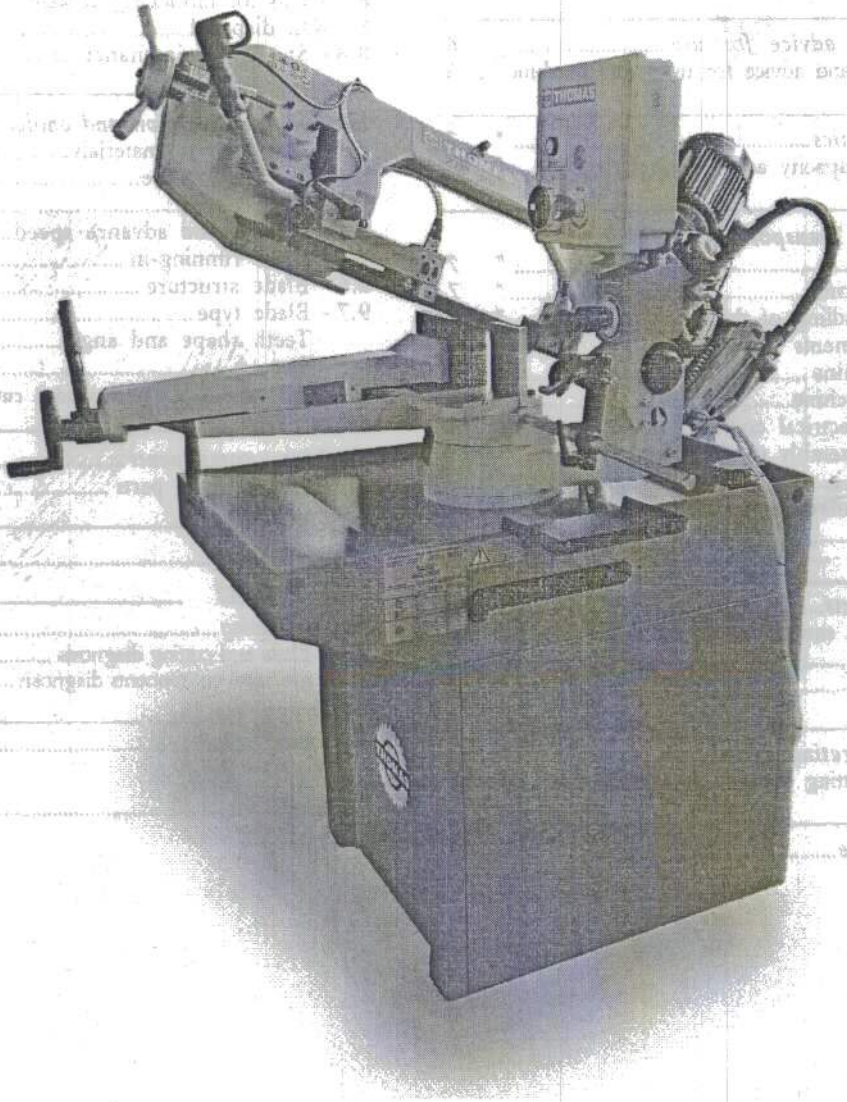
THOMAS

USE AND MAINTENANCE MANUAL

ZIP 29 - ZIP 29 DA



CE

12/2011

THOMAS S.r.l. - Via Pasubio, 32 - 36033 Isola Vicentina (VI) - Telephone 0444 / 976105 - Fax 0444 / 976934

Contents

Ordering spare parts

- When ordering spare parts you must state:
  MACHINE MODEL
  SERIAL NUMBER
  PART REFERENCE NUMBER
Without these references WE WILL NOT SUPPLY the spares. See point 10.1 - list of spare parts -

Guarantee

- The Company guarantees that the machine to which this manual refers has been designed and built to comply with safety regulations and that it has been tested for functionality in the factory.
- The machine is guaranteed for 12 months: the guarantee does not cover the electric motors, electric components, pneumatic components or any damage due to dropping or to bad machine management, the failure to observe maintenance standards or bad handling by the operator.
- The buyer has only the right to replacement of the faulty parts, while transport and packing costs are at his expense.
- The serial number on the machine is a primary reference for the guarantee, for after-sales assistance and for identifying the machine for any necessity.

Machine certification and identification marking

MACHINE LABEL

THOMAS S.p.A. CE
via Pasubio, 32 36033 ISOLA VIC. - ITALIA

MODEL	*ZIP 29*
TYP	*DA*
SERIAL NUMBER	248000000328
YEAR OF MANUFACTURE	2012

1 REFERENCE TO ACCIDENT- PREVENTION REGULATIONS

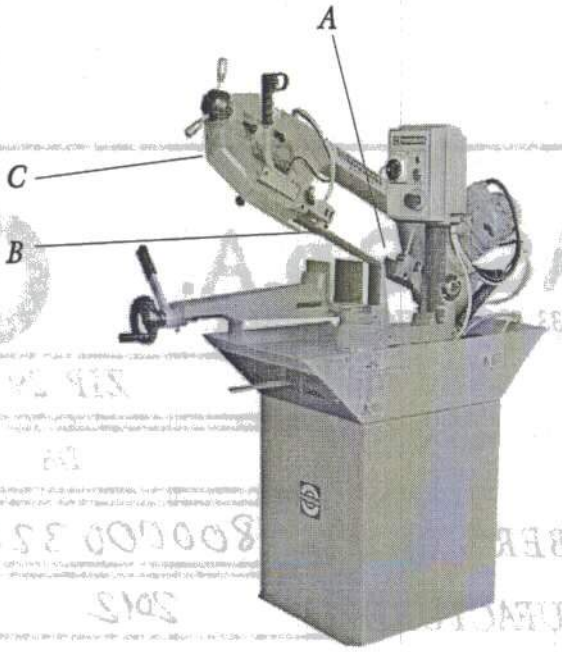
This machine has been built to comply with the national and community accident-prevention regulations in force. Improper use and/or tampering with the safety devices will relieve the manufacturer of all responsibility.

1.1 - Advice for the operator

- Check that the voltage indicated on the plate, normally fixed to the machine motor, is the same as the line voltage.
- Check the efficiency of your electric supply and earthing system; connect the power cable of the machine to the socket and the earth lead (yellow-green in colour) to the earthing system.
- When the saw frame is in suspend mode (up) the toothed blade must not move.
- Only the blade section used for cutting must be kept unprotected. Remove guarding by operating on the adjustable head.
- It is forbidden to work on the machine without its shields (these are all blue or grey in colour).
- Always disconnect the machine from the power socket before blade change or carrying out any maintenance job, even in the case of abnormal machine operation.
- Always wear suitable eye protection.
- Never put your hands or arms into the cutting area while the machine is operating.
- Do not shift the machine while it is cutting.
- Do not wear loose clothing with sleeves that are too long, gloves that are too big, bracelets, chains or any other object that could get caught in the machine during operation; tie back long hair.
- Keep the area free of equipment, tools or any other object.
- Perform only one operation at a time and never have several objects in your hands at the same time. Keep your hands as clean as possible.
- All internal and/or internal operations, maintenance or repairs, must be performed in a well-lit area or where there is sufficient light from extra sources so as to avoid the risk of even slight accidents.

1.2 - Location of shields against accidental contact with the tool

- Blue, grey right and left hand metal shields, fastened with screws onto the guide blade stationary head (REF. A).
- Blue or grey metal shield fastened with screws onto the blade guide adjustable head, ensures covering of blade section not used in cutting operation (REF. B).
- Grey metal guard, fastened with knobs onto the saw frame, to protect from flywheels (REF. C).



1.3 - Electrical equipment according to Euro-pean Standard"CENELEC EN 60 204-1" which as-similates, with some integrating modifications, the publication "IEC 204-1 "

- The electrical equipment ensures protection against electric shock as a result of direct or indirect contact. The active parts of this equipment are housed in a box to which access is limited by screws that can only be removed with a special tool; the parts are fed with alternating current at low voltage (24 V). The equipment is protected against splashes of water and dust.
- Protection of the system against short circuits is ensured by means of rapid fuses and earthing; in the event of motor overload, protection is provided by a thermal probe.
- In the event of a power cut, the specific start-up button must be reset.
- The machine has been tested in conformity with point 20 of EN 60204.

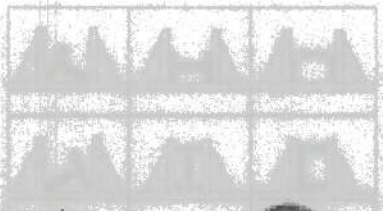
1.4 - Emergencies according to European Standard "CENELEC EN 60 204-1 "

- In the event of incorrect operation or of danger conditions, the machine may be stopped immediately by pressing the red mushroom button.
- The casual or voluntary removal of the protection shield of the flywheels causes the stepping-in of a microswitch that automatically stops all machine functions.

NOTE: Resetting of machine operation after each emergency stop is achieved by reactivating the specific restart button.

1.5 - OTHER RISKS

- As the machine is running, any intervention from the operator within the "*dangerous zone*" *or cutting area must be considered a risk for his own safety.*



Act most carefully during the execution of the cutting cycle.
Do not approach the cutting area with hands or arms as the blade is running.

Always wear protection glasses.

It is recommended to use audio protection devices.

Act most carefully as moving cutting materials.

Wear gloves while replacing the blade.

Do not use the sawing machine without safety protections.

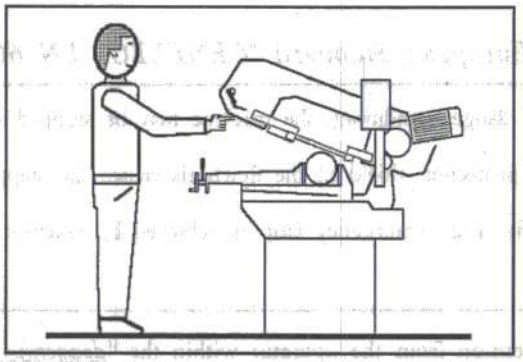
Act most carefully during maintenance operations and/or resetting electric protections.

It is recommended to train the operators to the use of the machine and inform them about the relevant accident risks.

2 RECOMMENDATIONS AND ADVICE FOR USE

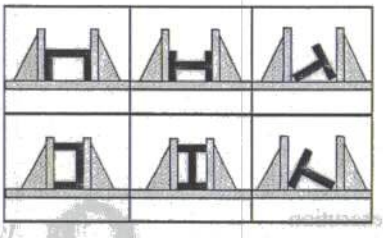
2.1 - Recommendations and advice for using the machine

- The machine has been designed to cut metal building materials, with different shapes and profiles, used in workshops, turner's shops and general mechanical structural work.
- Only one operator is needed to use the machine, that must stand as shown in the picture.



- Before starting each cutting operation, ensure that the part is firmly gripped in the vice and that the end is suitably supported.

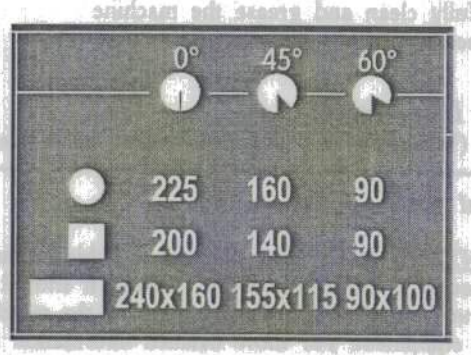
These figures show examples of suitable clamping of different section bars, bearing in mind the cutting capacities of the machine in order to achieve a good efficiency and blade durability.



- Do not use blades of a different size from those stated in the machine specifications.
- If the blade gets stuck in the cut, release the running button immediately, switch off the machine, open the vice slowly, remove the part and check that the blade or its teeth are not broken. If they are broken, change the tool.
- Check saw frame return spring to ensure proper balancing.
- Before carrying out any repairs on the machine, consult the dealer or apply to THOMAS.

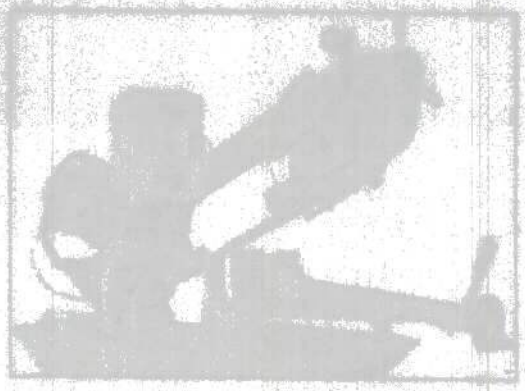
3 TECHNICAL CHARACTERISTICS

3.1 - Table of cutting capacity and technical details



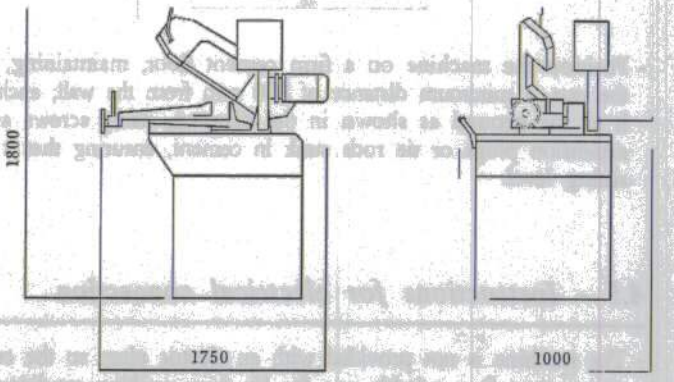
Technical Data

Blade Motor	kW	0,55/1,1
Electropump	kW	0,07
Gear-box Reduction	Ratio	40/1
Blade Dimensions	mm	2450x27x0,9
Flywheel diameter	mm	290
Blade Speeds	m/min	32/64
Vice Opening	mm	250
Sawframe Inclination	°	40
Working Height	mm	980
Machine Dimensions	mm	1400x750x1600
Machine Weight	kg.	215



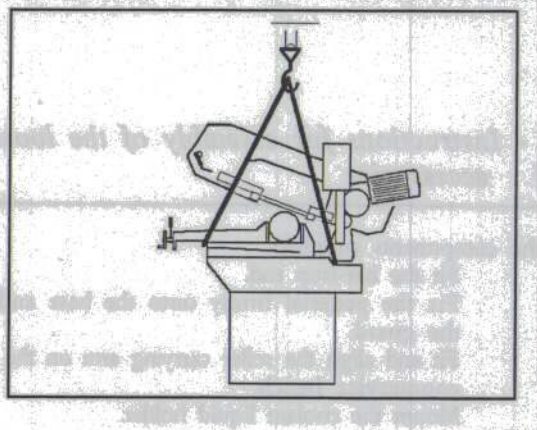
4 MACHINE DIMENSIONS TRANSPORT INSTALLATION DISMANTLING

4.1 - Machine dimensions



4.2 - Transport and handling of the machine

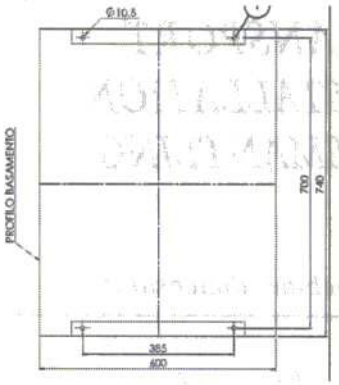
If the machine has to be shifted in its own packing, use a fork-lift truck or sling it with straps as illustrated.



4.3 - Minimum requirements for the premises housing the machine

- Mains voltage and frequency complying with the machine motor characteristics.
- Environment temperature from -10 °C to +50 °C.
- Relative humidity not over 90 .

4.4 - Anchoring the machine

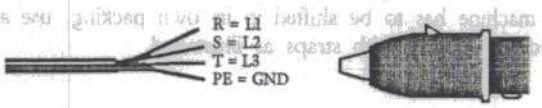


- Position the machine on a firm cement floor, maintaining, at the rear, a minimum distance of 800 mm from the wall; anchor it to the ground as shown in the diagram, using screws and expansion plugs or tie rods sunk in cement, ensuring that it is sitting level.

4.5 - Instructions for electrical connection

- The machine is not provided with an electric plug, so the customer must fit a suitable one for his own working conditions:

1 - WIRING DIAGRAM FOR 4-WIRE SYSTEM FOR THREE-PHASE MACHINE - SOCKET FOR A 16A PLUG



4.6 - Instructions for assembly of the loose parts and accessories

Fit the components supplied:

Fit the bar-stop rod.
Fix the pedestal firmly onto the base and remove the guard.
Fit and align the roller carrying arm on the countervice bench.
Mount the coolant liquid holder.

4.7 - Disactivating the machine

- If the sawing machine is to be out of use for a long period, it is advisable to proceed as follows:

1) detach the plug from the electric supply panel
2) loosen blade
3) release the arch return spring
4) empty the coolant tank
5) carefully clean and grease the machine
6) if necessary, cover the machine.

4.8 - Dismantling

(because of deterioration and/or obsolescence)

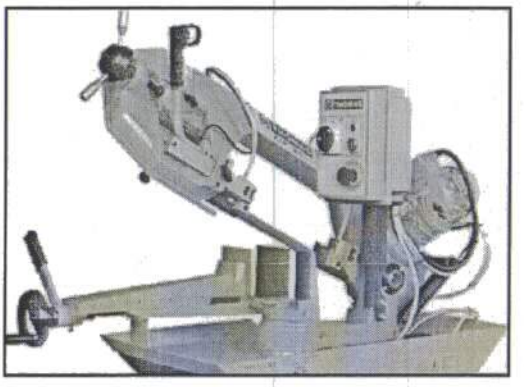
General rules

ATTENTION: This symbol indicates that this product shall not be treated as household waste. Instead it should be handed over to the applicable collection point for the recycling of electrical equipment. For more detailed information about recycling of this product, please contact your local Civic Office, your household waste disposal service or the shop where you purchased the product.

5 MACHINE FUNCTIONAL PARTS

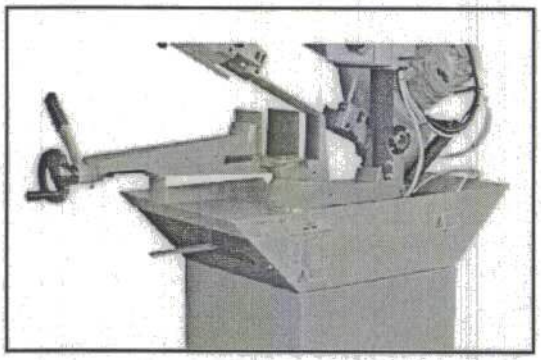
5.1 - Operating head or saw frame

- Machine part consisting of the members that transfer the motion (gearmotor, flywheels), and tension/guide (blade-guides, blade tension slide) and lowering control (optional) of tool.



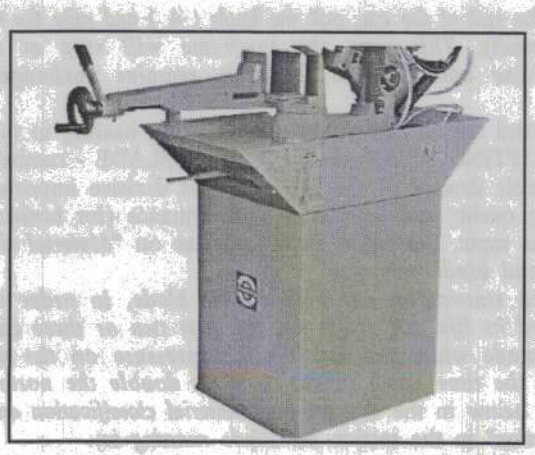
5.2 - Vice

- System fro clamping the material during the cutting operation, operated with approach handwheel and locking lever or by a pneumatic device (optional).



5.3 - Bed

- Support structure for the OPERATING HEAD OR SAW FRAME (rotating arm for gradual cutting, with respective blocking system), the ELECTRIC BOX, the VICE, the BAR STOP, the material support ROLLER and the housing for the cutting coolant TANK and pump.



6 DESCRIPTION OF THE OPERATING CYCLE

Before operating, all the main organs of the machine must be set in optimum conditions (see the chapter on "*Regulating the machine*").

6.1 - Starting up and cutting cycle

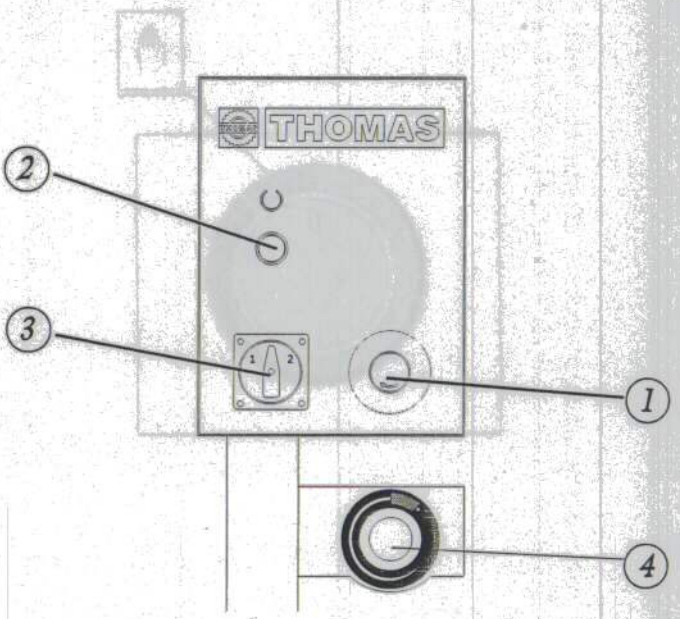
- Ensure that the machine is not in emergency stop condition; if it is, release the red mushroom button (1).
- Turn the blade tension Handwheel clockwise untill the microswitch button is pressed down.
  for ZIP29DA only:
- Pull the regulator knob to stop the sawframe descent (4).

- Select the cutting speed on the switch (3):
  position 1 = 32 m/min.
  position 2 = 64 m/min.

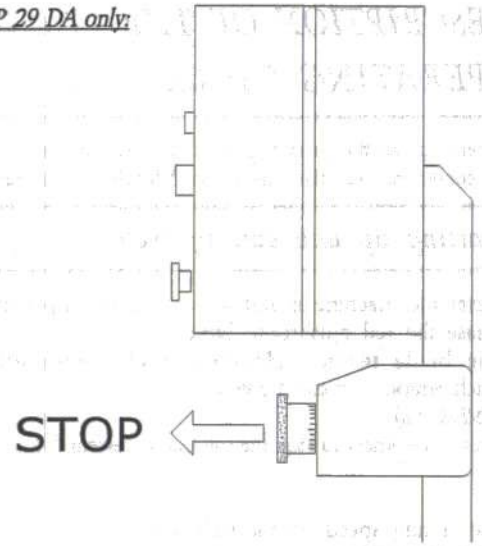
- Place material to be cut in the vice. Close jaws against piece, keeping a distance of approx. 3 - 4 mm then clamp with lever.
- Press the start/reset button (2).

The machine is ready to work in the manual function. Therefore, the operator pulls down the sawframe manually whilst the motor turns as long as the trigger switch located on the sawframe lever is activated by the operator's finger.

for ZIP29DA only:
The machine is ready to work in the controlled sawframe downfeed function. To start the cutting cycle, the operator will press the trigger switch located on the sawframe lever. The sawframe downfeed speed can be adjusted on the Regulator (4).



for ZIP 29 DA only:



- The hydraulic regulator provides two different functions:

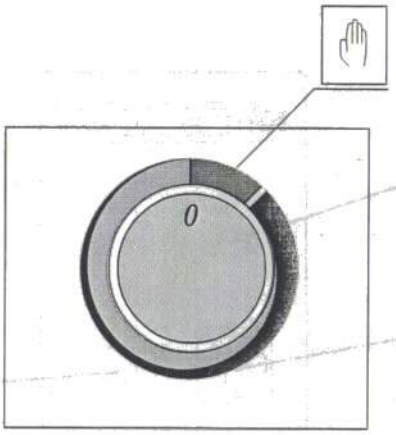
A) Adjustment of the sawframe downfeed speed at a desired feed rate.

B) Stop or Start the sawframe downfeed as you Pull or Push the regulator knob.

Pull the knob at the end of the cutting cycle before lifting the sawframe. Push the knob to start the sawframe downfeed.

SAWFRAME DOWNFEED SPEED:

- The black coloured field indicates the feed rate controlled by the sawframe downfeed system.
- Attention: The red coloured field indicates *'NO CONTROL'* of downfeed speed for the sawframe would fall down if not held up manually.



- WARNING for your safety at work:
  Blade teeth must be covered by metal guard to prevent any accident. Just let uncover the teeth required for the cutting only and according to the section of the material to cut.
- At the start of the cut check that the blade is turning in the direction indicated. Make sure that the cooling liquid flows regulary (THE MINIMUM PERCENTAGE OF OIL DILUTED IN WATER IS 8 - 10).
- Adjust the device for the control of the saw frame lowering and press the Knob (4).
- At the end of the cut, pull the knob (4) *and raise the sawframe manually. This way, the sawframe will stop at the top position and the downfeed rate remains unchanged.*

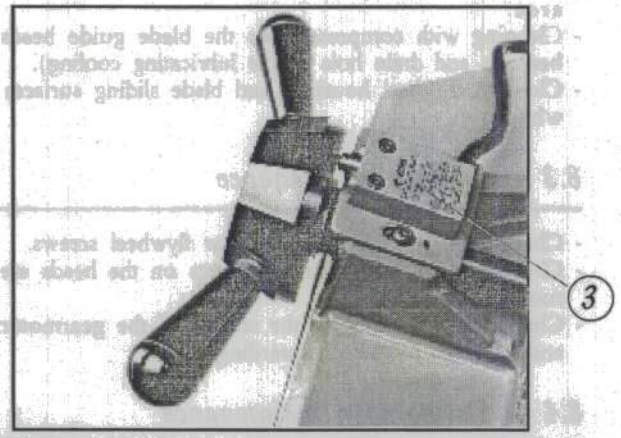
The band saw is now ready to start work, bearing in mind that the CUTTING SPEED and the TYPE of BLADE - combined with a suitable descent of the head - are of decisive importance for cutting quality and for machine performance (for further details on this topic, see below in the chapter on "*Material classification and blade selection*").

- *When starting to cut with a new blade, in order to safeguard its life and efficiency, the first two or three cuts must be made while exerting a slight pressure on the part, so that the time taken to cut is about double the normal time* (see below in the chapter on "*Material classification and blade selection*" in the section on *Blade running-in*).
- Press the red emergency button (1) when there are conditions of danger or malfunctions in general, so as to stop machine operation immediately.

7 REGULATING THE MACHINE

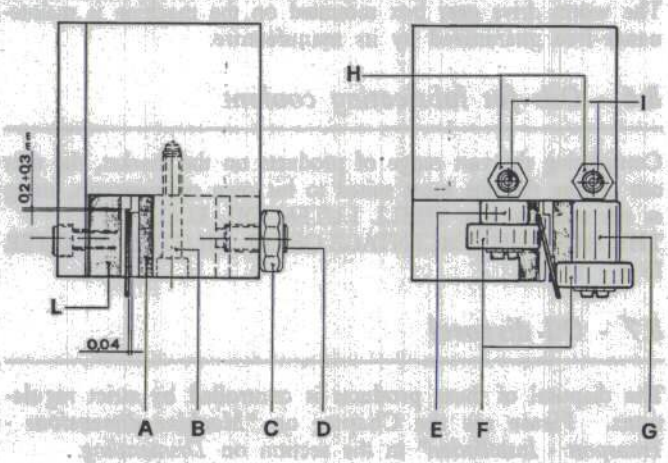
7.1 - Blade tension assembly

The ideal tension of the blade is achieved rotating the handwheel until it stops against the microswitch button (A).
WARNING: the projection of the microswitch is factory set during inspection, after having tightened the blade on the lengthening values indicated by its manufacturer as per specific dimensions set with the help of a special gauge. If, when replacing the blade, the thickness and the width differ, it will be necessary to correct the projection of the microswitch. For this purpose we suggest to strictly select blades having the same features as the ones mounted originally.



7.2 - Blade guide blocks

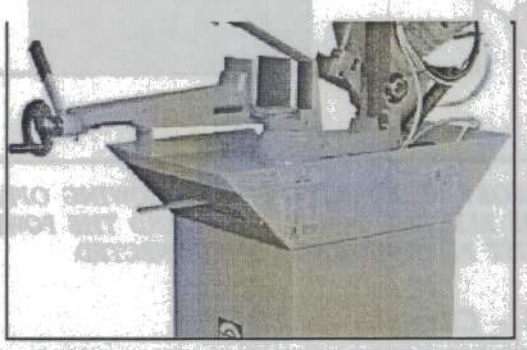
The blade is guided by means of adjustable pads set in place during inspection as per the thickness of the blade with minimum play as shown in the figure.



In case the blade needs to be replaced, make sure to always install 0.9 mm thick blades for which the blade guide pads have been adjusted. In the case of toothed blades with different thicknesses adjustment should be carried out as follows:
- Loosen nut (C), screw (B) and loosen dowel (D) widening the passage between the pads.
- Loosen the nuts (H) and the dowels (I) and rotate the pins (E - G) to widen the passage between the bearings (F).
- Mount the new blade, place the pad (A) on the blade and, loosening the dowel, allow a play of 0.04 mm for the sliding of the toothed blade; lock the relative nut and screw (B):
- Rotate the pins (E - G) until the bearings rest against the blade as indicated in the figure and then secure the dowels (I) and nut (H).
- Make sure that between the blade and the upper teeth of the pad (L) this is at least 0.2 - 0.3 mm of play; if necessary, loosen the screws that fasten the blocks and adjust accordingly.

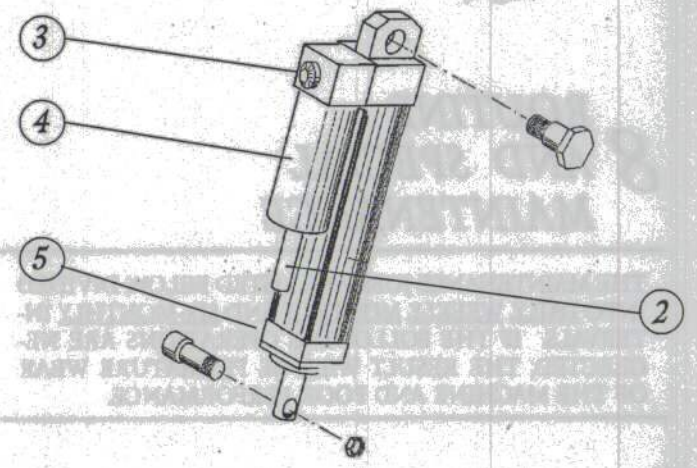
7.3 - Vice

- The device does not require any particular adjustment; in case of excess play of the sliding guide, tighten slide screw more.
- Place material to be cut in the vice. Close jaws against piece, keeping a distance of approx. 3 - 4 mm then clamp with lever.



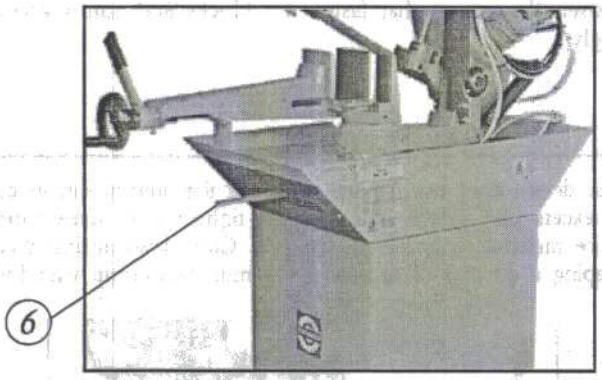
7.4 - Saw frame lowering control device (for ZIP29DA)

It is an accessory, ideal for the cutting of thin or STAINLESS STEEL section bars, that determines a constant lowering and consequently a good efficiency of the blade throughout the work phase. This device can be accommodated to the different situations and applications. Defectiveness in the control of the lowering may be caused by the drop in braking power of the device due to the long-term blow-by of the braking fluid.
Push rod (2) back into its seat and loosen plug (3). Use recommended oil to top up oil tank (4) with the help of a syringe-type pump. Bleed air, after having tightened plug (3) and loosen screw (5) lightly until a little oil drip out; when this has been completed, secure the screw.
Use SHELL HYDRAULIC OIL 32 or similar.



7.5 - Cutting angle adjustment

- Unlock lever (6) and rotate the saw frame arm until you reach mechanical stop and check if the index corresponds to 45°; if not operate on the set screws to make measures meet.



BEFORE PERFORMING THE FOLLOWING OPERATIONS, THE ELECTRIC POWER SUPPLY AND THE POWER CABLE MUST BE COMPLETELY DISCONNECTED.

7.6 - Changing the blade

To change the blade:
- Lift the saw frame.
- Loosen the blade with the handwheel, remove the mobile blade-guard cover, open the flywheel guards and remove the old blade from the flywheels and the blade guide heads.
- Assemble the new blade by placing it first between the bearings of the heads and then on the seat of the flywheels, paying particular attention to the cutting direction of the teeth (page 7).
- Tension the blade and make sure it perfectly fits inside the seat of the flywheels.
- Assemble the mobile blade-guide and the flywheel guard and fasten it with the relative knobs. Check that the safety microswitch is activated otherwise when electric connection will be restored the machine will not start.

WARNING: always assemble blades having dimensions specified in this manual and for which the blade guide heads have be set: otherwise, see chapter on "Description of the operating cycle" in the section Starting-up.

8 ROUTINE AND SPECIAL MAINTENANCE

THE MAINTENANCE JOBS ARE LISTED BELOW, DIVIDED INTO DAILY, WEEKLY, MONTHLY AND SIX-MONTHLY INTERVALS. IF THE FOLLOWING OPERATIONS ARE NEGLECTED, THE RESULT WILL BE PREMATURE WEAR OF THE MACHINE AND POOR PERFORMANCE.

8.1 - Daily maintenance

- General cleaning of the machine to remove accumulated shavings.
- Clean the lubricating coolant drain hole to avoid excess fluid.
- Top up the level of lubricating coolant.
- Check blade for wear.
- Rise of saw frame to top position and partial slackening of the blade to avoid useless yield stress.
- Check functionality of the shields and emergency stops.

8.2 - Weekly maintenance

- More accurate general cleaning of the machine to remove shavings, especially from the lubricant fluid tank.
- Removal of pump from its housing, cleaning of the suction filter and suction zone.
- Clean the filter of the pump suction head and the suction area.
- Cleaning with compressed air the blade guide heads (guide bearings and drain hole of the lubricating cooling).
- Cleaning flywheel housings and blade sliding surfaces on flywheels.

8.3 - Monthly maintenance

- Check the tightening of the motor flywheel screws.
- Check that the blade guide bearings on the heads are perfect running condition.
- Check the tightening of the screws of the gearmotor, pump and accident protection guarding.

8.4 - Six-monthly maintenance

- Continuity test of the equipotential protection circuit.

8.5 - Maintenance of the operating machine members

The worm drive gear box mounted on the machine is maintenance-free guaranteed by its manufacture.

8.6 - Oils for lubricating coolant

Considering the vast range of products on the market, the user can choose the one most suited to his own requirements, using as reference the type SHELL LUTEM OIL ECO.
THE MINIMUM PERCENTAGE OF OIL DILUTED IN WATER IS 8 - 10 .

8.7 - Oil disposal

The disposal of these products is controlled by strict regulations. Please see the Chapter on "*Machine dimensions - Transport - Installation*" in the section on *Dismantling*.

8.8 - Special maintenance

Special maintenance operations must be carried out by skilled personnel. However, we advise contacting THOMAS or their dealer and/or importer. Also the reset of protective and safety equipment and devices, of the reducer, the motor, the motor pump and electric components is to be considered extraordinary maintenance.

9 MATERIAL CLASSIFICATION AND CHOICE OF TOOL

Since the aim is to obtain excellent cutting quality, the various parameters such as *hardness of the material, shape and thickness, transverse cutting section* of the part to be cut, *selection of the type of cutting blade, cutting speed* and *control of saw frame lowering.* These specifications must therefore be harmoniously combined in a single operating condition according to practical considerations and common sense, so as to achieve an optimum condition that does not require countless operations to prepare the machine when there are many variations in the job to be performed. The various problems that crop up from time to time will be solved more easily if the operator has a good knoledge of these specifications.

WE THEREFORE RECOMMEND YOU TO ALWAYS USE GENUINE "THOMAS" SPARE BLADES THAT GUARANTEE SUPERIOR QUALITY AND PERFORMANCE.

9.1 - Definition of materials

The table at the foot of the page lists the characteristics of the materials to be cut, so as to choose the right tool to use.

9.2 - Selecting blade

First of all the pitch of the teeth must be chosen, in the other words, the number of teeth per inch (25,4 mm) suitable for thematerial to be cut, according to these criteria:

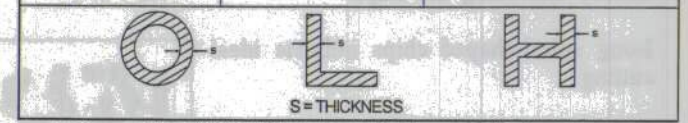
- parts with a thin and/or variable section such as profiles, pipes and plate, need close toothing, so that the number of teeth used simultaneously in cutting is from 3 to 6;
- parts with large transverse sections and solid sections need widely spaced toothing to allow for the greater volume of the shavings and better tooth penetration;
- parts made of soft material or plastic (light alloys, mild bronze, teflon, wood, etc.) also require widely spaced toothing;
- pieces cut in bundles require combo tooth design.

9.3 - Teeth pitch

As already stated, this depends on the following factors:

- *hardness of the material*
- *dimensions of the section*
- *thickness of the wall.*

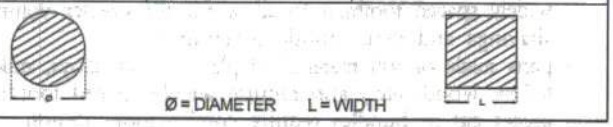
BLADE TEETH SELECTION TABLE		
THICKNESS MM	Z CONTINUOUS TOOTH DESIGN	Z COMBO TOOTH DESIGN
TILL 1.5	14	10/14
FROM 1 TO 2	8	8/12
FROM 2 TO 3	6	6/10
FROM 3 TO 5	6	5/8
FROM 4 TO 6	6	4/6
MORE THAN 6	4	4/6



S = THICKNESS

TYPES OF STEEL						CHARACTERISTICS		
USE	I UNI	D DIN	F AF NOR	GB SB	USA AISI-SAE	Hardness BRINELL HB	Hardness ROCKWELL HRB	R=N/mm²
Construction steels	Fe360	St37	E24	---	---	116	67	360÷480
	Fe430	St44	E28	43	---	148	80	430÷560
	Fe510	St52	E36	50	---	180	88	510÷660
Carbon steels	C20	CK20	XC20	060 A 20	1020	198	93	540÷690
	C40	CK40	XC42H1	060 A 40	1040	198	93	700÷840
	C50	CK50	---	---	1050	202	94	760÷900
	C60	CK60	XC55	060 A 62	1060	202	94	830÷980
Spring steels	50CrV4	50CrV4	50CV4	735 A 50	6150	207	95	1140÷1330
	60SiCr8	60SiCr7	---	---	9262	224	98	1220÷1400
Alloyed steels for hardening and tempering and for nitriding	35CrMo4	34CrMo4	35CD4	708 A 37	4135	220	98	780÷930
	39NiCrMo4	36CrNiMo4	39NCD4	---	9840	228	99	880÷1080
	41CrAlMo7	41CrAlMo7	40CADG12	905 M 39	---	232	100	930÷1130
Alloyed casehardening steels	18NiCrMo7	---	20NCD7	En 325	4320	232	100	760÷1030
	20NiCrMo2	21NiCrMo2	20NCD2	805 H 20	4315	224	98	690÷980
Steel for bearings	100Cr6	100Cr6	100C6	534 A 99	52100	207	95	690÷980
Tool steel	52NiCrMoKU	56NiCrMoV7	---	---	---	244	102	800÷1030
	C100KU	C100W1	---	BS 1	S-1	212	96	710÷980
	X210Cr13KU	X210Cr12	Z200C12	BD2 - BD3	D6 - D3	252	103	820÷1060
	58SiMo8KU	---	Y60SC7	---	S5	244	102	800÷1030
Stainless steel	X12Cr13	4001	---	---	410	202	94	670÷885
	X5CrNi1810	4301	Z5CN18.09	304 C 12	304	202	94	590÷685
	X8CrNi1910	---	---	---	---	202	94	540÷685
	X8CrNiMo1713	4401	Z6CDN17.12	316 S 16	316	202	94	490÷685
Copper alloys Special brass Bronze	Aluminium copper alloy G-CuAl11Fe4Ni4 UNI 5275					220	98	620÷685
	Special manganese/silicon brass G-CuZn36Si1Pb1 UNI5038					140	77	375÷440
	Manganese bronze SAE43 - SAE430					120	69	320÷410
	Phosphor bronze G-CuSn12 UNI 7013/2a					100	56,5	265÷314
Cast iron	Gray pig iron		G25			212	96	245
	Spheroidal graphite cast iron		GS600			232	100	600
	Malleable cast iron		W40-05			222	98	420

SOLID Ø OR L MM	Z CONTINUOUS TOOTH DESIGN	Z COMBO TOOTH DESIGN
TILL 30	8	5/8
FROM 30 TO 60	6	4/6
FROM 40 TO 80	4	4/6
MORE THAN 90	3	3/4

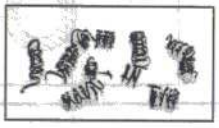


9.4 - Cutting and advance speed

The cutting speed (m/min) and the advance speed (cm^2/min = area travelled by the disk teeth when removing shavings) are limited by the development of heat close to the tips of the teeth.
- The cutting speed is subordinate to the resistance of the material (R = N/mm^2), to its hardness (HRC) and to the dimensions of the widest section.
- Too high an advance speed (= lowering of the saw frame) tends to cause the disk to deviate from the ideal cutting path, producing non rectilinear cuts on both the vertical and the horizontal plane.

The best combination of these two parameters can be seen directly examining the chips.

Long spiral-shaped chips indicate ideal cutting.



Very fine or pulverized chips indicate lack of feed and/or cutting pressure.

Thick and/or blue chips indicate overload of the blade.

9.5 - Blade running-in

When cutting for the first time, it is good practice to run in the tool making a series of cuts at a low advance speed (= 30-35 cm^2/min on material of average dimensions with respect to the cutting capacity and solid section of normal steel with R = 410-510 N/mm^2), ***generously spraying the cutting area with lubricating coolant.***

9.6 - Blade structure

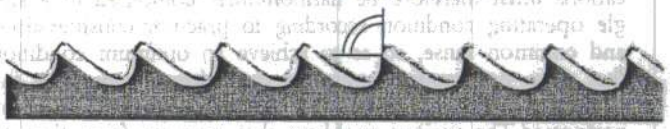
Bi-metal blades are the most commonly used. They consist in a silicon-steel blade backing with electron beam or laser welded high speed steel (HHS) cutting edge. The type of stocks are classified in M2, M42, M51 and differ from each other because of their major hardness due to the increasing percentage of Cobalt (Co) and molybdenum (Mo) contained in the metal alloy.

9.7 - Blade type

They differ essentially in their constructive characteristics, such as:
- *shape* and cutting *angle* of tooth
- *pitch*
- *set*

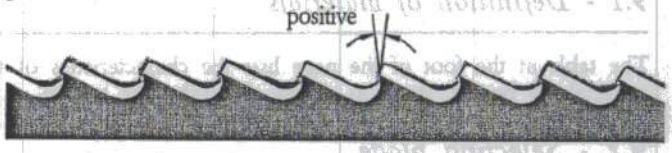
Shape and angle of tooth

REGULAR TOOTH: 0° rake and constant pitch.



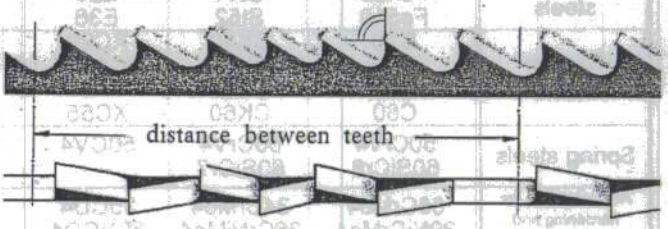
Most common form for transversal or inclined cutting of solid small and average cross-sections or pipes, in laminated mild steel and grey iron or general metal.

POSITIVE RAKE TOOTH: 9° - 10° positive rake and constant pitch.



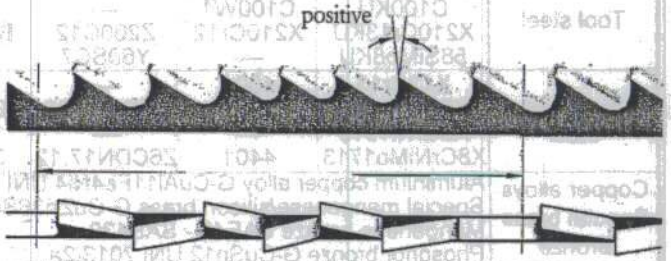
Particular use for crosswise or inclined cuts in solid sections or large pipes, but above all harder materials (highly alloyed and stainless steels, special bronze and forge pig).

COMBO TOOTH: pitch varies between teeth and consequently varying teeth size and varying gullet depths. Pitch varies between teeth which ensures a smoother, quieter cut and longer blade life owing to the lack of vibration.



Another advantage offered in the use of this type of blade in the fact that with an only blade it is possible to cut a wide range of different materials in size and type.

COMBO TOOTH: 9° - 10° positive rake.



This type of blade is the most suitable for the cutting of section bars and large and thick pipes as well as for the cutting of solid bars at maximum machine capacity. Available pitches: 3-4/4-6.

Set
Saw teeth bent out of the plane of the saw body, resulting in a wide cut in the workpiece.

REGULAR OR RAKER SET: Cutting teeth right and left, alternated by a straight tooth.

Of general use for materials with dimensions superior to 5 mm. Used for the cutting of steel, castings and hard nonferrous materials.

WAVY SET: Set in smooth waves.

This set is associated with very fine teeth and it is mainly used for the cutting of pipes and thin section bars (from 1 to 3 mm).

ALTERNATE SET (IN GROUPS): Groups of cutting teeth right and left, alternated by a straight tooth.

This set is associated with very fine teeth and it is used for extremely thin materials (less than 1 mm).

ALTERNATE SET (INDIVIDUAL TEETH): Cutting teeth right and left.

This set is used for the cutting of nonferrous soft materials, plastics and wood.

9.7.1 - RECOMMENDED CUTTING PARAMETERS

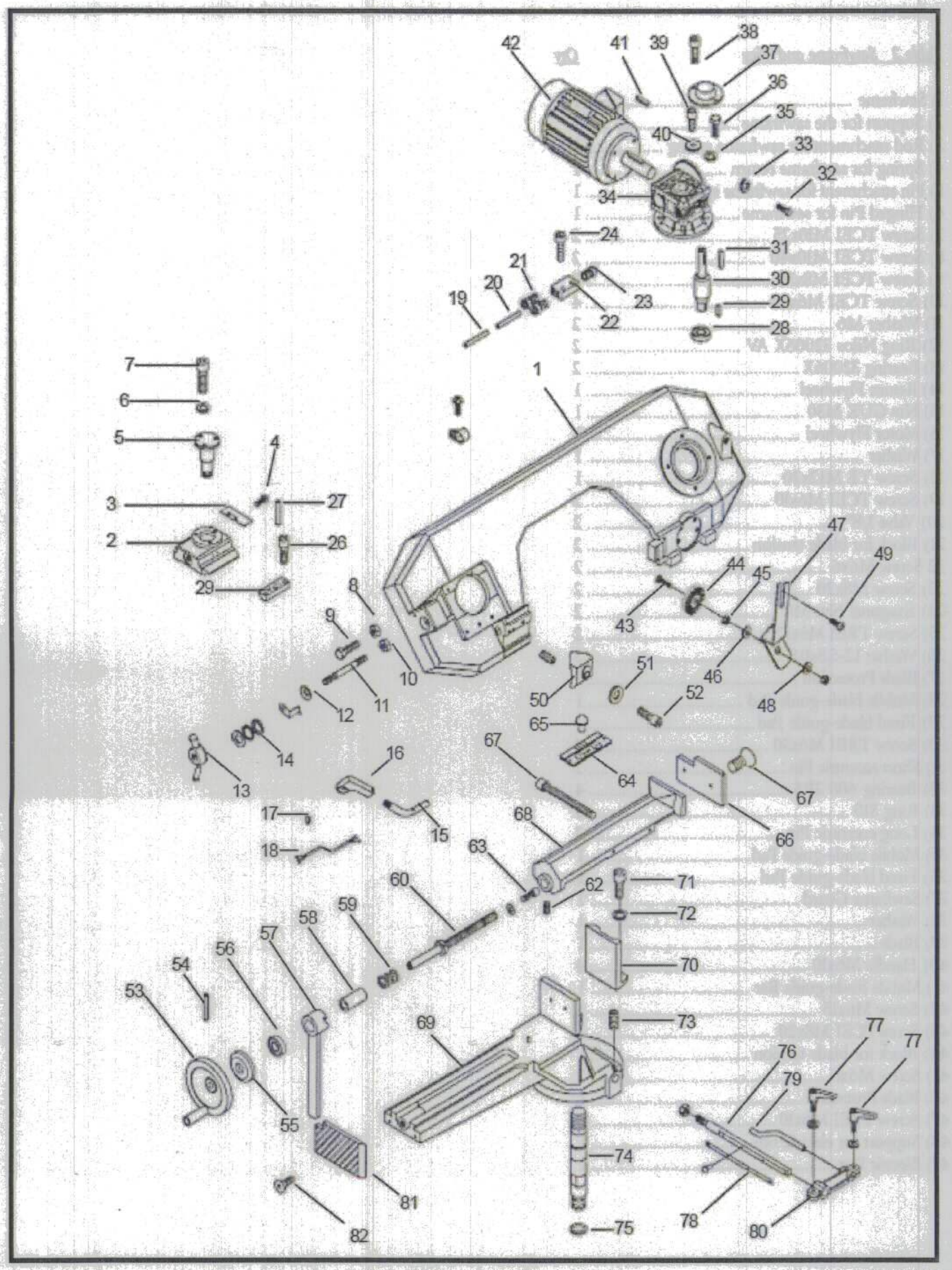
STEEL	CUTTING SPEED	LUBRICATION
CONSTRUCTION	60/80	EMULSIFIABLE OIL
CEMENTATION	40/50	EMULSIFIABLE OIL
CARBON STEEL	40/60	EMULSIFIABLE OIL
HARDENING AND TEMPERING	40/50	EMULSIFIABLE OIL
BEARINGS	40/60	EMULSIFIABLE OIL
SPRINGS	40/60	EMULSIFIABLE OIL
FOR TOOLS	30/40	EMULSIFIABLE OIL
FOR VALVES	35/50	EMULSIFIABLE OIL
STAINLESS STEEL	30/40	EMULSIFIABLE OIL
SPHEROIDAL GRAPHITE	20/40	EMULSIFIABLE OIL
CAST IRON	40/60	EMULSIFIABLE OIL
ALUMINIUM	80/600	KEROSENE
BRONZE	70/120	EMULSIFIABLE OIL
HARD BRONZE	30/60	EMULSIFIABLE OIL
BRASS	70/350	EMULSIFIABLE OIL
COPPER	50/720	EMULSIFIABLE OIL

10 MACHINE COMPONENTS

10.1 - List of spare parts

TCEI = screw with cilindric head and embedded exagon
TE = screw exagonal head
TBEI = screw with bubble head and embedded exagon
TBIC = screw with bubble head and cross notch
TSEI = screw with countersunk head and embedded exagon

Table 1 Sawframe	*Qty*
1) Sawframe	1
2) Block for blade tension	1
3) Plate for blade tension	1
4) Screw TBEI M5x10	2
5) Shaft for return flywheel	1
6) Washer M8	3
7) ScrewTCEI M8x20	3
8) Exagonal Nut M 8	1
9) Screw TE M8x45	1
10) Exagonal Nut M16	1
11) Pin for blade tension M16	1
12) Cup Spring Ø 31,5-16,3x1,8	14
13) Handwheel for blade tension M12	1
14) Bearing 51203	1
15) Sawframe Lever	1
16) Grip Switch	1
17) Start Push Button	1
18) Electric Cable	1
19) Tube Ø 6 L=800	1
20) Tube Ø 6 L=240	1
21) Connection 6x1/8"	4
22) Three-ways Valve	1
23) Connection 8x1/4"	1
24) Screw TCEI M6x15	2
25) Block	1
26) Screw TCEI M8x20	3
27) Pin Ø 5x38	2
28) Bearing 6208 2RS	1
29) Spline 8x7x25	1
30) Shaft for motor flywheel	1
31) Spline 8x7x50	1
32) Screw TE M6x20	4
33) Washer M6	4
34) Gear-box G5A i=1/40	1
35) Washer M10	4
36) Screw TCEI M10x25	4
37) Plastic Protection	1
38) Screw TCEI M10x25	2
39) Screw TCEI M10x20	1
40) Washer	1
41) Spline 6x6x40	1
42) Motor 1,5 kW - 50Hz - 400V - 4P	1
43) Screw TE M6x30	1
44) Brush 50-14x6	1
45) Exagonal Nut M6	1
46) Washer 18-6,5x1,5	2
47) Brush Support	1
48) Washer 13-6,5x0,8	2
49) Screw TBEI M6x10	2
50) Block	1
51) Washer M10-20x2	1
52) Screw TCEI M10x50	1
53) Vice Handwheel	1
54) Pin Ø 5x35	1
55) Bearing Protection	1
56) Bearing AX3047XCP	1
57) Vice Lever	1
58) Vice Bushing	1
59) Spring	1
60) Vice Screw	1
61) Screw M8x5	1
62) Screw TCEI M6X15	1
63) Screw TCEI M6X110	2
64) Scale	1
65) Rivet	1
66) Vice Jaw	1
67) Screw TSEI 6X12	2
68) Vice	1
69) Vice Base	1
70) Right Jaw	1
71) Screw TCEI M10X30L	1
72) Washer M10	1
73) Exagonal Screw M8X10	1
74) Pivot	1
75) O-ring 19,8x2,4	1
76) Bar stop Rod	1
77) Handle	1
78) Millimeter Scale	1
79) Bar-stop Pointer	1
80) Blar-stop Plate	1
81) Left Jaw	1
82) Screw TSEI M6x15	1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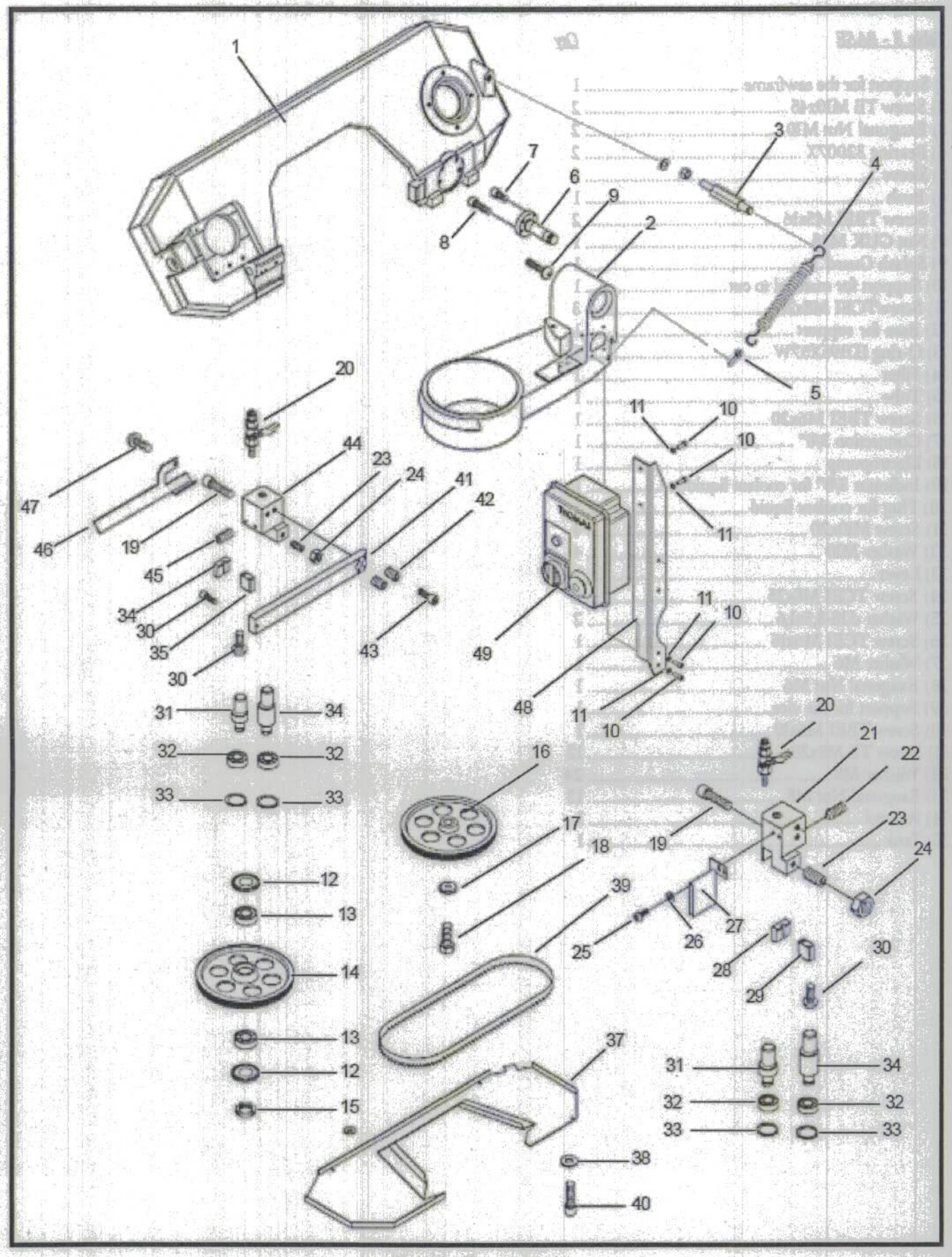
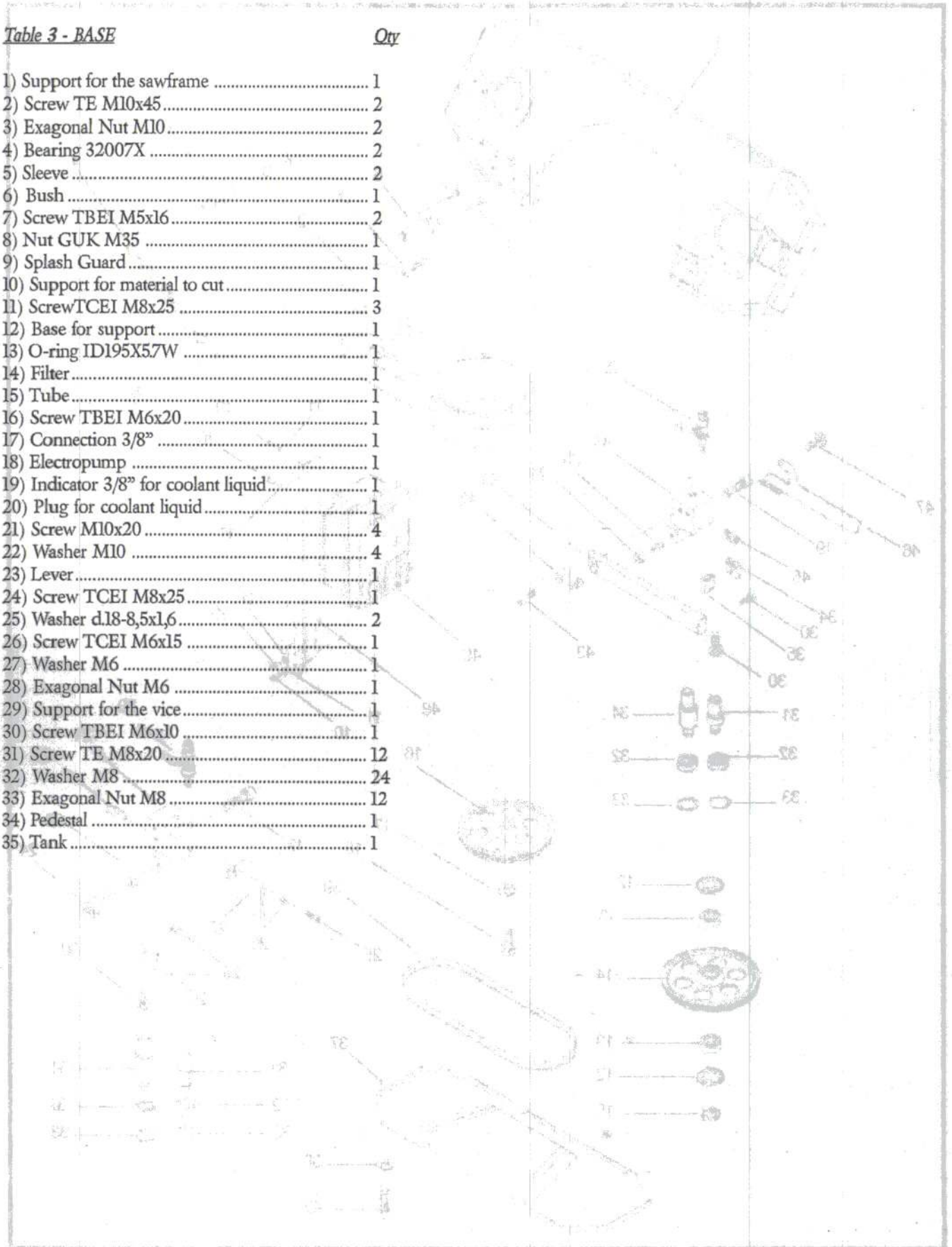
Tav. 1 - Arco

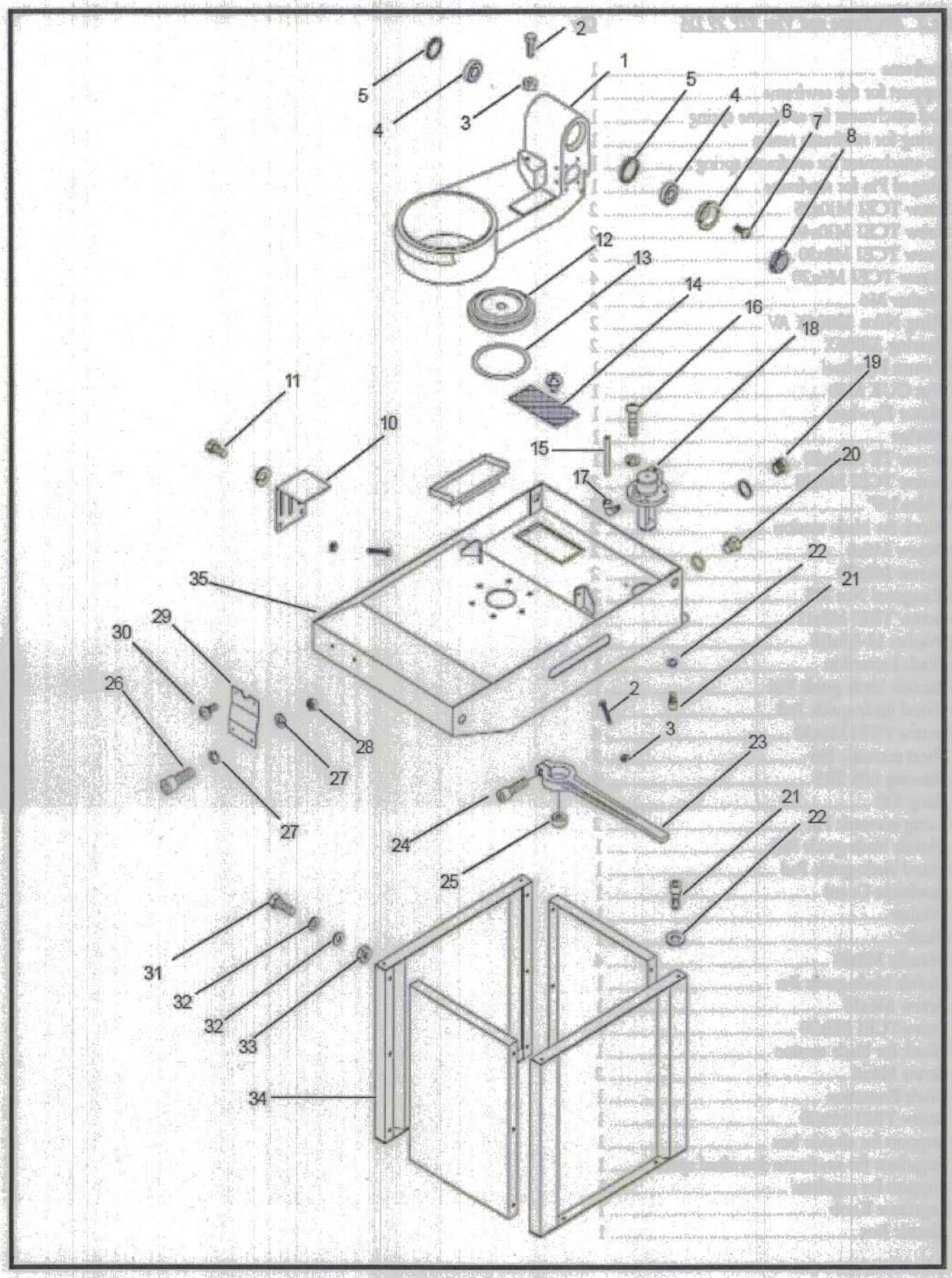
Table 2 Sawframe and Vice	*Qty*
1) Sawframe	1
2) Support for the sawframe	1
3) Rod attachment for sawframe spring	1
4) Spring for sawframe return	1
5) Pin attachment for sawframe spring	1
6) Hinged Pin for sawframe	1
7) Screw TCEI M10x25	2
8) Screw TCEI M10x40	2
9) Screw TCEI M8x30	2
10) Screw TCEI M6x20	4
11) Washer M6	2
12) Ring Nilos 32006X AV	2
13) Bearing 32006X	2
14) Return Flywheel	1
15) Nut GUK M30	1
16) Motor Flywheel	1
17) Washer	1
18) Screw TE M12x20	1
19) Screw TCEI M6x10	2
20) Valve 1/8"	2
21) Block for blade tension	2
22 Screw M6x6	2
23) Screw M8x20	2
24) Exagonal Nut M8	2
25) Screw TBEI M5x12	2
26) Washer 12-5,5x0,8	3
27) Blade Protection	1
28) Mobile blade-guide Pad	1
29) Fixed blade-guide Pad	1
30) Screw TBEI M6x30	4
31) Short eccentric Pin	2
32) Bearing 608 2RS	4
33) Ring S10	4
34) Long eccentric Pin	2
35) Mobile blade-guide Pad	1
36) Fixed blade-guide Pad	1
37) Sawframe Guard	1
38) Washer	1
39) Blade	1
40) Handle M6x10	4
41) Mobile blade-guide Bar	1
42) Screw M6x15	1
43) ScrewTCEI M8x20	1
44) Block for blade tension	1
45) Screw M6x6	2
46) Blade Protection	1
47) Screw TBEI M6x10	1
48) Support for electric box	1
49) Electric Box	1



Tav. 2 - Basamento

Table 3 - BASE	*Qty*
1) Support for the sawframe	1
2) Screw TE M10x45	2
3) Exagonal Nut M10	2
4) Bearing 32007X	2
5) Sleeve	2
6) Bush	1
7) Screw TBEI M5x16	2
8) Nut GUK M35	1
9) Splash Guard	1
10) Support for material to cut	1
11) ScrewTCEI M8x25	3
12) Base for support	1
13) O-ring ID195X5.7W	1
14) Filter	1
15) Tube	1
16) Screw TBEI M6x20	1
17) Connection 3/8"	1
18) Electropump	1
19) Indicator 3/8" for coolant liquid	1
20) Plug for coolant liquid	1
21) Screw M10x20	4
22) Washer M10	4
23) Lever	1
24) Screw TCEI M8x25	1
25) Washer d.18-8,5x1,6	2
26) Screw TCEI M6x15	1
27) Washer M6	1
28) Exagonal Nut M6	1
29) Support for the vice	1
30) Screw TBEI M6x10	1
31) Screw TE M8x20	12
32) Washer M8	24
33) Exagonal Nut M8	12
34) Pedestal	1
35) Tank	1

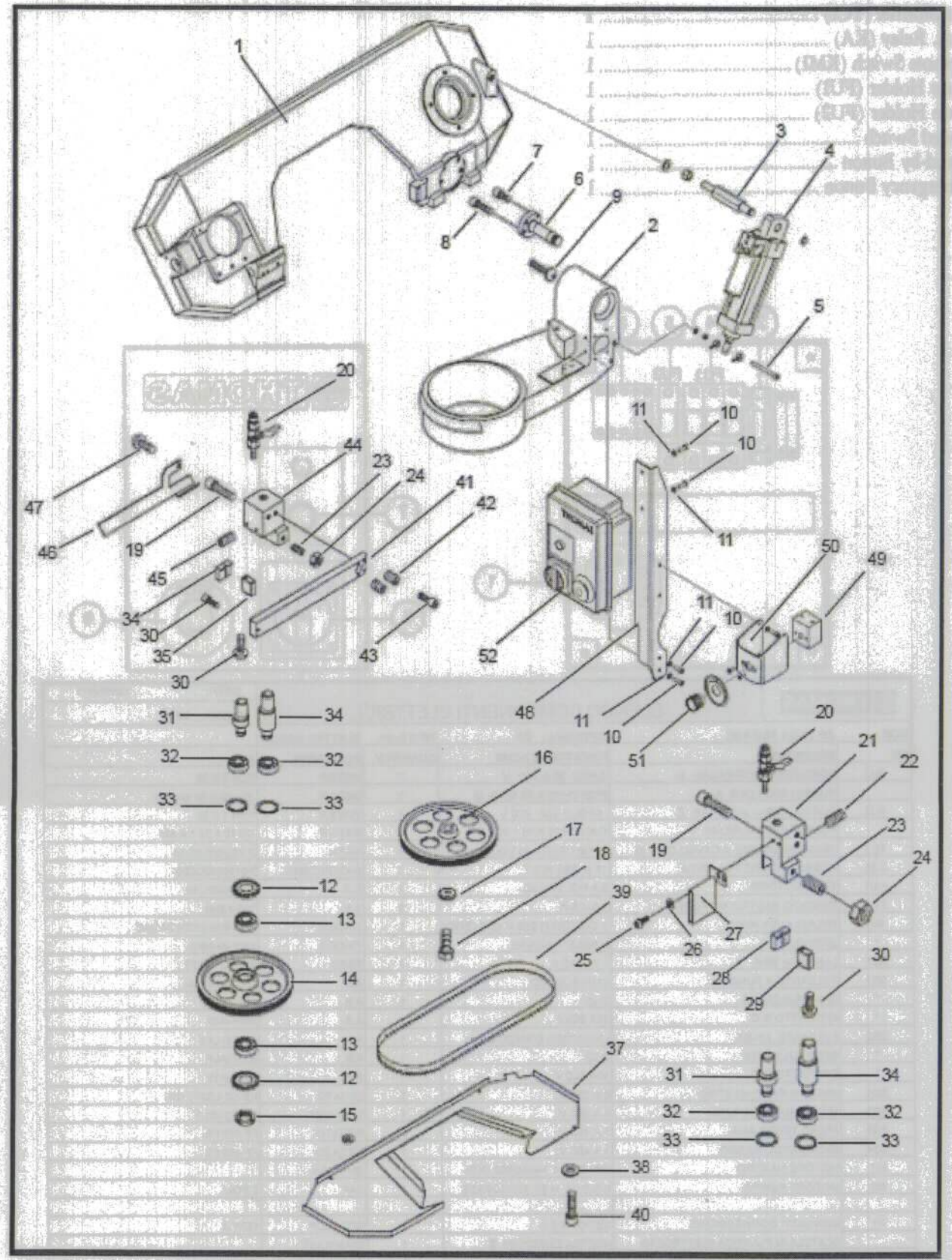




Tav.3 - Basamento

Table 2 Sawframe and Vice ZIP 29 DA	*Qty*
1) Sawframe	1
2) Support for the sawframe	1
3) Rod attachment for sawframe spring	1
4) Spring for sawframe return	1
5) Pin attachment for sawframe spring	1
6) Hinged Pin for sawframe	1
7) Screw TCEI M10x25	2
8) Screw TCEI M10x40	2
9) Screw TCEI M8x30	2
10) Screw TCEI M6x20	4
11) Washer M6	2
12) Ring Nilos 32006X AV	2
13) Bearing 32006X	2
14) Return Flywheel	1
15) Nut GUK M30	1
16) Motor Flywheel	1
17) Washer	1
18) Screw TE M12x20	1
19) Screw TCEI M6x10	2
20) Valve 1/8"	2
21) Block for blade tension	2
22) Screw M6x6	2
23) Screw M8x20	2
24) Exagonal Nut M8	2
25) Screw TBEI M5x12	2
26) Washer 12-5,5x0,8	3
27) Blade Protection	1
28) Mobile blade-guide Pad	1
29) Fixed blade-guide Pad	1
30) Screw TBEI M6x30	4
31) Short eccentric Pin	2
32) Bearing 608 2RS	4
33) Ring S10	4
34) Long eccentric Pin	2
35) Mobile blade-guide Pad	1
36) Fixed blade-guide Pad	1
37) Sawframe Guard	1
38) Washer	1
39) Blade	1
40) Handle M6x10	4
41) Mobile blade-guide Bar	1
42) Screw M6x15	1
43) ScrewTCEI M8x20	1
44) Block for blade tension	1
45) Screw M6x6	2
46) Blade Protection	1
47) Screw TBEI M6x10	1
48) Support for electric box	1
49) Regulator for sawframe downfeed speed	1
50) Support for regulator	1
51) Regulator Knob	1
52) Electric Box	1

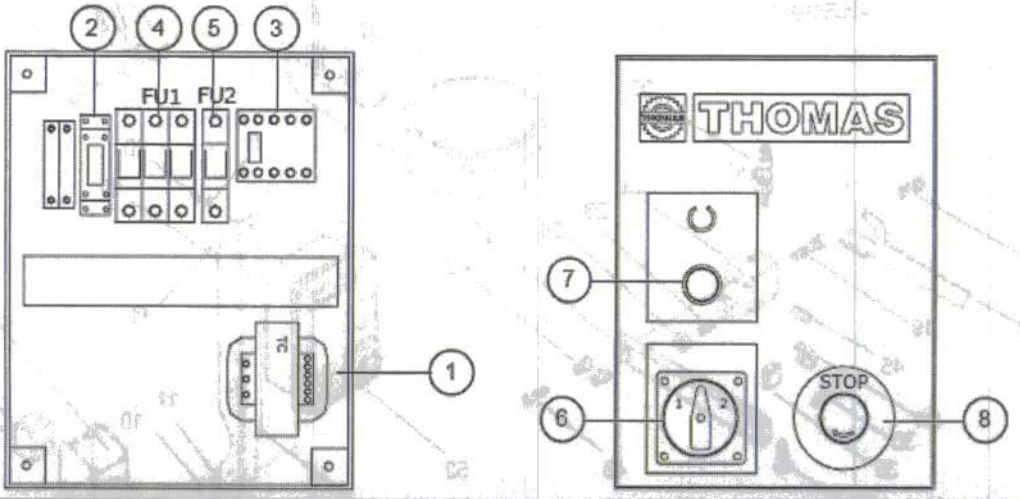
Table 2 Sawframe and Vice ZIP 29 DA



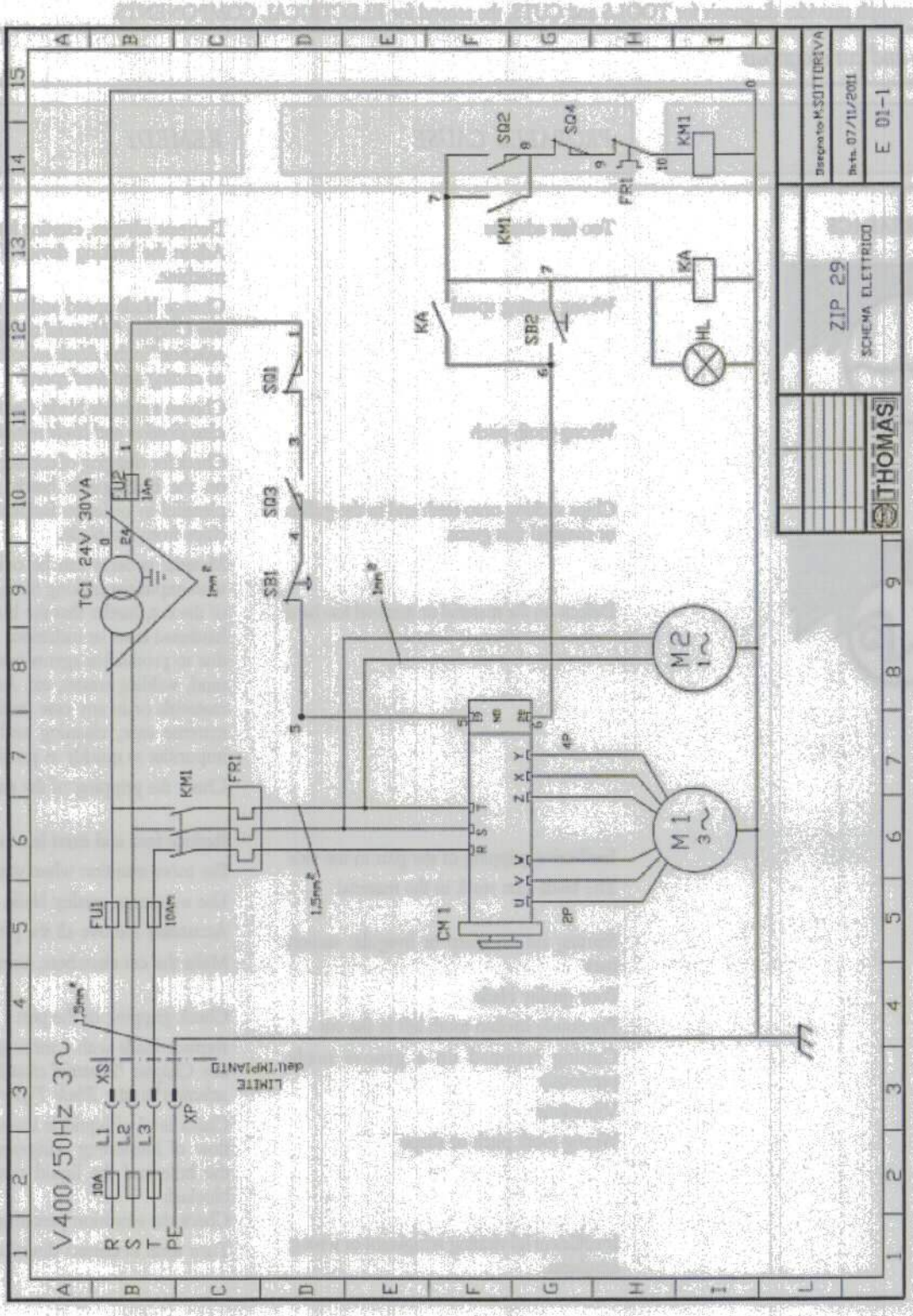
Tav. 2 - Basamento

11 WIRING DIAGRAMS

1) Transformer (TC1) 1
2) Aux. Relay (KA) 1
3) Remote Switch (KM1) 1
4) Fuse Holder (FU1) 1
5) Fuse Holder (FU2) 1
6) Speed Switch 1
7) Stand-by Button 1
8) Emergency Button 1



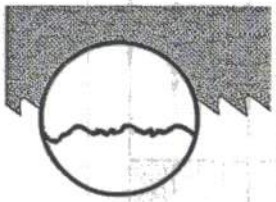
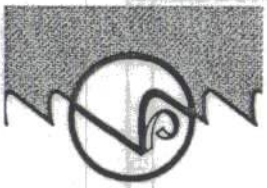
THOMAS	ELENCO COMPONENTI ELETTRICI				DATA: 12/10/2011 SCHEMA : E01-1
MOD.:	ZIP 29-DA TRIFASE	OPTIONAL: CE	TIPO D.SP.	ELETTRO CABL.	
RIF.	DESCRIZIONE	CARATTERISTICHE	QUANTITA'	FORNITORE	ART.
FU1	PORTAFUSIBILI TRIPOLAR E	3 POLI 32 A 600 V	1	WEBER	PCH 3 X 38
	FUSIBILI PROT.LINE A	FUS/ CH 10 X 38 12AG G	3	WEBER	CH 10 X 38 10A AM
FU2	PORTAFUSIBILI UNIPOLAR E	1 POLO 32A 600 V	1	WEBER	PCH 1 X 38
	FUSIBILI PROT.AUSILIAR I	FUS/ CH 10 X 38 1 600V	1	WEBER	CH 10 X 38 1 A AM
TC1	TRASFORMATORE A CAVALLOTT O	20 VA USCITA 24 VOL T	1	METH	P 230/400 S0-24
C.M.	COMMUTATORE POLARITA	16 A 690 VOLT	1	GIOVENZANA	PD160630S009
KM1	TELERUTTORE	9 A NO. 24 VAC	1	A.B.	100-K09KJ10
FR1	TERMICO NASTRO MOTORE	3,5-4,8-A	1	A.B.	193-KB48
KA	RELAIS AUSILIARIO	1 CONTATTI 250 V 10 A+ZOCC	1	FINDER	ART 4031800024 24 VAC
"	ZOCCOLO	X RELE' FINDERE	1	FINDER	ART 40-9563
HL1	LAMPADA SPIA	2 W BAS 9	1	REER	30 V. 2 WATT
SB1	PULSANTE A FUNGO	CON BLOCCO	1	A.B.	800 FP-MT 44
"	BASE PULSANTE	D.22	1	A.B.	800F-ALP
"	CONTATTO N.C.	10A 600V	1	A.B.	800F-XD1
SB2	PULSANTE LINEA	LUMINOSO BIANCO D.22	1	A.B.	800FP-LF3
"	BASE PULSANTE	D.22	1	A.B.	800F-ALP
"	CONTATTO N.O.	10A 600 V	1	A.B.	800F-X10
SQ1	MICRO RIPARO NASTRO	6 A 250 V.	1	LOVATO	KB N2 L02PV155
SQ2	MICRO IMPUGNATURA	4 A 250 V.	1	CROUZET	E.F.83161.1
SQ3	MICRO TENDILAMA	3 A 400 V.	1	PIZZATO	FF 4501/3
SQ4	MICRO ARCO BASSO	3 A 400 V.	1	PIZZATO	FF 4501/2
M1	MOTORE NASTRO	KW 0,55-1 1400/2800 GIRI	1	JIUH DAH	
M2	MOTORE POMPA	KW 0.05 H 85 MONOFASE	1	SAP	2 POLI
X1	MORSETTI CONNESSIONE	SEZIONE 2,5	3	COTACLIP	1574'.2
	SCATOLA IN PLASTICA ELETTROCAB .	NOSTRA 230E0009/1 0	1	STANPLAST	
	PELLICOLA PANNELLO ELETTROCAB .	NOSTRA 220X018 1	1	TECNOTARGH E	220X0181
	SCATOLA IMP. ELETTRICO	ELETTROCABLAGGI	1		TIPO D.SPECIAL

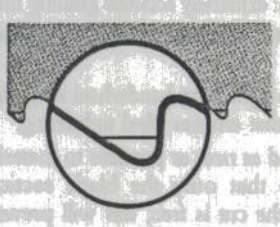
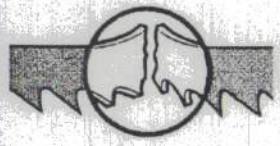

V400/50Hz 3~
R
S
T
PE
L1
L2
L3
XS
XP
10A
FU1
10AM
TC1 24V 30VA
FU2
1AM
SQ1
SQ2
SQ3
SQ4
SB1
SB2
KM1
FR1
KA
HL
M1
3~
M2
1~
CN1
ZIP 29
SCHEMA ELETTRICO
THOMAS
E 01-1

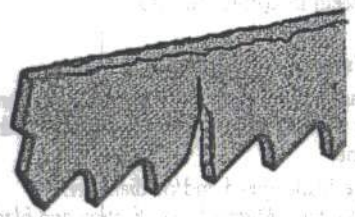
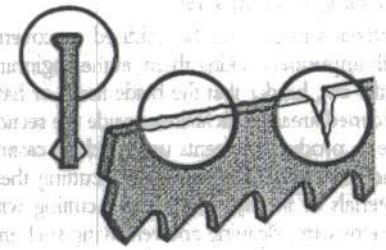
12 TROUBLESHOOTING

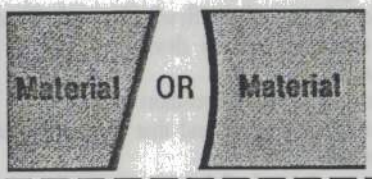
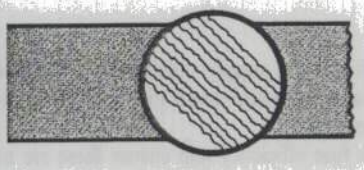
This chapter lists the probable faults and malfunctions that could occur while the machine is being used and suggests possible remedies for solving them.
The first paragraph provides diagnosis for TOOLS and CUTS, the second for ELECTRICAL COMPONENTS.

12.1 - Blade and cut diagnosis

FAULT	PROBABLE CAUSE	REMEDY
TOOTH BREAKAGE 	Too fast advance	Decrease advance, exerting less cutting pressure. Adjust the braking device if mounted on the machine.
	Wrong cutting speed	Change blade speed and/or diameter. See Chapter *"Material classification and blade selection"* in the *Blade selection table according to cutting and feed speed.*
	Wrong tooth pitch	Choose a suitable blade. See Chapter *"Material classification and blade selection".*
	Chips sticking onto teeth and in the gullets or material that gums	Check for clogging of cooling liquid drain holes on the blade-guide heads and that flow is plentiful in order to facilitate the removal of chips from the blade.
	Defects on the material or material too hard	Material surfaces can be oxidised or covered with impurities making them, at the beginning of the cut, harder that the blade itself, or have hardened areas or inclusions inside the section due to productive agents used such as casting sand, welding wastes, etc. Avoid cutting these materials or in any case perform cutting with extreme care, cleaning and removing such impurities as quickly as possible.
	Ineffective gripping of the part in the vice	Check the gripping of the part.
	The blade gets stuck in the material	Reduce feed and exert less cutting pressure.
	Starting cut on sharp or irregular section bars	Pay more attention when you start cutting.
	Poor quality blade	Use a superior quality blade.
	Previously broken tooth left in the cut	Accurately remove all the parts left in.
	Cutting resumed on a groove made previously	Make the cut elsewhere, turning the part.
	Vibrations	Check gripping of the part.
	Wrong tooth pitch or shape	Replace blade with a more suitable one. See Chapter *"Material classification and blade selection"* in the *Blade Types* section.
	Insufficient lubricating refrigerant or wrong emulsion	Check level of liquid in the tank. Increase the flow of lubricating refrigerant, checking that the hole and the liquid outlet pipe are not blocked. Check the emulsion percentage.
	Teeth positioned in the direction opposite the cutting direction	Turn teeth in correct direction.

FAULT	PROBABLE CAUSE	REMEDY
PREMATURE BLADE WEAR 	Faulty running-in of blade	See Chapter *"Material classification and blade selection"* in the *Blade running-in* section.
	Teeth positioned in the direction opposite the cutting direction	Turn teeth in correct direction.
	Poor quality blade	Use a superior quality blade.
	Too fast advance	Decrease advance, exerting less cutting pressure. Adjust the braking device if mounted on the machine.
	Wrong cutting speed	Change blade speed and/or diameter. See Chapter *"Material classification and blade selection"* in the *Blade selection table according to cutting and feed speed.*
	Defects on the material or material too hard	Material surfaces can be oxidised or covered with impurities making them, at the beginning of the cut, harder that the blade itself, or have hardened areas or inclusions inside the section due to productive agents used such as casting sand, welding wastes, etc. Avoid cutting these materials or in any case perform cutting with extreme care, cleaning and removing such impurities as quickly as possible.
	Insufficient lubricating refrigerant or wrong emulsion	Check level of liquid in the tank. Increase the flow of lubricating refrigerant, checking that the hole and the liquid outlet pipe are not blocked. Check the emulsion percentage.
BLADE BREAKAGE 	Faulty welding of blade	The welding of the blade is of utmost importance. The meeting surfaces must perfectly match and once they are welded they must have no inclusions or bubbles; the welded part must be perfectly smooth and even. They must be evenly thick and have no bulges that can cause dents or instant breakage when sliding between the blade guides.
	Too fast advance	Decrease advance, exerting less cutting pressure. Adjust the braking device if mounted on the machine.
	Wrong cutting speed	Change blade speed and/or diameter. See Chapter *"Material classification and blade selection"* in the *Blade selection table according to cutting and feed speed.*
	Wrong tooth pitch	Choose a suitable blade. See Chapter *"Material classification and blade selection"*.
	Ineffective gripping of the part in the vice	Check the gripping of the part.
	Blade touching material at beginning of cut	At the beginning of the cutting process, never lower the saw frame before starting the blade motor.

FAULT	PROBABLE CAUSE	REMEDY
	Blade guide heads not regulated or dirty because of lack of maintenance	Check distance between bearings (see Chapter *"Machine adjustments"* in the *Blade Guide Heads* section): extremely accurate guiding may cause cracks and breakage of the tooth. Clean carefully.
	Blade too slack	Check that the tightening handwheel is against the set screw that ensures ideal tightening.
	Blade guide head too far from material to be cut	Approach head as near as possible to material to be cut so that only the blade section employed in the cut is free, this will prevent deflections that would excessively stress the blade.
	Improper position of blade on flywheels	The back of blade rubs against the support due to deformed or poorly welded bands (tapered), causing cracks and swelling of the back contour.
	Insufficient lubricating refrigerant or wrong emulsion	Check level of liquid in the tank. Increase the flow of lubricating refrigerant, checking that the hole and the liquid outlet pipe are not blocked. Check the emulsion percentage.
		Replace them.
STREAKED OR ETCHED BANDS	Damaged or chipped blade guide bearings Tight or slackened blade guide bearings	Adjust them (see Chapter *"Machine adjustments"* in *Blade guide* section).
CUTS OFF THE STRAIGHT	Blade not parallel as to the counter-vice	Check fastenings of the blade guide heads as to the counter-vice so that they are not too loose and adjust heads vertically; bring into line the position of the degrees and if necessary adjust the stop screws of the degree cuts.
	Blade not perpendicular due to the excessive play between the guide bearings and mal-adjustment of the heads	Check and vertically re-adjust the blade guide heads; reset proper side guide play (see Chapter *"Machine adjustments"* in *Blade guide* section).
	Too fast advance	Decrease advance, exerting less cutting pressure. Adjust the braking device if mounted on the machine.
	Blade guide head too far from material to be cut	Approach head as near as possible to material to be cut so that only the blade section employed in the cut is free, this will prevent deflections that would excessively stress the blade.
	Blade too slack	Check that the tightening handwheel is against the set screw that ensures ideal tightening.
	Worn out blade	Replace it.
	Wrong tooth pitch	Blade with major density of teeth is being used, try using one with less teeth (see Chapter *"Material classification and blade selection"* in the *Blade Types* section).

FAULT	PROBABLE CAUSE	REMEDY
	Broken teeth	Irregular work of the blade due to the lack of teeth can cause deflection in the cut; check blade and if necessary replace it.
	Insufficient lubricating refrigerant or wrong emulsion	Check level of liquid in the tank. Increase the flow of lubricating refrigerant, checking that the hole and the liquid outlet pipe are not blocked. Check the emulsion percentage.
FAULTY CUT 	Worn out flywheels	The support and guide flange of the band are so worn out that they cannot ensure the alignment of the blade, causing faulty cutting; blade rolling and drawing tracks can have become tapered. Replace them.
	Flywheel housing full of chips	Clean with compressed air.
	Blade too slack	Check that the tightening handwheel is against the set screw that ensures ideal tightening.
STREAKED CUTTING SURFACE 	Too fast advance	Decrease advance, exerting less cutting pressure. Adjust the braking device if mounted on the machine.
	Poor quality blade	Use a superior quality blade.
	Worn out blade or with chipped and/or broken teeth	Replace it.
	Wrong tooth pitch	Blade with not enough teeth is being used, try using one with major density (see Chapter *"Material classification and blade selection"* in the *Blade Types* section).
	Blade guide head too far from material to be cut	Approach head as near as possible to material to be cut so that only the blade section employed in the cut is free, this will prevent deflections that would excessively stress the blade.
	Blade too slack	Check that the tightening handwheel is against the set screw that ensures ideal tightening.
	Insufficient lubricating refrigerant or wrong emulsion	Check level of liquid in the tank. Increase the flow of lubricating refrigerant, checking that the hole and the liquid outlet pipe are not blocked. Check the emulsion percentage.
GUIDE BEARINGS PRODUCING NOISE	Dirt and/or chips between blade and guide bearings.	Replace them.
	Chipped bearings	Replace them.
	Worn out or damaged bearings	

12.2 - Electrical components diagnosis

FAULT	PROBABLE CAUSE	REMEDY
MACHINE DOES NOT WORK	Power supply	Check: - phases - cables - socket - plug Voltage must arrive upstream from the fuses (terminal board).
	Fuses "FU 1"	Check electrical efficiency and check for shorts that trigger such protections.
	"SQ 1" safety microswitch	Check closing of the flywheel guard. Check the efficiency of the device; replace it if damaged.
	Speed switch "SA" in position "0" Emergency button "SB 1" on	It must be turned to position 1 or 2. Ensure that it is off and that its contacts are unbroken.
	Cycle reset or line button "SB 2"	Check mechanical efficiency; replace if damaged.
	Thermal relay of band motor	Check that thermal relay protecting band motor is correctly cennected.
	Transformer "TC 1"	Check that the supply voltage is the same as the line voltage and that it gives a value of 24 V at output.
	Fuse "FU 2"	Check fuse efficiency and ensure there are no short circuits causing the protection to trip.
MOTOR STOPPED WITH PILOT LIGHT "HL" LIT	Microswitch "SQ 2"	Check operation and/or efficiency; replace if broken.
	Remote-control switch "KM"	Check that phases are present at both input and output; ensure that it is not blocked, that it closes when fed, that it does not cause short circuits; otherwise change it.
	Motor "M 1"	Check that it is not burnt and that it turns freely. It may be rewound or changed.

13 NOISE TESTS

In accordance with point 1.7.4.f of the Machines Directive EEC 98/37

2 measurements with the machine operating unloaded.
- The microphone was been located close to the operator's head, at medium height.
- The weighted equivalent continuous acoustic pressure level was 68,1 dB (A).
- The maximum level of the WEIGHTED instantaneous acoustic pressure C was always less than 130 dB.

NOTE: with the machine operating, the noise level will vary according to the different materials being processed. The user must there-fore assess the intensity and if necessary provide the operators with the necessary personal protection, as required by Law 277/1991.

PLATES AND LABELS