OPERATOR'S MANUAL AND PARTS LIST

Hydraulically Powered Punch, Angle and Plate Shear

MODEL HPS

Size:
Serial Number:

OPERATOR'S MANUAL

PARTS LIST

Muhr und Bender Attendorn

D-5952 Attendorn · Telephone: (02722) 62-1 · Cables: muhr attendorn · Telex: 0876706 muhr d

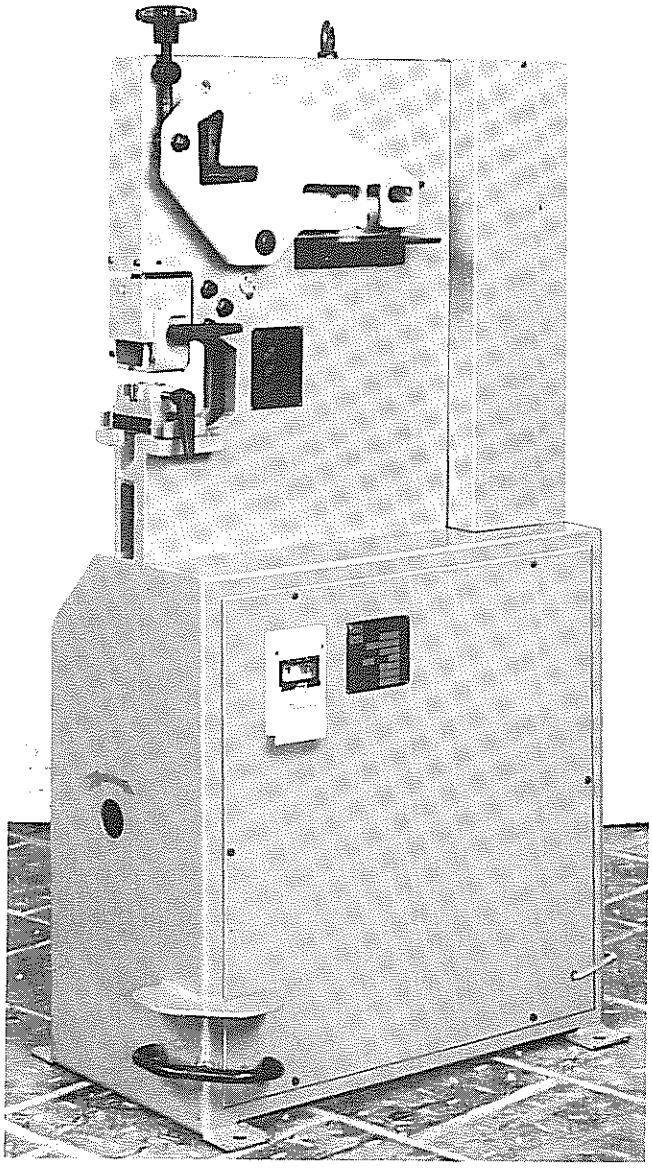
Your decision to purchase a MUBEA machine was a good one as you will see. Decades of experience in the field of punch and shear construction are incorporated in your MUBEA machine. Many satisfied customers confirm again and again that the daily use of the machine shows its outstanding advantages.

To benefit from all the advantages, we ask you to read and follow these operating instructions carefully.

The life of this machine is high as proven from experience. All parts subject to wear are quickly and easily replaceable. It is important that only MUBEA parts are used. Only on that basis can the expected life of the machine and constant quality of work produced be insured. The same applies if you want to increase the range of applications by adding additional accessories.

The first part of this book contains the installation, operating and maintenance instructions. The second part contains a view of all parts and the part numbers.

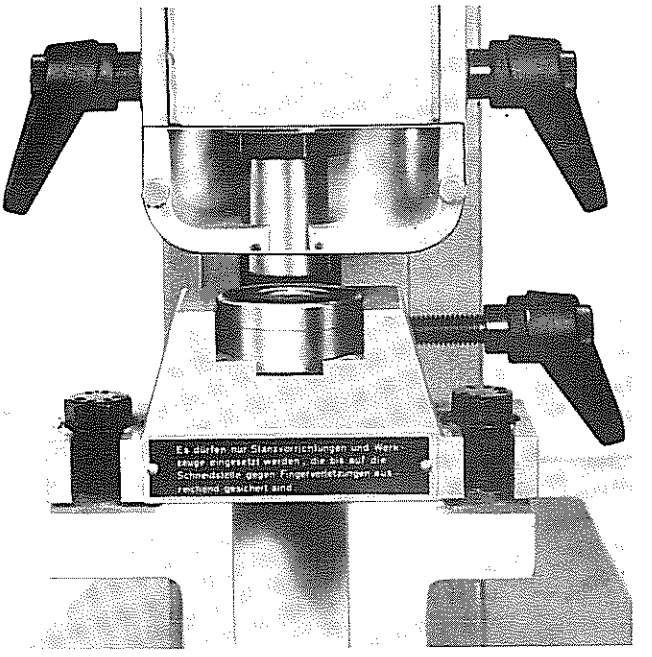
In case of any questions please contact your local MUBEA representative or our offices.



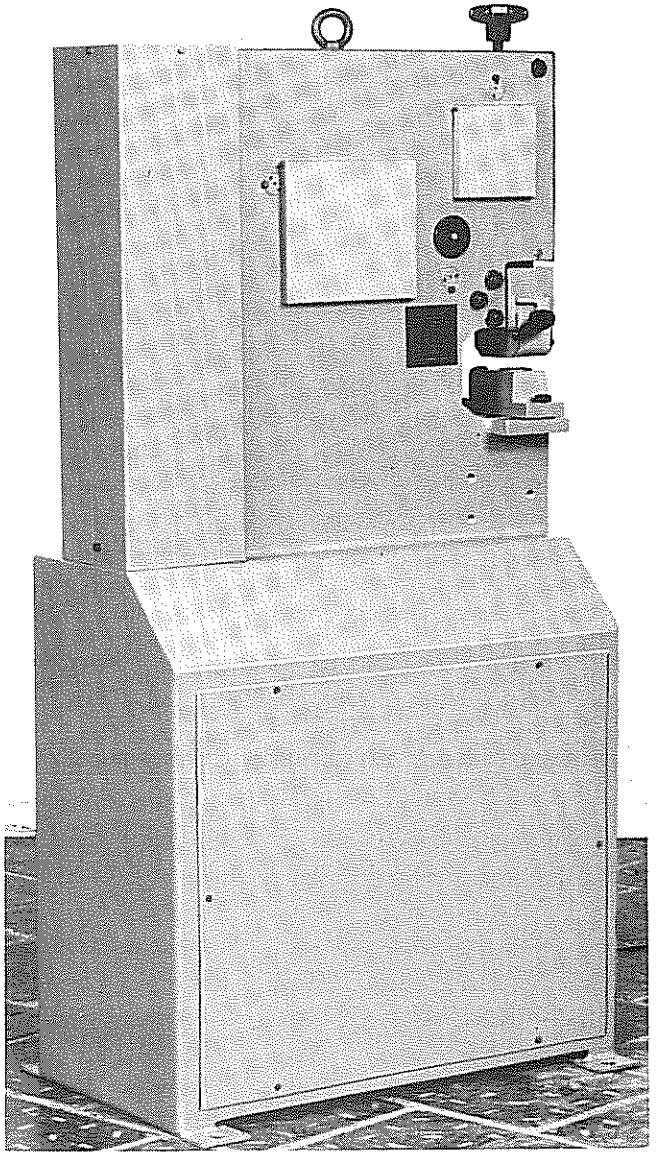
It is very important to Maintain your machine carefully as directed. Some hints in this respect are outlined in these instructions.

Your MUBEA machine complies with the regulations for the prevention of accidents.

For safe operation all working stations are provided with the necessary guards. The illustrations in this manual showing the various working stations and accessories do not show those guards, as they would interfere with the views.



Guard on punch



Guards on the discharge side of the Section Shear and Flat Bar Shear

Transport:

When transporting machine, secure it with bolts to heavy planks.

If machine is lifted by crane, the crane hook should be inserted into the eye which is designed for that purpose.

Placing of machine:

All working stations are at a normal working height. Changing the height should not be necessary. The anchoring bolts should be firmly tightened. Machine should be level.

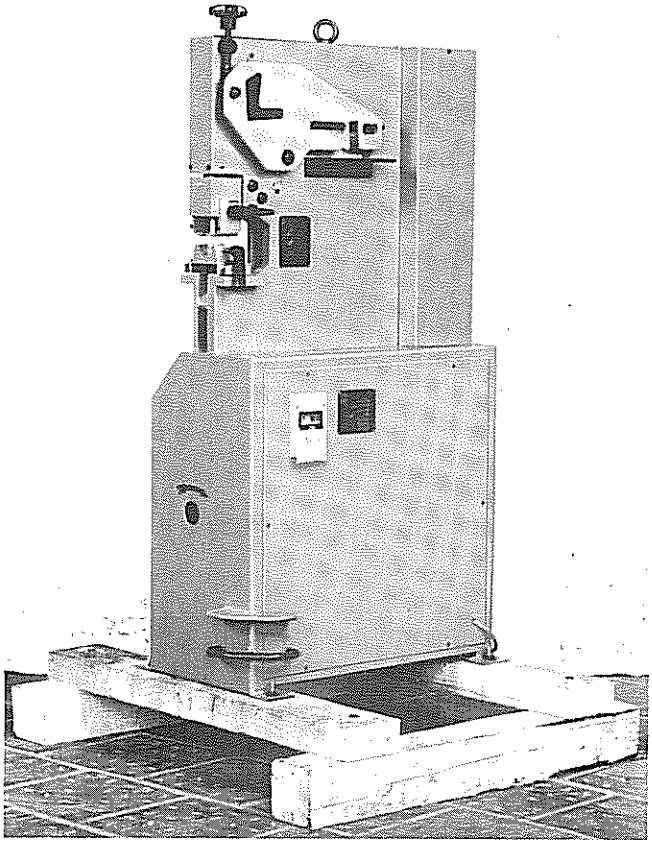


Illustration 1: Transport of machine by truck

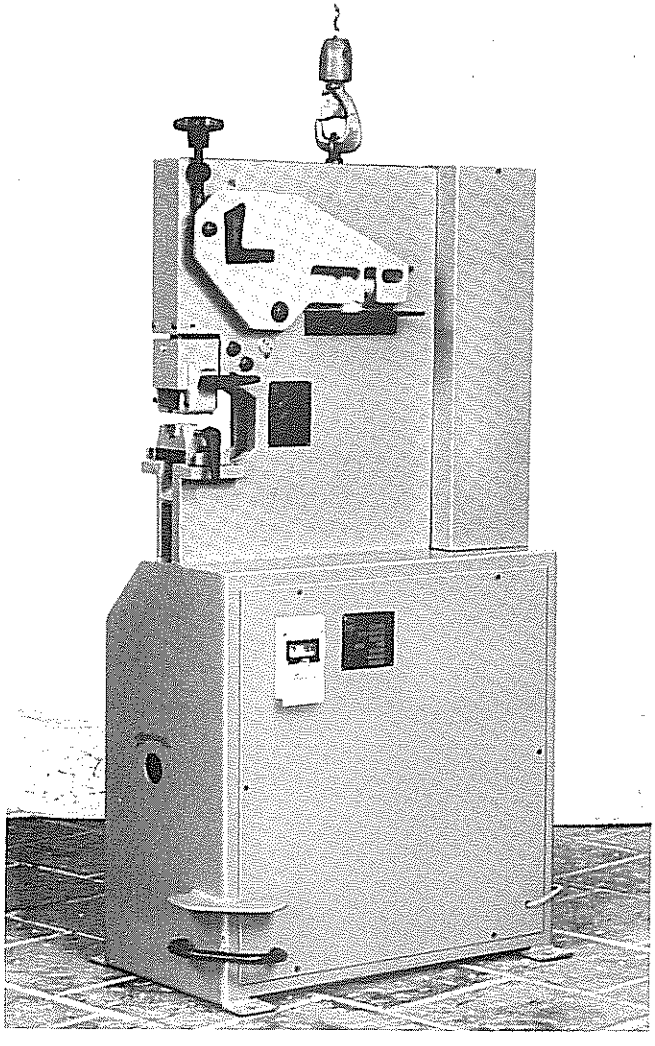


Illustration 2: Transport of machine by crane

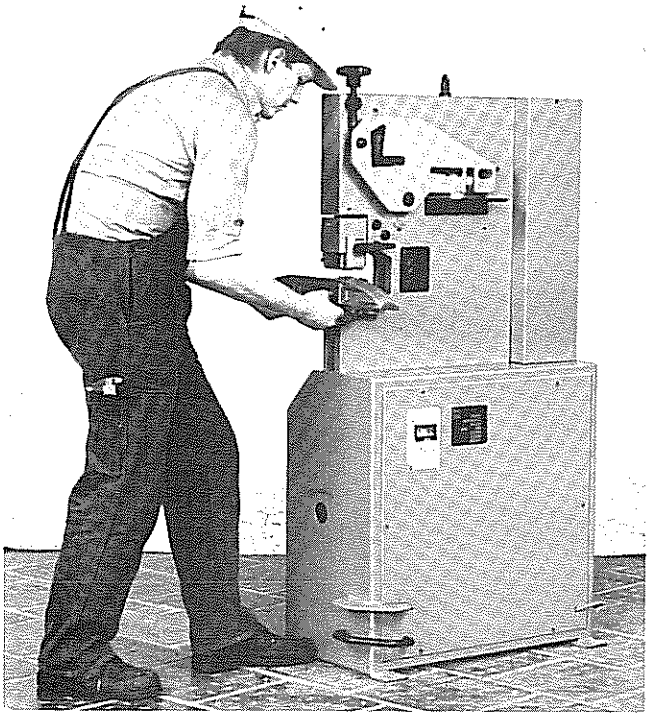


Illustration 3: Checking vertical position with a level

Connection and puting into operation:

The drive system with oil tank is located in the substructure of the machine. Check whether tank is filled with oil up to a level of one inch from top. Checking is done through the filler cap.

When refilling, please follow instructions carefully.

The machine is now ready for electrical connection. The main switch is located in the machine substructure in a protective housing on the front cover plate. Connect according to the description in the electrical drawing. Please check conformity to voltage. Switch-on motor briefly:

If motor does not turn in the direction indicated by the arrow, two wires have to be changed. When checking this, power should be only briefly applied.

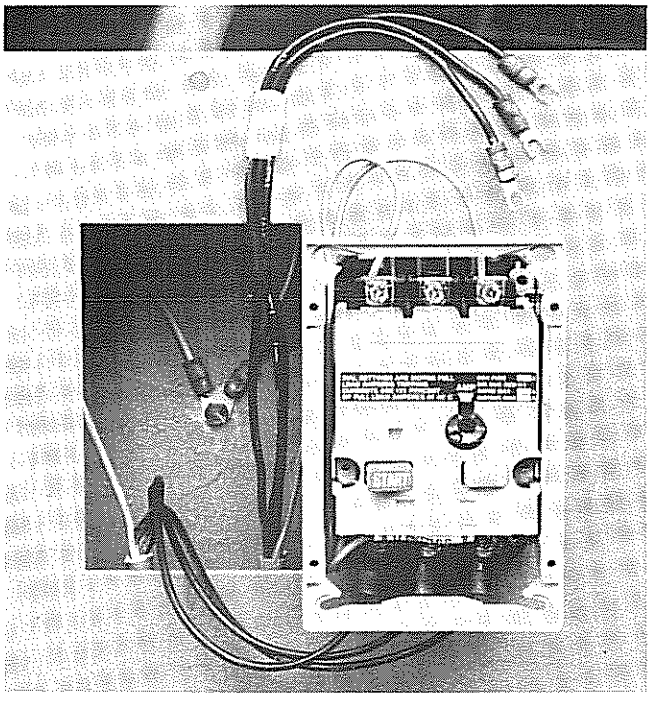


Illustration 4: Connection of power supply

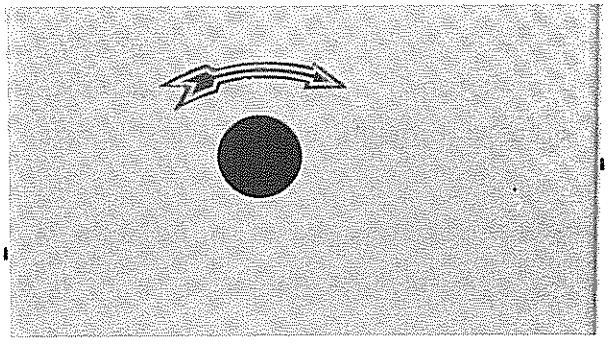


Illustration 5: Check rotation of motor

Check whether slides are moving correctly, blades have clearance and punch tools are properly aligned. For that purpose please lower the slide slowly by jogging.

Lubrication of machine:

Lubricant oil

The machine is to be lubricated with oil. For all lubrication points the same oil can be used.

The following brands are suitable:

ARAL-Deganit B 220
Viscosity 130 mm^2/s at 50°C

SHELL-Tonna oil T 220
Viscosity 128 mm^2/s at 50°C

MOBIL OIL AG-VACTRA OIL No. 4
Viscosity 125 mm^2/s at 50°C

ESSO AG-MILLCOT K 220
Viscosity 120 mm^2/s at 50°C

BP-Energol HP-C 220
Viscosity 127 mm^2/s at 50°C

Chevron Vistac Oil 150 X

Grease machine properly (vide lubrication plan).

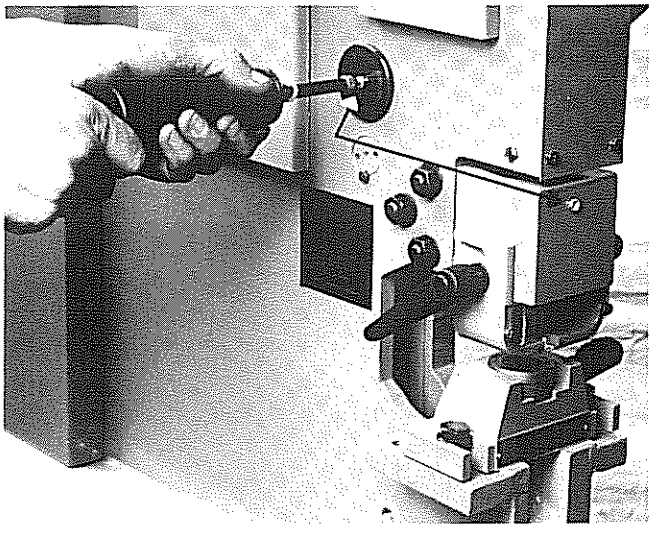


Illustration 6: Lubrication

Lubrication has to be performed with a pressure oil pump which is supplied in the tool kit. Please read the lubrication information in this manual and follow these instructions.

Operation:

The movement of the slide is actuated by the foot pedal. It pivots on the center. One end is for down, the other end for up.

The slide can be stopped at any position and reversed.

Continued pressing of the foot pedal after the slide has reached the end of its stroke will result in the motor stopping due to automatic disconnect in the electric overload switch.

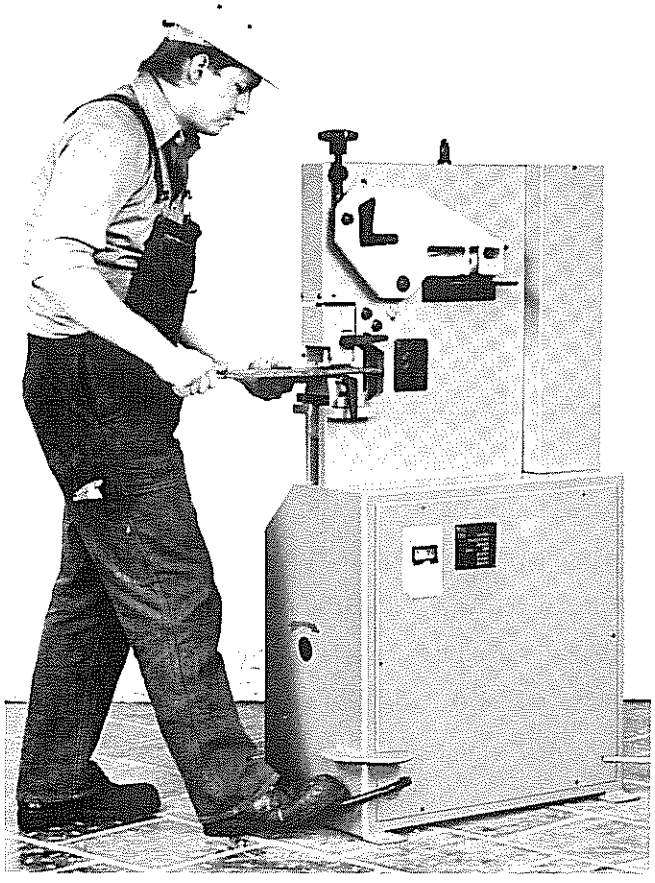


Illustration 7: Foot engagement

THE PLATE SHEAR

1. Blades

Upper and lower blades are interchangeable and each has 4 cutting edges.

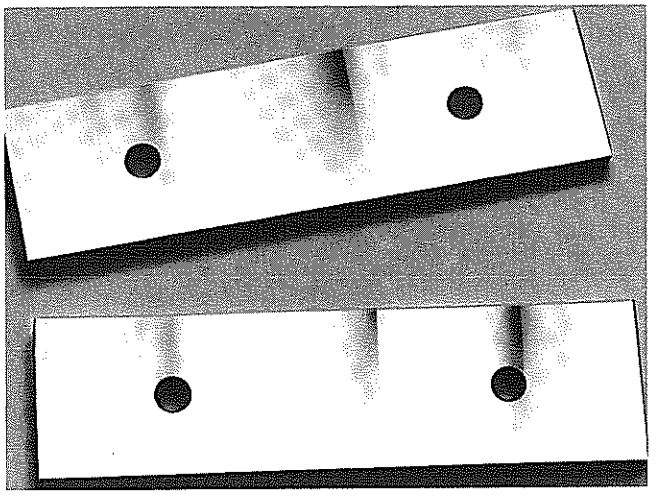


Illustration 8a: Plate shear blades with 4 cutting endges

Resharpening

Blades should be sharpened in time and only on the narrow edge. When grinding, an angle of 90° must be maintained with the side and ends. If the edges that seat against the frame and slide are ground, a shim must be used so the bolt holes line up. If the blades are worn out, they should be replaced by MUBEA blades.

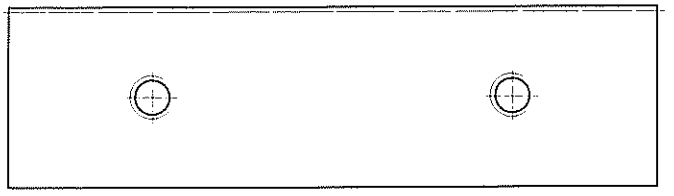


Illustration 8b: Sharpening of plate shear knives

2. The clearance gap

The clearance gap between the blades has to be .008 inch up to .012 inch. Measuring of that clearance should be done with a feeler gauge when the slide is lowered.

Blades are factory adjusted for all material thicknesses within the capacity range. If extremely thin material has to be sheared, the clearance has to be decreased.

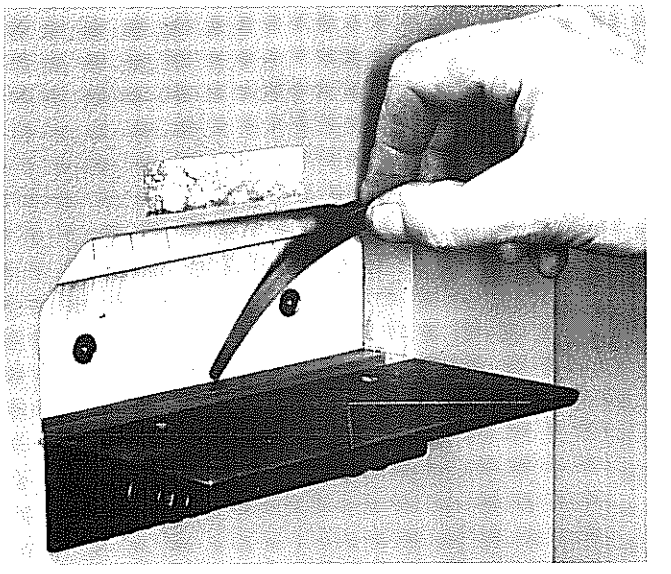


Illustration 9: Checking clearance

3. Miter cuts on angles

The hold-down is made with a vertical opening which allows miter cuts on angles. The angle is fed through that opening until it stops on the upper knife and has then to be adjusted according to the 45° marks on the supporting table.

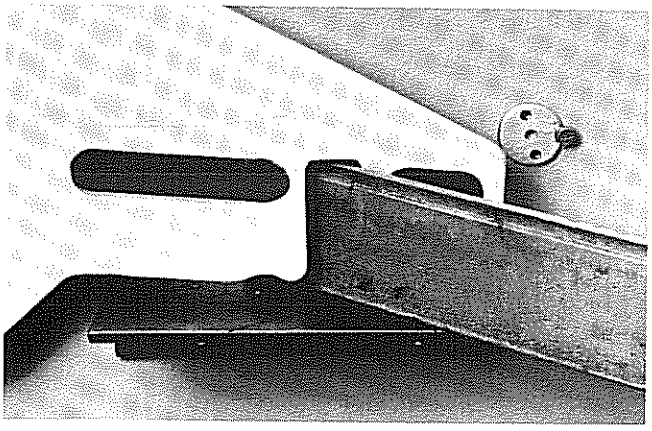


Illustration 10: Miter cutting

4. Adjustment of hold-down

The material to be sheared has to be properly positioned and held down in a horizontal position. Wrong hold-down adjustment or if the material is not under the hold-down serious can occur to the machine as well as injury to the operator. The operator must never touch the material on the outfeed side of the machine.

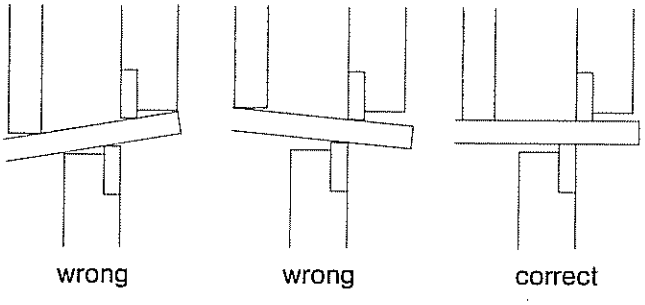


Illustration 11: Correct and wrong adjustment of hold-down

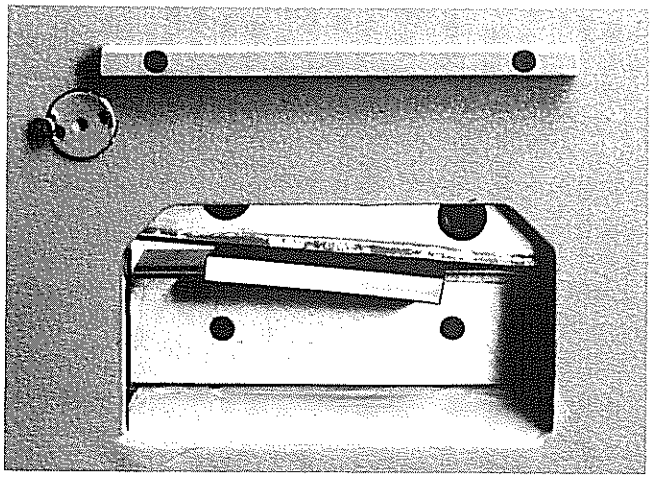


Illustration 12: Cutting flat bars

To disassemble the hold-down loosen the 2 screws and move hold-down forward from pivot shaft and adjusting spindle.

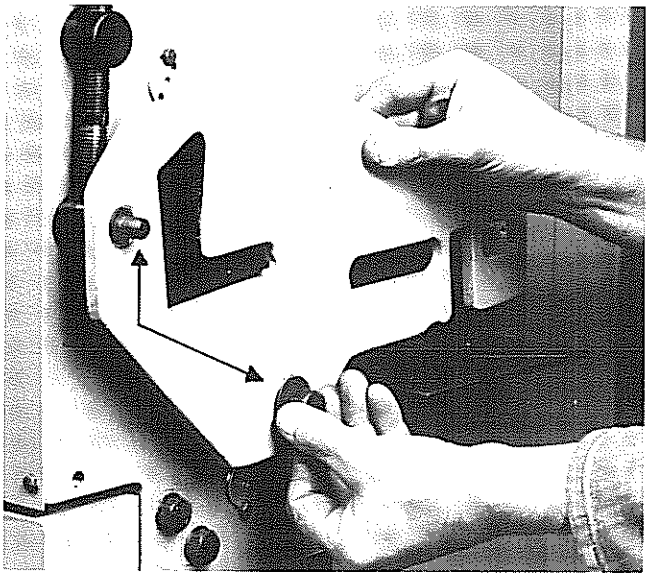


Illustration 13: Removal of hold-down

5. Changing shearing blades

a) Lower blade

Remove bolts A and the supporting table. Remove lower blade from the back side of the machine.

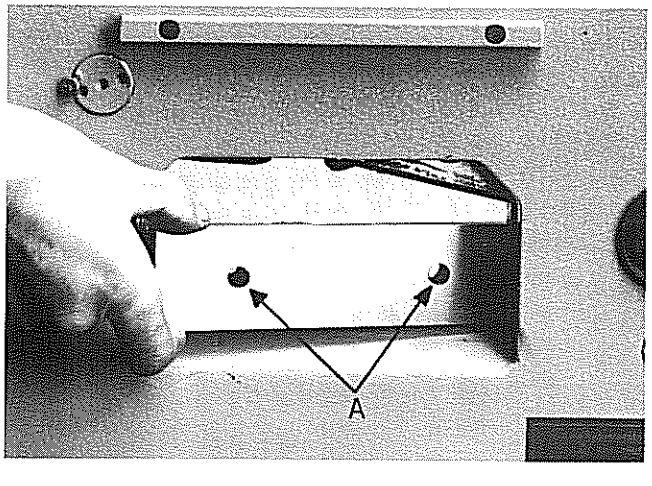


Illustration 14: Changing lower blade

b) Upper blade

Lower plate shear slide to lowest position. Remove bolts A and upper blade B will be free. Installation is done in reverse order.

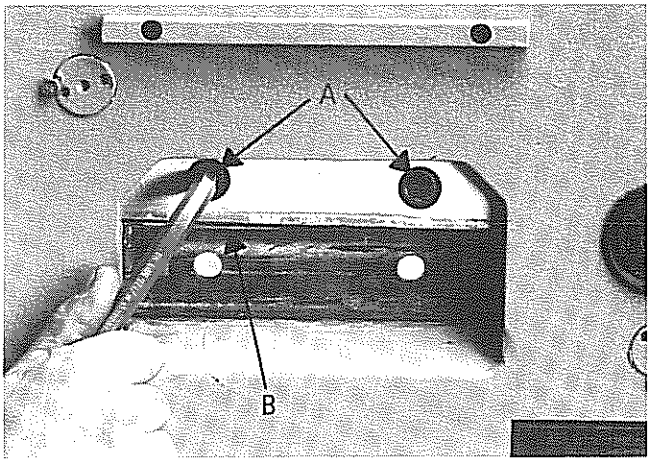


Illustration 15: Removing upper blade

6. Adjustment of gibs

If, after extensive operation, clearance of the plate shear blades and section shear blades has increased, the gibs must be readjusted.

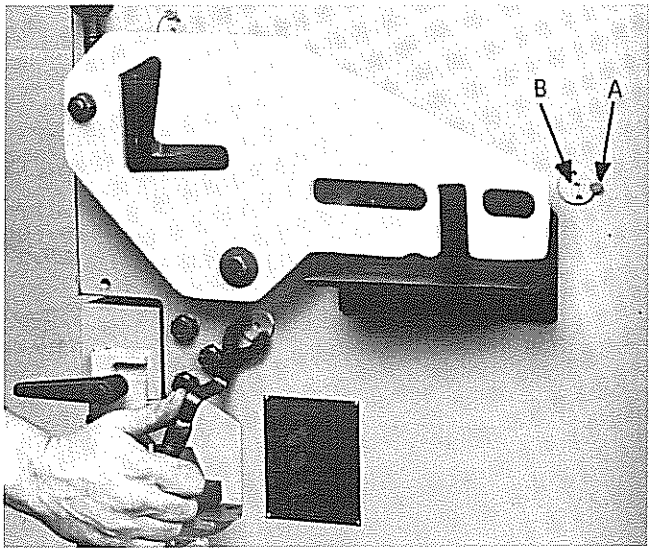


Illustration 16: Adjustment of gibs on in feed side

Remove self tapping screws A on the infeed side of machine and turn gibs B counter clockwise one revolution (Illustr. 16).

On the back side of the machine the self-tapping screws A have to be removed and gibs B turned clockwise until the required clearance is reached. (Illustr. 17).

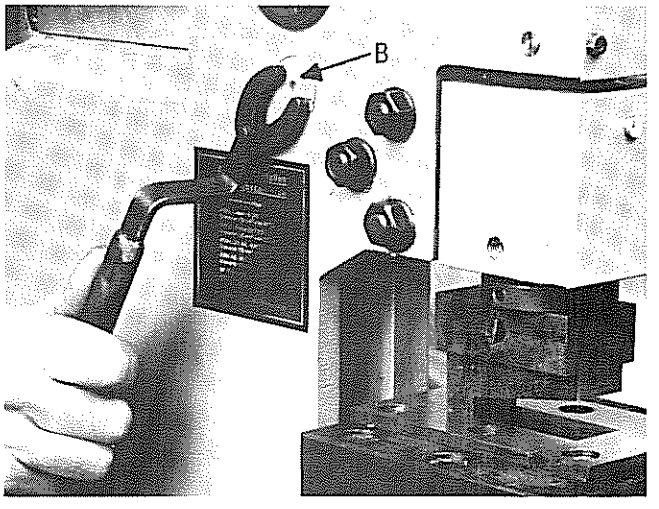


Illustration 17: Adjustment of gibs on outfeed side

An exact equal clearance must be set on both plate shear and section shear. This must be measured with a feeler gauge when slide is lowered.

Tighten gibs B on the in-feed side and then back off by 1/16 of a turn.

To lock the gibs, drill 11/64 or 4.5 mm and insert the self tapping screw.

7. Cutting of round and square bars

Special blades can be ordered for the plate shear for cutting round and square bars.

Round and square bars are safely accomodated in these special blades and proper cuts are achieved.

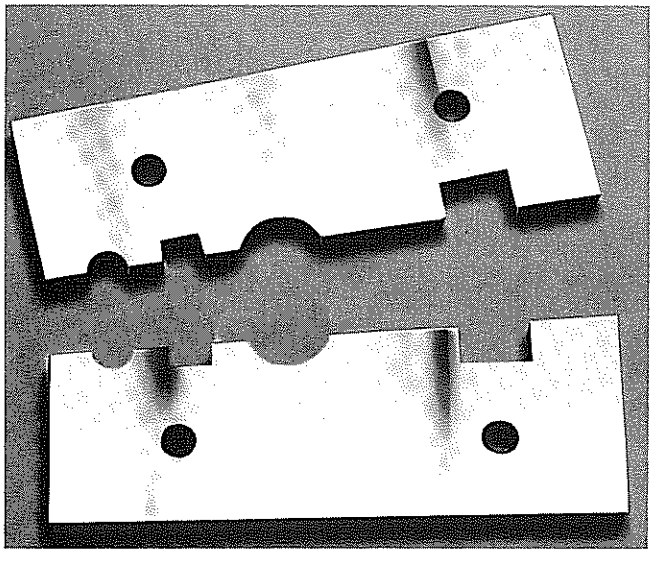


Illustration 18: Blades for shearing round and square bars

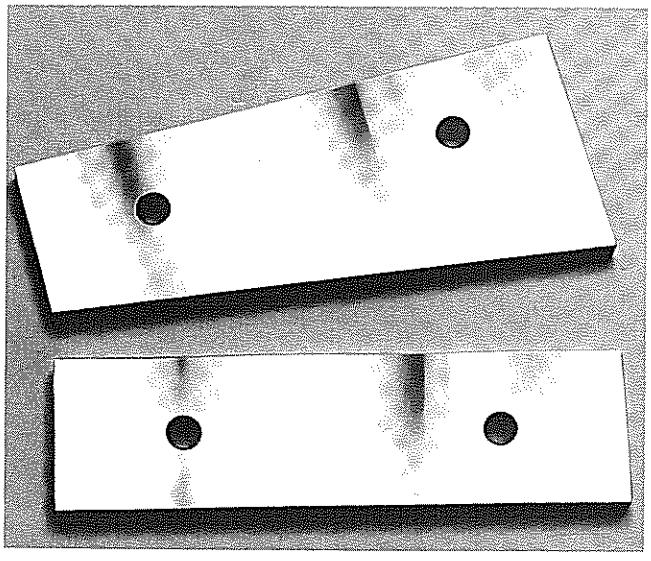


Illustration 19: Special upper knife for distortion free cut

8. Distortion-free cut

If distortion free cuts on the plate shear are required, a special upper knife can be ordered. The maximum capacity will be slightly decreased due to the reduced rake angle.

THE ANGLE SHEAR

1. General

The angle shear is designed for 90° cuts only.

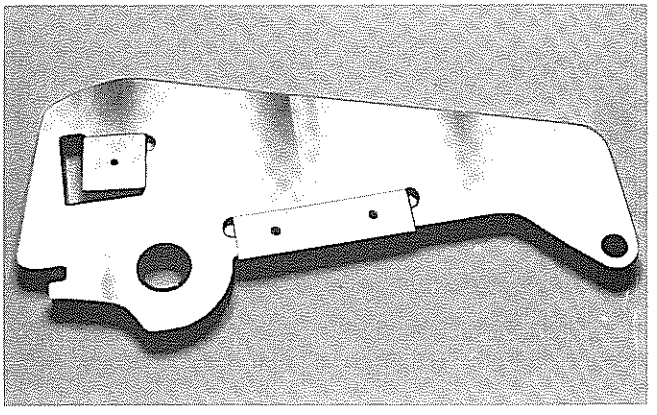


Illustration 20: Shear slide

2. The blades, sharpening

The two stationary blades have four cutting edges. The movable blade has eight cutting edges. Blades may only be ground on the narrow cutting edges. Shims must be used otherwise the bolt holes will not line up. Also the support for aligning the angle for 90° cuts must be in line with the cutting surface of the 2 stationary blades. Grinding has to be done equally on all surfaces in order to insure that the movable insert is meeting the cutting edges of the fixed blades correctly. Of course, grinding can only be done as far as the stroke of the slide allows. Dull blades result in poor cuts and require higher pressure resulting in less capacity. Please order new MUBEA blades in time.

3. The clearance

Before delivery blades are correctly adjusted to a clearance of .008 inch up to .012 inch. A decrease of clearance is achieved by insertion of shims behind the movable blade. Clearance is checked with a feeler gauge when the slide is down.

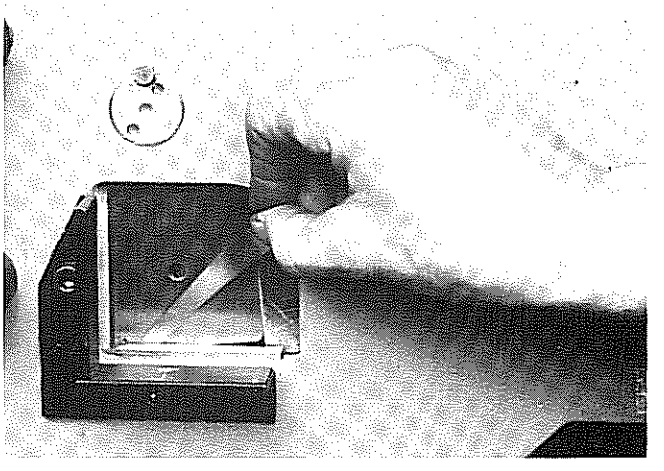


Illustration 21: Checking clearance

4. Hold-down

The hold-down has to be adjusted as necessary to secure a 90° cut. The root of angle is to be touching the corner of the hold-down.

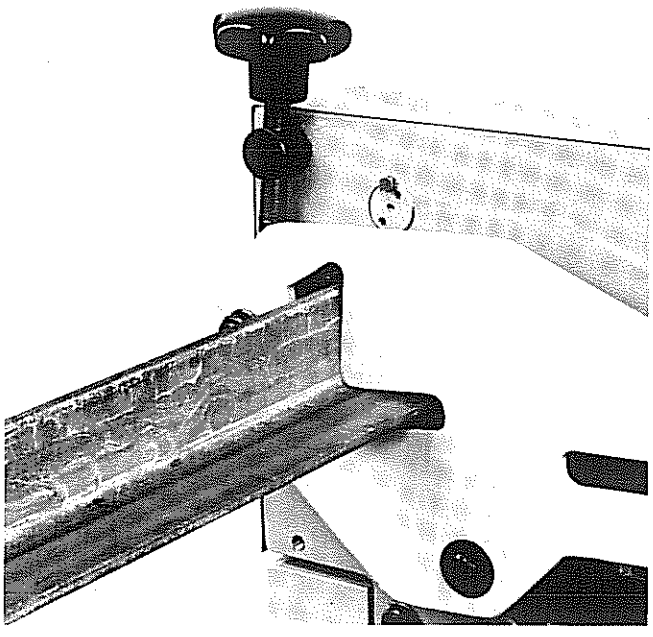


Illustration 22: Position of hold-down when cutting

5. Removing blades

First lower shear slide until bolt is visible.

Remove the socket head bolt A illustr. 23a and the blade can be removed illustr. 23b.

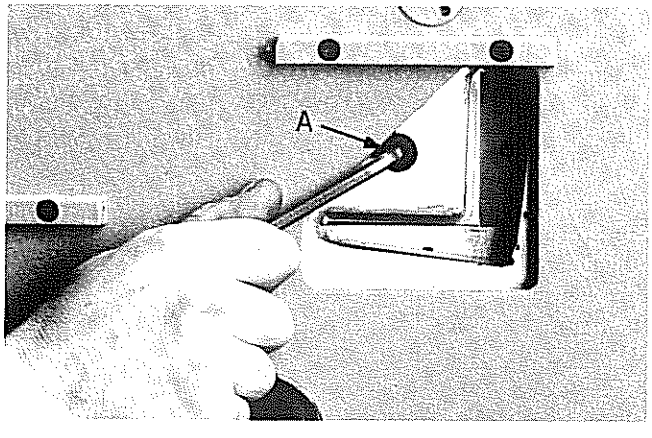


Illustration 23a: Removing of movable blade insert

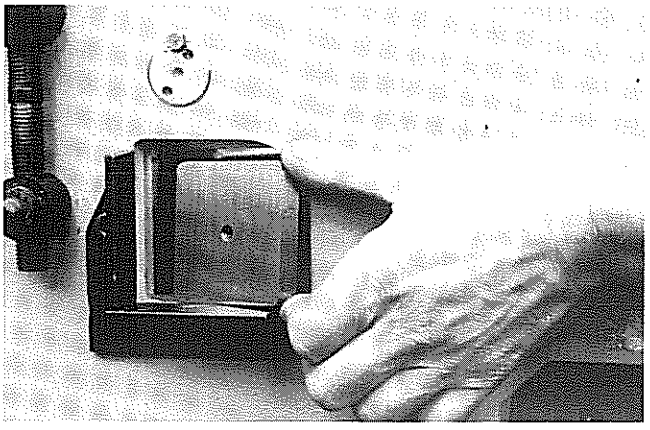


Illustration 23b: Removing movable blade insert

If socket head bolt A is removed, the vertical blade can be removed first. Once this is done, socket head bolt B is removed and the horizontal blade is taken out illustration 24 and 25.

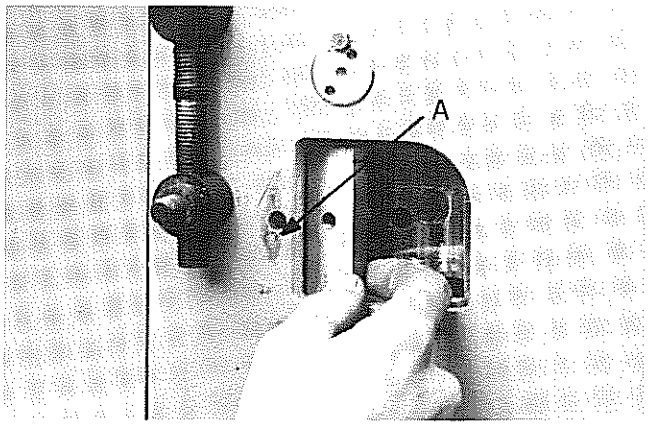


Illustration 24: Removal of vertical blade

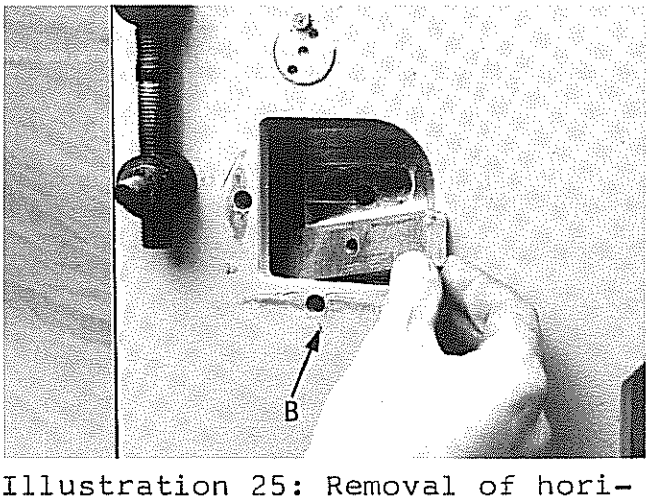


Illustration 25: Removal of horizontal blade

The installation of the blades is performed in reverse order.

THE PUNCH

ONLY ACCESSORIES AND TOOLS WITH APPROVED GUARDS ARE TO BE USED IN THIS MACHINE.

1. General

The range of applications of the punch is extremely wide, because of the hydraulic operation. The supporting table allows small and large punching tools, as well as attachments for shearing and press brake tools.

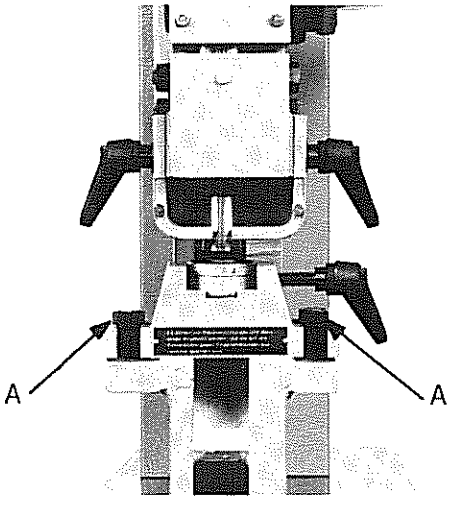


Illustration 26: Punch, normal set-up

The machine is equipped with a standard punching tool for up to 1-1/8" diameter.

2. Punch holder

The bottom of the punch slide is threaded to take a coupling nut. The opening in the nut will accomodate up to 1-1/8" punches.

3. Punch saddle

The punch saddle, having a large supporting base, is a safe holder for the die.

The saddle can be removed by loosening the 2 hex. head bolts A illustration 26.

4. Aligning of punch and die

When the machine is delivered, the punch and die are aligned properly. Alignment has to be checked each time a punch or die is chanded and during punching operations. This can be done by slowly lowering the punch into the die.

For alignment of punch and die, hex. bolts A on the saddle B have to be loosened and the saddle moved into correct position illustration 27.

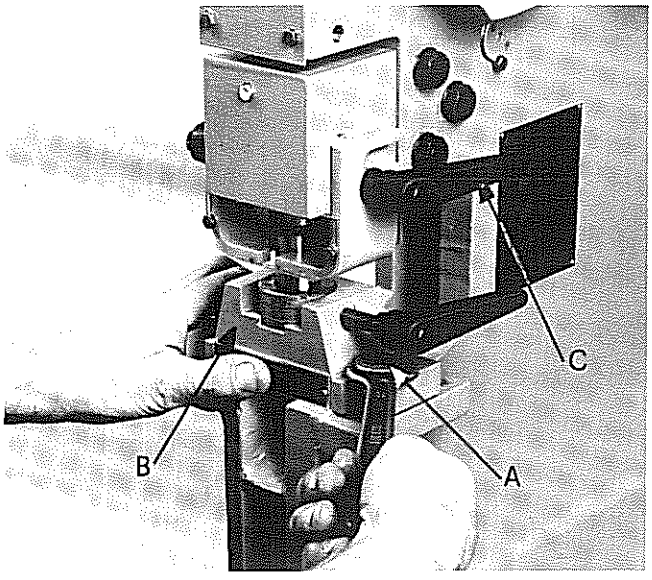


Illustration 27: Alignment of punch tool

When saddle is in the correct position, the bolts have to be tightened again.

The clearance between punch and die should be 1/32". If holes are punched into material of 3/16 or less, die clearance should be 1/64".

5. The stripper

The sturdy stripper is directly mounted to the punch housing by two clamping levers. (Illustr. 27).

If for any reason the handles must be replaced, the threaded part must not be longer than the original otherwise it will rub against the slide on the inside.

6. MUBEA-HI punches and dies are used in this machine, with a special attachment H2 punches and dies can be used for up to 1-3/16.

In the size 350 machine a special tool will hold H 3 punches and dies for up to 1-9/16".

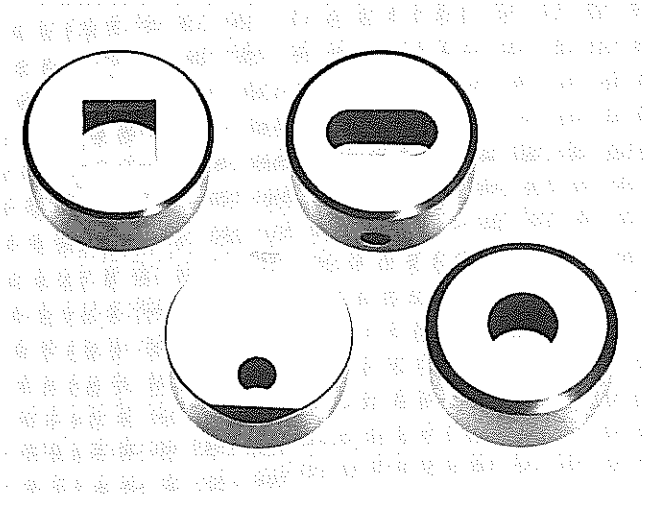


Illustration 28: MUBEA Dies

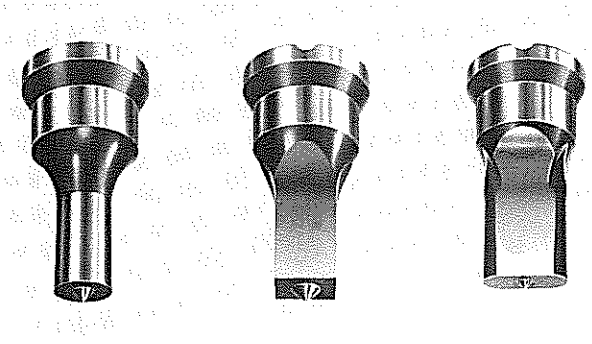


Illustration 29: MUBEA Punches

7. When it is necessary to punch close to the leg, flange or web of angle, channel or beam, an eccentric die can be used. The edge of the hole will be 1/4" from the side of the die. They are available with flat top or bevel top.

Please ask for detailed catalogue covering MUBEA punches and dies.

8. Special tooling

The vast range of MUBEA accessories guarantees quick delivery of all popular special tools. The speciality of MUBEA punch design offers a large variety of using special tools which we are unable to list in this booklet.

a) Rectangular coper

This tool is especially suitable for coping and notching angles and flanges. Wider copes are obtained by further coping operations. If triangular notching is required, the material must be placed at a 45° angle into the opening.

Grinding of rectangular coper

The upper blade must be ground only on the lower surface while the lower blades have to be ground on their top surfaces. Make sure that the clearance is correct when the blades are replaced. The cutting edges should be lubricated regularly.

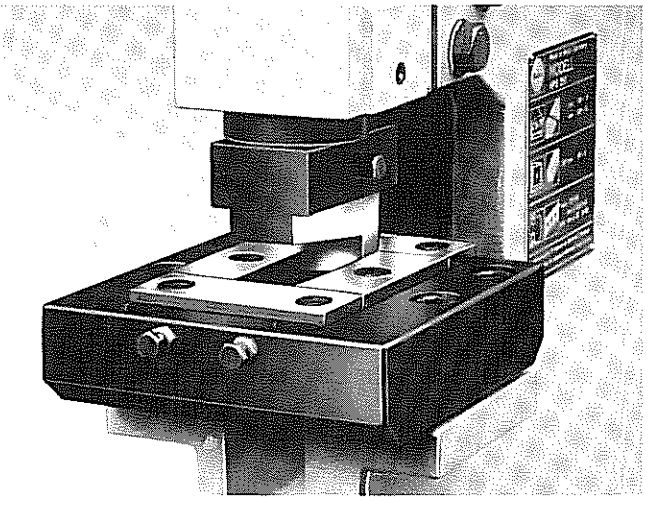


Illustration 30: Rectangular coper

Special attention:

With the coper we supply a guard that must be used. It is secured with the clamping levers of the punch stripper.

Special attention:

With the notcher we supply a guard that must be used. It is secured with the clamping levers of the punch stripper.

b) Triangular notcher

This tool is suitable for notching angles and flanges.

Grinding of triangular notcher

The upper blade must be ground only on the lower surface while the lower blades have to be ground on their top surfaces (Make sure that the clearance is correct when the blades are replaces. The cutting edges should be lubricated regularly).

c) Press brake tool

This tool is especially suitable for bending plates from 0^{o} up to 90^{o}.

Please be sure the plate is always in the center of the dies otherwise the tool and punch ram will be damaged. The bending tool has been designed in such a way that it does not completely close. An additional plate has to be used when bending thin material.

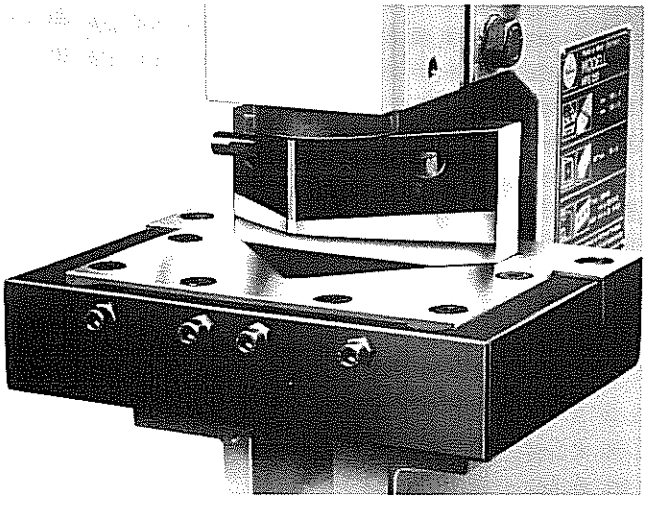


Illustration 31: Triangular notcher

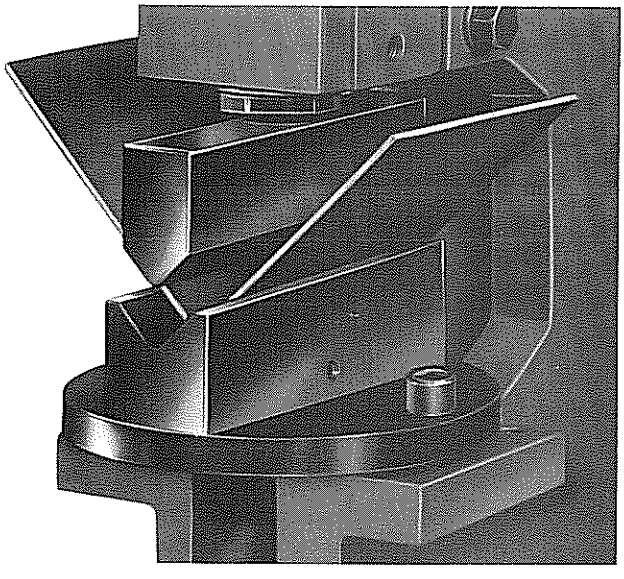


Illustration 32: Press brake tool

d) Pipe notching

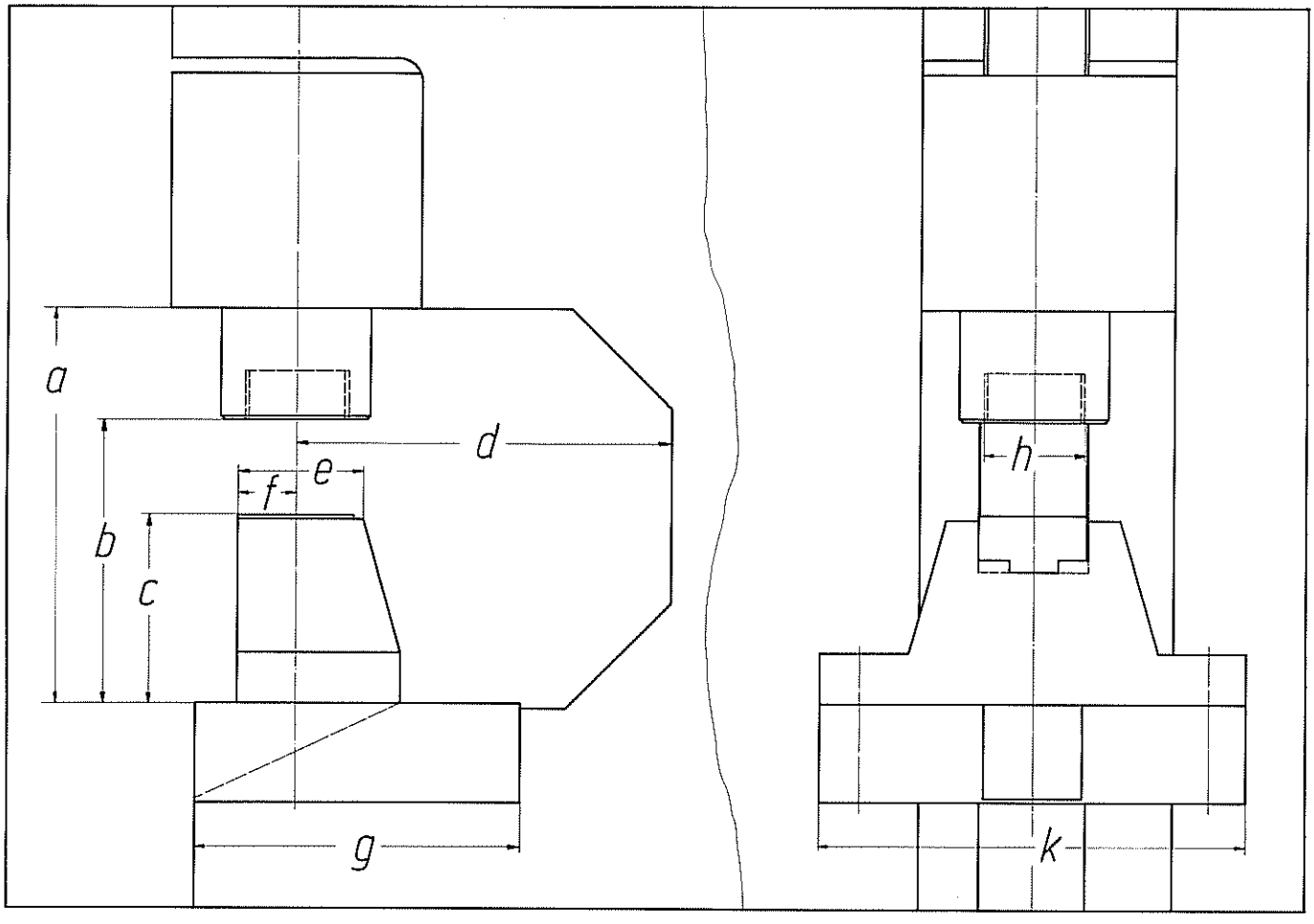
With this tool pipe is notched in preparation for 90° welds. Only the two cutting blades for the movable and stationary blade are necessary for different tube diameters.

When inquiring please let us know:

1) pipe size to be notched.
2) outside diameter of tube to which notch shall fit
3) material of tube to be notched

e) Radiusing and seperating flat bars:

Special coping tools can be supplied such as for radiusing flat bars, for welding to round bars or pipe.



HPS	250		350	
	mm	inch	mm	inch
a	117,5	4 5/8	155	6 1/8
b	126	4 9/16	144	5 1/4
c	62	2 7/16	74,5	2 7/8
d	110	4 3/8	150	5 7/8
e	51	2	50,5	2
f	23	7/8	22,5	7/8
g	100	3 7/8	130	5 1/8
h	M 42 × 2		M 42 × 2	
k	150	5 7/8	170	6 11/16

Dimensions of the Punch

MAINTENANCE INSTRUCTIONS
for HYDRAULIC PARTS

A. General

For proper functioning and satisfactory service life of the hydraulic parts it is extremely important to observe the following maintenance instructions.

B. Filling the Oil Reservoir

Before starting, the oil level of the oil reservoir should be checked. The oil level shall be about 1" below the reservoir cover. Checking is done with the gauge stick in the filling filter. Filling should be carried out only through the filter element. After filling, the cap must be perfectly replaced.

Use only highgrade hydraulic oil. At extreme low or high temperature, the manufacturer should be consulted.

All reputable oil manufacturers supply suitable oils. Mixing of the hydraulic oil of various manufacturers is not advisable. The oil type in machines filled at the factory is stated on the oil reservoir.

C. Starting

Check for the correct rotation of the motor. To avoid damaging the pump, the motor should be started in short bursts. The engagements should not be actuated. After having confirmed the correct direction of rotation, the motor must be kept running for about 3 to 4 minutes without actuating the engagements, to insure the release of any air existing in the system. Each cylinder should then be moved in and out repeatedly without load for the entire stroke. After venting, the motor can be started up under load.

The max. operating pressure adjusted in the factory is specified on the reference plate on the oil reservoir. Checking of the pressure can be carried out by means of a manometer at the measuring connection above the oil reservoir.

The stated max. operating pressure should not be exceeded.

D. Maintenance

Current checking of the oil level in the oil reservoir is necessary in order to avoid damages.

After approximately 10 operating hours the return filter on the oil reservoir should be cleaned for the first time. Cleaning should be done in kerosene.

Throw-away type filter cartridges have to be replaced. After having installed the clean or new filter element the system is again ready for work.

The first oil change should be carried out after approximately 600 operating hours. After that the oil should be changed every 1200 to 1500 operating hours. After draining the oil, the reservoir and the entire system should be cleaned with rinsing oil. Water and petroleum are not suitable as purifying agents. After complete cleaning the system has to be closed and the reservoir filled with new hydraulic oil. The filters have to be cleaned at every oil change. Cleanliness is very important when refilling.

E. Eliminating troubles

Fault 1: Excessive noise in the system

Cause	Reason	Elimination
1.1 Intermittent flow of oil from the pump	1.1.1 Hydraulic oil too cold (below + 42°f)	Heat the hydraulic oil to the temperature of + 42°f.
	1.1.2 Viscosity of the hydraulic oil is too high	Replace the hydraulic oil by a suitable one (see section "Filling up the Oil Reservoir)
	1.1.3 Steam generation	The max. oil temperature of + 155° f is exceede. Refill hydraulic oil or replace by prescribed oil
	1.1.4 Failure of the pump	Exchange the pump
	1.1.5 Sealed reservoir	Clean vent-filter in the cover of the filler
1.2 Foam formation or air pockets in the oil	1.2.1 Oil level in the reservoir is too low	Fill up to the correct level
	1.2.2 Wrong hydraulic oil	Replace by suitable oil
	1.2.3 Entering of air caused by loose fitting in the suction pipe	Retighten or replace the fittings.
1.3 Mechanical vibrations	1.3.1 Vibrations of the piping	Retighten the fittings
1.3.1 Pump	1.3.1.1 Used up or damaged	Replace
1.3.2 Drive motor	1.3.2.1 Used up or damaged	Repair or replace
1.3.3 Safety or pressure limiting valve	1.3.3.1 Flutters	Adjust correctly or replace

Fault 2: No pressure or unsufficient pressure

Cause	Reason	Elimination
2.1 Pump does not feed correctly	2.1.1 Air enters into the suction pipe	See 1.2.3
2.2 High pump temperature	2.2.1 Used up or damaged pump	Replace the pump
	2.2.2 Unsufficient viscosity of the hydraulic oil	See 1.1.3
2.3 Leakage losses of the pressure in the return system	2.3.1 Mechanic control valve not connected properly	Reset limitations of the engaging path
	2.3.2 Wrong adjustment of the pressure	Correct the adjustment
	2.3.3 Safety valve does not shut as there is dirt or defective parts	Clean, ascertain the damage, replace or renew
	2.3.4 Way valve open as there are dirt or defective parts electric fault	Clean the damaged unit, repair or replace
	2.3.5 Damaged cylinder bore, piston rod or piston seal	Renew the damaged parts
2.4 Failure of the pump	2.4.1 Damaged pump, defective drive, unsuitable viscosity of the oil, etc.	See faults 1.3.1.1., 1.1.2

Fault 3: Varying pressure or flow fluctuations and vibrations

Cause	Reason	Elimination
3.1 Intermittant flow of oil from the pump	3.1.1 See faults 1.1.1 to 1.1.5	See faults 1.1.1 to 1.1.5
3.2 Foam or air pockets in the oil	3.2.1 See faults 1.2.1 to 1.2.3	See faults 1.2.1 to 1.2.3
3.3 Mechanic vibrations	3.3.1 See faults 1.3.1	See faults 1.3.1
3.4 Fluctuating flow pressure limitating or safety valves	3.4.1 See faults 1.3.3.1	See faults 1.3.3.1
	3.4.2 Damaged valve seat	Repair or renew
3.5 Valves stick	3.5.1 Fouling	Drain the hydraulic oil, clean plant and parts, fill up with clean oil
	3.5.2 Defective or distorted	Replace the unit, eliminate distortion
3.6 Air pockets in the system which cause irregular or yielding motion	3.6.1 Plant is not completely vented	Vent the plant (see section "Starting")
	3.6.2 Electric equipment defective	Trace and eliminate the error

Fault 4: Unsufficient or no oil flow

Cause	Reason	Elimination
4.1 Intermittant flow in the pump	4.1.1 See faults 1.1.1 to 1.1.5	See faults 1.1.1 to 1.1.5
4.2 Foam or air pockets in the oil	4.2.1 See faults 1.2.1 to 1.2.3	See faults 1.2.1 to 1.2.3
4.3 Damaged up pump	4.3.1 See faults 1.1.4	See faults 1.1.4
4.4 Leaking from the pressure side in the return cycle	4.4.1 See faults 2.3.1 to 2.3.5	See faults 2.3.1 to 2.3.5
4.5 Pump rotates in the wrong direction	4.5.1 Wrong rotation of the motor	Reverse polarity of the electric connections

Fault 5: Too high temperature of oil

Cause	Reason	Elimination
5.1 Overflow through relief valve	5.1.1 Pressure adjustment too high	Correct the adjustment
5.2 Leaking from the pressure side in the return cycle	5.2.1 Bad functioning of the valves and defective seals	See faults 2.3.1 to 2.3.5
	5.2.2 Wrong viscosity of the hydraulic oil (too low, too high)	Drain the hydraulic oil and use the prescribed oil
5.3 Overheated pump	5.3.1 Wear of the pump	Replace the pump
5.4 Too rapid circulation of the oil	5.4.1 Oil level has become too low in the tank	Fil tank to the prescribed level. (See section "Filling up the Oil Reservoir")