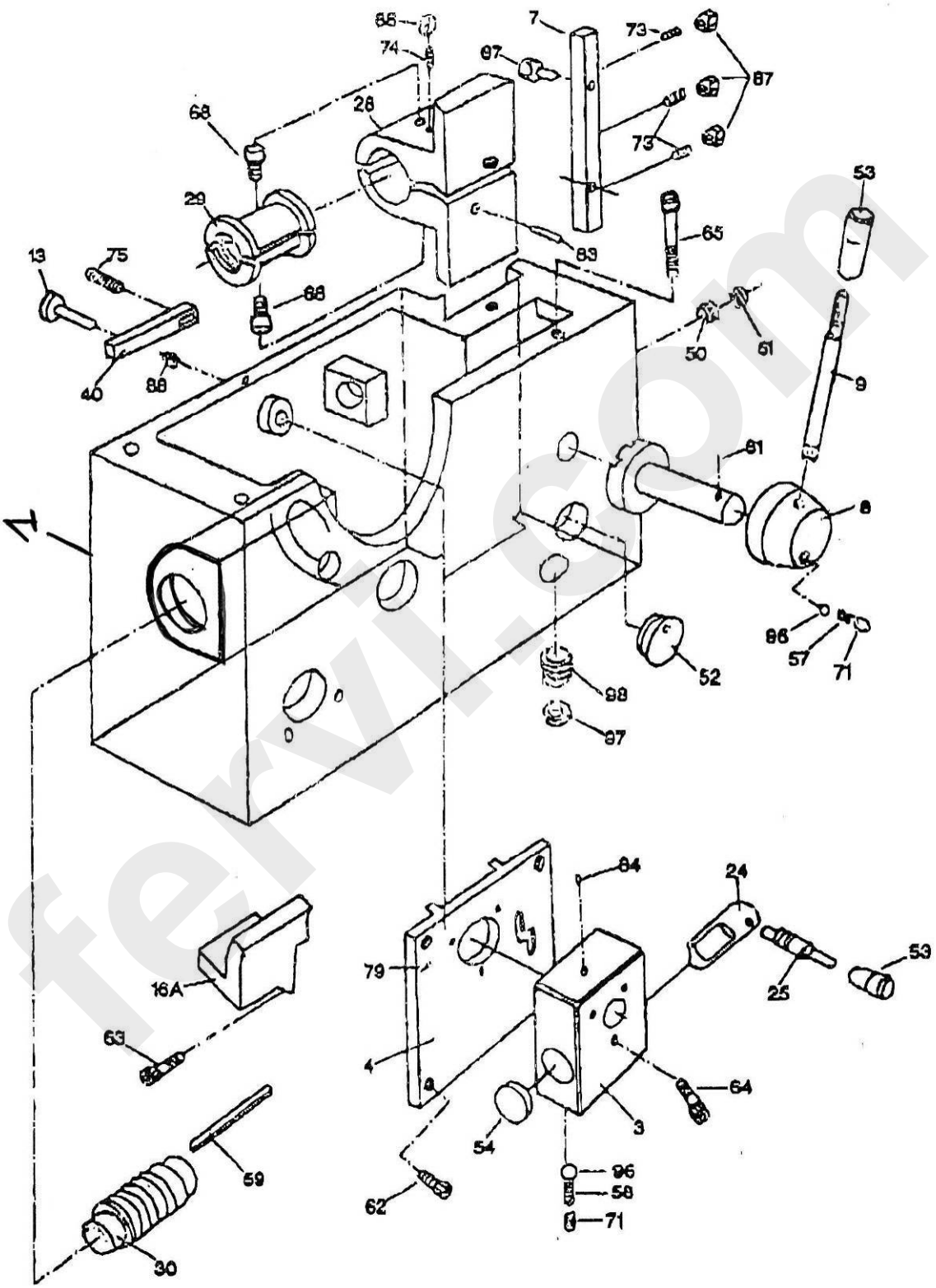
12 REPLACEMENT PARTS

TABLE A



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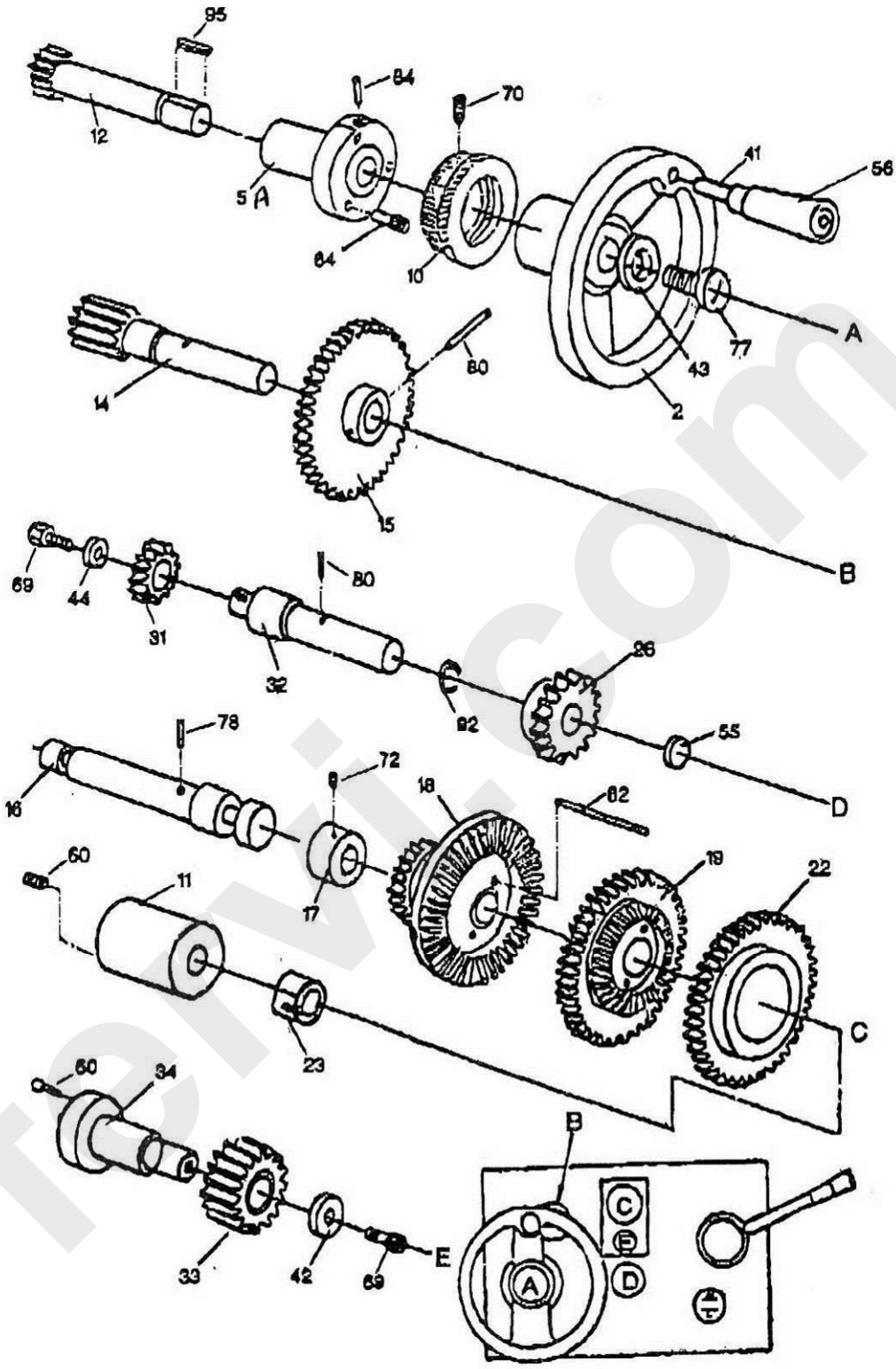
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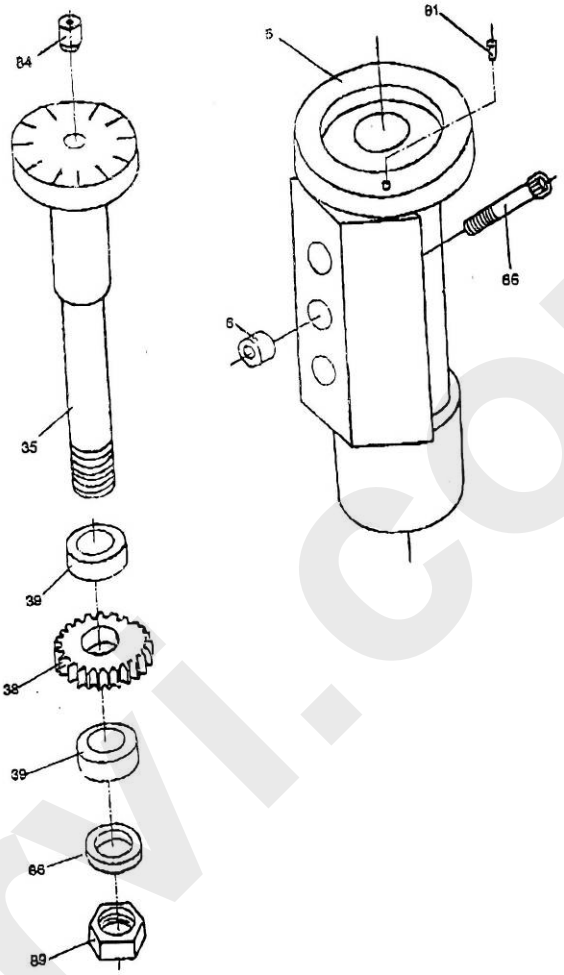

Part No.	description	Part No.	description
T999/A001	Fusion	T999/A053	Plastic terminal
T999/A002	Hand wheel	T999/A054	Cap
T999/A003	Box	T999/A055	Cap
T999/A004	Cover	T999/A056	Handle
T999/A005	Comparator body	T999/A057	Spring
T999/A006	Washer	T999/A058	Spring
T999/A007	Gib	T999/A059	Key
T999/A008	Selector body	T999/A060	Screw
T999/A009	Selection lever	T999/A062	Screw
T999/A010	Micrometer	T999/A063	Screw
T999/A011	Cover	T999/A064	Screw

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Part No.	description	Part No.	description
T999/A012	Shaft	T999/A065	Screw
T999/A013	Gear 60 Teeth	T999/A066	Screw
T999/A014	Shaft 18 Teeth	T999/A067	Screw
T999/A015	Gear	T999/A068	Screw
T999/A016	Shaft	T999/A069	Screw
T999/A017	Ring	T999/A070	Screw
T999/A018	Gear with 30 Teeth	T999/A071	Screw
T999/A019	Gear with 46 Teeth	T999/A072	Screw
T999/A022	Gear with 63 Teeth	T999/A073	Screw
T999/A023	Ring	T999/A074	Screw
T999/A024	Selector	T999/A075	Screw
T999/A025	Lever	T999/A076	Screw
T999/A026	Gear with 40 Teeth	T999/A077	Screw
T999/A028	Support	T999/A078	Plug
T999/A029	Half nut	T999/A079	Plug
T999/A030	Worm	T999/A060	Plug
T999/A031	Gear with 22 Teeth	T999/A081	Plug
T999/A032	Shaft	T999/A082	Plug
T999/A033	Gear 16 Teeth	T999/A083	Plug
T999/A034	Shaft	T999/A084	Oiler
T999/A035	Comparator shaft	T999/A085	Washer
T999/A038	Gear	T999/A086	Locking ring
T999/A039	Ring	T999/A087	Nut
T999/A040	Bar	T999/A088	Nut
T999/A041	Screw	T999/A089	Nut
T999/A041	Washer	T999/A090	Rivet
T999/A042	Washer	T999/A091	Rivet
T999/A043	Washer	T999/A092	O-ring
T999/A044	Washer	T999/A095	Key
T999/A050	Cap	T999/A096	Steel ball
T999/A051	Cap	T999/A097	Washer
T999/A052	Cap	T999/A098	Screw

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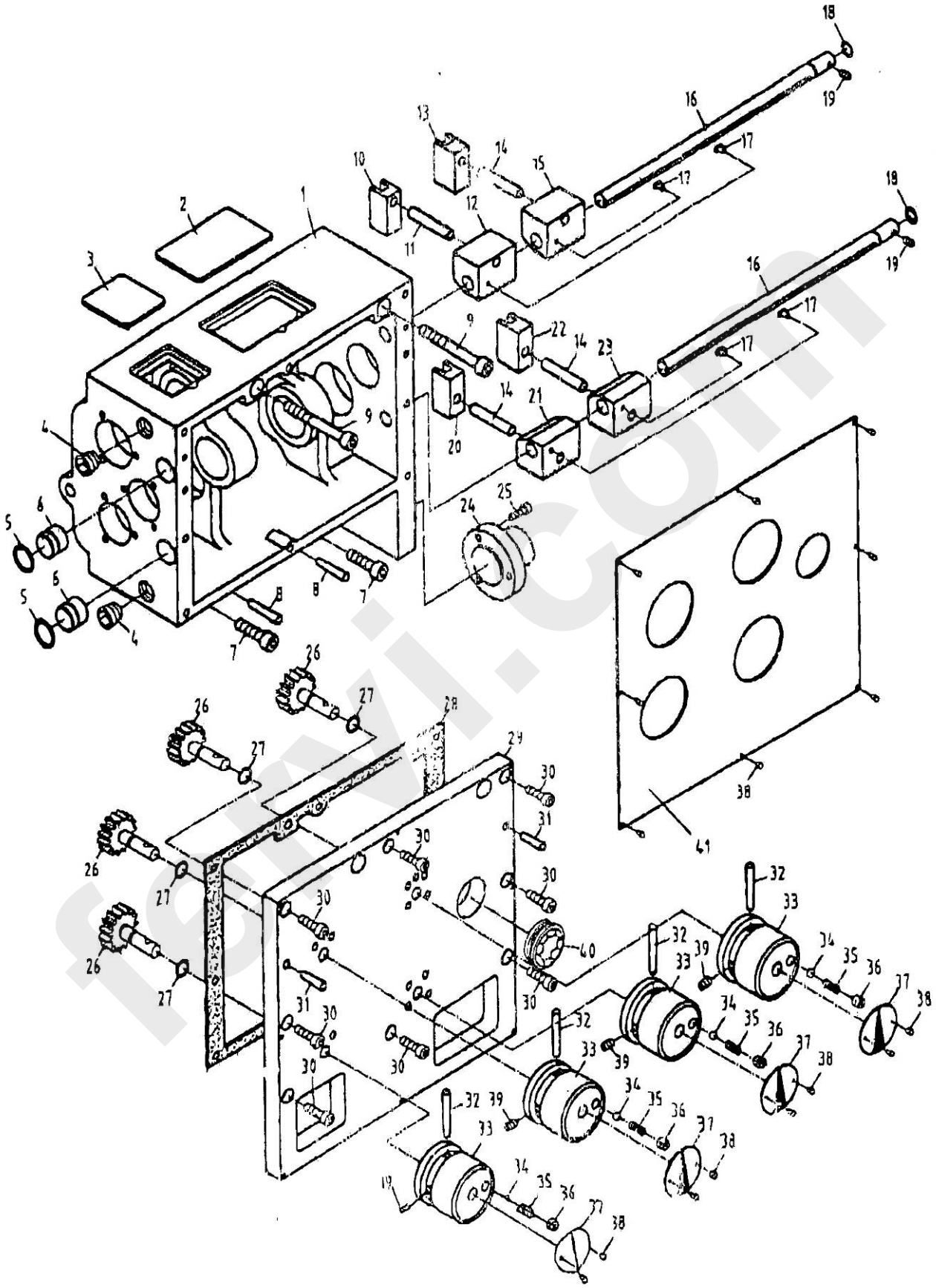
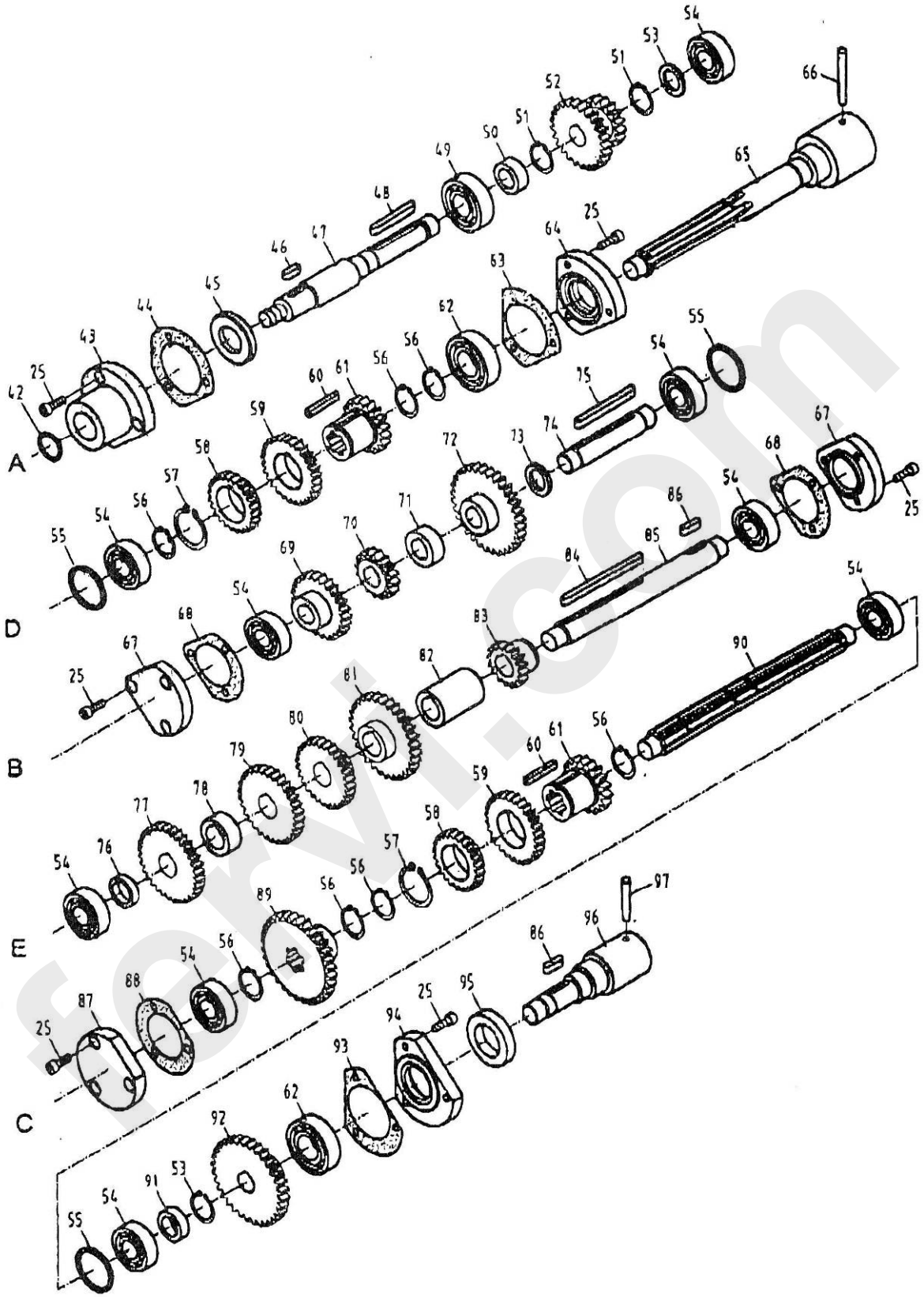
TABLE B





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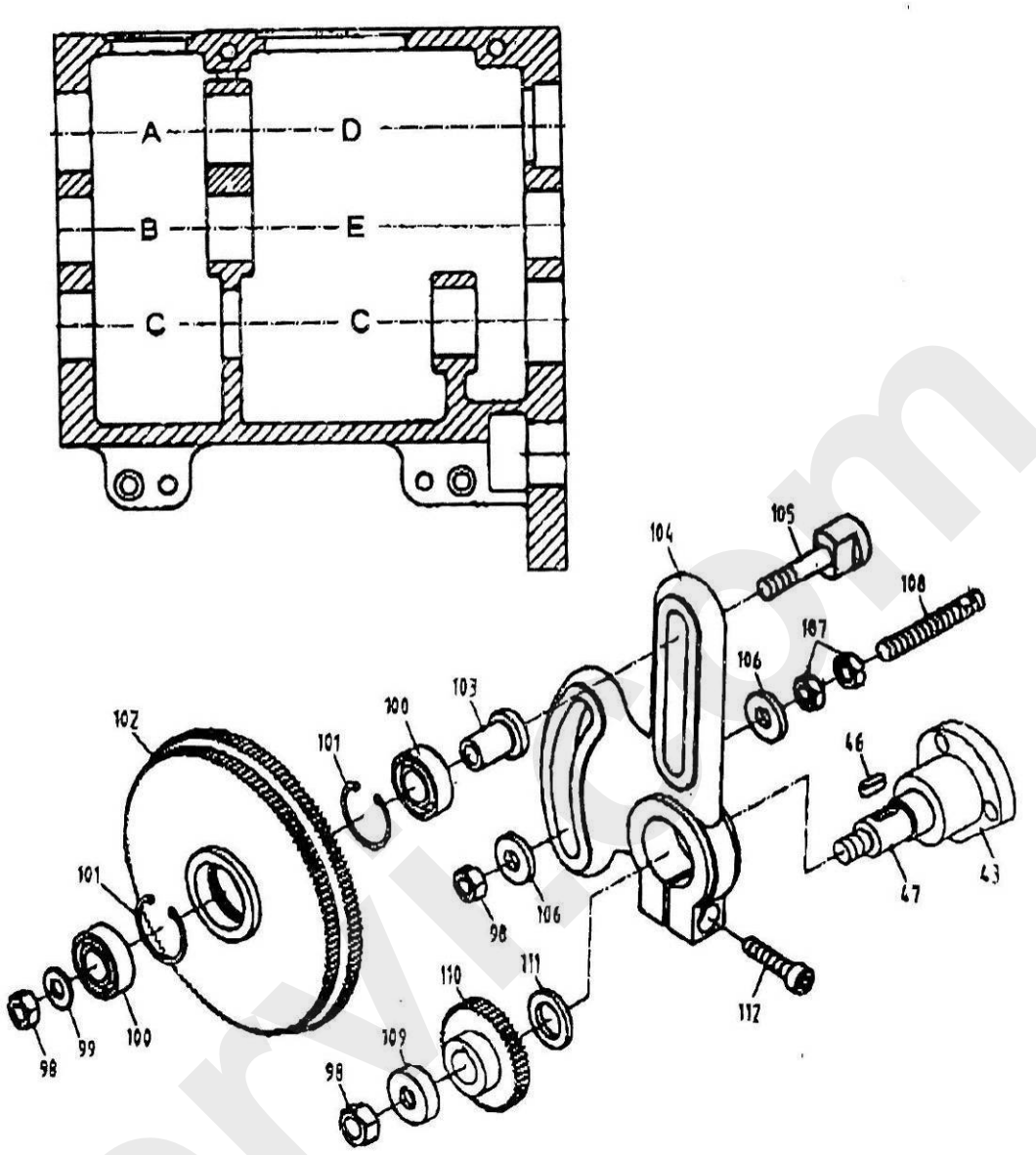
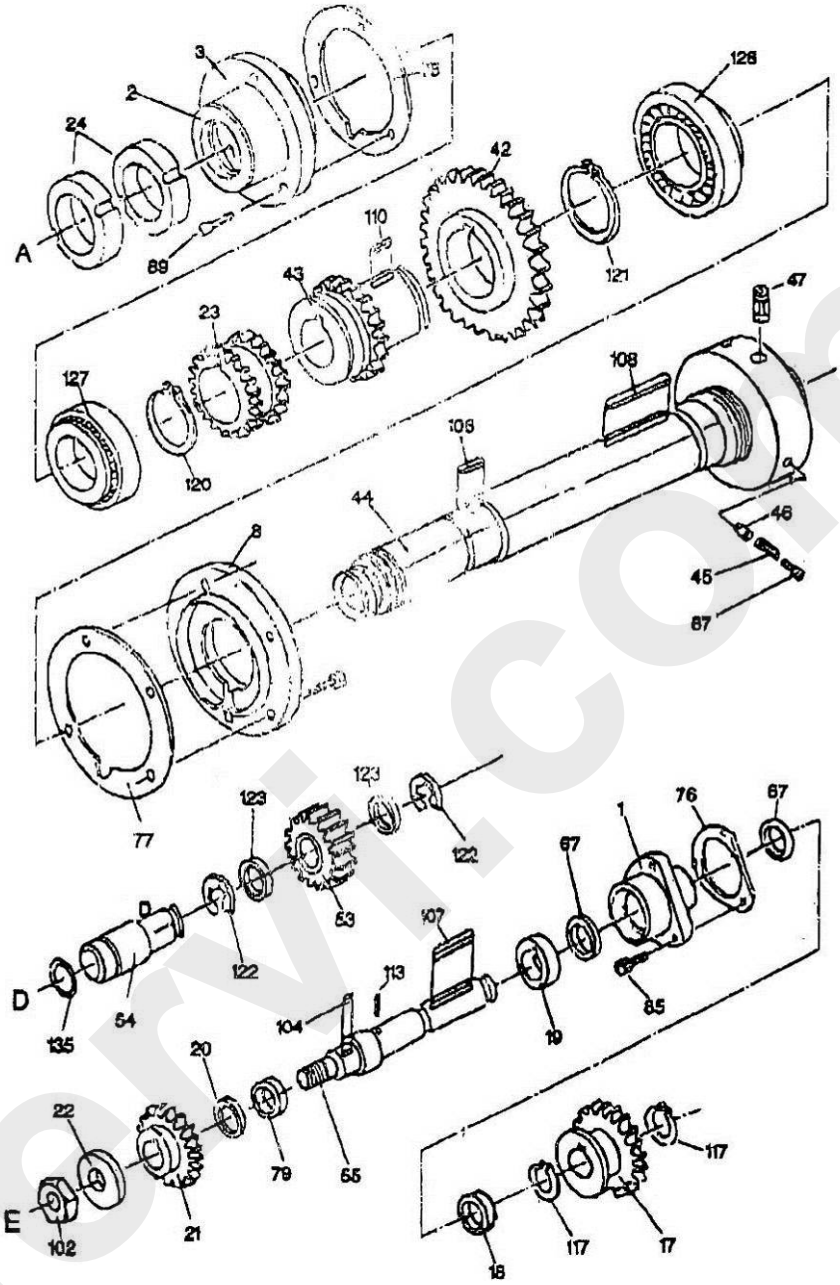


Part No.	Description	Part No.	Description
T999/B001	Fusion	T999/B049	Bearing
T999/B002	Cover	T999/B050	Brass bushing
T999/B003	Cover	T999/B051	Stop
T999/B004	Oil cap	T999/B052	Gear
T999/B005	O-ring	T999/B053	Washer
T999/B006	Sliding block	T999/B054	Bearing
T999/B007	Bolt	T999/B055	Washer
T999/B008	Conical plug	T999/B056	Stop
T999/B009	Bolt	T999/B057	Stop
T999/B010	Selector	T999/B058	Gear
T999/B011	Pin	T999/B059	Gear
T999/B012	Support	T999/B060	Key
T999/B013	Selector	T999/B061	Gear
T999/B014	Pin	T999/B062	Bearing
T999/B015	Support	T999/B063	Gasket
T999/B016	Shaft	T999/B064	Bearing cover

Part No.	Description	Part No.	Description
T999/B017	Key	T999/B065	Shaft
T999/B018	O-ring	T999/B066	Pin
T999/B019	Locking screw	T999/B067	Bearing cover
T999/B020	Selector	T999/B068	Gasket
T999/B021	Support	T999/B069	Gear
T999/B022	Selector	T999/B070	Gear
T999/B023	Support	T999/B071	Brass bushing
T999/B024	Support	T999/B072	Gear
T999/B025	Allen key	T999/B073	Brass bushing
T999/B026	Gear	T999/B074	Shaft
T999/B027	O-ring	T999/B075	Key
T999/B028	Gasket	T999/B076	Brass bushing
T999/B029	Cover	T999/B077	Gear
T999/B030	Allen key	T999/B078	Brass bushing
T999/B031	Conical plug	T999/B079	Gear
T999/B032	Plug	T999/B060	Gear
T999/B033	Support	T999/B081	Gear
T999/B034	Small sphere	T999/B082	Brass bushing
T999/B035	Spring	T999/B083	Gear
T999/B036	Locking screw	T999/B084	Key
T999/B037	Label	T999/B085	Shaft
T999/B038	Phillips head screw	T999/B086	Key
T999/B039	Locking screw	T999/B087	Bearing cover
T999/B040	Oil level	T999/B088	Gasket
T999/B041	Label	T999/B089	Gear
T999/B042	Lock	T999/B090	Shaft
T999/B043	Bearing protection	T999/B091	Brass bushing
T999/B044	Gasket	T999/B092	Gear
T999/B045	Washer	T999/B093	Gasket
T999/B046	Key	T999/B094	Bearing cover
T999/B047	Shaft 7	T999/B095	Ring
T999/B048	Key	T999/B096	Shaft
T999/B097	Pin	T999/B105	Bolt
T999/B098	Screw	T999/B106	Washer
T999/B099	Washer	T999/B107	Screw
T999/B100	Bearing	T999/B108	Bolt
T999/B101	Stop	T999/B109	Washer
T999/B102	Gear	T999/B110	Gear
T999/B103	Bearing	T999/B111	Washer
T999/B104	Gear cover	T999/B112	Allen key

TABLE C



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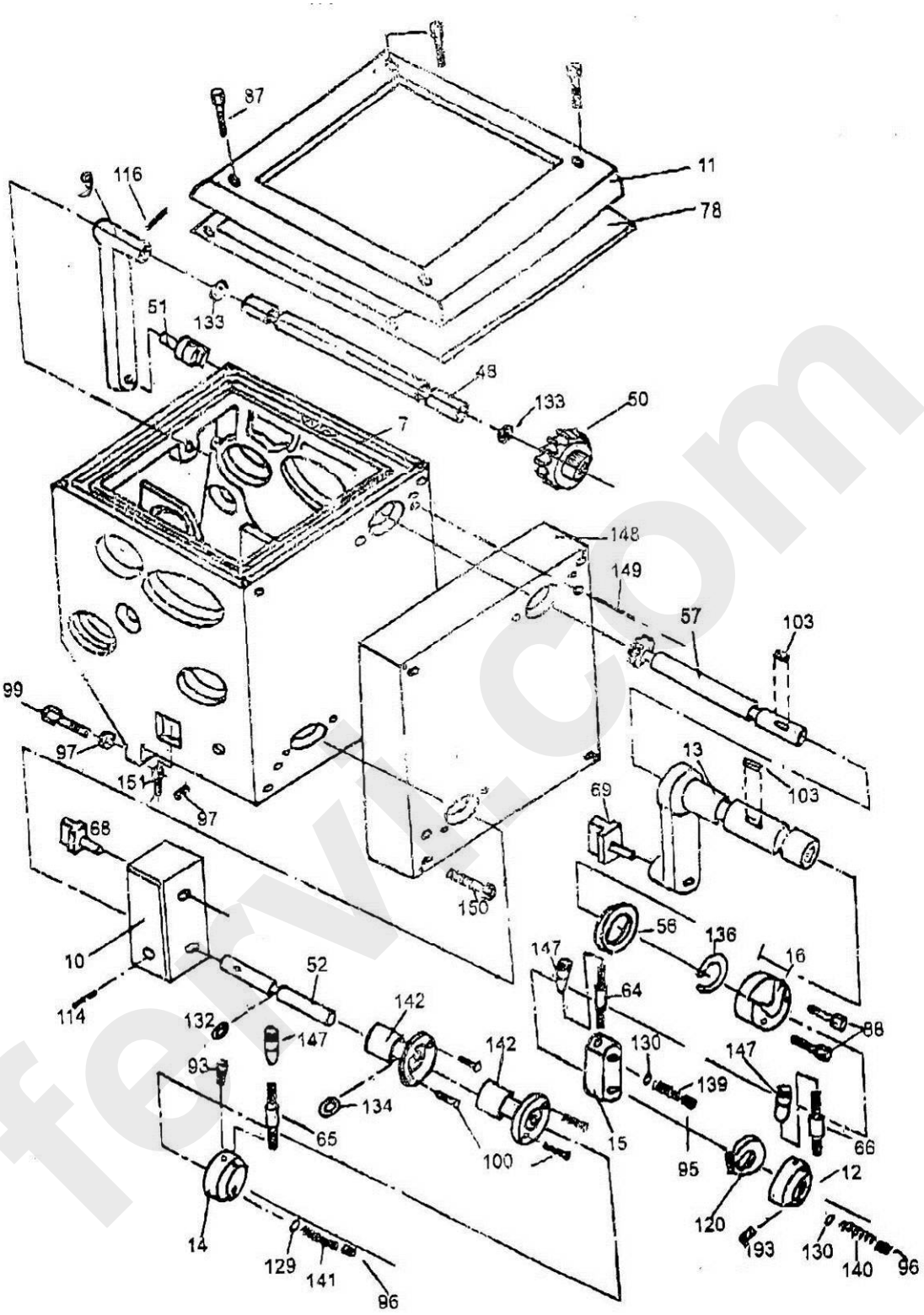
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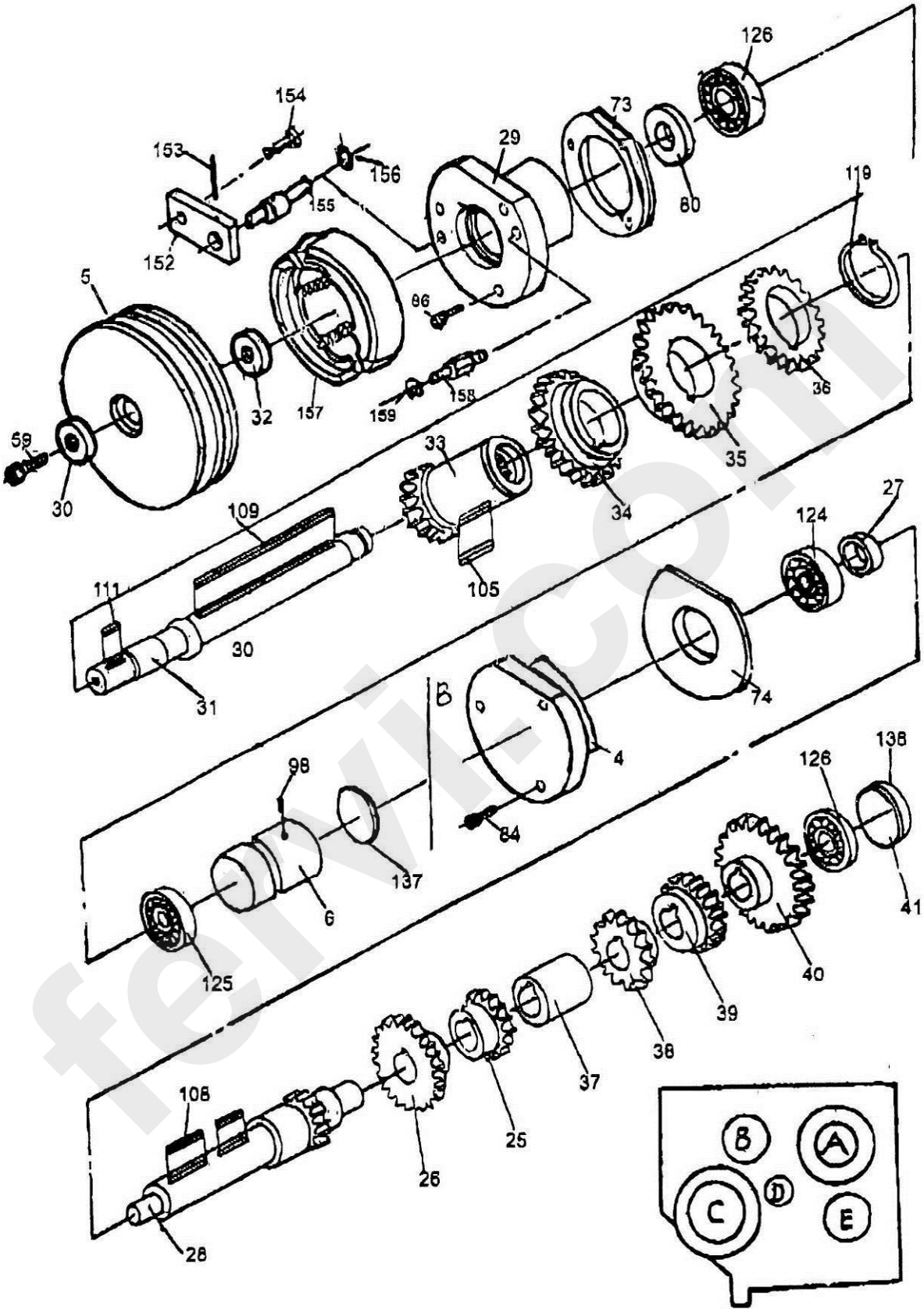
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Part No.	Description	Part No.	Description
T999/C001	Collar	T999/C046	Small pin
T999/C002	Collar	T999/C047	Cam
T999/C003	Back cover	T999/C048	Shaft
T999/C004	Back cover	T999/C050	Gear 51z
T999/C005	Pulley	T999/C051	Spacer
T999/C006	Pin	T999/C052	Shaft
T999/C007	Head	T999/C053	Gear 30 z
T999/C008	Front cover	T999/C054	Shaft
T999/C009	Lever	T999/C055	Shaft
T999/C010	Shaft support	T999/C056	Washer
T999/C011	Cover	T999/C057	Toothed shaft 17z
T999/C012	Body	T999/C059	Screw
T999/C013	Shaft	T999/C064	Switch
T999/C014	Body	T999/C065	Switch
T999/C015	Pad	T999/C066	Switch
T999/C016	Hub	T999/C067	Spacer
T999/C017	Gear 37z	T999/C068	Fork
T999/C018	Washer	T999/C069	Fork
T999/C019	Washer	T999/C073	Gasket
T999/C020	Washer	T999/C074	Gasket
T999/C021	Gear 40z	T999/C075	Gasket
T999/C022	Washer	T999/C076	Gasket
T999/C023	Gear 37z	T999/C077	Gasket
T999/C024	Locking nut	T999/C078	Gasket
T999/C025	Gear 43z	T999/C079	Gasket
T999/C026	Gear 51z	T999/C080	Gasket
T999/C028	Shaft 16z	T999/C081	Oil level window
T999/C029	Washer	T999/C084	Allen key M4 x 12
T999/C030	Washer	T999/C085	Allen key M4 x 12
T999/C031	Shaft	T999/C086	Allen key M4 x 12
T999/C032	Washer	T999/C087	Allen key M4 x 12
T999/C033	Gear 21z	T999/C088	Allen key M4 x 12
T999/C034	Gear 29z	T999/C089	Allen key M4 x 12
T999/C035	Gear 46z	T999/C093	Screw M6 x 12
T999/C036	Gear 38z	T999/C095	Screw M8 x 8
T999/C037	Spacer	T999/C096	Screw M8 x 10
T999/C038	Gear 26z	T999/C097	Screw M8 x 12
T999/C039	Gear 34z	T999/C098	Screw M8 x 16
T999/C040	Gear 53z	T999/C099	Screw M8 x 40
T999/C041	Lid	T999/C100	Screw M4 x 8

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Part No.	Description	Part No.	Description
T999/C042	Gear 74z	T999/C102	Nut M12
T999/C043	Gear 37z	T999/C103	Key 5 x 15
T999/C044	Shaft	T999/C104	Key 5 x 18
T999/C045	Spring	T999/C105	Key5 x 50
T999/C106	Key 6 x 40	T999/C131	O_Ring
T999/C107	Key 6 x 55	T999/C132	O_Ring
T999/C108	Key 6 x 120	T999/C133	O_Ring
T999/C109	Key 6 x 120	T999/C134	O_Ring
T999/C110	Key 6 x 18	T999/C135	O_Ring
T999/C111	Key 5 x 20	T999/C136	O_Ring
T999/C113	Plug 3 x 10	T999/C137	O_Ring
T999/C114	Plug 4 x 18	T999/C138	O_Ring
T999/C116	Plug 5 x 32	T999/C139	Spring
T999/C117	Locking ring 35	T999/C140	Spring
T999/C119	Locking ring 20	T999/C141	Spring
T999/C120	Locking ring 50	T999/C142	Hub
T999/C121	Locking ring 72	T999/C143	Brass tube
T999/C122	Locking ring 42	T999/C144	Knob
T999/C123	Bearing	T999/C145	Belt
T999/C124	Bearing	T999/C148	Lid
T999/C125	Bearing	T999/C149	Plug
T999/C126	Bearing	T999/C150	Screw M6 x 50
T999/C127	Bearing	T999/C151	Allen key
T999/C128	Bearing	T999/C152	Handle plate
T999/C129	Sphere	T999/C153	Plug
T999/C130	Sphere	T999/C154	Shaft

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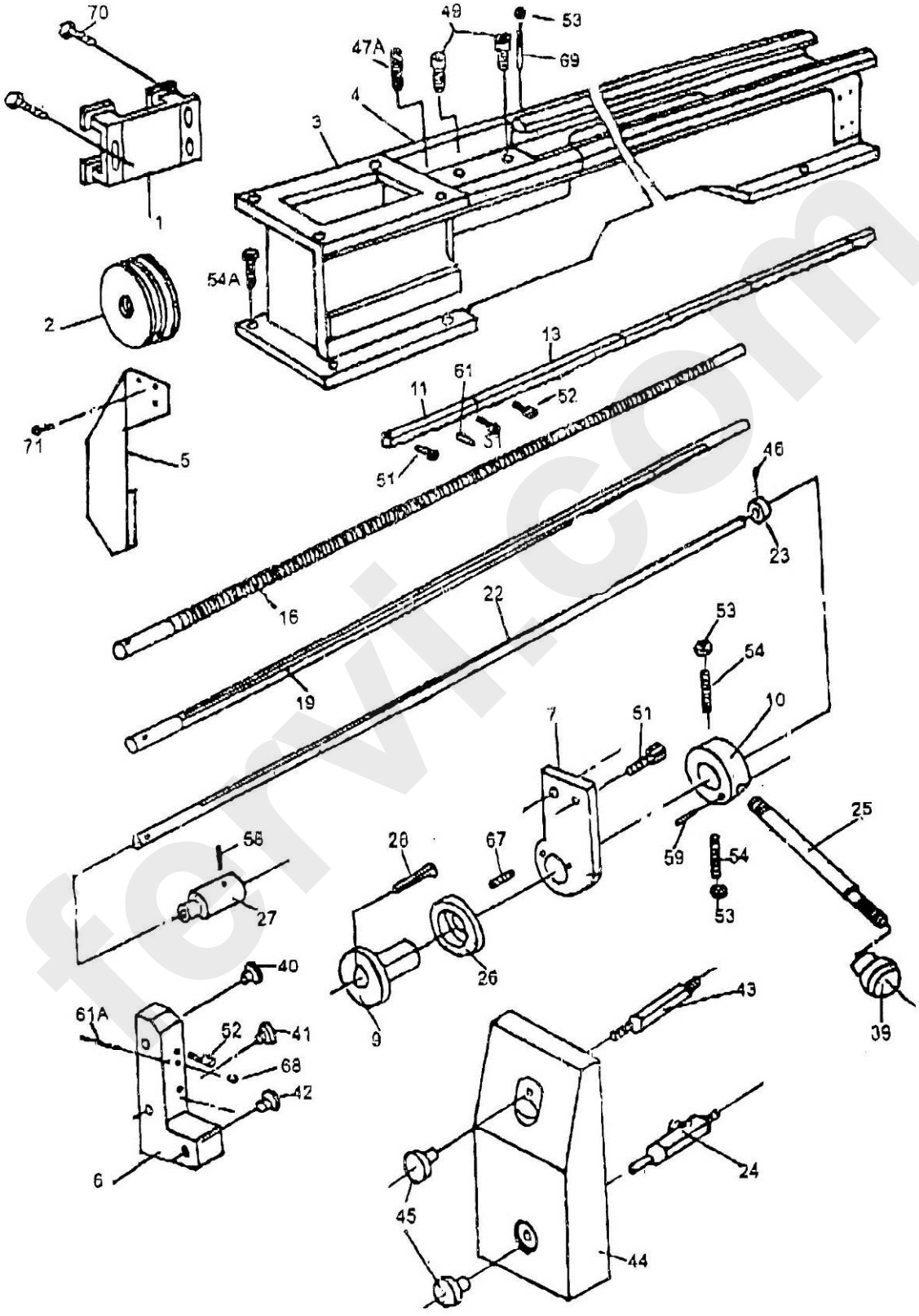
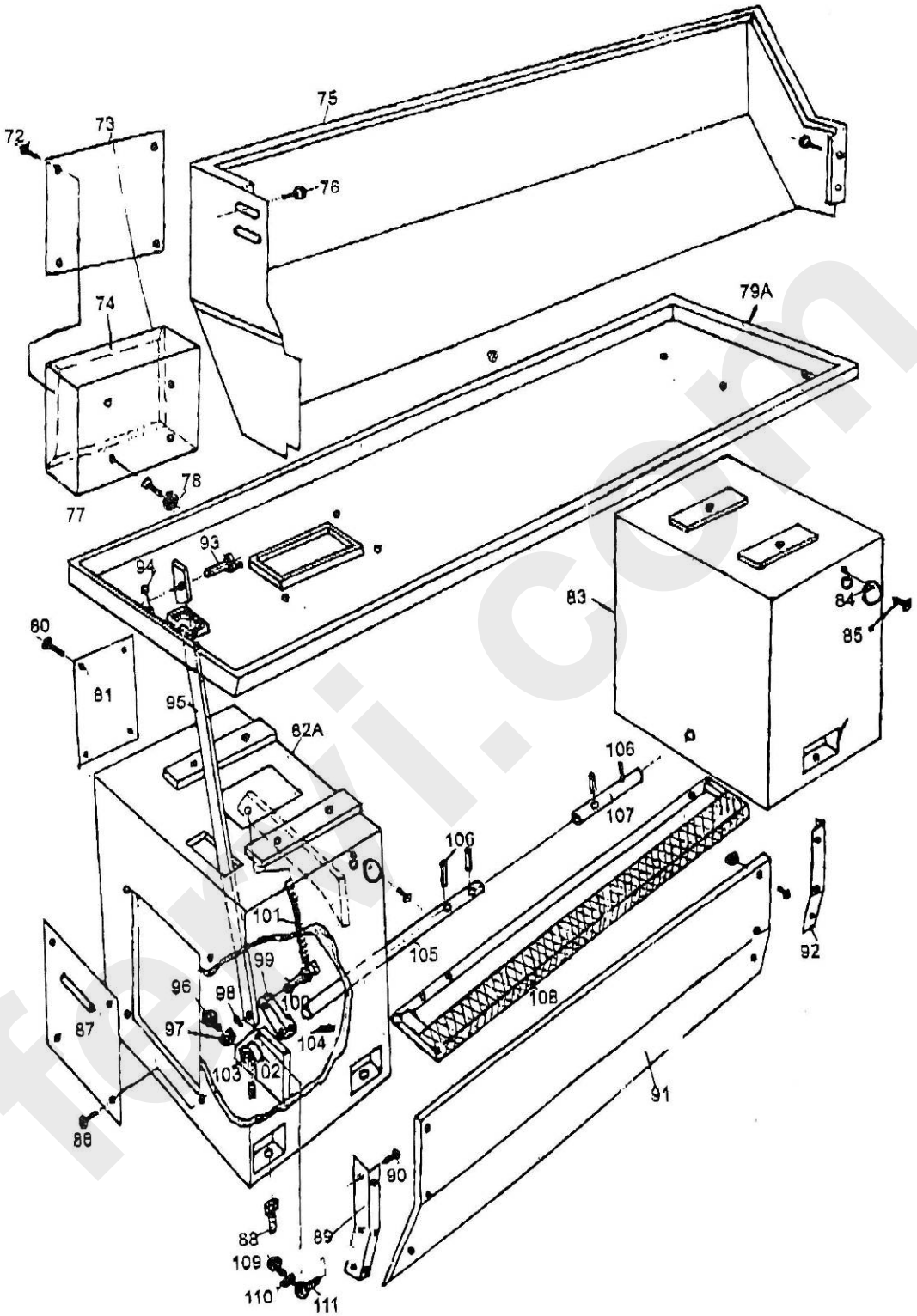
TABLE D



fervi.com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Part No.	Description	Part No.	Description
T999/D001	Motor support	T999/D069	Plug
T999/D002	Pulley	T999/D070	Bolt
T999/D003	Table	T999/D071	Bolt
T999/D004	Cavity	T999/D072	Bolt
T999/D005	Protective device	T999/D073	Lid
T999/D006	Support	T999/D074	Electrical controls box
T999/D007	Support	T999/D075	Splashguard
T999/D008	Spacer	T999/D076	Bolt
T999/A009	Collar	T999/D077	Bolt
T999/D010	Rack	T999/D078	Nut
T999/D011	Rack	T999/D079	Bath
T999/D013	Rack	T999/D060	Screw
T999/D016	Main screw	T999/D081	Lid
T999/D019	Feed rod	T999/D082	Left table support
T999/D022	Shaft	T999/D083	Right table support
T999/D023	Spacer	T999/D084	Lid
T999/D024	Shaft	T999/D085	Screw
T999/D025	Rod	T999/D086	Screw
T999/D026	Ring	T999/D087	Lid
T999/D027	Spacer	T999/D088	Screw
T999/D028	Key	T999/D089	Support
T999/D029	Oil cup	T999/D090	Screw
T999/D039	Knob	T999/D091	Tin plate
T999/D040	Plug	T999/D092	Support
T999/D041	Plug	T999/D093	Shaft
T999/D041	Plug	T999/D094	Elastic pin
T999/D042	Screw	T999/D095	Rod
T999/D043	Protective device	T999/D096	Lid
T999/D044	Locking nut	T999/D097	Nut
T999/D045	Screw	T999/D098	Elastic pin
T999/D046	Screw	T999/D099	Pedal arm
T999/D047	Screw	T999/D100	Connection
T999/D049	Allen key	T999/D101	Spring
T999/D051	Allen key	T999/D102	Lock
T999/D052	Allen key	T999/D103	Screw
T999/D053	Nut	T999/D104	Plug
T999/D054	Grub screw	T999/D105	Tube
T999/D054A	Bolt	T999/D106	Elastic pin
T999/D058	Plug	T999/D107	Tube
T999/D059	Plug	T999/D108	Pedal

Part No.	Description	Part No.	Description
T999/D061	Plug	T999/D109	Screw
T999/D061A	Plug	T999/D110	Nut
T999/D067	Spring	T999/D111	Rod support
T999/D068	Sphere		

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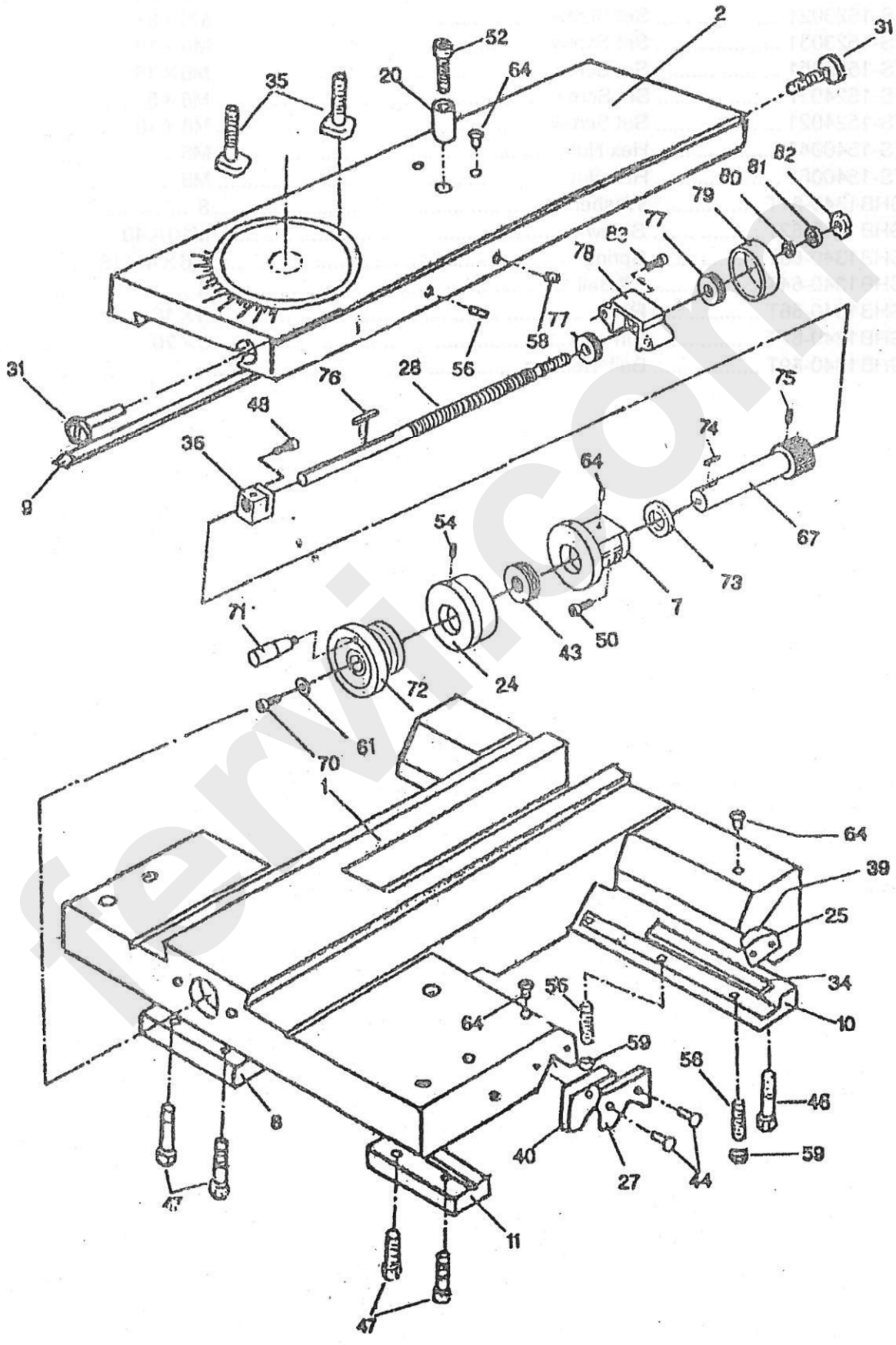
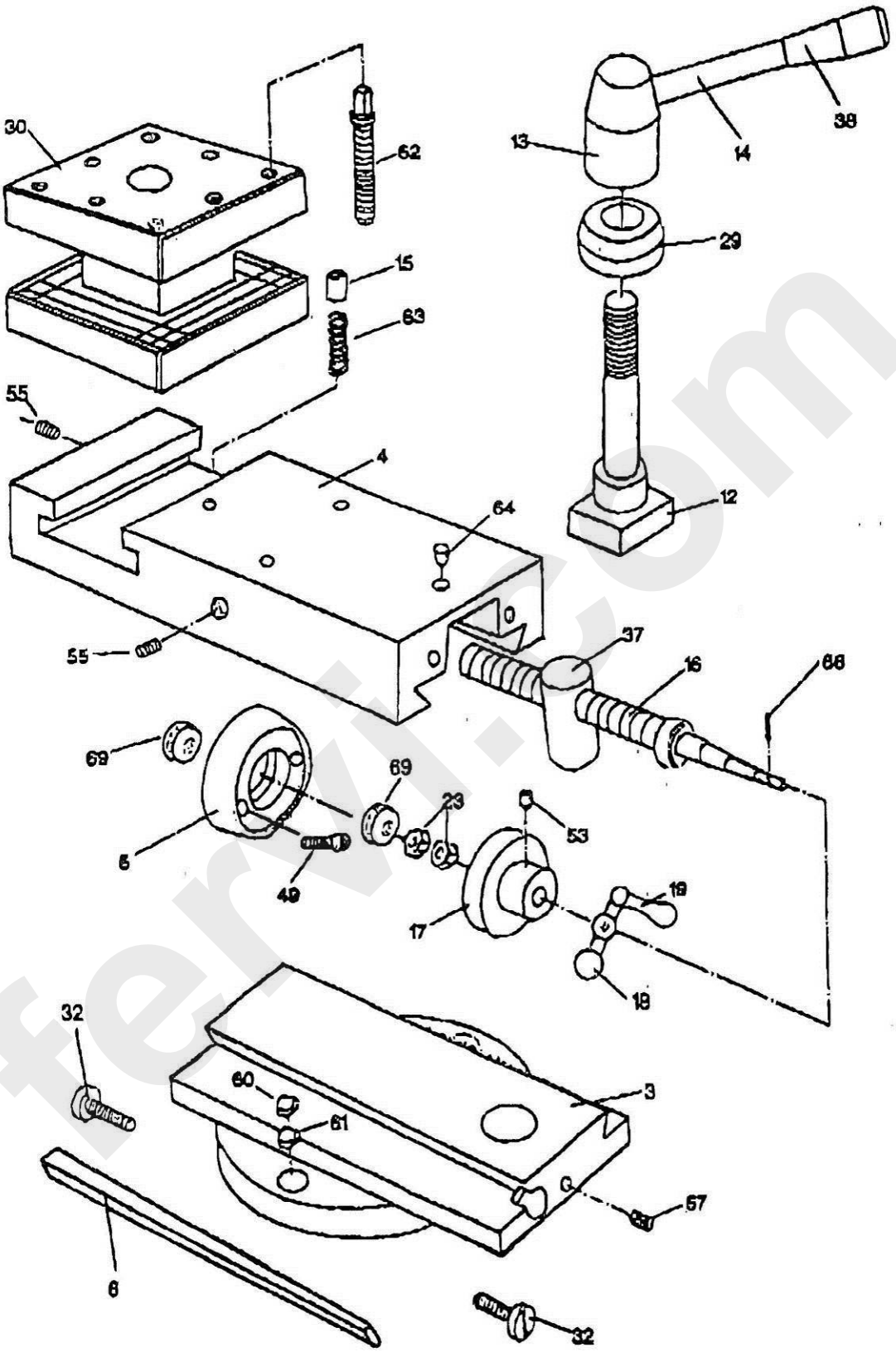
TABLE E



fervi.com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Part No.	Description	Part No.	Description
T999/E001	Saddle	T999/E042	Bearing
T999/E002	Slide	T999/E043	Bearing
T999/E003	Rotating slide	T999/E044	Screw
T999/E004	Upper slide	T999/E045	Screw
T999/E005	Collar	T999/E046	Screw
T999/E006	Gib	T999/E047	Screw
T999/E007	Hub	T999/E048	Allen key
T999/E008	Strip	T999/E049	Allen key
T999/E009	Gib	T999/E050	Allen key
T999/E010	Stop	T999/E052	Allen key
T999/E011	Stop	T999/E053	Adjustment grub screw
T999/E012	Hammer screw	T999/E054	Adjustment grub screw
T999/E013	Lever base	T999/E055	Adjustment grub screw
T999/E014	Lever	T999/E056	Adjustment grub screw
T999/E015	Stop	T999/E057	Adjustment grub screw
T999/E016	Screw	T999/E058	Adjustment grub screw
T999/E017	Micrometer	T999/E059	Nut
T999/E018	Switch	T999/E060	Nut
T999/E019	Switch	T999/E061	Washer
T999/E020	Collar	T999/E062	Screw
T999/E022	Washer	T999/E063	Spring
T999/E023	Nut	T999/E064	Oiler
T999/E024	Micrometer	T999/E066	Plug
T999/E025	Plate	T999/E067	Shaft gear
T999/E026	Plate	T999/E069	Bearing
T999/E027	Plate	T999/E070	Allen key
T999/E028	Screw	T999/E071	Lever
T999/E029	Washer	T999/E072	Handle
T999/E030	Turret base	T999/E073	Spacer
T999/E031	Adjustment screw	T999/E074	Key
T999/E032	Adjustment screw	T999/E075	Screw
T999/E033	Switch	T999/E076	Key
T999/E034	Gib	T999/E077	Thrusting bearing
T999/E035	T bolts	T999/E078	Bearing housing
T999/E036	Threaded lock	T999/E079	Bearing dust cover
T999/E037	Nut	T999/E080	Washer
T999/E038	Switch cover	T999/E081	Washer
T999/E039	Small brush	T999/E082	Locking nut
T999/E040	Small brush	T999/E083	Allen key

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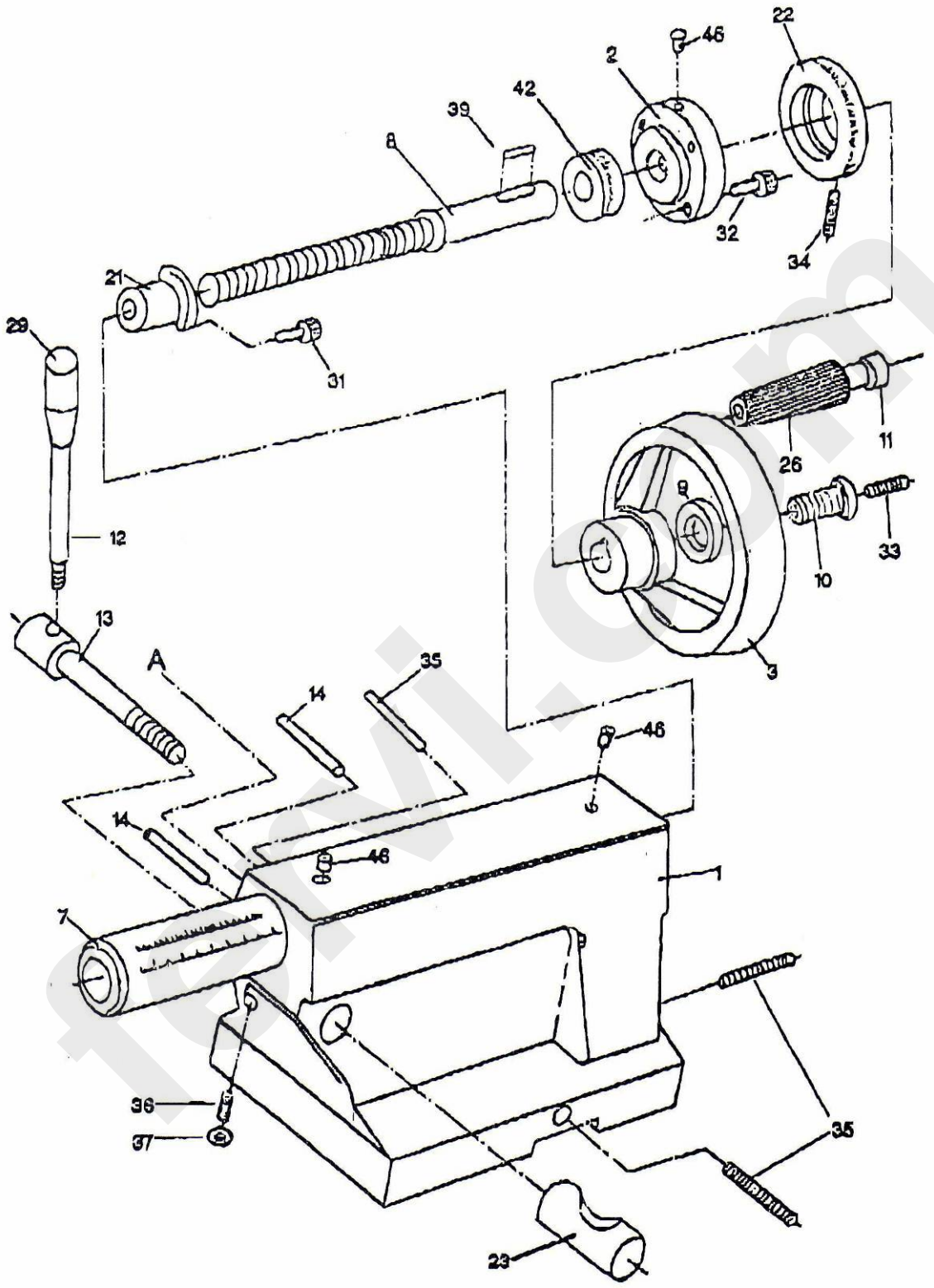
TABLE F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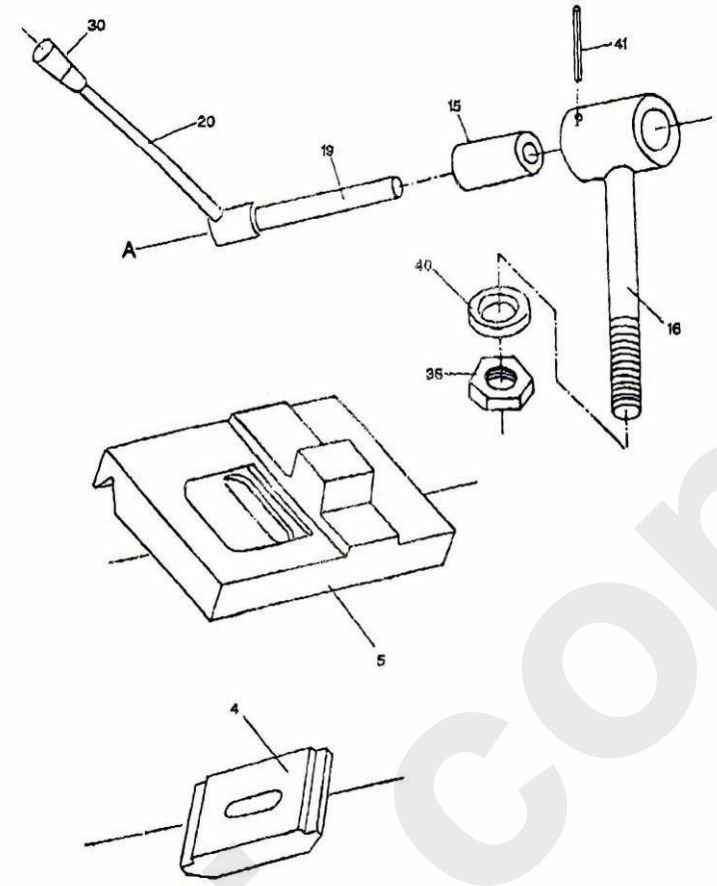

Part No.	Description	Part No.	Description
T999/F001	Body	T999/F022	Micrometer
T999/F002	Flange	T999/F023	Lock
T999/F003	Hand wheel	T999/F026	Switch
T999/F004	Plate	T999/F029	Knob
T999/F005	Base	T999/F030	Knob
T999/F007	Sleeve	T999/F031	Allen key
T999/F008	Screw	T999/F032	Allen key
T999/F009	Washer	T999/F033	Screw
T999/F010	Screw	T999/F034	Screw
T999/F011	Screw	T999/F035	Screw
T999/F012	Screw	T999/F036	Screw
T999/F013	Pin	T999/F037	Nut
T999/F014	Screw	T999/F038	Nut
T999/F015	Sleeve coupling	T999/F039	Key
T999/F016	Tie rod	T999/F040	Washer
T999/F019	Pin	T999/F041	Plug
T999/F020	Lever	T999/F041	Bearing
T999/F021	Nut	T999/F042	Oiler

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TABLE G

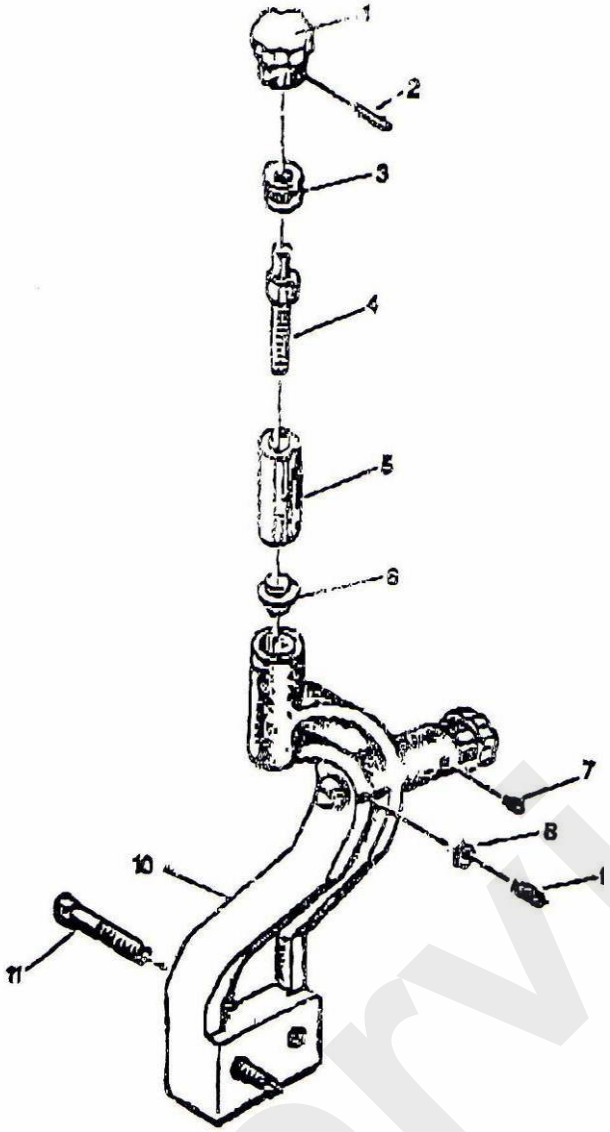
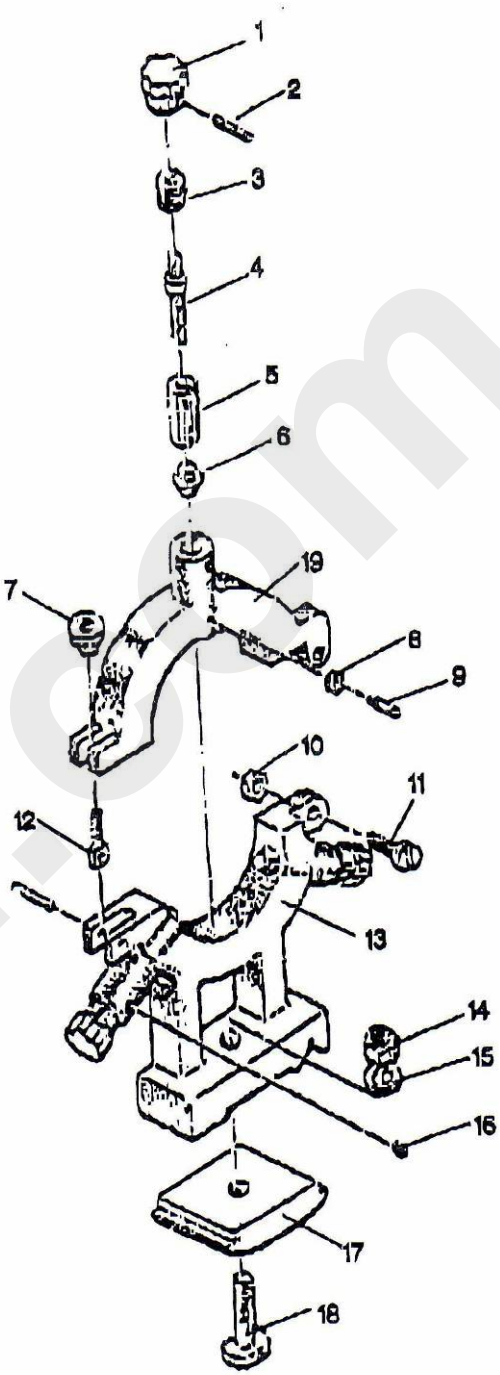


TABLE H



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Part No.	Description	Part No.	Description
T999/G001	Knob	T999/H001	Knob
T999/G002	Plug	T999/H002	Plug
T999/G003	Plain bearing	T999/H003	Plain bearing
T999/G004	Screw	T999/H004	Screw
T999/G005	Sleeve coupling	T999/H005	Sleeve coupling
T999/G006	Brass probe	T999/H006	Probe
T999/G007	Screw	T999/H007	Knob
T999/G008	Nut	T999/H008	Nut
T999/G009	Screw	T999/H009	Screw
T999/G010	Body	T999/H010	Nut
T999/G011	Allen key	T999/H011	Bolt
		T999/H012	Bolt
		T999/H013	Lower body
		T999/H014	Nut
		T999/H015	Washer
		T999/H016	Screw
		T999/H017	Plate
		T999/H018	Bolt
		T999/H019	Upper body

12.1ACCESSORIES SUPPLIED

1) Self-centring device 3+3 Ø 160 mm
2) Movable rest
3) Independent jawed spindle 4+4 Ø 200 mm
4) Reduction bushing CM5
5) Fixed rest
6) Flange Ø 250 mm
7) Adjustable brake
8) Rotating tailstock CM 3
9) Spindle protector
10) Threading comparator
11) Quick change turret
12) Rear splashguard
13) Pedal brake
14) Lead screw guard

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13 DISPOSAL OF PARTS AND MATERIALS

If the machine is to be scrapped, its parts must be disposed of differently.
The Lathe is composed of the following materials:

- the head, the table, the tailstock, the slides and the carriages are made of cast iron;
- the gears, shafts, bearings, slideways and spindle are made of steel.

Respect the environment!

Contact a specialist centre for the collection of metallic materials.

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14 TROUBLESHOOTING

PROBLEM	PROBABLE CAUSE	SOLUTION
Noisy operation	A) Damaged bearings. B) Bearings not lubricated. C) Blunt tool. D) Loose tool.	B) Contact Customer Service. C) Lubricate D) Remove/sharpen the tool. E) Tighten the fastening lever.
The motor will not start.	A) Electrical power supply. B) Wiring connections C) Burnt motor windings. D) Blown fuses. E) Broken switch.	A) Check the mains power supply. B) Check the wiring connections. C) Contact Technical Support. D) Replace the fuses. E) Contact technical support.
The tool "softens" or overheats too much.	A) Excessive pressure on the workpiece. B) Shavings will not discharge. C) Tool is worn or does not cut the material well. D) Needs lubrication.	A) Apply less pressure. B) Clean the machine. C) Check the tool sharpness and wear. D) Lubricate as you work.
The panel does not display correctly	A) Data cables not connected properly. B) Compensation factor is incorrect. F) C) Setting unit is not correct.	A) Check the correct connection of data cables X, Y, Z at the rear of the panel. B) Proceed with the deciding the compensation factor and setting of the panel. C) Check to see if the display unit is Metric or Imperial.

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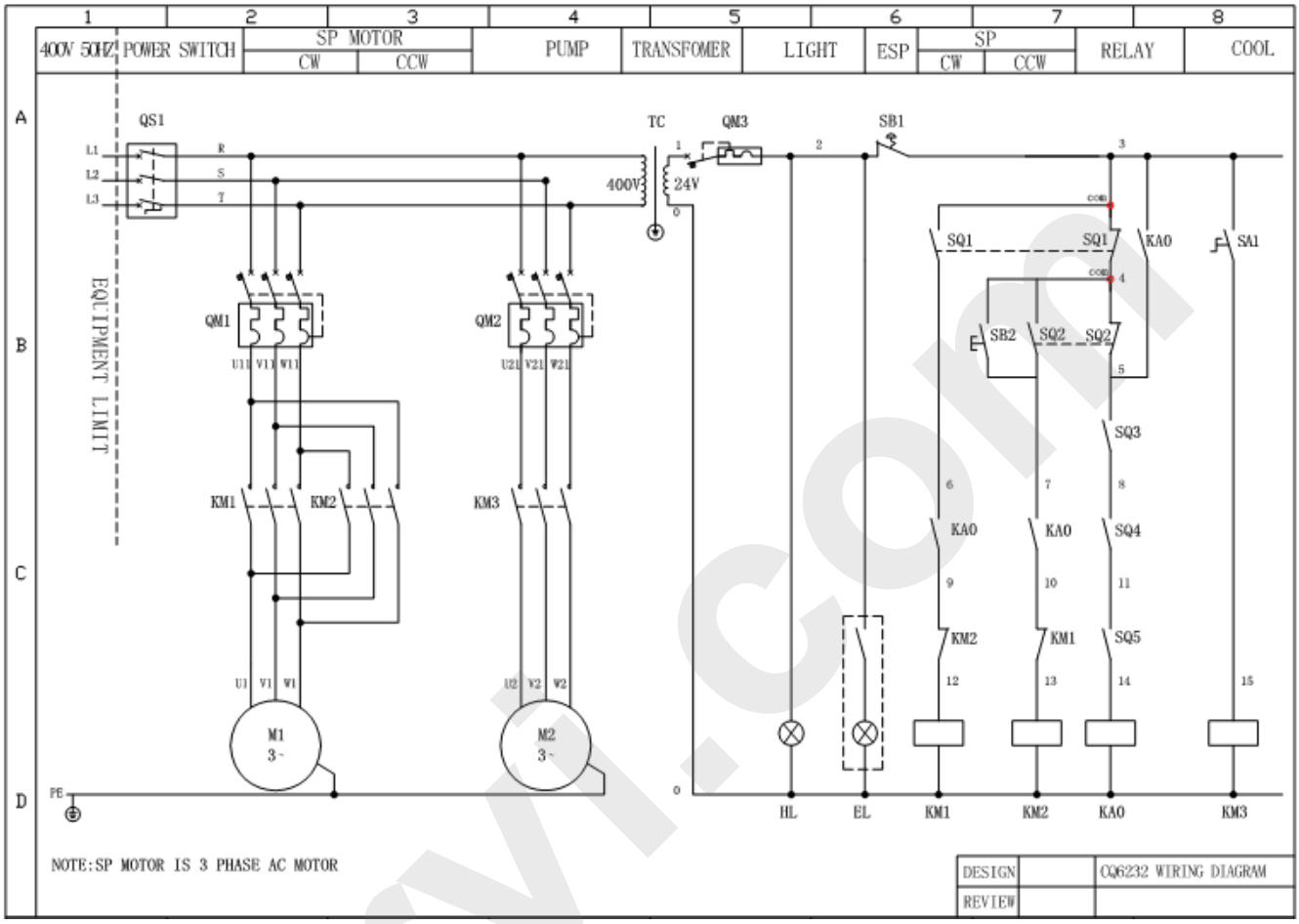
15 ELECTRIC CIRCUIT

15.1Art. T999/400V



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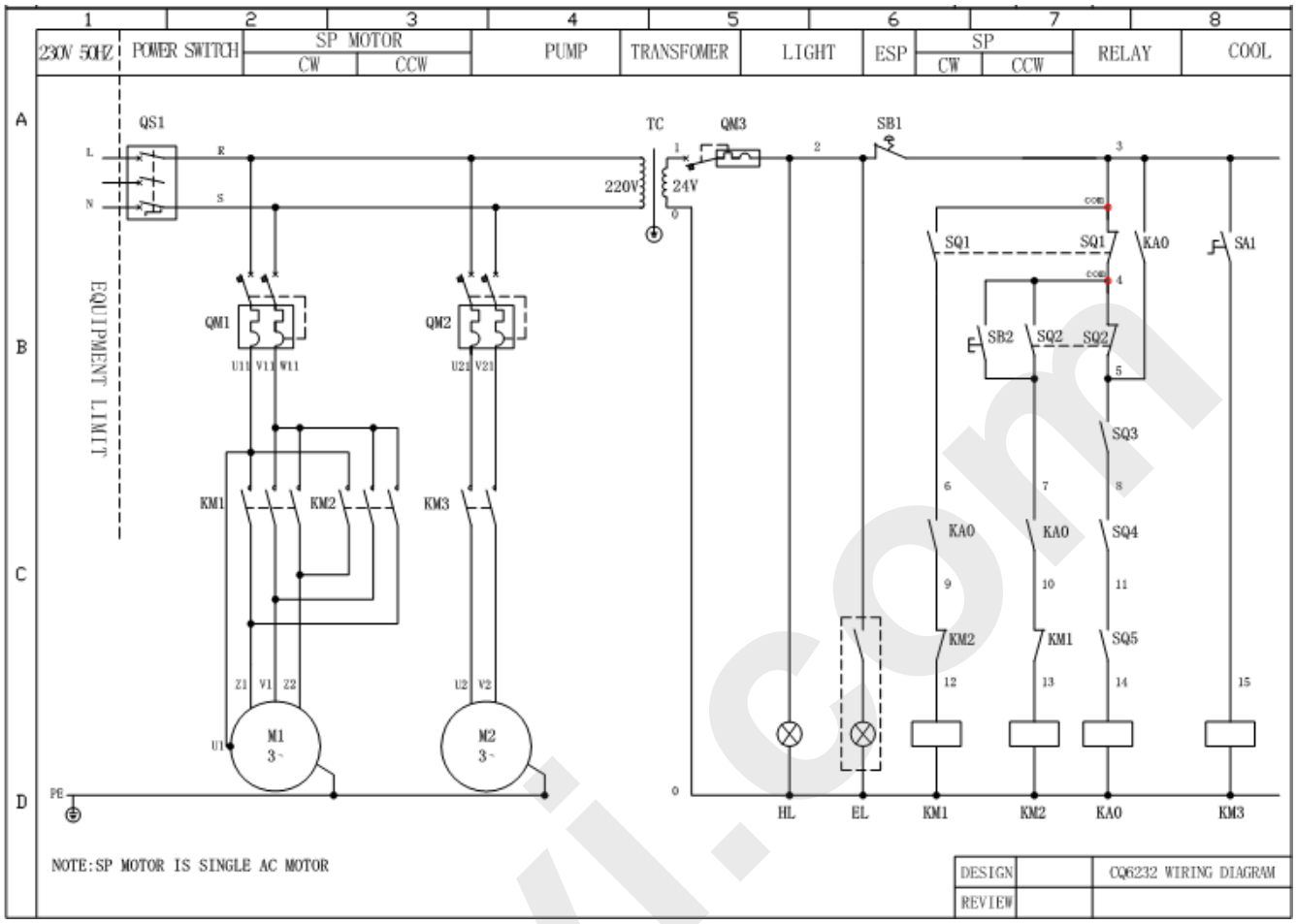
15.2Art. T999/230V



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