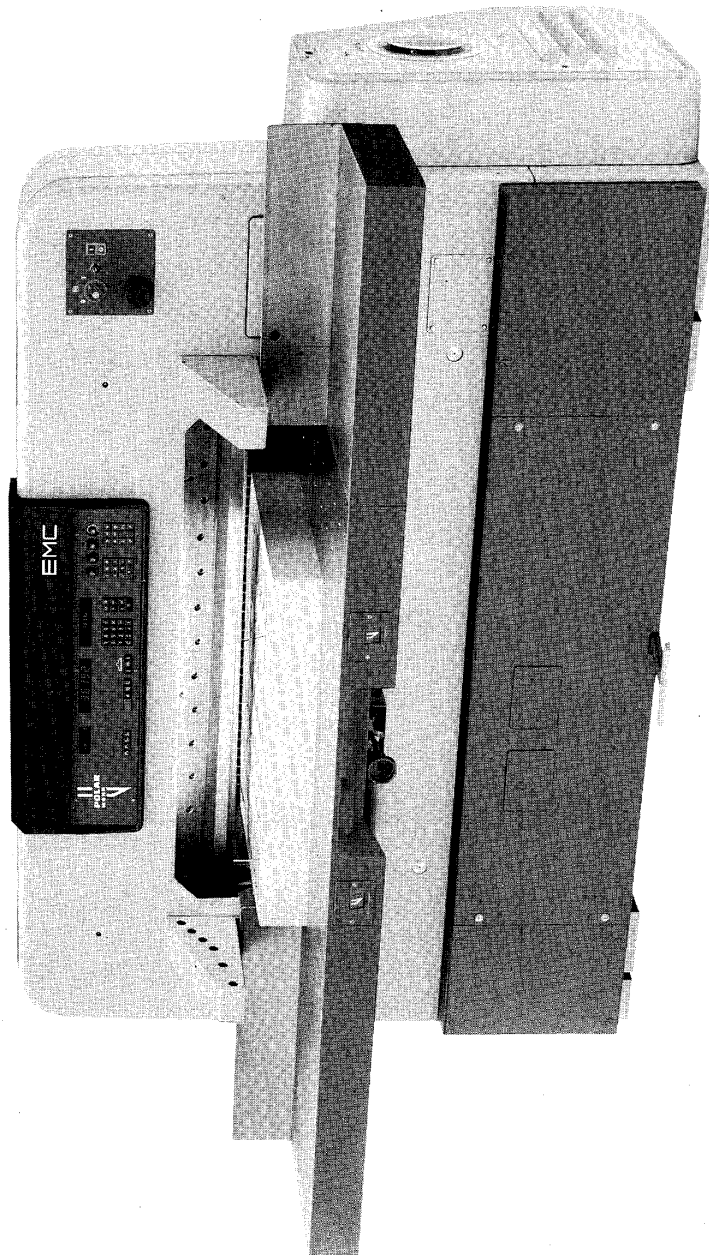


Operating Instructions

561001



POLAR 92/115/137/155 EMC
EM SD-P



006627L

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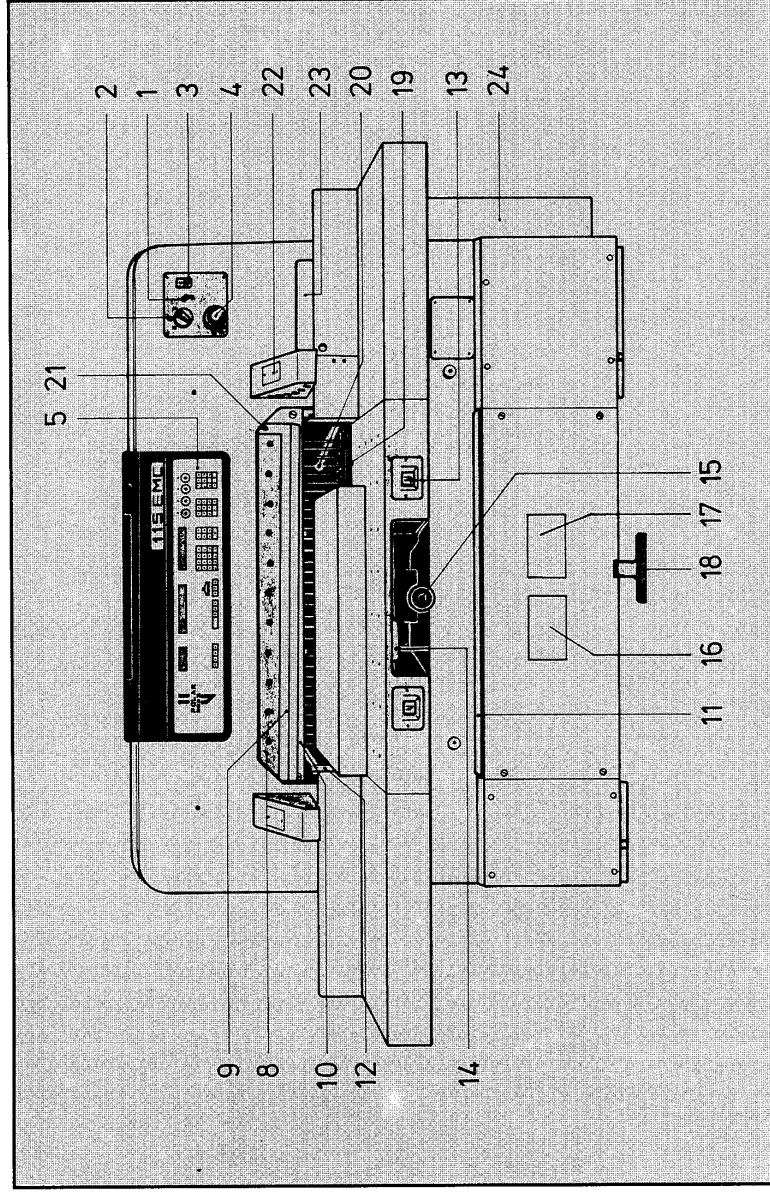
Operating Instructions POLAR 92/115/137/155 EMC, EM, SD-P

SD-P (Standard Digital Positioning)

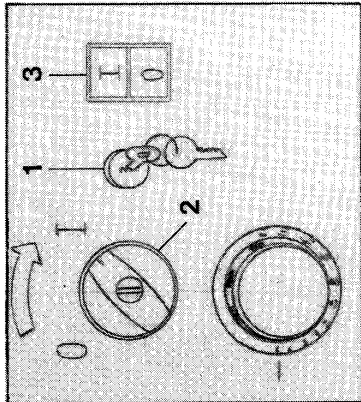
EM (Eltromat Memory)

EMC (Eltromat Mikrocomputer)

- 1 Safety lock
- 2 Main switch
- 3 ON-OFF key-combination
- 4 Turning knob for clamp pressure adjustment and knife change
- 5 Control panel EMC
- 8 Knife bar
- 9 Knife
- 10 Clamp
- 11 False clamp
- 12 Short left side gauge
- 13 Cut buttons
- 14 Airtable switch
- 15 One-hand operation
- 16 Flap for changing memory (only EMC)
- 17 Flap for motor overload
- 18 Pedal
- 19 Cutting stick
- 20 Backgauge with rakes
- 21 Switch for table lamp/cutting-line indication
- 22 Light-barrier
- 23 Access-hole lid
- 24 Drive guard



Starting of machine



Automatic start

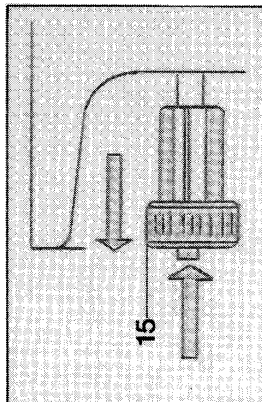
Unlock safety lock (1).
Turn main switch (2) from "0" (Off) to "I" (On).
Press key **[1]** (On) of the On-Off key-combination (3).
Main motor starts in Y-position. At full speed main motor is switched automatically to **Δ**-position.
To switch on controls press key **[1]** again.

On EM/EMC the backgauge position display (32) shows the actual distance between backgauge (20) and cutting line. In exceptional cases a **0** appears on the far right digit on the keyboard display (34). In this case reference point has to be reached.

Turning off of machine

Wait until automatic operations have ended:
knife (9) and clamp (10) in upper position,
backgauge (20) has stopped.
Then press key **[2]** of On-Off key-combination (3).
Main motor and all controls are switched off. Displays disappear.

Reaching of reference point



When EM/EMC machines are turned off the actual backgauge (20) position will be stored and after turning on again will appear in the backgauge position display (32).

In case an EM/EMC machine has been switched off contrary to the rule (e.g. while backgauge was moving or through power failure) only a **0** may be shown on the far right digit of the keyboard display (34) when it is turned on again.

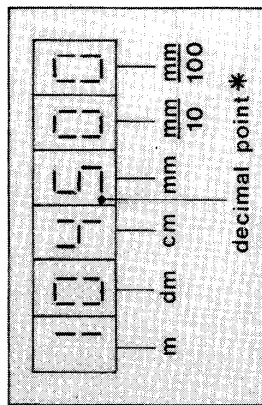
In this case the backgauge (20) has to be run over the reference point which is approx. at the middle of the rear table.

If the backgauge is in the rear half of the table it will come forward after shortly pulling the handwheel (15).

If the backgauge is in the front half it will run back after shortly pressing the button in the center of the handwheel (15).

After the backgauge (20) was run over the reference point the distance between the backgauge (20) and the cutting line will appear in the backgauge position display (32).
Machine is now ready for operation.

Measurement system

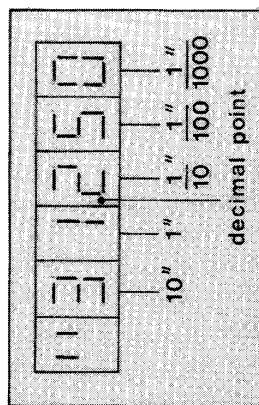


Metric:

The distance between the backgauge (20) and the cutting line that will be shown in the backgauge position display (32) after the machine has been switched on can upon demand be set to metric or inches by the manufacturer.

* If desired decimal point can be shifted for mm display. On SD machines display accuracy only 1/10 of a mm.

Inches:

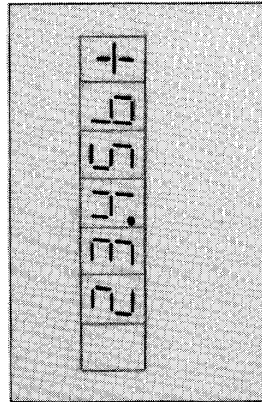


Conversion of measurement system (EM, EMC, SD-P)

By pressing the key $\frac{EM}{SD}$ the complete system can be converted.
If during metric display the key $\frac{EM}{SD}$ is pressed backgauge position and keyboard display will be automatically switched to inches.
By pressing the key $\frac{EM}{SD}$ again displays will be converted back to metric.
Pressing the key $\frac{EM}{SD}$ during inch display will convert the system to metric.

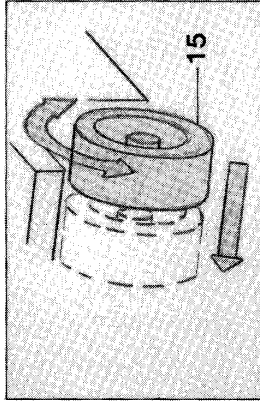
If a selected program shown in the keyboard display (34) is not corresponding to the applied system in the backgauge position display (32) the signal lamp of the $\frac{EM}{SD}$ key will be flashing and the buzzer will sound.
By actuating button $\frac{EM}{SD}$ the measuring system of the position display (32) will be converted.

Display of backgauge movement



As long as the backgauge (20) is approaching the cutting line (= advance) a "—" sign is shown in the backgauge position display (32).
This indicates the measurement is getting smaller (= advance). If the backgauge (20) is moving to the rear a "+" sign is shown in the backgauge position display (32) indicating the measurement is getting larger (= return movement).

Manual measurement setting



Push handwheel (15) of fine adjustment to engage clutch and then turn right or left to move backgauge to desired position, e.g. according to a printed sheet.

Pulling at the hand wheel (15) or actuating the key "backgauge motion" $\frac{1}{2}$ the backgauge will move forward.

Pulling the center button of the hand wheel or the key "backgauge motion" $\frac{1}{2}$ the backgauge will move backward.

If one of the keys $\frac{1}{2}$ or $\frac{1}{2}$ is pressed simultaneously with the key $\frac{EM}{SD}$ the forward or backward movement will be in fast speed.

Automatic backgauge setting via digital keyboard (EM, EMC, SD-P)

In case you want to set the backgauge e.g. to 30.735 cm the input is done with the digital keyboard by successively pressing the following keys:

$\frac{3}{10}$ $\frac{0}{10}$ $\frac{7}{10}$ $\frac{3}{10}$ $\frac{5}{10}$

The keyboard display (34) shows the measurement

$\frac{3}{10}$ $\frac{0}{10}$ $\frac{7}{10}$ $\frac{3}{10}$ $\frac{5}{10}$

During the input of cm values the digits will be shifted from the decimal point to the left.

After pressing the key $\frac{EM}{SD}$ the following digits for

mm, 1/10 mm and 1/100 mm

will be successively shifted to the right from the decimal point (pocket calculator input!).

After pressing the key $\frac{EM}{SD}$ twice the backgauge will automatically run to the entered measurement 30.735.

The same input mode applies for the inch system. With this inches can even be entered as fractions; e.g. 30 7/32".

Input is done by pressing the following keys successively.

$\frac{3}{10}$ $\frac{0}{10}$ $\frac{7}{10}$ $\frac{3}{10}$ $\frac{5}{10}$ $\frac{EM}{SD}$ $\frac{EM}{SD}$

Keyboard display (34) shows

$\frac{3}{10}$ $\frac{0}{10}$ $\frac{7}{10}$ $\frac{3}{10}$ $\frac{5}{10}$

Again after twice pressing the key $\frac{EM}{SD}$ the backgauge will go to this position.

Zeros right of the decimal point of measurement to be entered will not have to be pressed unless they are followed by a number. These are automatically added when pressing the key $\frac{EM}{SD}$ or $\frac{SD}{EM}$.

example 1: measurement 12,0 cm

Input $\frac{1}{10}$ $\frac{2}{10}$

display after pressing $\frac{EM}{SD}$:

$\frac{1}{10}$ $\frac{2}{10}$ $\frac{0}{10}$ $\frac{0}{10}$

example 2: measurement 102,50 cm

Input $\frac{1}{10}$ $\frac{0}{10}$ $\frac{2}{10}$ $\frac{5}{10}$

display after pressing $\frac{EM}{SD}$:

$\frac{1}{10}$ $\frac{0}{10}$ $\frac{2}{10}$ $\frac{5}{10}$ $\frac{0}{10}$ $\frac{0}{10}$

If the desired measurements contains a zero on the first or second digit behind the decimal point followed by a number the zeroes have to be entered.

example 3: measurement 25,04 cm

Input $\frac{2}{10}$ $\frac{5}{10}$ $\frac{0}{10}$ $\frac{4}{10}$

display after pressing $\frac{EM}{SD}$:

$\frac{2}{10}$ $\frac{5}{10}$ $\frac{0}{10}$ $\frac{4}{10}$ $\frac{0}{10}$ $\frac{0}{10}$

example 4: measurement 103,205 cm

Input $\frac{1}{10}$ $\frac{0}{10}$ $\frac{3}{10}$ $\frac{2}{10}$ $\frac{0}{10}$ $\frac{5}{10}$

immediate complete display

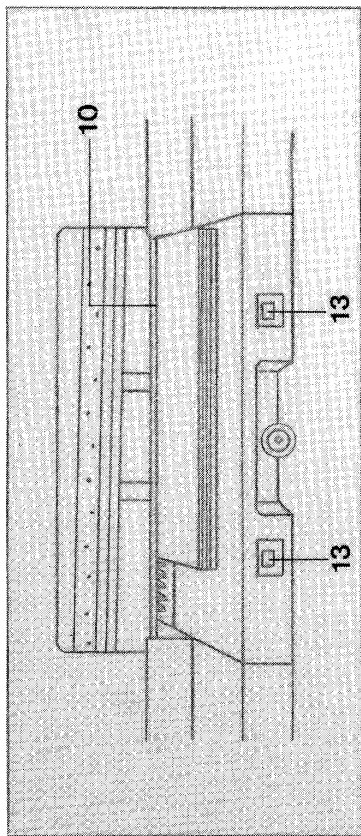
$\frac{1}{10}$ $\frac{0}{10}$ $\frac{3}{10}$ $\frac{2}{10}$ $\frac{0}{10}$ $\frac{5}{10}$

In case the backgauge position (32) is larger than the entered measurement the backgauge (20) will move in the "..." direction after pressing the key  twice, i. e. towards the cutting line (= advance). If the entered measurement is bigger than the backgauge position (32) after pressing the key  the backgauge (20) will move away until it reaches the entered measurement.

If a measurement is entered that cannot be reached by the backgauge (20) the present backgauge position display (32) and dashes on all 6 digits of the backgauge position display (32) will flash alternately with the buzzer sounding with the same rhythm. If the wrong input is not cleared by pressing key  the display will flash ten times. Then flashing and buzzing stops and the keyboard display (34) continues flashing until the wrong input is cleared.

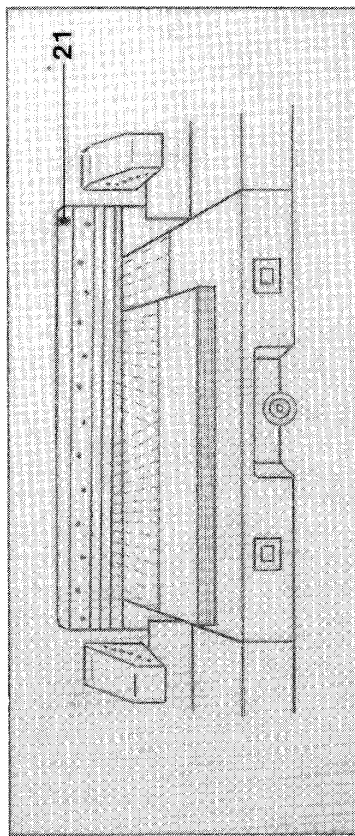
A wrong input can be cleared by pressing the key .

Cutting-line indicator, mechanical with clamp



The front edge of the clamp being nearly identical with the cutting line can therefore be used to indicate the actual cutting position. Through the respective operation of the foot pedal (18) the clamp (10) can be stopped in any position and returned to the upper position. With fully actuated foot pedal (18) the clamp pressure on the stock will not exceed 30 daN (≈ 30 kp).

Cutting-line indicator, optical



Through operating the switch (21) the fluorescent table lamp is switched off and the optical cutting line indicator is switched on. Through this a thin light beam is indicating the cutting line. Thus the exact cutting of a printed sheet is facilitated.

Clamping and cutting

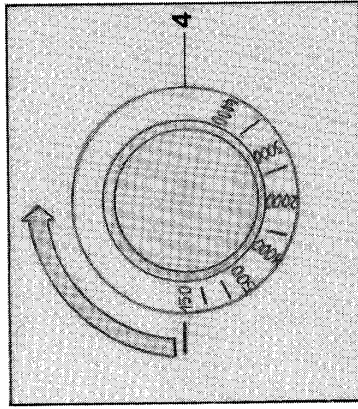
Simultaneous actuating of the two cut buttons (13) = 'cutting' at the front side of the table causes the descending of the clamp onto the stock which will be pressed with the previously set pressure. The knife will follow shortly after this and perform the cut. The cut buttons have to remain pressed until the knife is halfway up again.

After this knife and clamp return to the upper position and remain there even if the cut buttons (13) remain pressed.

To perform the next cut the cut buttons (13) have to be released and simultaneously pressed again. The descending of clamp and knife can be interrupted any time by releasing one or both of the cut buttons. By pressing both cut buttons (13) again the cut can be continued.

After performing the cut the knife will automatically return to the upper position and is then automatically followed by the clamp.

Clamp pressure adjustment



The clamp pressure can be adjusted steplessly according to the stock to be cut by turning the knob (4).

Range on 92:	150 to 3000 daN (330 — 6,600 lbs)
Range on 115:	200 to 4000 daN (440 — 8,800 lbs)
Range on 137:	200 to 4500 daN (440 — 9,900 lbs)
Range on 155:	200 to 5500 daN (440 — 12,100 lbs)

Setting of clamping time

With the turning knob (4) the clamping time can be changed.

On voluminous stock a longer clamping before cutting can help to achieve more exact cuts. The knife movement will be delayed.

Clamping without cutting (EM, EMC)

If you want clamping of voluminous stock before actual cutting by actuating the key  the cut will be blocked.

After simultaneous pressing of the cut buttons (13) only clamping will be performed according to the set pressure on the knob (4) but no cutting.

Lightbarrier

The lightbarrier (22) forms an invisible net of light beams in front of the knife and clamp. If the beams are interrupted by any obstacle no clamping and cutting is possible. Still the clamp (10) can be lowered with the foot pedal (18) for mechanically indicating the cutting line.

Cut interruption through lightbarrier

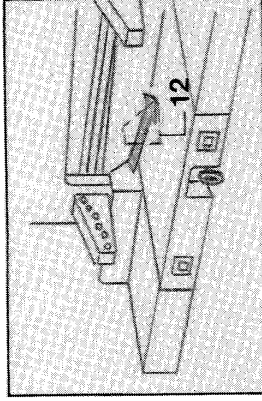
If the beams are interrupted during a cut the clamp (10) and knife (9) will stop immediately. Cutting can only be continued after releasing and again simultaneous pressing of both cut buttons (13).

The state of the lightbarrier (22) is indicated through a red and green signal lamp:

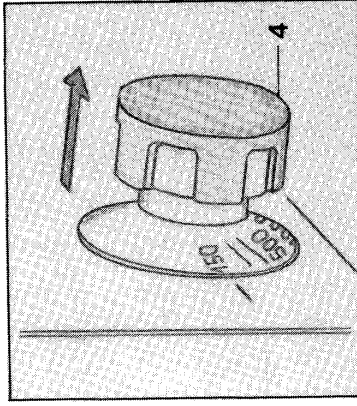
green: cut possible
red: cut blocked

A short flashing of the red lamp before a cut is caused by an automatic self-check of the lightbarrier.

Knife change Removing of knife



Remove short left-hand side gauge (12)

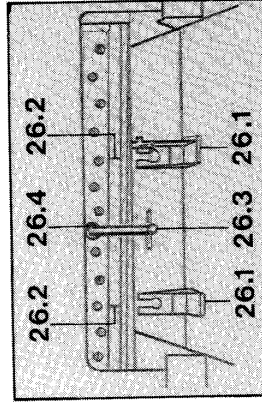


Pull turning knob (4). Backgauge position display flashes and any backgauge movement is blocked.

Step on pedal (18) to get clamp (10) down to approx. 3/4" above the table. Jog knife bar (8) down by means of cut buttons (13).

Remove the two knife screws on the left end.

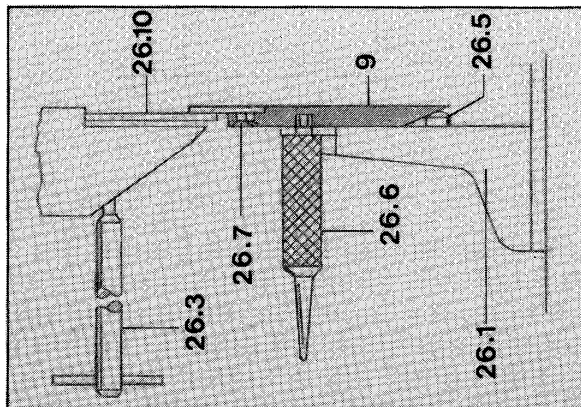
Press cut buttons (13) again to return knife bar to upper position. Remove remaining knife screws.



Place knife supports. (26.1) in front of knife with their slots matching the arrow marks (26.2) on the knife resp. knife bar. Place support with knife measuring gauge on the right side.

Insert T-wrench (26.3) into allen screw (26.4).

Inserting of knife

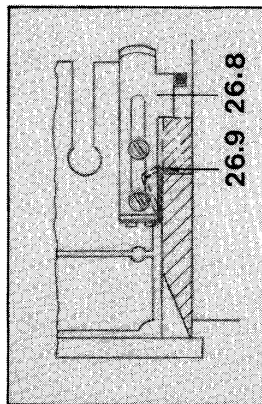


Lower knife (9) by turning T-wrench until knife bevel is touching guide pins (26.5) of knife supports (26.1). Attach knife to knife supports by means of knife handles (26.6).

Turn T-wrench (26.7) a little more so that knife can easily be pulled away from knife suspension lugs (26.3) slide knife on supports towards you and place it flat on a piece of cardboard on the table. Loosen knife handles to remove knife supports and re-tighten handles.

Place knife in knife case!

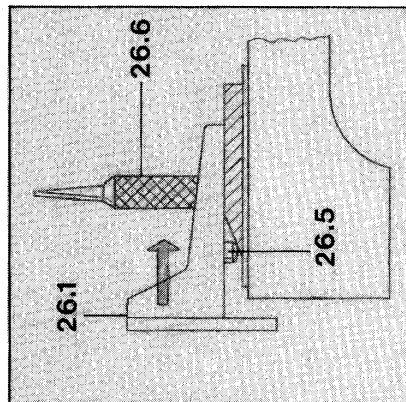
Turn or replace cutting stick (see page 8).



Screw knife handles (26.6) tight into knife. Remove knife from case and place it flat on a piece of cardboard on the table. Adjust measuring gauge (26.8) on knife support (26.1) to height of knife.

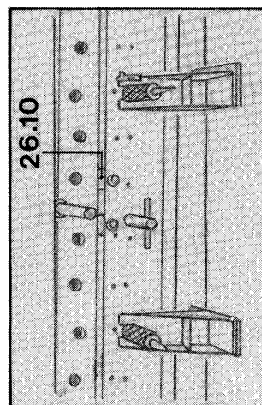
Note:

In the case height is less than 130 mm ($= 5 \frac{1}{8}''$) the lower gauge step (26.9) must be used for measuring. (See: compensating knife height, page 7)



Then return knife bar (8) to upper position by pressing cut buttons (13). Loosen knife handles (26.6) to attach knife supports (26.1).

Slide knife supports onto knife until guide pins (26.5) touch knife bevel and tighten knife handles.



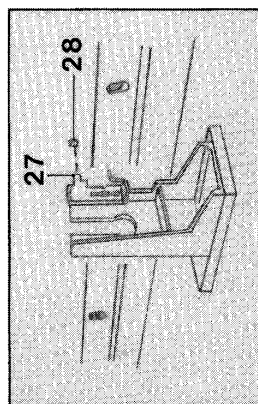
Set knife with supports into an upright position on the table and slide it to the knife bar.

Adjust knife suspension (26.10) with T-wrench (26.3) so that knife can be slid easily onto the lugs. After slightly lifting the knife by a 90° clockwise turn of the T-wrench (26.3) remove knife handles (26.6) and knife supports (26.1). Then lift knife all the way by turning the T-wrench (26.3).

Insert all knife screws and then tighten each one with the T-wrench (26.3) starting in the center and continuing alternatingly (13) and then insert and tighten the two screws on the left end.

Align knife parallel to cutting stick by using right eccentric bolt and turnbuckle (also see page 7). Fit short left side gauge (12) back into position. Return knife to upper position. Push back turning knob (4). Flashing of backgauge display stops. Backgauge can be moved again.

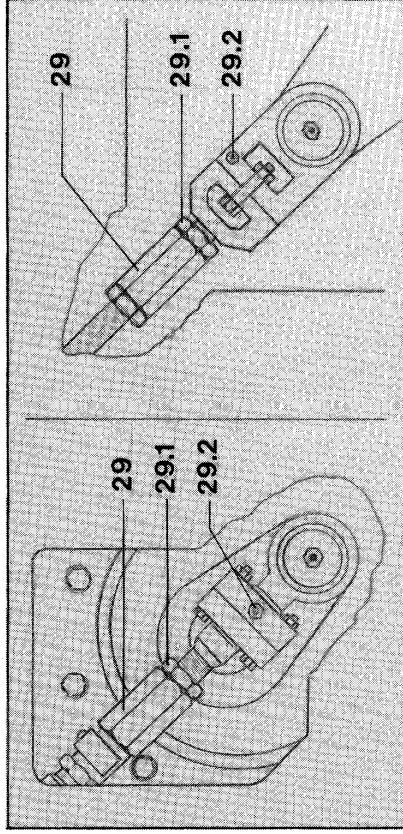
Get clamp (10) back in upper position by using pedal (18).



After knife is measured remove access hole lid (23). Jog knife bar down to lower dead center by means of cut buttons (13) (Make sure markers are matching!)

Place knife support with previously set measuring gauge in front of knife bar (8). The red pin (27) should fit into the hole (28) of the knife bar. If not, knife bar (8) has to be adjusted (see page 7).

Adjustment of knife bar

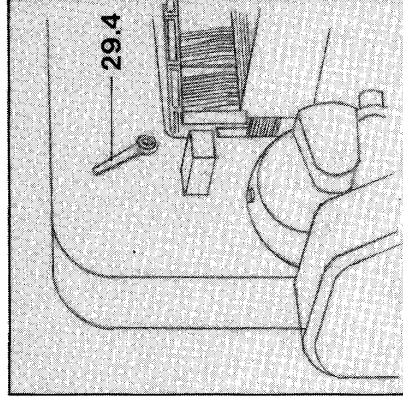


Jog knife bar down into lowest position by using cut buttons (13). Observe markers (29.2). Loosen locking nuts (29.1) on pulling rod.
By turning the turnbuckle (29) knife bar can be adjusted to the required position. After this tighten locking nuts (29.1) again.

Attention!

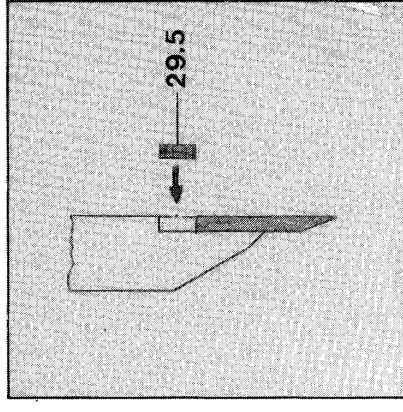
After each knife-change check the safety bolts; if necessary readjust them.

Aligning of knife bar



After loosening the locking nut the knife bar can be aligned parallel to the cutting stick with the handle (29.4) at the right eccentric bolt.
After aligning tighten locking nut again.

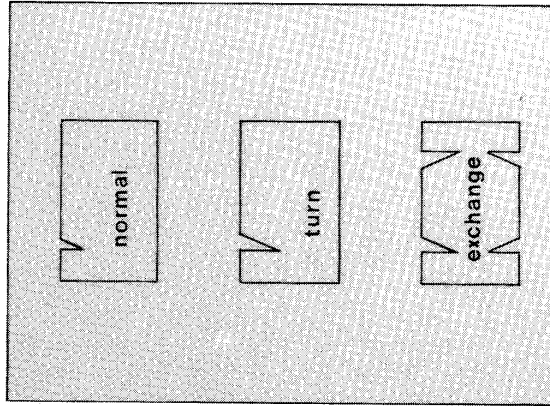
Compensation of knife height (only 115, 137, 155)



In case the height of the knife to be inserted is smaller than 130 mm (= 5 1/8\"/>

Accurate cutting is to a great extent depending on the quality and accuracy of the used knife.

Changing of cutting stick



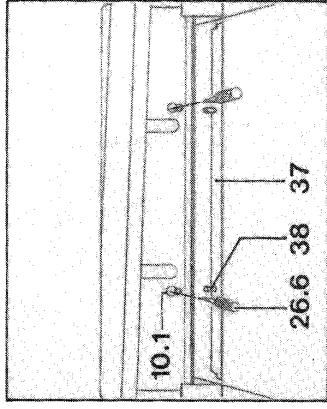
To maintain accuracy the turning or replacing of the cutting stick is necessary with each knife change.

The POLAR-Sinus Cutting Stick is made out of tough plastic material. Through its wavy shape it stays in the table groove without glue or screws. By turning each stick can be used four times.

For carbide knives cutting sticks of specially suited material are available.

Red cutting stick: for Original POLAR-knives
Grey cutting stick: for carbide knives.

Cutting with false clamp plate



The false clamp plate prevents pressure marks by the clamp on sensitive cutting stick.

Inserting the false clamp plate:

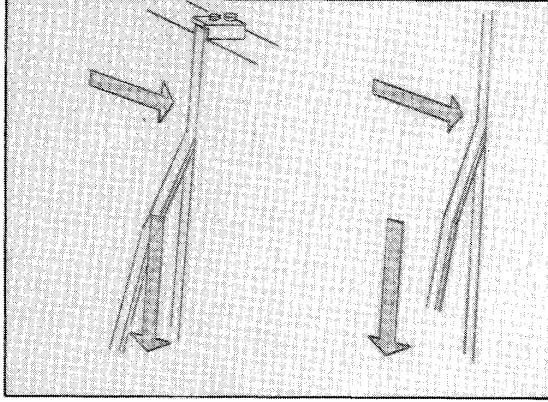
Push plate (37) against clamp (10) from below until you hear the guide pins (38) snap.

Removing false clamp plate:

Lower clamp with foot-pedal to approx. 50 mm (= 2") above the table and hold it.

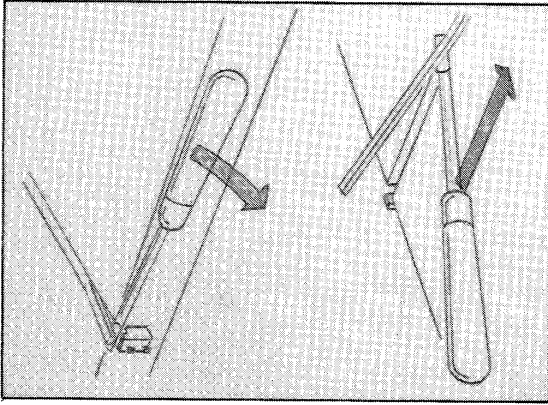
Use the tips of the knife handles (26.6) to push both locking bolts (10.1) back through the front of the clamp simultaneously.

The false clamp will drop down on the table.



Inserting of cutting stick

Push cutting stick against right-hand stop and fit into groove following its wavy shape. Then press firmly and completely into groove.

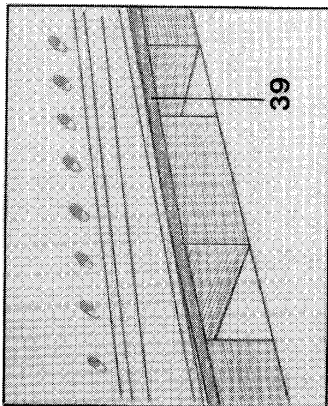


Removing of cutting stick

Start removing of cutting stick by lifting with screw-driver at left end.

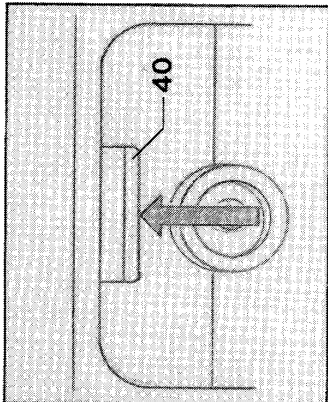
Clean groove thoroughly.

Flexible false clamp plate (Optional equipment)



Due to its flexibility the clamp plate (39) compensates for differing heights within the cutting material, it provides for even clamping pressure over the full cutting width and ensures accurate cutting. For plate insertion- and removal procedures see page 8.

Air table



An air current produced by a blower is connected to a system of plastic hoses under the table and distributed by a system of air jets that are closed by spring supported steel balls.

When opened by the weight of the stock the air jets produce an air film that allows easy sliding even of heavy material.

The air-supply can be turned on pressing the key (40).

air only front table:

press key only once shortly

air complete table:

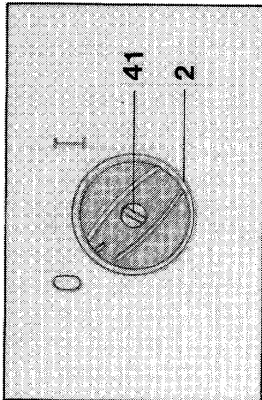
press key twice shortly or once for 2 or 3 seconds.

The air is switched off with each cut or by pressing one of the cut buttons (13) or by activating the pedal.

On automatic operation the air table will automatically be switched on during each backward movement of the backgauge.

Furthermore the air table can be programmed to each cut position within a program. (see page 20)

Manual knife cycling



In case the knife gets stuck during a cut because it is blunt or has a wrong angle cutting has to be stopped immediately either by releasing the cut buttons (13) or switching off the automatic knife. Then turn off machine completely. Turn main switch (2) resp. star-delta-switch (2.1) back to 'O' (OFF).

Wait for complete stop of main motor. Loosen knurled screw (41) on main switch and remove knob (2).

Remove plexiglass cover (25) from drive guard. Place knob (2) on square pin of drive wheel and push in locking pin.

Turn securing plate (42) with knob (2) clockwise to the end.

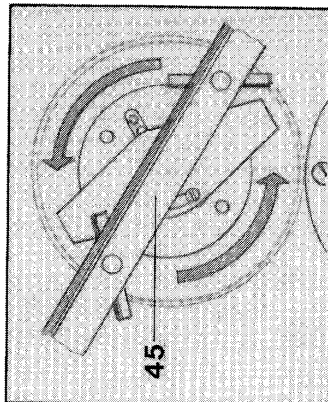
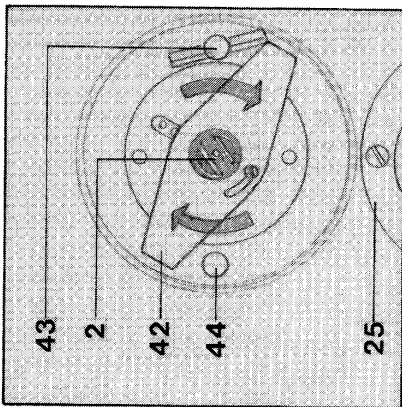
Insert clutch handles (43) into accessible holes (44) and then turn drive wheel until you find matching holes in the clutch disc. Tightly screw in clutch handles and fit crank bar (45) onto them in position.

Now get knife into upper position by turning drive wheel anti-clockwise.

Remove clutch handles (43) and crank bar (45) from drive wheel.

Turn knob (2) anti-clockwise to stop and replace it onto main switch.

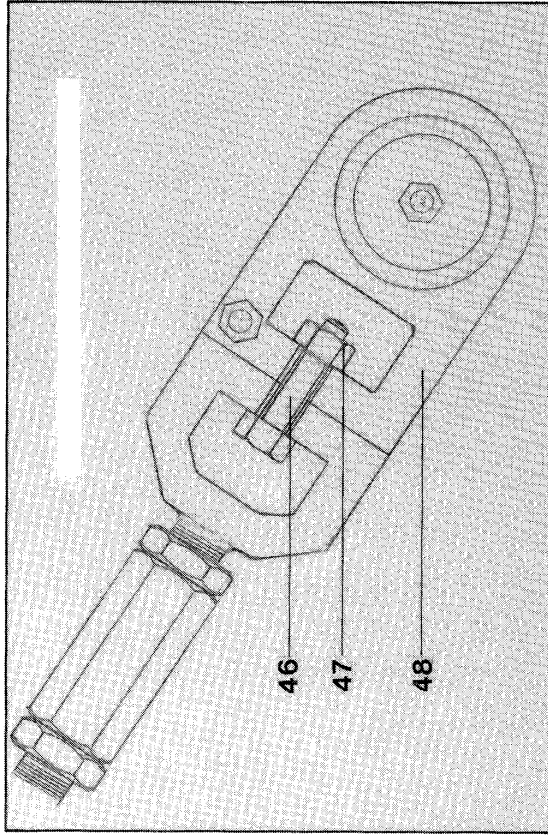
Attach plexiglass cover (25) an main drive.



Note:

The manual knife cycling cannot be started from knife's upper position. Before turning off machine the knife has to be jogged half way down with cut buttons (13).

Shear bolt protected pulling rod



To protect the machine from mechanical damage the pulling rod for the knife drive is secured by a shear bolt (46) that will be torn apart in case of overload. If that happens the shear bolt (46) has to be replaced.

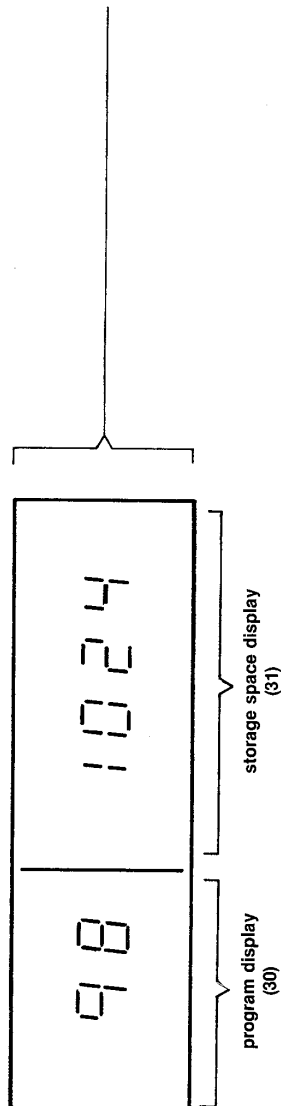
On 155 (61''):

1. Remove knife and clamp by pressing cut buttons (13) into upper position.
2. Remove stock from table.
3. Pull turn knob (4).
4. Remove access hole lid (23).
5. Remove broken shear bolts (46).
6. Insert new shear bolts.
7. Tighten shear bolt nuts (47) again after approx. 50 cuts.
8. Cover access hole with lid (23).

When replacing the shear bolt on these model make sure the shear bolt nut (47) is mounted in the lower part of the pulling rod (48) (crank shaft)!

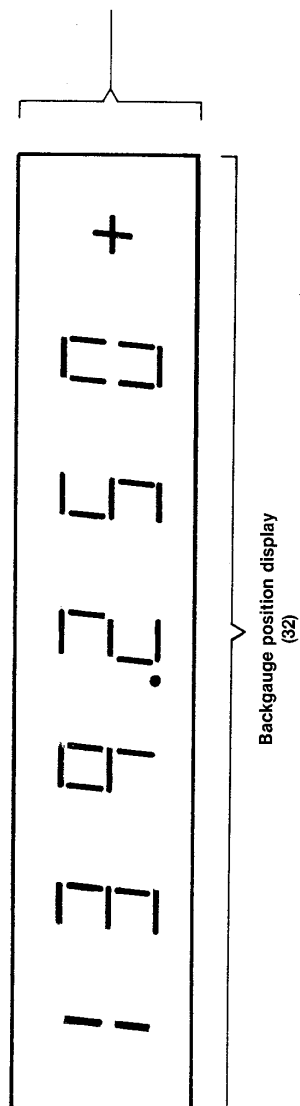
Important!
In case shear bolts were torn because knife bar has been stopped by safety bolt call a service engineer and have him eliminate the reason for this malfunction!

Displays on control panel

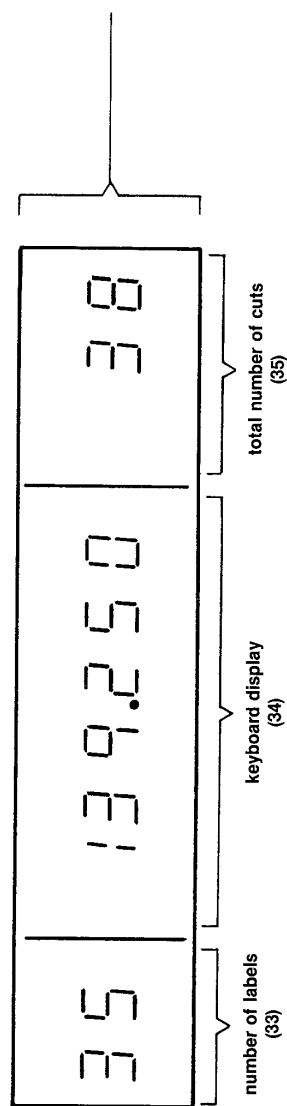


Program display:
on EMC and EM: 1 to 99

Storage space display:
on EMC and EM: display from 0 to 1024 spaces*
*1024 spaces: 1 k memory (standard equipment)



Backgauge position display:
display of actual backgauge position in cm** or inches



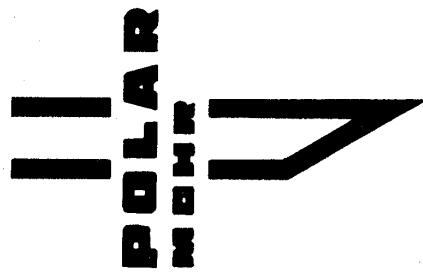
Display of number of labels (only EMC):
number of cuts of a label in a repeat cut sequence

Keyboard display:
display of input in cm** or inches

Display of total number of cuts (only EMC):
total number of cuts in repeat cut sequence

** upon request display in "mm"

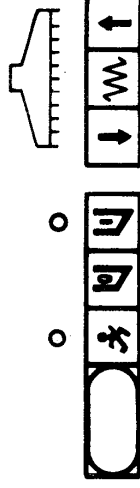
POLAR EMC
(Eltromat - Mikrocomputer)



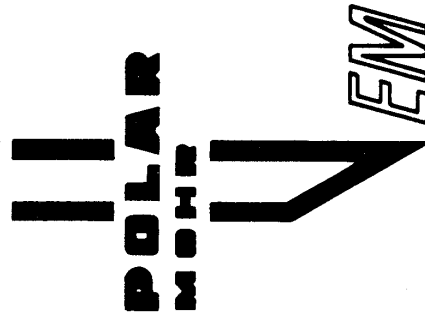
98 | 12
30 31

83.456 ÷
32

P+ P- S+ S-



POLAR EM
(Eltromat - Memory)



9 | 99
30 31

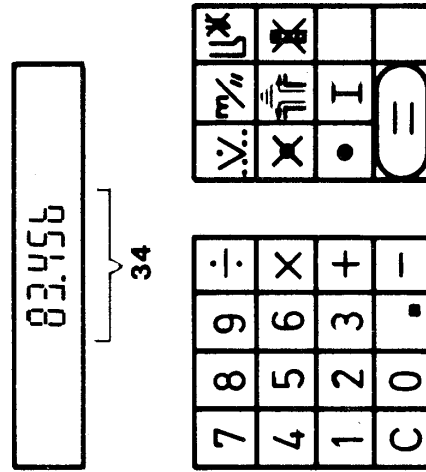
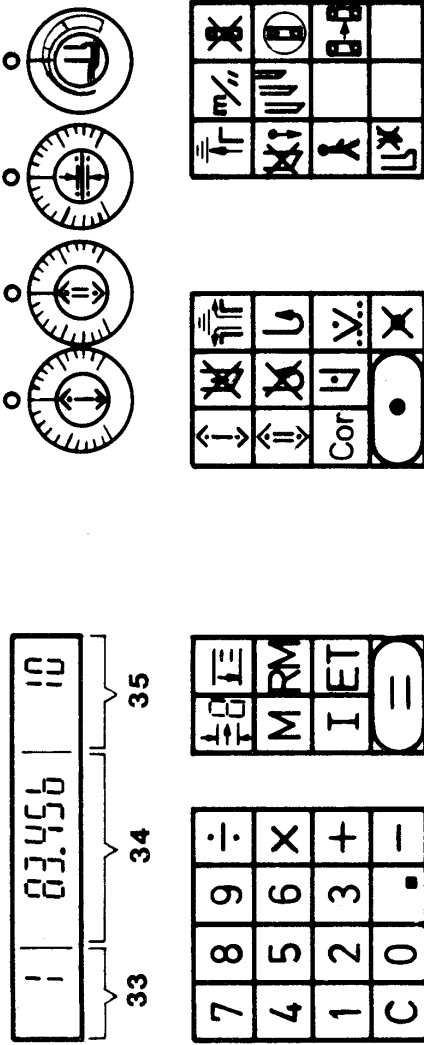
83.456 ÷
32

P+ P- S+ S-



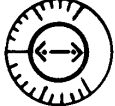
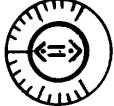
Explanation for the displays:
page 11

Explanation for the symbols of keys and button systems:
page 14 and 15



Operational elements on control panel (EM, EMC)

	Program number (increasing)		Dividing		Memory input (only EMC)
	Program number (decreasing) Next empty program appears when both P + and P - are pressed together.		Automatic knife OFF (only EMC)		Memory recall (only EMC)
	Cut number (increasing)		Automatic knife ON (only if automatic ON) (only EMC)		Digital keyboard ON
	Cut number (decreasing) When pressing both S + and S - number of available storage spaces is shown. After releasing last cut of selected program appears.		Digital keys		ELTROTACT: input of repeated label sizes (only EMC)
	Automatic OFF		Clear input/keyboard display		Transfer of backgauge position into keyboard display (only EMC)
	Automatic ON		Decimal point		Difference between keyboard display and calculator memory (only EMC)
			Backgauge motion: backgauge advance slow		Backgauge compensation I effective (only EMC)
			Additional key „Backgauge motion“: backgauge advance or reverse fast speed.		Backgauge motion: backgauge reverse slow

	Backgauge compensation II effective (only EMC)		Programmable ejector (only EMC)		Program protection (only EMC)		Memory copying (only EMC)
	Correction (only EMC)		Inserting of measurement		Backgauge advance slow (only EMC)		Backgauge compensation I (only EMC)
	Automatic knife OFF (only EMC)		Erasing		Clamping without cutting		Backgauge compensation II (only EMC)
	Suppression of ejector (only EMC)		Marking		Converting of measurement system		Cut corrections (only EMC)
	Marking with cut (only EMC)		Permanent air together with air table ON. Extra equipment: front air table ON (only EMC)		Cut counter (only EMC)		Setting of clamping time
	Air table ON		Jogging mark (only EMC)		Multiple erasing		

Programming of machine for automatic operation (EM, EMC)

Storing of measurements

A cut measurement inserted via the digital keyboard can be stored permanently by pressing the key . This will be acknowledged by a beep and a short flashing of the backgauge position display. The storage space display will be increased by 1. The input and storing of any number of cuts necessary for a job can be done in the same way. For EMC- and EM machines exchangeable memory banks with 1024 storage locations are available.

Through exchanging the memory bank the number of available storage locations can be extended without limit.
Data given into the memory bank remains permanently stored. If required, they can be erased and can be replaced by new data.

Display of unused storage spaces

By simultaneous pressing both  and  keys the number of still available storage spaces is displayed in the storage space display (31). After releasing both  and  keys the last cut position of the selected program will be displayed on the storage space display (31). It will be a "0" if that program is still unused.

In that case input and storing of cut positions and additional functions can be started immediately.

Selecting a free program

The necessary cut positions and additional functions for cutting a stack of material can be stored under a program number. For this numbers from 1 to 98 are available.

After machines have been turned on the program display (30) will show the program selected before machine was turned off.

In case this program contains measurements a "1" appears in the storage space display (31) and the keyboard display (34) shows the first measurement.

If the displayed program is empty the storage space display (31) shows a "0". In this case inserting and storing of measurements can be done right away.

If displayed program is already occupied a free program has to be selected. For this on both keys  and  have to be pressed simultaneously. Dashes appear in the program display (30). After releasing both keys  and  the number of the next free program appears automatically.

If machines are switched off against the rules the program display will show a "1" after switching on again.

Setting up of a program, example 1

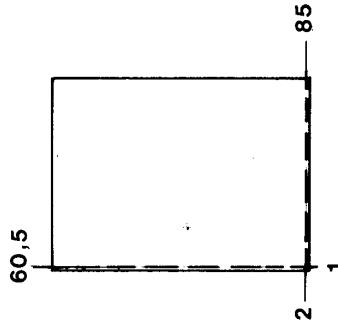
Example 1:

Squaring of a size A1 sheet, uncut size 61 x 86 cm.

1. measurement — 60,5 cm

2. measurement — 85 cm

Both measurement on program 1



key operation	program-no.	keyboard display	storage space no.
    		   	   
    		     	   
  		     	   

When pressing the first numerical key — in example 1 **[6]** — the key **[I]** will be lit.
A wrong input of measurements can be cleared by pressing the key **[C]** "before the key **[.]**" has been pressed. Then correct measurements can be entered again.

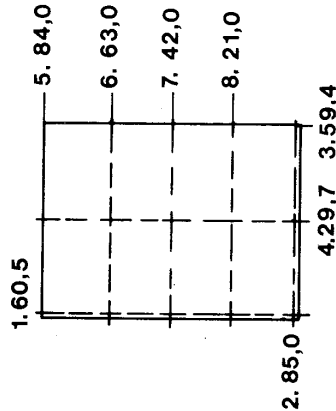
Setting up of a program, example 2

Example 2:

All-round trim and dividing cuts
starting size DIN A1
uncut 61 x 86 cm
finished size A4 (21 x 29,7 cm)

Cut Positions: on program 2

1. 60,5 cm
2. 85 cm
3. 59,4 cm
4. 29,7 cm
5. 84 cm
6. 63 cm
7. 42 cm
8. 21 cm



Selecting a program

By pressing key **[P]** "or" **[P]** "the number of the desired program can be selected. By pressing key **[P]** "or" **[P]** "just shortly the number in the program display (30) will be increased or decreased by 1 with each pressing. During longer pressing of keys **[P]** "or" **[P]** "program numbers will be shown successively in rising or falling order.
The keyboard display (34) shortly shows the first cut position of each program.
To select any desired program press and hold both keys **[P]** "and" **[P]** "together. After dashes appear in the program display (30) desired program number can be inserted via numerical keyboard.

Selecting an occupied storage space

By shortly pressing key **[S]** "or" **[S]** "the number shown in the storage space display (31) will be increased or decreased by 1. The corresponding cut measurement will appear in the keyboard display (34). Through this you can easily check whether a stored program is correct and complete.
By longer pressing key **[S]** "the cut positions of the selected program will be shown successively in increasing order. After the last storage space in the display (31) will jump back to 1 and start again.
By longer pressing key **[S]** "storage space numbers are shown in descending order until no. 1 is reached. If key **[S]** "is kept pressed longer storage space display will not change any more.

Key operation	Program-no.	Keyboard display	storage space no.
[P]	[2]	[.]	[0]
[6][0][.]	[2]	[60,500]	[1]
[8][5]	[2]	[85,000]	[2]
[5][9][.]	[2]	[59,400]	[3]
[2][9][.]	[2]	[29,700]	[4]
[8][4]	[2]	[84,000]	[5]
[6][3]	[2]	[63,000]	[6]
[4][2]	[2]	[42,000]	[7]
[2][1]	[2]	[21,000]	[8]

Running a program (EM, EMC)

see 'setting up of a program'

Example 1, page 16:

Select program 1.
To storage space no. 1 the keyboard display (34) will show the measurement 60.500 (cm). By pressing the key 'F' the automatic advance is switched on. The signal lamp above the key 'F' will be lit.
After pressing the key 'E', the backgauge automatically moves to the position shown in the keyboard display (34). Both display are equal.
Align stock and start clamping and cutting by simultaneous pressing of cut buttons (13).
After the return of knife and clamp to the upper position the storage space number is increased to 2 and the keyboard display reads 85.000 (cm). The backgauge automatically moves forward about 10 cm and then goes back to the measurement 85.000 cm. During this the air jets of the table are supplied with air. After the stock has been turned, aligned and cut the readout will again be storage space no. 1 and measurement 60.500 (cm).
Again backgauge (20) moves to this measurement.

See 'setting up of a program'

Example 2, page 17:

With storage space no. 1 the keyboard display (34) will show the measurement 60.500 (cm). After pressing the key 'F' for the automatic advance and the key 'E', the backgauge moves to the cutting position.
After each of the following cuts was performed the storage space number is increased by 1. The keyboard display (34) shows the referring cut position.
Automatically the backgauge moves to this position.
After the 8. cut of this programming example the storage space display (31) again shows the 1 and the corresponding measurement 60.500 (cm) is shown in both displays (34) and (32).

Automatic Knife (EMC)

For programs with a number of cuts followed by advancing of the backgauge the automatic knife can be used. To start the automatic knife you first have to press the automatic advance (key 'F') and key 'E' twice within 0.5 sec.
The correct operation will be acknowledged by a double flashing of the backgauge position display (32) and two short beeps. After this the signal lamp above key 'E' is lit constantly.

Through pressing the cut buttons (13) the first cut is performed and the signal lamp starts flashing.

The following cuts of the program sequence will be done automatically, i.e. without pressing of the cut buttons (13) as soon as the backgauge has reached the measurement shown in the keyboard display (34).

The automatic knife will be switched off:

1. by pressing keys 'F' or 'E' ;
2. during backgauge reverse
3. the front final position is reached
4. an 'automatic knife off' function has been programmed to a cut position by means of key 'X' ;

The signal lamp above the key 'E' is switched off.

If during automatic knife operation the lightbarrier is interrupted knife and clamp will stop immediately. Signal lamp above key 'E' stops flashing and is lit constantly. Automatic cutting can be continued after lightbarrier is undisturbed and cut buttons (13) are pressed again.

Correction of the value of nominal backgauge position / Additional function (EMC)

After actuating the key 'E' a correction of the input is possible as follows:

1. Select program and step number
2. Actuate key 'E'
3. Insert the new measurement/add. function
4. Actuate key 'E'

Erasing of one measurement (EM, EMC)

If a stored measurement is not needed any more it can be erased in the following way:

1. First program number containing the measurement to be erased is selected by pressing key 'F' or 'E' ;
2. Then select storage space number showing the measurement in the keyboard display by means of key 'E' ;
3. When pressing the erasing key 'X' the measurement in the keyboard display (34) will disappear and will be replaced by the measurement with the next higher storage space number. The storage space number of this and all following cut positions will be decreased by 1.

Example:

In the programming example no. 2 on page 17 the measurement 59.400 (cm) in storage space 3 is to be erased:

1. Select program 2 by means of key 'F' or 'E' ;
2. Then press key 'E' twice to select storage space 3. Keyboard display shows the measurement 59.400.

After pressing the erasing key 'X' the beeper sounds, the backgauge position display flashes shortly and the keyboard display shows the measurement 29.700 (cm) with the storage space display still showing '3'. The measurement 84.000 now is in storage space 4 a.s.o.
Program 2 now occupies only 7 storage spaces.

If instead of measurement 59.400 (cm) on storage space 3 the measurement 21.000 (cm) on storage space 8 would be erased the keyboard display (34) would show the measurement 42.000 (cm) and the number 7 would appear on the storage space display (31).

If a measurement is erased that was the only one in a program both the keyboard display (34) and the storage space display (31) will show a 0. The same happens if all measurements of a program are erased by pressing the erasing key 'X' several times.

Erasing of a program (EM EMC)

To erase a complete program it is not necessary to erase each measurement separately. After pressing the key 'X' the integrated signal lamp will be lit. Through pressing the key 'X' once all measurement of the selected program starting at the number shown in the storage space display (31) will be erased. In case the storage space number 1 was displayed the whole program is erased.

The erasing will also be indicated through a beep and the flashing of the backgauge position display (32).

Erasing of the memory bank (EMC)

In case it is necessary to erase the complete memory bank program number 99 has to be selected by pressing of key 'E' or 'E'.

Erasing then is performed by first pressing key 'X' and then actuating key 'X'.

Erased programs or memory banks are immediately ready for storing of new data.

Note:

Described erasing procedures refer only to unprotected programs (see page 21).

Inserting a measurement into a program (EM, EMC)

Additional measurements can be inserted into previously stored programs on any desired space.

With the key 'E' or 'E' the storage space number has to be selected **in front** of which an additional measurement is to be inserted.

Then press key 'X' and dial desired measurement.

Through pressing key 'E', the measurement is stored which will be indicated by a beep and a short flashing of the backgauge position display.

The signal lamps of key 'X' will become extinct. The added measurement is registered under the storage space number indicated.

The previously stored measurements of the following program move up one storage place number.

Marking according to a printed image (EM, EMC)

If cuts are to be made according to images or cut marks on a printed sheet, the backgauge should be moved by hand for the exact aligning of the paper by means of the mechanical or optical cutting line indicator. If key 'E' was pressed before this adjustment the keyboard display (34) shows the measurement of the backgauge position (32) and can be stored with the key 'E' providing an unoccupied program has been selected.

If key 'X' was pressed, storing of the current backgauge position is done automatically with each cut.

Programmable additional functions (EM, EMC)

The program run can even be more automatized by using additional functions. During the input of measurements keys for the desired additional functions are pressed indicated by lighting of respective signal lamps.
By pressing the key  measurements as well as additional functions are stored. After acknowledging the storage with a short flashing of the backgauge position display and a short beep the signal

lamps of the additional function keys are switched off.
During a program run all marked additional functions will be indicated through their signal lamps.

Subsequent storing/deletion of an additional function

If additional functions shall be added subsequently to an already stored nominal position:

1. Call the program and step number
2. Actuate key 
3. Actuate the key for the desired add. function
4. Actuate key 

Air table (EM, EMC)

Key 

Air to the table will be turned on. On EMC the air will stay on continuously if the key  was marked together with the above key. Only during a knife cycle the air table will be cut off.

Clamping without cutting (EM, EMC)

Key 

On all measurements to which this feature was programmed only clamping will be performed. The clamping time can be adjusted by means of the turning knob



On EMC a program including 'Clamping without Cutting' can be run with the 'Automatic Knife' after pressing key  and actuating cut buttons (13) only once shortly.

This will result in alternating clamping and backgauge advance.

With every change from 'Clamping without Cutting' to clamping and cutting the 'Automatic Knife' will be switched off automatically.

The signal lamp of the turn knob



will be lit if during an automatic run of 'Clamping without Cutting' clamping time is changed.

Programmable ejector (EMC)

Key 

Before each automatic backgauge reverse motion an automatic backgauge advance movement will take place. Thus the material can be taken off easier.

Preceding each reverse movement the backgauge automatically moves forward to enable easier handling of the paper.

This movement normally is approx. 10 cm (= 4"). If you want it shorter or longer you first have to press the key  and then via the numerical key-board enter the position up to which you want the backgauge to advance and store by pressing the key .

Ejector OFF (only EMC)

Key 

If before an automatic backgauge reverse motion there shall be no ejector function:

By pressing  „Ejector OFF" the function „Ejector OFF" is programmed together with the measurement for the backgauge reverse motion.

In case you want no ejector at all you have to mark the function 'Ejector OFF' by means of key  together with the position of the reverse stop.

Automatic knife 'OFF' (EMC)

Key 

The automatic switching off of the 'Automatic Knife' can be marked as an additional function to any desired measurement and will stop the 'Automatic Knife' on the program run.

Re-start of the 'Automatic Knife' will be achieved after pressing of key  and simultaneous actuating of cut buttons (13).

Jogging Mark (EMC)



Key

For exact and easier aligning of paperstock against backgauge and side guides any suitable measurement can be entered and the cut will be suppressed by programming key  with it. After aligning the next cut position can be reached by pressing key  or pulling handwheel (15).

Backgauge compensation (EMC)



Keys



and

Dials



and



This device compensates differences between print image and gripper margin.

Normally compensation I is used and marked together with the first cut crosswise and compensation II used and marked together with the first cut lengthwise.

Measurements with programmed compensation can be altered by means of turn knobs within a range of $\pm 2.5 \text{ mm}$ ($= 1/10''$)*.

Signal lamps will be lit if knobs are not in 'O' position and adjustments result in a difference between backgauge position (32) and keyboard display (34) on a program stop.

If both keys  and  are pressed when inserting a measurement compensation I will be added to all following marks.

* If necessary range of compensation can be altered by service engineers.

Program protection (EMC)



Key

If a programmed measurement shall be protected from subsequent modifying or deletion:

Press key  (signal lamp is lit up)

A thus protected program cannot be changed by inserting or adding additional measurements or functions. It cannot be erased either. In case you try to erase a complete memory bank containing a protected program no erasing will be done at all. Program number display (30) will show the number of the protected program instead.

Erasing a protected program (EMC)

A protected program can only be deleted after the program protection has been cancelled.

Actuate key  (signal lamp goes out)

Thereafter a deletion of a program step, a program or an entire memory will be possible.

Backgauge advance 'slow' (EMC)



Key

If a cutting size is programmed together with this function, the backgauge will move, during the program runs, to this measurement in slow speed.

Extra functions (EM, EMC)

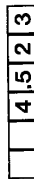
The blank keys at the far right side of the keyboard can be used for the programming of additional equipment.

If machine is equipped with additional devices keys will be marked with respective symbols and description of application will be found in the instructions.

Cut counter (EMC)

Key 

POLAR EMC cutters are equipped with an integrated cut counter. By pressing key  current contents will be shown on keyboard display (34). Decimal point is ignored during this display



= 4523 cuts

Counter stores each cut since last reset. If cuts should be counted over a short period only, the counter can be set to zero by simultaneously pressing keys  and . After this press key  while holding key . This is a continuation of the total cut counter required, the last figure should be noted, before reversing the counter to "0".

After concluding the intermediate counting one can add the noted figure to the new figure in the display and put the sum of both in the memory. This is done by continuous actuations to key  and inserting the required number with the numerical keys. Please mind the correct putting of key .

Is the counter-number completely shown in the keyboard display (34), push key , whereby the backgauge position display (32) blinks and a peep-sound can be heard. After that release key .

Calculator functions (EM, EMC)

The numerical keyboard includes the 4 basic arithmetic calculations to figure out measurements for cut sequences and programs.

Key operation:

Keyboard Display:

Adding:

Subtracting:

Multiplying:

Dividing:

Note the correct position of the decimal point during calculations!

Negative sign

A negative solution of a calculation will be indicated by a minus "-" sign in the keyboard display. If this is to be marked as a measurement the negative sign has to be cleared by pressing key .

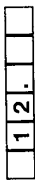
Key operation:

Keyboard display:







Calculations with memory (EMC)

Interim results of a calculation can be stored in an internal memory by using key **M** and can be recalled to the keyboard display (34) by using key

Example:

$$(3 \times 5) + (7 \times 2) = 29$$

Key operation:

Keyboard display:

$$3 \times 5 = 15.000$$

[illegible]

$$7 \times 2 = 14.000$$

RM **+** **=** **29.000**

Calculations with the back-gauge position (EMC)

In case current backgauge position is needed to calculate further cut positions it can be transferred to the keyboard display (34) by pressing key .

Difference between keyboard display and calculator memory (EMC)

By pressing key " $\square$ " the difference between a measurement inserted into the calculator memory by pressing key " M " and another measurement in the keyboard display will be shown and is ready for further calculations.

Example:

A cut sequence with the initial cut of 63 cm and the final cut of 20 cm consists of 8 equal cuts. The size of a single cut is to be calculated.

Key Input

Keyboard Display

	6	3	.	0	0
--	---	---	---	---	---

	6	3	.	0	0
--	---	---	---	---	---

	2	0	.	0	0
--	---	---	---	---	---

	4	3	.	0	0
--	---	---	---	---	---

		5	.	3	7	5
--	--	---	---	---	---	---

Setting of backgauge to a calculated position

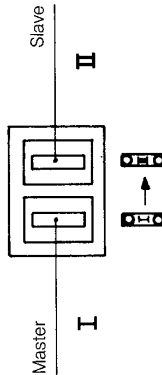
Backgauge will travel to calculated position in key-board display after pressing key  twice (automatic advance OFF) or once (automatic advance ON).

Storing of calculated position

Calculated positions in keyboard display (34) can be stored by pressing key  same as measurement inserted via keyboard.

Copying of memory bank (EMC)

POLAR-EMC machines offer the possibility to transfer data from one memory bank to another with all data in first memory (master) being retained. For this purpose the second memory (slave) is plugged into the right memory receptacle (16).



During copying automatic advance must remain switched OFF.

Copying of a single program

To copy a certain program first the number of the program has to be selected by pressing key **[P•]** or **[P-]**.

Pressing of key **P** will turn on its signal lamp. Program display (30) and storage space display (31) show programs and spaces of slave memory. By means of keys **P** and **P** an empty program is selected in slave memory.

Pressing of key starts the automatic data transfer from selected master program to slave program.

A few seconds later the end of the transfer is indicated by a beep and a flashing of the backgauge position display (32). Signal lamp of the key  is switched off and machine is again ready for normal operation.

Conditions for program copying

No copying possible if target program in slave memory is occupied. It still keys **Ⓚ** and **Ⓛ** are pressed the signal lamp in the key **Ⓚ** will start flashing. The same happens if slave memory does not contain enough empty spaces to accept master program. After pressing key **Ⓚ** twice its signal lamp is lit for some time and then switched off totally.

Either unused programs in slave memory will have to be erased or a slave memory with sufficient storage capacity is used.

Copying of a complete memory bank

For copying of all data from a master into a slave memory program no. 99 has to be selected prior to pressing key **□**. Further steps are the same as on single program copying. Any program protection will be copied into slave memory.

Programs will be copied from master to slave with same program number. Occupied programs in slave memory will be erased prior to copying.

Erasing data in slave memory bank

Data in slave memory bank can only be erased after it has been plugged into receptacle of master memory bank.

memory bank. During marking and erasing a signal lamp on the memory bank housing will be lit. During these operations the memory must not be removed from the receptacle.

Repeat cuts with ELTROTACT (EMC)

Repeat cut sequences of labels of same size can be programmed fast and easy with the repeat device, ELTROTACT.

For repeat cut sequences the following terms are used:

Label Size:
distance between two cuts

Number of Labels:
number of successive cuts of same size

Total Number of Cuts:
total sum of cuts in a label sequence

For the storing of a label program you first have to select an unused program.

Before the input on the label cutting data you will have to figure out and mark the initial trims according to sheet size or printed image.
Marking of the ELTROTACT will also be acknowledged by a beep and a flashing of the backgauge position display (32).

Input of label size

After actuating of key  6 dashes are flashing in the keyboard display (34). Keyboard is ready for input of label size. Input via keyboard can be read on keyboard display (34) and will be stored by pressing key . After this signal lamp in key  is switched off.

After a label size is stored and automatic advance switched on with key  backgauge will advance by this label size after each cut. If no number of labels was stored backgauge will advance until stopped by forward limit switch. After this backgauge returns automatically to initial cut position.

Input of number of labels

If a definite number of labels of same size is wanted after storing label size number of labels has to be inserted. For this again key  has to be pressed which will start flashing of the 2-digit display of number of labels (33).

Insert number of labels via numerical keyboard in to display (33) and press key  for storing.

Finding out total number of cuts

If a pile is cut into different label sequences with same label size in a sequence but different labels all over the sheet the total number of cuts will be the sum of all stored number of labels plus any included trims.

Input of total number of cuts

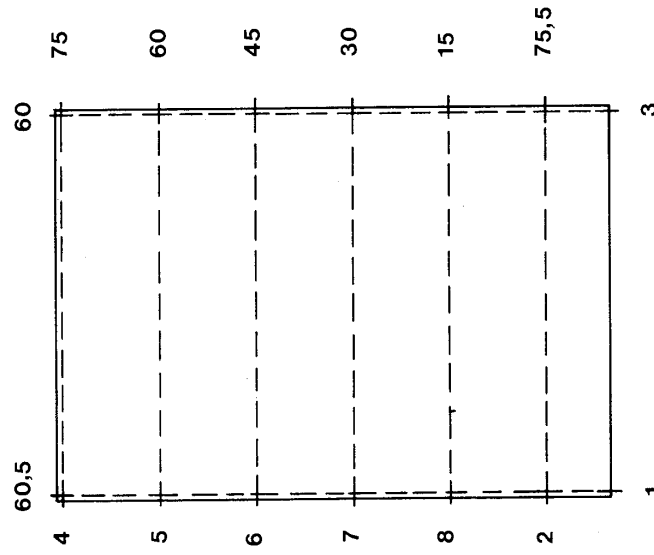
After storing last number of labels press key  again. Keyboard display (34) is flashing. Now press key  : dashes in the 3-digit display of total number of cuts (35) are flashing. Insert total number of cuts via numerical keyboard and store by pressing key .

Program examples with repeating device ELTROACT

Example 1: Cutting of a sheet size DIN A1 (untrimmed 61 x 86 cm) into equal strips of 15 x 60 cm.

1. cut: 60.5 cm
2. cut: 75.5 cm
3. cut: 60.0 cm
4. cut: 75.0 cm
5. cut: 60.0 cm
6. cut: 45.0 cm
7. cut: 30.0 cm
8. cut: 15.0 cm

Note: 2. cut produces a waste strip of 11.5 cm



By simultaneous pressing of keys **P+** and **P-** next free program is selected.

key operation	keyboard display	program no.	storage space no.
P+ P- simultaneous	00.00	3	0
6 0 . 5 . 0	60.500	3	1
7 5 . 5 . 0	75.500	3	2
6 0 . 0 . 0	60.000	3	3
7 5 . 0 . 0	75.000	3	4
ET	- - - - -	3	4
1 5 . 0 . 0	15.000	3	5
S+	60.500	3	1

Program run

After pressing keys **P+** and **P-** backgauge moves to 60.5 cm. After 1. cut and ejecting backgauge goes back to 75.5 cm with the air table being switched on automatically. Pile is turned by 90° and aligned again. After 2. cut backgauge goes to 60.0 cm.

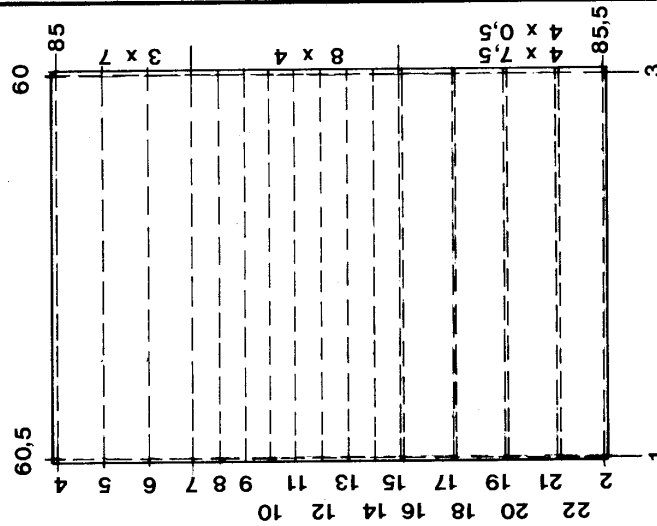
Turn pile by 90° and align
After 3. cut and an ejector backgauge goes to 75.0 cm with air table switched on.
Turn pile again by 90° and align.
After cuts 4 to 7 backgauge advance will be 15 cm each and storage space number is not increased up to cut 8.

After the last cut backgauge starts at 1. cut position 60.5 cm.
Cuts 4 to 8 can be done by the "Automatic Knife".

Program examples with repeating device ELTROTACT

Example 2: cutting of a sheet size DIN A1 (61 x 86 cm untrimmed) into strips of different width.

1. cut: 50,6 cm
2. cut: 85,5 cm
3. cut: 60 cm
4. cut: 85 cm
5. cut: 78 cm
6. cut: 71 cm
7. cut: 64 cm
8. cut: 60 cm
9. cut: 56 cm
10. cut: 52 cm
11. cut: 48 cm
12. cut: 44 cm
13. cut: 40 cm
14. cut: 36 cm
15. cut: 32 cm
16. cut: 31,5 cm
17. cut: 24 cm
18. cut: 23,5 cm
19. cut: 16 cm
20. cut: 15,5 cm
21. cut: 8 cm
22. cut: 7,5 cm



Key operation	number of labels	keyboard display	total number of cuts	program no.	storage space no.
P₊ P₋ simultaneous					
6 0 . 5 .		60,5000			
8 5 . 5 .		85,5000			
6 0		60,0000			
8 5		85,0000			
ET		- - - - -			
7		7,0000			
ET		7,0000			
3		7,0000			
ET		- - - - -			
4		4,0000			
ET		4,0000			
8		4,0000			
ET		4,0000			
1 1		4,0000			
ET		- - - - -			

Program run

After cuts 1 to 3 have been made as in example 1 backgauge moves to 85 cm.

After paper has been aligned automatic knife can be prepared with key  and 4, cut is made.

After this backgauge advances 3 times 7 cm with a cut on each stop.

Then it is 8 forward moves of 4 cm each followed by cuts.

Finally 7 cuts with alternating forward moves of 0.5 cm and 7.5 cm are performed.

After this backgauge returns to starting position of 60.5 cm while the automatic knife is switched off automatically.

	Key operation	number of labels	keyboard display	total number of cuts	program no.	storage space no.
						
ET		-				
1		1				
ET						
7						
ET		-				
1		1				
ET						
7						
S+						

Repeat cuts with additional functions (EMC)

Some additional functions can be programmed with repeat cuts.
Marking is done by pressing key of desired additional function and storing with key  during the input of label size, number of labels or total number of cuts.
They can also be stored later to already marked programs by means of key .

The additional function stored to a label size will be effective as long as this label size is cut.
Functions stored to number of labels or total number of cuts will be effective as soon as respective number is finished, i.e. counted down to 0.

Cut correction (EMC)

Differences of a printed sheet be cause of stretching or shrinking can be compensated on the automatic run of an ELTROTRACT program by turning the knob . Maximum compensation of a label can be up to ± 0.1 mm.
The set compensation will be added resp. subtracted with each cut.
To avoid wrong cuts on the next pile the effect of the knob is automatically switched off, when backgauge goes in reverse. For further compensation knob  has to be turned to 0 first and then to desired position.
Cut compensation works with any cut on a program or ELTROTRACT operation.

Malfunctions (EM, EMC)

Backgauge does not stop exactly on the marked measurement:
In case backgauge does not exactly reach a desired measurement on automatic advance backgauge position display (32) will flash and the beeper is heard.
Automatic advance and automatic knife will be switched off.

Remedy:
Adjust backgauge by hand and align paper. Press key  and perform the cut. In case same malfunction happens again call a service engineer.

Error messages

In case of other malfunctions the self-checking machine control will show a 2-digit number in the keyboard display (34) with dashes on all other digits.
Remember that number.
All functions are blocked.

Remedy:
Switch machine off and on again. If same or other number is shown turn off machine completely and call a service engineer. Remember shown number.

Display test

On EM and EMC machines a display test can be made by pressing automatic off key  twice.
This will cause all display segments and signal lamps to light up for a few seconds.
On SD-machines backgauge position display (32) will flash when turn knob (4) is pulled.

Chart of possible additional functions with ELTROTRACT

function	key	label size	number of labels	total number of cuts
air table		—	—	X
constant air table	 	X	—	—
clamping without cutting		X	—	—
automatic knife OFF		—	X	X
backgauge advance slow		X	—	—

Maintenance and Lubrication

Main Gear

Oil level to be checked monthly!

The gear oil should be changed after 500 working hours and thereafter every 6000 working hours.

Oil change:

Remove drain plug and let oil drain out.
Insert drain screw again and fill in new oil up to middle oil level indicator.

Brands of following companies are suitable:

- (Succession alphabetically)
1. ARAL OIL BG 78
2. BP ENERGOL GR 300-EP
3. CHEVRON GEAR COMPOUND 120
4. ESSO PEN-O-LED EP 220
5. FINA SATURNA 58
6. MOBIL COMPOUND DD
7. SHELL OMALA OEL 320
8. TEXACO MEROLA LUBRICANT 3

Oil quantity:

92 approx. 0.5 l — 0.13 gal
115 approx. 1 l — 0.26 gal
137 approx. 1.4 l — 0.37 gal
155 approx. 2.5 l — 0.7 gal

Backgauge Guide Rails

Oil to be filled in before machine is installed.

A few pumping strokes per week are sufficient for an adequate oil supply to the lubrication points.

The distribution of the lubricant is assured by the backgauge movement. Oil level should be checked frequently and refilled if necessary.

1. ARAL Degantit B 220
2. BP ENERGOL HPC 220
3. CHEVRON WAY OIL 220
4. ESSO FEBIS K 220
5. FINA ARTAC ET 220 or HYDRAN CIN 220
6. MOBIL VACTRA No. 4
7. SHELL TONNA T 220
8. TEXACO WAY LUBRICANT 220

Guide Blocks, Guide Slots of Knife Carrier and Clamp, Electric Bolt, Crank Arm.

Lubrication schedules as per label on machine.

2-3 strokes with the grease gun are sufficient.

1. ARAL Fett LF 2
2. BP Energol LS 2
3. CHEVRON Multi-Motive-Grease
4. ESSO BEACON 2
5. FINA MARSON HTL 2
6. MOBIL MOBILUX GREASE No. 2 or MOBILEX 47
7. SHELL ALVANIA FETT R 2
8. TEXACO GLISSANDO FL 20

Hydraulic

The complete hydraulic unit is located within the right machine frame pillar.
The hydraulic oil should be changed after every 6000 working hours.
The oil filter should be cleaned at this time and any residue accumulated in the hydraulic fluid container (right pillar) is to be removed.
It is advisable to have the oil change combined with a check up of the hydraulic system by one of our POLAR service technicians.

1. ARAL OEL TU 508
2. BP ENERGOL HLP 80
3. CHEVRON HG-OIL 25
4. ESSO NUTO H-32
5. FINA HYDRAN 31
6. MOBIL D.T.E. OIL Light or VAC HL 16
7. SHELL TELLUS OEL 32
8. TEXACO RANDO OIL B (HLP 25)

Oil quantity: 30 Liter (approx. 8 gal)

Service Schedules:

1. 500 working hrs. check up (gear oil change)
(8 hrs. per day = 2 months)
2. 6000 working hrs. check up
(8 hrs. per day = 3 years)
3. 1200 working hrs. check up
(8 hrs. per day = 6 years)
4. 1800 working hrs. check up
(8 hrs. per day = 9 years)

5. 2400 working hrs. check up
(8 hrs. per day = 12 years)

Please make a service appointment ahead of time before the service interval point is reached.