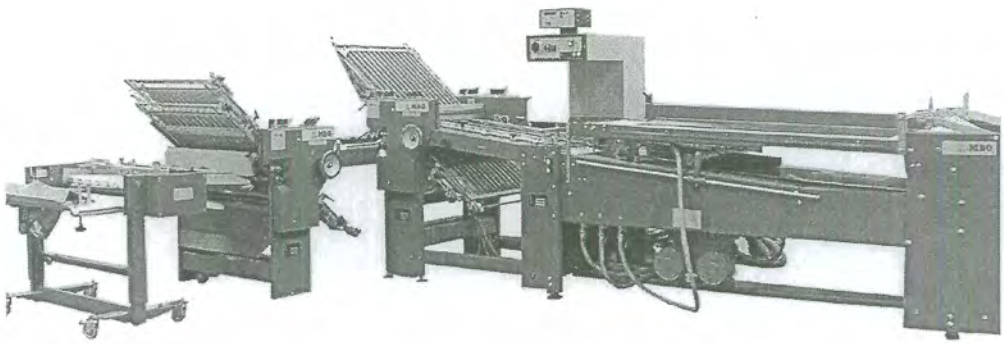
MBO
Folding Technology



Buckle Folding Machine Typ B26E/B30E

Continuous feeder

Operating Manual

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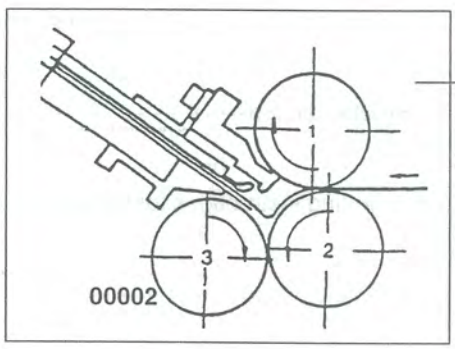

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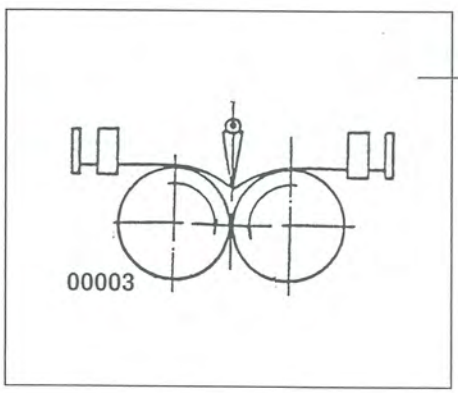

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1.2 Prologue

With the folding machine B26E/B30E by MBO you have purchased a valuable product. The MBO folding machine is mechanically, electrically as well as electronically built on the highest level. However, it is absolutely imperative to comply with all Safety Regulations and Safety Instructions.

This Operating Manual refers to these aspects, accordingly.This Operating Manual should instruct you to correctly operate the MBO folding machine and to comply with the Safety Regulations and maintenance of the machine, accordingly.

1.3 Information to user / Functioning description

FOLDING MACHINE TO FOLD FLAT SHEETS.The buckle folding machine works exclusively in accordance with the principle of buckle folding. The MBO buckle folding machine B26E/B30E with continuous feeder has been developed to process sheets in the sizes of 15 x 18 cm up to 66 x 127 cm (76 x 127 cm if B30E). The production speed can be regulated between 10 and 205 mtrs/min. However, this result depends on the type and size of sheet and type of fold.

The basic machine consists of a folding unit one with continuous feeder as well as the well-proven MBO register table.

The folding unit one is equipped with four stainless-steel buckle plates, sheet stop fine adjustment and integrated swing deflectors. Moreover, it is also equipped with the well-proven MBO spiral foldrollers, which may be adjusted through the quick-setting elements located on top of the machine, combined with the low-noise belt drive system and solid, quickly removeable slitter shafts through plug bearings.

The folding units two, three and four are mobile buckle folding units with own drive, register table as well as four buckle plates (two at folding unit four) as descriped above.The stream delivery is mobile.The following description from the feeder to the machine should enable the operator to achieve a general understanding of the machine.

Buckle fold (16):

For the adjustment of the foldrollers it is very important to know that the principle of a buckle fold is that the sheet is pushed but not pulled into the buckle plate. Three foldrollers and one buckle plate are required to produce a buckle fold. Foldrollers **1** and **2** carry the sheet into the buckle plate to its stop. If sheet transportation is continued through these foldrollers a buckle occurs into the direction of foldrollers **2** and **3**, by which the sheet is folded during the passage.

Knife fold (17):

Two foldrollers and one knife are required for the preparation of a knife fold. The sheet is transported underneath the knife to a sheet stop, and adjusted. After the knife has been released it carries the sheet between the foldrollers where it is folded during its passage.

1.4 Manufacturer / Technical data

Manufacturer: **MBO Binder + Co.** - Máquinas Gráficas, Lda.

Rua Joaquim Alves da Silva — TEL.: 22 996 59 47

Perafita - Apartado 5092 — 22 996 22 00

4458 - MATOSINHOS / PORTUGAL — FAX: 22 998 22 01

Buckle folding machine: Type

B26E/B30E

Configurations: 4; 44; 444; 4442; 6; 64; 644; 6442

Customer: _____

Machine configuration: _____

Machine No.: _____

Serial No.: _____

Type of feeder: _____

Type of pump: _____

_____

Electrical data:

Wiring diagram no.:

Folding unit I: _____

Folding unit II: _____

Folding unit III: _____

Folding unit IV: _____

Stream delivery: _____

Operating voltage: (V: / Hz:) _____

Control voltage: (V: / A:) _____

Control voltage: (V: / A:) _____

Total rated current: (A:) _____

Fuse at power supply: (A:) _____

Conformity Certificate: _____

Noise level: (dB(Al):) _____

1.5 Supplementary documentations:

Operating Manual of

batch counter: _____

air pump: _____

air pump: _____

auxiliary units: _____

auxiliary units: _____

Wiring diagram no. of

auxiliary unit: _____

auxiliary unit: _____

Spare part list of

machine: _____

feeder: _____

delivery: _____

auxiliary units: _____

auxiliary units: _____

Knife list TM 32/2: _____

2.0 BASIC SAFETY INSTRUCTIONS

2.1 Warnings and symbols

The following designations or signs are used for very special instructions.

>NOTICE< Special instructions with regard to the economical use of the machine.

>ATTENTION< Special instructions respectively requirements and prohibitions to avoid injuries and damages.

>DANGER< Instructions respectively requirements and prohibitions to prevent personal injuries or extensive damages.

2.2 Safety at working place Destined use of the folding machine

2.2.1 MBO folding machines correspond to their stipulated Safety Technical Requirement at the time of their shipment. Therefore, any moveable and rotating parts are covered with protective hoods and are mechanically and electrically interlocked to such an extent as to not unreasonably detract from the operation.

2.2.2 At all safety technical preventions it is extremely important that the operating personnel achieves sufficient safety experience and is advised of all dangerous sources. The use of the deliverry does not exclude danger to life and limb of the operator or third parties, respectively does not exclude the detraction of the machine and any other material assets.

2.2.3 The machine should only be operated when in good working order. Any malfunctions which may impair the safety must be removed immediately by trained personnel of the manufacturer / supplier.

2.2.4 The folding machine is designed to fold, feed and perforate etc. sheets. The processing of any other material should not be attempted. The manufacturer or supplier would not be liable for any damage caused as a result.

2.2.5 Carefully read the complete Operating Manual before you operate the machine, including the Safety and Service Requirements.

2.2.6 The Operating Manual should be kept with the machine at all times.

2.2.7 Complete the Operating Manual, if necessary, with internal Safety Instructions as well as with the legal Regulations for Prevention of Accidents.

2.2.8 In case of changing operators ensure that all are trained and informed of the points mentioned in the Operating Manual.

2.2.9 Never remove guards or safety interlocks as the machine will no longer be protected.

2.2.10 >**DANGER**< Never use any tools which are not in a perfect condition and make sure that no tools are left on the machine after completion of settings and maintenance. Tools which fall into the machine may cause serious injuries and damages.

2.2.11 Note that all Safety Instructions are kept in a legible and visible condition.

2.2.12 Any audible and visible change on the machine in relation to the safety must be reported to the supervisor / manager of your company immediately.

2.2.13 The operating personnel should be aware that loose clothing, jewellry or hair can cause serious injuries if caught in the machine.

2.2.14 It is absolutely prohibited to clean rollers, eliminate malfunctions, or to undertake adjustments while the machine is on operation.

2.2.15 Make sure that no other person starts the machine while you are working on it.

>**DANGER**< Always activate the **EMERGENCY-STOP** button or turn the main switch **OFF**.

2.2.16 Check all the machine stoppages prior to starting the machine. You should never switch on the machine without first checking that the machine is in good working order and that no other person is making adjustments.

2.2.17 Turn **OFF** the main switch and secure it, if necessary, with a lock if you are required to undertake extensive mechanical or electrical maintenance and repair works.

2.2.18 Never open the main or sub-control panel! Only authorized personnel should gain access to the electronic control cabinets as there are no user serviceable parts.

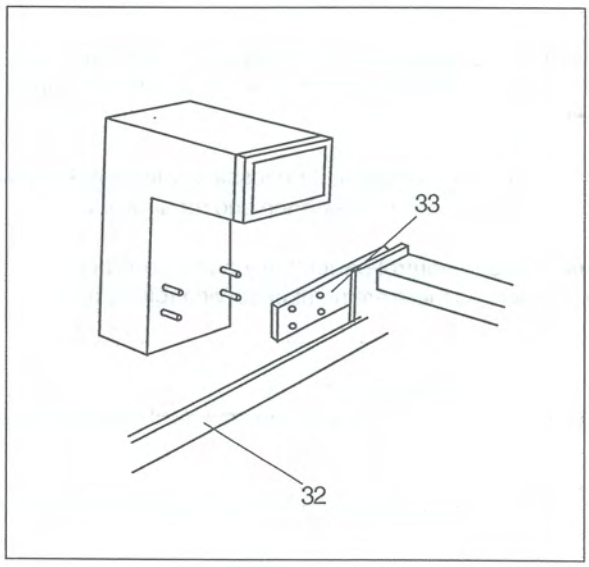
>HAZARDOUS< If control cabinet is open!
All main terminals carry current even though the main switch has been turned off!

2.2.19 Any damaged cables or electrical connections must be reported to the competent authorities of your company.

2.2.20 If you are working at the machine with opened damping hood, make sure that the damping hood is completely opened and rests on the limit stop. If this is not done, the damping hood may fall.

The noise damping hood is equipped with an electrical switch.
>**DANGER**< It is absolutely prohibited to remove or over-bridge this switch. It may cause serious injuries to the operator.

2.2.21 Machine connections must be installed in such a manner that no cables, tubes or hoses are left trailing.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3,0 Electrical connection

(>**HAZARDOUS**< This work is only to be carried out by authorized personnel!)

3.1 Control cabinet

Unpack the control cabinet and fasten it onto the side panel of the register table **32** as well as at the feeder **33**. Insert the plugs of the feeder and the machine into the sockets of the control cabinet. Plugs as well as sockets bear the same marking.

Connect the cable of the feeder motor, machine motor, sockets for auxiliary folding units as well as the connection cable of the compressor directly to the motor protective switch inside the main control panel according to the attached wiring diagram.

>**HAZARDOUS**< This work is only to be carried out by authorized personnel!

3.1.1 Main current connection

>**ATTENTION**< Make sure that power supply and frequency correspond with the data of your machine! These data should be checked with the label on the control cabinet.

Insert the cable from the base of the control cabinet and connect it with the main terminals provided according to the attached wiring diagram.

>**HAZARDOUS**< This work is only to be carried out by authorized personnel!

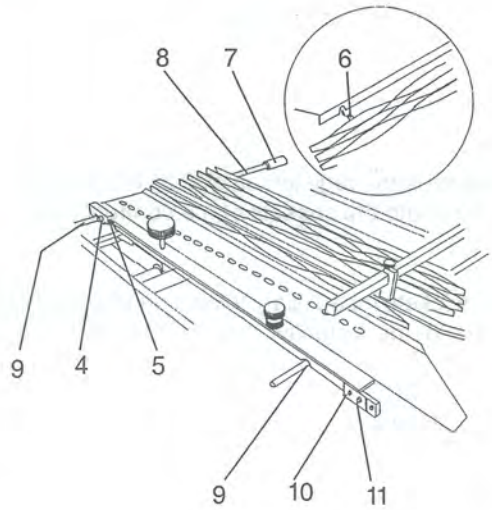
>**ATTENTION**< Consider **CLOCKWISE ROTATING FIELD**! After wiring has been completed the terminals must be protected with cover plates provided with.

>**ATTENTION**< After connections have been completed check the rotating field of motors as described under item 3.1. However, if one of these motors should have the wrong rotating field, change the connection of the individual motor terminal.

3.1.2 Stream delivery

>**ATTENTION**< The **printed circuit board** (p.c.b.) of the stream delivery is provided with **220 voltages**! If you are working on the opened cabinet of the delivery make sure that no power is provided or do not touch this p.c.b!

4.1.1



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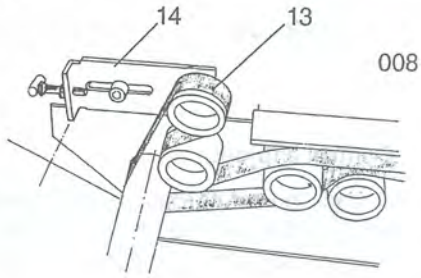

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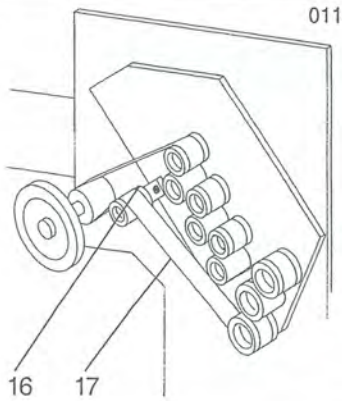

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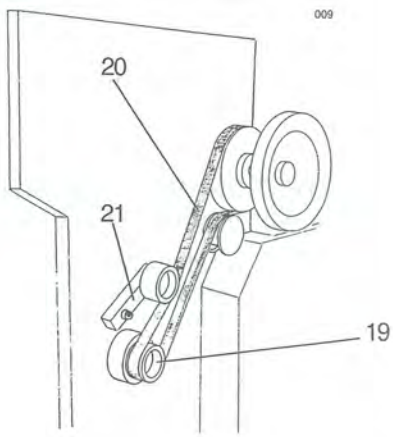

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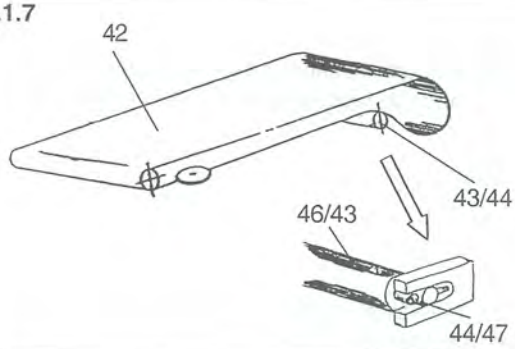

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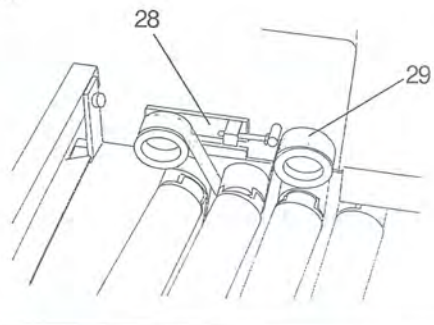

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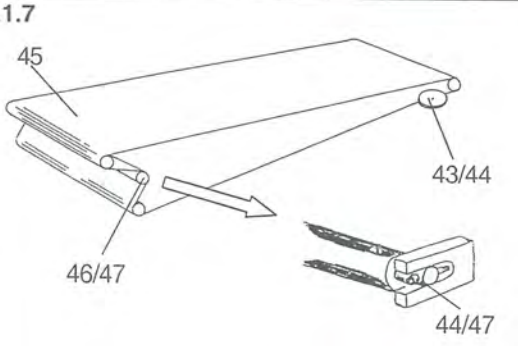

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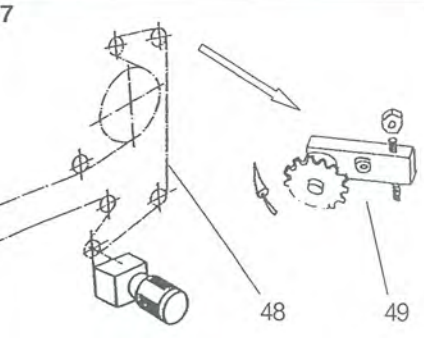


4.0 Maintenance

(This part of the Operating Manual is directed to the competent service personnel and internal authorized personnel.

>**DANGER**< It is absolutely prohibited to undertake cleaning and/or maintenance works if the machine is still in operation. Always push the **EMERGENCY-STOP** button and/or switch **OFF** main switch.

4.1 Tensioning or exchange of belts/tapes

>**NOTICE**< The tension of drive belts, and especially for foldrollers and slitter shaft drives should be checked periodically, i.e. monthly. The drive belts must be tensioned to such an extent that the foldrollers cannot manually be held if the machine is turned by handwheel.

>**DANGER**< This work should be carried out by one person only ! Danger of injuries to fingers.

4.1.1 Alignment tape at register table

Loosen screw **5** and release tension of tape. For threading/rethreading unhinge the lattice-type alignment table at pos. **6**. Loosen screw **7**, push back the rod **8** into direction of drive side, remove tape from the rollers and rethread at pos. **9**. Install new tape in the opposite sequence and tension it through screw **5**.

Adjustment for centre running of tape occurs through screw **10**. For this purpose loosen the screw **11** (screw **10** and **11** are located at the internal side) and fasten it again after completion. Thereafter, check again and, if necessary, make necessary corrections.

4.1.2 Drive belt for suction wheel

The drive belt **13** is tensioned by means of tensioning lever **14**.

4.1.3 Drive belt for foldrollers and slitter shaft at parallel unit

The drive belt **16** is tensioned by means of tensioning lever **17**.

4.1.4 Main drive of parallel unit

The poly-V-belt **20** coming from the main drive shaft **19** to the parallel unit is tensioned by means of tensioning lever **21**.

4.1.5 Drive belt for foldrollers at parallel unit and slitter shafts at subsequent unit

See item 4.1.3

4.1.6 Drive belt at register table of previous folding unit

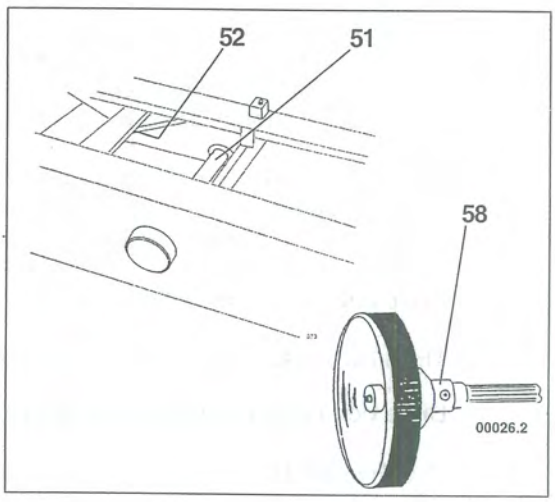
The drive belt 29 should be tensioned by means of tape tensioner 28.

>**ATTENTION**< The drive belt should be tensioned only to such an extent that the rollers can **slightly be held** with the other hand if the folding unit is turned by handwheel.

>**DANGER**< This work must be carried out by **one** person only. Danger of injuries to fingers!

4.1.7 Transportation tapes and drive chain at continuous feeder

Due to the centric run the pulleys at the upper and lower table are laterally fixed. The tape tensioning occurs through the deviation shafts. The upper tape **42** is tensioned through the shaft **43** by clockwise turning the screw **44** at both sides of the shaft. Analog the lower tape **45** through the shaft **46** and the screws **47**. The drive chain of the continuous feeder **48** is tensioned through the sprocket **49**.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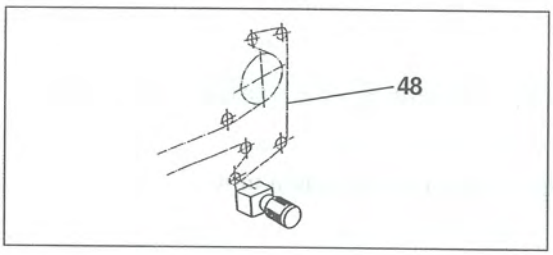
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4.2 Lubrication / Cleaning

>**NOTICE**< Generally, the machine should be cleaned after each job, particularly moveable parts which have been changed due to change of sheet size, because heavy dust may cause reduction of function.

4.2.1 Main machine including register table

Clean off guide shaft for change of sheet size **51** at register table as well as drive shaft **52** from dust and provide a slight touch of oil.Safety handwheels should also occasionally be relubricated at nipples **58**.

4.2.2 Continuous feeder R

The drive chain **48**, should be checked occasionally and, if necessary, be cleaned off from dust and provided with a slight touch of oil.

4.2.3 Cleaning of foldrollers

>**DANGER**< Foldrollers should be cleaned only if the machine is not in motion! Push the **EMERGENCY-STOP** button and/or turn **OFF** main switch. Ensure that the machine cannot be re-started!

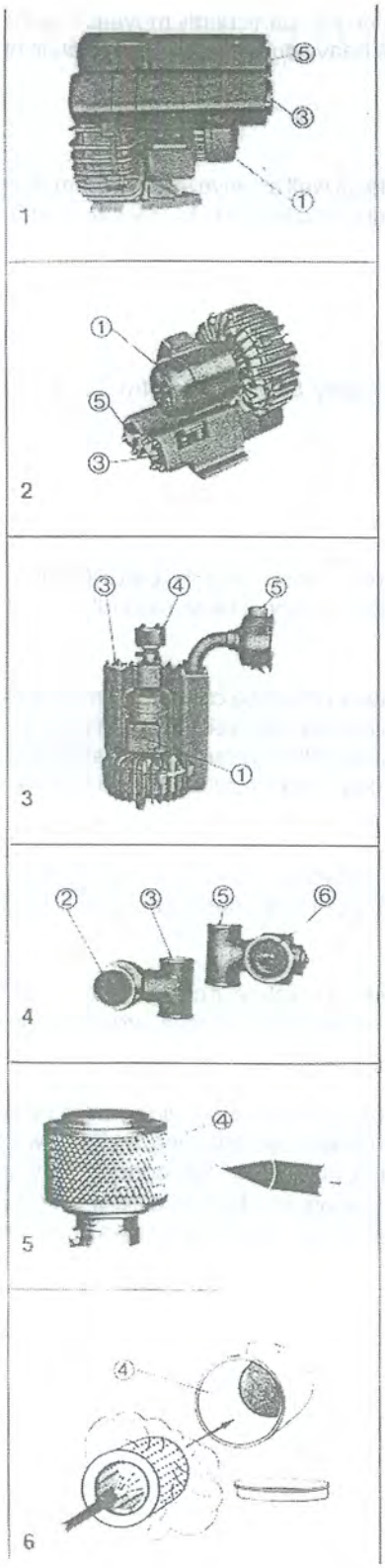
>**NOTICE**< Depending on the extent of ink build-up, the foldrollers must be cleaned from time to time. The affect of printing powder or ink build-up on the foldrollers may decrease the quality of the folding. The rollers must be cleaned with a cleansing agent suitable for the synthetic material. Please contact your machine supplier. Improper cleaner may cause decomposure or swelling of the foldroller coating.

MBO - the manufacturer of this folding machine recommends a cleaning material for the foldrollers made by VARN, bearing the no. VARN -Wash VM 111 or VWM. Our recommendation is on a label near the foldrollers.

The VARN company is a worldwide supplier for the printing industry. Therefore, it cannot be excluded that in certain other countries different indications are used. Please take the individual order no. from the technical data sheets of VARN.

>**DANGER**< No chemical aggressive cleaner must be used. Protective gloves should be worn while you are cleaning. Protect yourself against splashes or contact with the cleaning material with uncovered parts of your body. Dispose of the soiled cleaning material in the correct manner (environmentally friendly. Consider the flammability of the cleansing agent. Make sure if any residual danger could eventually exist. Check the technical data sheet from the cleansing agent manufacturer.

SV 5...



DT / VT 3 ...

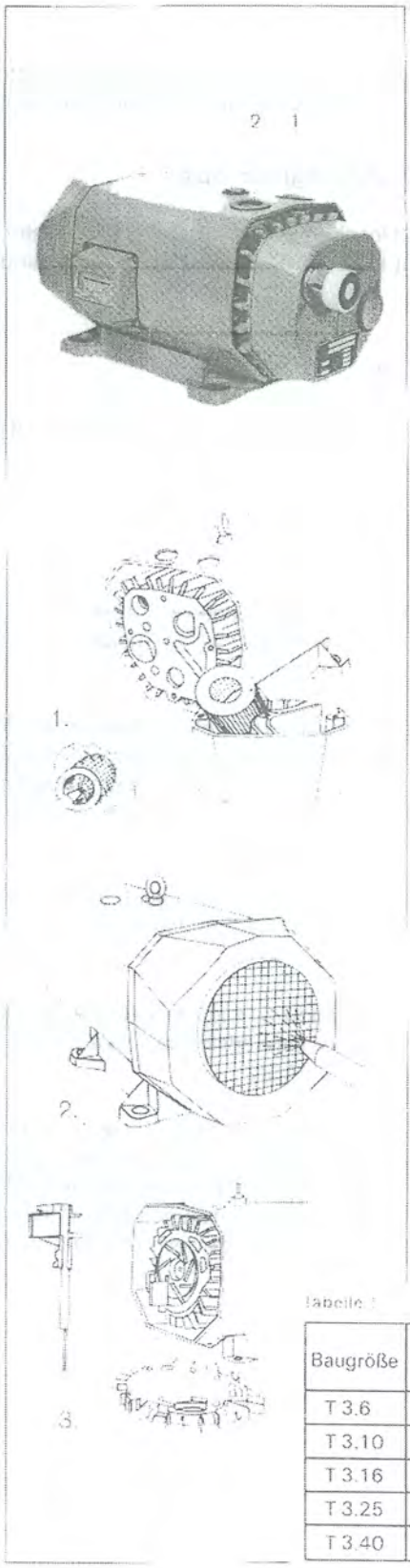


Tabelle 1

Baugröße	Anschluß-Gewinde	Schieber-Mindestbreite mm
T 3.6	R 1/2"	19
T 3.10	R 1/2"	21
T 3.16	R 1/2"	27
T 3.25	R 3/4"	34
T 3.40	R 3/4"	34

4.2.4 Compressor

Side channel compressor SV 5. ... (Airblast)

Essential maintenance:
>**NOTICE**< The filter cartridge **43** (**see page 31!**) must be cleaned **every 50 hours of operation**. Dirty or damaged cartridges must be replaced immediately. Do not remove the filter cartridge in any case, otherwise penetration of foreign substances will damage the compressor. Make sure that compressor is turned OFF during maintenance works.

During operation
1. Clean suction filter **4**, if existing, every day or every week, depending on the dust content of the intake air. Clogged filters impair the performance of the appliances and result in overloading of the motor.

2. Check safety valve **2**, **6**, if existing, every week, and clean it if necessary.

3. Clean compressor every month or more, depending on dust content of ambient air, to avoid overheating.

For pumps of the DT/VT 3. ... series (Vakuum)

Essential maintenance:
>**NOTICE**< The filter cartridge **42** (**see page 31!**) must be cleaned **every 150 HOURS OF OPERATION**. Dirty or damaged cartridges must be replaced immediately. Do not remove the filter cartridge in any case, otherwise penetration of foreign substances will damage the compressor. Make sure that compressor is turned OFF during maintenance works.

During operation
1. Clean suction filter as required. Blow through the **filter cartridges** from the inside outwards. If grease or oil are to be found in the cartridge it should always be replaced as should clogged cartridges. If dust collection is extremly high, additional filters.

2. Clean the **cooling ducts** with compressed air when they are clogged. Clogged ducts cause overheating and the breakdown of the pump.

3. After 5000 hours inspect **width of vanes**. One mm more than min. width of the rotor vanes means approx. 1000 hours ore working time. When min. width is reached (Table 1), install new vanes. Before that, clean cylinder with **dry** compressed air.

4. Do not close pressure and vakuum valve more than necessary. In this way you will economise your current consumption.

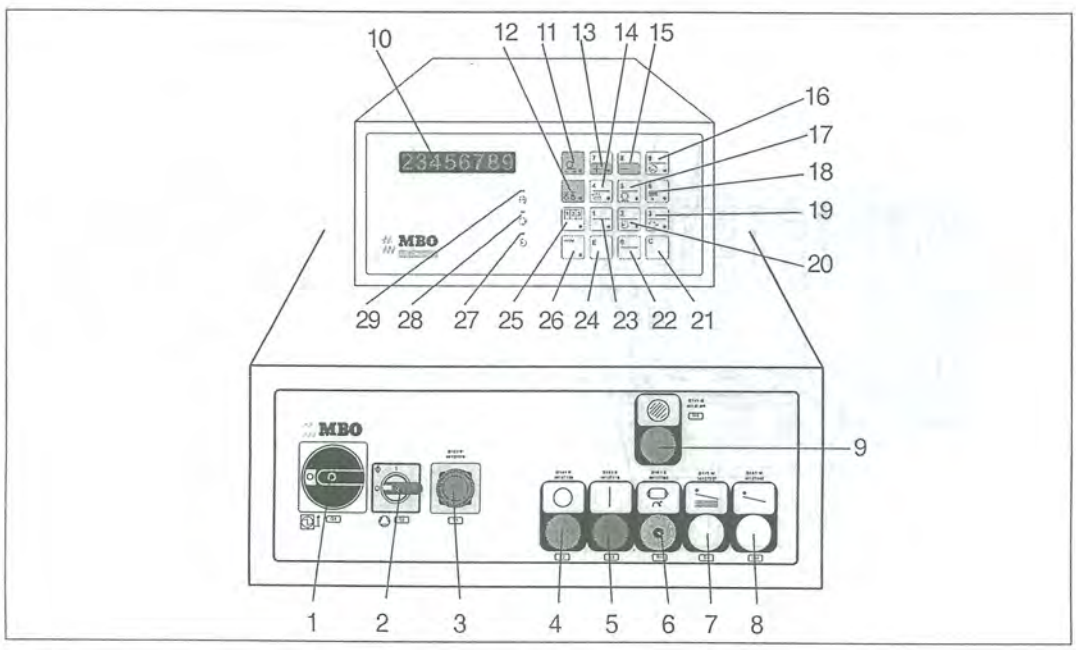
5.0 Operation of the machine

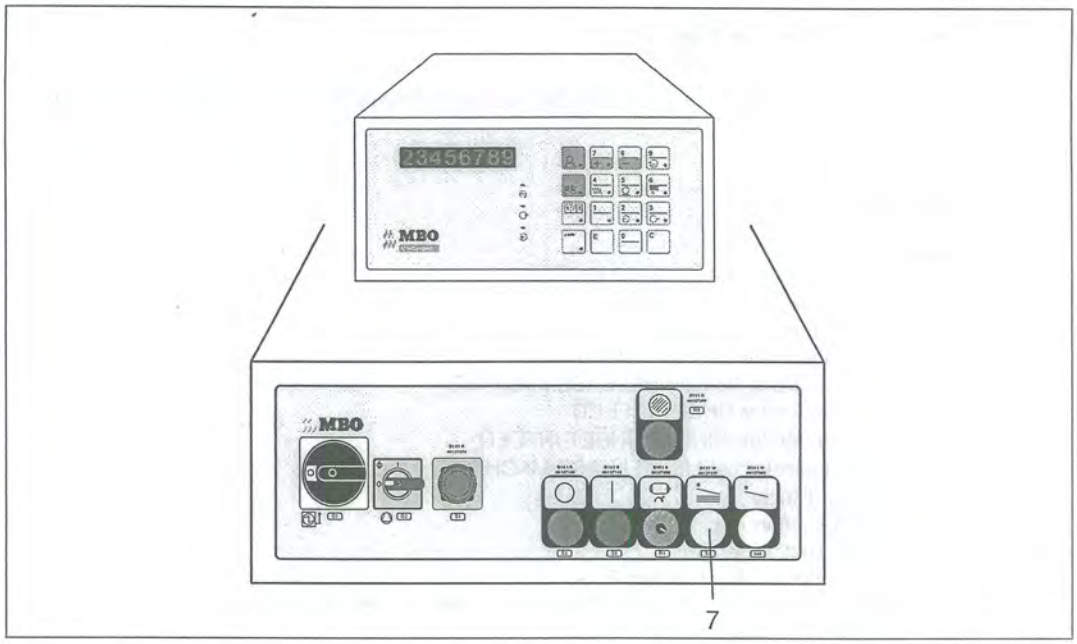
In addition to the numbers the operating sequences to operate the machine are marked additionaly with a B.

B1.0 Main control panel

1 MAIN SWITCH
2 Turn on/off switch for COMPRESSOR
3 EMERGENCY-STOP button
4 Red button for machine STOP
5 Black button for machine START
6 Green indicator light for RELEASE MACHINE
7 White button for SHEET INFEED
8 White button for SINGLE SHEET INFEED
9 Green indicator light for RELEASE MACHINE
10 8- digit display
11 Button suction gap
12 Button suction length
13 Button with double function 7 / +
14 Button with multliple function 4/ speed up delievery/ Kicker/ marking device
15 Button with double function 8 / -
16 Button with double function 9 / speed indication
17 Button with double function 5 / interruption suction whee
18 Button with double function 6 / current productions speed / hrs
19 Button with double function 3 / total counter at infeed
20 Button with double function 2 / total counter at exit
21 Button Clear (delete)
22 Button 0
23 Button 1
24 Button Enter (confirm)
25 Button Batch preselection
26 Button Code
27 Diagnosis LED photocell at exit B 43 (Option)
28 Diagnosis LED photocell at suction wheel B 2
29 Diagnosis LED slit initiator B 1

>NOTICE< For more information see separated opratoring manual „MS - Control".

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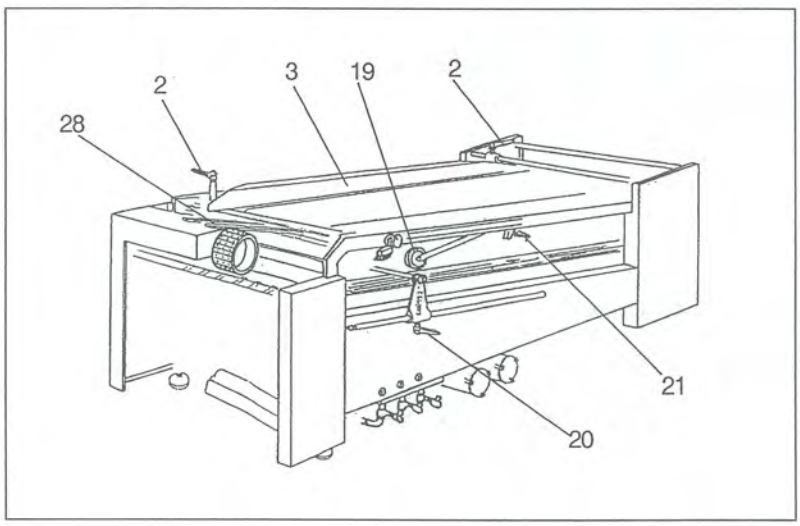
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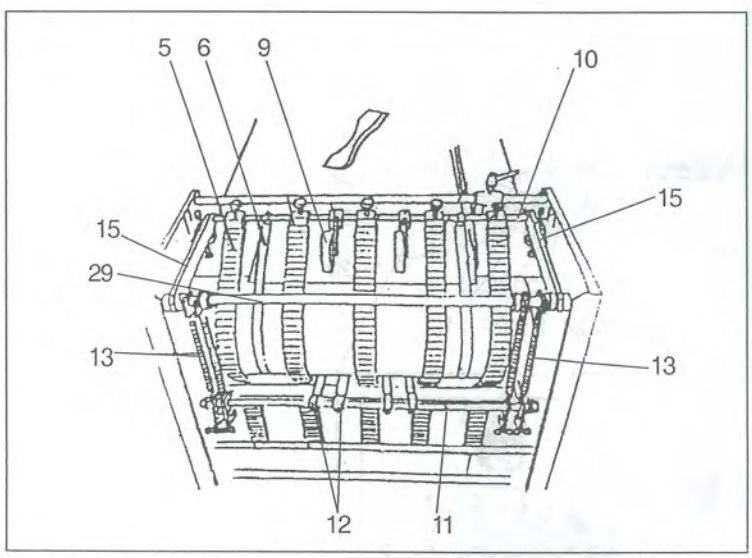
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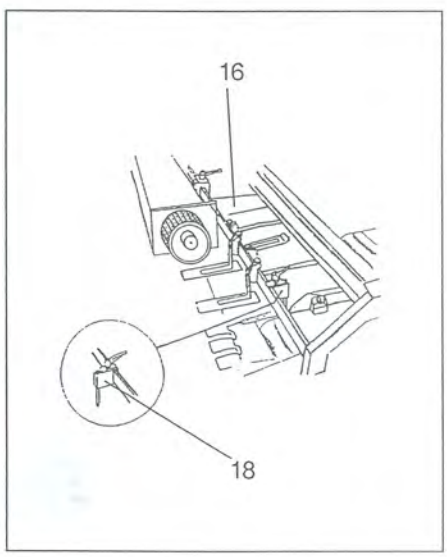
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B2.0 Continuous feeder R

B2.1 Generally settings

For pile transportation use the white push button **7** at main control panel . Use the locking handle **2** to adjust lateral sheet guide **3**; set to 1/2 of sheet width. (Lateral sheet guide can be used on either left or right side, if you want to load the feeder at drive side!).

Load and fan out the sheets on the upper table; the entire table may be loaded. By detaching stainless steel rods **28** you achieve and additional extension of the upper table.

Move the sheets up to the drum by activating the blue sheet infeed button and adjust the roller chains **5** in accordance with the sheet size. If large sheets have to be processed use all five chains (four chains if B26E), for small sheets preferably use three or less chains. The outer chains should be positioned approximately 5 cm away from the sheet edge, the chain in the middle should be centred.

Depending on the type and weight of paper, however, particularly for short oblong (landscape) sheets you may affix two cast iron rollers **9** as an additional auxiliary onto the bar 10.

The infeed angle between the loading table and the roller chains may be changed through knurled screws **15**. The infeed angle should be as flat as possible.

>**NOTICE**< The edges may become damaged if the angle is too flat.To be able to transport sheets around the drum without damaged edges teflon tapes **6** should be affixed between the outer roller chains and the sheet edges onto the bar **10** and placed around the drum down to the lower table.

>**NOTICE**< Do not affix these teflon tapes onto the lower bar **11**, or otherwise these tapes will reach too far down to the lower table and will stop the sheets or the feeder.Short teflon tapes **12** should be mounted onto the bar **11** as a transition between the roller chains and the lower table.

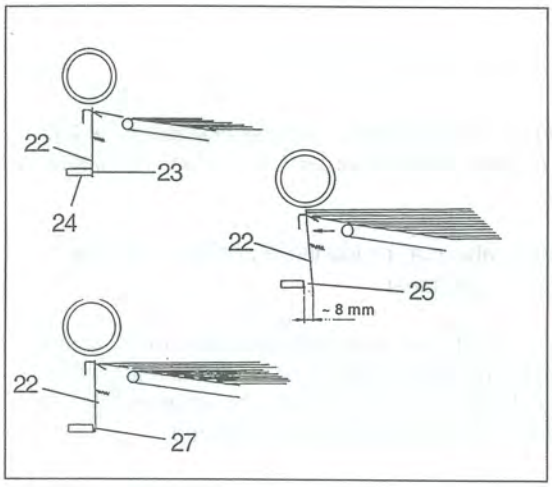
The short lower table is moveable and suspended with springs **13**. Depending on the weight and size of paper two or four springs should be used. These springs must be hinged through hooks to the bar **29**.

>**NOTICE**< The tension of the springs should not be to tight since the paper may easily sag underneath the drum.

The sheets which are transported on the lower table are controlled through a feeler tongue which is placed underneath the sheet infeed. In order to obtain an exact position of the sheet you may install a guide plate **16** at drive side and the guide pin **18** at operator side.

>**NOTICE**< Both guide elements should not be to tight to the sheets or otherwise it may lead to a jam-up.

At the end of the shingled sheets soft rubber rollers **19** as well as a brush should be placed on top of the first 2-5 sheets to achieve a safe sheet separation. The rollers and brushes may be adjusted through knurled screw **20**. The sheet length may be read-off through a scale.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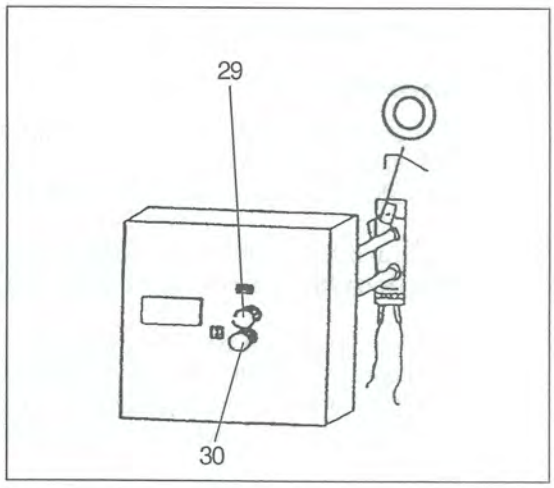
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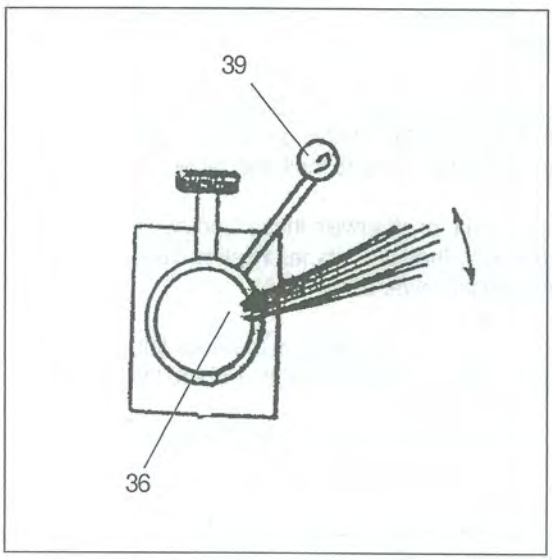
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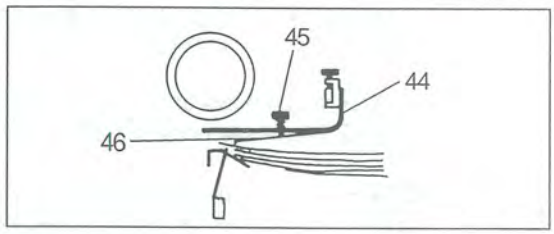
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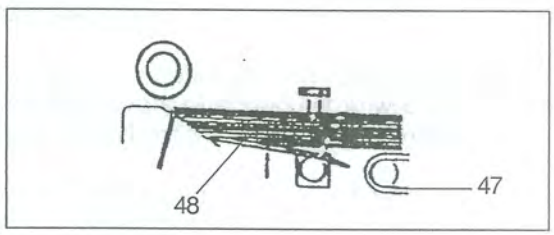
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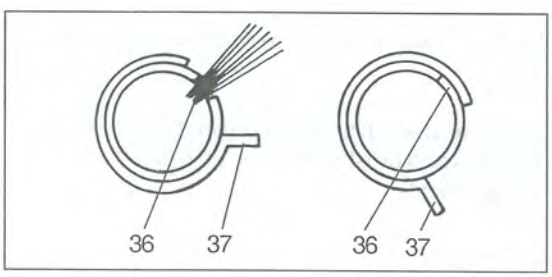
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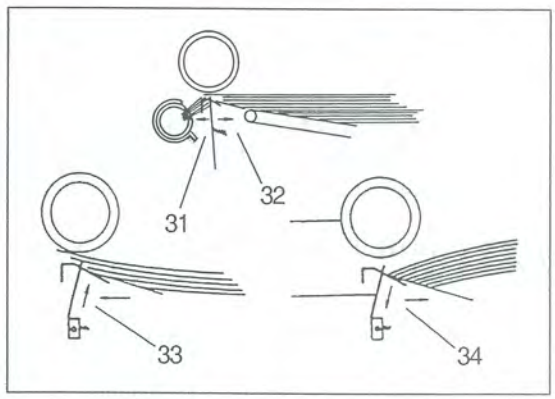
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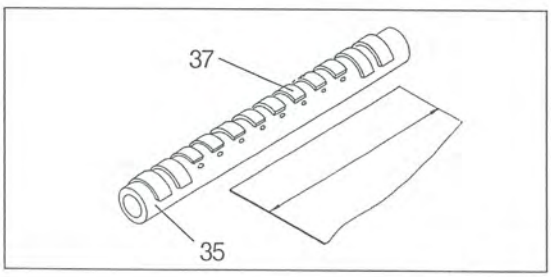
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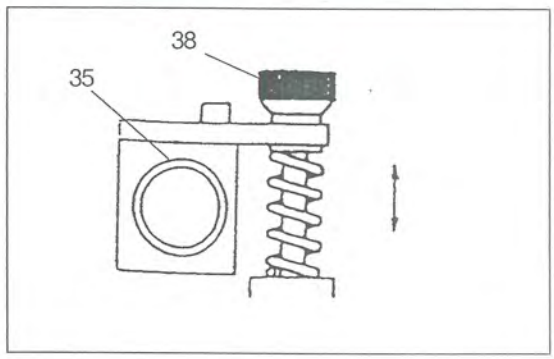
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The sheet transportation is controlled by the feeler tongue **22** and a inductive switch **24**. If no sheets are at the tongue and if the end of this tongue **23** is placed at the inductive switch **24** the feeder will run approximately 2,0 m/min in rapid speed, if sheet infeed **7** (page 26) is activated. If the feeler tongue **27** leaves the sensor **24**, caused by the sheets arrive], the speed will reduce to ca. 0,3 m/min The sheet transportation will stop if the distance between the end of the feeler tongue and the sensor **25** is approximately 8 mm.

The feeler tongue **22** may be adjusted through two buttons at feeder operator side in a horizontal **29** and vertical **30** position.

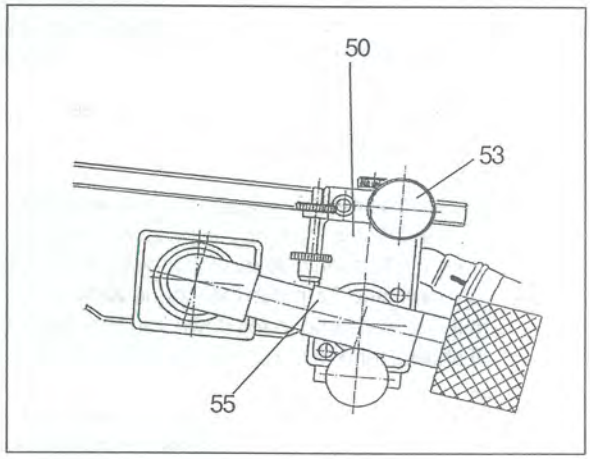
Button **29** sets the tongue forwards and backwards.
Button **30** sets the tongue upwards and downwards.
Tongue **22** should be moved forwards if sheets need to be more ventilated **31** but if a few sheets should be ventilated **32**, move the tongue **22** backwards.
If the sheets tend to roll down you should set the tongue downwards **33**.
If sheets tend to roll up then you should set the tongue upwards **34**.

If the sheets tend to roll up you may affix and additional smoother bar **44** beside the suction wheel onto the tie-bar. The plate spring **46** with the knurled screw **45** enables you to smooth sheets which tend to push upwards.

An infeed plate **48** which may be adjusted upwards and downwards rests between the lower transportation tape **47** and the feeler tongue **22**.
Set the plate upwards if sheets tend to roll down.
Set the plate downwards if sheets tend to roll up.

The air tube **35** is located underneath the suction wheel. It contains air discharge holes **36** along its whole length. These discharge holes may be opened or closed through slide clips **37**. These clips should be opened in accordance to the sheet width, the remaining clips should be closed. In order to achieve more air blast at the side blower it is advisable to open every send clip only. However, the clips in the centre of the air tube underneath the suction wheel should be opened continuously.

The air tube is height adjustable through knurled screw **38** and through the adjustment lever **39** it can be also turned.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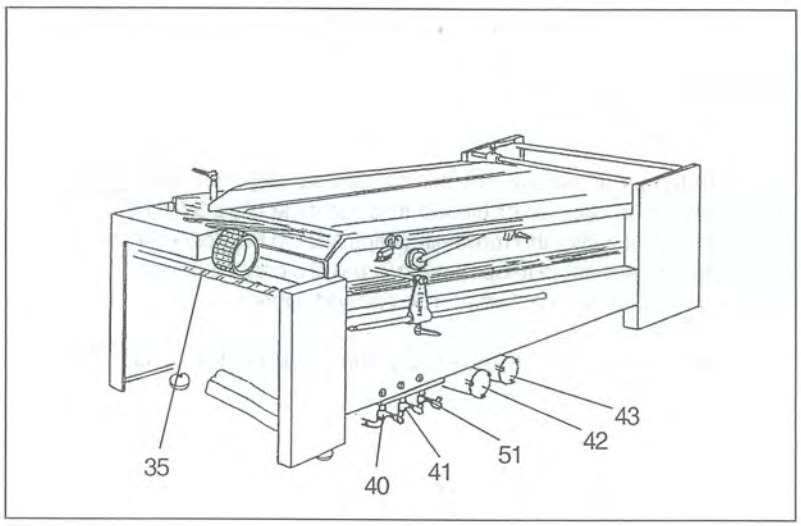
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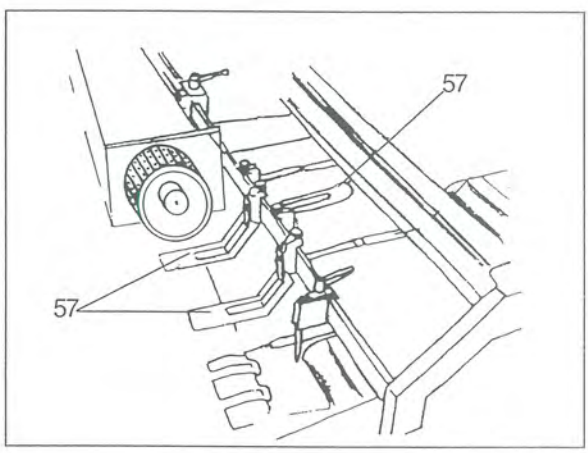
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57

The air blast of the air tube **35** may be regulated through the chokes **40** and **41**. In order to achieve an exact sheet separation it is necessary that the first 10-15 top sheets of the shingled pile are properly ventilated.

In addition to the air tube **35** a side blower **50** may be used. The air support may be regulated through the chokes **51**. This side blower may be adjusted in the longitudinal as well as in the transversal direction of the feeder through the element **53**. The balance of the blower should be adjusted through the weight **55** to such an extent that the blower is slightly touching the sheet.

Limited air blast will be achieved if the air pumps has been turned on. This air blast is reduced through a throttle valve. If one of the blue push buttons for sheet infeed has been activated you will receive full air blast.

For a controlled travel of the sheets to the alignment table smoother bars **57** beyond the air tube and smoother bar **57** into the direction of the feeder are used. These bars also creates a suction effect for better sheet control.

Airfilter for vakuum 42
Airfilter for air blast 43

B2.2 Suction wheel

The suction wheel **40** which transports the sheets onto the alignment table enables you to change the point of suction **41**. Generally, the point of suction should be at the lowest position of the suction wheel, for which the adjustment lever **42** must be in a vertical position. However, should the suction point be moved forward (if sheets are curled at front) move the lever into the upwards direction. Should, however, the point of suction be moved to the rear (if sheets are curled up) move the lever into the downwards direction. When processing sensitive papers and double sheets are supported frequently you may decrease the vacuum at suction wheel.

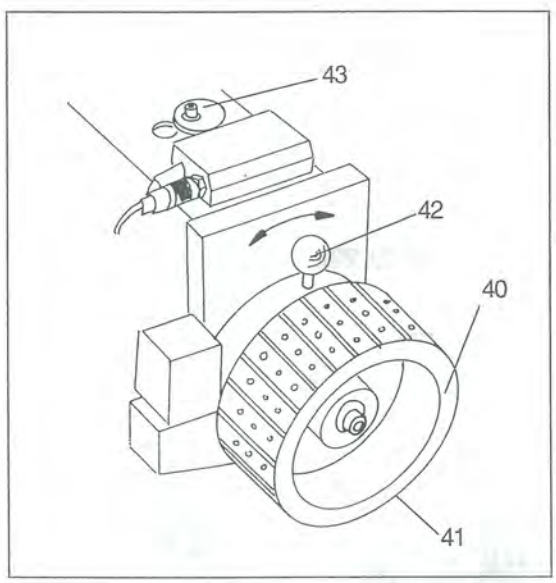
A washer **43** located near by the suction wheel, is secured by a spring. This washer opens or close an air hole. Partial movement of this washer will effectuate the opening of this hole. The opening will then effectuate a decrease of vacuum at suction wheel.

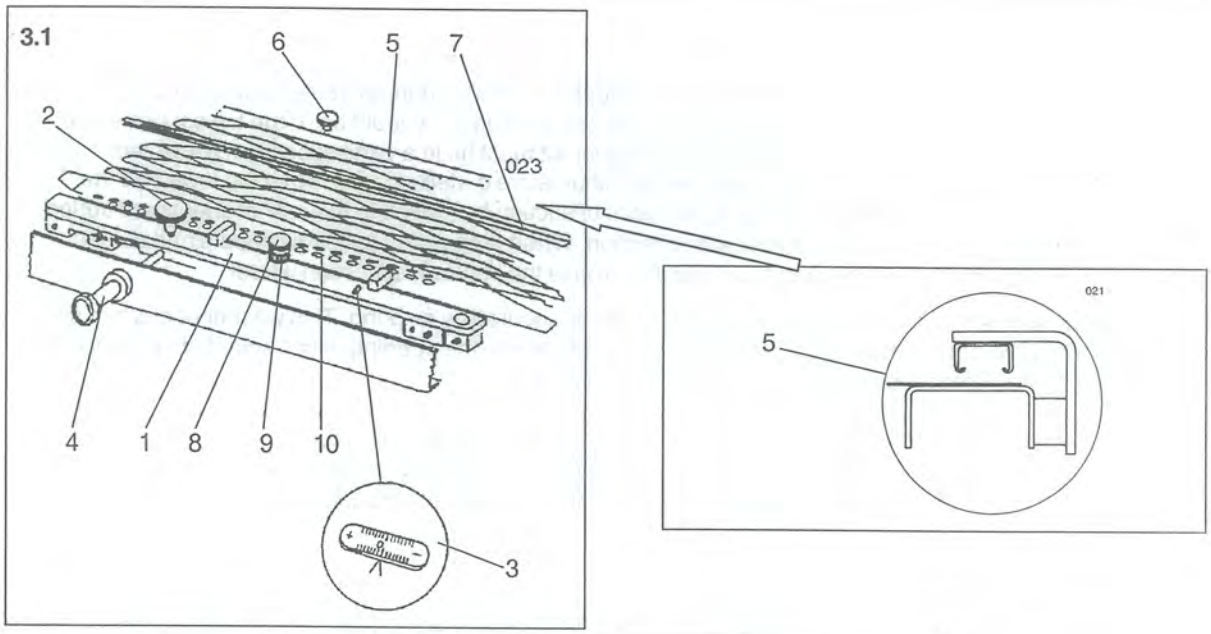
if hole is closed	Þ	maximum quantity of vacuum
if hole is partial opened	Þ	medium quantity of vacuum
if hole is completely opened	Þ	minimum quantity of vacuum

B2.3 Air support

The air blast/vacuum is produced by a two pumping system, which can be turn on/off through switch 1.2 at main control panel.Carefully read the technical data sheet or maintenance data which are attached to this Operating Manual

>**ATTENTION**< It is extremely important to clean the filter cartridges occasionally (see item 4.2.4)!

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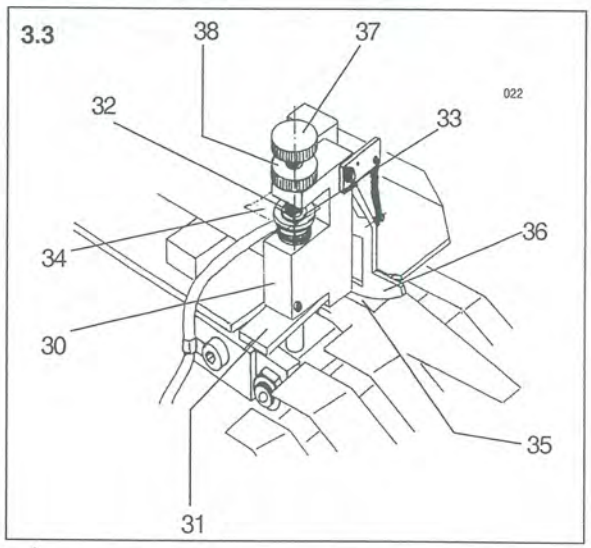
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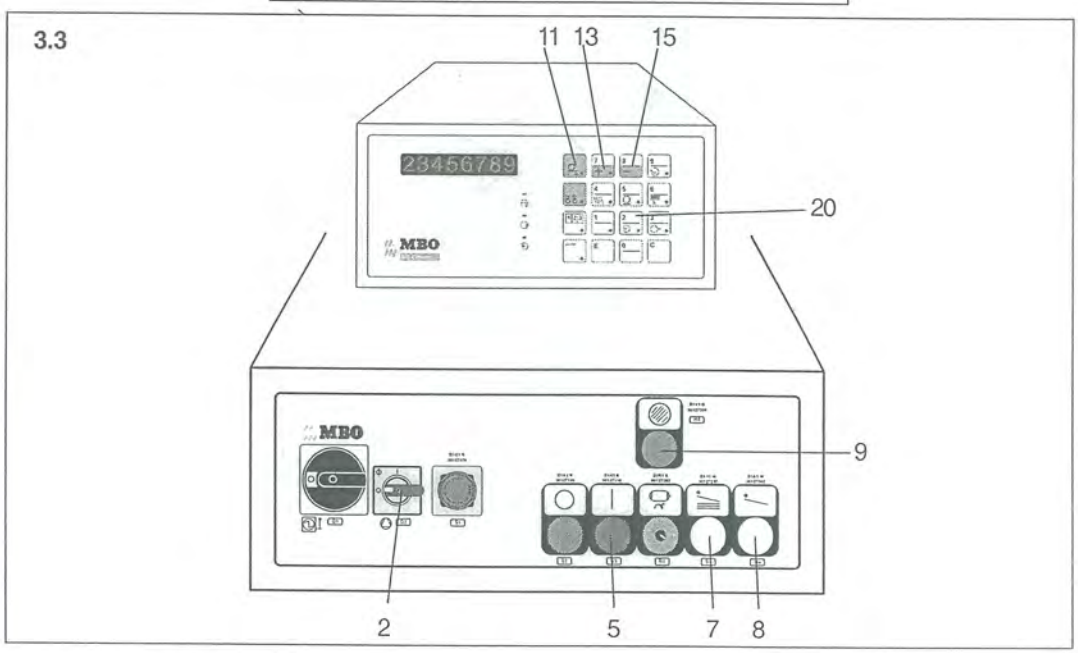
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MBO
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B3.0 Register table with ball rail,

double sheet control, sheet infeed control

B3.1 Ball rail

Loosen the star-shaped grip **2** to set the sidelay **1** to the appropriate size (1/2 of sheet width). Fine adjustments can be made through knurled grip **4**. Opposite to the sidelay on the alignment table is the outer edge sheet guide consisting of a rail and guide plate **5**. This should be adjusted with the knurled grip so as to control the outside edge of the transported sheet.

Depending on the sheet width you may add additional smoother bars **7**.

The angle of the sidelay to the foldrollers may be adjusted through the knurled screw **8** and the excenter **9**. Please note the setting indication by the double sheet detector **24**.

Depending on the quality of sheets, fill the ball rail **10** (light sheets=light/plastic balls, heavy sheets=heavy/steel balls, or combinated with plastic and steel balls). However, if you process oblong or eventually heavy sheets place the balls into two rows. In both cases, the first three holes of both rows must be fitted with steel balls to ensure a proper drive of the sheets from the suction wheel.

B3.2 Double sheet control

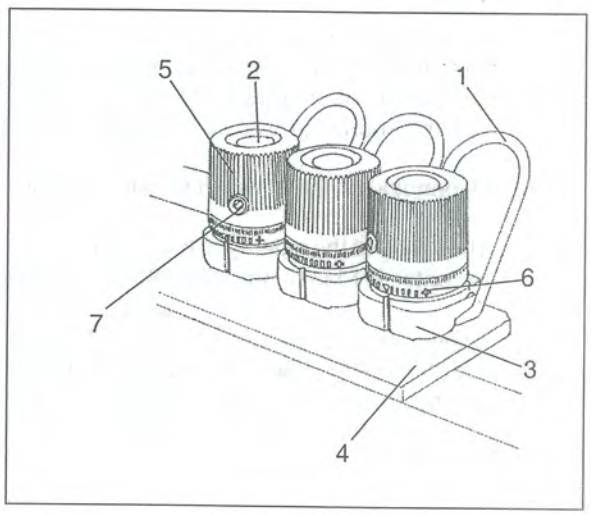
The double sheet control **30** operates electro-mechanically. To obtain setting press the lever **31** then insert a strip of paper **34** between the pins **32** and knurled screw **33**. Check by running the machine the distance between the transport roller **35** and the adjusting segment **36**. If you twist the knurled screw **37** counter-clockwise the adjusting segment will move towards the transportation roller. In order to bring certain paper differences under control you may, depending on the paper weight, move the double sheet control upwards by twist the knurled screw approx. 1/4 clockwise.
If you check with two (double) sheets of paper the double sheet control must interrupt the sheet infeed, however, the machine will continue to run. If you check with a single sheet the machine run must continue and the sheet infeed must remain in ON position.

Tighten the knurled screw **37** after adjustment of double sheet control has been completed. Recheck your settings and, if necessary, readjust!

B3.3 Sheet infeed

Automatic calibration of sheet gap and suction length

Start machine and push black button **5**, switch air pump **2** on. Keep pressing soft touch button suction length **11** and press single sheet button **8**. A single sheet will enter with a base suction length (machine specific). The suction length from the single sheet will be measured by the reflection light sens B2 at the suction wheel.
To increase or decrease the suction length for all following single sheets press soft touch button **11** together with + **13** or - **15**.
All following single sheets are new calibrated. Touch white button sheet infeed **7** to deactivate calibration, sheet gap and suction length will be memorized with last values.
Suction length = 1/3 of full sheet length.
Sheet gap basic setting code 24 = 1 = sheet length + 1cm.
Sheet gap basic setting code 24 = 0 = 1cm.
Calibrated suction length and sheet gap allows reconfigure, see chapter **2** and **3** in operating manual „MS-Steuerung".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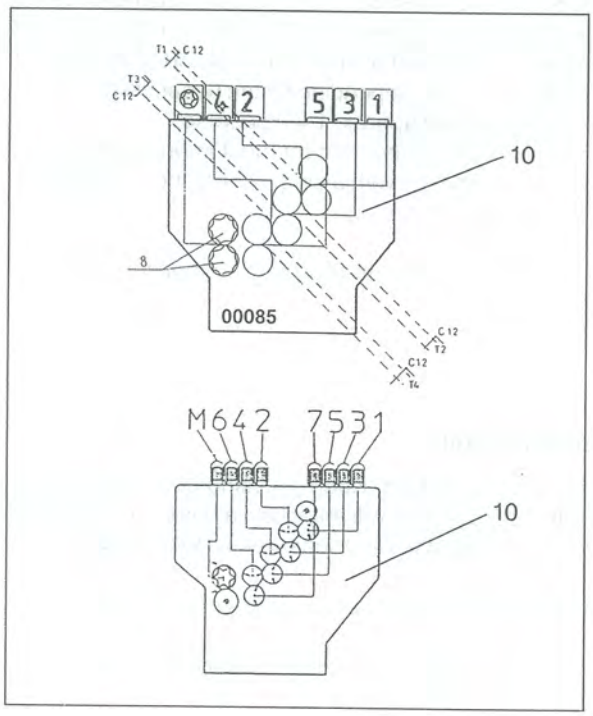
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C12
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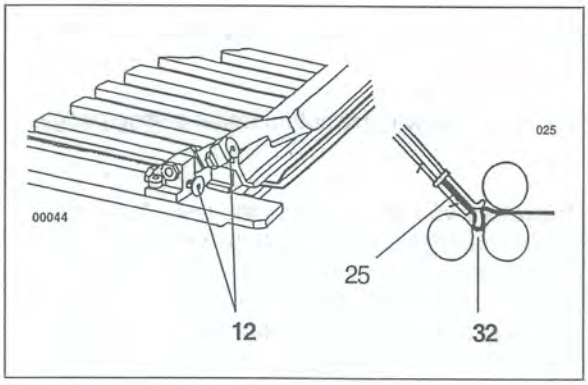
B4.0 Parallel folding unit

B4.1 Setting of foldrollers

>**DANGER**< Never carry out foldrollers settings while the machine is still running! Machine must be turned OFF (activate **EMERGENCY-STOP** button)!

>**NOTICE**< Please be are in mind that although you manually carry out foldroller setting danger exists for injuries to your fingers!

In order to achieve the required setting of the foldrollers you should press the lever **1** at caliper setting element **2** and insert a paper strip of the material to be processed between the pressure plate **3** and pressure bar **4**. Thereafter, turn the handwheel of the machine and, in doing so, check whether the paper strip goes through the foldrollers, then adjust the knurled screw **5** to achieve an even pressure of foldrollers to paper strip at operators and operators opposite side. When you turn the knurled screw **5** clockwise, the pressure on the foldrollers becomes less, if you turn the knurled screw counter-clockwise, the pressure on the foldrollers has increased. After this basic setting reset the adjusting ring **6** to 0-position, in order to enable a quick readjustment of foldrollers into their original position. A slight tightening of locking screw **7** will secure it against unintended twisting. For setting of slitter shafts proceed in the same manner. Depending on the kind of fold you may now insert the paper strip to achieve the desired paper gauge between the pressure plate **3** and the pressure bar **4**. You will find instructions to set the most commonly parallel folds on pages **D1 - D3**. A scheme of foldrollers **10** indicates which elements belong to the individual pair of foldrollers. This scheme is also fitted as a diagram on the side frame of the machine.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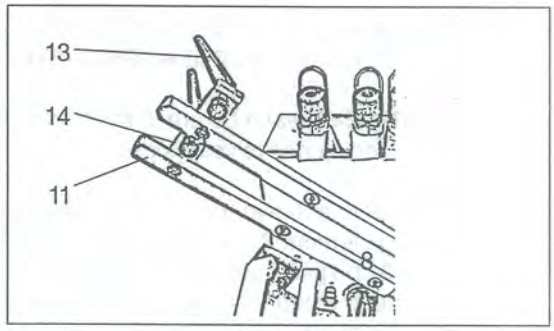
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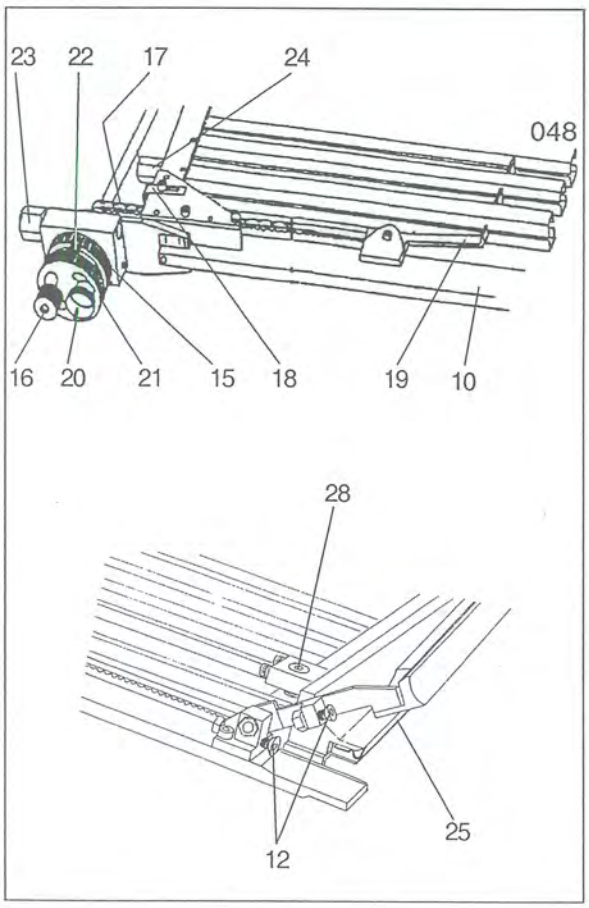
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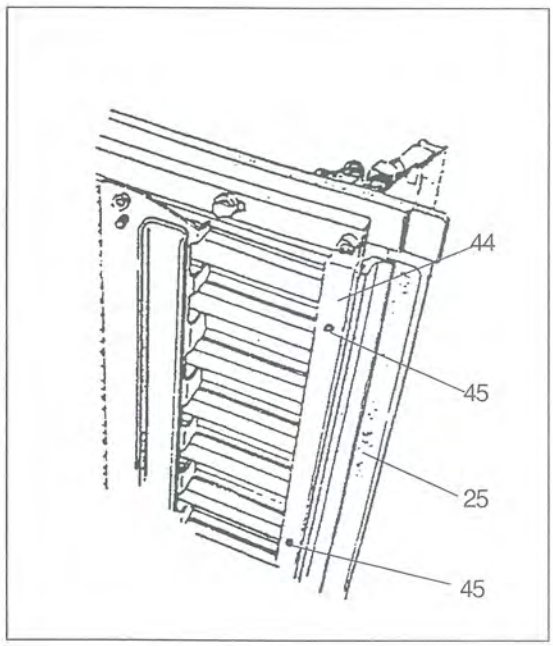
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B4.2 Buckle plates

Insert the buckle plates **10** into the lateral supports **11**. The buckle plates are equipped with integrated deflectors. The buckle plate and the sheet deflector is set with their positioning pins **12** into their lowest (basic) position with the rounded bolt. Lock them up on both sides through clamping lever **13** and clambs **14**. The upper buckle plates should be locked to such a way that the cam is pushing the plates downwards to the foldrollers. The downer buckle plates should be locked to such a way that the cam is pulling the plates upwards to the foldrollers.

>**NOTICE**< You should check that when the plates are locked, they are pushed forwards into the direction of the foldrollers and are resting on the rounded bolt!

After metal screw **16** has been loosened you may carry out the sheet length setting through handwheel **15**. The size can be read-off at toothed belt **17** and the red marked point **18**.

When folding sheets which are not right-angled the angle of the sheet stop **19** may be changed if you loosen the plastic knurled screw **20** and twisting the frontal adjustment ring **21**. The 0-position is shown by two markings on the adjustment rings **22**.
When you loosen the knurled screw **23** you may carry out fine adjustments without loosening the metal knurled screw.
When using different sheet gauges or multiple folded sheets the inside diameter, i.e. the distance between the upper and lower U-rails may be changed with the hollow screw **28**.
You may change the position of the lower infeed plate **25** through the metal knurled screw **24**. A mm-scale **26** is located laterally on the external buckle rails. Remove the lower buckle infeed (off the foldrollers) for processing heavy papers. Move the lower buckle infeed (towards the foldrollers) if you process sensitive papers.

Tensioning of buckle plate: the lower plate lips may be pre-tensioned, i.e. by means of two hexagon screws **45** on the initial tensioning bar **44** you may press the lower plate lip into the direction of the upper plate lip.
Such pre-tensioning may become necessary if perforating lines are fluctuating or if edges of sheets are bent back, or if boxfold is occurring on the outside.

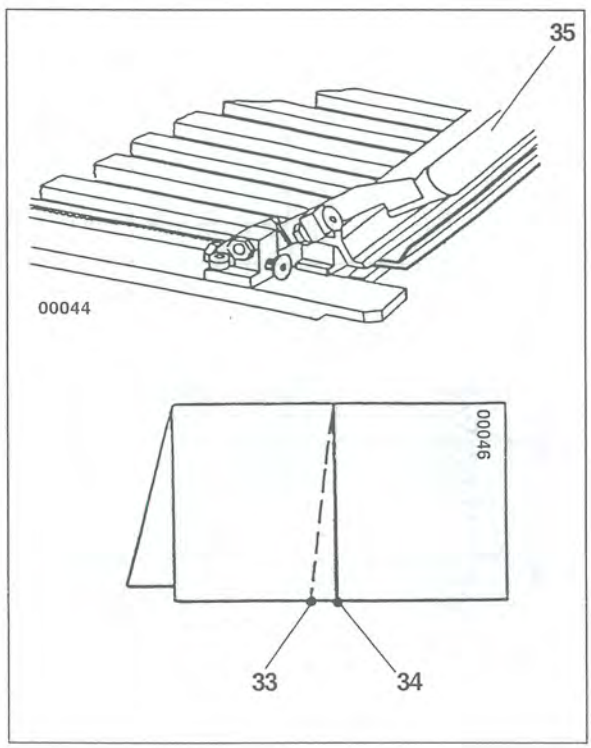
B4.3 Deflectors

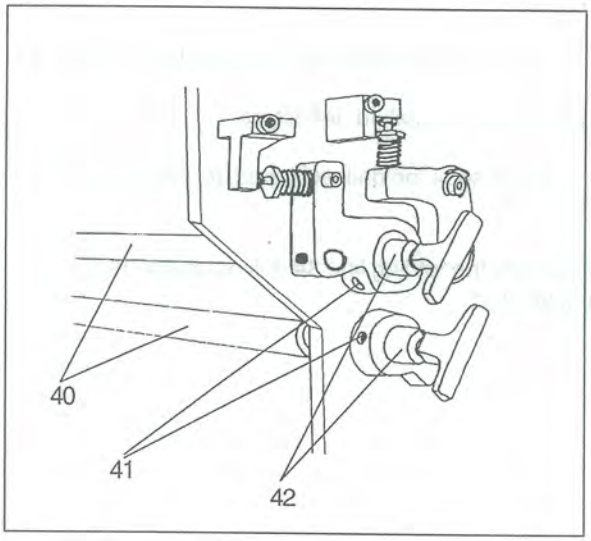
The buckle plates which are not used for the individual type of fold are replaced by deflectors **35**.

In this case pull out the buckle plates and dislocate the installed deflectors.

Heavy (multiple) folded sheets may require an increase of the deflector area, for which purpose you should slightly pullout the buckle plates.

If the perforating or scoring line **33** are not square to the folding line **34** pull out the deflector or buckle plate at one side to correct perforating position.

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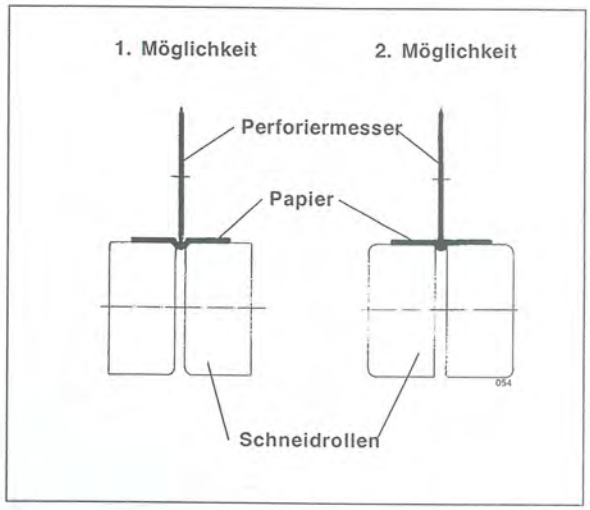
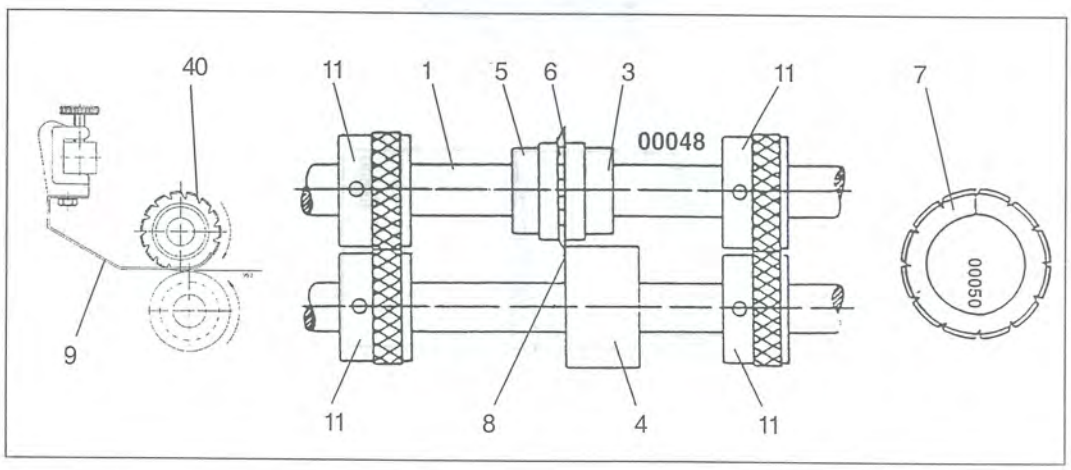

1. Möglichkeit
2. Möglichkeit
Perforiermesser
Papier
Schneidrollen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B5.0 Slitter shafts

Both slitter shafts **40** which are fitted after each folding unit may easily be mounted and removed by plug bearings **42** enabling insertion of tools for perforation, scoring or cutting. For removal of the slitter shafts losen the internal hexagon screw **41** which locks the plug bearing. Pull the plug bearing out of the slitter shaft while holding the slitter shaft with your other hand. Reinstallation occurs in the opposite sequence. However, push the plug bearing against the slitter shaft - to equalize an axial play - while you are locking the plug bearing with the internal hexagon screw.

B5.1 Perforating

To avoid creasing you perforate crossfold as well as for tear or punch perforation.

To use perforating or cutting knives a knife shaft **3** as well as a counter knife (lower part) **4** is required. When loosening the nut **5** you may fit a knife **6** into the holder. Some knives are split **7**, which enables you to install them without removing the shaft.

For proper installation the knife **6** should be adjacent to the ground side of counter knife **8**

Make sure that during the installation of the shaft that the nut **5** is opposite to the direction of the shafts rotation **40**. This guarantees that nut does not become loose during rotation. The lock nut may also be retightened with a C-wrench.

Perforating knives with slanted teeth must be installed in such a manner that they enter with the obtuse angle first into the sheet. In doing so you may avoid jam-up of sheets between perforating knife and stripper **9**.

Depending on the sheet size you may use additional transport rollers **11**. Carefully read the attached knife list TM 32/2 which indicates the knives you should use when processing different kind of papers and/or making different types of folds.

B5.2 Special perforating knife (Option)

We are hereby dealing with an non-slotted, V-shaped and two-side grinded perforating knife of 6 mm thickness.
This special perforating knife is employed on the knive shafts at 1st folding unit of buckle folding machines.
During perforation the sheet is also pre-scored. This causes that the dog ears at head side of cross-fold-unit (8-page-unit) are avoided.

There are two possiblities of installation:
1st between the scoring edges and
2nd between the slitter edges

In any case, the slitter respectively scoring rollers shall not touch the perforating knives. Distance and method of installation should be adjusted to the product to be processed. It should be considered that the cut of the perforation is not clear as usual, because the perforating knife does not touch the counter knives.

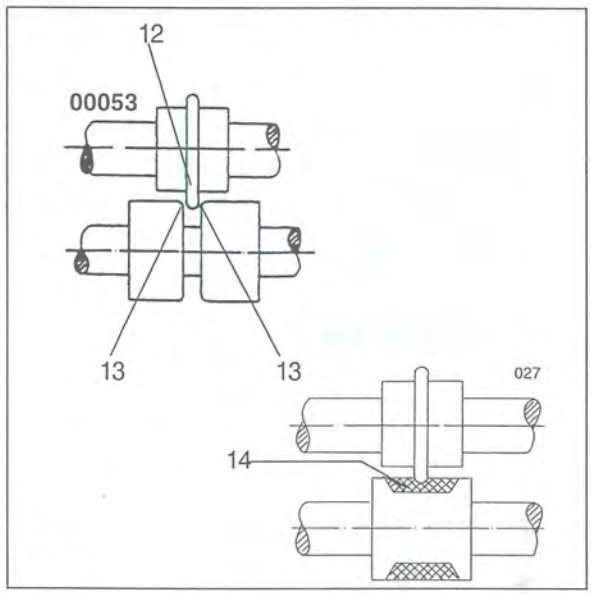
B5.3 Cutting

Instead or in addition to a perforating knife you may use a cutting knife (mainly for cutting when running multiple production). Installation occurs in the same way.

B5.4 Scoring

A score should be made before a buckle fold. If this score has not been made it is not guaranteed that you obtain the fold in the desired place. Normally you should score with one scoring knife **12** which is placed between two control rollers or two counter knives **13** placed at the round side.

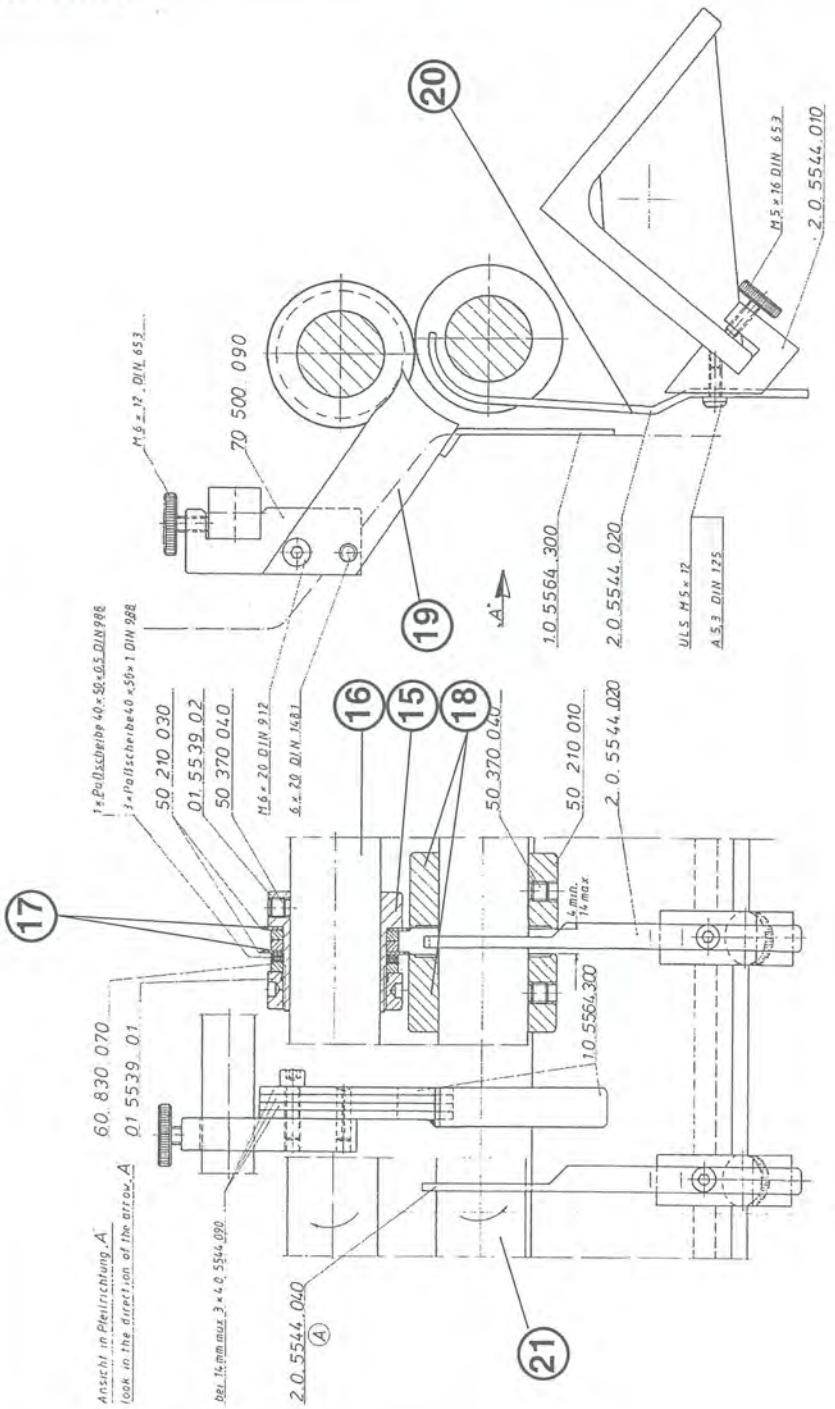
Alternatively, you may also score on the rubber part of the control roller **14**. However, a scoring knife with a smaller external diameter must be used. Special scoring devices may also be used upon request.



B5.5 Gully cut

(see page 48!) When carrying out this procedure you install the knife holder **15** onto the upper slitter shaft **16**. Insert two knives **17** with external cutting edge, place two counter knives **18** against them on the lower slitter shaft **21**. Min. 4 mm to max. 14 mm can be cutted off. In order to eject the paper shavings place strippers **19** and **20** between counter knives.

Gully cut device



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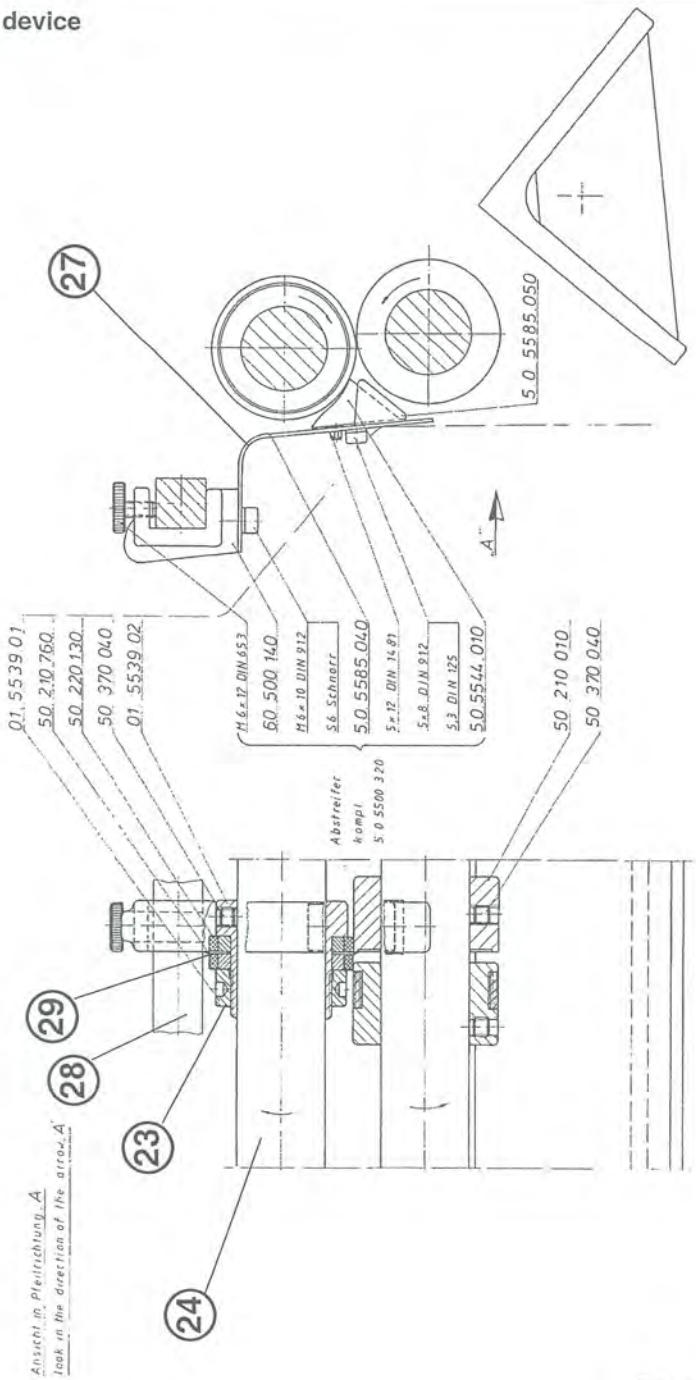
B5.6 Edge trimming

Install the knife holder **23** which has rubber ring **28** and cutting knife **29** onto the upper slitter shaft **24**. You may place a control roller to the second rubber ring as additional guide. Stripper **27** should be used to guide paper cut-off between rubber ring and counter knife.

>**NOTICE**< If you obtain angled cut or badly guided paper trim-off you may also install the knife folder onto the lower instead of the upper slitter shaft. Moreover, you may also install the knife with its cut edge into the direction of the folding product. However, it mostly depends on the paper thickness or running direction.
Experiences shows that the following alternative of installation reveals in the best result:knife top, counter knife bottom, cut edge of top knife into direction of paper cut-off. Paper cut-off is guided by rubber ring.

Edge trim device



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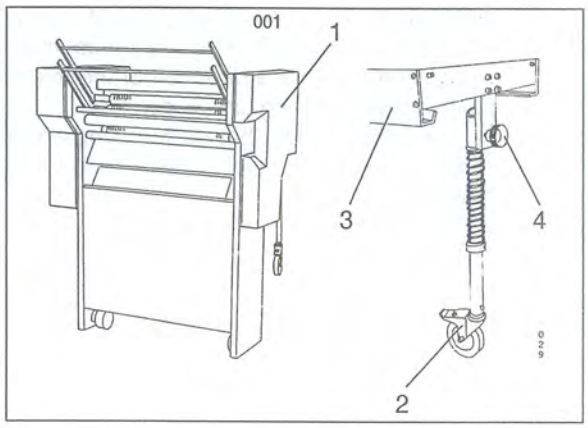
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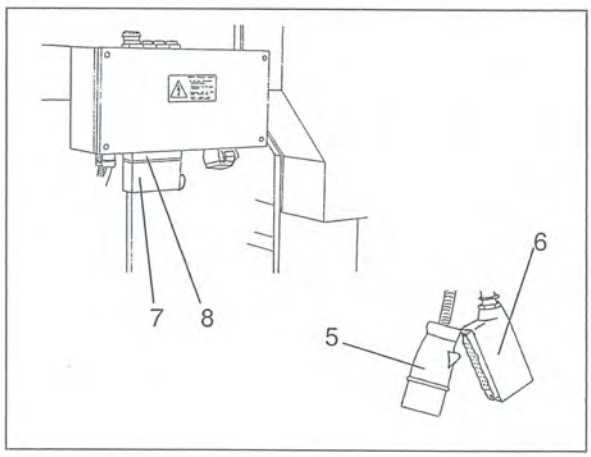
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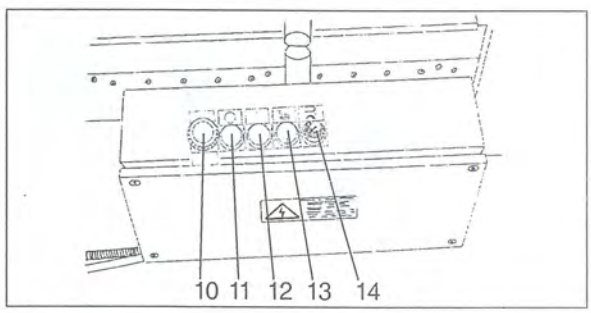
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B 6.0 Mobile buckle folding unit

B6.1 Installation

This unit **1** is normally placed crosswise to the previous folding unit. It is locked through a brake at foot **2**. The infeed height of the register table **3** or its inclination may also be carried out through this foot, whereby knurled screw **4** is used for locking purposes.

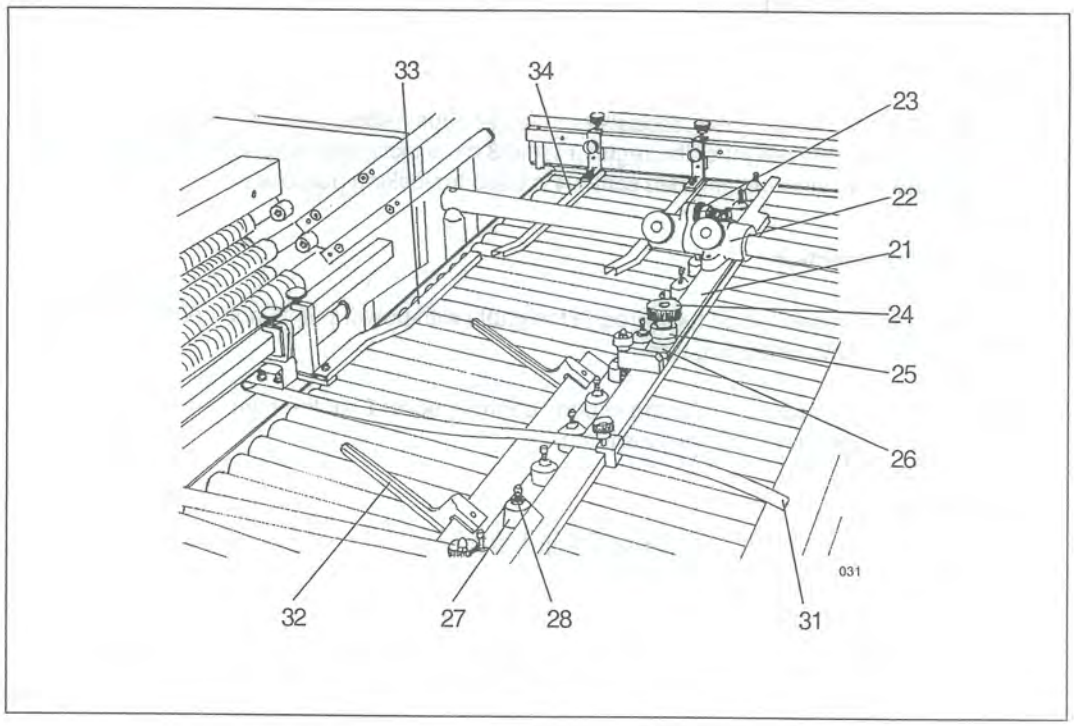
B6.2 Electrical connection

The electrical connection occurs through the cable with power plug **5** and control plug **6** at control cabinet of the previous folding unit.

A dummy plug **7** should be plugged into the control socket **8** for the control cable, if no subsequent folding unit or delivery is used.

B6.3 Control panel

10 Red mushroom button for EMERGENCY-STOP
11 Red button for machine STOP
12 Black button for machine START
13 White button for SHEET INFEED
14 Electronic speed control (potentiometer) to control SPEED at FOLDING UNIT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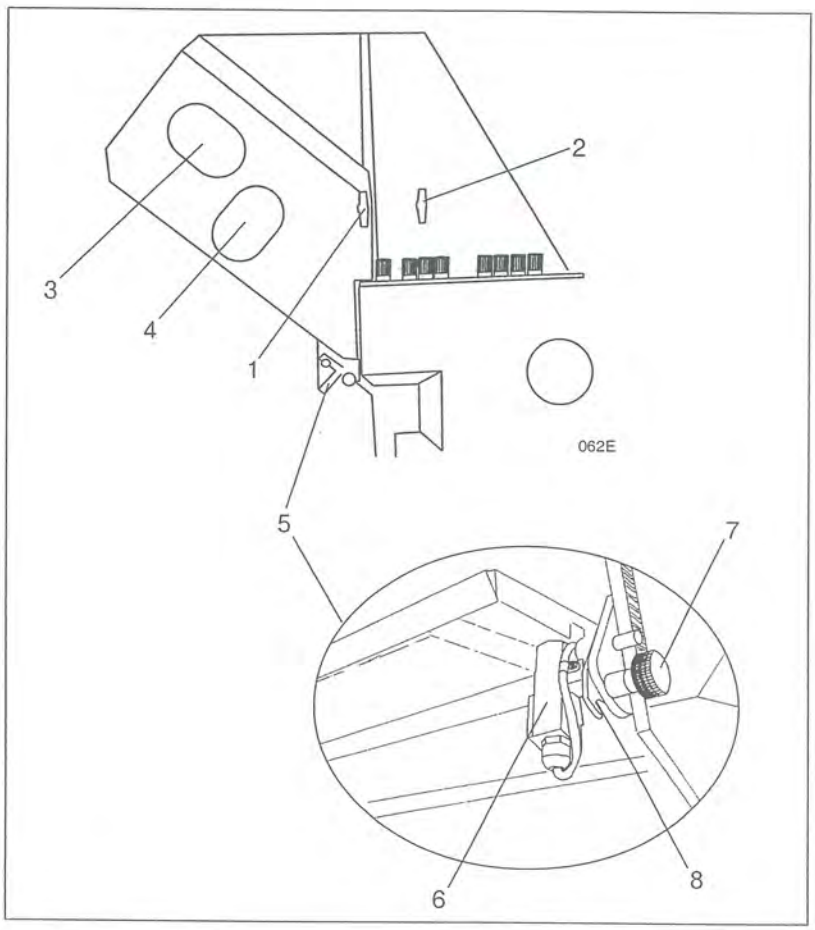
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B6.4 Setting and sheet transportation

Set the sidelay **21** to the approrpiate sheet size through the setting elements **22**. Fine adjustments can be made via knurled nut **23**. The angle of the sidelay to the foldrollers can be changed via the knurled screw **24** or through the excenter **25**. Please note that a scale **26** has been fixed onto the sidelay. The sheet should run with its end as close as possible at the edge of the mobile folding unit. In order to avoid any lifting of the sheet at the exit of the previous folding unit, smoother tapes **31** should be used. A safe infeed of the sheets underbeath the ball rails are achieved if you use sheet holders **32**.

In order to avoid any lifting of the sheets on the unit and to ensure a proper infeed of the sheet into the foldroller, you may also use smoother bars **33** and **34**. The height of these smoother bars is adjustable.

Plastic or steel balls which are positioned in a ball holder are used to transport the sheets on the register table. The weight or quantity of these balls depend on the quality of paper.

Light (porous) paper = plastic or less balls
Heavy paper = steel or more balls

As screw with a spring is located on top of this ball holder (28). If you turn in this screw it will avoid that the ball will not jump-up (or just a bit) during fast production.

A stop switch is placed at the exits of the folding units which will turn off the machine in case of jam-ups.

The foldrollers, sheet deflectors, slitter shafts and noise damping device are used and adjusted as described previously.

B6.5 Foldrollers and slitter shafts at subsequent folding units

Settings of foldrollers and slitter shafts hsould be carried out as described under item **B7**. You will find the MBO setting instructions of the most commonly folds under item **D1 - D3**.

B7.0 Noise damping device

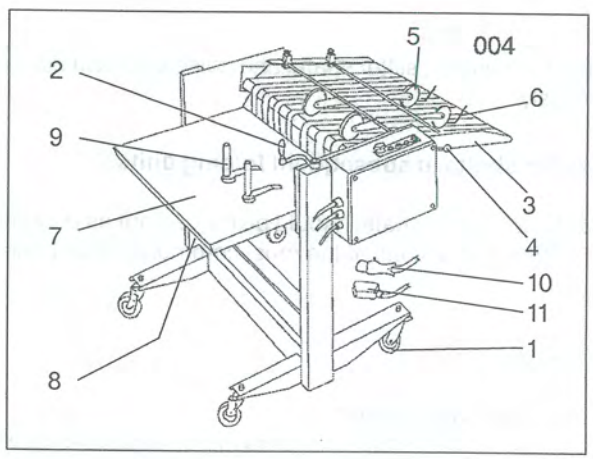
Noise damping and protection device.
The noise hood consists of two parts for insertions or adjustments. Push the hood upwards by means of the grips **1** and **2**. Fine adjustments at buckle plates **1** and **3** can be made through the openings **3** and **4**.

>Danger< It is absolutely prohibited to manually operate the machine while it is running. It may cause serious injury to the operator.

The flap **5** is a safety guard for the slitter shafts and it is electrically locked.

>Danger< it is absolutely prohibited to remove or over-bridge this switch. It may cause serious injuries to the operator.

For insertion of other aggregates, regulate flat **5** , release knurled nut **7** , pull the grip **8** up and screw-in the knurled nut **7**.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B8.0 Mobile steam delivery

The stream delivery may be placed at each exit (outlet) of a folding machine.
Move the stream delivery into the required position and secure the caster wheels with foot brakes **1**.
Use the hand crank **2** for height adjustments whereby a slight angle of the infeed table **3** is required.
The setting of the infeed table occurs through lever **4**.

>**ATTENTION**< The infeed table must be held with your other hand when you activate the lever!

Since the tapes of the infeed table are fixed only the transport rollers **5** should be set in accordance to the sheet size. In order to guide the sheets underneath the transport rollers, fit rods **6** onto the frontal transport rollers. In case of multiple production affix the rear transport rollers onto the front rod.
The folded sheets fall onto the collector sheet **7** which may be adjusted by a setting spindle **8** located beneath the collector sheet. Two moveable magnetic posts serve as sheet stop.

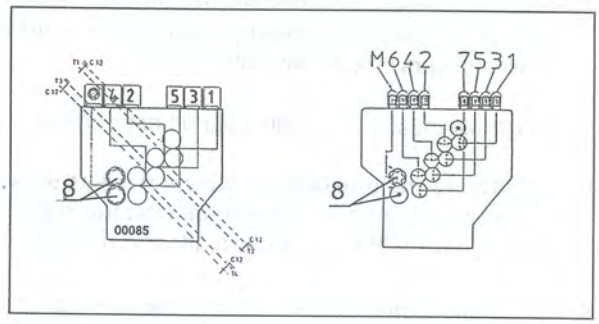
The electric power is supplied from the control panel of the previous folding unit with connections **10** and **11**. The speed may be regulated through the button located at the terminal box of the stream delivery.

B9.0 Batch counter

The batch counter functions are included in the MS-Control, which is described in a separate operating manual.

B10.0 Additional units

Mobile knife folding units, pressing stations, vertical stacker deliveries, table deliveries, marking devices, gluing devices, gatefold plates etc., are individually described in separate Operating Manuals.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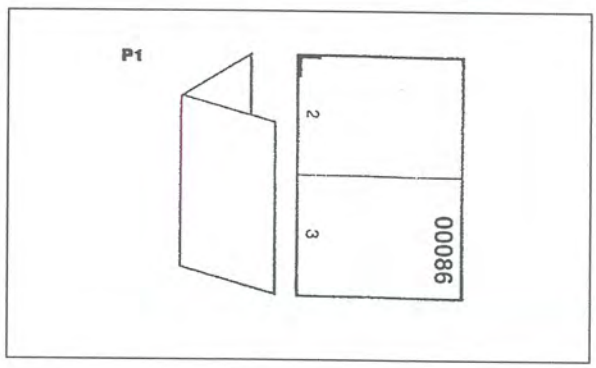
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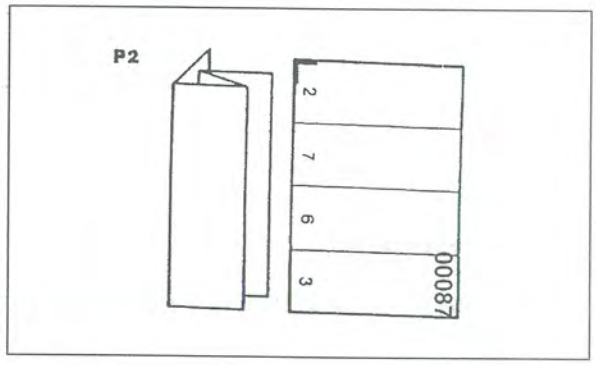
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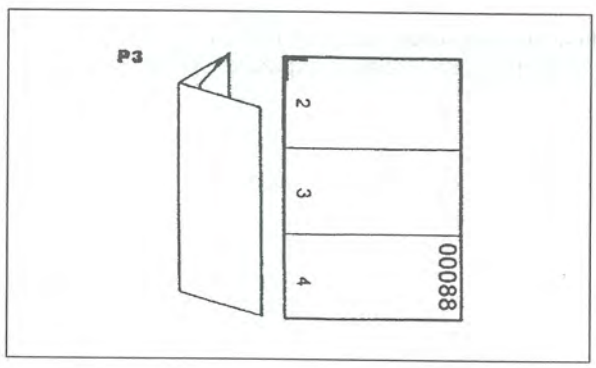
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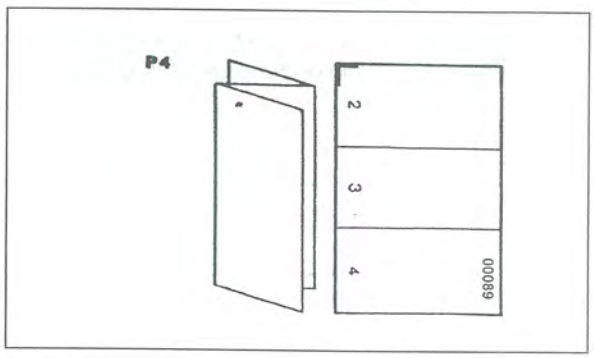
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D1 MBO setting instructions for the most commonly folds

The MBO folding machine operates in accordance to the so-called „principle of buckle fold", i.e. the entered sheet will be transported through a register table towards the foldrollers of the parallel unit. The sheet will be catched up by the first set of foldrollers and passed into the first buckle plate. Due to a sheet stop the sheet will come to a stop. However, the set of foldrollers will push the sheet further ahead whereby a loop will be created inside the buckle area. Foldrollers number two and three will catch up the folded sheet and transport it into the buckle plate number two.

The course of folding will occur as descriped above.

However, if you require an asymetric fold, i.e. may 1/3 of the sheet is folded, the remaining folded sheet (tail end) will be single thickness and the range of the folded sheet will be double thickness. The foldrollers must be set to single paper thickness until no part of the folded sheet is in single condition. If the foldrollers are set to double paper thickness although single thickness would be necessary, the sheet will not be catched by the foldrollers but rather be clinged between them.

A. Parallel unit

1-5, i.e. 1st through 5th pair of foldrollers
8 i.e. set of slitter shafts

P1 1 x parallel unit, i.e. 4 pages

at 1, set for single paper thickness, and from 2 through 8, set to double paper thickness. Set sheet stop C12 at 1st buckle plate at 1/2 of sheet length. The buckle plates 2nd through 4th are replaced by sheet deflectors.

P2 2 x parallel fold, i.e. 8 page

sat 1 set for single, and at 2 set for double paper thickness, and at 3 through 8 set to quadruple paper thickness. Set sheet stop C12 to 1/2 of sheet length at 1st buckle plate and 1/4 of sheet length at 2nd buckle plate. Buckle plates 3 and 4 are replaced by sheet deflectors.

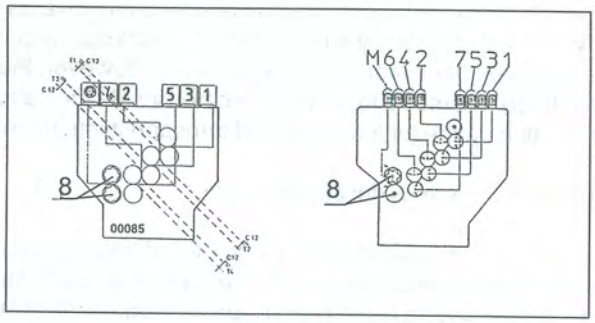
P3 2 x parallel unit (letter fold), i.e. 6 pages

I. with one top (T1) and one bottom (T2) buckle plate, set at 1 and 2 for single and at 3 through 8 for triple thickness of paper. Set the sheet stop C12 at 1st buckle plate to 2/3 of sheet length, and 2nd to 1/3 of sheet length. Buckle plates 3 and 4 are replaced by sheet deflectors.

II. with two top buckle plates (T1 and T3), set at 1 through 3 to single and at 4 through 8 to triple thickness of paper. Set the sheet stop C12 at 1st and 3rd buckle plate to 1/3 of sheet length. Buckle plates 2 and 4 are replaced by sheet deflectors.

P4 2 x parallel unit (accordian fold), i.e. 6 pages

set at 1 and 2 to single thickness of paper, and at 3 through 8 to triple thickness of paper. Set sheet stop C12 at buckle plate T1 and T2 to 1/3 of sheet length. Buckle plates 3 and 4 are replaced by sheet deflectors.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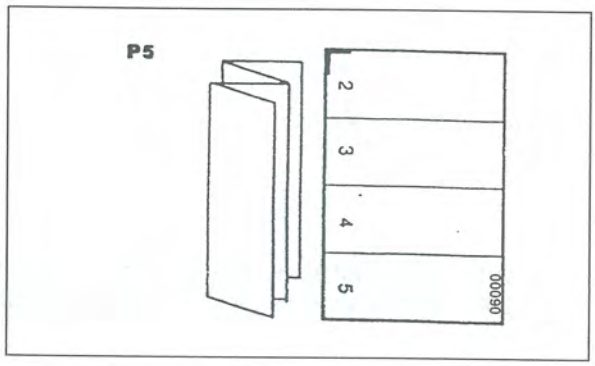
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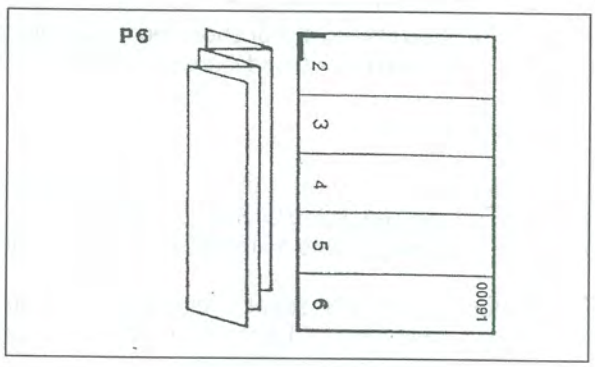
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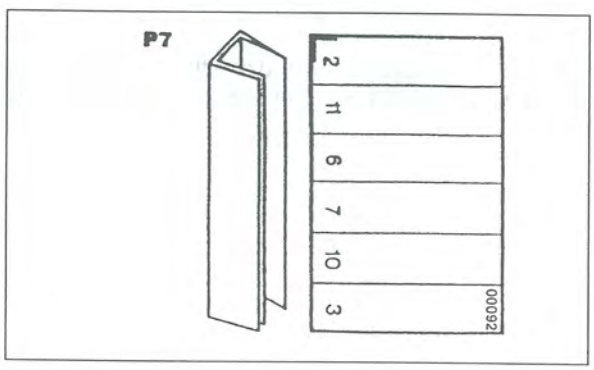
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P5 3 x parallel unit (accordian fold), i.e. 8 pages

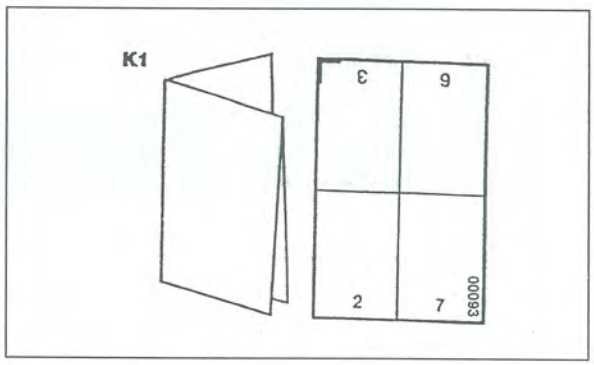
set at 1 through 3 for single thickness and at 4 through 8 to quarduple thickness of paper. Set sheet stop C12 to 1/4 of sheet length of buckle plates 1st to 3rd. The 4th buckle plate is replaced by sheet deflector.

P6 4 x parallel unit (accordian fold), i.e. 10 pages

set at 1 through 4 to single paper thickness and at 5 through 8 to fivefold thickness of paper. Set the sheet stop C12 to 1/5 of sheet length at buckle plate 1st through 4th.

P7 3 x parallel unit (letter fold), i.e. 12 pages

set at 1 to single paper thickness, at 2 through 4 to double thickness of paper and at 5 through 8 to sixfold thickness of paper. Sheet stop C 12 should be set 1/2 of sheet length at first buckle plate, and to 1/6 of sheet length at 2nd and 4th buckle plate. The 3rd buckle plate is replaced by a sheet deflector.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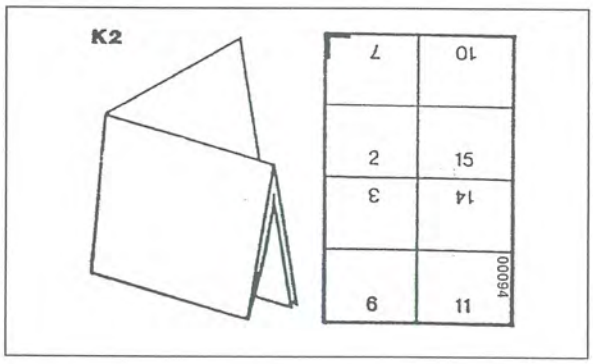
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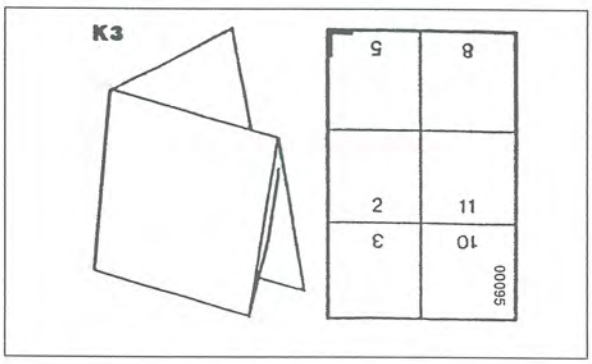
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D2 MBO setting instructions for the most commonly folds

B. Crossfold unit

K1 1 x parallel unit and 1 x crossfold unit (double folding), i.e. 8 pages

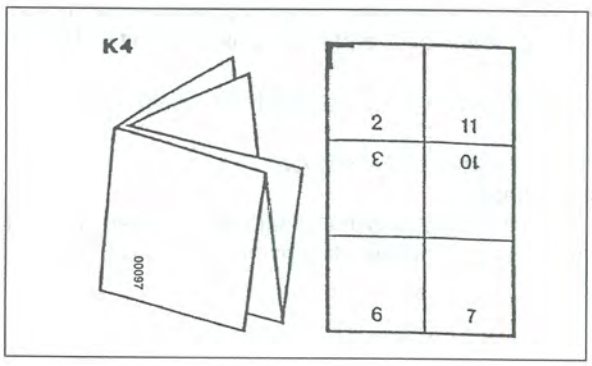
See item **P1** for setting of parallel section.
Setting of crossfold section:
set the foldroller 1 to doublefold, and the remaining foldrollers and slitter shaft to fourfold thickness of paper. Set the sheet stop of buckle plate at crossfold unit to 1/2 of sheet width.

K2 2 x parallel unit and 1 x crossfold unit, i.e. 16 pages

See item **P2** for setting of parallel unit.
Setting of crossfold unit:
set the foldroller 1 to fourfold, and the remaining foldrollers and slitter shaft to eightfold thickness of paper. Set the sheet stop of buckle plate at crossfold unit to 1/2 of sheet width.

K3 2 x parallel unit (letter fold) and 1 x crossfold unit, i.e. 12 pages

see item **P3/1** for setting of parallel section.
setting of crossfold section:
set the foldroller 1 to triplefold, and the remaining foldrollers and slitter shaft to sixfold thickness of paper. Set the sheet stop of buckle plate at crossfold unit to 1/2 of sheet width.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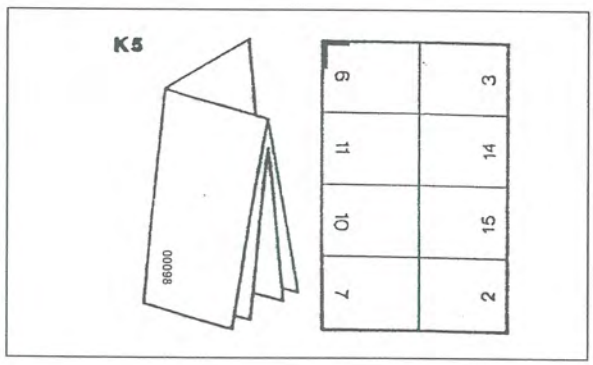
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D3 MBO setting instructions for the most commonly folds

B. Crossfold

K4 2 x parallel fold (accordian) and 1 x crossfold, i.e. 12 pages

see item **P4** for setting of parallel unit.
setting of crossfold section:
set the foldroller 1 to threefold, and the remaining foldrollers and slitter shaft to sixfold of paper thickness and sheet stops at crossfold unit to 1/2 of sheet width.

K5 1 x parallel unit, 1 x crossfold unit and 1 x threefold unit (threefold right-angle), i.e. 16 pages

see item **K1** for setting of parallel and crossfold unit
setting of threefold section:
set the foldroller 1 to fourfold, and the remaining foldrollers and slitter shaft to eightfold of paper thickness and sheet stop at threefold section to 1/4 of sheet length.

MBO Folding Technology - **Gruppe weltweit**

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