

X-CODE
ELECTRONIC MACHINE
INSTRUCTION MANUAL

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1 PRESENTATION AND GENERAL ASPECTS

1.1 GENERAL POINTS

The X-code key cutting machine has been designed taking into account the safety standards currently in force in the EU.

The safety of personnel involved in the handling of this type of machines can only be achieved with a well designed worker safety programme, the implementation of a maintenance programme and following recommended advice as well as compliance with the safety standards included in this manual.

Although the machine is not difficult to install, it is best not to try to install, adjust or use it without first having read this manual.

The machine leaves our factory ready for use and only requires the carrying out of calibration operations for the tools that are going to be used. To ensure the correct use of the machine and an optimum result in the cut key please follow these steps:

- *Respect and follow the steps indicated on the machine.*
- *Always use original JMA brand tools and spare parts.*
- *Use JMA original metal keys (steel, aluminium, brass, alpaca...) to ensure top quality dimensional results.*

Any use other than that indicated in this manual will mean the loss of any right the customer may have to compensation from JMA and such use is not included in the terms of the warranty. Moreover, the incorrect use of the machine may constitute a source of danger for the operator or third parties.

1.2 TRANSPORTATION AND PACKING

The machine comes inside packing of the following dimensions:

Width = 600 mm, length = 505 mm, height = 660mm

Weight of machine plus packing = 50 Kg.

The machine must be transported upright when transported in its original packing. Keep the packing in case you have to move the machine distances over which it cannot be carried by hand by two people.

When you unpack the machine, check carefully if has suffered any damage during transportation. If you find any problems, please inform the carrier immediately and do not do anything with the machine until the carrier's agent has carried out an inspection.

1.3 IDENTIFICATION LABEL

The X-code key cutting machine has an identification label, giving the serial number, the manufacturer's name and address, the CE mark and the year of manufacture.

ALTUNA MDL ,SL	
Bidekurtzeta 3 20500 MOMDRAGON (Guipuzcoa) - Spain Tfnos.:(943)712478 Telefax:(943)794388	
	<input type="checkbox"/>
Tipo:	<input type="text"/>
Nº de Serie:	<input type="text"/>
<input type="text"/>	

1.4 GUARDS AND SAFETY

The X-code machine complies with the Machine Directive. Observation of the general safety standards and the indications provided in this manual make human errors impossible, unless they are deliberate. Therefore:

- **Electricity supply**

The electrical connection shall always be by means of a socket with an earth connection and a differential switch.

- **Switching on (No. 1 on page 6)**

The machine is switched on by means of the red switch on the front. The light coming on indicates that the machine is being supplied with power.

- **Protective screen. (No. 4 on page 6)**

The X-CODE machine is fitted with a transparent protective screen that covers all the moving parts and also covers any swarf.

The protective screen is controlled by a switch. To cut a key it is necessary to raise this screen which therefore cancels out any movement. For any operation requiring the movement of slides or the cutter, the closure of this screen will be indicated for complete operator safety. No movement can be carried out until this is done.

- **Emergency stop (No. 2 on page 6)**

The emergency button is on the front right-hand side of the machine, next to the ON switch. It cuts off the power supply in the event of an emergency or unforeseen danger. This is why it is in an accessible place where it can be used quickly.

The button can be released by turning it 45° clockwise.

2 CHARACTERISTICS OF THE MACHINE

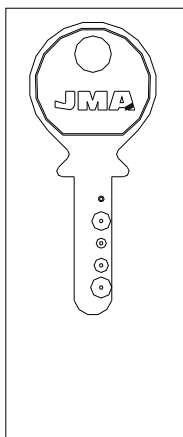
The X-Code key cutting machine has been designed to cut original laser and safety type keys based on code, by means of the onboard control.

2.1 FAMILY OF KEYS

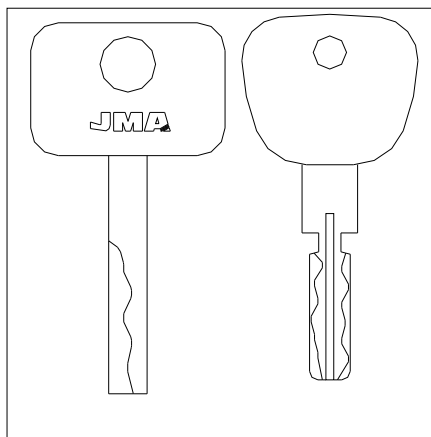
The X-Code machine can cut the following types of keys:

In the whole manual and on the X-code machine the keys can be classified in the following way:

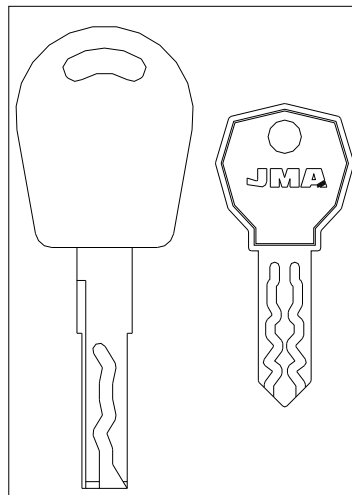
- Safety keys (Drawing 1). Keys with machined dimples.
- Laser keys (Drawing 2) for vehicles. The machining is done on the sides of the key, on either one or both backs.
- Groove keys (Drawing-3) for vehicles. The machined groove runs down the middle of the key.



Drawing 1



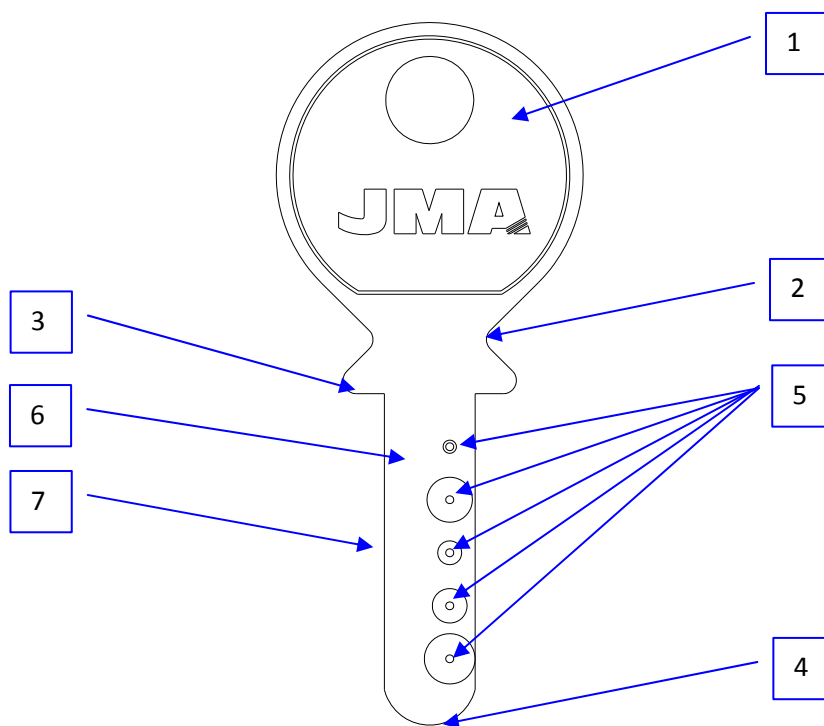
Drawing 2



Drawing 3

2.1.1 Parts of the key

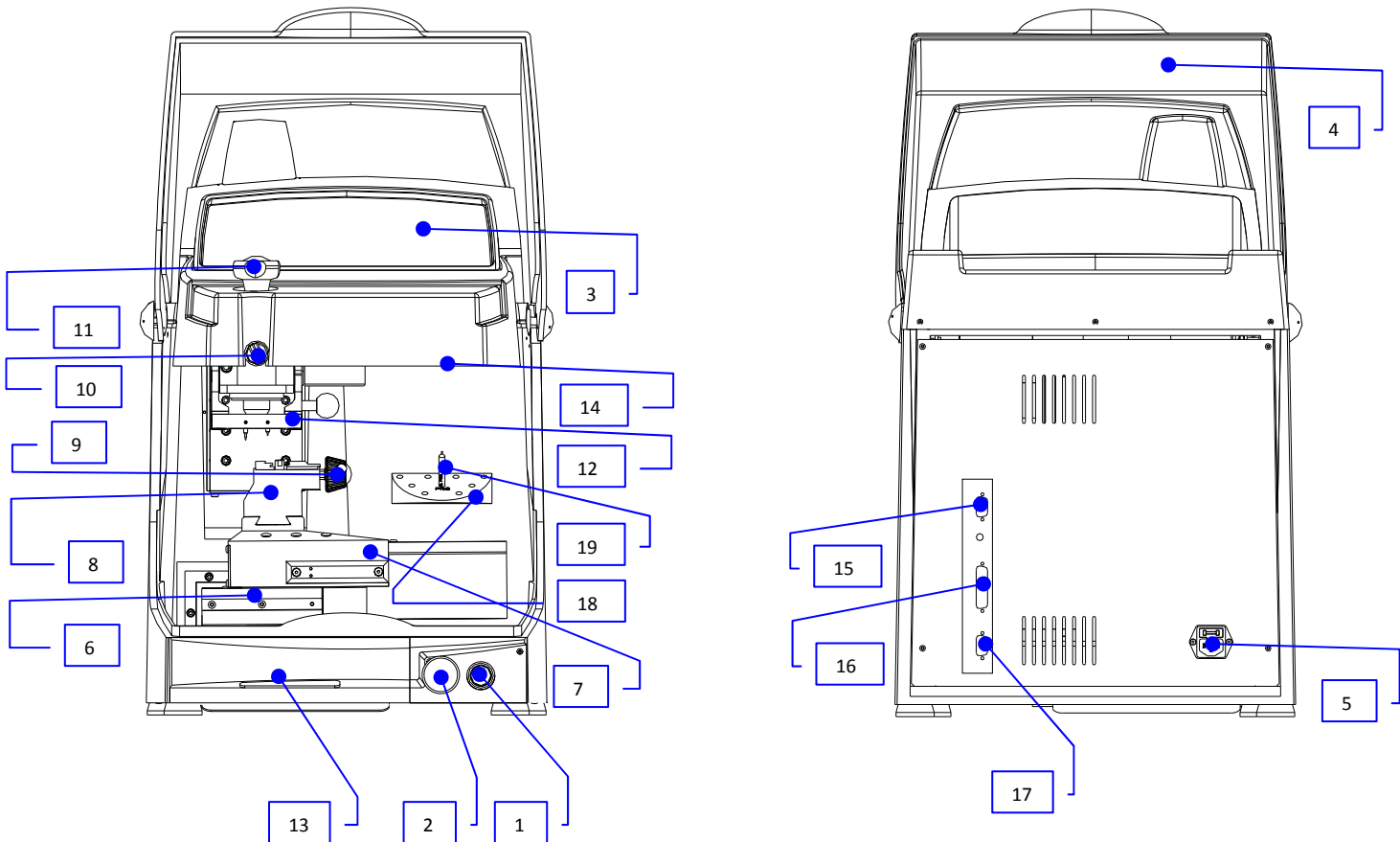
1. Head
2. Neck
3. Shoulder
4. Tip
5. Teeth
6. Blade
7. Back



2.2 MAIN ELEMENTS OF THE MACHINE

1. Red ON light
2. Emergency button
3. Keypad + Display.
4. Transparent protection guard
5. Feed
6. Y slide
7. X slide
8. Clamp
9. Clamp handle
10. Shaft-blocking knob
11. Collet-opening knob
12. Tracer device (dimples and laser)

- 13. Swarf box
- 14. Inside light
- 15. RS-232 serial line
- 16. Inputs/Output
- 17. Connector for start-stop control
- 18. Tool-holder
- 19. P-RG set up tracer



2.3 TECHNICAL INFORMATION

The main technical information is as follows:

Mains supply:

-230V-50Hz 300W
-110V-60Hz 300W
100V-50/60Hz 300W

Motor: Single-phase 2 speed 220V, 50Hz, 0.18Kw, 1500/3000 rpm, 1/0.91 Amp.

Cutter speed: 3500/7000 rpm.

Clamps: Universal clamp (M1). Others can be fitted.

Displacement: By means of a ball screw driven by stepping motors on ground ball guides.

Effective travel: X=40 mm.
 Y=60 mm.
 Z=40 mm

Lighting: 15W halogen lamp.

Dimensions: Depth: 550 mm, Width: 400mm, Height: 612 mm. (700 screen up)

Data memory: 8Mb of Flash memory

Display: 128x64 dot matrix

Weight: 45 Kg.

2.4 OPENING THE PACKING

To remove the machine from its packing, make sure that the packing is in the right position (machine upright). If you remove the machine upside down the guards covering the top part may get damaged. Bear in mind that at the bottom the machine is totally square and wider, providing full stability when it comes to removing the machine from the packing. Proceed as follows:

1. Place the box on a low surface like the floor as you have to lift the machine above the box.
2. Open the box at the top. Cut the tape or staples with scissors (suitable for cutting staples).
3. Take out the material and any other material there may be at the top. Tools, cables, accessories...
4. Lift up the top foam protection. Once you have done this you should have access to the bottom of the machine down the sides.
5. It s very important that this operation be carried out by 2 people or more. Put your hands underneath the machine (always down the sides holding on to the metal parts of the casing and not the plastic parts "swarf box or start switch").
6. After removing the X-code machine from its packing, put it straight onto the work bench.

2.5 ACCESSORIES

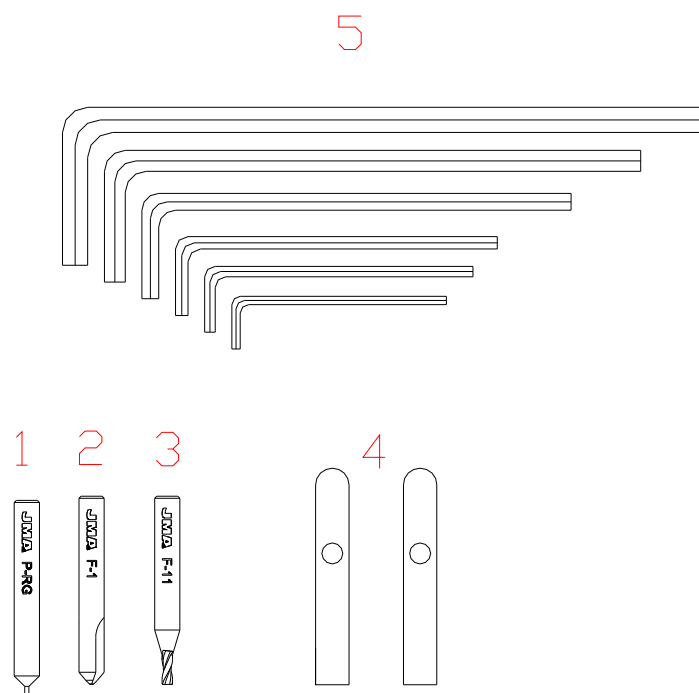


Figure no. 1

1. P-RG set-up tracer

2. F-1 cutter
3. F-11 cutter
4. Wedges for adjusting keys by tip
5. Set of Allen keys (2.5, 3, 4, 5, 6).
6. Computer connection cable.

2.6 INSTALLING THE MACHINE

The machine is installed, calibrated and controlled at the Altuna MDL factory. In any case, before starting it up for the first time, it is best to carry out the following controls:

- Connect the X-code machine to the correct power supply (220 V 50/60 Hz), in accordance with the information given on the identification label on the rear of the machine.
- It is very important that the establishment's electrical installation have an earth connection, with a safety trip switch. Make sure that the machine is earthed.
- After having unpacked the machine and connected it to the power supply, make sure that the emergency button has not been pressed down. If it has, release it
- Once the red start button has been pressed (with the protection guard closed), the "JMA" logo will appear. A few moments later, the machine will carry out an internal test and give the machine's serial number and the version of the database. One second later the machine will go to the main menu.

The X-code machine offers the following possibilities:

1. Connect the X-code machine to an Intel compatible PC, with the Interactive Key Software program installed. This program is essentially a database of codes for lock-, automotive-keys..., safety keys in general. This makes a fully integrated work system possible (code search, cut selection, additional lock data, complete digital catalogue of JMA keys).
2. Use the X-code machine independently as an autonomous machine. By means of known cuts (code books, code program, decoded original key...) and the file, a correct copy can be cut based on a direct code with only the cut pattern having to be entered via the keypad.
3. Use the X-code machine to do your own keys using the editor included in the machine. You can create your own new keys or enter into the machine the latest keys to appear on the market without having to wait for an upgrade.
4. To read the code of a key for which the file is known. Also to correct copy errors and make cuts on an original key or the key read.

2.7 MACHINE KEYPAD

The machine keypad is the complete interface between the X-code machine and the operator. This keypad has 32 alphanumeric characters (18 keys) + 14 different function keys. This provides everything necessary for the control of the machine (see the figure below).

The alphanumeric keys can be used in the following way:

- Each number has its own key.
- The keys corresponding to letters work differently. Each key has three letters of the alphabet, so the letter required has to be chosen in the following way:
 1. To choose the first letter, it is only necessary to press the key once.
 2. The second letter on the key can be chosen by pressing the key twice, consecutively.
 3. The third letter can be chosen by pressing the key in question three times consecutively. If the key is pressed more than three times, you return to the first letter and so on successively.

The other keys have the following functions:



– Stops the machine when it is cutting a key, giving the option to cancel the operation.



– This key is used to give the command to start cutting a key; and to continue cutting, if the machine has been stopped.



– Function 1 key, can initiate different operations depending on which part of the menu you are in.



– Function 2 key, can initiate different operations depending on which part of the menu you are in.



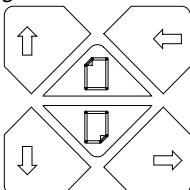
– The machine goes into slave or computer-connected mode, and the computer tells you which key to cut. Press the same key again to go back to autonomous mode.



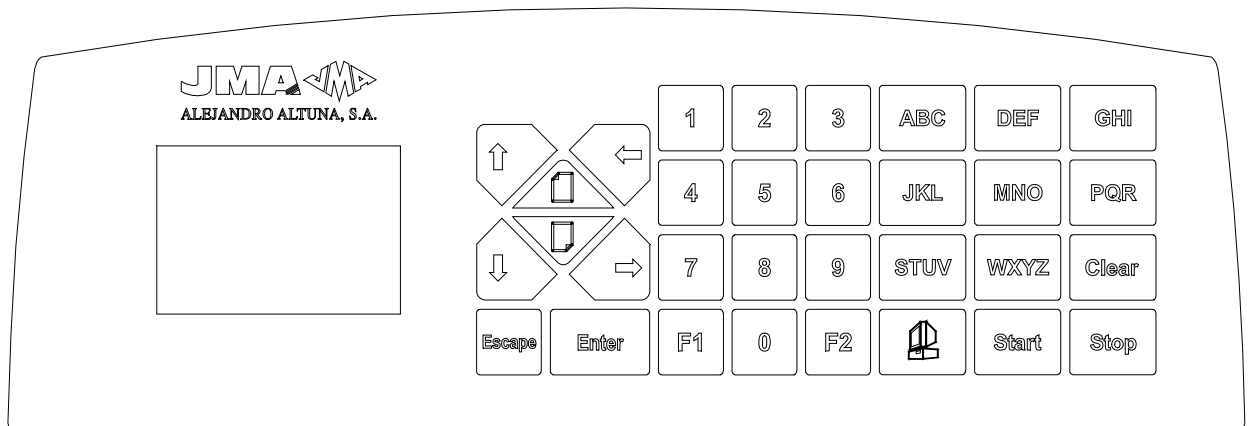
– This is the confirmation key. It is similar to the “RETURN” key on a computer. Use it to confirm what it says on the screen and go on to the next menu. It memorises the data from the keypad and the computer.



– Cancellation key. It cancels what it says on the screen. It can also be used to go from one menu to a previous one or to the main menu.

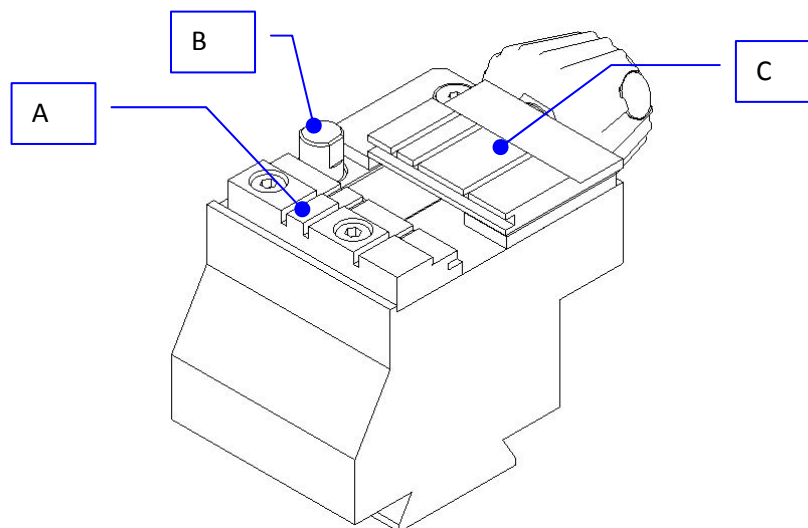


– Cursors to move across the screen in the direction indicated by the arrows. The two buttons in the middle are to go page up and page down, for use in the key editor to make it easier to go through the keys.



2.8 KEY CLAMP

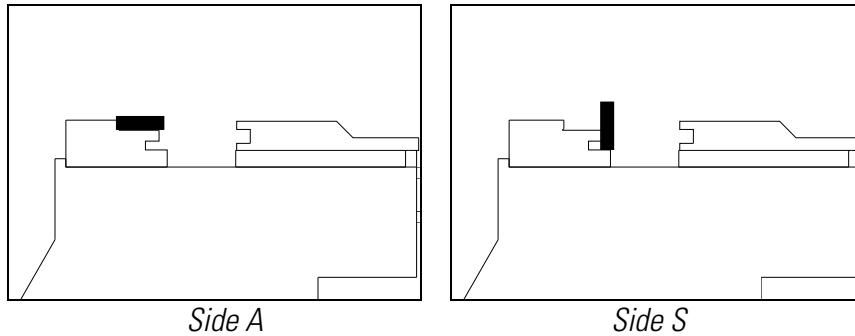
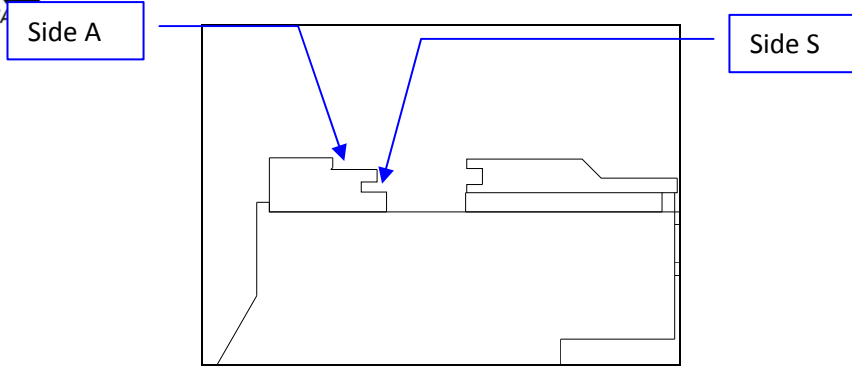
The X-code comes fitted with the M1 clamp (see the figure below).



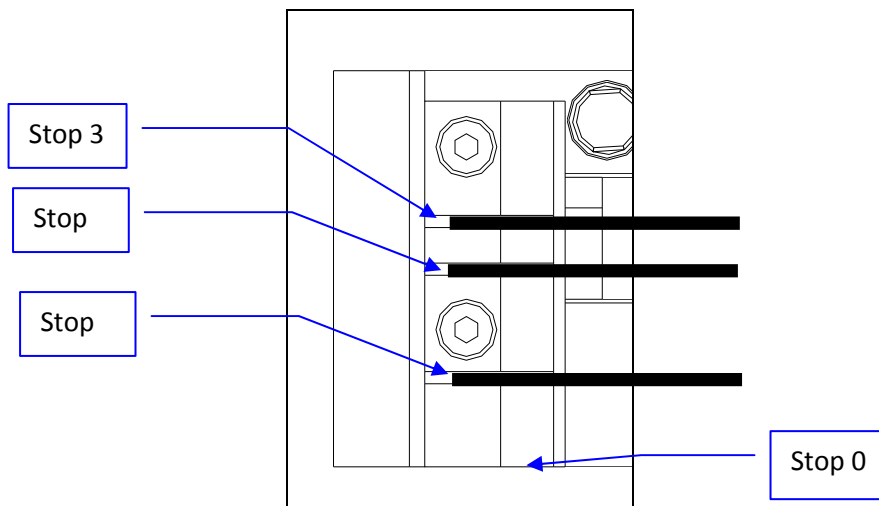
This clamp has a fixed jaw (where the key takes the reference, marked A in the diagram), a moving jaw (to secure the key, marked C) and a button (B) to detect the cutter. The two jaws can be changed if they become worn as a result of continuous use.

The following diagram shows the different clamp references that the machine uses for cutting, which serve as a guide when putting the key into position.

- Key support face. Side A: the key is supported on part A of the key. Side S, or support on the bottom part of the jaw, normally for cutting lateral dimples.



- Key reference when cutting, there are 4 different references:
 0. Stop 0: Support on the neck of the key.
 1. Stop 1: Using wedge to adjust keys by tip (Accessory shown in chapter 2.5). The stop is done in the first groove after stop 0. The key is referenced with the tip.
 2. Stop 2: Using wedge to adjust keys by tip (Accessory shown in chapter 2.5). The stop is done in the second groove after stop 0.
 3. Stop 3: Using wedge to adjust keys by tip (Accessory shown in chapter 2.5). The stop is done in the third groove after stop 0.

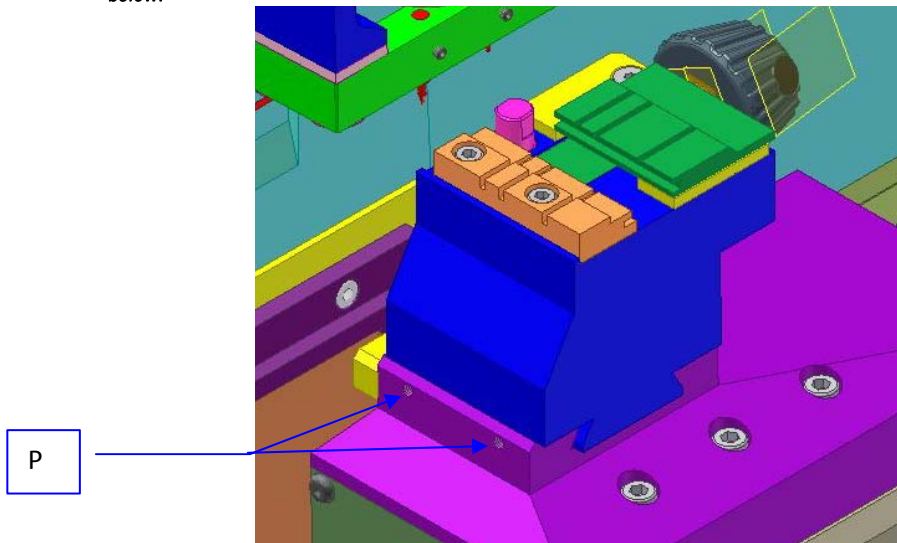


N.B.: It is very important in the case of a tip stop (stop 1, 2 and 3), to remove the wedge used to adjust the keys by the tip once the key is in place and before carrying out the cutting operation, as the cutter could collide with the wedge for adjusting the key by the tip.

2.9 FITTING THE CLAMP IN THE X-CODE MACHINE

The clamp is an element that can be changed in the machine depending on the model of key to be used, but the way of securing and butting up the clamp is similar in the different models:

- In order to be able to remove the clamp, first of all you have to remove the two screws (P) holding it in place. See the figure below:



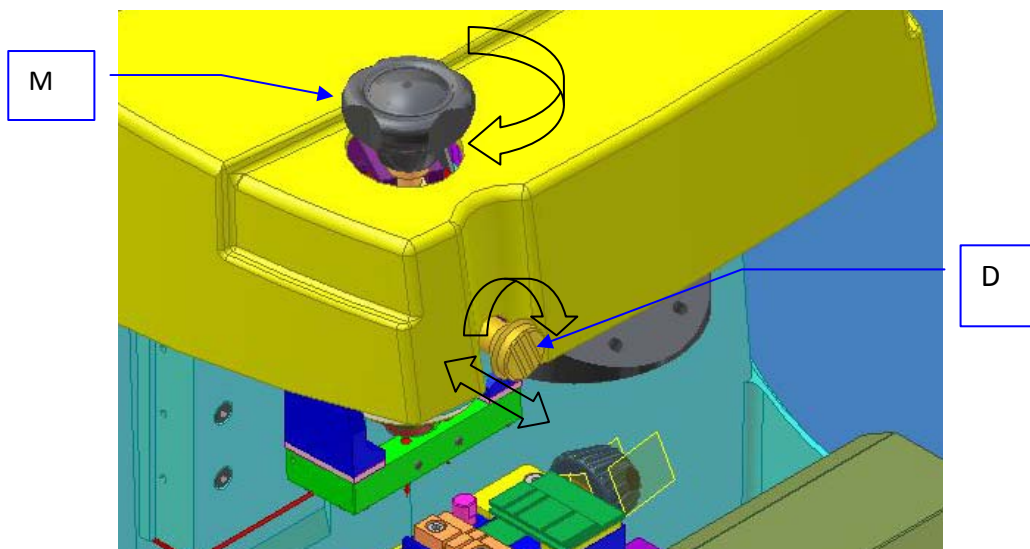
- Once these screws have been removed, you have the option of removing the clamp from the dovetail. To put it back you have to bear in mind that the clamp has to butt up at the back against the part shown (T). Once you have ensured that the clamp is butting up against the part (T), you can put the screws back and tighten them up (P).



2.10 CHANGING THE CUTTER/TRACER

Follow these steps to change the cutter or change the tracer:

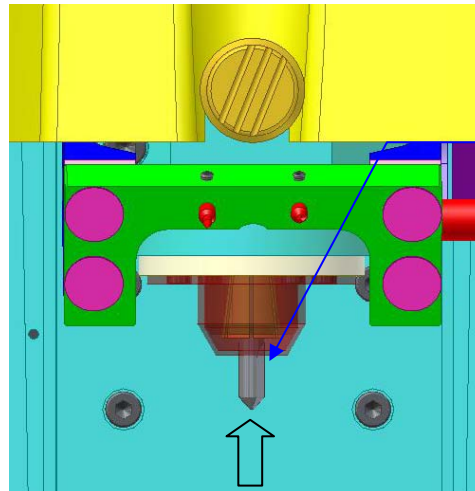
- Open the big safety guard (No. 4 in chapter 2.2). This makes it impossible for the cutter to rotate.
- Turn the blocking knob D 90° until it coincides with the groove. The pin will go in a little.
- Turn the cutter shaft using the handle (M) until the blocking knob (D) goes into the cutter shaft and blocks the shaft.



- Once the cutter-holder shaft has been blocked, turn the knob anticlockwise to release the cutter/tracer. Keep your hand underneath so that the cutter/tracer does not fall onto the slide.
- Release the shaft by pulling knob D out. Once it is out, turn it 90° to put it in the rest position so that it does not block the cutter-holder shaft.

Follow these steps to fit the new tool:

- Block the shaft as explained above.
- Insert the tool (cutter or tracer) until the base of the tool touches the internal stop of the milling cutter-holder shaft. Make sure that the internal claw is open enough for the tool to be able to enter. The claw has an internal spring, so that the tool comes out more easily. When fitting the cutter, make sure that this spring is as compressed as possible, so that when cutting is carried out there is no danger of the tool moving in.



Press up when
tightening the shaft

- *Once the tool has been inserted right in, tighten the handle (M) in a clockwise direction. Hold the tool right in with one hand and use the other hand to turn the handle (M).*

VERY IMPORTANT

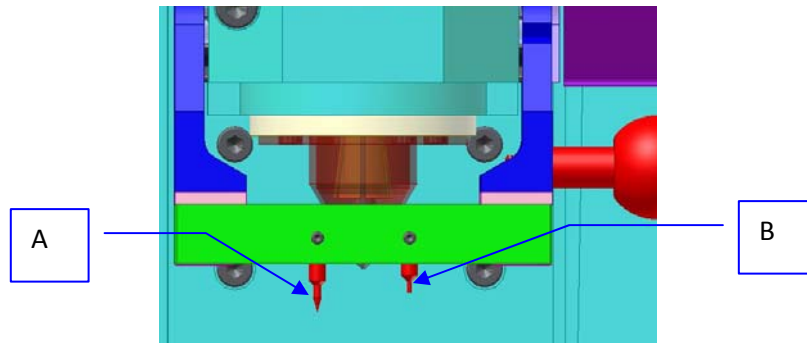
The cutter must be inserted right in as far as it will go so that when cutting a key there is no chance of it slipping in and the cutting not being carried out properly.

IMPORTANT NOTE: *when starting a cutting or reading operation, the cutter blocking knob D has to have been released, in the rest position as the cutter-holder shaft is isolated from the casing and when knob D is blocked the cutter-holder makes contact and the following message will appear:*

**Cutter blocked
or unexpected contact
Press START/STOP**

2.11 TRACER DEVICE

The X-code machine is equipped with a device for reading keys. This device enables you to read the majority of safety keys, laser keys, ... without having to use a special tracer to do so.



The tracer device consists of two tracers, with the following names:

- PT01 (marked with an A in the diagram above): General tracer for dimple keys.
- PT02 (marked with a B in the diagram above): General tracer for laser and groove keys.

The device has two positions:

The reading position is the one shown in diagram 1. You have to turn the part until it is right in at the back. This is very important to prevent the tracer from vibrating during the reading operation (there is a ball that exercises pressure to prevent this from happening).

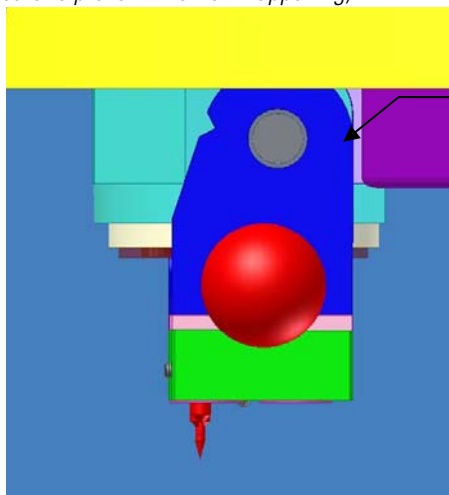


Diagram 1

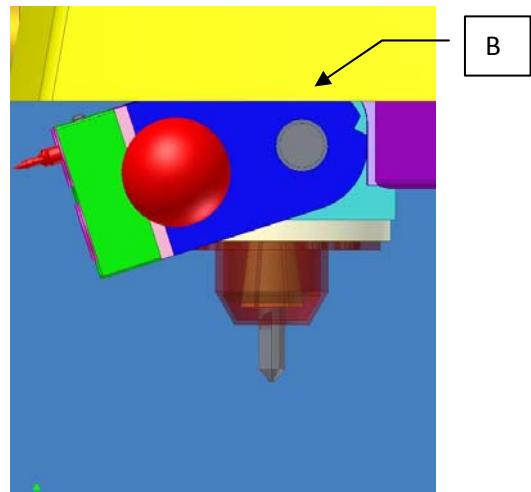


Diagram 2

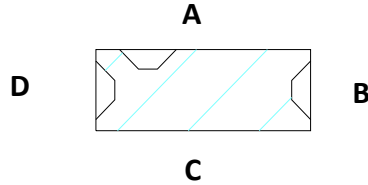
The rest position is shown in diagram 2. This position is also blocked by a ball, when the tracer device is positioned at the top.

2.12 TERMS FOR A KEY

The aim of this chapter is to explain the different parts of a key. This will help you to understand how a key file works and how it is programmed in the machine. You will then understand how you can edit using the key editor.

The key can be defined with the following parameters:

- Sides of the key, on which the cuts are made. There can be up to four sides.



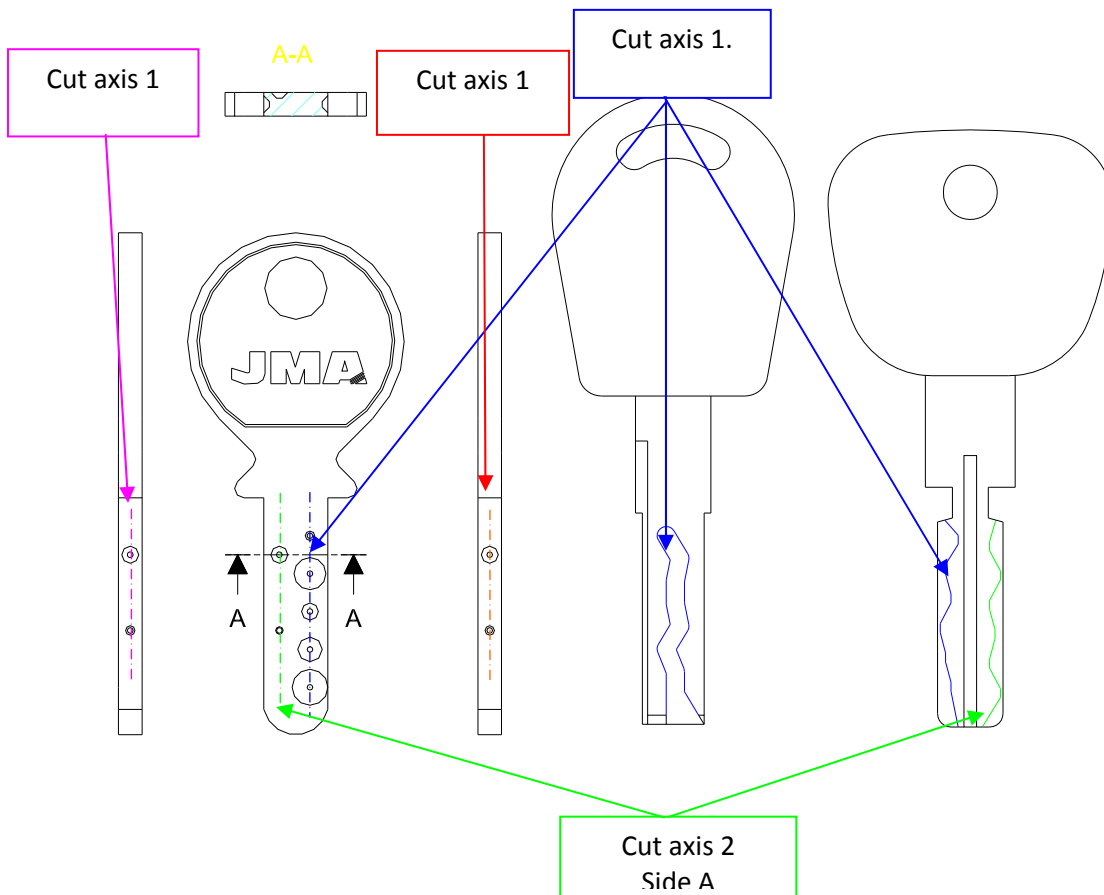
Side A: Main side or first side of the key.

Side B: Back side of the key.

Side C: Opposite side to A.

Side D: Back side, opposite to B.

Each side of the key can have several cuts. These cuts are defined as cut axes:



3 MANUAL OPERATION OF THE MACHINE

3.1 STARTING





Once the machine has been switched on (after pressing the red button (No. 1 in chapter 2.2)), the JMA logo will appear. Once the JMA logo has gone, the following box will appear within one second, providing the following machine information:

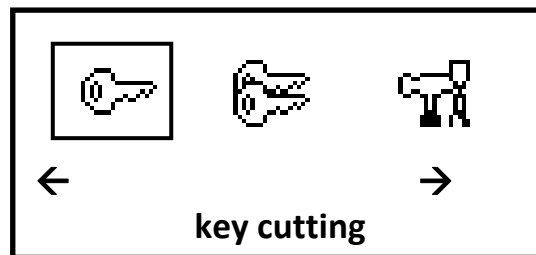
X CODE number:	

Software vers:	2.01
Database	3.1



The 10 digits of the Xcode number are the same as the machine's serial number. You will also be informed which version of the software of the machine has been upgraded with (see chapter dealing with upgrades). The final piece of information is the version of the database included in the machine (see the chapter on upgrades).

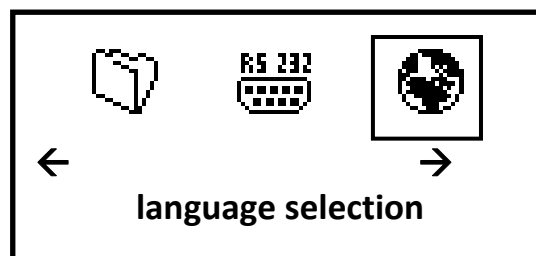
You will then enter the main menu. This menu appears every time you switch the X-code machine on or off.


Remember that the machine's screen uses a graphic format so you have to use the   cursors to move between the different icons and the Enter button  to select the options and the Escape button  to return to the previous menu. A box continually informs you which menu you are accessing and a description of the menu to be selected appears at the bottom of the screen.

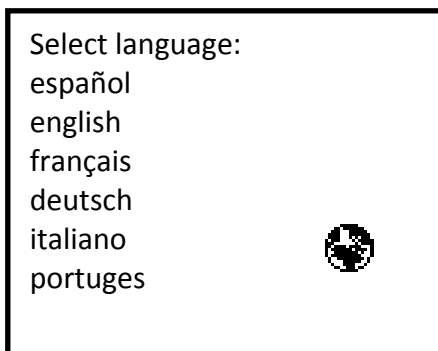


3.2 CHANGING THE LANGUAGE

One of the first things you need to do after purchasing the machine is to select the language that suits you best. In the main menu, as shown in the diagram in the chapter above, press the arrow to the right 5 times  or the arrow to the left once , to take you to the menu prior to the main menu.




Once you are on the language selection icon, press the ENTER button . This will take you to the submenu where you can choose the machine language.



Choose the right language and press the ENTER button.

3.3 XCODE CONNECTED TO PC

In the main menu press the computer connection button , for the machine to be controlled by the personal computer. For this to happen the machine has to be connected via a serial port.

Press the computer connection button  again for the machine to return to normal autonomous operating mode.


If the machine is connected to the computer when you switch it off, when you switch it on again this computer connection will be maintained.

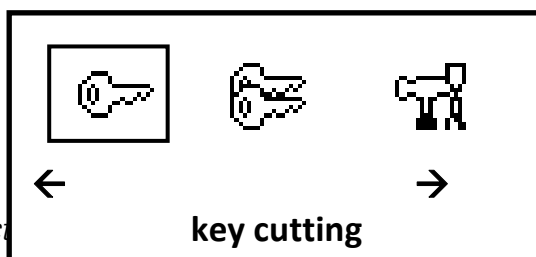
3.4 CUTTING A KEY


The handling of the machine in autonomous mode, that is to say not connected to the computer, is very easy. It cuts the key quicker if you have the file number and the number for the cuts to be made (cut code). This information can come from the database installed on the PC not connected to the machine, or by means of the machine's reader.

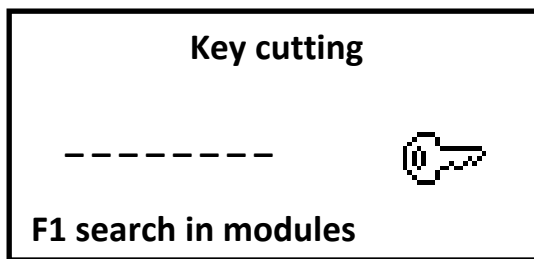
3.4.1 Establishing the cuts

The steps to follow to cut a key in manual mode, without connection to the computer, are as follows:

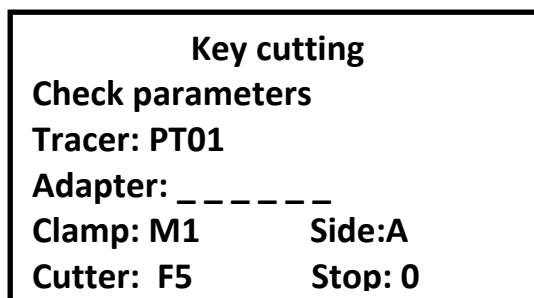
Go to the main menu and in the key cutting option press ENTER .



Once you have selected the key cutting option, press the ENTER button  to enter the file for the key to be cut.



Enter the file to be cut in the following screen. The information to be entered is going to be a file up to 8 characters in length. Let us take an example. Key in 204P and press ENTER. The system will search for the file in the memory and go on to the next information screen.

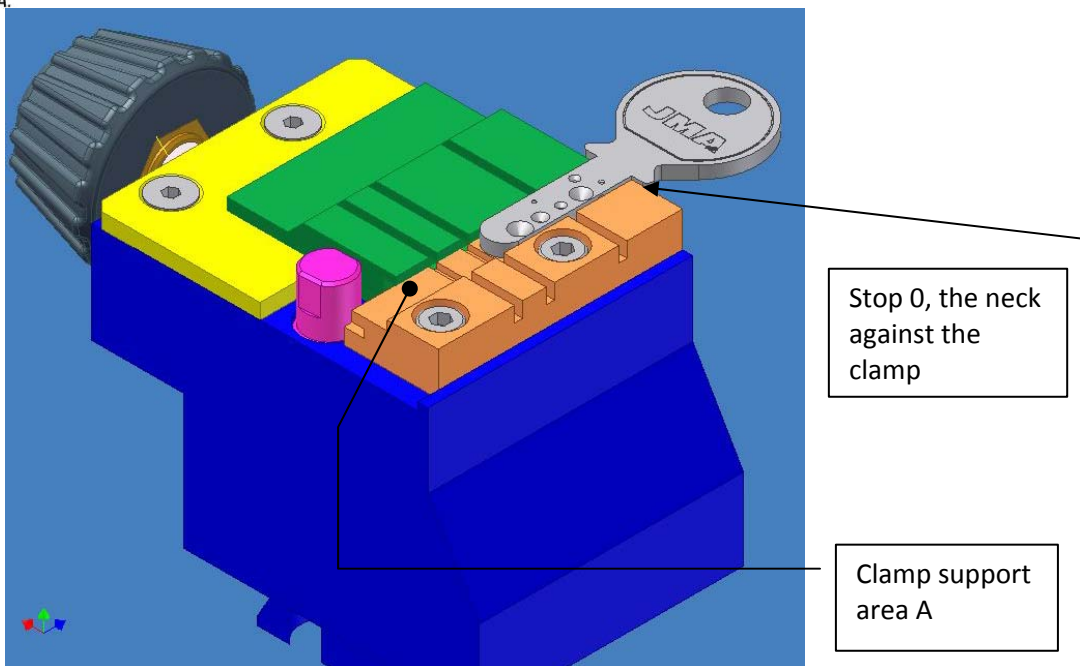


The following screen will show all the information necessary to cut the key. Let us take a look at the information given on this screen:

- *Tracer: PT01. Indicates that this key can be read with the standard PT01 tracer included with the machine (see chapter 2.11).*
- *Adapter: In this case the adapter is not necessary, as no reference is given. If one is given, the adapter has to be used to cut the key.*
- *Clamp: M1. The M1 clamp needs to be installed to cut the key. If this clamp is not fitted go to the chapter dealing with changing the clamp and install the clamp necessary.*
- *M. Cutter: F5. Fit the F5 cutter (as indicated in chapter 2.10). Once the cutter has been changed it is very important not to leave the shaft blocked as the shaft blocked message will appear when you want to cut a key.*
- *Side: A. Indicates the support area in the clamp (see chapter 2.8). Key supported horizontally.*
- *Stop: 0. Indicates the stop for the key when placed in the clamp (see chapter 2.8). In this case the key is stopped by the neck in the clamp.*

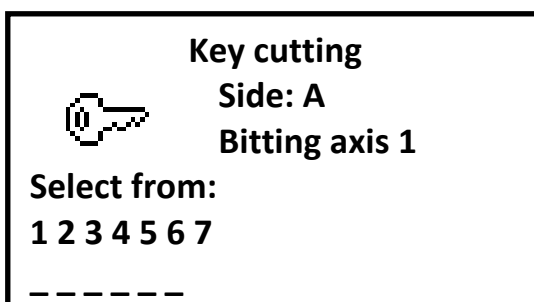
So the key will be clamped as shown in the drawing. Supported on side A, and with stop

0.

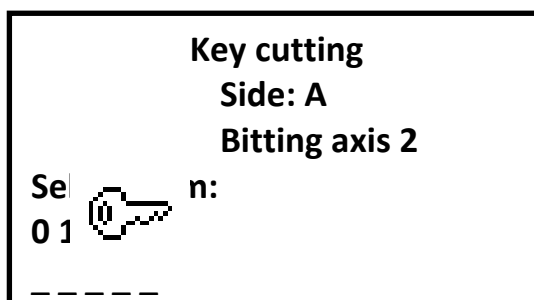


Now that the clamping of the key has been explained (by the characteristics that appear on the cutting screen) let us continue with the next menu that will appear once you press ENTER.

With the next menu you start to establish the key's cuts. As the screen indicates, the cuts you are establishing are the cuts on side A. The cuts will be on axis 1 (the main axis closest to the fixed jaw, chapter 2.12). As you can see this axis consists of 6 cuts (number of underscores "_" in the file), and the depths or cuts allowed are as follows: 1, 2, 3, 4, 5, 6 and 7.



When entering the cuts for a key, the machine allows you to enter cuts for just one cut or as you like (or establish them all). You must bear in mind that these cuts are from the head to the tip. This means that the first position for the cut is that closest to the head and the last is that closest to the tip. Press ENTER to record the cuts and go on to the next screen. Axis 1 is the axis closest to the fixed jaw. Axis 2 or axis 3 are the axes adjacent to axis 1 from left to right, with the clamp's fixed jaw where the key is supported serving as the reference.



This key has two cutting axes on side A and you are therefore now asked to enter axis 2. As you can see this second axis has 5 cuts and the bitting permitted is 0, 1, 2 and 3. Once the bitting has been entered press ENTER.


3.4.2 Cutting modes

Number of key blanks
New cut
HSS type cutter ←→
Depth auto adjust
Press START to
Cut side A

If the next screen that you see is the one above, this means that you have finished establishing the key. The key file implicitly contains the information that says whether the key is symmetrical or not, so you will not be asked for the data for side C. Neither will you be asked about side B or D, as the key does not have any lateral cuts.


When you go to this screen the cursor is positioned over the number of keys, so if you press ENTER, you will go to the number-of-key-blanks screen.




Key cutting

 **Number of key blanks**

When establishing the number of key blanks, remember that the cursor is in the first position. So to establish 100 units, you have to enter first of all a 1 and then a 0 followed by another 0. During cutting, the machine provides a counter so that you know how many keys have been cut and how many are left to do. However if you want to do 20 keys you have to proceed as follows: enter a 0, then a 2 and finally another 0. Press ENTER to accept. When you press ENTER you return to the previous screen.

Number of key blanks
New cut
HSS type cutter ←→
Depth auto adjust
Press START to
cut side A

Press the down button  to go to the next option which is establishing a new cut. You will go through the point in the menu again where you establish the cut for side A axis 1 and axis 2, to define a key again.

The next button to appear when you press the down button , is the type of cutter. Use the right and left buttons   to change the type of cutter from HSS to W. This parameter affects the rotation speed of the shaft. So:

- HSS: Shaft speed 3500 rpm. Ideal rotation speed for a cutter made of HSS (High Speed Steel).
- W: Shaft speed 7000 rpm. Ideal rotation speed for a hard metal cutter (Widia). JMA's cutters are coded with a W at the end.

Example: F1: Cutter F1 made of high speed steel. F1W: Cutter F1 made of hard metal.

The machine also allows two types of cutting, depending on where you press the cutting START button:

A) NORMAL cutting:

In the menu shown above you can press the START button at any time. The machine will then carry out normal cutting.

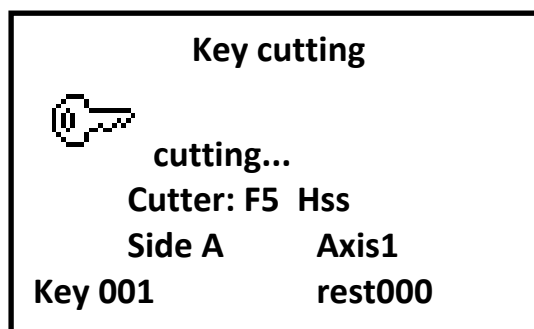
B) AUTOADJUST cutting

If you press the START button when the screen menu selection is on depth auto adjust, you will then go into a special operating mode. The machine takes as a reference each surface where the cut is located and carries out cutting on that reference. This means that it does not matter if the key is not properly in position or properly supported in the clamp, as it is adjusted from its top surface.

N.B.: Auto adjust is only valid for cutting blank keys that have no cuts. If you machine a key that already has a cut, the reference in auto-adjust will not be valid as it is smaller than the surface area of the key. To go over keys that have already been cut use NORMAL mode.

3.4.3 Cutting a key

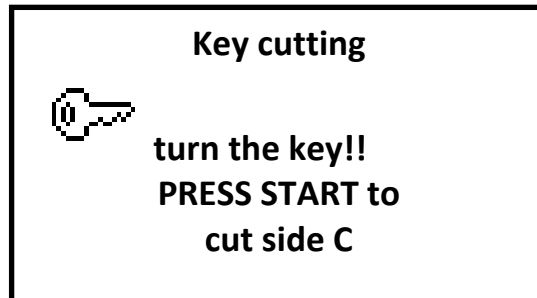
When the machine starts cutting it normally displays the following screen:



The screen indicates the cutter being used, as well as what process you are in. In this case you are machining axis 1 of key A. The machine allows you to stop the process either by opening the guard or pressing the STOP button.

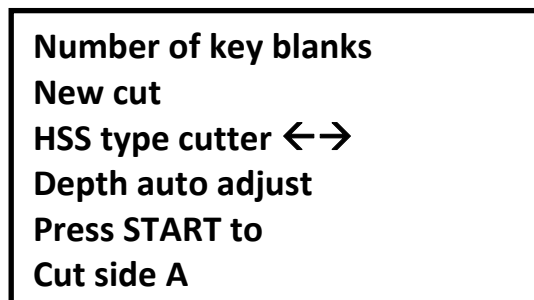
It gives you information about the key you are cutting and if you have established a quantity of more than 1, it also tells you how many keys are left to do.

Once the cutting of the face, axis 1 and axis 2 has been completed, you will go to the next menu.



Open the guard, turn the key and close the guard. Press START to continue. In this case the machine is indicating that you are cutting side C.

Once the cutting operation has been completed, the machine returns to the cutting menu, where you can repeat the operation or define another key in new cut but with the same file.

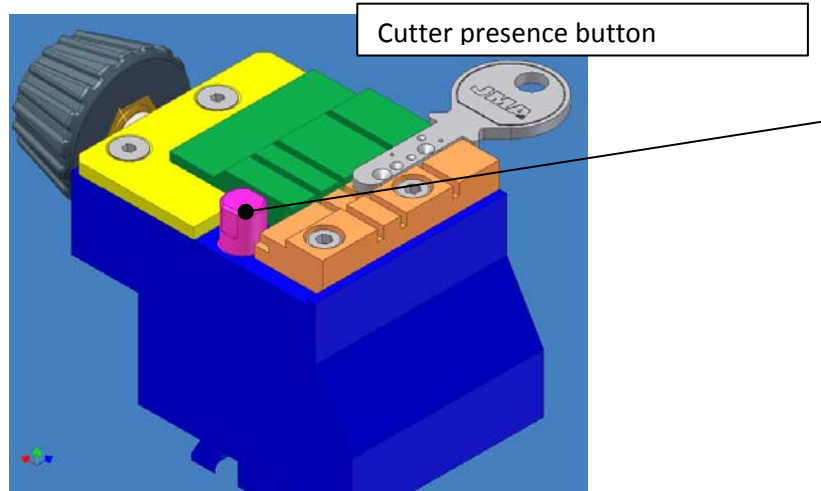


If you want to do another key with another file, press ESCAPE to go back to the initial menu.

3.4.4 Frequent problems with cutting

Maybe when you start cutting you have to use another clamp. The machine will indicate that you have to change the clamp. When you change the clamp you have to adjust it and also adjust the tracer device to the new clamp (see chapter dealing with changing and adjusting the clamp).

When starting to cut the machine carries out a test to check if there is a cutter. This is what the cutter presence button is for (see diagram below)

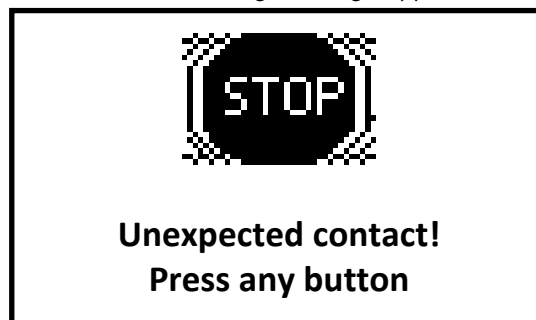


If there is no cutter present when you come to start cutting the following menu will appear after the cutter test has been carried out.



N.B.: It is important to use original JMA cutters and tracers, as the machine has the relevant dimensions for each tool.

It might be that you have not fitted the cutter right up against the shaft, so that it sticks out more than is allowed. In this case the following message appears:

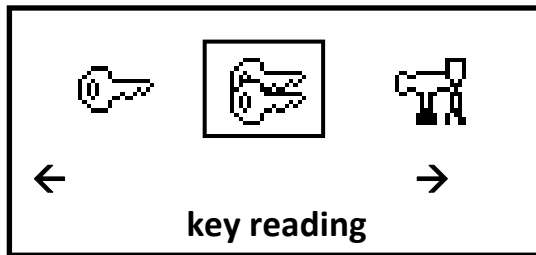


*The solution is to secure the cutter as described in chapter 2.10
In both cases the cutting operation is cancelled.*

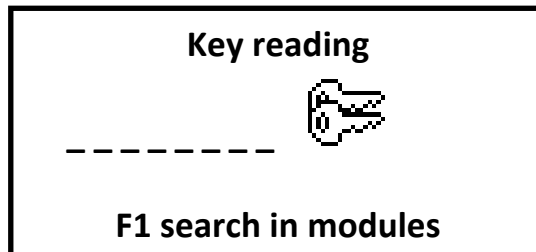
3.5 READING THE KEYS

Go to the main menu and on the key reading option press ENTER

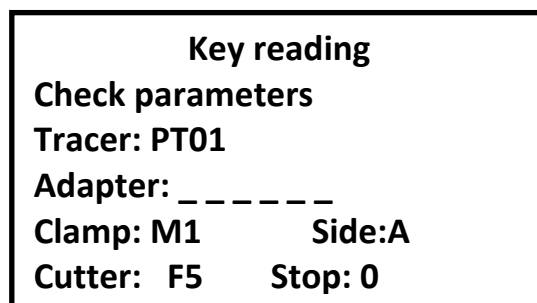




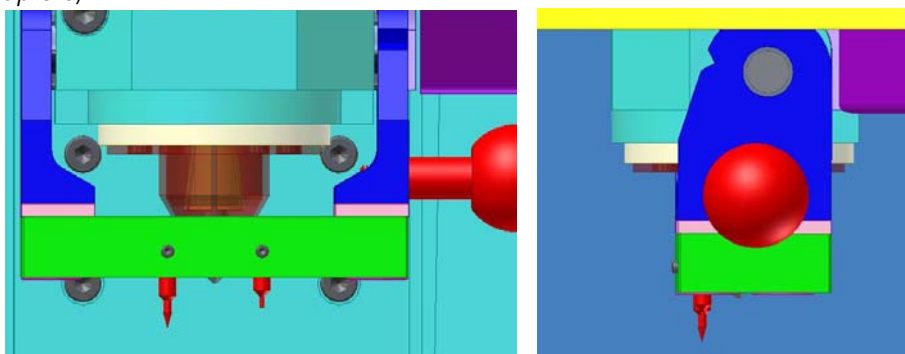
Once you select this option you will be asked for the file for the key to be read.



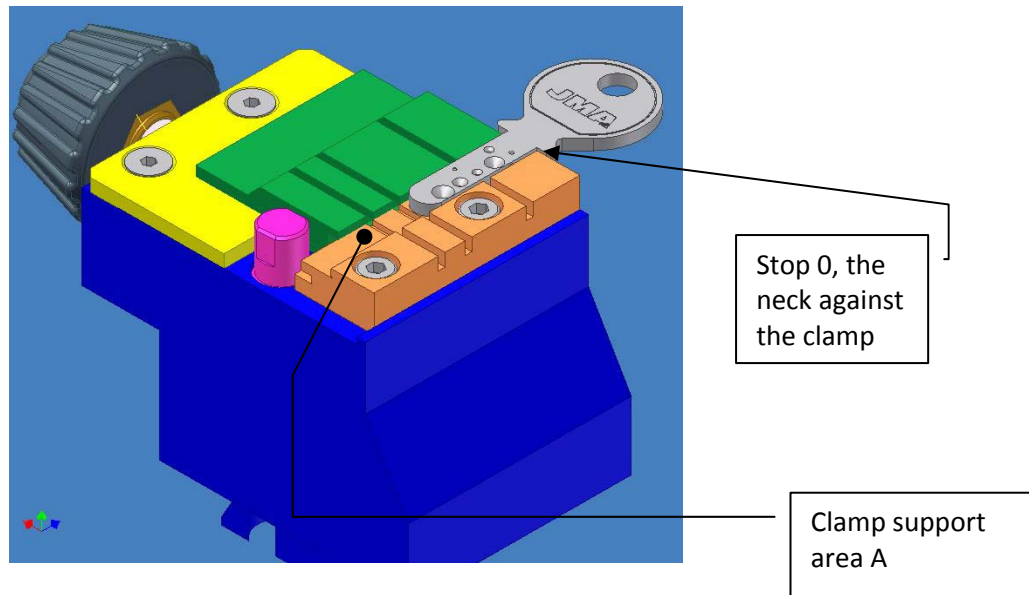
The following screen provides the information to be able to cut the key, or the information to read it, which tracer and adapter are used for reading (PT01 and PT02 are fitted in the tracer device).



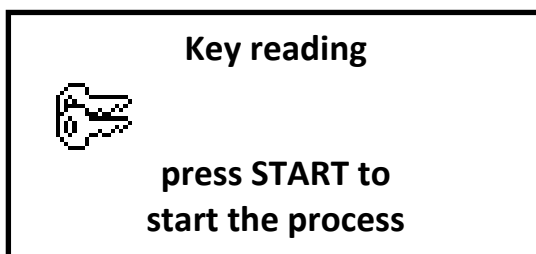
Download the tracer system and press ENTER to continue the reading. As indicated in the menu above, the key to be read is positioned in clamp position A and stop 0 (as explained in earlier chapters).



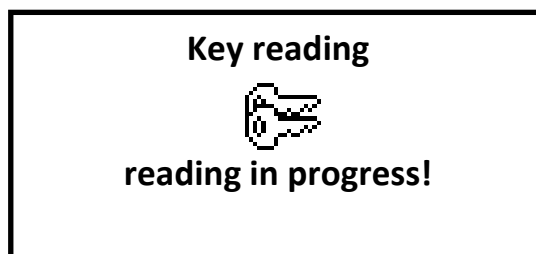
Reading position



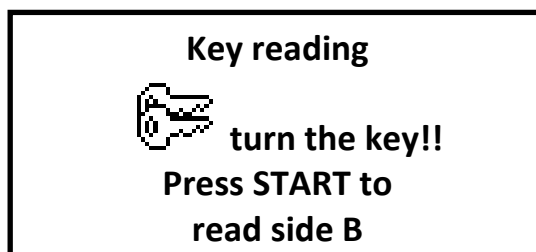
You are now ready to do the reading. Press **START** as indicated on the screen.



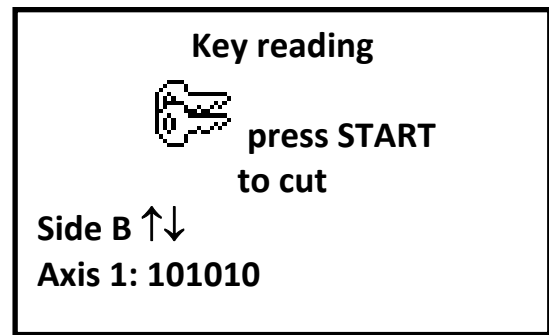
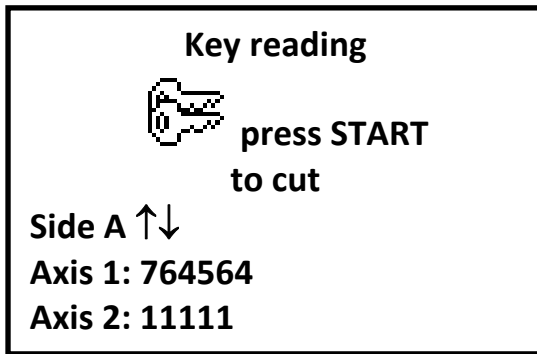
Once you have pressed **START** the machine will carry out the reading process.



Once the reading process has started it can be stopped by pressing the **STOP** button. When the reading process has been completed on side A the machine will ask you to put the key in another position, if necessary.



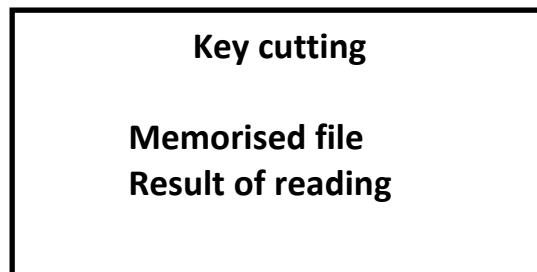
Once the reading of the keys has been carried out, the machine will display the reading result.



Press the down button  to see the different cuts for the different sides of the key.

N.B.: The reading is done by electrical contact so the key has to be made of metal. BE CAREFUL with any swarf on the key as it could distort the reading.

Once the reading data has been confirmed press **START** or **ENTER**. In the following screen you will be asked what you want to cut. There are two possibilities, depending on what you select.

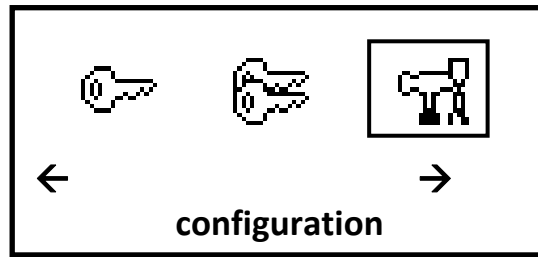


- *Memorised file: The key is cut with the manufacturer's original data.*
- *Result of reading: The key is cut with the depths read in the reading (with any wear that the key may have).*

Once the selection has been made, you go straight to the main cutting menu. This menu's possibilities are described in the previous chapter.

3.6 SPECIAL CONFIGURATION OPTIONS

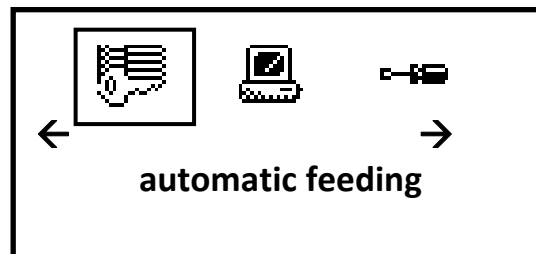
Once the machine's basic options have been explained, let us take a look at the special configuration options that it has. In the machine's main menu access the third option and press **ENTER**.



The following screen offers the following options in the basic menu.

3.6.1 Automatic feeding

Option available if the machine is fitted with a feeder. To configure the feeder (NOT AVAILABLE YET)

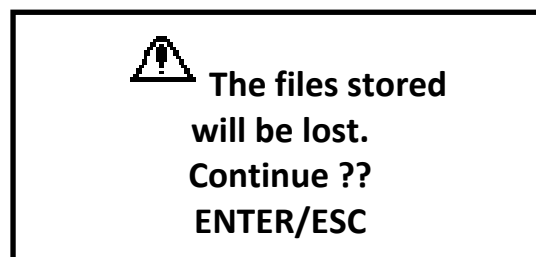


3.6.2 File reception

To select this option you have to go to the configuration section and choose the second option as shown in the diagram. This option enables you to upgrade the machine with new files, clamps and cutters. In order to be able to use this option you have to have the IKS software (Interactive Key Software V4) enabled for the Xcode machine. Once the machine has been upgraded the machine indicates the software version installed when the system is switched on.

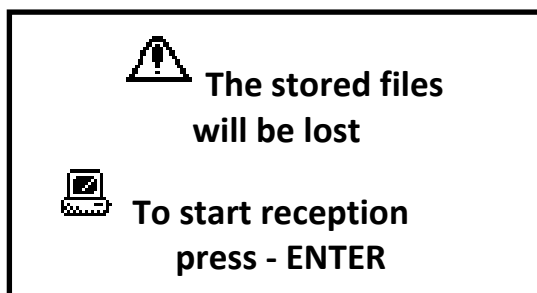


Once you have selected this option, the system warns you that you are going to delete the machine's file database. The assumption is that you have chosen this option to upgrade the machine.

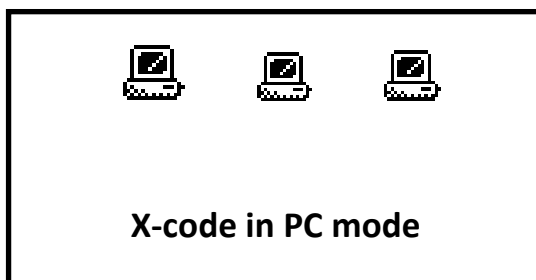


If you press **ENTER** the process continues and if you press **ESC** you return to previous menu, cancelling the process.

When you press **ENTER** you go to the next screen, which asks you to confirm the process again.



You can go back by pressing **ESCAPE**, but if you press **ENTER** the process will continue. On the following screen the machine informs you that it is carrying out the deletion. You have to wait for this screen to disappear and a flashing screen to appear. The information is now being sent by computer. (Consult the Interactive Key Software manual).

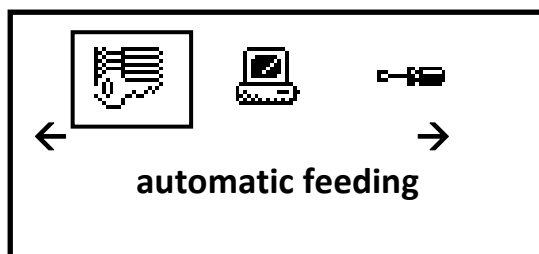




Screen in which the machine is ready for reception.

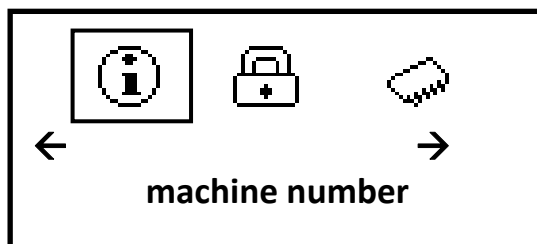
Once the complete database has been loaded, the machine returns to the main menu.

3.6.3 Machine number

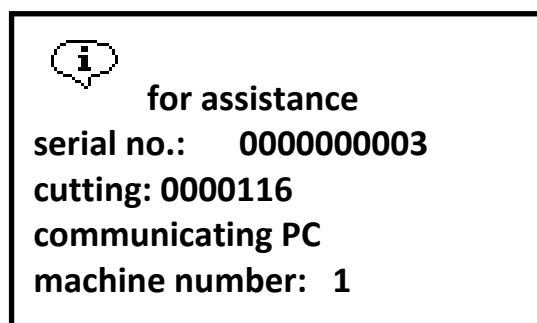
This menu is like the second screen of the configuration menu. You can access the configuration menu as follows.



Press the right or left button   3 times to go to the following menu.



When the cursor is on machine number, press ENTER.

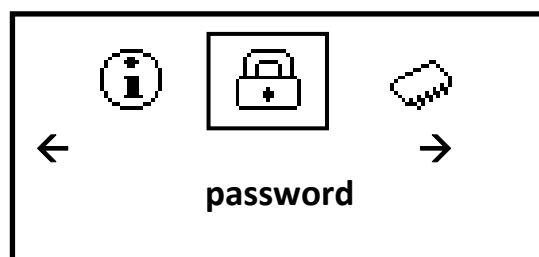


Here you can see the machine's serial number. This also appears when the machine is switched on. A counter also informs you the total number of keys cut on the machine.

Finally a cursor appears on the machine number. Normally a 1 is entered here. But if more than one machine is connected to the same serial line, they can be differentiated by the number (advance options, it is best to get in touch with our technical service).

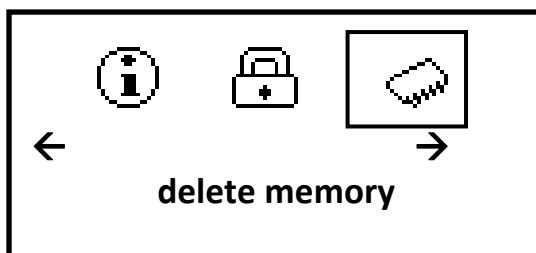
3.6.4 Password area

This is an area accessible to qualified people, where the machine calibration parameters are stored. Access is only permitted if you are in contact with our technical service.



3.6.5 Memory deletion options

There are options to delete the different memories or parts of memories that the machine has.

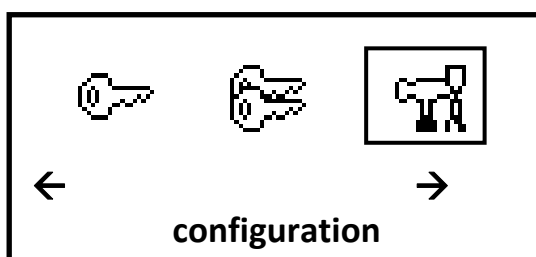


WARNING! – DO NOT SELECT THIS OPTION IF YOU ARE NOT IN CONTACT WITH OUR TECHNICAL SERVICE.

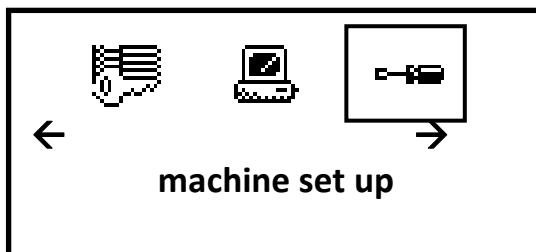
3.7 SETTING UP THE MACHINE

We have prepared this special section because it is more likely that you will enter this option. This is because it is here that you set up the clamp and reading device.

To access the setup menu proceed as follows. In the machine's main menu access the third option and press ENTER.



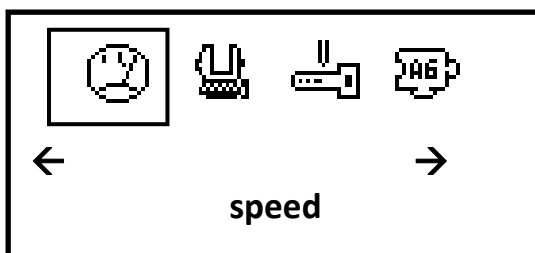
Do the same on the following screen by moving the cursor to the third box on the right to access machine set up. Press ENTER to select this option.



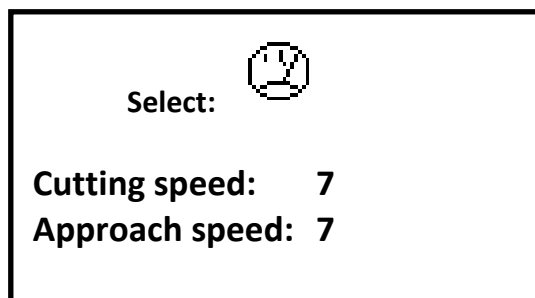
Now that you are in the setup menu let us take a look at the different options available:

3.7.1 Adjusting the speed

This is the first option that appears when you enter the setup menu. If you press ENTER with the cursor indicating speed you will select this option.



With this option you can adjust the machine's approach or no load speed; all the movements that do not involve cutting. Although the machine is set by default to 5 the figure can be raised to 8 or 9.



Cutting speed: Speed used when the cutter is cutting the key. It can be set to speed 7 with any material without any problem. But maybe due to wear in the cutter or the hardness of the key it could happen that the deep holes are not cut properly. If this is detected the machine can be made to cut more slowly by reducing the cutting speed setting.

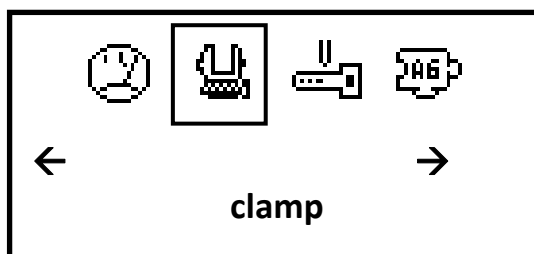
3.7.2 Adjusting the clamp

Whenever a clamp is changed or a clamp is removed from the machine for any maintenance work and then put back, it is necessary to adjust the clamp as the previous clamp position settings may no longer be correct.

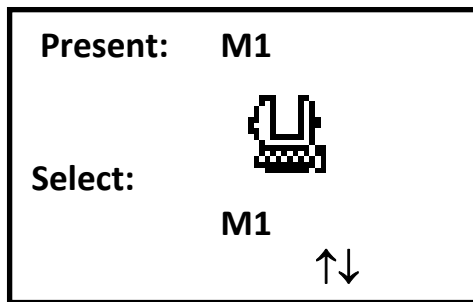
To adjust the clamp it is very important for the clamp to be completely clean so that the swarf does not interfere with the adjustment. You also have to remove any keys or objects from the top of the clamp. In principle, it does not matter if the clamp is open or closed.

WARNING! Every time the clamp is adjusted, the tracer device has to be adjusted as well.

To select this option press ENTER with the cursor on clamp.



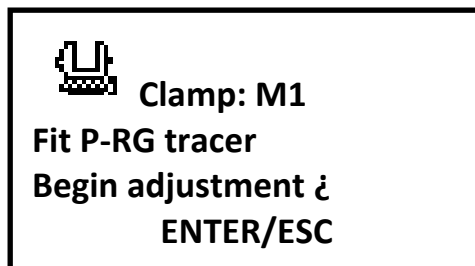
Once you have selected the option, select the clamp that you have fitted. The system informs you which clamp is fitted and with the up and down arrows you can select the clamp you want to fit. It might be the same one that you want to readjust.



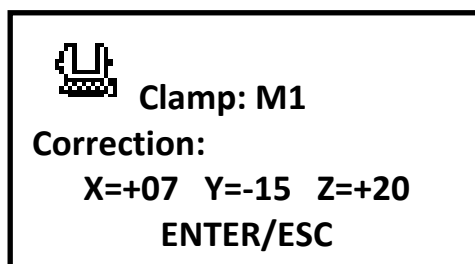
Once you have selected the clamp, go to the next screen where you will be told about installing the P-RG tracer to make the adjustment. See chapter 2.10 dealing with changing the cutter or tracer to fit the P-RG tracer properly. The picture below shows the P-RG tracer supplied as an accessory.



Once the tracer has been fitted, the cutter shaft released and you are sure that the clamp is clean and properly fitted, continue with the adjustment process by pressing ENTER in this last menu.



Remember that for the machine to carry out any movement the guard has to be closed. Once the adjustment starts you will see the machine carrying out the adjustment on the three axes Z, X, Y. Once the cycle has been completed, the machine will give the adjustment figures for each axis. These figures have to be lower than +/-99 (hundredths of mm). Otherwise it means that the clamp has an error greater than 1 mm and that you have to call our technical service. It is very important to remember to press the ENTER button to save the corrected figures.

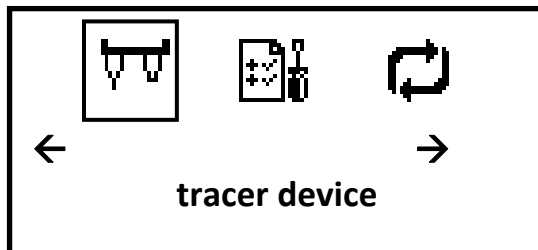


Once you have saved the data, you have to adjust the tracer device.

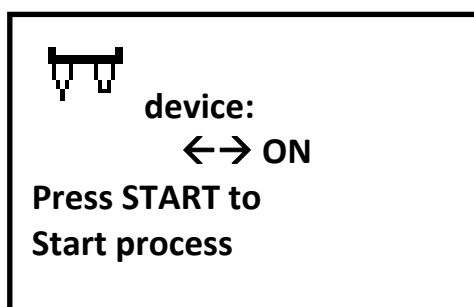
IMPORTANT – Every time the clamp is adjusted, the tracer device has to be adjusted as well.

3.7.3 Adjusting the tracer device

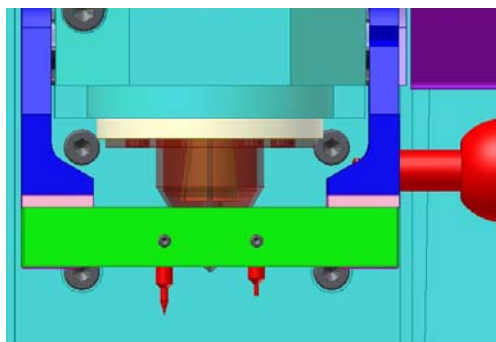
To adjust the tracer device you have to go to the next menu, which is on the same level as the clamp adjustment menu. Press the right or left button until the following symbol appears.



Once you have located the tracer device symbol, press ENTER and the following message will appear.



You can use the right and left arrows to cancel the device, but keep it set to ON in principle to be able to read the keys. When you are at this point you should lower the tracer device and make sure that the cutter shaft is not locked so that it does not interfere with the electrical contact. Once you have checked that, you can start to adjust the tracers by pressing START.

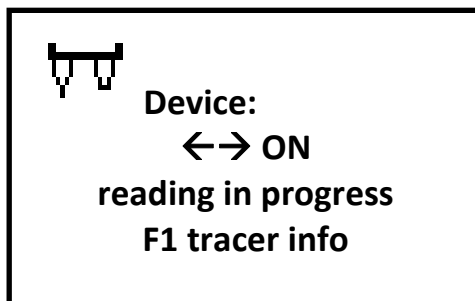


Tracer device down

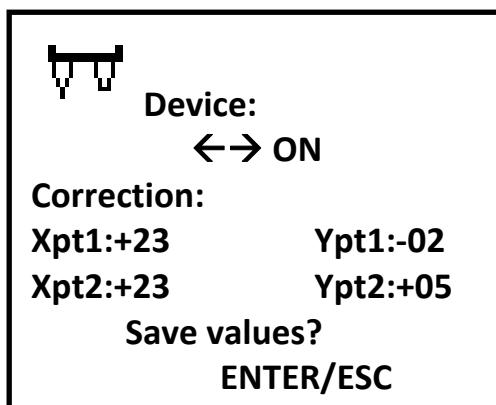
IMPORTANT NOTE: The tracer can be adjusted with the cutter in place, but not with the P-RG adjustment tracer in place, as its length interferes with

Press F1 to access the tracer menu where you will see the characteristics for the PT01, PT02 tracers and all those in the database.

Once you have pressed START the machine begins the adjustment process.



The clamp must be free from any swarf for it to be adjusted correctly. During the process you will see that the machine adjusts the two tracers to the new clamp position. When the adjustment has been completed you go to the next screen.

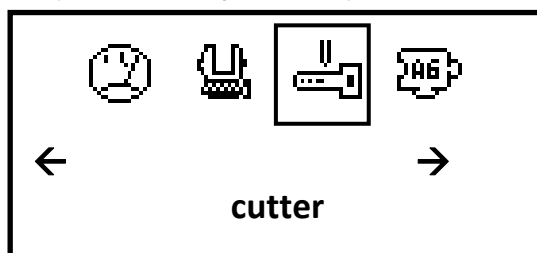


When you press ENTER the figures are recorded and the adjustment is done. If you press ESCAPE in the previous screen, the machine will understand that the adjustment is not valid and will not save the adjustment figures in its memory.

3.7.4 Cutter menu


In the cutter menu you can find the characteristics for each cutter memorised in the machine. This allows you to select the right cutter for the key to be edited in the editor or look for characteristics of the dimple in the key.

This menu is the third option in the adjustment options.



Press **ENTER** to select the option. This screen shows the cutter's characteristics. Use the left and right buttons to move through the characteristics of the different cutters. The following screens show the characteristics for a dimple cutter and a laser cutter.


Dimple cutter



F1 ← →

Length: 4500
Angle: 090
Edges: 2
Upper Ø: 0600
Lower Ø: 0080

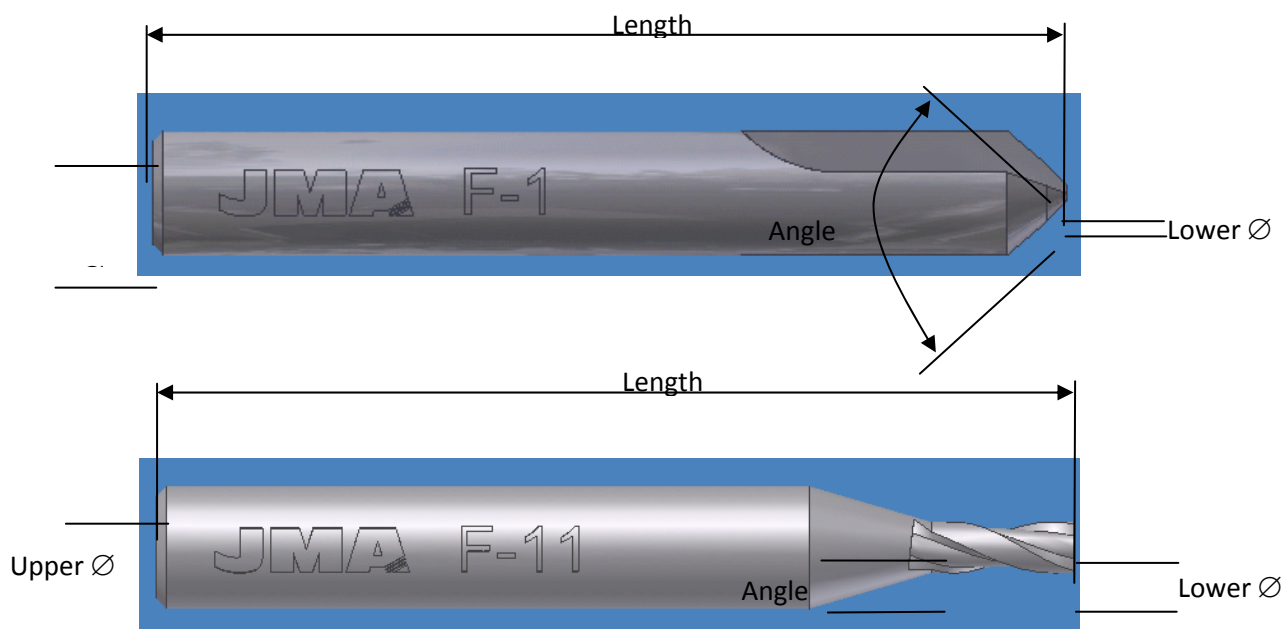
Laser cutter



F11 ← →

Length: 4500
Angle: 000
Edges: 2
Upper Ø: 0600
Lower Ø: 0245

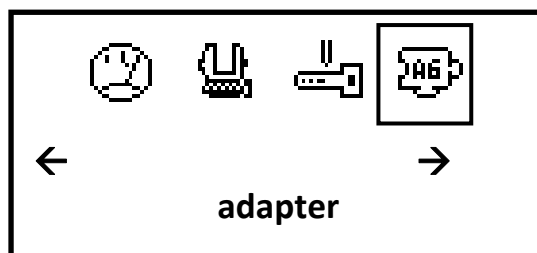
This information means the following in terms of the cutter



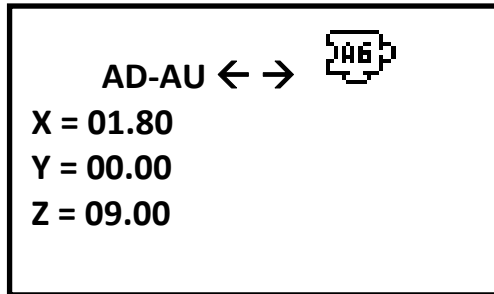
The data that appears on the screens is for information purposes only. It cannot be changed.

3.7.5 Adapter menu

It is also possible to see the adapters that the machine has, together with their characteristics. To access this menu, go to the setup menu and choose the last option on the basic screen.

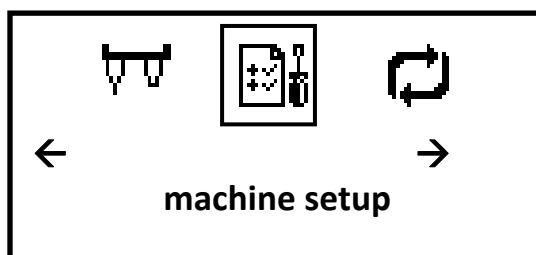


When you select the different adapters with the right and left button, the information given by the screen is the height offset used by the machine.

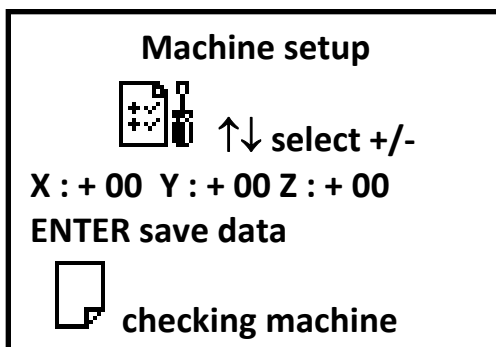


The Xcode machine enables corrections to be made in the machine's three axes. Bear in mind that these corrections are going to be transferred to all the keys, as they are general corrections that are applied to the axes. Remember that each unit in the correction is equivalent to 0.01mm .

To select this option, go to the adjustment area and press the right or left arrow to go to the rear or secondary menu where it says machine setup and press ENTER:

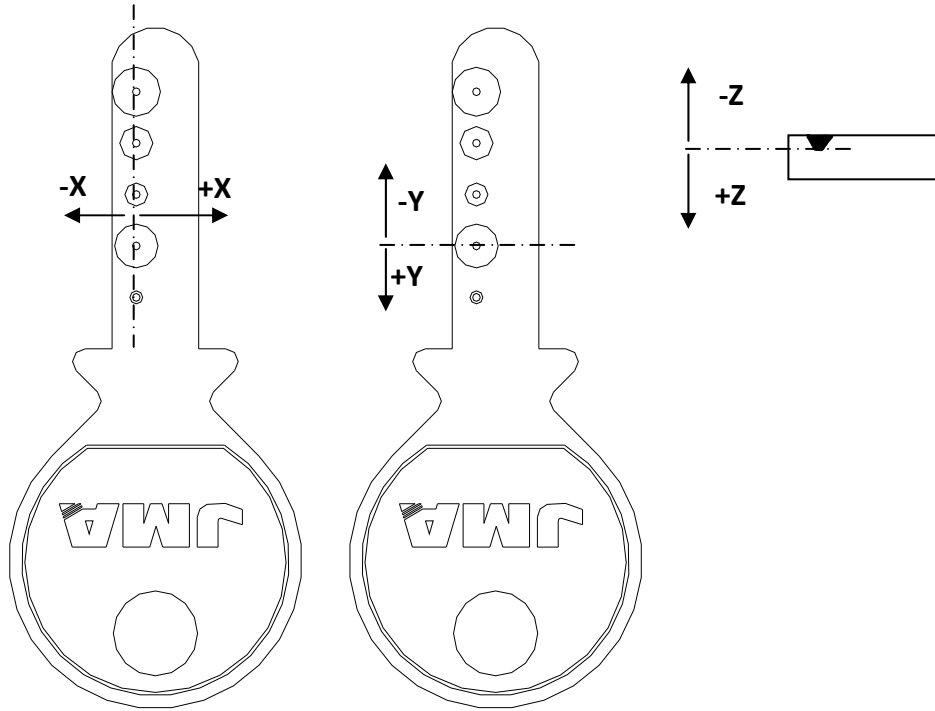


Once you have selected the menu you will see the following screen.




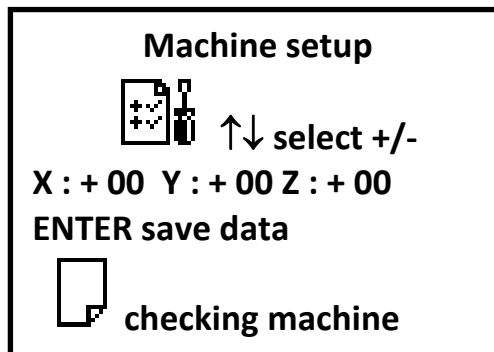
You can change the figures in the following way. Use the up ↑ or down ↓ arrows to change a positive figure to a negative one. Then press the button on the right to go to the two-digit box and enter the units to be modified 05 (equivalent to 0.05mm), press ENTER to confirm the figure and you will automatically jump to the next box. Once you have entered the figures for the three axes, you will automatically quit this menu.

The figures have the following effect on the cutting of the key.

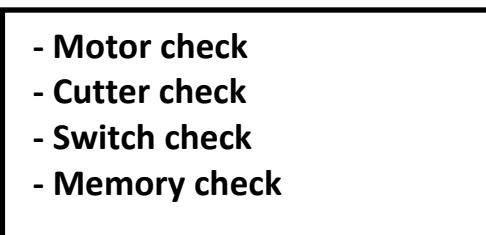


3.7.7 Checking the machine

In the previous machine setup menu you have an option to see the correct operation of the different elements of the machine. You can enter this option by pressing the page down button .



Once you have pressed this button you go to the possible check options.



Let us take a look at the options available by selecting the different options

A) Motor check.

Motor check

1-6 motor x
2-7 motor Y
3-8 motor Z
4 photoswitches XY
5 photoswitches Z

Press the different buttons to operate the motors and check that they are working properly. To do this, the cutter shaft must not be blocked, nor the cover open, as no movement can be carried out with the cover open.

- 1.- X axis to the left
- 6.- X axis to the right
- 2.- Y axis goes away
- 7.- Y axis approaches person
- 3.- Z axis goes down
- 8.- Z axis goes up
- 4.- X and Y axes return to start position (limit switch).
- 5.- Z axis returns to start position (limit switch)

Press the ESCAPE button to quit this menu

B) Cutter check

Cutter check

1. slow speed
2. quick speed
3. stop motor

You can check that the cutter is rotating in the right direction. Press button 1 to obtain a speed of 3500 RPM and press button 2 to obtain 7000 RPM. Button 3 stops the cutter from rotating. To do this, the cutter shaft must not be blocked, nor the cover open, as no movement can be carried out with the cover open.

C) Switch check

Switch check

Cover state:
Open/closed

Tracer device
Lowered/raised

This screen shows you the status of the different switches. The action of opening the cover or raising or lowering the tracer device is reflected on this screen.

D) Memory check

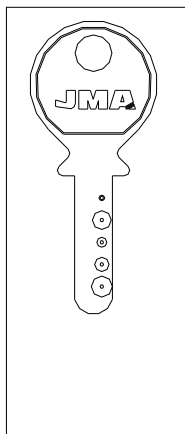
When you select this option, the machine carries out a check of the entire internal memory, to check that it is working properly. If all the results are OK, it will be normal control status. An error in any memory could cause the machine to malfunction. In this case, it is recommended that you call our technical service.

Memo. chip 1	OK
Memo. chip 2	OK
Memo. chip 3	OK
Memo. chip 4	OK
Memo. chip 5	OK
Memo. chip 6	OK
Memo. chip 7	OK
Memo. chip 8	OK

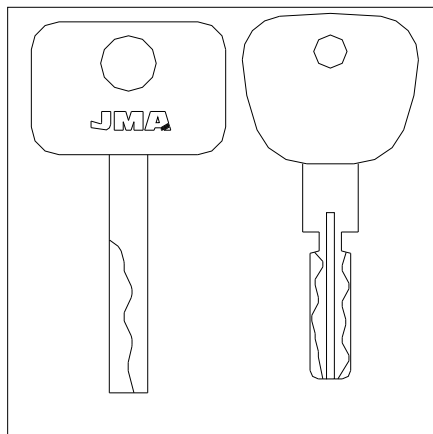
4 FILE EDITING

The aim of this chapter is to explain how to create a key. The keys have been divided into 3 families, so each family will be explained separately, as they have special ways of being defined. It is not possible to define special keys, only those that have some preset parameters like those defined now. The three families are:

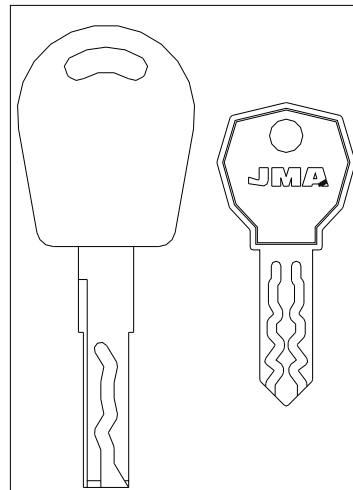
- Dimple keys
- Laser keys
- Groove keys





Dimple




Laser



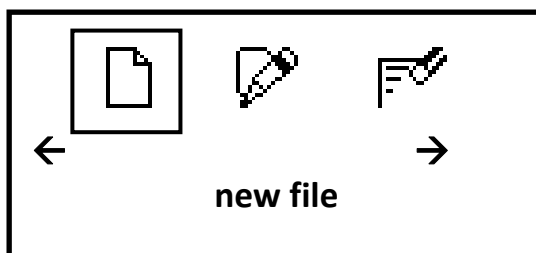
Groove

To edit a key file follow the steps below. Go to the main menu and press the cursor to the right  3 times of the cursor to the left  3 times to get to the menu following the main one.



Once you are on the key editing icon press the ENTER button . This will take you to a submenu where you can choose the different file editor options.

Select the first option which is new file, as shown below.



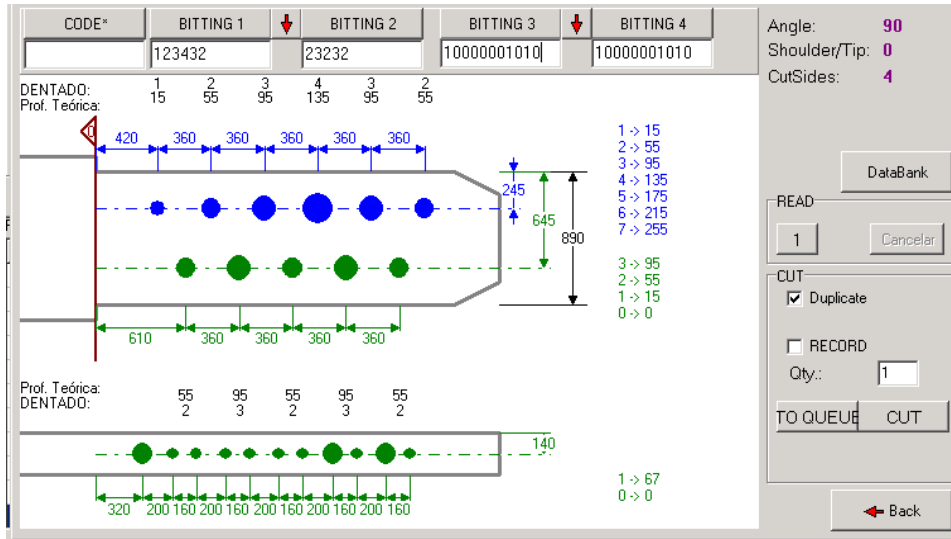
Let us take a look at how the file is created for each type of key.

4.1.1 Creating a dimple key

First of all let us take a look at a dimple key. Here is an example from the IKS program.

You can see that the key is made up of two rows or dimples on side A ("axis 1" blue and "axis 2" green) and a row of dimples on side C ("axis 1" green). On dimple keys each row is called an axis.

So a key consists of different axes and sides, and each axis is equivalent to a file. You have a main file which calls up the other files. Let us have a look at how this key is created.



When selecting a new file once you have pressed ENTER you go on to the next screen.

File edit

Name: A _____

Key type(← →)
dimples

In this screen you give the key a name of up to 8 characters. Let us call it A (remember not to use 3 numbers + a P), so as not to coincide with the internal files. Press the down arrow or ENTER. Once the cursor is at the bottom press the right or left arrow until the dimple type of key appears on the screen. Press ENTER to go on to the next screen:

File edit

Side: A

Stop: 0

Cutter: F5

Clamp: M1

Tracer: PT01

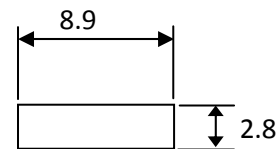
Use the up and down arrows to go to the different parameters. The data to be entered in this case is as follows:

- Side: A (Part of the clamp supporting the key, possibilities: A and S "see chapter 2.8)
- Stop: 0 (Neck stop in clamp stop 0, possibilities 0, 1, 2 and 3 see chapter 2.8)
- Cutter: F5 (With the left and right arrows you can use the different cutters from the JMA range included with the machine). It depends on the shape of the dimple.
- Clamp: M1 (use the right and left arrows to select the different clamps available).
- Tracer: PT01 (Universal tracer for dimple keys, located in the tracer device).
- Adapter: Use the right and left arrows to select the adapter to be used. If it is not necessary like in this case just leave it blank.

When you have selected these parameters press ENTER to go on to the next screen. On the following screen you can establish the key's mechanical parameters.

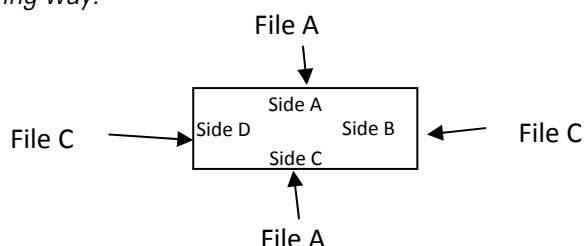
File edit	
Key width:	0 8 9 0
Key height:	0 2 8 0
Coord. Ref. X:	0 0 0 0
Coord. Ref. Y:	0 0 0 0
Coord. Ref. Z:	0 0 0 0

- Key width: 0880 (Equivalent to 8.8 millimetres)
- Key height: 0280 (Equivalent to 2.8 millimetres)
- Coord. Ref. X: 0000 (X axis offset)
- Coord. Ref. Y: 0000 (Y axis offset)
- Coord. Ref. Z: 0000 (Z axis offset)
- Cutting sides: 4 Establishes how many sides of the key are cut (side A+B+C+D = 4 sides of the key.)



File edit	
File C: A	_____
Symmetry with A:	← → OK
File B: C	_____
File D: C	_____
Symmetry with B:	← → OK

On this screen you establish the main files for each side of the key. So then each main file establishes how many axes there are on each side. You also establish the file that goes on each side and then you establish the symmetry of each side with its opposite side. So the key will be defined in the following way:



When establishing the symmetry of one side with its opposite side: A is symmetrical to C, and side B is symmetrical to D. The machine understands that what is symmetrical is the cut, so once the cut has been entered for one side you will not be asked for the cut on the opposite side (when you are going to cut or read one side). In this case it will ask you for the cut for side A and will also use it for side C. It will also ask you for the cut for side B and use it for side D.

When these parameters have been established press ENTER to go on to the next screen. On this screen you establish the depths of the dimples. These measurements come from the surface of the key inwards. In the case given as an example, the depths of axis 1 of side A are as follows:

1= 0.15mm 2=0.55 3=0.95 4=1.35 5=1.75 6=2.15 7=2.55

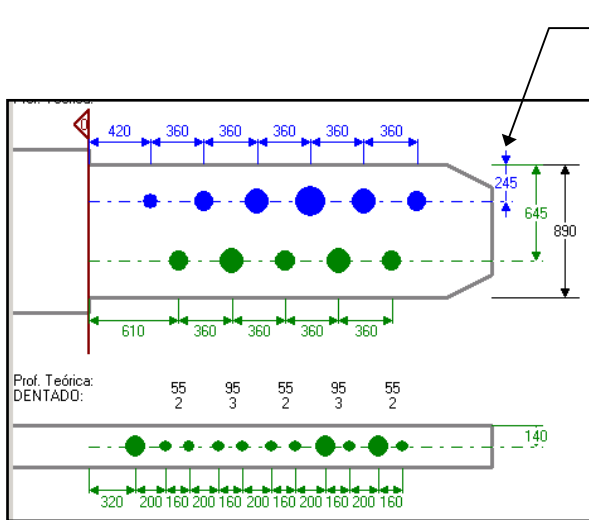
This data is entered in the following way. Enter the figures and press ENTER to validate them. When you have finished press ENTER on an empty space so that the machine knows that you are not going to enter any more figures:

1 -> 15
2 -> 55
3 -> 95
4 -> 135
5 -> 175
6 -> 215
7 -> 255
3 -> 95
2 -> 55
1 -> 15
0 -> 0

File edit											
Sb-Pr:	1	0	1	5	2	0	5	5			
3	0	9	5	4	1	3	5	5	1	7	5
6	2	1	5	7	2	5	5	●	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-

Press ENTER on an empty field to complete the cycle.

When you have established the symbols and their respective depths go on to the next screen. On this screen you establish the number of axes on side A (there are two as can be seen in the diagram). Then you establish the axis 1 distance and the name of the file for axis 2 (file B in the example).



Axis distance

File edit
Number of axes: 2
Axis 1 distance: 2 4 5
File names
Axis 2: B _____
Axis 3: _____

Let us go on to the next screen where the following data is established:
 As can be seen in the diagram above, the number of bits (or axis 1 cuts) are 6.

- Type of cut: - **NORMAL**: The machine carries out a vertical movement when making the dimple. The dimple is the shape of the cutter (the cut angle field is not used).
 - **IDEAL**: From one cut to another the machine follows a linear path.
 - **PLANE**: From one cut to another, the machine goes straight and then does the angle established in the angle field.

File edit
Number of bits: 0 6
Cut angle: 0 0 0
Type of cut: NORMAL

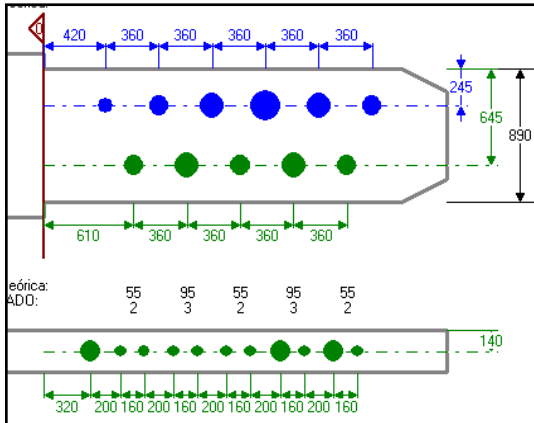
The key is a normal dimple key so the type of cut is **NORMAL**.
 The following definition screen is for the bases of the dimples. This base is normally 0 for dimple keys, but if you want the effect of a displaced dimple, set the displacement figure to the sides in relation to the centre of the dimple.

File edit
BASES: 0 0 0 0 | 0 0 0 | 0 0 0
0 0 0	0 0 0	0 0 0	---	---
 --- | --- | --- | --- | ---

The file you are editing has 6 cuts with the cutter base so the figures to be entered are 000 in all cases. As you established that the key has 6 cuts in the last screen, once you have entered the 6 figures you go on to the next screen. In this screen you enter the distances there are

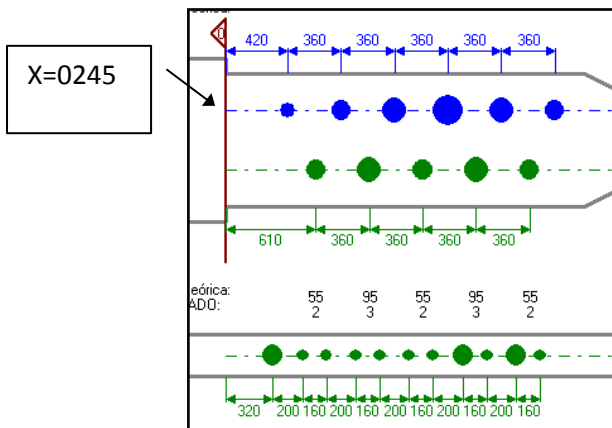
from the key's stop 0 to the first cut on axis 1. The remaining distances are those between one dimple and the next and so on consecutively:

Distance 420 and 360 are the following, in the 6 dimples.



File edit				
Dist. :	0 4 2 0	3 6 0	3 6 0	
	3 6 0	3 6 0	---	---
	---	---	---	---
	---	---	---	---

In this last screen you establish the calibration point for the cutter on the key. This point is very important as before cutting the machine touches the key to calibrate the depth. Normally this point is established on key's same axis 1 and the Y axis distance is 0, which is on the shoulder of the key, as there is never a cut in this position. Another point could be established.



File edit	
Coordinate for key auto adjust	
X: 0 2 4 5 Y: 0 0 0 0	

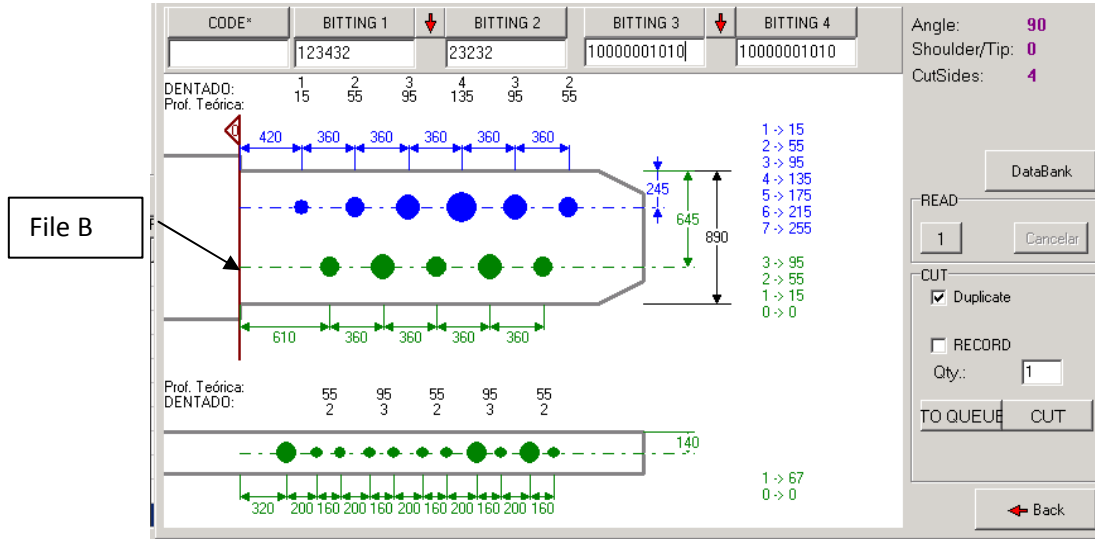
The last thing is the save operation which confirms if you want to save and then tells you in which memory block it has been saved. When cutting you can access the same block to carry out a search.

File edit
File A
Save data ??
ENTER / ESCAPE

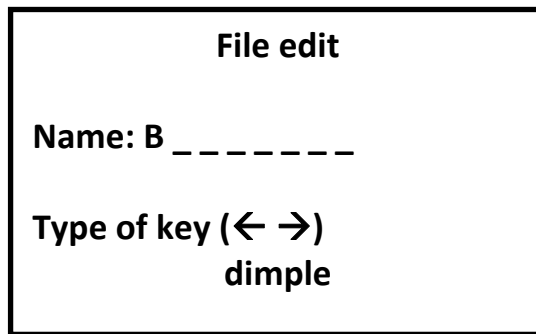
Press
ENTER

Work with module 1
Work with module 2
Work with module 3

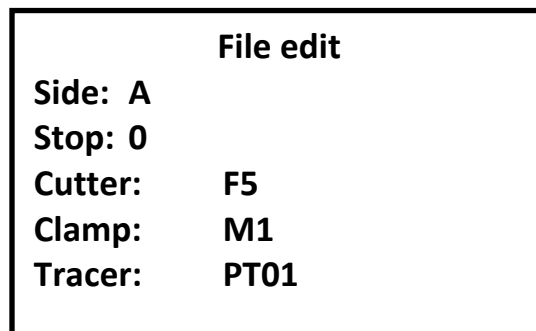
With this operation you have created file A which is equivalent to the file for the main axis 1 on side A. Axis 2 still has to be defined, which shall be called file B and also the file for side B which shall be called file C. So let us proceed.



When you are in the edit menu go to the screen for creating a new file.



You give a name of up to 8 characters to the key in this screen. Let us call it B and press the down arrow or ENTER. Once the cursor is at the bottom press the right or left arrow until the dimple type of key appears on the screen. Press ENTER and go on to the next screen:



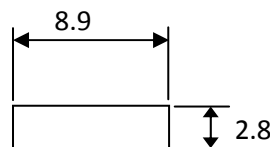
To go to the different parameters you can use the up and down arrows. The data to be entered in this case is as follows:

- Side: A (Part of the clamp that supports the key, possibilities: A and S "see chapter 2.8)
- Stop: 0 (Neck stop in clamp stop 0, possibilities 0, 1, 2 and 3 see chapter 2.8)
- Cutter: F5 (With the left and right arrows you can use the different cutters from the JMA range included with the machine). It depends on the shape of the dimple.
- Clamp: M1 (use the right and left arrows to select the different clamps available).
- Tracer: PT01 (Universal tracer for dimple keys, located in the tracer device).
- Adapter: Use the right and left arrows to select the adapter to be used. If it is not necessary like in this case just leave it blank.

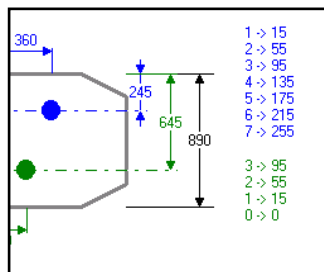
When you have selected these parameters press ENTER to go on to the next screen. On the following screen you can establish the key's mechanical parameters.

File edit	
Key width:	0 8 9 0
Key height:	0 2 8 0
Coord. Ref. X:	0 0 0 0
Coord. Ref. Y:	0 0 0 0
Coord. Ref. Z:	0 0 0 0
Cutting sides:	1

- Key width: 0880 (Equivalent to 8.8 millimetres)
- Key height: 0280 (Equivalent to 2.8 millimetres)
- Coord. Ref. X: 0000 (X axis offset)
- Coord. Ref. Y: 0000 (Y axis offset)
- Coord. Ref. Z: 0000 (Z axis offset)
- Cutting sides: 1 This establishes how many sides of the key are cut (As this is a secondary axis, this parameter is not important. File B is called up by file A)



When these parameters have been established press ENTER to go on to the next screen. On this screen you establish the depths of the dimples (on secondary axis B). These measurements come from the surface of the key inwards. In the case given as an example, the depths of axis 2 of side A are as follows:
0= 0 mm 1=0,15 2=0,55 3=0,95

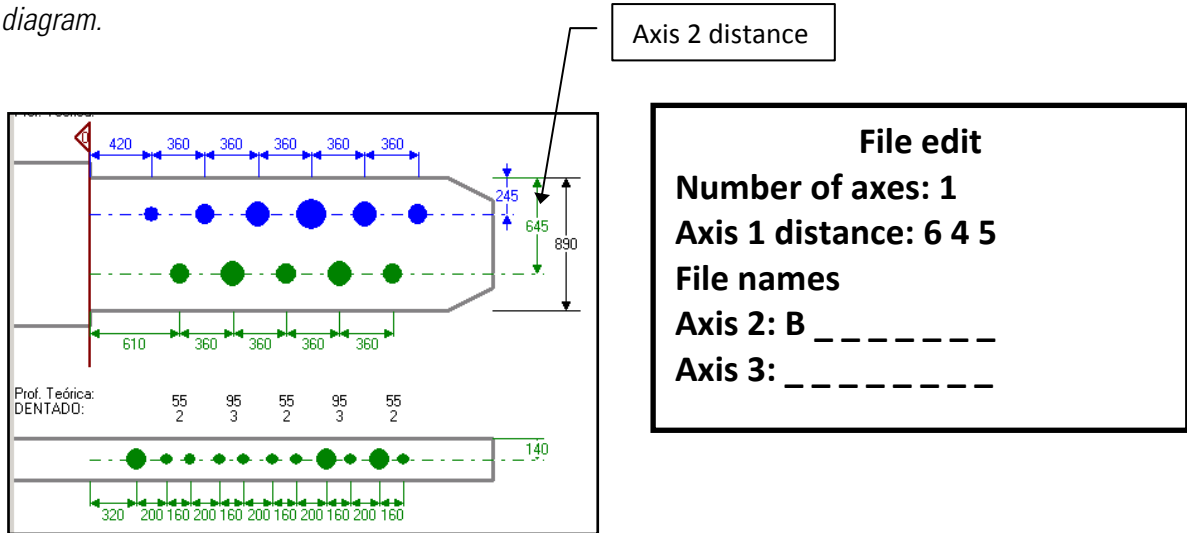


File edit	
Sb-Pr:	0 0 0 0 2 0 5 5
3 0 9 5	-----
-----	-----
-----	-----
-----	-----

Press ENTER with the field empty to complete the cycle.

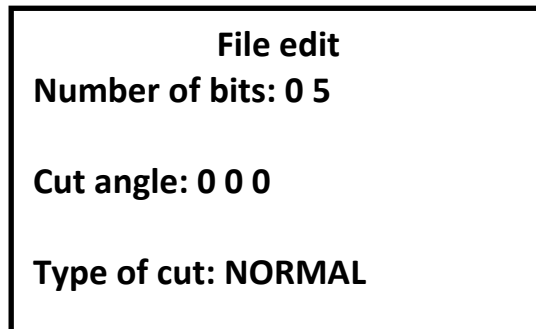
This data is entered in the following way. Enter the figures and press ENTER to validate them. When you have finished press ENTER on an empty space so that the machine knows that you are not going to enter any more figures:

When you have established the symbols and their respective depths go on to the next screen. On this screen you establish the number of axes on the secondary axis of side A (for secondary axes enter 1). The distance from the fixed jaw is 6.45 mm as can be seen in the diagram.



Let us go on to the next screen where the following data is established: As can be seen in the diagram above, the number of bits (or axis 2 cuts) are 5.

- Type of cut: - **NORMAL**: The machine carries out a vertical movement when making the dimple. The dimple is the shape of the cutter (the cut angle field is not used).
 - **IDEAL**: From one cut to another the machine follows a linear path.
 - **PLANE**: From one cut to another, the machine goes straight and then does the angle established in the angle field.



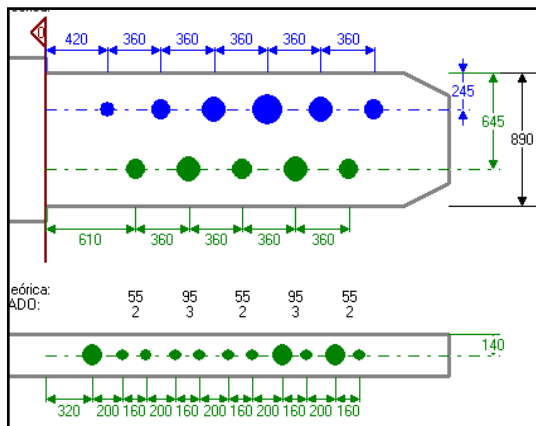
The key is a normal dimple key so the type of cut is **NORMAL**.

The following definition screen is for the bases of the dimples. This base is normally 0 for dimple keys, but if you want the effect of a displaced dimple, set the displacement figure to the sides in relation to the centre of the dimple.

File edit				
BASES:	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0
0 0 0 0	0 0 0 0	---	---	---
---	---	---	---	---
---	---	---	---	---

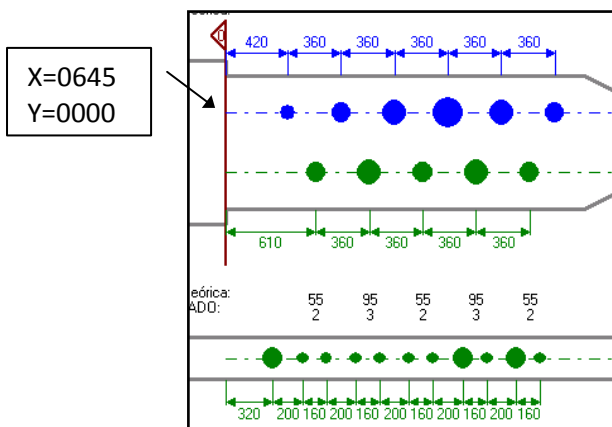
The file you are editing has 5 cuts with the cutter base so the figures to be entered are 000 in all cases. As you established that the key has 5 cuts in the last screen, once you have entered the 5 figures you go on to the next screen. In this screen you enter the distances there are from the key's stop 0 to the first cut on axis 2. The remaining distances are those between one dimple and the next and so on consecutively:

Distance 610 and 360 are the following, in the 5 dimples.



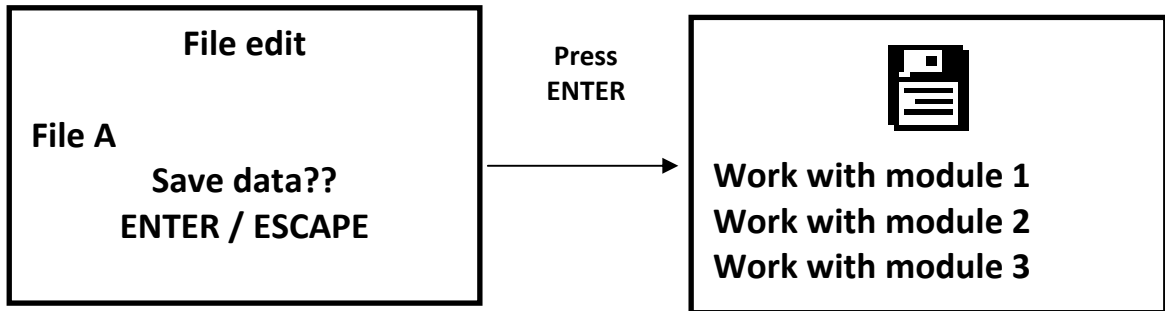
File edit				
Dist. :	0 6 1 0	3 6 0	3 6 0	
3 6 0	3 6 0	---	---	---
---	---	---	---	---
---	---	---	---	---

In this last screen you establish the calibration point for the cutter on the key. This point is very important as before cutting the machine touches the key to calibrate the depth. Normally this point is established on key's same axis 2 and the Y axis distance is 0, which is on the shoulder of the key, as there is never a cut in this position. Another point could be established.



File edit	
Coordinates for key auto adjust	
X: 0 6 4 5 Y: 0 0 0 0	

The last thing is the save operation which confirms if you want to save and then tells you in which memory block it has been saved. When cutting you can access the same block to carry out a search.



With this operation you have created file B which is equivalent to the file axis 2 for side A.

Axis 1 or the main axis on side B still has to be defined, which shall be called file C. So let us proceed

Once in the edit menu go to the screen for creating a new file.

File edit

Name: C _ _ _ _ _

Type of key (← →)
dimple

Let us call it C and press the down arrow or ENTER. Once the cursor is at the bottom press the right or left arrow until the dimple type of key appears on the screen. Press ENTER and go on to the next screen:

File edit

Side: S

Stop: 0

Cutter: F5

Clamp: M1

Tracer: PT01

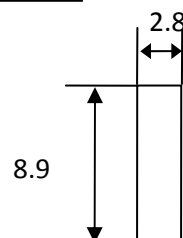
To go to the different parameters you can use the up and down arrows. The data to be entered in this case is as follows:

- Side: S (Part of the clamp that supports the key, possibilities: A and S "see chapter 2.8). The key is supported on its side, in the S area of the clamp.
- Stop: 0 (Neck stop in clamp stop 0, possibilities 0, 1, 2 and 3 see chapter 2.8)
- Cutter: F5 (With the left and right arrows you can use the different cutters from the JMA range included with the machine). It depends on the shape of the dimple.
- Clamp: M1 (Use the right and left arrows to select the different clamps available).
- Tracer: PT01 (Universal tracer for dimple keys, located in the tracer device).
- Adapter: Use the right and left arrows to select the adapter to be used. If it is not necessary like in this case just leave it blank.

When you have selected these parameters press ENTER to go on to the next screen. In the following screen you can establish the key's mechanical parameters.

File edit	
Key width:	0 2 8 0
Key height:	0 8 8 0
Coord. Ref. X:	0 0 0 0
Coord. Ref. Y:	0 0 0 0
Coord. Ref. Z:	0 0 0 0
Cutting sides:	1

- Key width: 0280 (Equivalent to 2.8 millimetres)
- Key height: 0880 (Equivalent to 8.8 millimetres)
- Coord. Ref. X: 0000 (X axis offset)
- Coord. Ref. Y: 0000 (Y axis offset)
- Coord. Ref. Z: 0000 (Z axis offset)
- Cutting sides: 1 Establishes how many side of the key are cut (As it is a secondary axis this parameter is not important. File C is called up by file A)



When these parameters have been established press ENTER to go on to the next screen. On this screen you establish the depths of the dimples (on secondary axis C). These measurements come from the surface of the key inwards. In the case given as an example, the depths of axis 1 on side B are as follows:

0= 0 mm 1=0.67

This data is entered in the following way. Enter the figures and press ENTER to validate them. When you have finished press ENTER on an empty space so that the machine knows that you are not going to enter any more figures:

File edit

Sb-Pr:	0	0	0	1	0	6	7
				●			

Press ENTER on the empty field to complete the cycle.

When you have established the symbols and their respective depths go on to the next screen. On this screen you establish the number of axes on the secondary axis on side B (for secondary axes enter 1). The distance from the fixed jaw is 1.4 mm as can be seen in the diagram.

File edit

Number of axes: 1

Axis 1 distance: 1 4 0

Axis 1 distance side B

Let us go on to the next screen where the following data is established:
As can be seen in the diagram above, the number of bits (or axis 1 cuts) are 11.

- Type of cut: - **NORMAL**: The machine carries out a vertical movement when making the dimple. The dimple is the shape of the cutter (the cut angle field is not used).
 - **IDEAL**: From one cut to another the machine follows a linear path.
 - **PLANE**: From one cut to another, the machine goes straight and then does the angle established in the angle field.

File edit

Number of bits: 1 1

Cut angle: 0 0 0

Type of cut: NORMAL

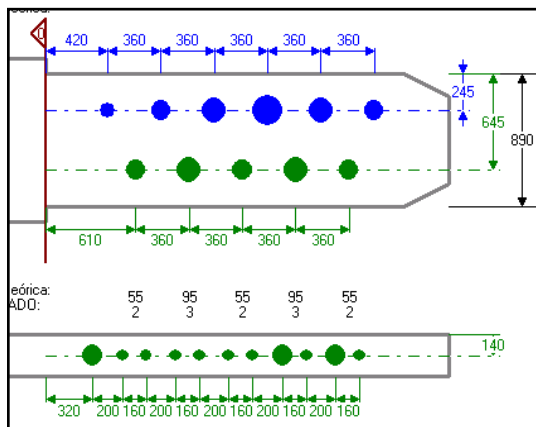
The key is a normal dimple key so the type of cut is NORMAL.

The following definition screen is for the bases of the dimples. This base is normally 0 for dimple keys, but if you want the effect of a displaced dimple, set the displacement figure to the sides in relation to the centre of the dimple.

File edit				
BASES:	0000	0000	0000	0000
000	000	000	000	000
000	000	000	---	---
---	---	---	---	---

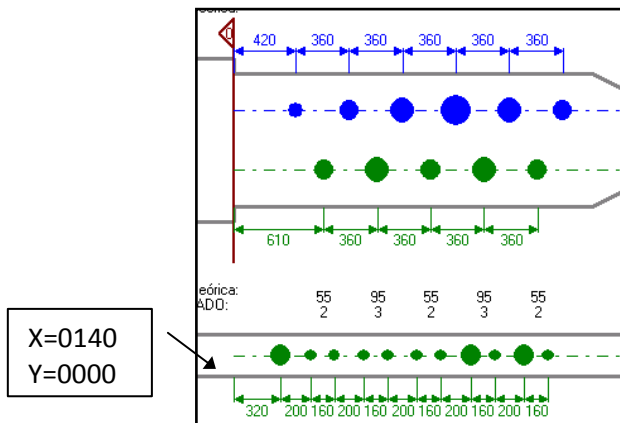
The file you are editing has 11 cuts with the cutter base so the figures to be entered are 000 in all cases. As you established that the key has 11 cuts in the last screen, once you have entered the 11 figures you go on to the next screen. In this screen you enter the distances there are from the key's stop 0 to the first cut on axis 1. The remaining distances are those between one dimple and the next and so on consecutively:

First distance 320, then 200 and 160 are the next consecutively in the 11 dimples.



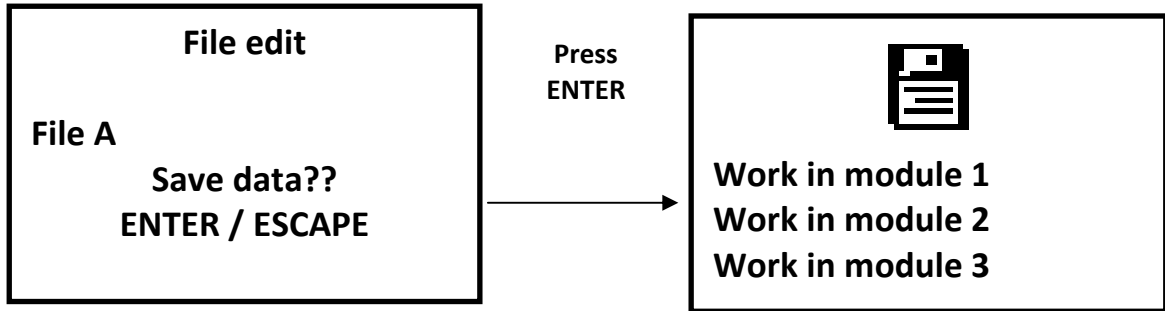
File edit				
Dist. :	0320	200	160	
200	160	200	160	200
160	200	160	---	---
---	---	---	---	---

In this last screen you establish the calibration point for the cutter on the key. This point is very important as before cutting the machine touches the key to calibrate the depth. Normally this point is established on key's same axis 2 and the Y axis distance is 0, which is on the shoulder of the key, as there is never a cut in this position. Another point could be established.



File edit	
Coordinates for key auto adjust	
X: 0140 Y: 0000	

The last thing is the save operation which confirms if you want to save and then tells you in which memory block it has been saved. When cutting you can access the same block to carry out a search.

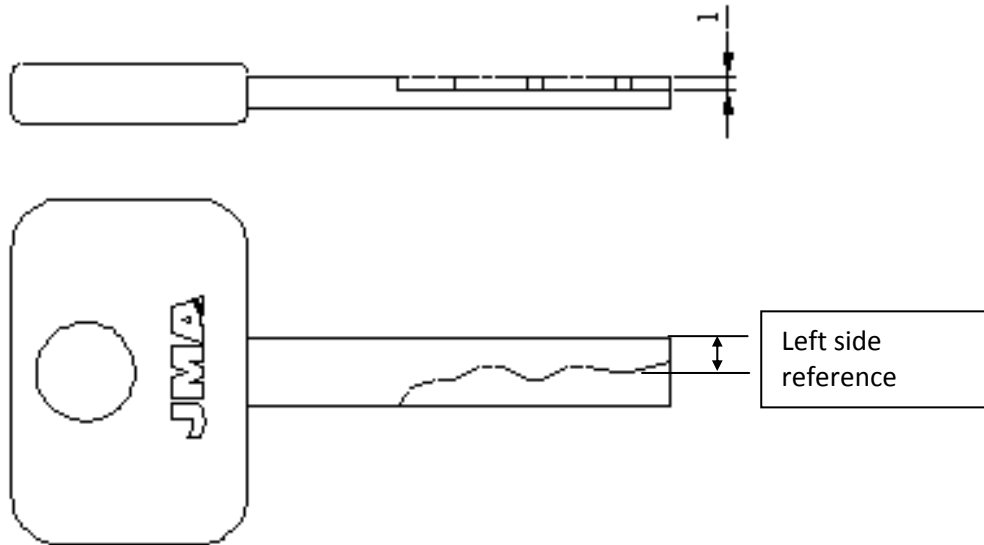


With this operation you have created file C which is equivalent to the file for axis 1 on side B.

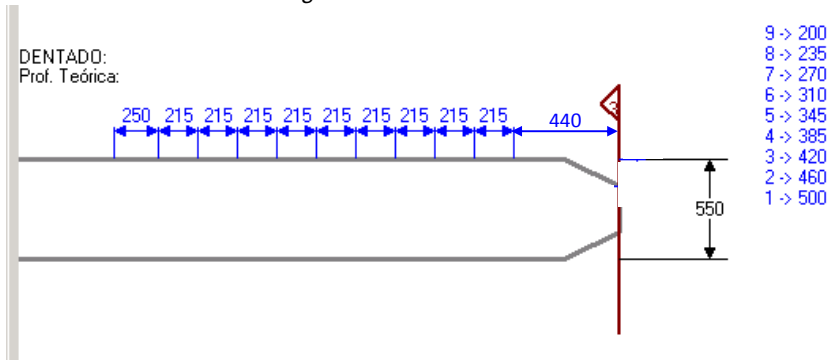
The key has now been fully defined; defined with file A. You can now cut and read this key using file A.

4.1.2 Creating a laser key

First of all let us take a look at a laser key. The following diagram shows that a laser key is like a flat key but cut vertically.



One of the most important pieces of data in a laser key is on what side the depths of the cuts are referenced (in this example the reference is on the left side). There are keys that have the reference on the left and on the right.



We have taken an example from the IKS program which represents the key shown in the diagram above. You can see that the key has an axis with a cutting depth of 1mm.

After having looked at the characteristics of a laser key.

File edit

Name: R _____

Type of key (← →)
laser

In this screen you give the key a name of up to 8 characters. Let us call it R (remember not to use 3 numbers + a P), so as not to coincide with the internal files. Press the down arrow or ENTER. Once the cursor is at the bottom press the right or left arrow until the laser type of key appears on the screen. Press ENTER to go on to the next screen:

File edit	
Side:	A
Stop:	3
Cutter:	F11
Clamp:	M1
Tracer:	PT02
Adapter:	_____

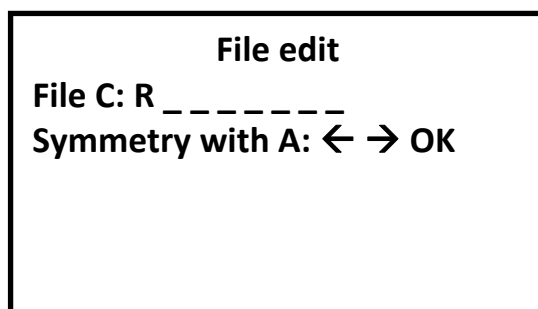
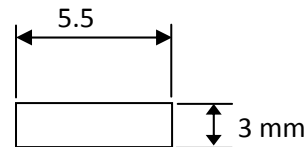
You can use the up and down arrows to go to the different parameters. The data to be entered in this case is as follows:

- Side: A (Area of clamp supporting the key, possibilities: A and S "see chapter 2.8)
- Stop: 3 (Neck stop in clamp stop 0, possibilities 0, 1, 2 and 3 see chapter 2.8). This laser key is of the tip stop type.
- Cutter: F11 (With the left and right arrows you can use the different cutters from the JMA range included with the machine). It depends on the shape of the cut. In this case the 2.5mm diameter cutter is used.
- Clamp: M1 (Use the right and left arrows to select the different clamps available).
- Tracer: PT02 (Universal tracer for laser or groove keys, located in the tracer device).
- Adapter: Use the right and left arrows to select the adapter to be used. If it is not necessary like in this case just leave it blank.

Once you have selected these parameters, press ENTER to go on to the next screen. In the next screen you can establish the mechanical parameters for the key.

File edit	
Key length:	2 7 6 0
Key width:	0 5 5 0
Key height:	0 3 0 0
Coord. Ref. X:	0 0 0 0
Coord. Ref. Y:	0 0 0 0
Coord. Ref. Z:	0 0 0 0
Cutting sides:	2

- Key length: 2760 (stop 0 case, length from the shoulder of the key to the tip, so that the machine can calculate the cutting of the tip)
- Key width: 0550 (Equivalent to 5.5 millimetres)
- Key height: 0300 (Equivalent to 3 millimetres)
- Coord. Ref. X: 0000 (X axis offset)
- Coord. Ref. Y: 0000 (Y axis offset)
- Coord. Ref. Z: 0000 (Z axis offset)
- Cutting sides: 2 Establishes how many sides of the key are cut (side A+C = 2 sides of the key.)



When establishing the symmetry of one side with its opposite: A is symmetrical to C, the machine understands that what is symmetrical is the cut, so once the cut has been entered for one side you will not be asked for the cut on the opposite side (when you are going to cut or read one side). In this case it will ask you for the cut for side A and will also use it for side C.

When these parameters have been established press ENTER to go on to the next screen. On this screen you establish the depths of the cuts, but you have to bear in mind that this depth is not on the Z axis, but it is the height to the left side (or left back, as it is cut on the right) as if it were a flat key laid down.

9= 2mm 8=2,35 mm 7=2,7 mm 6=3,1 mm 5=3,45 mm 4=3,85 mm 3=4,2 mm 2=4,6 mm 1=5 mm

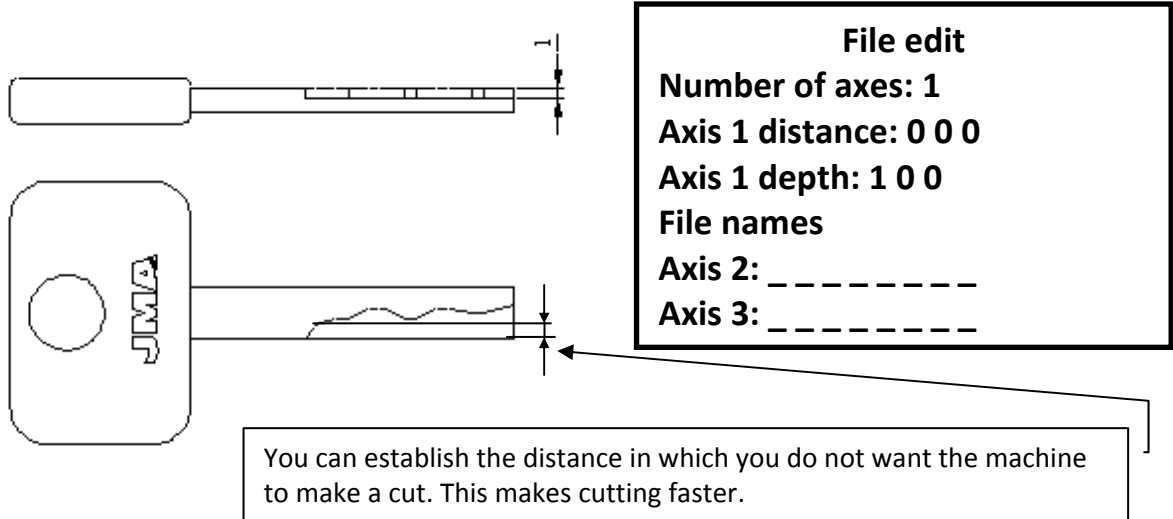
This data is entered in the following way. Enter the figures and press ENTER to validate them. When you have finished press ENTER on an empty space so that the machine knows that you are not going to enter any more figures:

File edit

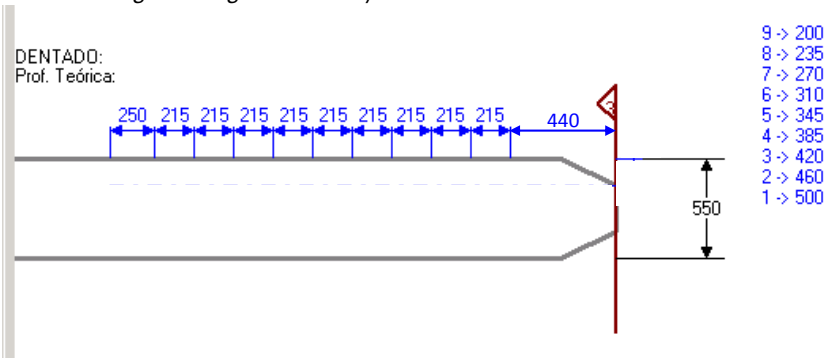
Sb-Pr:	9	2 0 0	8	2 3 5
7	2 7 0	6	3 1 0	5 3 4 5
4	3 8 5	3	4 2 0	2 4 6 0
1	5 0 0	●	-	-
-	-	-	-	-

Press ENTER on an empty field to complete the cycle.

When you have established the symbols and their respective depths go on to the next screen. On this screen you establish the number of axes on side A (which is one as can be seen in the diagram, but could be 2 as in the case of BM-5P which has cuts with reference on the left side and on the right side.)

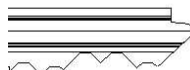


The depth of the wave is 1 mm. You can also establish the "axis 1 distance" which is a field that serves for the machine automatically not to cut that distance, but which is set to 0 by default. The Xcode will cut from the outer edge of the key inwards. When establishing this field it is as if you were moving the edge of the key inwards.

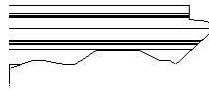


Let us go on to the next screen where the following data is established: As you can see in the diagram above there are 10 bits (or cuts on axis 1). You have 11 lines but the first is the distance in which the cutter begins to cut.

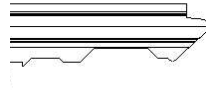
- Type of cut: - **NORMAL**: The machine makes a movement at the angle established from one cut to another like a flat key.



- **IDEAL**: From one cut to another the machine follows a linear path.



- *PLANE: From one cut to another the machine goes straight and then does the angle established in the angle field.*



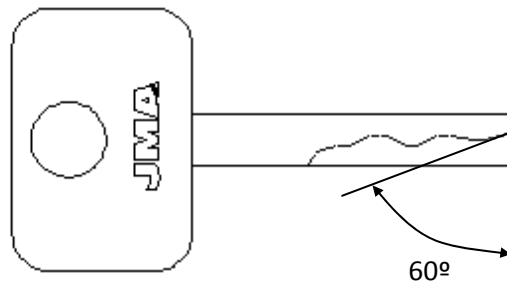
File edit

Number of bits: 10

Cut angle: 1 2 0

Type of cut: IDEAL

The key is a laser key with an ideal cut. The angle is established by the start of the key. In this case you want an entry of 60 so the angle is 120 (2x60)



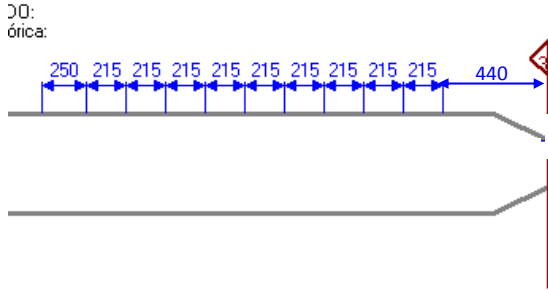
The following definition screen establishes the bases of the holes. Laser keys can have a base as if they were flat keys. This base is where the cut goes. In this case you are going to establish a base of 60 (0.6 mm) for the 10 bits.

File edit

BASES:	0 0 6 0	0 6 0	0 6 0	0 6 0
	0 6 0	0 6 0	0 6 0	0 6 0
	0 6 0	0 6 0	---	---
	---	---	---	---

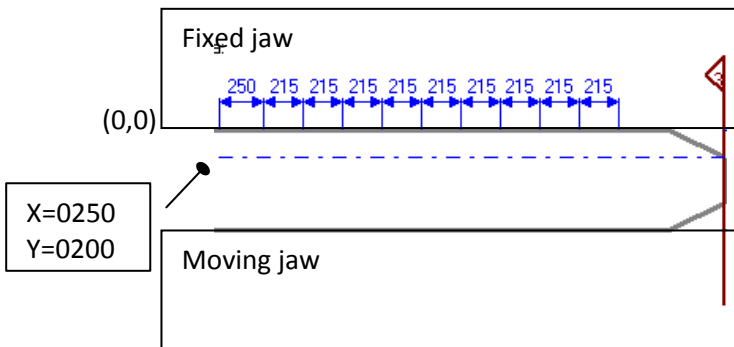
In this screen you establish the distances between the cuts from the head of the key to the tip. If the key is a tip stop type 3 (like in this case), in these cases you have to establish N+1 distances with N cuts, the first distance is the point where the cutter is going to start to cut.

Distance 250 (where the cutting ends), 215x9 distance between cuts and 440 is the distance between the last cut and the tip of the key.



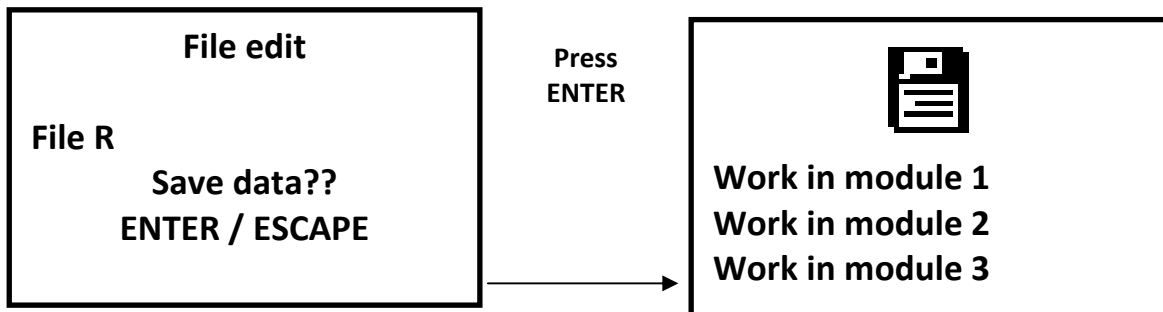
File edit				
Dist. :	0	250	215	215
	215	215	215	215
	215	215	440	---
	---	---	---	---

In this last screen you establish the calibration point for the cutter on the key. This point is very important as before cutting, the machine touches the key to calibrate the depth. For a laser key this point is a point on the surface of the key that maintains the actual thickness of the key and cannot have any cutting which could distort the reading or cutting.



File edit	
Coordinates for key auto adjust	
X: 0 2 5 0	Y: 2 0 0 0

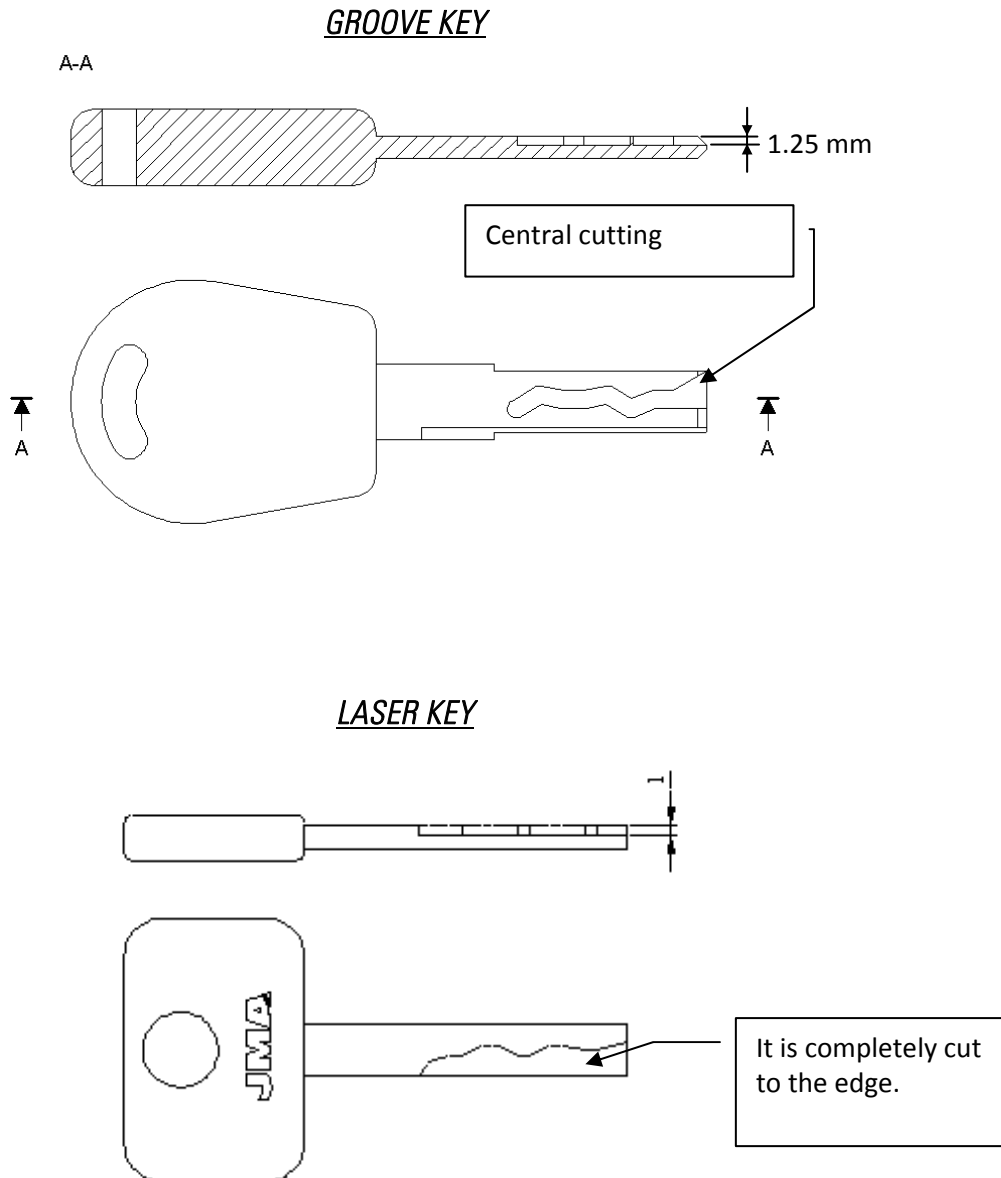
The last thing is the save operation which confirms if you want to save and then tells you in which memory block it has been saved. When cutting you can access the same block to carry out a search.



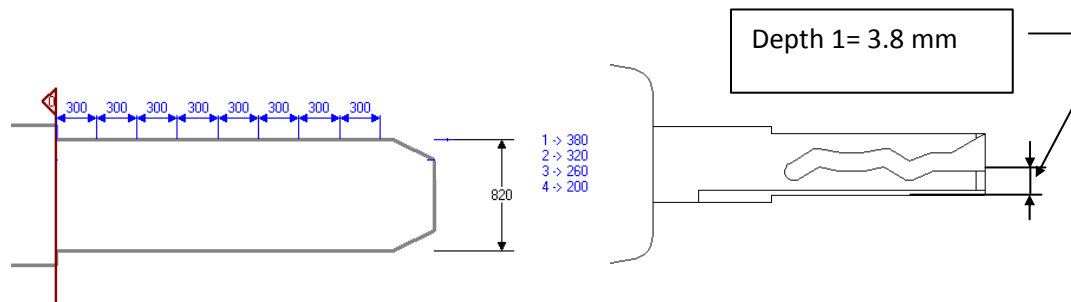
With this operation you have created the file R which is equivalent to a file for a LASER key with cutting on one axis. If there were two cutting axes, this would have to be generated and included on the main axis as done with the dimple key in the example above.

4.1.3 Creating a groove key

The diagram below shows a groove key. In principle, groove keys are the same as laser keys. The difference is that the way the key is read is different and then when cutting the key the machine only cuts the central part with the relevant width and does not cut the key up to the edge as happens with laser keys.



One of the most important pieces of data in a groove key is on what side the depths of the cuts are referenced (in this example the reference is on the left side). There are keys that have the reference on the left and on the right.



We have taken an example from the IKS program which represents the key shown in the diagram above. You can see that the key has an axis with a cutting depth of 1.25mm.

After having seen the characteristics of the groove key .

File edit

Name: R A _ _ _ _ _

Type of key (← →)
groove

In this screen you can give the key a name of up to 8 characters. Let us call it RA (remember not to use 3 numbers + P), so as not to coincide with the internal files, and press the down arrow or ENTER. Once the cursor is at the bottom, press the left or right arrow until the groove type of key appears on the screen. Press ENTER to go on to the next screen:

File edit

Side: A

Stop: 0

Cutter: F17

Clamp: M1

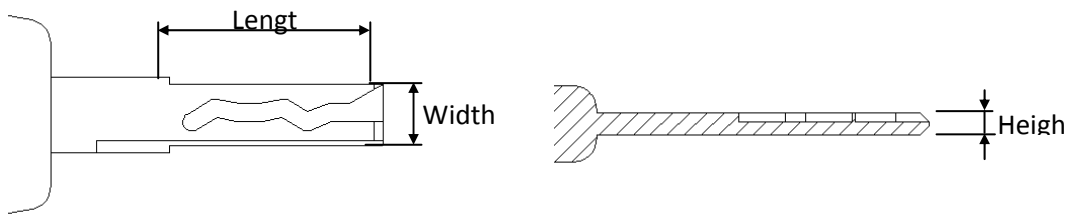
Tracer: PT02

You can use the up and down arrows to go to the different parameters. The data to be entered in this case is as follows:

- Side: A (Part of the clamp supporting the key, possibilities: A and S "see chapter 2.8)
- Stop: 3 (Neck stop in clamp stop 0, possibilities 0, 1, 2 and 3 see chapter 2.8). This groove key is of the tip stop type.

- *Cutter: F17 (With the left and right arrows you can use the different cutters from the JMA range included with the machine). It depends on the shape of the cut, in this case a 3mm diameter cutter is used.*
- *Clamp: M1 (Use the right and left arrows to select the different clamps available).*
- *Tracer: PT02 (universal tracer for laser or groove keys, located in the tracer device).*
- *Adapter: Use the right and left arrows to select the adapter to be used. If it is not necessary like in this case just leave it blank.*

Once you have selected these parameters, press ENTER to go on to the next screen. In the next screen you can establish the mechanical parameters for the key.



File edit	
Key length:	2 8 0 0
Key width:	0 8 2 0
Key height:	0 3 0 0
Coord. Ref. X:	0 0 0 0
Coord. Ref. Y:	0 0 0 0
Coord. Ref. Z:	0 0 0 0
Cutting sides:	2

- *Key length: 2800. (Equivalent to 28 millimetres)*
- *Key width: 0820 (Equivalent to 8.2 millimetres)*
- *Key height: 0300 (Equivalent to 3 millimetres)*
- *Coord. Ref. X: 0000 (X axis offset)*
- *Coord. Ref. Y: 0000 (Y axis offset)*
- *Coord. Ref. Z: 0000 (Z axis offset)*
- *Cutting sides: 2 Establishes how many sides of the key are cut (side A+C = 2 sides of the key.)*

File edit	
File C:	R A _ _ _ _ _
Symmetry with A:	← → OK

When establishing the symmetry of one side with its opposite side: A is symmetrical to C, the machine understands that what is symmetrical is the cut, so once the cut has been entered for one side you will not be asked for the cut on the opposite side (when you are going to cut or read one side). In this case it will ask you for the cut for side A and will also use it for side C.

When these parameters have been established press ENTER to go on to the next screen. On this screen you establish the depths of the cuts, but you have to bear in mind that this depth is not on the Z axis, but it is the height to the left side (or left back, as it is cut on the right) as if it were a flat key laid down.

1= 3,8mm 2= 3,2 mm 3= 2,6 mm 4=2 mm

This data is entered in the following way. Enter the figures and press ENTER to validate them. When you have finished press ENTER on an empty space so that the machine knows that you are not going to enter any more figures:

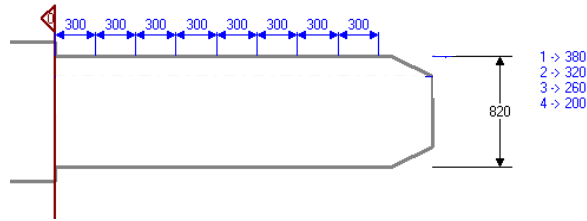
File edit								
Sb-Pr:	1	3	8	0	2	3	2	0
	3	2	6	0	4	2	0	0
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-

Press ENTER on an empty field to complete the cycle.

When you have established the symbols and their respective depths go on to the next screen. On this screen you establish the number of axes on side A (which is one as can be seen in the diagram, but could be 2 as in the case of SEA-1, which has cuts with reference on the left side and on the right side.)

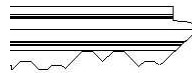
File edit	
Number of axes:	1
Axis 1 distance:	0 0 0
Axis 1 depth:	1 2 5
File names	
Axis 2:	_____
Axis 3:	_____

The depth of the groove is 1.25 mm. The figure for the axis 1 distance is not valid for groove keys, so you have to enter 0.

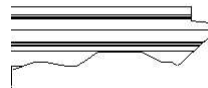


Let us go on to the next screen where the following data can be established:
As can be seen in the diagram above, there are 8 bits (or cuts on axis 1).

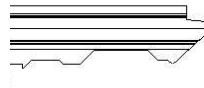
- Type of cut: - **NORMAL**: The machine makes a movement at the angle established from one cut to another like a flat key.



- **IDEAL**: From one cut to another the machine follows a linear path.

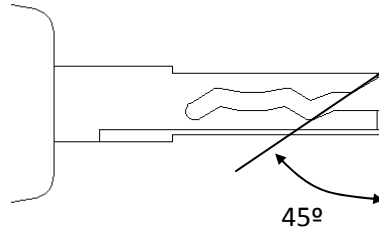


- **PLANE**: From one cut to another the machine goes straight and then does the angle established in the angle field.



File edit
Number of bits: 08
Cut angle: 0 9 0
Type of cut: IDEAL

The key is a groove key with an ideal cut. The angle is established by the start of the key.
In this case you want a 45° entry, so the angle is 90 (2x45).

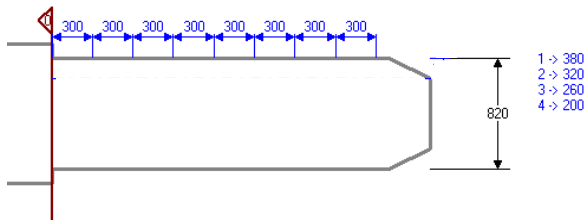


The following screen establishes the bases of the holes. Groove keys can have a base as if they were flat keys. This base is where the cut goes. In this case enter a base of 60 (0.6 mm) for the 8 bits.

File edit				
BASES:	0 0 6 0	0 6 0	0 6 0	0 6 0
0 6 0	0 6 0	0 6 0	0 6 0	0 6 0
---	---	---	---	---
---	---	---	---	---

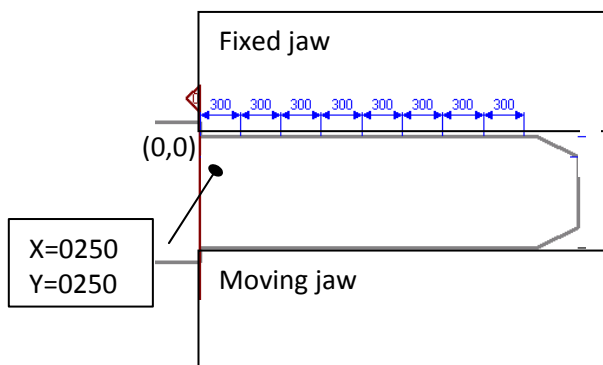
In this screen you establish the distances between the cuts from the shoulder of the key to the first cut and the distance between the cuts.

Distance 300 (3 mm) between the shoulder and the first cut and 300x7 between the cuts.



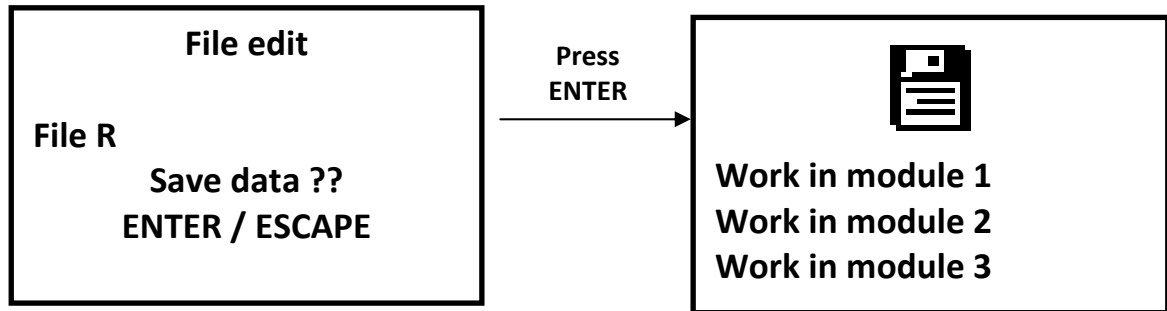
File edit				
Dist. :	0 3 0 0	3 0 0	3 0 0	3 0 0
3 0 0	3 0 0	3 0 0	3 0 0	3 0 0
---	---	---	---	---
---	---	---	---	---

In this last screen you establish the calibration point for the cutter on the key. This point is very important as before cutting, the machine touches the key to calibrate the depth. For a groove key this point is a point on the surface of the key that maintains the actual thickness of the key and cannot have any cutting which could distort the reading or cutting.



File edit	
Coordinates for key auto adjust	
X: 0 2 5 0	Y: 0 2 5 0

The last thing is the save operation which confirms if you want to save and then tells you in which memory block it has been saved. When cutting you can access the same block to carry out a search.



With this operation you have created the RA file which is equivalent to a file for a GROOVE key with cutting on one axis. If there were two cutting axes, this would have to be generated and included on the main axis as done with the dimple key in the example above.

When carrying out any maintenance work, the following requirements have to be met:

- 1. Never carry out any maintenance work with the machine in operation.*
- 2. The machine must be unplugged from the mains supply.*
- 3. The indications in this manual must be strictly adhered to.*
- 4. Only use original spare parts.*

