INSTRUCTION MANUAL

EB-350DSA
Swivel Head Metal Cutting Band Saw (415V)
350 x 220mm (W x H) Rectangle

B070

PLANT SAFETY PROGRAMME

NEW MACHINERY HAZARD IDENTIFICATION, ASSESSMENT & CONTROL

Stock Code: B070

Description: Metal Cutting Bandsaw **Model:** EB-350DSA **Brand:** HAFCO

Developed in Co-operation Between A.W.I.S.A and Australia Chamber of Manufactures
This program is based upon the Australian Worksafe Standard for Plant(NOHSC:1010-1994)

Item No.	Hazard Identification	Hazard Assessment	Risk Control Strategies (Recommended for Purchase / Buyer / User)
A	ENTANGLEMENT	HIGH	Eliminate, avoid loose clothing / Long hair etc.
B	CRUSHING	LOW	Secure & support Long / heavy material
C	CUTTING, STABBING, PUNCTURING	MEDIUM	Blade guards should always be in the closed position before starting machine. Blade guide system should be adjusted to suit material width. Wear gloves when changing blades. Isolate main power switch before changing blade, cleaning or adjusting. If blade breaks do not open door until both wheels have stopped. Check blade tracking before starting.
D	SHEARING	MEDIUM	Make sure all guards are secured shut when machine is on. Isolate power to machine prior to changing belts or maintenance.
F	STRIKING	LOW	Support long heavy jobs and stand clear of offcuts. Stand clear of machine when in operation. Remove all loose objects around moving parts. Wear safety glasses
H	ELECTRICAL	MEDIUM	All electrical enclosures should only be opened with a tool that is not to be kept with the machine. Machine should be installed & checked by a Licensed Electrician.
O	OTHER HAZARDS, NOISE.	LOW	Wear hearing protection as required.
Plant Safety Program to be read in conjunction with manufactures instructions			

HARE & FORBES MACHINERYHOUSE
ABN 96 000 286 957

"THE JUNCTION" 2 WINDSOR ROAD, NORTHMEAD NSW 2152
Phone (02) 9890 9111 Fax (02) 9890 3888

Authorised and signed by:
Safety officer:
Manager:

Date: Mar-02

1 ACCIDENT PREVENTION AND SAFETY REGULATION

This machine has been designed to comply with national and community accident-prevention regulations. 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 machine motor is the same as the line voltage.
- Check the efficiency of your electric supply and grounding system; connect the power cable of the machine to the socket and the ground lead (yellow-green in color) to the grounding system.
- When the saw frame is in suspended mode (or raised) the blade must not move.
- Only the blade section used for cutting must be kept unprotected. To remove guards operate on the adjustable head.
- It is forbidden to use the machine without its shields
- 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 like: shirts 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. Never have several objects in your hands at the same time. Keep your hands as clean as possible.
- All 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 The electrical equipment according to European Standard "CENELEC EN 60 204-1" which assimilates, with some integrating modifications, the publication "IEC 204-1 (1992)"

- 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 as low voltage (24V). 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 grounding; in the event of a 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

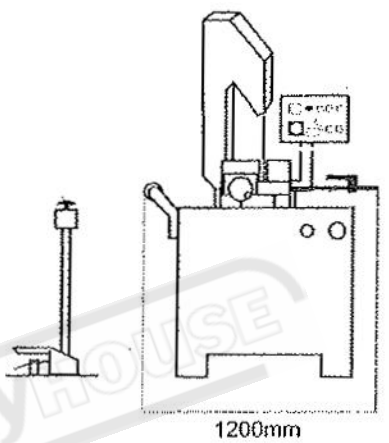
1.3 *Emergencies according to European Standard "CENELEC EN 60 204-1 (1992)"*

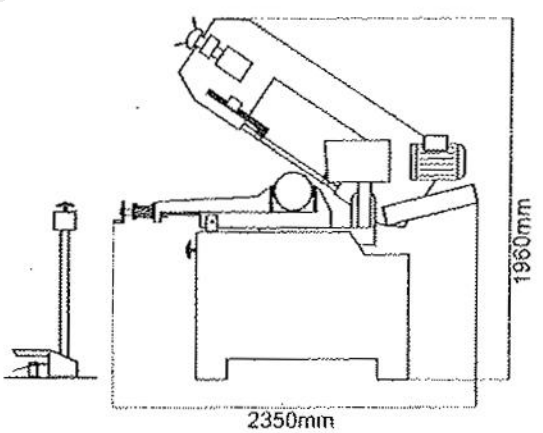
- In the event of incorrect operation or of danger conditions, the machine may be stopped immediately by pressing the red mushroom button.
- The casual or voluntary removal of the protection shield of the flywheels causes the stepping-in of a microswitch that automatically stops all machine functions.

NOTE: Resetting of machine operation after each emergency stop requires specific restart button.

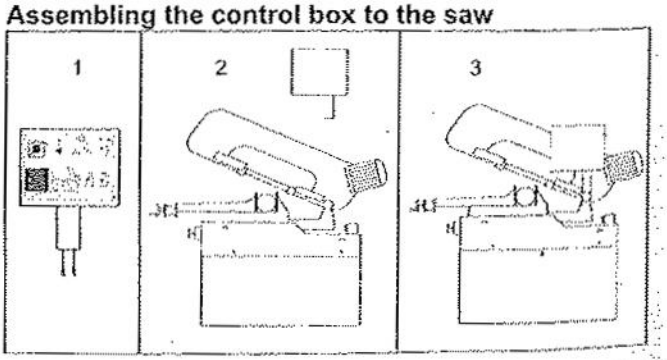
2 MACHINE DIMENSIONS TRANSPORT INSTALLATION DISMANTLING

2.1 Machine dimensions



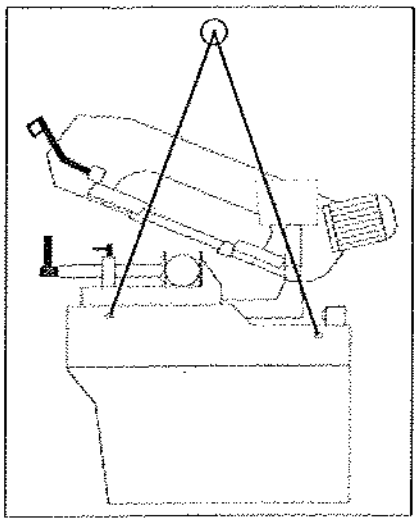


Assembling the control box to the saw



- Attach the control box to the saw with two provided set screws.

2.2 Transportation of your machine

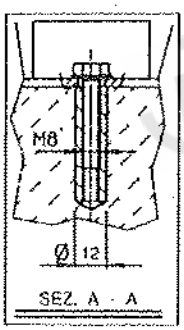


To move the machine, the machine needs to be moved in its own packing, use a forklift truck or sling it with straps as illustrated in the drawing above.

2.3 Minimum requirements for housing the machine

- Main voltage and frequency must comply with the machine's motor requirements.
- Environment temperature should fall within –10 °C to +50 °C.
- Relative humidity cannot be over 90%.

2.4 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.

2.5 Instructions for assembly of the loose parts and accessories

Fit the components supplied:
Detail 1 Mount bar-stop rod
Detail 2 Mount and align the roll-supporting arm as per the counter-vice table.

2.6 Disactivation of machine

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

I) Detach the plug from the electric supply panel
2) Loosen blade
3) Release the saw arm return spring
4) Empty the coolant tank
5) Carefully clean and grease the machine
6) If necessary, cover the machine.

2.7 Dismantling (due to deterioration and/or (obsolescence)

General rules

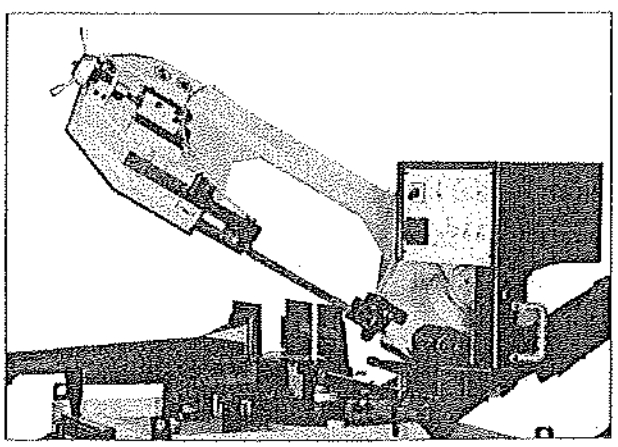
If the machine is to be permanently demolished and/or scrapped, divide the material to be disposed of according to type and composition, as follows:
1) Cast iron or ferrous materials, composed of metal alone are secondary raw materials, so they may be taken to an iron foundry for re-smelting after having removed the contents (classified in point 3).
2) Electrical components, including the cable and electronic material (magnetic cards, etc.), fall within the category of material classified as being assimilated to urban waste according to the laws of your local, state, or federal government, so they may be set aside for collection by the public waste disposal service;
3) Old mineral and synthetic and/or mixed oils, emulsified oils and greases are considered hazardous or special refuse, so they must be collected, transported and disposed of at a special waste disposal service.

NOTE: The standards and legislation concerning refuse is in a constant state of evolution, therefore is subject to changes. The user must keep informed of the regulations at the time of disposal as these may differ from those described above.

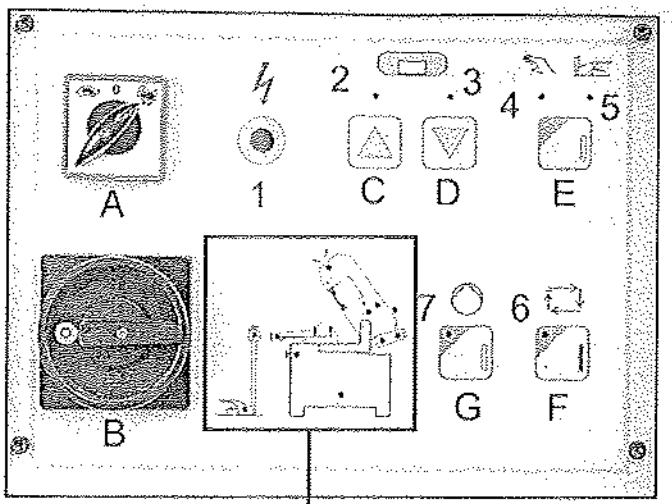
3 *THE MACHINE'S FUNCTIONAL PARTS*

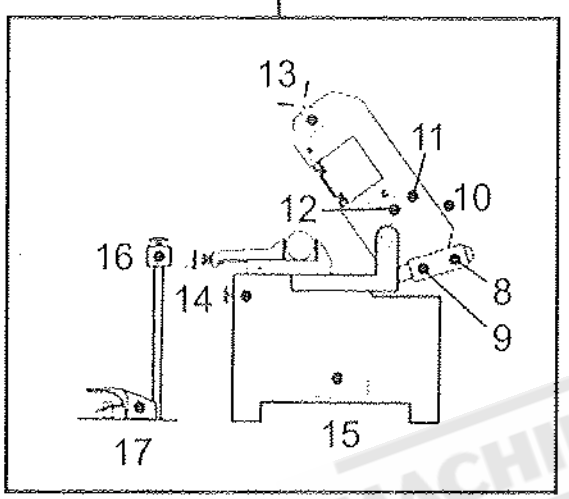
3.1 The saw arm

Machine part consisting of drive members (gear motor or variable speed motor, flywheels), tightening and guide (blade tightening slide, blade guide blocks) of tool.

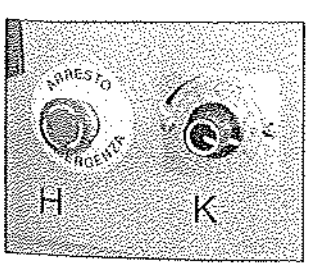


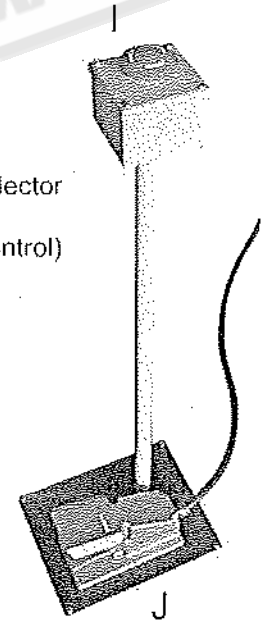
3.2 Controls





A~G Control Switches
A. Speed selector
B. Main connect switch
C. Saw bow up switch
D. Saw bow down switch
E. Hand/foot pedal operation selector
F. Cycle start switch
G. Start switch (hydraulic flow control)
H. Emergency button
I. Footpad emergency button
J. Footpad switch
K. Flow regulator





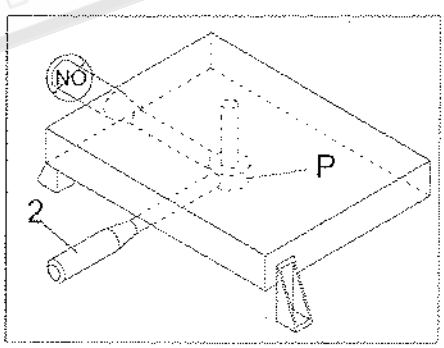
1~17 Indicator lights
Red- Warning indicator
Yellow- Selection indicator
Green- Operation indicator

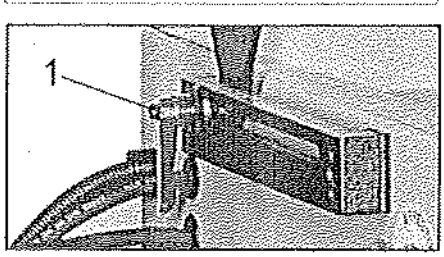
1. Power supply ON, indicator lights
2. Saw bow up, indicator light
3. Saw bow down, indicator light
4. Hand operation, indicator light
5. Foot pedal operation, indicator light
6. Cycle start switch indicator light
7. Start switch (hydraulic flow control), indicator light
8. Saw bow maximum height, indicator light
9. Saw bow lowest height, indicator light
10. Open blade cover, warning indicator light
11. Improper speed selection, warning indicator light
12. Motor overload, warning indicator light
13. Broken blade, warning indicator light
14. Emergency button indicator light
15. Hydraulic motor overload, warning indicator light
16. Foot pad's emergency button indicator light
17. Foot pad, operation indicator light

3.3 Vice adjustment

Clamping the Work Piece
- Place work piece between the jaws.
- Use the hand wheel to close the vice jaw. For multiple cuts of a same size material, leave a small gap between the work piece and vice jaw. Push cycle start button (F). The vise will automatically clamp the work piece while going through the operation cycle. When the operation cycle is finished, the vice will open and the work piece can be adjusted or replaced.

Operation of the Vice



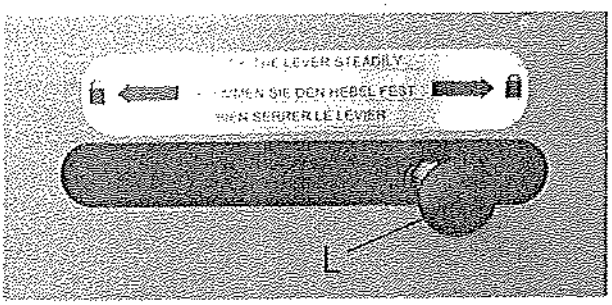


When cutting angles, it may require the adjustment of the vice jaw's position so that the saw blade's path is not impeded. Follow the procedures below.
- Release the track support by turning handle (1) counter-clockwise.
- Release the vice by moving the lever (2) to the left.
- The vice may now be moved to right position or left position by pushing with one hand on the adjustable vise jaw and the other hand on the track handle (1).
- Once in position, move the lever (2) to the right to lock it into position. If the lever (2) is not between the vice/bed mounts and facing the user, then the

vise will not be able to lock. If the vice lever (2) has gone beyond or is obstructed by a vice/bed mount, then use the following procedures.

- Adjust the lever (2) by grasping at the pivot point (P) and lowering it, which may assist in the adjustment. The lever can now be freely rotated into a more convenient position. Some movement of the vise jaw may be required. Raise the lever (2) then move to the right to lock.
- Lock the track support (1) by turning handle clockwise.

3.4 Cutting angle adjustment

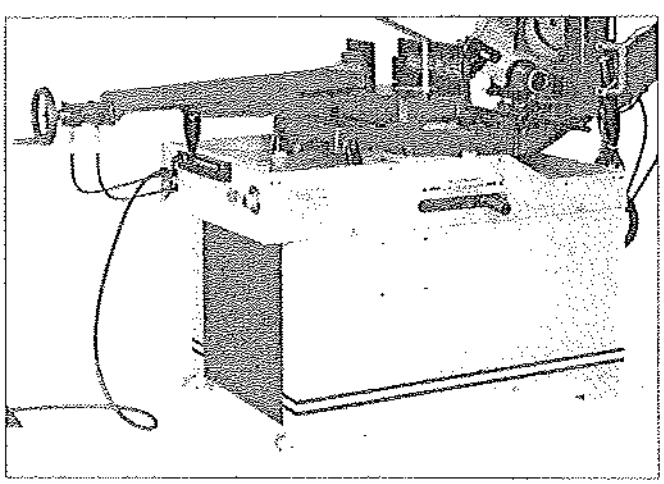


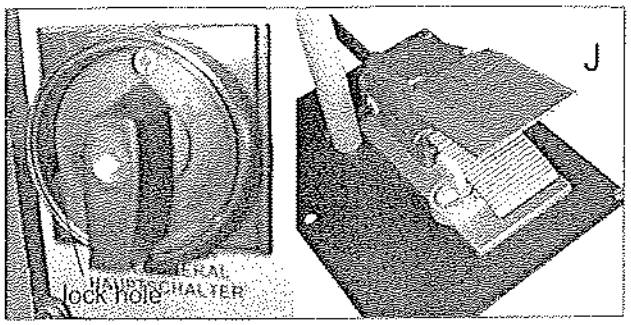
Cutting at angles

- Angle can be cut up to 60°.
- Unlock lever (L) by pushing it to the left side.
- Rotate the saw arm to the desired angle by following the index on the scale.
- Lock lever (L) by pushing to the right side.

3.5 The base

- A structure supporting the SAW ARM (revolving arm for gradual cutting and respective blocking system), the VICE, the BAR STOP, the ROLLER, and the coolant return plate for the support of the material. The base houses the cooling liquid TANK and PUMP.





The main connect switch is designed with a lock hole. A lock can be attached to the lock hole to prevent machine operation for safety and security purposes.

- To use the footpad switch (J), first use the side of the foot to push aside the plastic clip that blocks the foot pad. Be careful not to damage the clip by using excessive force or stomping on the footpad. Next, step down on the footpad to start operation.

3.6 The operation cycle

- Make sure the voltage indicated on machine motor is the same as power source voltage. Connect the machine to the power source, and Press the main connect switch (B). If power indicator light (1) is on, it means the voltages are okay.
-Select the cutting speed on switch (A).
  *Note: While selecting the cutting speed indicator light will blink.
-Press hydraulic flow control start switch (G). *Note: If the hydraulic flow control fails to activate, then switch (C), (D), and (F) cannot operate. Indicator light (7) will blink if any are pressed, indicating that start switch (G) has failed to activate.
-Check the hydraulic oil level. If oil rises up, it means the motor is running in the right direction. If not, rewire the plug.
- Check that the saw arm is properly set. Press saw bow switches (C) or (D) to adjust the bow height to help when setting the workpiece.
-Place the workpiece in the vise and clamp securely.
-Select the speed using speed selector switch (A). The turtle indicates low speed and the rabbit indicates high speed. "O" is for neutral.
-Be sure to stand in a safe location while operating.- There are two ways to start the machine. Press the a switch (C) to let the saw how return to the highest position and then using the first method, select hand operation on selector (E) and press cycle start switch (F) to start operation. Using the second method, Select footpad operation on selector (E) and step on start footpad (J) to start operation.
- In general, start cuts by slightly turning hydraulic flow regulation switch (K) counter-clockwise from 2 to 3 to control the saw arm descent rate. If the arm descends too quickly, turn hydraulic flow regulation switch (K) clockwise all the way back to stop its descent - When cutting different material use the hydraulic flow regulation switch (K) to control saw arm's rate of descent.

*Note: A saw arm dropping too quickly can cause the blade to stall on the work piece and the machine will

shut off. If so, push down on either emergency push buttons (I or H) to immediately stop all machine functions.

- During the operation cycle, the hydraulic vise will automatically close on the work piece for a distance up to 8mm. The hydraulic vise will then open maximum 8mm on end of operation. Now it is ready for the next operation. Therefore, it is not necessary to manually lock down the vise jaws on the work piece for every operation. Allowing a gap of 4-5mm between jaws and the work piece will suffice.
- The saw bow will return to the bow's maximum height upon completion of operation.

- In case of Emergency or problem during the operation cycle, press the emergency push button (H or I) down to shut off all functions.
- To release the emergency push button (H or I), rotate the mushroom shaped button clock-wise. The button will pop up and then the cutting cycle can be restarted.

- The hydraulic flow control (G) will automatically shut-off after 5 minutes of non-operation.

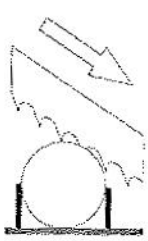
*Note: If the hydraulic flow control fails to activate, then switch (C), (D), and (F) cannot operate. Indicator light (7) will blink if any are pressed, indicating that start switch (G) has failed to activate.

- If the hand operation is selected and the foot pad is used, then the hand operation indicator light (4) will blink. And vice versa, If the foot pad operation is selected and the hand switches are used, then the foot operation indicator light (5) will blink. They indicate improper selection.
- The appropriate indicator light will blink to indicate which part of the machine has gone out of order.

1. Indicator light 14 indicates the emergency button is pressed. Indicator light 16 indicates the emergency button on foot pad is pressed.
2. Indicator light 13 indicates the band saw blade has broken.
3. Indicator light 10 indicates the blade cover is open.
4. Indicator light 12 indicates the motor has overloaded.
5. Indicator light 15 indicates the hydraulic motor has overloaded.
6. Indicator light 11 indicates the speed is not properly selected.

- If the saw bow up/down switches are out of order then indicator lights 2 and 3 will blink at the same time.

BLADE CUTTING DIRECTION

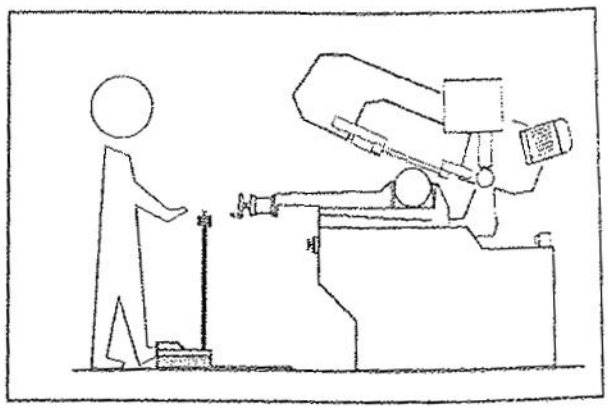


4 ADVICE ON USING YOUR BANDSAW

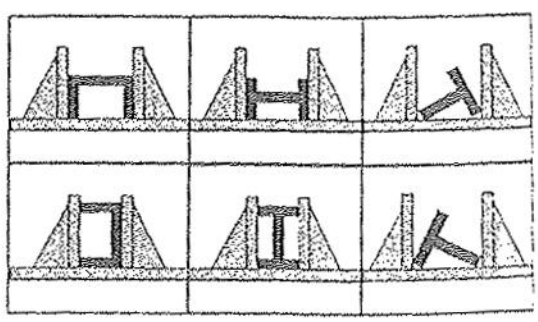
4.1 Recommendations and advice for using the machine

The machine has been designed to cut metal building materials of various shapes and profiles for use 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 clamped in the vice and that the end is suitably supported.
- These figures below 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.

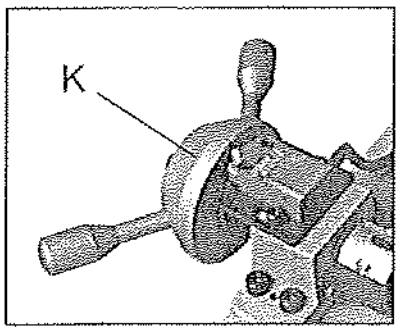


- Do not use blades of a different size from those stated in the machine specifications.
- If the blade gets stuck in the cut, press the cycle start switch or emergency button immediately to switch off the machine, open the vice slowly, remove the part and check that the blade or its teeth are not broken. If they are broken, change the blade.
- Before carrying out any repairs on the machine, consult the dealer.

5 ADJUSTING YOUR MACHINE

5.1 Blade tension assembly

Blade tension is important to the proper operation of the saw. Proper blade tension is 1200 to 1400 kgs. Per square mm as measured on a blade tension gauge.

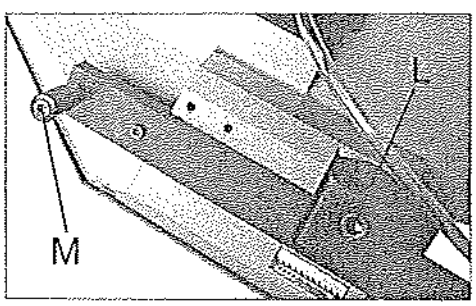


To set the blade tension without the use of a tension scale:

- Disconnect the machine from the power source.
- Install blade between wheel and insert blade between bearings on blade guides.
- Tension blade slightly to remove any sag in blade between blade wheels.
- Next turn blade tension knob (K) 1 3/4-2 revolutions clockwise. Then test the tension by pressing the flat side of the blade with your thumb, if moves within a 2mm-3mm range then it has been set correctly.
- After blade has been completely installed, close covers, connect the power source, and run saw for two to three minutes so blade can seat properly.
- Disconnect machine from the power source. Open cover and loosen blade just until it begins to sag.
- Tighten blade until it becomes straight between blade wheel and all sag has been eliminated.
- Tighten blade by tuning blade tension wheel two full revolutions. Blade is now property tensioned and ready for use.

Close covers and connect machine to the power source.

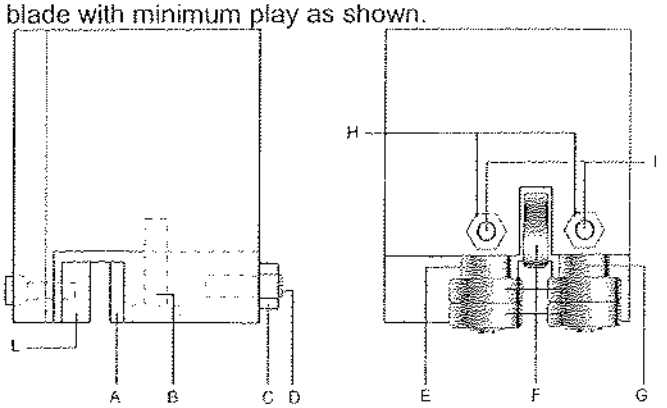
5.2 Adjusting the blade guide



- Disconnect the machine from the power source.
- Loosen hex screw (L) on the guide bar clamp.
- Hold the handle (M) and slide blade guide bar so that the blade guide is as close as possible to the material without interfering with the cut.
- Tighten hex screw (L).
- Reconnect the machine to power source.

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.

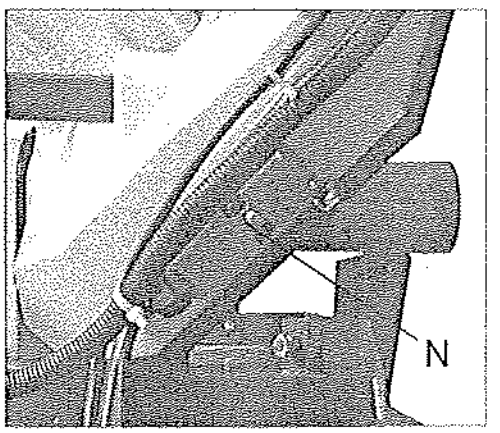


When replacing the blade use a 0.9mm thick blade for which the blade guides have been pre-set. For of blades of another thickness, the adjustment should be carried out as follows:

- 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).
- To mount the new blade: place the pad (A) on the blade, 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.

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

5.3 Changing the blade



To change the blade:

- Lift the saw arm.

- Loosen the blade with the blade tension hand wheel, remove the blade-guards, open the blade box cover and remove the old blade from the flywheels and the blade guide blocks.
- Place the new blade in between the blade guide pads and on the race of the flywheels. Check the cutting direction of the teeth.
- Tension the blade. Check that it is seated properly on the flywheels.
- Replace and fasten the blade guards and the flywheel guard. Check the safety **interlock switch (N)** is activated otherwise the machine will not start.

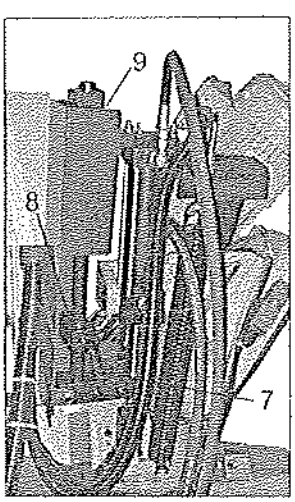
WARNING: Always use blades with the same thickness as specified by this manual to match the blade guide's factory setting; otherwise, see chapter

5.4 Saw frame return stroke-limiting device

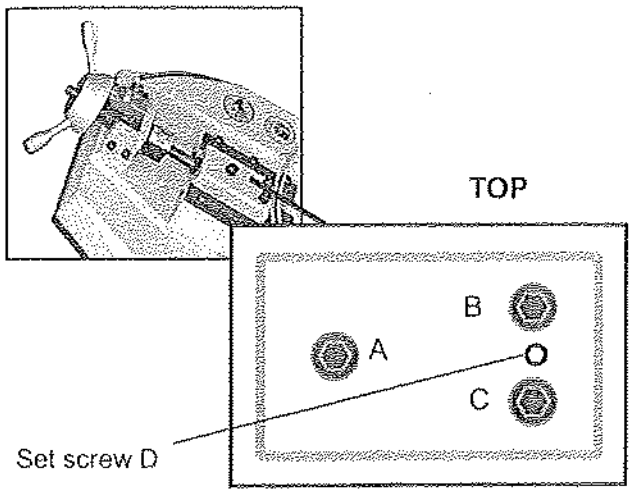
It consists in a mechanical adjustment system, mounted parallel to the saw frame rise cylinder, to reduce the passive phases of the operating cycle. In other words to eliminate the idle stroke that takes place when the size of the part to be cut is much smaller than the maximum cutting capacity. Practically, you adjust the starting position of the blade in proximity of the part, independently of its dimensions.

Operate as follows:
- Slightly open the flow regulation valve(K).
- Bring the blade as near as 10mm from the work piece with the bow up/bow down switches (C and D).
- Loosen handle (7) to release the adjustable stop (8) against the limit switch (9).
- Lock the handle (7)

ATTENTION:
- It is not necessary to adjust the mechanical stop (8) every time; bring the blade near the workpiece by means of bow switch (D) and then start the automatic cutting cycle (F) which will begin operation from this position of the blade.
- The bow will return to the upper endstroke.



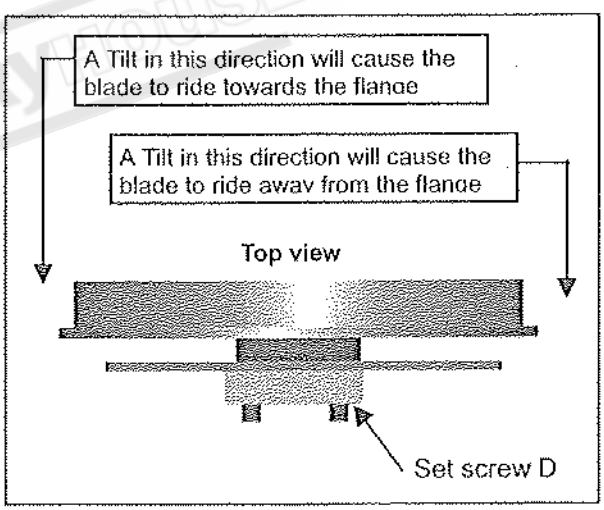
5.5 Adjusting the blade to the flywheels



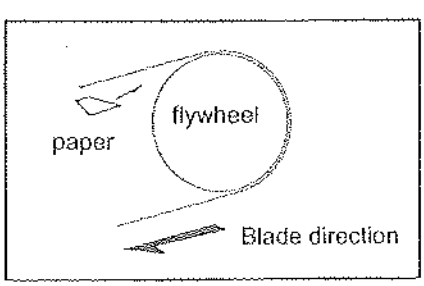
1. Loosen the hex nut screws A, B, and C.
2. Use an Allen wrench on set screw D to adjust the tilt of the flywheel.

-Turning the set screw D clockwise will tilt flywheel so that the blade will ride closer to the flange.
-Turning the set screw D counter-clockwise with tilt the flywheels that the blade will ride away from the flange. If the blade rides away too far then it will come off.

After the adjustment is finished, fasten the hex nut screws in this order: A, B, and C.



Checking the adjustment of the blade



Use a strip of scrap paper and slide it between the blade and the flywheel while it is running.
-if the paper is cut then the blade is riding too close to the flange. Re-adjust.
-if you notice that the blade is riding away from the flange. Then re-adjust.

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

5.6 Replacing the saw frame return spring

- When performing this operation it is necessary to support saw arm using the lifting device.
- Replace the spring by loosening the upper coupling rod and releasing it from the lower tie-rod.

6 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.

6.1 Daily maintenance

- General cleaning of the machine to remove accumulated shavings.
- Clean the lubricating coolant drain hole to avoid excess fluid.
- Top off 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.

6.2 Weekly maintenance

- Thorough 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.
- Use compressed air to clean the blade guides (guide bearings and drain hole of the lubricating cooling).
- Cleaning flywheel housings and blade sliding surfaces on flywheels.

6.3 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 gear motor, pump, and accident protection guarding.

6.4 Six-monthly maintenance

- Continuity test of the equipotential protection circuit.

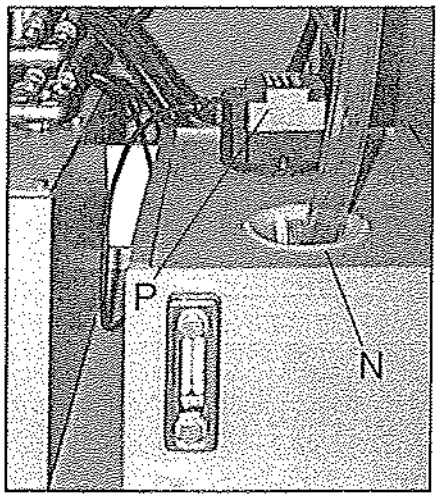
6.5 Oils for lubricating coolant

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

6.6 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*.

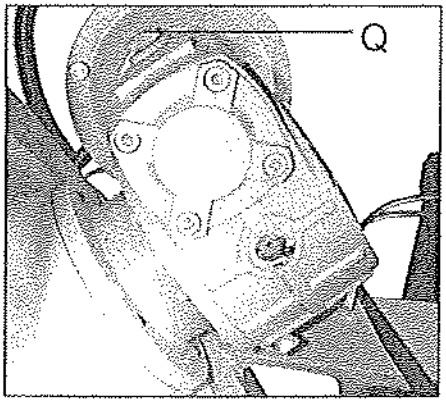
6.7 Coolant system



Cleaning the tank

- Use hex wrench to open the drain plug to allow the coolant to drain out.
- Remove the hose and filter (N).
- Remove the pump (P) by loosening the 2 set screws.
- Use a vacuum cleaner to vacuum chips and debris from the tank.
- Replace the drain plug. Thoroughly clean the pump (P) and replace.
- Fill tank with coolant to a level about 25mm below the filter.
- Replace the hose and filter.

6.8 The gear box



The gear box requires periodic changing of oil. The oil must be changed by the first 6 months of a new machine and every year thereafter.

To change the gear box oil

- Disconnect the machine from the power source.
- Raise the saw arm to vertical position
- Release the drain hold (R) to draw off gear oil by loosening the hex socket screw (S).
- Replace the screw (S) after oil completely flows off.

- Place the saw arm back to horizontal position.
- Fill Gear box with approximately .3 liter of gear oil through the hole of the vent screw (Q)

For reference, use SHELL type gear oil or Mobile gear oil #90.

6.9 Special maintenance

Special maintenance must be conducted by skilled personnel. We advise contacting your nearest dealer and/or importer. Also the reset of protective and safety equipment and devices (of the reducer), the motor, the motor pump, and other electrical components requires special maintenance.

7 TECHNICAL CHARACTERISTICS

7.1 Table of cutting capacity and technical details

CUTTING CAPACITY			
0°	270	260 x 260	350 x 220
45°	240	220 x 220	240 x 160
60°	160	150 x 150	
45°(L)	210	180 x 180	180 x 180

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 Fe430 Fe510	St37 St44 St52	E24 E28 E36	---- 43 50	---- ---- ----	116 148 180	67 80 88	360÷480 430÷560 510÷660
Carbon steels	C20 C40 C50 C60	CK20 CK40 CK50 CK60	XC20 XC42H1 ---- XC55	060 A 20 060 A 40 ---- 060 A 62	1020 1040 1050 1060	198 198 202 202	93 93 94 94	540÷690 700÷840 760÷900 830÷980
Spring steels	50CrV4 60SiCr8	50CrV4 60SiCr7	50CV4 ----	735 A 50 ----	6150 9262	207 224	95 98	1140÷1330 1220÷1400
Alloyed steels for hardening and tempering and for nitriding	35CrMo4 39NiCrMo4 41CrAlMo7	34CrMo4 36CrNiMo4 41CrAlMo7	35CD4 39NCD4 40CADG12	708 A 37 ---- 905 M 39	4135 9840 ----	220 228 232	98 99 100	780÷930 880÷1080 930÷1130
Alloyed casehardening steels	18NiCrMo7 20NiCrMo2	---- 21NiCrMo2	20NCD7 20NCD2	En 325 805 H 20	4320 4315	232 224	100 98	760÷1030 690÷980
Alloyed for bearings	100Cr6	100Cr6	100C6	534 A 99	52100	207	95	690÷980
Tool steel	52NiCrMoKU C100KU X210Cr13KU 58SiMo8KU	56NiCrMoV7C100K C100W1 X210Cr12 ----	---- ---- Z200C12 Y60SC7	---- BS 1 BD2-BD3 ----	---- S-1 D6-D3 S5	244 212 252 244	102 96 103 102	800÷1030 710÷980 820÷1060 800÷1030
Stainless steels	X12Cr13 X5CrNi1810 X8CrNi1910 X8CrNiMo1713	4001 4301 ---- 4401	---- Z5CN18.09 ---- Z6CDN17.12	---- 304 C 12 ---- 316 S 16	410 304 ---- 316	202 202 202 202	94 94 94 94	670÷885 590÷685 540÷685 490÷685
Copper alloys Special brass Bronze	Aluminium copper alloy G-CuAl11Fe4Ni4 UNI 5275 Special manganese/silicon brass G-CuZn36Si1Pb1 UNI5038 Manganese bronze SAE43 - SAE430 Phosphor bronze G-CuSn12 UNI 7013/2a					220 140 120 100	98 77 69 56,5	620÷685 375÷440 320÷410 265÷314
Cast iron	Gray pig iron G25 Spheroidal graphite cast iron GS600 Malleable cast iron W40-05					212 232 222	96 100 98	245 600 420

ELECTRIC MOTOR-BLADE ROTATION	kW	0.75 / 1.5
REDUCTION UNIT IN OIL BATH	i	40:1
FLYWHEEL DIAMETER	mm	380
BLADE DIMENSIONS	mm	27x0.9x3160
BLADE SPEED CUTTING	m/min	34 / 68
OPENING VICE	mm	355
SAW FRAME TILTING	°	40
WORKING TABLE HEIGHT	mm	900
MACHINE WEIGHT	kg	460

8 *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 knowledge of these specifications.

8.1 Definition of materials

The table above lists the characteristics of the materials to be cut. So as to choose the right tool to use.

8.2 Selecting blade

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

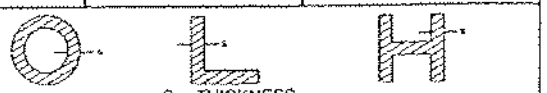
- Parts with a thin and/or variable section such as profiles, pipes and plate, fine toothing is needed, so that the number of teeth used simultaneously while cutting is from 3 to 6;
- Parts with large transverse sections and solid sections need widely spaced toothing to allow for the greater volume of 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.

8.3 Teeth pitch

As already stated, this depends on the following factors:

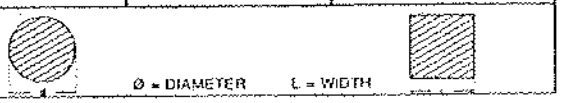
- **Hardness of the material**
- **Dimensions of the section**
- **Wall thickness.**

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

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 80	3	3/4



Ø = DIAMETER L = WIDTH

8.4 Cutting and advance speed

The cutting speed (m/min) and the advance speed (cm^2/min =area traveled 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 bath 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.

8.5 Blade running-in

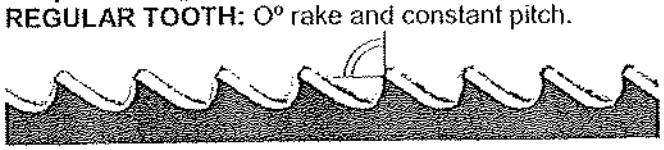
When cutting for the first time, it is good practice to run in the tool making a series of cuts at a low advance speed (= 30-35 cm^2/min on material of average dimensions with respect to the cutting capacity and solid section of normal steel with R = 410-510 $Nimm^2$). **Generously spraying the cutting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

8.6 Blade structure

Bi-metal blades are the most commonly used. They consist of a silicon-steel blade backing by a 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 (Cc) and molybdenum (Mo) contained in the metal alloy.

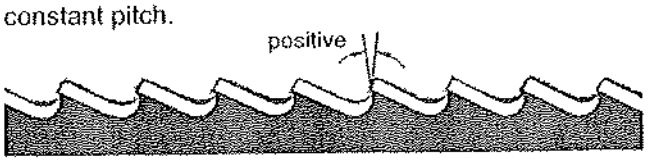
8.7 Blade type
They differ essentially in their constructive characteristics, such as:
- **Shape** and cutting **angle** of tooth
- **Pitch**
- **Set**

Shape and angle of tooth
REGULAR TOOTH: O° rake and constant pitch.



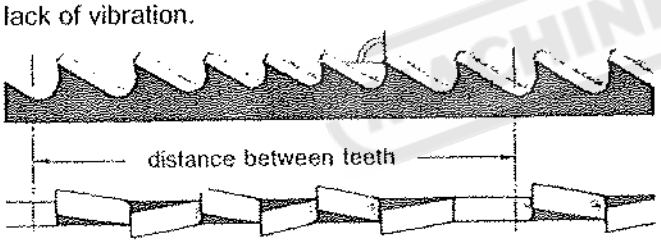
Most common form for transversal or inclined cutting of solid small and average cross-sections or pipes, in laminated mild steel and gray iron or general metal.

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



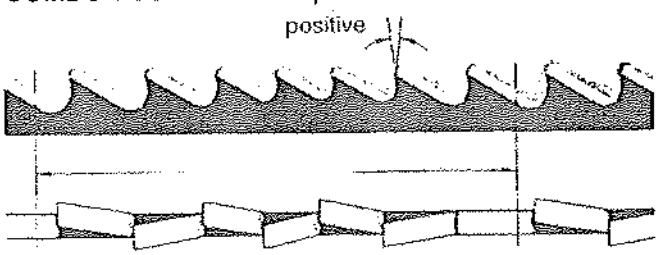
Particular use for crosswise or inclined cuts in solid sections or large pipes, but above all harder materials (highly alloyed and stainless steels, special bronze and forge pig iron).

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.

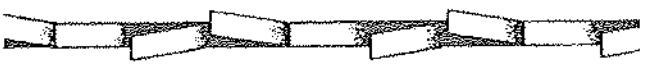
COMBO TOOTH: 9° - 10° positive rake.



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.

SETS
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 1mm).

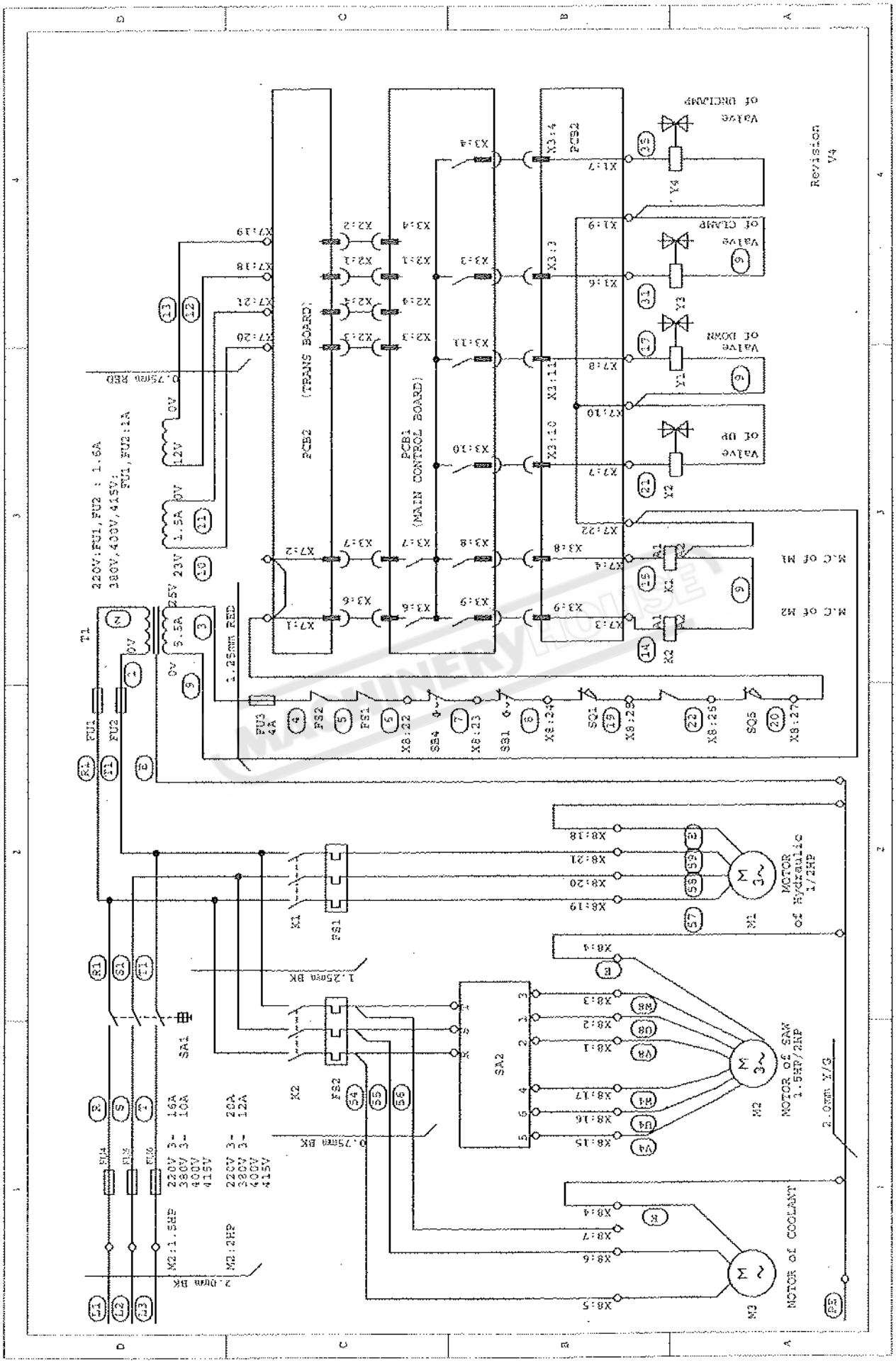
ALTERNATE SET *(INDIVIDUAL* TEETH): Cutting teeth right and left.

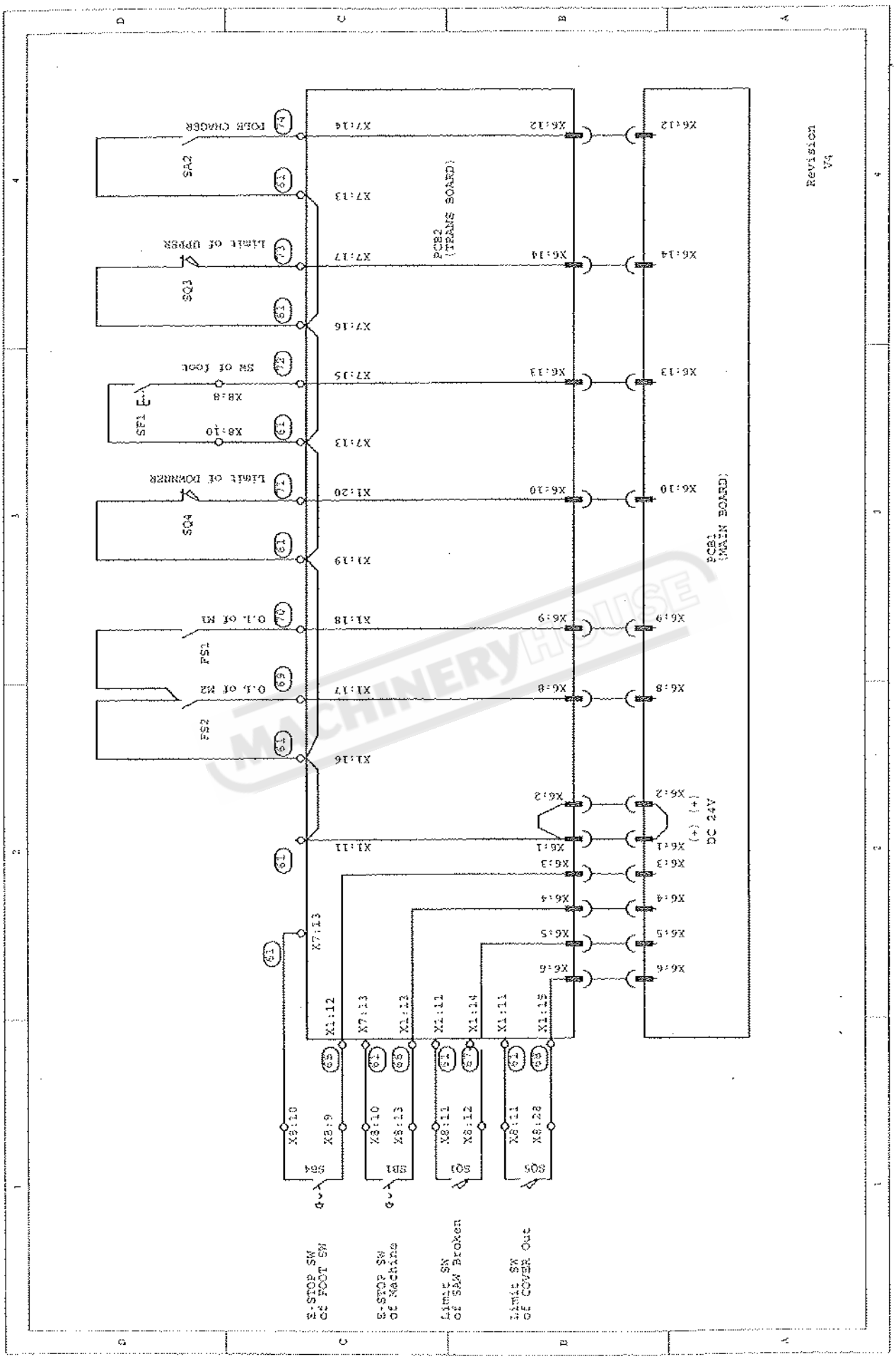
This set is used for the cutting of nonferrous soft materials, plastics and wood.

9 NOISE TESTS

The test was held under environmental noise levels of 65db. Noise measurements with the machine operating unload was 71db. Noise level during the cutting of mild carbon steel was 73db.
NOTE: with the machine operating, the noise level will vary according to the different materials being processed. The user must therefore assess the intensity and if necessary provide the operators with the necessary personal protection, as required by Law 277/1991.

10 *WIRING DIAGRAMS*

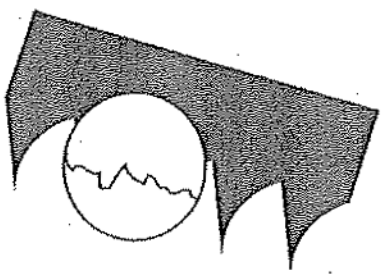
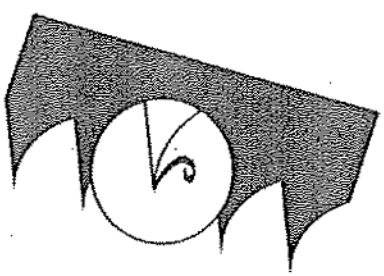


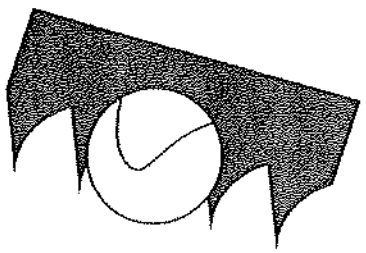
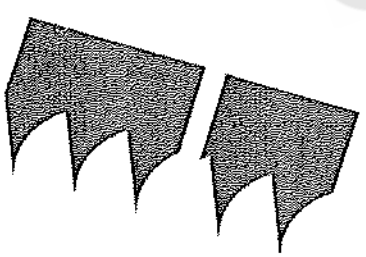
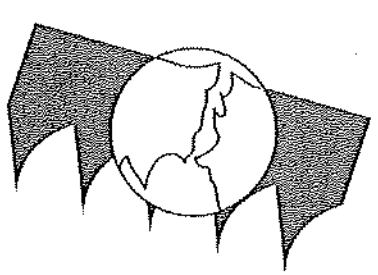

Revision
V4
PCB2
(TRANS BOARD)
PCB1
(MAIN BOARD)
FOOT CHANGER
SA2
LIMIT OF UPPER
SQ3
SW OF FOOT
SF1
LIMIT OF DOWNER
SQ4
O.L OF M1
PS1
O.L OF M2
PS2
DC 24V
E-STOP SW
OF FOOT SW
E-STOP SW
OF Machine
LIMIT SW
OF SAW Broken
LIMIT SW
OF COVER Out

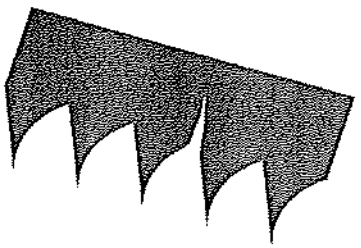
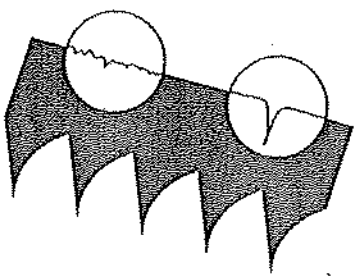
11 *TROUBLESHOOTING*

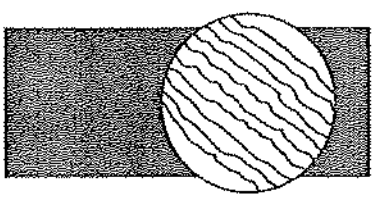
This chapter lists the probable faults and malfunctions that could occur while the machine is being used and suggests possible remedies for solving them.
The first paragraph provides diagnosis for TOOLS and CUTS the second for ELECTRICAL COMPONENTS.

11.1 - Blade and cut diagnosis

FAULT	PROBABLE CAUSE	REMEDY
TOOTH BREAKAGE 	Too fast advance	Decrease advance, exerting less cuttir pressure. Adjust the braking device.
	Wrong cutting speed	Change speed and/or type of blade. See chapter on "Material classification and blade selection", in the section *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 coolant drain holes on the blade-guide blocks 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 oxidized 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 a situation a cut has to be made use extreme care, cleaning and remove any such impurities as quickly as possible.
	Ineffective gripping of the part in the vise	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 "Material classification and blade selection" in the *Blade Types* section. Adjust blade guide pads.
	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 to correct direction.

FAULT	PROBABLE CAUSE	REMEDY
PREMATURE BLADE WEAR 	Faulty running-in of blade	**See "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.
	Wrong cutting speed	Change speed and/or type of blade. See chapter on **"Material classification and blade selection"**, in the section *Blade selection table according to cutting and feed speed.*
	Defects on the material or material too hard	Material surfaces can be oxidized 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 perform cutting with extreme care, cleaning and remove such impurities as quickly as possible.
	Insufficient lubricating refrigerant or wrong emulsion	Check level of liquid in the tank. Increase the flow of lubricating coolant, checking that the coolant nozzle and 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 guide pads.
	Too fast advance	Decrease advance, exerting less cutting pressure. Adjust the braking device.
	Wrong cutting speed	Change speed and/or type of blade.
	Wrong tooth pitch	See chapter on **"Material classification and blade selection"**, in the section *Blade selection table according to cutting and feed speed.*
	Ineffective gripping of the part in the vice	Choose a suitable blade. See Chapter **"Material classification and blade selection"**.
	Blade touching material at beginning of cut	Check the gripping of the part.
	Remedy	At the beginning of the cutting process, never lower the saw arm before starting the blade motor.

FAULT	PROBABLE CAUSE	REMEDY
 	Blade guide pads not regulated or dirty because of lack of maintenance	Check distance between pads (see **"Machine adjustments" in** the *Blade Guide Blocks* section): extremely accurate guiding may cause cracks and breakage of the tooth. Use extreme care when cleaning.
	Blade guide block 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 coolant 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.
STEAKED OR ETCHED BANDS	Damaged or chipped blade guide pads	Replace them.
	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 service	Check fastenings of the blade guide blocks as to the counter-vice so that they are not too loose and adjust blocks 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 pads and maladjustment of the blocks	Check and vertically re-adjust the blade guide blocks; 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.
	Worn out blade	Approach it 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.
	Wrong tooth pitch	Replace it. 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 coolant, checking that the hole and the liquid outlet pipe are not blocked. Check the emulsion *percentage*.
FAULTY CUT	Worn out flywheels Flywheel housing full of chips	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. Clean with compressed air.
STREAKED CUTTING SURFACE 	Too fast advance	Decrease advance, exerting less cutting pressure. Adjust the braking device.
	Poor quality blade	Use a superior quality blade.
	Worn out blade or with chipped and/or broken teeth	Replace it.
	Wrong tooth pitch	Blade used probably has too large teeth, use one with more teeth (see **"Material classification and blade selection"** in the *Blade Types* section).
	Blade guide block too far from material to be cut	Approach it 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.
	Insufficient lubricating coolant or wrong emulsion	Check level of liquid in the tank. Increase the flow of lubricating coolant, checking that the hole and the liquid outlet pipe are not blocked. Check the emulsion percentage.
NOISE ON GUIDE BLOCKS	Chipped bearings Worn out or damaged pads	Dirt and/or chips between blade and guide bearings. Replace them. Replace them.

11.2 - Electrical components diagnosis

FAULT	PROBABLE CAUSE	REMEDY
1. No Power	Blown fuse	If a fuse is blown, check the related components for an over-load or short-circuit.
	A. No operation on three-phase	Check the power supply and fuses No. FU4, FU5, FU6 for normal condition.
	B. No DC24V (The white indicator light is failed on the panel)	a. Check the transformer's inputs FU1 and FU2(1A/1.6A) for normal condition. b. Check fuse FU1(1A) on PCB1 for normal condition.
	C. No DC5V (The rest of indicator lights are failed.) I	a. Check the transformer's inputs FU1 and FU2(1A) for normal condition. b. Check fuse FU2(1A) on PCB1 for normal condition.
	D. No AC24V power	a. Check the transformer's inputs FU1 and FU2(1A) for normal condition. b. Check fuse FU3(4A) on the distributor board for normal condition. c. Check the connection points of the safety limit switches at their locations on the machine for normal condition -refer to the wire diagram No: WT/M3/C-01, connection wire No. 4, 5, 6, 7, 8, 19, and 20.
2. Hydraulic pump	Failure	a. Check on hydraulic motor M1, and see if it works. b. Check the pump for normal condition. c. Check AC contactor K1 for normal condition or over-load (FS1). d. Check the distributor board for voltage flow to Coil K1(Wire No. 9 and 15).
	Pump works but low pressure	a. Check the hydraulic motor M1 wiring for correct three phase connections. b. Check the hydraulic flow for normal condition-without staleness, shortage, or leaking.
3. Saw bow	No operation	a. Check the hydraulic pump. b. Check the hydraulic flow for normal condition. c. Check the distributor board for voltage flow to Coil K1(Wire No. 9 and 15). d. Check the signal of the hydraulic magnetic valve for normal condition (Bow up wire No. 9 and 21; bow down wire No. 9 and 17.)
4. Vise (Front, back)	No operation	a. Check the hydraulic pump. b. Check the hydraulic flow for normal condition. c. Check the control panel for voltage flow to Coil K1(Wire No. 9 and 15). d. Check the signal of the hydraulic magnetic valve for normal condition (Vise close wire No. 9 and 31; vise open wire No. 9 and 35.)

FAULT	PROBABLE CAUSE	REMEDY
5. Saw blade	Doesn't work	a. Check saw blade motor M2 for normal condition b. Check the motor's speed-exchanging switch for normal condition.. c. Check the AC contactor K2 for normal condition or over-load (FS2). d. Check on the distributor board for voltage flow to Coil K2 (Wire No. 9 and 14).
	Reversing	Check the blade motor M2 the wiring of motor phases.
6. Control panel	No operation	a. Check DC24V and DC5V (check the related components for an over-load or short-circuit.) b. Check the switches and see if each one is correctly positioned.(Refer to page 4: Other functions descriptions.)
7. Speed-exchanging switch's	Indicator light blinking	a. Check the speed-exchange switch position. b. Check the speed-exchange switch for working order. c. Check the DC24V power supply for normal condition.
8. Saw Blade	Blade-broken indicator light blinking	a. Check the blade for damage or improper placement on flywheels. b. Check the limit switches for normal conditions (Check connection for wire No. 61 and 67.)
9. Blade cover	Indicator light blinking	a. Check the blade covers, and see if both are properly located and closed. b. Check the limit switches for normal condition (Check the connection for wire No. 61 and 68.)
10. Motor M1, M2	Over-loaded indicator light blinking	a. Check the motor-loading for normal condition (neither over-loaded or short-circuited.) b. Check the wire connections for normal condition (Check the connection points for wire No. 61, and 70 on FS1, No. 61, 69 on FS2.)
11. Saw bow Up & Down	Limit switches indicators blinking at the same time	This means the both limit switches are being pressed at the same time. a. Check the DC24V power supply for normal condition. b. Check connections for each limit switch and that the wires are correctly connected (Check the Up limit switch, wires No. 61, 73; Down limit switch, wires No. 61, 71.)
12. Emergency button	Indicator light blinking	a. See if the emergency switch is stuck. b. Check the wire connections (Wires No. 61, 66 in the emergency switch on saw body; wires No. 61, 65 for the emergency switch on the food pad control.)
13. Foot pad	Switch not working	a. Check the Hand/foot pad control operation selector (E) is properly switched. b. Check for foot pad switch is in working order. c. Check the wire No. 61, 72 for OK signal.
14. Other indicator lights	Warning signal	Refer to page4: Other functions descriptions.

PART LIST

Part No.	Description	Size No.	Q'ty	Part No.	Description	Size No.	Q'ty
1	Base (Bottom Plate)		1	49	Roller Shaft		1
2	Base (Left Part)		1	50	Hex. Socket Cap Screw	M10X25	2
2-1	Nut	M8	2	51	Pedal Plate		1
3	Base (Right Part)		1	52	Rubber Pad		4
4	Base (Front Part)		1	53	Pedal Switch		1
4-1	Hex. Cap Bolt	M8x16	2	53-1	Micro Switch		1
4-2	Nut	M8	2	54	Round Head Screw	M4X8	4
5	Hex. Cap Bolt	M12X40	2	55	Hex. Socket Cap Screw	M6X8	1
6	Nut	M12	2	56A	Emergency Switch Box		1
8	Hex. Socket Cap Screw	M8X16	6	56-1	Pipe		1
8-1	Washer	M8	6	57A	Switch Cover		1
9	Plate		1	57-1	Flat Head Cross Screw		4
10	Hex. Socket Cap Screw	M5X8	4	58	Round Head Screw	M4X8	4
11	Coolant Tank		1	58-1	Nut	M4	4
12	Hex. Cap Bolt	M8X16	2	59A	Emergency Switch		1
13	Coolant Gauge		1	60	Handle		1
14	Hex. Cap Bolt	M10X30	2	60-1	Hex. Socket Cap Screw	M8X20	2
15	Tank Cover		1	60-2	Nut	M8	2
16	Filter		1	61	Handle		1
17	Pump		1	61-1	Nut	M12	1
18	Hex. Socket Cap Screw	M6X15	2	63	Locking Lever		1
18-1	Washer	M6	2	63-1	Set Screw	M10X16	1
22	Hose Clamp		1	64	Hex. Socket Cap Screw	M10X35	1
23	Hose	5/16" X235cm	1	64-1	Spring Washer	M10	1
23-1	Hose	1" X45cm	1	65	Shaft Nut		1
24A	Coolant and Chip Tray		1	65-1	Oil Seal		1
24-1	Plate		4	65-3	Disk		1
24-2	Hex. Cap Bolt	M10X20	4	65-4	Spring Washer	M8	4
24-3	Nut	M10	4	65-5	Hex. Socket Cap Screw	M8X35	4
24-4A	Block Plate		1	66A	Shaft		1
25	Mounting Bracket		2	68	Swivel Arm		1
26	Spring Washer	M10	4	68-1	Hex. Cap Bolt	M10X35	1
27	Hex. Socket Cap Screw	M10X20	4	69	Scale		1
28	Washer	M10	2	70	Rivet	2m/m	3
29	Hex. Cap Bolt	M10X20	4	71	Pin		1
30	Hex. Cap Bolt	M12X40	2	72	Hollow Pin	Ø 2.5x16	1
31	Nut	M12	2	73	Spring		1
32	Scale		1	74	Bushing		1
33	Round Head Screw	M5X10	2	75	Bracket		1
34	Nut		1	76	Spring Washer	M8	2
35	Switch		1	77	Hex. Socket Cap Screw	M8X20	2
36	Emergency Switch	Ø 25	1	78	Nut		1
37	Grommet		2	79	Jam Nut	M40	1
38	Grommet		1	80	Star Washer	M40	1
39	Track		1	81	Anti-Dust Cover	M40	2
40	Hex. Socket Cap Screw	M8X35	2	82	Ball Bearing	32008	2
40-1	Nut	M8	2	83	Shaft		1
41	Set Screw	M6X12	4	84	Hex. Cap Bolt	M10X45	1
42	Washer		1	85	Nut	M10	2
43	Handle	M8X25	1	86A	Pointer		1
44	Roller Stand		1	87	Hex. Socket Cap Screw	M5X8	1
45	Hex. Cap Bolt	M12X25	2	88A	Cover		1
46	Spring Washer	M12	2	88-1	Hollow Pin	Ø 6X20	2
46-1	Washer	M12	2	88-2	Set Screw (not show)	M8X10	1
47	Roller		1	89	Hex. Socket Cap Screw	M8X35	3
48	Ball Bearing	6004 ZZ#	2	89-1	Spring Washer	M8	3
48-1	C-Ring	S-20	2	92	Table		1

940812

PART LIST

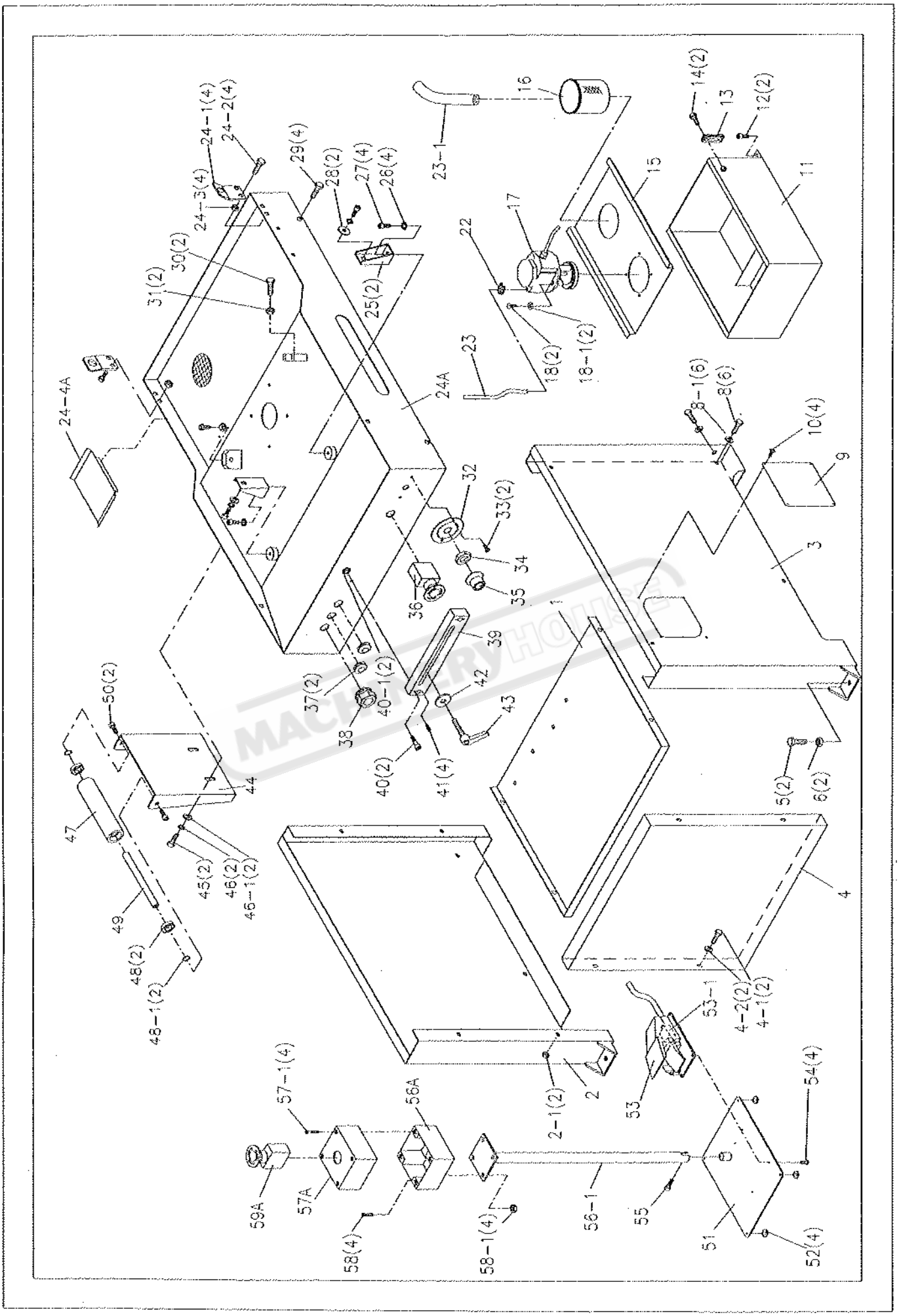
Part No.	Description	Size No.	Q'ty	Part No.	Description	Size No.	Q'ty
92-1	Set Screw	M6X12	1	147-5	Speed Selector		1
93	C-Ring	S-20	1	151	Reduction Unit		1
94	Bar-Stop-Rod		1	152	Key	8X8X30	1
95A	Bar-Stop		1	152-1	Vent Screw		1
95-1	Hex. Cap Bolt	M10X45	1	153	Hex. Cap Bolt	M8X25	4
95-2	Nut	M10	1	153-1	Spring Washer	M8	4
96	Handle	M10X35	1	154	Motor		1
97	Scale		1	155	Key	8X7X35	1
98	Rivet	2m/m	3	156	Anchoring Dowel		1
99	Chip Gutter		1	157	Hex. Socket Cap Screw	M8X25	4
100	Hex. Socket Cap Screw	M6X8	2	157-1	Spring Washer	M8	4
102	No-Burr Jaw		1	158	Hollow Pin	Ø6X20	2
103	Hex. Socket Cap Screw	M6X15	2	159	Coupling Fork		1
104	Counter Vise Jaw		1	160	Pin on Fork		1
105	Hex. Socket Cap Screw	M6X15	2	161	C-Ring	S-20	2
106	Vise Jaw		1	162	Nut		1
107	Flat Head Machine Screw	M6X15	2	163	Rod Supporting Block		1
108A	Vise		1	164	Hex. Socket Cap Screw	M10X30	1
109	Dovetail Plate		1	165	Nut	M10	1
110	Nut	M5	3	166	Hex. Socket Cap Screw	M10X40	1
111	Set Screw	M5X25	3	167	Adjustable Stop		1
112A	Vise Screw for Hydraulic Drive		1	168	Handle	M8X25	1
113	Key	5X5X20	1	169	Stop Bar		1
114	Hydraulic Cylinder (Vise)		1	170	Adjustable Stop		1
115	Spring Washer	M8	4	170-1	Set Screw	M8X10	1
116	Hex. Socket Cap Screw	M8X25	4	171	Hydraulic Cylinder (Arm)		1
117	Hand Wheel		1	172	Bushing		2
117-1	Spring Washer	M6	1	173	Hex. Socket Cap Screw	M10X25	2
117-2	Hex. Socket Cap Screw	M6X25	1	174	Upper Plate on Hydraulic Unit		1
117-3	Bushing		1	175	Spring Washer	M8	4
118	Set Screw	M8X10	1	176	Nut	M8	4
				177	Setting Plate		1
120A	Vise Seat		1	178	Hex. Socket Cap Screw	M6X12	2
				179	Limit Switch	XCK-M102	2
				180	Hex. Socket Cap Screw	M5X10	4
122	Vise Setting Plate		1	181	Spring Holder		1
123	Hex. Socket Cap Screw	M10X35	2	182	Nut	3/8"	1
124	Setting Washer		1	183	Hex. Cap Bolt	M12X30	2
125	Setting Screw		1	183-1	Spring Washer	M12	2
126	Setting Bolt		1	184	Cylinder Guard		1
127	Handle		1	185	Hex. Socket Cap Screw	M6X60	2
128	Setting Plate		1	186	Hex. Socket Cap Screw	M10X35	4
129	Bushing		1	186-1	Spring Washer	M10	4
130	Hex. Socket Cap Screw	M8X20	2	187	Cylinder Coupling		1
130-1	Spring Washer	M8	2	188	Spring Hook	3/8"	1
131	Electric Box Holder		1	189A	Spring		1
132	Spring Washer	M8	4	190	Setting Bushing		1
133	Hex. Socket Cap Screw	M8X20	4	191	Washer	M8	1
135	Hex. Socket Cap Screw	M10X35	2	192	Hex. Socket Cap Screw	M8X35	1
136	Spring Washer	M10	2	193B	Saw Arm		1
138	Hex. Socket Cap Screw	M6X25	2	194	Hex. Socket Cap Screw	M10X35	4
139	Nut	M6	2	194-1	Spring Washer	M10	4
140-5	Magnetic Switch		2	195	Limit Switch		1
140-6	Overload Relay	1.2A	1	195-1	Switch Pin		1
140-8	Hex. Cap Bolt	M6X15	3	196	Hex. Socket Cap Screw	M4X35	2
140-11	Overload Relay	6.5A	1	197	Hex. Socket Cap Screw	M10X35	4
142	Hex. Socket Cap Screw	M5X8	10	197-1	Spring Washer	M10	4
143	Nut	M5	4	198	Pipe Fitting Seat		1
146	Round Head Screw	M5X10	4	199	Hex. Socket Cap Screw	M5X30	2
147-2	Main Connect Switch		1	200	Coolant Switch		1

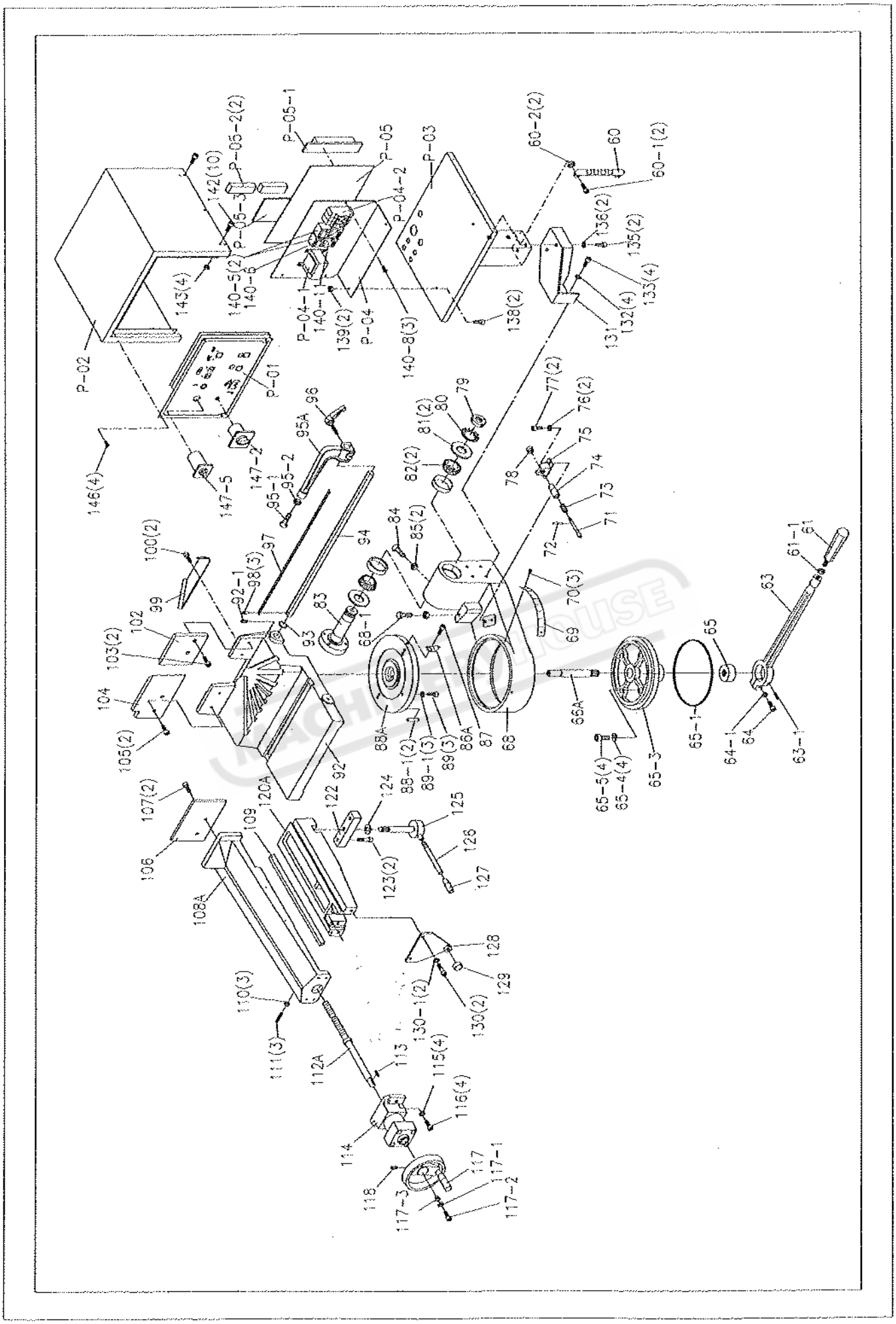
940812

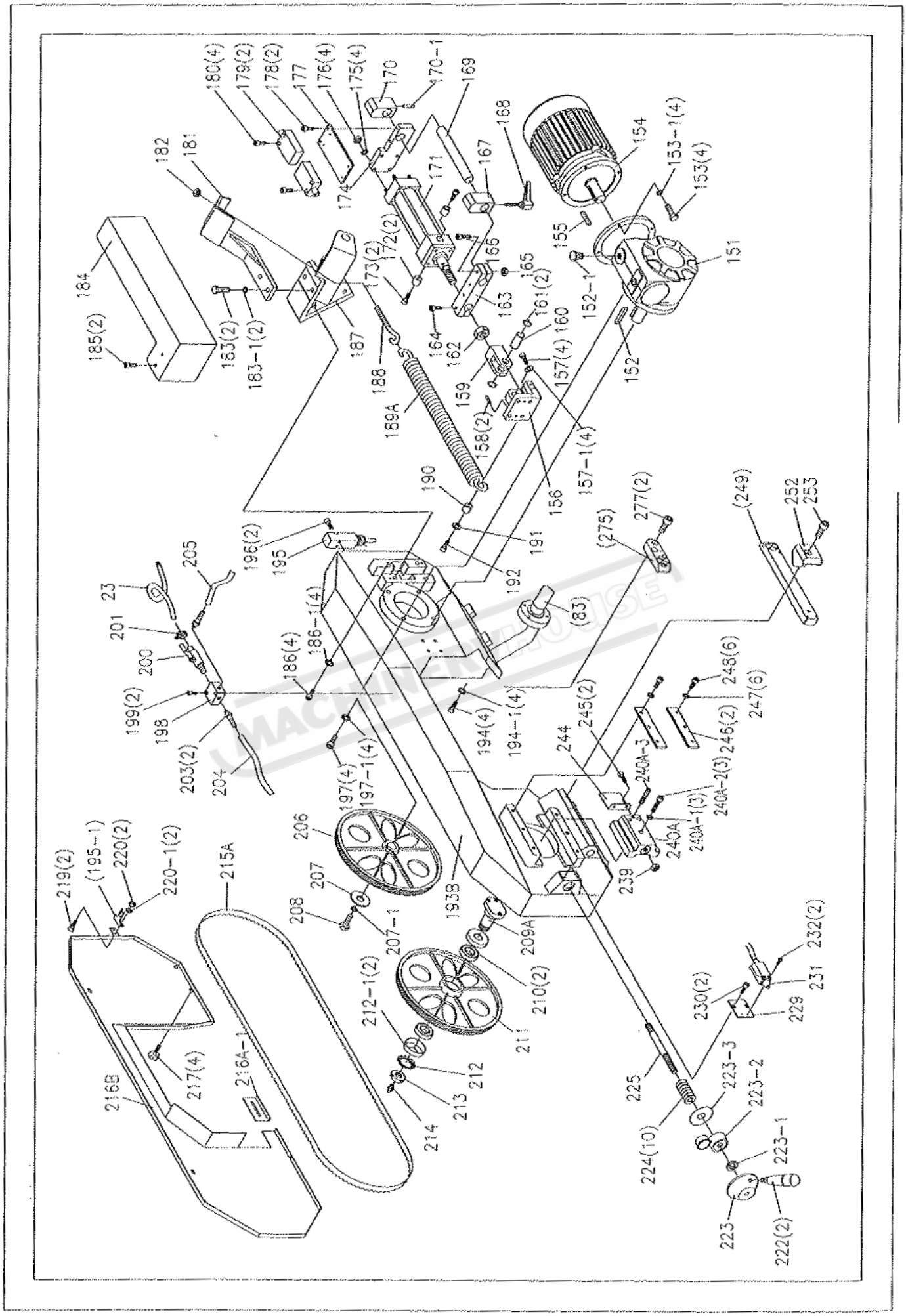
PART LIST

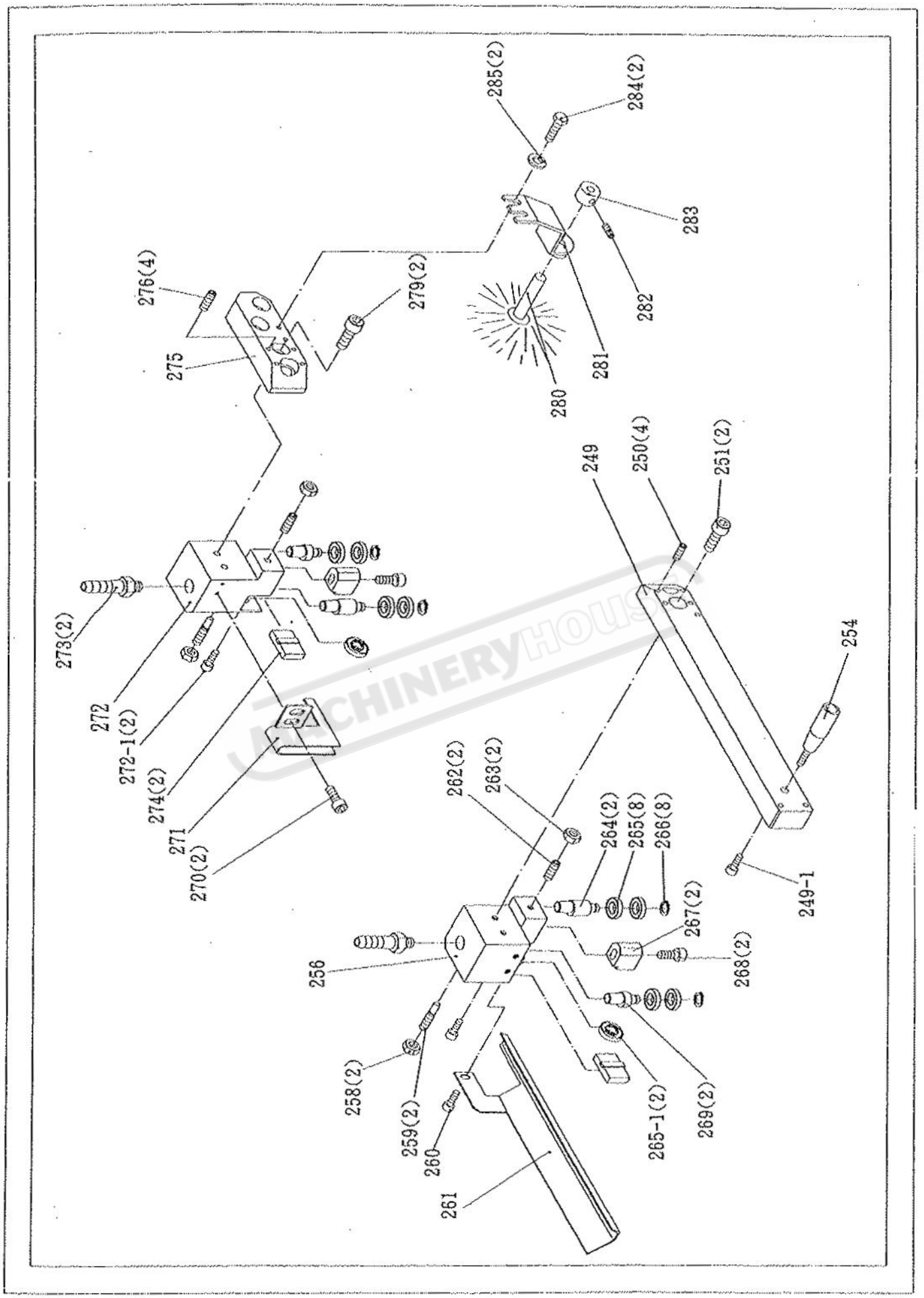
Part No.	Description	Size No.	Q'ty	Part No.	Description	Size No.	Q'ty
201	Hose Clamp		1	261	Blade Guard		1
203	Pipe Fitting	1/4PX5/16	2	262	Set Screw	M6X12	2
204	Hose	5/16" x40cm	1	263	Nut	M6	2
205	Hose	5/16" x90cm	1	264	Centric Shaft		2
206	Drive Flywheel		1	265	Ball Bearing	#608ZZ	8
207	Washer		1	265-1	Ball Bearing	#608ZZ	2
207-1	Spring Washer	M10	1	266	E-Ring	Ø7	8
208	Hex. Cap Bolt	M10X25	1	267	Blade Guide		2
209A	Idle Flywheel Shaft		1	268	Hex. Socket Cap Screw	M6X25	2
210	Roller Bearing	32007	2	269	Eccentric Shaft		2
211	Idle Flywheel		1	270	Hex. Socket Cap Screw	M6X8	2
212	Star Washer	Ø35	1	271	Blade Guard		1
212-1	Anti-dust Cover	M35	2	272	Guide Bracket		1
213	Jam Nut	M35	1	272-1	Hex. Socket Cap Screw	M6X12	2
214	Oil Inlet	1/16	1	273	Pipe Fitting		1
215A	Saw Blade		1	274	Blade Guide		2
216B	Blade Cover		1	275	Ball Bearing Bracket		1
216A-1	Extension		1	276	Set Screw	M6X12	4
217	Plum Screw	M5X10	4	277	Hex. Socket Cap Screw	M10X25	2
219	Round Head Screw	M4X8	2	279	Hex. Socket Cap Screw	M8X20	2
220	Nut	M4	2	280	Brush		1
220-1	Spring Washer	M4	2	281	Brush Clamp		1
222	Handle		2	282	Set Screw	M5X5	1
223	Handle Wheel		1	283	Set Bushing		1
223-1	Thrust Bearing	51103	1	284	Hex. Cap Bolt	M6X12	2
223-2	Blade Tension Gauge		1	285	Washer	M6	2
223-3	Plate		1	325A	Y Connector		1
224	Special Spring Washer		10	326A	Flow Control		1
225	Tension Shaft		1	327A	Hose	2.5 meters	1
229	Plate		1	328A	Hose	2.0 meters	1
230	Hex. Socket Cap Screw	M6X12	2	329A	Hose	2.0 meters	1
231	Limit Switch		1	330A	Hose	2.0 meters	1
232	Hex. Socket Cap Screw	M4X25	2	331A	Hose	1.5 meters	1
239	Nut	M16	1	332A	Manifold		1
240A	Slide Bracket		1	333A	Motor		1
240A-1	Spring Washer	M10	3	334A	Pump		1
240A-2	Hex. Socket Cap Screw	M10x50	3	335A	Oil Gauge		1
240A-3	Set Screw	M10x25	1	336A	Solenoid	2D2	1
244	Cover Plate		1	337A	Solenoid	3C2	1
245	Hex. Socket Cap Screw	M6X8	2	337A-1	Pilot Check		1
246	Gib		2	338A	Reducing		1
247	Spring Washer	M8	6	339A	Oil Fill Port		1
248	Hex. Socket Cap Screw	M8X25	6	340A	Tank Cover		1
249	Blade Guide Movable Rod		1	341A	Tank		1
249-1	Hex. Socket Cap Screw	M6x8	1	P01	Control Panel		1
250	Set Screw	M6X12	4	P02	Electrical Box Cover		1
251	Hex. Socket Cap Screw	M8X20	2	P03	Electric Box Platform		1
252	Setting Bracket		1	P04	Electric Parts Plate		1
253	Hex. Socket Cap Screw	M12X50	1	P04-1	Transformer		1
254	Handle		1	P04-2	Fuse Block		1
256	Guide Bracket		1	P05	Electric Parts Plate (Rear)		1
258	Nut	M10	2	P05-1	Contacts		1
259	Set Screw	M10X35	2	P05-2	IC Contacts		2
260	Hex. Socket Cap Screw	M6X8	1	P05-3	IC Plate		1

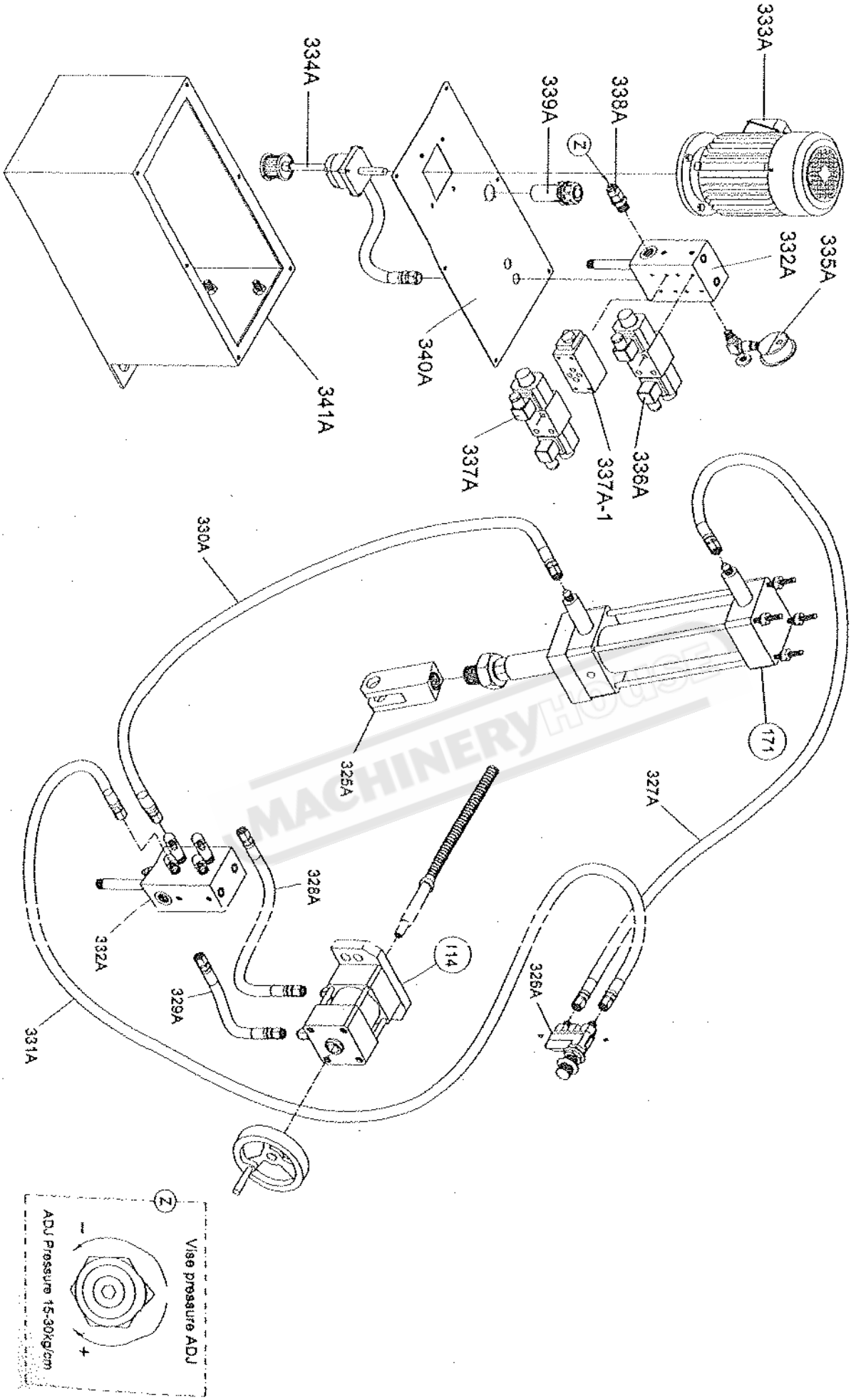
940812


24-4A
24-1(4)
24-2(4)
24-3(4)
29(4)
28(2)
27(4)
26(4)
25(2)
31(2)
30(2)
23-1
16
14(2)
13
12(2)
15
11
22
17
18-1(2)
18(2)
23
24A
8-1(6)
8(6)
10(4)
9
3
32
33(2)
34
35
36
39
37(2)
40-1(2)
42
43
38
40(2)
41(4)
1
50(2)
44
47
45(2)
46(2)
46-1(2)
49
48(2)
48-1(2)
5(2)
6(2)
4
4-2(2)
4-1(2)
53-1
53
2-1(2)
2
57-1(4)
56A
59A
57A
58(4)
58-1(4)
56-1
55
54(4)
51
52(4)


P-02
P-01
P-05-1
P-05
P-05-2(2)
P-05-3
142(10)
143(4)
140-5(2)
140-6
P-04-1
140-11
139(2)
P-04
P-04-2
P-03
140-8(3)
138(2)
60-2(2)
60
60-1(2)
136(2)
135(2)
133(4)
132(4)
131
146(4)
147-5
147-2
95-1
95-2
95A
96
97
94
92-1
98(3)
93
83
68-1
84
85(2)
82(2)
81(2)
80
79
77(2)
76(2)
75
74
73
71
78
72
70(3)
69
100(2)
99
102
103(2)
104
105(2)
92
122
120A
124
123(2)
125
126
127
107(2)
106
109
108A
110(3)
111(3)
112A
113
115(4)
116(4)
114
118
117
117-1
117-2
117-3
130-1(2)
130(2)
128
129
88A
88-1(2)
89-1(3)
89(3)
86A
87
68
66A
65-5(4)
65-4(4)
65-3
65-1
65
63
61-1
61
64-1
64
63-1


180(4)
179(2)
178(2)
177
176(4)
175(4)
170
170-1
169
168
167
154
153-1(4)
153(4)
182
181
171
172(2)
166
165
155
151
184
173(2)
163
161(2)
160
152-1
185(2)
183(2)
183-1(2)
187
164
162
157(4)
152
188
159
189A
158(2)
157-1(4)
156
190
191
192
277(2)
(275)
(249)
252
253
196(2)
195
205
23
201
200
199(2)
198
203(2)
204
186-1(4)
186(4)
(83)
194(4)
194-1(4)
244
245(2)
248(6)
247(6)
246(2)
240A-3
240A-2(3)
240A-1(3)
240A
239
197(4)
197-1(4)
206
207
208
207-1
193B
209A
210(2)
211
212-1(2)
212
213
214
215A
216A-1
216B
217(4)
219(2)
(195-1)
220(2)
220-1(2)
225
224(10)
223-3
223-2
223-1
223
222(2)
230(2)
232(2)
231
229


285(2)
284(2)
283
282
281
280
279(2)
276(4)
275
273(2)
272
272-1(2)
274(2)
271
270(2)
249
250(4)
251(2)
254
249-1
262(2)
263(2)
264(2)
265(8)
266(8)
267(2)
268(2)
256
258(2)
259(2)
260
261
265-1(2)
269(2)


Semi Auto and Vise Hydraulic System
333A
334A
339A
338A
335A
332A
340A
341A
337A
337A-1
336A
330A
325A
171
327A
328A
332A
329A
114
326A
331A
Vise pressure ADJ
ADJ Pressure 15-30kg/cm