

Table of Contents

1. Introduction

- 1.1. Terms of use 6
- 1.2. Translation into User's language..... 6

2. Safety notices

- 2.1. Safety notes in the manual..... 7
- 2.2. Safety notes for machine use 8
- 2.3. Safety notes concerning maintenance 10
- 2.4. Contact information 10

3. System specifications

- 3.1. Weight.....11
- 3.2. Service area requirements.....11
 - 3.2.1. Site requirements and arrangements.....11
 - 3.2.2. Power supply requirements.....11
 - 3.2.3. Telephone lines.....11
 - 3.2.4. Working surface for the machine 12
 - 3.2.5. Vibration..... 12
 - 3.2.6. Lighting 12
 - 3.2.7. Noise level 12

4. Packing and transporting

- 4.1. Safety notes for lifting and transport 13
- 4.2. Transporting instructions..... 14
- 4.3. Uncrating 16
- 4.4. Packing dimensions 16
- 4.5. Installation area features..... 16
- 4.6. Receiving inspection 17
- 4.7. Mobile state installation 19
 - 4.7.1. Installation 19
 - 4.7.2. Electrical connection 19
- 4.8. General side view..... 20

Table of contents

5. System specification

5.1. Machine layout and measurements	21
5.2. Properties and description	21

6. Functional description

6.1. Drive assembly	22
6.1.1 Electrical motor	22
6.1.2 Milling cutters	22
6.1.3 Tumbler disk assembly	22
6.1.4 Operating panel	22
6.1.5 Back panel and electric circuit	24
6.1.6 Arm assembly	25
6.1.7 Optional eccentric positioning	25

7. Operator's manual

7.1. Operator training and certification	27
7.2 Key cutting process	28
7.2.1 Customer identification	28
7.3 Key mounting	29
7.3.1 Right hand profile	29
7.3.2 Left hand profile	30
7.3.3 Side pins dimples	30
7.3.4 Back pins - right profile key	31
7.3.5 Back pins - left profile key	31
7.4 Adjusting key combination	32
7.4.1 Code setup mechanism	32
7.4.2 Right profile key	32
7.4.3 Left profile key	33
7.4.4 Side pins	33
7.4.5 Back pins - right profile key	34
7.4.6 Back pins - left profile key	34
7.5 Cutting process	35
7.5.1 Key cutting	35
7.5.2 Machine general view	36

Table of contents

8. Mul-T-Lock key gauge

8.1. General	37
8.1.1. Measuring procedure	37
8.1.2. Tolerance specification	37
8.1.3. Checking machine calibration	38
8.1.4. Depth of dimples	38
8.1.5. Tolerance	39

9. Replacing cutters

9.1. Changing cutter procedure	40
9.2. Replacing probe tip	41

10. Moving arm cable Assembly

10.1. General	42
10.2. Assembly process	42

11. Maintenance

11.1. General	45
11.1.1 Cleaning	45
11.1.2 Daily check	46

12. Electric schema

12.1. Electric schema	47
-----------------------------	----

13. Parts catalog numbers


14. Troubleshooting

1. Introduction

This manual is intended as a practical guide for correct, safe and proper work and maintenance of the Compact II Key Cutting Machine.

It is important to read the manual carefully before operating the machine. Doing so will ensure proper use of the machine and prevent possible accidents during work or maintenance.

As Mul-T-Lock Technologies Ltd. continuously develops its machines to their maximum potential, this manual, although completely up-to-date when issued, is subject to future changes.

This manual includes reminder **Notes** written in *italic* font accompanied by a  sign. The machine serial number is marked on the machine label, attached to the back side of the machine.

1.1 Terms of use:

The right and license to cut keys for Mul-T-Lock Ltd. products is subject at all times to the terms of the agreement between the user of the key cutting machine and Mul-T-Lock Ltd. Refer to your agreement.

1.2 Translation into user's language:

After receiving the machine from Mul-T-Lock Technologies Ltd., the user may contact Mul-T-Lock Service Department and ask for permission to translate this manual into the user's language.

When the translation is complete, the user will return a printed copy (color printed hardcopy), of the translated document and, if possible, another copy in PDF or DOC file format.

2. Safety notices

2.1 Safety notes in the manual

The following safety notations are used in this manual:



CAUTION

Operating procedures and conditions, which must be strictly observed to prevent damage or destruction of the **equipment**.



WARNING

Operating procedures and conditions, which must be strictly observed to prevent **personnel** injury or death.

It is therefore essential to read this manual carefully before proceeding with working, maintenance or any other machine job.

The machine is equipped with safety sticker - **Wear Safety Glasses**

Machine installation, maintenance and adjustment must be carried out in accordance with all safety standards and in observance of all the precautions deemed necessary for each task.

The operator must be qualified. He must have expert machine knowledge and must have read this manual.

Extreme care must be taken to ensure a constant operator safety standard.

We recommend strict observance of the work safety standard as defined by the relative authorities in each country.

The manufacturers accept no responsibility for damage to persons or objects resulting from noncompliance with safety standards.

Safety notes

2.2. Safety notes for machine use



WARNING

The following safety practices must be complied with:

- **CAUTION** and **WARNING** notices posted on the machine and safety notes in this manual must be followed closely.
- Only qualified and certified personnel may operate the machine and/or perform maintenance on the machine. Operating personnel must not remove covers or panels.
- Do not start the machine if any safety cover is missing. Safety covers are located around the machine and around cutting tools.
- Ensure that all control panels and electrical panels are covered.
- When carrying out machine maintenance tasks, post highly visible warning signs.
- Before turning the machine **ON**, the operator must carry out the following steps:
 - Perform a visual examination of the machine's components (e.g. ensure that the equipment is properly placed, etc).
 - Verify that the machine is not undergoing maintenance at any moment.
- Never leave the machine unattended when in use.
- When there is a pause in the work cycle, switch the machine **OFF**. During a prolonged pause, turn the **Main Switch** to **OFF**, remove the machine key from the switch and take it with you.
- The machine may stop during work for any number of reasons. Whenever this happens and the situation requires accessing the inside of the machine, which contains electrical parts and connections, always set the **Main Switch** to **OFF**.
- **MOVING PARTS** – Moving parts may causes bruises and cuts.

Safety notes

WARNING

Stay from moving parts.

- Do not wear rings, wristwatches or other jewelry while working with the machine and live electrical circuitry. Keep long hair away from the machine
- No smoking or food is permitted in the working area.
- Verify that all safety shields are assembled after completing any adjusting, troubleshooting or maintenance procedures.
- Report any unsafe conditions to your supervisor.
- Secure electrical wires and cables to prevent damage.
- Ensure that all personnel know where the main power switch is located, and how to react in case of an electrical, mechanical or other emergency.
- Place approved types of **fire extinguishers** near the machine.
- Arrange the material to be worked in a rational manner, so as not to hinder the work process.

WARNING

- **HOT SURFACES:** *Some parts might have **hot surface** after running. Unauthorized personnel may not remove covers. If a cover was removed **do not touch**.*

Safety notes

2.3. Safety notes concerning maintenance

WARNING

Do not allow unauthorized personnel to carry out repairs, maintenance or tool replacement tasks. Carefully read the user manual and maintenance instructions before starting or using the machine, or performing machine or plant maintenance or tool replacement tasks.

Use only original spare parts, cutting tools and accessories by Mul-T-Lock Technologies Ltd., either supplied with the machine or purchased directly from Mul-T-Lock Technologies Ltd.

To avoid getting caught in the moving parts area, do not repair, adjust or replace tools in the machine while it is in operation and/or the main switch is **ON**.

Turn the machine **OFF** according to the procedures laid down in the user manual and maintenance instructions before carrying out other tasks.

Do not use matches, cigarette lighters or torches as a means of lighting during the work on the machine.

Tool replacement is part of the functional description included in this manual.

2.4 Contact information:

Headquarters:

Mul-T-Lock Technologies Ltd

Tel: +972 942 8 4600

Fax: +972 942 8 4609

Address: Mul-T-Lock Park

P.O.B 637, Yavne 81104, Israel

Technical Support:

Tel: +972 942 8 4318

Fax: +972 942 8 4418

Email: tech.support@mul-t-lock.com

3. System specifications

3.1. Weight

Machine (net) weight: 22.5 Kg.

Packing box (tare) weight: 1.5 Kg.

Packed unit weight: 24.0 Kg.

3.2. Service area requirements

Preparing the working site in advance is recommended.

3.2.1. Site requirements and arrangement

The machine should be installed in a working area that provides adequate space for its operation and maintenance.

3.2.2. Power supply requirements

- The machine needs one wall electric socket.
- Power supply requirements: 1 PHASE – 220/110 Volts, 10 Ampere, 50/60 Hz.
- An electrician should check the grounding of the electric socket used.

3.2.3. Telephone lines:

The site should include at least one telephone line for speaking with service personnel.

System Specifications

3.2.4. Working surface:

The machine should be placed on a workbench. A desk or a table may be used, if both they are rigid, stable and able to bear a load of approximately 70 kg. Load the table and check its rigidity. To ensure the table's rigidity, the table top may be attached to a wall. Use a table of suitable height: about 75 cm if the operator will operate the machine from a seated position, or about 100 cm if the operator will operate the machine from a standing position. Calculate the tabletop surface dimensions on the basis of machine size and other criteria. Do not block the ventilation shields at the back of the machine. Leave at least 6" (150 mm) of free space for ventilation around machine, especially at the back.

3.2.5. Vibration:

The machine's vibration is low, and no special arrangement is needed. If the operator feels any abnormal vibration, he must stop the machine immediately.

3.2.6. Lighting:

Install a regular 100 watt light bulb about 100 cm above the machine, or add a suitably strong light nearby.

3.2.7. Noise:

The machine's noise level is low and normal - below 70 dbA.

The use of ear protection aids is not mandatory, but is recommended in prolonged use.

4. Packing and transporting

4.1. Safety notes for lifting and transport



WARNING

The manufacturer bears no responsibility for any damage to objects or persons caused by non-compliance with the applicable safety standards in force relating to the lifting and movement of material within the user's work place.

Machine transfer and truck loading must only be carried out with the appropriate equipment as described in the Packing and Transporting section.

Always act with extreme care to prevent personal injury or damage to the machine or its individual parts.

Personnel must keep clear from the suspended load and, in any case, keep out of work areas where cranes, forklift trucks, and other lifting/handling equipment are in use.

The transit area inside the work place where the machine is to be installed must be kept clear.

The load must always be securely fixed to a load-bearing part of the lifting and transport equipment, thus preventing any movement whatever the cause.

Packing and Transporting

4.2. Transporting instructions

WARNING

Please note that specialized personnel trained for this type of maneuver must conduct handling and lifting operations.

Arrange the transportation to comply with the dimensions and weight of the package. Design and prepare the work place for the machine on the basis of the machine dimensions and electricity and telephone connections.

The machine may be delivered:

1. By road
2. By rail
3. By sea
4. By air

When the crate arrives at the user's site, it must be handled with extreme care, outdoors and indoors, using suitable equipment for crate's weight.

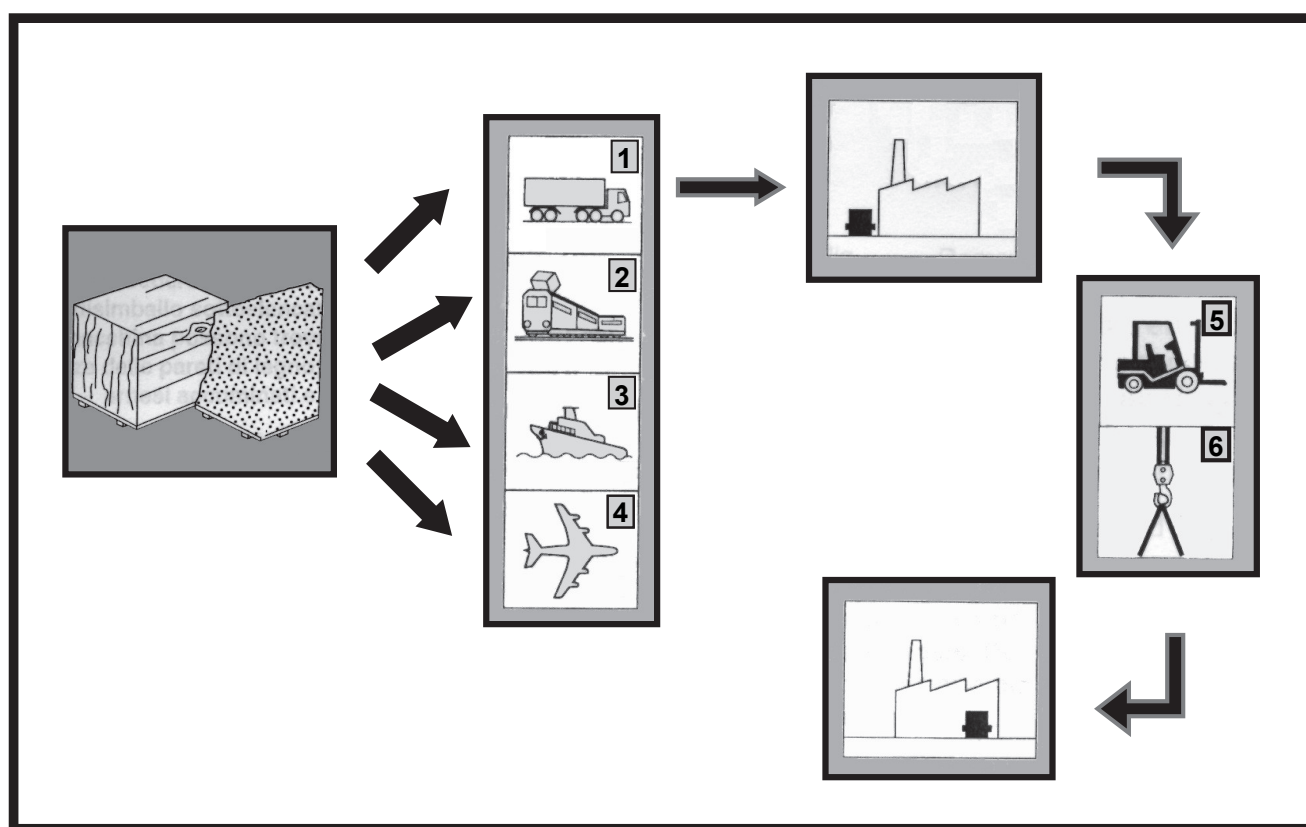
- A. Forklift
- B. Other mechanical means

These tools are also suitable for the lifting and movement of the unpacked machine.

Packing and Transporting

WARNING

Avoid manual handling as much as possible, protect your back. If manual work is mandatory, one person is sufficient for handling.



Packing and Transporting

4.3. Uncrating

WARNING

Proceed with extreme care when effecting the following uncrating procedure, because some machine parts may be up against the cardboard panels. Do not break open the crate with sharp tools and do not perforate the crate panels.

- Remove the plastic/metal strip. Remove the cardboard cover.
- Remove the internal plastic cover and check that the content corresponds to the shipping list in the enclosed documents. Inform the carrier or the company immediately of any missing or damaged part. Use the machine handle to lift the machine. Place the machine on a suitable surface.
- Unscrew 4xM10 screws. Pay attention to the washers and spacers and collect them for future use.
- Store the machine container parts for future transportation. Mul-T-Lock Ltd. is not responsible for any damage to the machine, shipment for repair or replacement if shipped without the container.

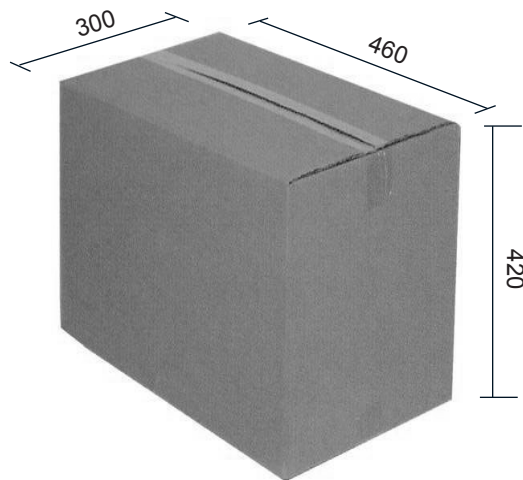
4.4. Packing dimensions

Overall Dimensions:

Width - 300 mm

Depth - 460 mm

Height - 420 mm



Packing and Transporting

4.5. Installation area features



WARNING

Make sure that the load-bearing capacity of the table or desk is suitable for machine's overall weight.

The overall machine dimensions must be carefully considered to ensure rational installation. The machine should preferably be located in an area that allows access from all sides.

The work area must be well lighted and equipped with telephone line and suitable electrical sockets. The latter should be in a protected position.

The electrical power supply cables and the telephone lines must be protected in such a way they that do not get in the way of the operator.

4.6. Receiving inspection:

The machine is fully inspected before shipment. After opening the machine container, the user must inspect the shipment as follows:

- Check that the machine is complete and intact. Make sure that no components were damaged or broken in transit.
- Check that your local electric voltage is compatible with the machine (110 VAC 60 Hz or 220 VAC 50 Hz)

Packing and Transporting

- Check package content:

No	Description	Check
a.	Key cutting machine	
b.	Machine operation manual	
c.	Key for machine power switch	
d.	2.5 mm hex (Allen) key	
e.	Special open key	
f.	Probe	
g.	Calibration reference blank	
h.	Key gauge	



Note:

No electrical cable/cord is supplied because electrical outlets vary from country to country. The cable is a standard 10 Ampere cable. Consult your local electrician.

Packing and Transporting

4.6. Installation for mobile use:

The machine may be installed on vehicles for “on the road” locksmithing service. Anchoring and power supply should be carefully maintained in such a mobile application.

4.6.1 Installation:

Arrange a strong wooden surface, table or a shelf with a minimum thickness of $\frac{3}{4}$ " (19 mm). Drill $4 \times \frac{1}{2}$ " (13 mm) holes in the surface at the best location, allowing a minimum space of 6" (150 mm) space at the back side for cooling air flow and for approaching the machine. Attach the machine with 4xM10 screw and washers ($\varnothing 10 \times 18 \times 2.2$)

4.6.2 Electrical connection:

Check your model type on identification label at the back of the machine

Voltage source needed - single phase:

- 220V model: 220 Volts VAC, 150 Watt, 50Hz
- 90 - 130V model: 90 - 130 VAC, 150 Watt, 60Hz

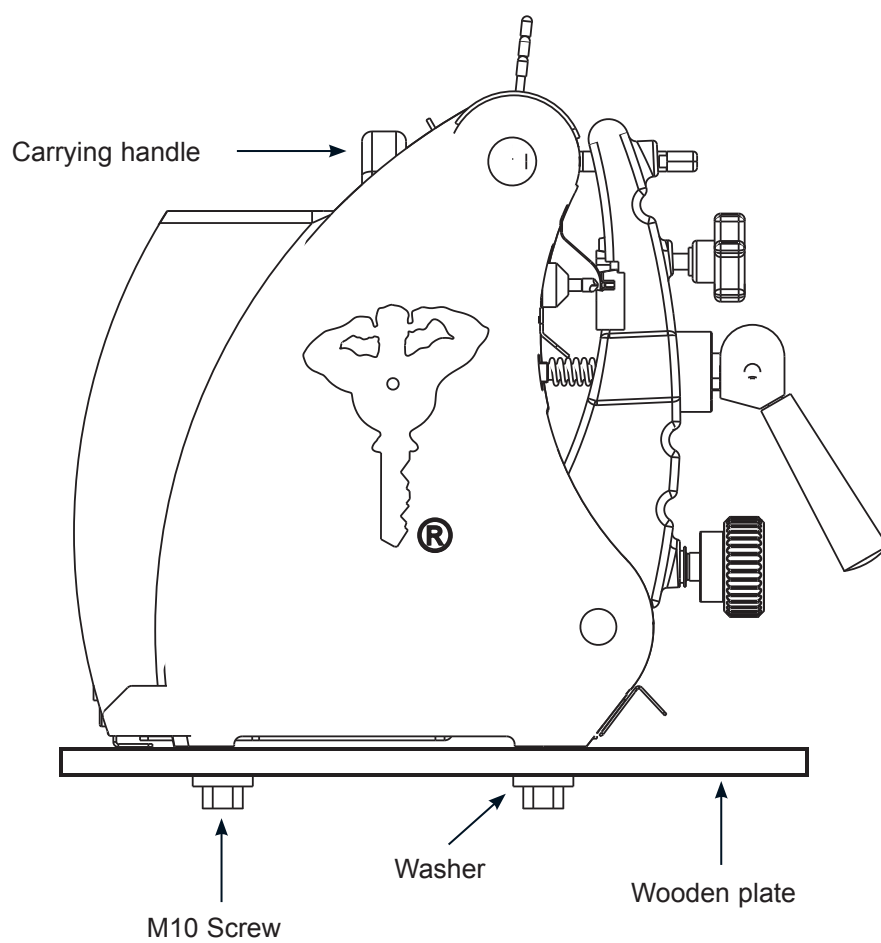


Note:

For car installation: 12VDC with suitable power inverter to 110/220 VAC having continuous 150 watt power.

Packing and Transporting

4.7. Machine side view:



5. Machine specifications

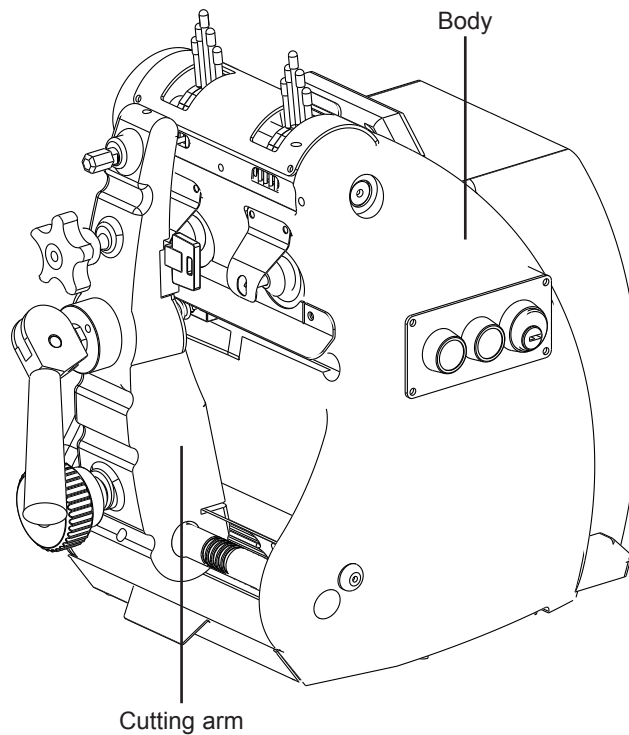
5.1. Machine layout and measurements:

Width	- 265 mm
Height	- 345 mm
Depth	- 340 mm

5.2. Properties and description:

The machine is designed for cutting Mul-T-Lock keys only, and assembled from two main parts:

1. Painted aluminum body, containing drive assembly, tumbler disk assembly, operating panel, back panel and electrical circuit.
2. Cutting arm assembly.



6. Functional description

6.1. Drive assembly:

6.1.1 Electrical motor:

Single-phase with an output of 150 watt.

6.1.2 Milling cutters:

The milling cutter shaft (6) has special bearings with a high accuracy level (3,5). The rotating motion of the external (13) and internal (14) cutters is transferred from the main motor to the cutter shaft by means of a belt (2) and three drive wheels (1,4). The milling cutters are secured by securing screws (16).

6.1.3 Tumbler disk assembly:

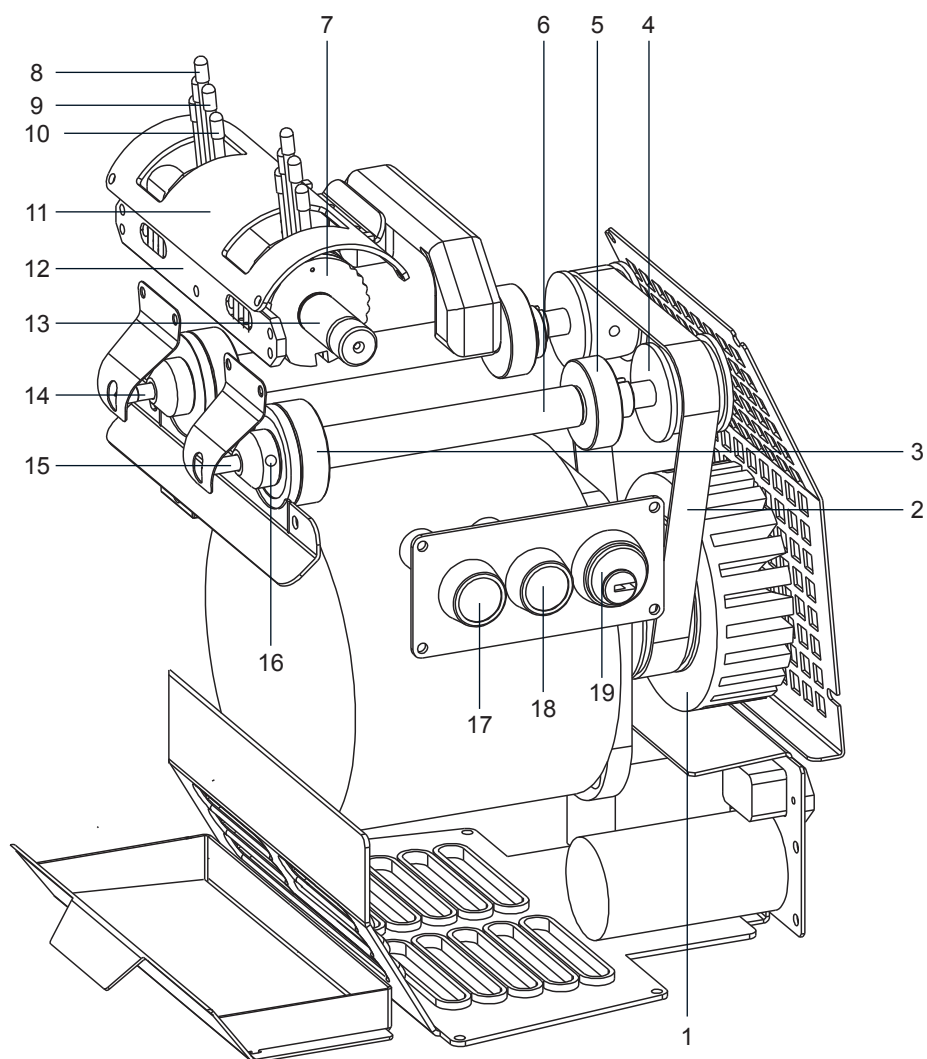
Includes a number of adjacent disks (7) which are rotatable around a generally horizontal axis (13). The rotational orientation of each disk determines the depth of a corresponding key dimple. Each tumbler disk includes joint handles (8,9) allowing the user to individually rotate the position of each disk about the horizontal axis. a locating plate (12) placed in front of the disks guides the user to the right probe position during use. The disks are covered with a top cover (11)

6.1.4 Operating panel:

Includes an electric key switch (18) and **ON/OFF** push buttons (16,17).

Functional Description

Machine general view



No.	Part	No.	Part	No.	Part
1	Motor drive wheel	8	Handle no. 3	15	V - milling cutter
2	Belt	9	Handle no. 2	16	Cutter securing screw
3	Bearing 7203B	10	Handle no. 1	17	Switch
4	Drive wheel	11	Top cover	18	Switch
5	Bearing 7202B	12	Locating plate	19	Cylinder switch 22
6	Shaft	13	Shaft for tumbler disk		
7	Tumbler disk	14	W - milling cutter		

For parts catalog numbers refer to page 48

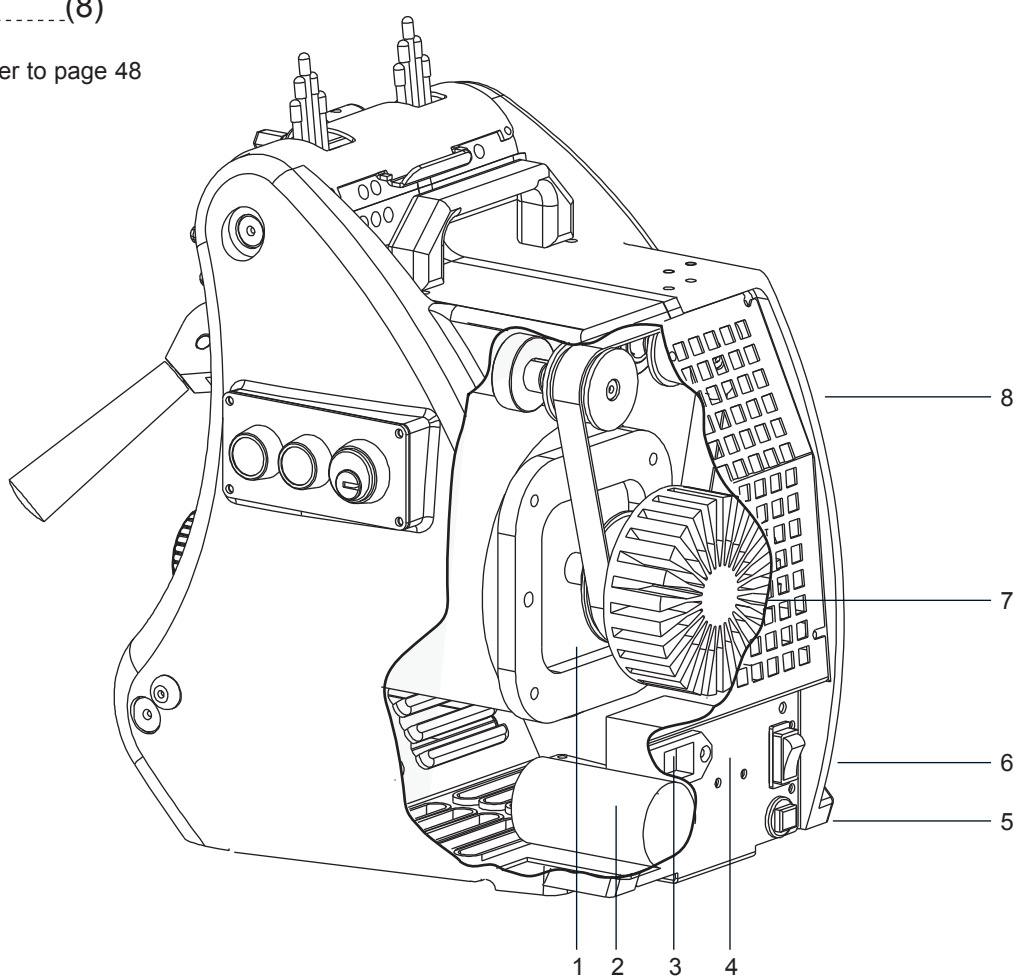
Functional Description

6.1.5 Back panel and electric circuit:

Back panel description:

- » Main motor.....(1)
- » Machine capacitor.....(2)
- » Relay.....(3)
- » Electric socket.....(4)
- » Fuse.....(5)
- » Main power switch.....(6)
- » Fan.....(7)
- » Rear cover.....(8)

For parts catalog numbers refer to page 48



General back view – covers removed

Functional Description

6.1.6 Arm assembly:

The arm is made of painted aluminum. The arm assembly slides on a shaft (6) enabling horizontal motion. The adjustable probe assembly (20,21,22,23) in the arm enables adjustment of the arm relative to the milling cutter and guides the arm to proper positions on the locating plates. The arm shaft is toothed, enabling exact location of the dimples. The arm has a vise for the key blank, an eccentric lever (12) for pushing the arm against the milling cutters, and a rotating knob (13) for sliding the arm from one dimple to the next.

For adjusting the probe use special tool supplied with the machine.

6.1.7 Optional eccentric positioning:

The arm lever may be placed at three different positions (Fig.5) for the operators' convenience (also for right/left handed operators).

To change position loosen the 2 screws (15) of the pressure coordinator (16) and move lever to the desired position.

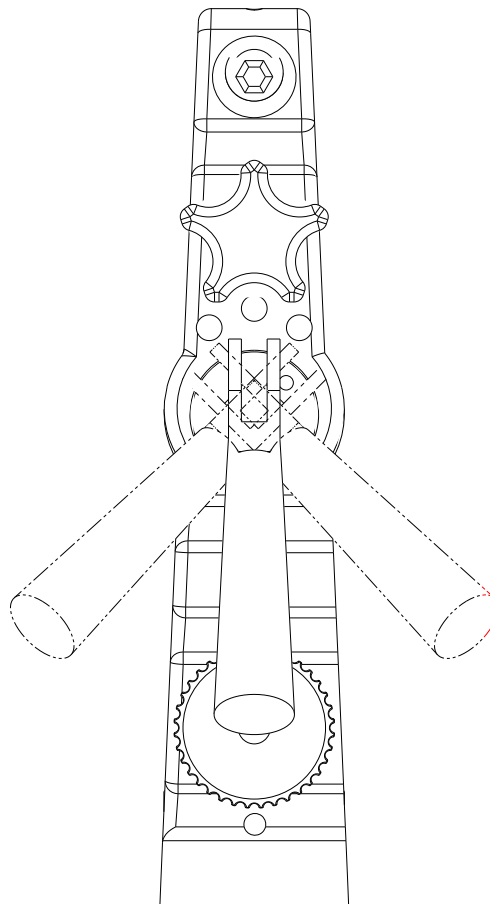
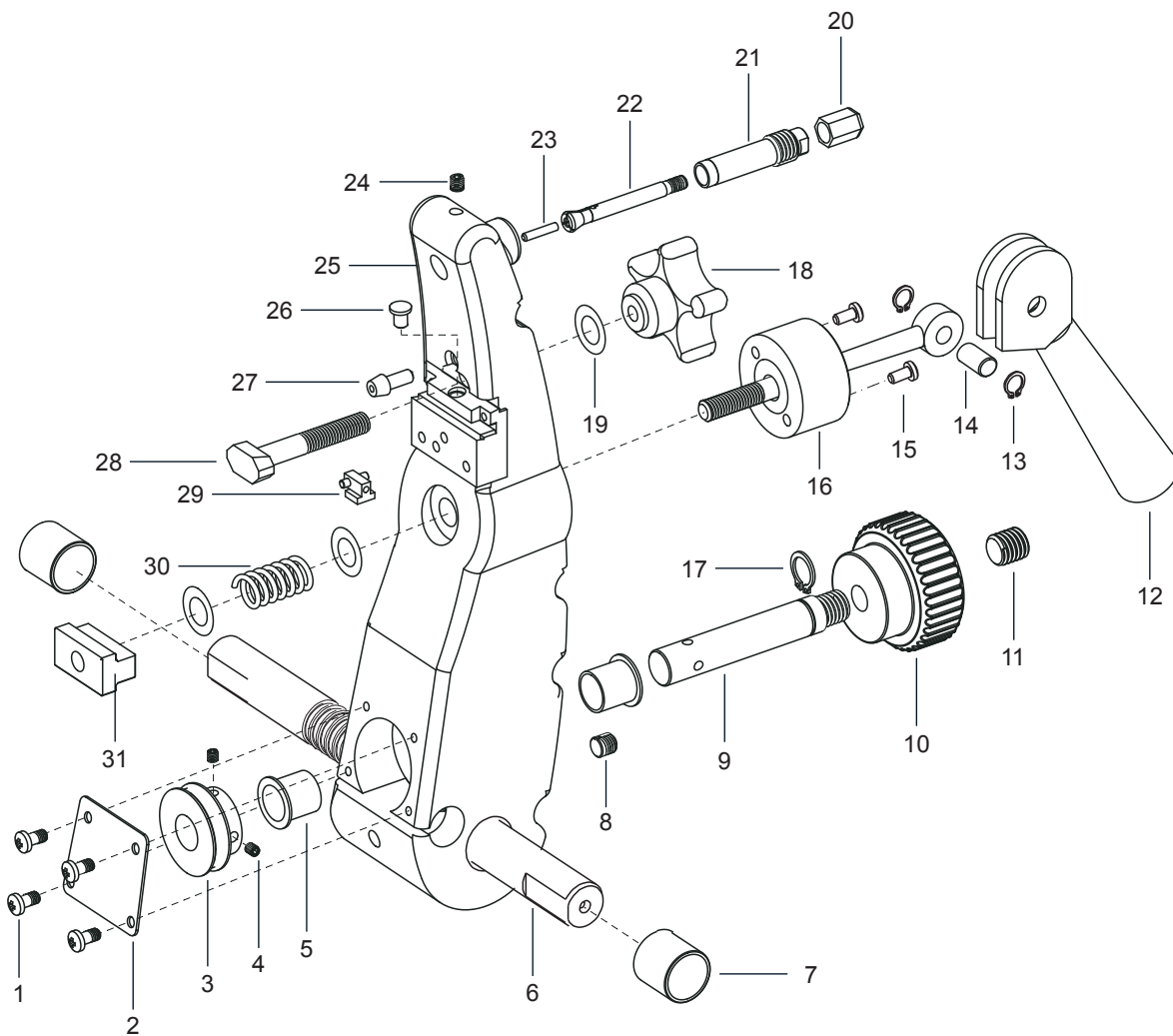


Fig. 5



No.	Part	No.	Part	No.	Part
1	Screw	12	Eccentric lever	23	Probe tip
2	Cover	13	Retaining ring	24	Probe locking screw
3	Cable pulley	14	Pin	25	Arm
4	Socket set screw	15	Screw	26	Pin
5	Bushing	16	Pressure coordinator	27	Special pin
6	Central shaft	17	Retaining ring	28	Holding bar
7	Bronze bushing	18	Clamping bolt	29	Stopper assembly
8	Screw	19	Handle ring	30	Spring
9	Cable wheel shaft	20	Probe nut	31	T - nut
10	Round handle	21	Probe housing		
11	Handle screw	22	Probe holder		

For parts catalog numbers refer to page 49

7. Operator's manual

7.1. Operator training and certification



WARNING

Before operating the machine, operators must be trained by official personnel from their company and certified to operate this machine. Recommended training should include a minimum of the following procedures:

7.1.1.

Learn, know and understand the machine's movements and hazardous areas.

7.1.2.

Learn, know and understand the machine's electrical system, high voltage and low voltage and especially hazardous areas. The machine covers may only be opened by authorized personnel or a certified electrician.

7.1.3.

Learn, know and understand the machine's system, in particular the machine operation, how to stop the machine, and hazardous situations.

7.1.4.

Learn about all possible hazards of the machine.

7.1.5.

Visually check that the machine and its surroundings are clear of debris, parts, tools, etc.

7.1.6.

Depending on the type of work, wear personal protection devices such as: safety goggles, protective shoes, ear protectors, etc. Apply all pertinent state laws and regulations and/or management guidelines.

7.1.7.

Learn, know and understand the machine operation stand and surrounding area. If unauthorized personnel approach the machine, warn and move them from the area.

7.1.8.

Read, learn and understand this manual in its entirety.

7.1.9.

Periodically refresh your knowledge by reading this manual.

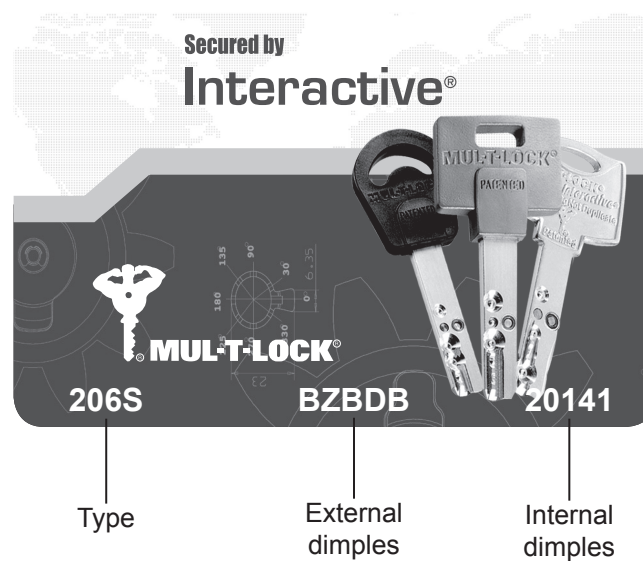
WARNING

You are about to perform actions near the cutting tools. Be sure no unauthorized personnel are near the machine. Avoid hazardous situations.

7.2. Key cutting process:

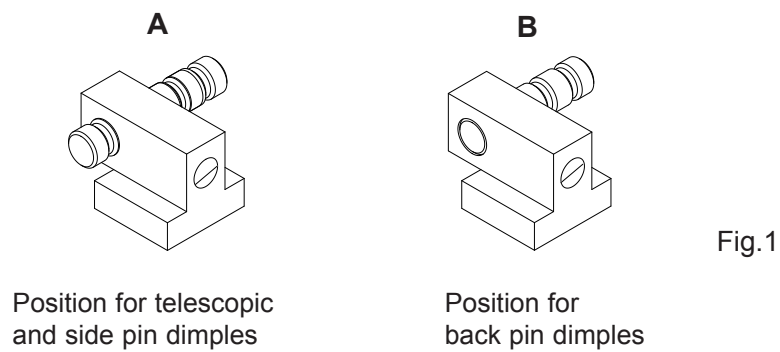
7.2.1 Customer identification:

- Keys are to be cut only according to code embossed on the key card or from MASTERpiece solution print.
- After presentation of the card to the receiver of the order/locksmith the locksmith will verify that the customer signature is identical to the signature on the back of the card.
- The locksmith will identify the type of key blank and code, and cut the key accordingly.
- Identification code on the card is read from left to right.
 - Type of key blank
 - External combination dimples
 - Internal combination dimples



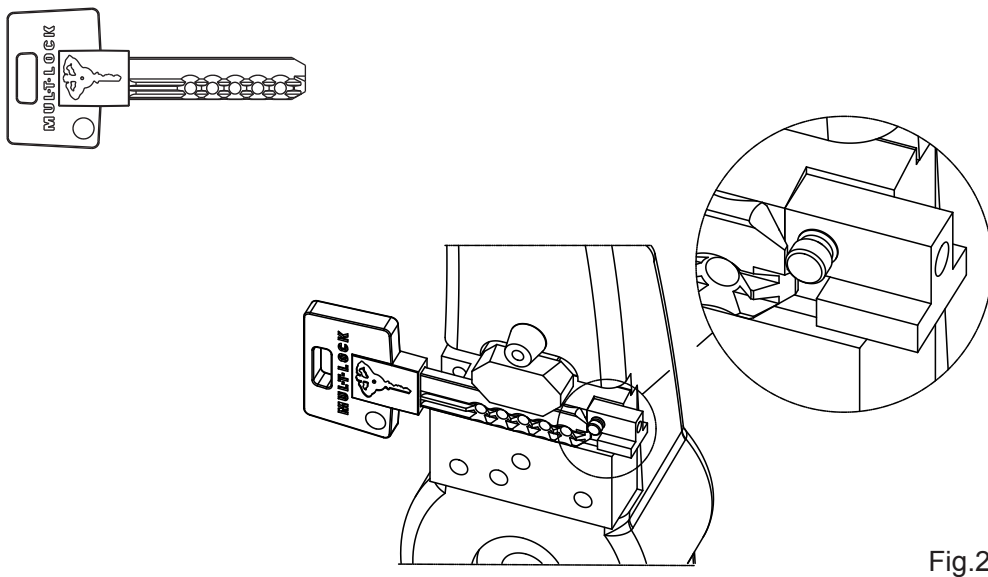
7.3. Key mounting

The machine is designed for cutting either left or right key profiles.
The stopper pin assembly enables cutting telescopic dimples, side pin and back pin dimples (Fig.1)



7.3.1. Right profile key

When cutting right key profile, locate the key stopper as shown (Fig.2)



Operator's Manual

7.3.2. Left profile key

When cutting left key profile, the stopper pin must be transferred to the opposite hole as shown. (Fig. 3)

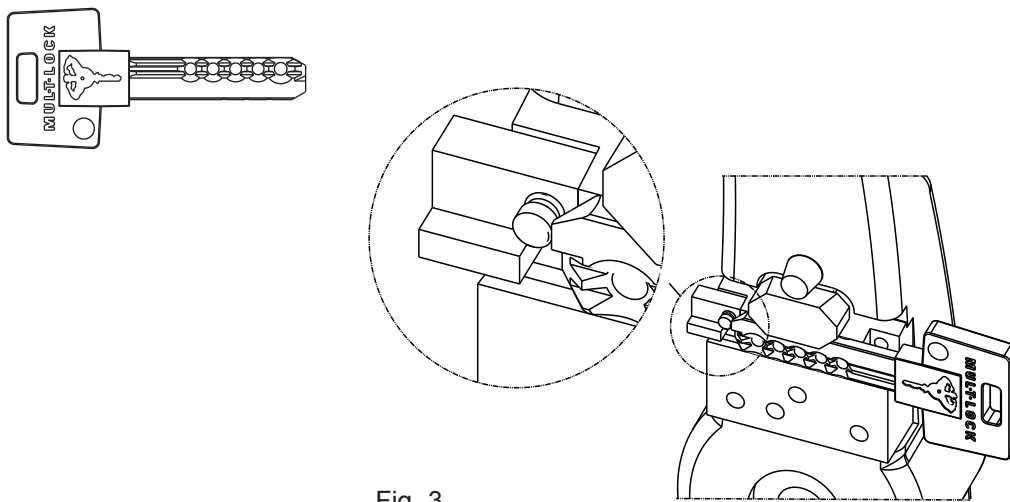


Fig. 3

7.3.3. Side pin dimples

Side pins dimples are created by locating the key blank inside the horizontal groove in the key clamp (Fig.4)

Push the key blank against the key stopper and tighten the clamping bolt.

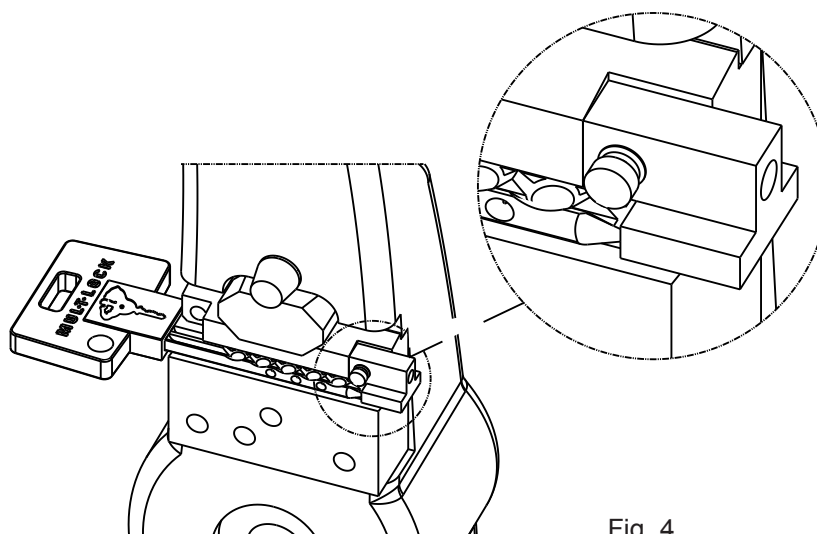


Fig. 4

Operator's Manual

7.3.4. Back pins - right profile key

When cutting back pin dimples release screw located at the back of the key clamp, press stopper pin into the hole in the key clamp (Fig.5)

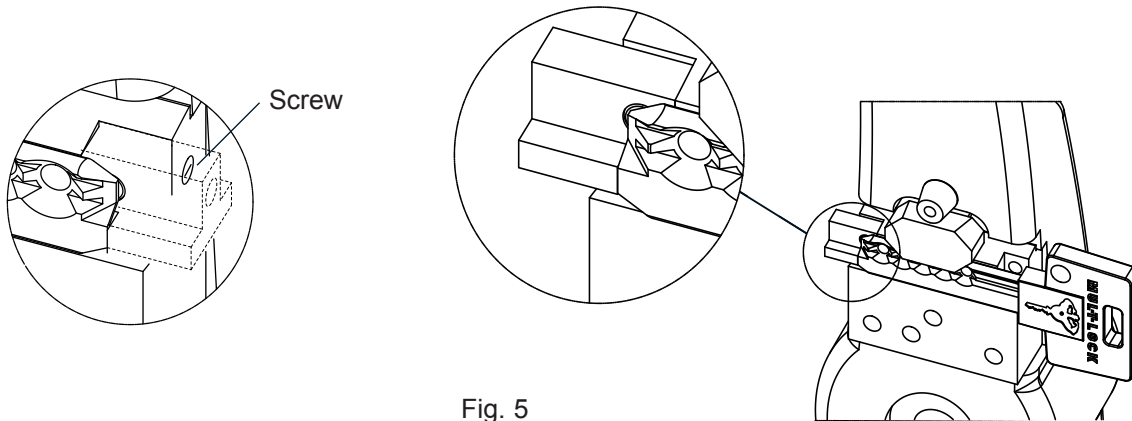


Fig. 5

7.3.5. Back pins - left profile key

When cutting back pin dimples release screw located at the back of the key clamp, press stopper pin into the hole in the key clamp (Fig.6)

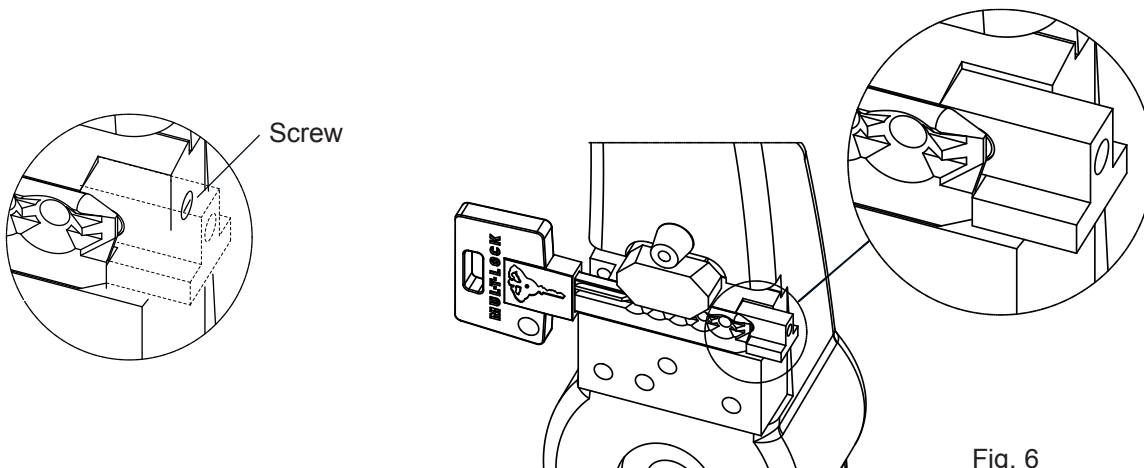


Fig. 6



CAUTION

Back/side pin dimples are created by internal cutter only. Dimple depths are identical in all positions.

7.4. Adjusting key combination

7.4.1. Code setup

Two sets of code levers are located at the top end of the machine, and are used for setting the machine to the desired combination. The left code levers, marked Z, A, B, C, D determine the depth of external dimples.

The right code levers, marked 0, 1, 2, 3, 4, 5 determine the depth of internal dimples.



Note:

*In combinations **Z** and **0** (for Interactive platform) the machine is set not to reach the key surface, because the combination is embedded inside the key blank.*

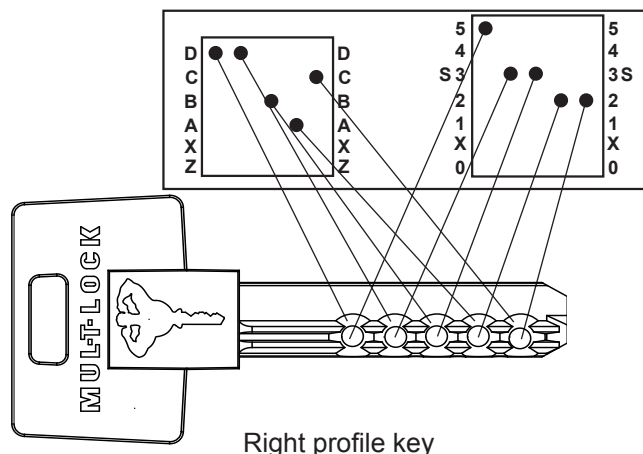


CAUTION

Cutting over Interactive floating pin will damage the cutters.

7.4.2. Right profile key

Code levers have to be arranged according to the desired combination. First cut external dimples levers are marked with letters. Then cut internal dimples - levers are marked with numbers.



Right profile key

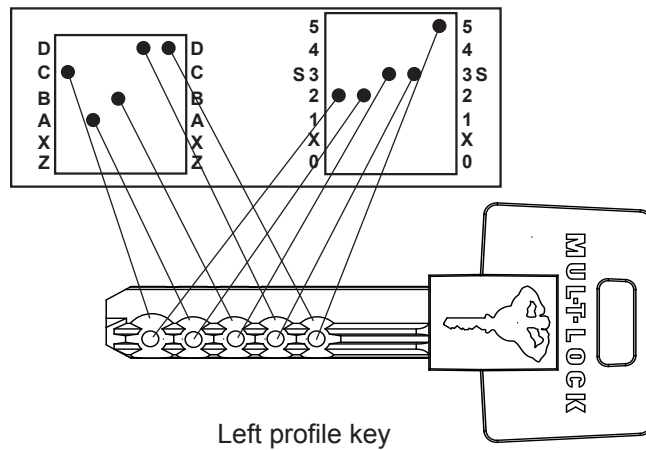
Operator's Manual

7.4.3. Left profile key

Code levers have to be arranged according to desired combination. First cut external dimples - levers marked with letters. Then cut Internal dimples - levers are marked with numbers.



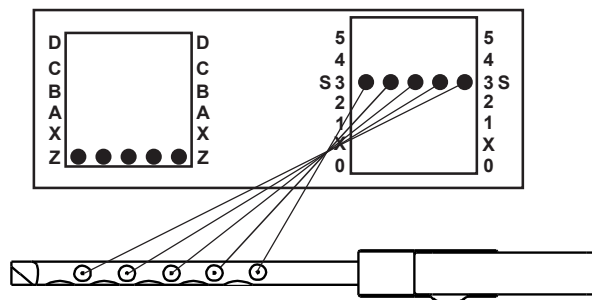
Note: Pay attention to the direction of the key blank insertion.



Left profile key

7.4.4. Side pins

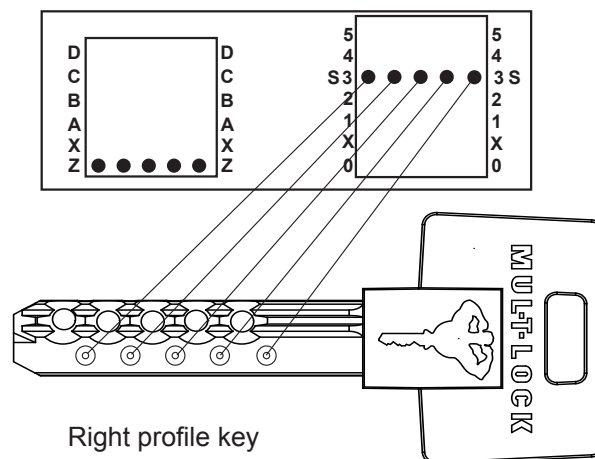
The process of cutting side pin dimples is identical to cutting telescopic dimples. Side pin dimples are of one depth. Use middle position **3S** on internal code levers. Cut selected dimple according to the cylinder combination. Key blank Inserting direction is the same for left or right key profiles.



Operator's Manual

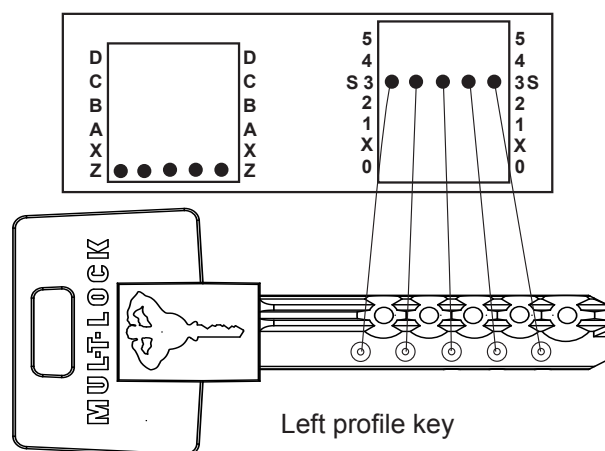
7.4.5. Back pins - right profile key

The process of cutting back pin dimples is identical to cutting telescopic dimples. Back pin dimples are of one depth. Use middle position **3S** on internal code levers. Cut selected dimples according to the cylinder combination



7.4.6. Back pins - left profile key

The process of cutting back pin dimples is identical to cutting telescopic dimples. Back pin dimples are of one depth. Use middle position **3S** on internal code levers. Cut selected dimples according to the cylinder combination





WARNING

You are about to perform actions using the machine near the cutting tools. Be sure no unauthorized personnel are near the machine. Avoid hazardous situations.

7.5. Cutting process

Verify that you are making an authorized duplication (page 28).

Connect the machine to a proper voltage source and unlock main switch. The switch cylinder on the operating panel prevents use by unauthorized people.

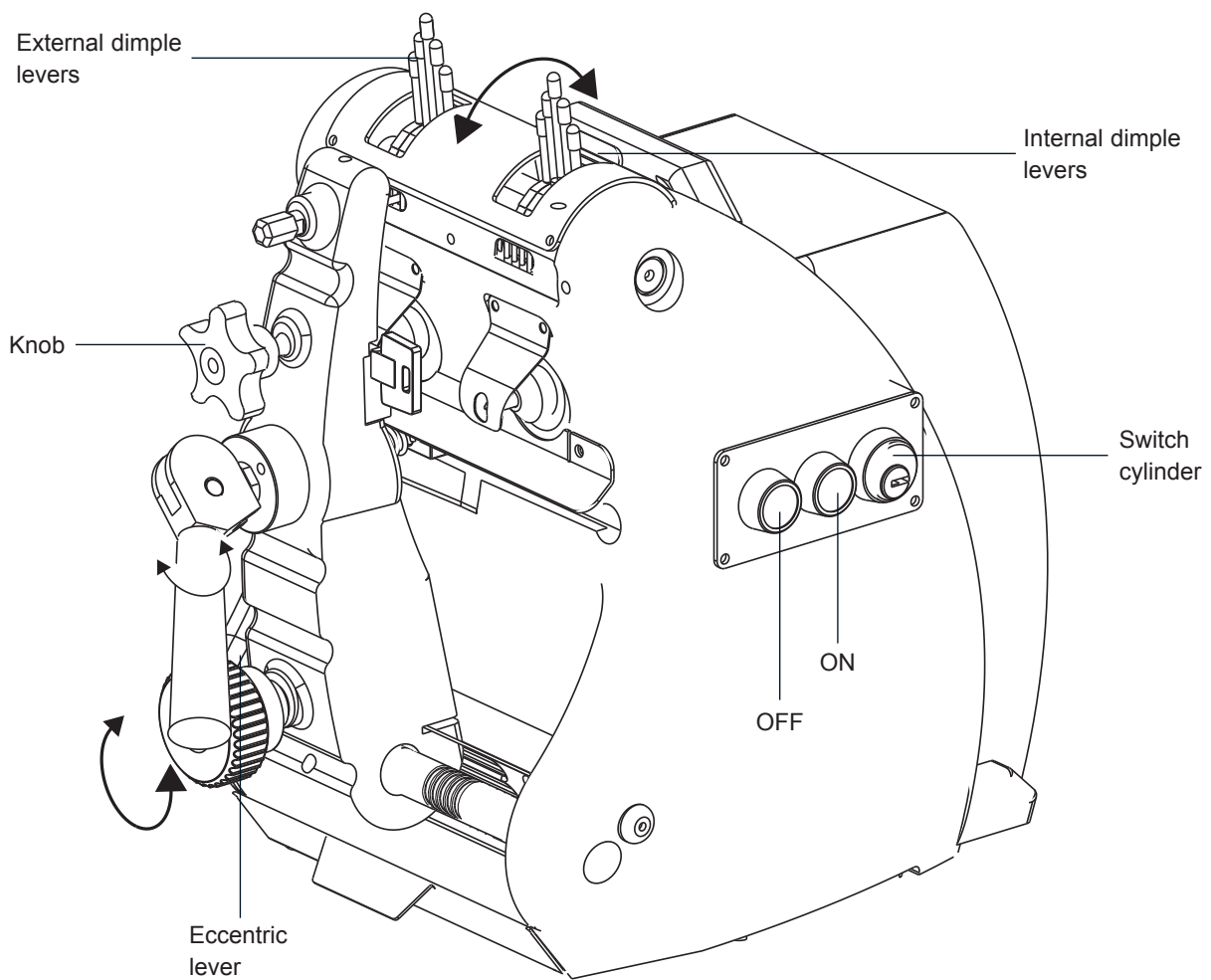
This switch cylinder has to be unlocked before starting the work process.

7.5.1. Key cutting

1. Insert suitable key blank into the key clamp on operating arm (make sure that the clamp is clean). Tighten the key blank in its place (pages 29,30).
2. Arrange the code for desired combination (pages 32,33).
3. Push the **ON** (green) button to start. First mill exterior dimples on key blank by using the eccentric lever and round knob. Slide the operating arm from side to side and insert the adjuster probe point into each probing position until it stops. Repeat the process for Internal dimples. Push **OFF** (red) button to stop. Turn the key blank 180° and repeat the cutting process. Cut side and back pins (if needed) according to process stages (pages 33,34). Push **OFF** (red) button to stop.
4. After key cutting is completed, verify that the two sides of the newly cut key are identical and fit to the cylinder.

Operator's Manual

7.5.2. Machine general view

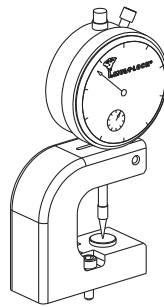


8. key gauge

8.1. General

The key gauge is a dial gauge indicator, for measuring the depth of the dimples after cutting of a key, or for dimple cut depth adjustment.

P/N - 90543513

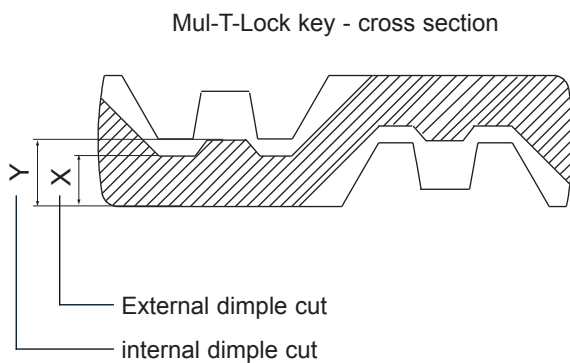


8.1.1. Measuring procedure

The depth of a key dimple is determined by measuring the leftover material, left after cutting the combination dimples in the key blank (see key cross section).

8.1.2. Tolerance specifications

Dimples may be cut to a tolerance of 0.00 mm to -0.06 mm from the basic size, and still be considered good combination dimples (Table 1).



key dimples		Tolerance		
External	Internal	min	basic	max
A	1	2.34	2.40	2.40
B	2	1.89	1.95	1.95
C	3	1.39	1.45	1.45
D	4	0.89	0.95	0.95
-	5	0.39	0.45	0.45
Side pins (3S)		8.10	8.15	8.15
Back pins (3S)		8.10	8.15	8.15
Key blank thickness - 2.47				

Table 1

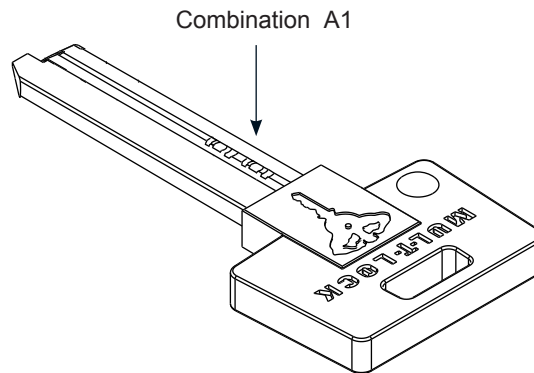
Mul-T-Lock Key Gauge

8.1.3. Checking machine calibration

Machine calibration should be checked regularly. This procedure is also performed when receiving the machine, and after replacement of milling cutters or probe.

8.1.4. Measuring procedure

Cut a key blank to a combination of A1 in 2 chambers. Using the key depth dial gauge measure the depth of the internal (1) dimple and external dimple (A). Both dimples should meet the required measurements and tolerances (Table 1 page 37).

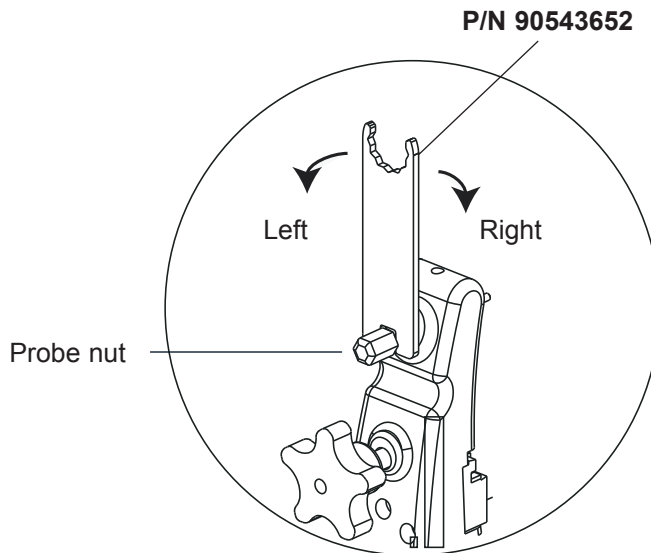


Mul-T-Lock Key Gauge

8.1.5. Probe adjustment

Adjustment is performed by releasing the adjuster probe screw, rotating the probe with special open key (P/N 90543652), left or right as necessary. When procedure is completed, lock probe screw.

Repeat machine calibration process described on page 38 until no further adjustment is needed.



Note:

The milling cutters are supplied in pairs of equal length. It is recommended to replace both cutters at the same time.

9. Replacing cutters

WARNING

You are about to perform actions near the cutting tools. Be sure no unauthorized personnel are near the machine. Avoid hazardous situations.

Prior to any operation, disconnect the machine from external electric power source.

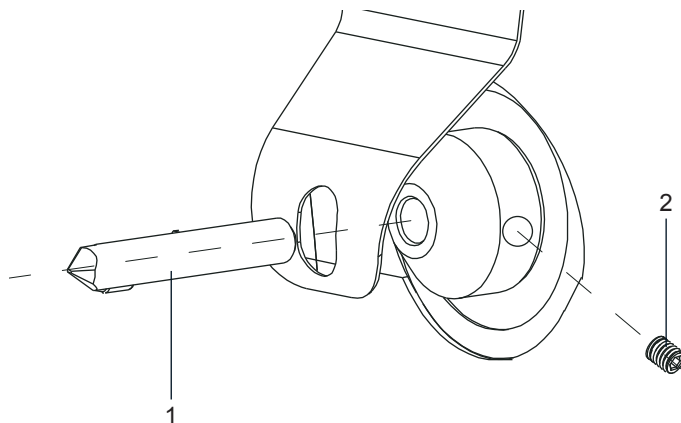
9.1. Replacing cutters

Cutters will be replaced when a cutter has broken when there are changes in the dimple cut tolerances.

Loosen screw (2) and take cutter (1) out. Insert a new cutter to the hole in the cutter housing. Press it until stooping point.

CAUTION

Do not push the cutter with your hand. Use soft material. Repeat machine calibration procedure when finished.



Replacing cutter

Replacing cutters

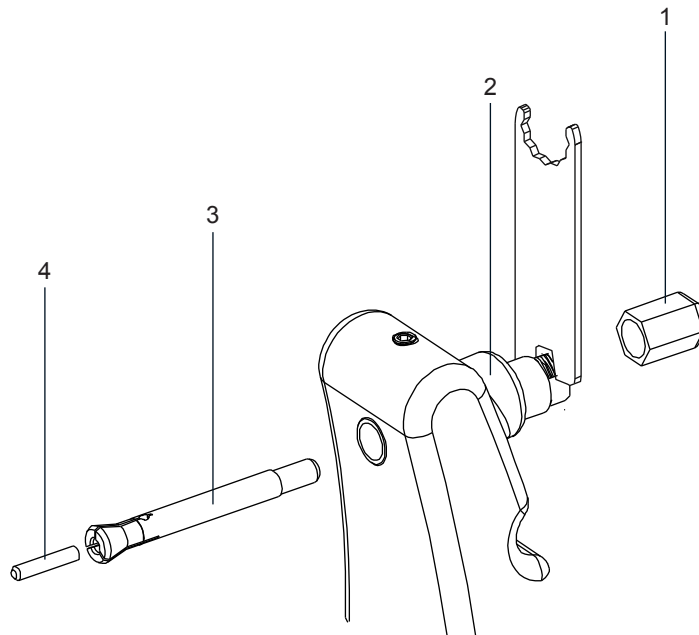
9.2. Replacing probe tip

Position cutting arm in front of aperture on locating plate. Push cutting arm with your hand. Rotate eccentric lever and screw it out.

Open Probe Nut (1) while holding probe housing (2) with special open key.

Remove probe holder and probe tip (3,4) and replace probe tip.

Preform machine calibration procedure when finished.



Replacing probe tip

10. Moving arm cable assembly

WARNING

Prior to any operation, disconnect the machine from external electric power source!

10.1. General

The assembly process includes positioning of the cable and relevant parts, and tightening the cable. (page 44)

General notes:

- Locking washer (2) and cable (7) are one part and cannot be separated.
- To remove plastic cover (1) screw M4 screw into threaded hole and pull it out.
- To start disassembling cable mechanism you must remove the eccentric lever (part 12 page 26). Position the moving arm in front of aperture on locating plate. Push upper part of moving arm with your hand, until the probe touches the tumbler disk. Rotate the eccentric lever and screw it out.
- Pay attention to the spring and two washers located on the other side.

Moving Arm Cable

10.2. Assembly process

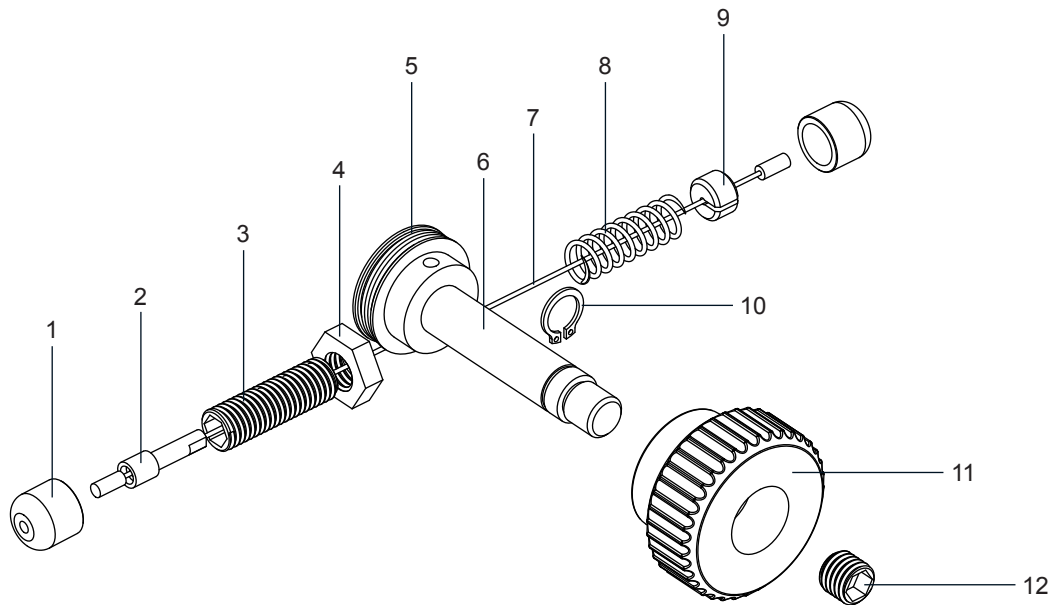
1. Assemble tension screw (3). Place hexagonal hole in the direction of locking washer (2) and nut (4) on the cable. Refer to description described on page 44.
2. Mount nut (4) at the end of tension screw.
3. Pass cable through right hand hole in machine body from inside out, and mount spring (8) and locking washer (9) on outer part of the cable. Refer to parts description in page 44.
4. Insert pulley (5) half drawn out into the machine arm. Wrap cable (7) three tires over the pulley (5) counter clockwise. Make sure there is no overlapping between tires.
5. Insert pulley all the way into the machine arm and fix it with retaining ring (10). Screw handle (11).
6. Use a 6 mm hex key to secure the hex screw (12)
7. Use a 2.5 mm hex key to secure pulley cover to moving arm with 4 screws. Mount eccentric lever into place. Screw in until the probe will touches the locating plate, and then screw it CCW one turn.
8. Hold the locking washer (2) with open spacial key (P/N 90543652) and fix it in place (To prevent cable twisting). Screw tension screw (3) into left threaded hole in machines body, until left face of the nut has reaches the machine body and right face is aligned with right end of tension screw. Use an 8 mm hex key.
9. If there is still slack in the cable, tighten it by using the tension screw.
10. Tighten the nut (4) to lock screw in place.
11. Check that the mechanism works properly.
12. Mount plastic cover (1) over cable.



CAUTION

Check calibration. If the tolerance is not correct, turn eccentric lever one turn in or out. Repeat machine calibration procedure when finished.

Moving Arm Cable



No.	Part	No.	Part	No.	Part
	Plastic cover	5	Cable wheel	9	Right cable locking washer
	Cable locking washer	6	Cable wheel shaft	10	Retaining ring
	Tension screw	7	Cable	11	Round handle
	Nut	8	Spring	12	Handle screw

For parts catalog numbers refer to page 49

11. Maintenance



WARNING

Prior to any maintenance operation, disconnect the machine from external electric power source!

11.1. General

Thorough periodic cleaning of the machine, its accessories and the work area is highly recommended, since it is a factor in operator safety. The machine was designed and manufactured so that it requires minimum maintenance.



CAUTION

11.1.1. Cleaning

- Periodic cleaning and maintenance are essential for proper machine operation and long machine life.
- Use a vacuum cleaner or a dry brush to clean areas that are difficult to reach. Remove grease, oil and sludge with clean cloth.



CAUTION

Do not use diesel or gasoline fuel.

- Clean carefully and dry with clean cloth.
- Do not use gasoline or solvents, which might damage the paintwork, transparent parts, cable insulation, etc.
- Do not blow dry the machine parts.

Maintenance



CAUTION

Never blow dry!

- When machine is idle for a long period, disconnect it from the power supply.
- Cover the machine with suitable material to prevent dust from building up. Any protective cover must have ventilation holes and not be completely sealed. This is to prevent humidity as a result of insufficient ventilation. Condensation will cause rusting or corrosion of the metal parts and damage the electrical apparatus.

11.1.2. Daily check

- Clean the machine and the surrounding area daily.
- Remove unused key blanks and any unused materials.
- Remove metal chips from the machine, and empty the metal chips drawer.

12. Electric schema

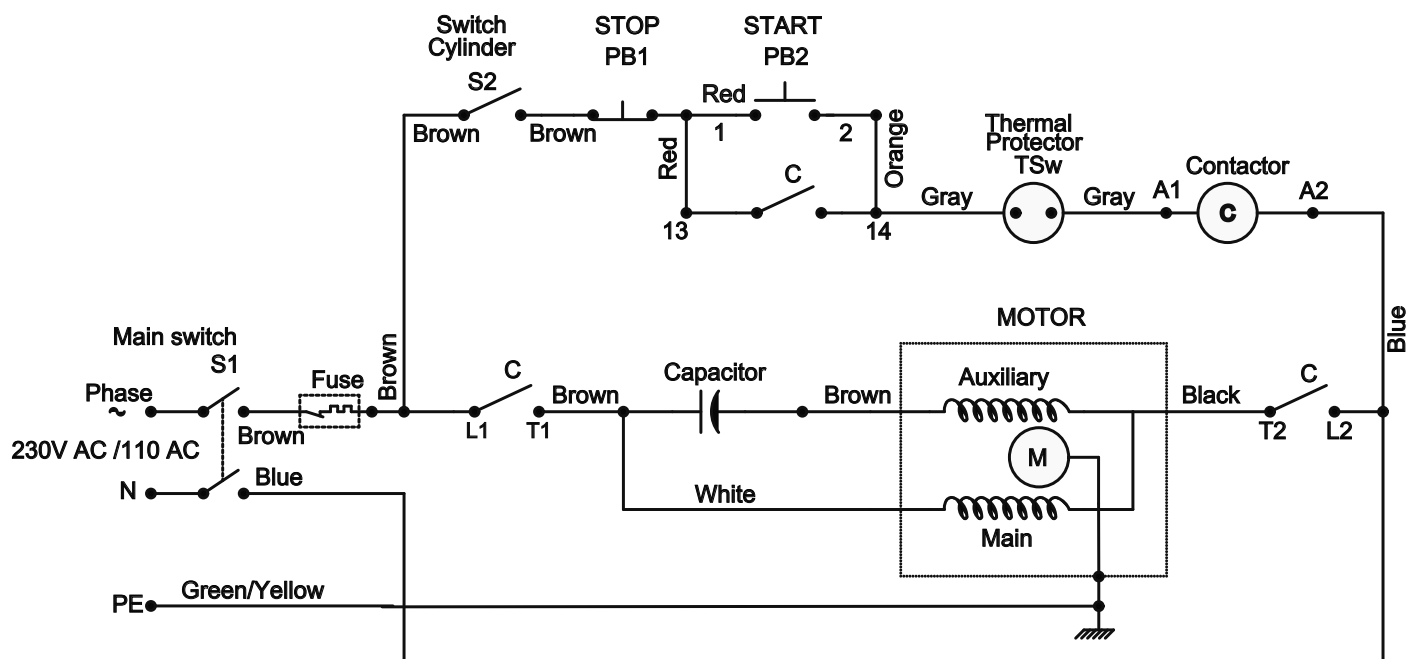
12.1 Electric schema for 220/110V model



WARNING

Prior to any maintenance operation, disconnect the machine from external electric power source!

Only Mul-T-Lock authorized electrician may perform any electric actions in the machine.



13. Parts catalog numbers

PAGE 23

No.	Part	Catalog number	No.	Part	Catalog number
1	Motor drive wheel	91535103	11	Top cover	91535011
2	Belt	91535035	12	Locating plate	91535032
3	Bearing 7203B	90543041	13	Shaft for tumbler disk	91535015
4	Drive wheel	91535104	14	W - milling cutter	90079161
5	Bearing 7202B	90543111	15	V - milling cutter	90079151
6	Shaft	91535004	16	Cutter securing screw	31610510
7	Tumbler disk	91535003	17	Switch	91535100
8	Handle no. 3	91535070	18	Switch	91535101
9	Handle no. 2	91535071	19	Cylinder switch 22	51050900
10	Handle no. 1	91535072			

PAGE 24

No.	Part	Catalog number	No.	Part	Catalog number
1	Electric motor 110V	91535115	4	Electric socket	91535042
1	Electric motor 220V	91535155	5	Fuse 8A	91535097
2	Capicator 25 Mf (110V)	91535128	6	Main switch	91535096
2	Capicator 8 Mf (220V)	95047731	7	Fan - vent 3.5"	91535087
3	Relay (110V)	96300241	8	Rear cover	91535065
3	Relay (220V)	96300194			

Parts catalog numbers


PAGE 26

No.	Part	Catalog number	No.	Part	Catalog number
1	Screw	31210408	18	Clamping bolt	95047261
2	Cover	91535046	19	Handle ring	33010802
3	Cable pulley	91535006	20	Probe nut	90543571
4	Socket set screw	31650506	21	Probe housing	91535017
5	Bushing	51054023	22	Probe holder	91535019
6	Central shaft	91535010	23	Probe tip	91535074
7	Bronze bushing	91535076	24	Probe locking screw	31610610
8	Screw	31690816	25	Arm	91535002
9	Cable wheel shaft	91535007	26	Pin	51019129
10	Round handle	95047601	27	Special pin	91535048
11	Handle screw	31611210	28	Holding bar	95047351
12	Eccentric lever	90216161	29	Stopper assembly	90216177
13	Retaining ring	33610808			90216178
14	Pin	95047461			31630615
15	Screw	31810430	30	Spring	91535041
16	Pressure coordinator	90543303	31	T - nut	90543371
17	Retaining ring	33411410			

PAGE 44

No.	Part	Catalog number	No.	Part	Catalog number
1	Plastic cover	91535037	7	Cable	91535156
2	Locking washer	91535162	8	Spring	91535043
3	Tension screw	91535038	9	Locking washer	91535160
4	Nut	32411200	10	Retaining ring	33411410
5	Cable wheel	91535161	11	Round handle	95047601
6	Cable wheel shaft	91535007	12	Handle screw	31611210

14. Troubleshooting

Malfunction	Troubleshooting
Newly cut keys do not function properly.	Check milling cutters for wear and abrasion. Replace if required (replace a pair of milling cutters even if only one is worn out). Re-calibrate the machine (Page 40).
Dimples on key are not round and present shivering marks.	Check milling cutters for wear and abrasion. Replace if required (replace a pair of milling cutters). Re-calibrate the machine. (See page 40).
Motor work but cutters do not turn.	Remove rear cover and checks the belt.
Motor does not work.	Visually check electric connection to the machine. Notify Mul-T-Lock Technical Support. <div>  WARNING </div> Repair of electric parts must only be performed by an Mul-T-Lock authorized service person.

WARNING

Contact the manufacture/distributor in case of any malfunction you cannot handle.
Whenever consulting the manufacturer about troubleshooting, refer to machine description in pages 23, 24 and parts catalog numbers according to the tables in pages 48, 49.