Adjustment and checking of important functions of

S-LETTERPRESS MACHINES

valid as of serial No. 4301

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**SUPPLEMENT**

Remedies to register problems 35 - 55
SETTING OF THE GUIDE FRAME  
S/SBD 0105

Adjust the guide frame "A" laterally to the center position between and parallel to the guide paths of the type bed on O.S. and D.S.

ADJUSTMENT OF THE RACKS FOR ROLLER CARRIAGE S/SBD 0728

The two racks for the roller carriage "B" are also set parallel to the guide paths of the type bed.

ALIGNING OF THE RACK CARRIERS S/SBD 0108/0109

To ensure a correct height setting of the rack carriers it may be necessary to lay shims (various thicknesses) between the screw-on surfaces ("A"). The thickness of the shims is correct when the lower bed drive rack with the screwed-on rack carrier can be moved freely in longitudinal direction.


The marked tooth of the bed drive pinion is inserted into the first gap of tooth of the lower bed drive rack (end position, inking unit side). Should there be no mark, insertion of tooth will have to be made with a view to have easy access to the grease nipple, situated at D.S. at the bed drive pinion (end position, inking unit side). The machined surface "F" on the connecting rod must point downward.
INSERTION AND ADJUSTMENT OF THE TYPE BED

The type bed is inserted with the bed drive pinion in end position at the inking unit side (crankshaft and connecting rod stretched horizontally).

If the position of the type bed was not marked in end position before it was removed, the engagement of teeth between the upper drive rack S/SBD 0702 and the bed drive pinion must be done according to the print begin (see sketch opposite).

### SUMMARY OF POSITIONS "A" AND "B"

Position "A" is the distance measured from the print begin line of the type bed to the bearer ring at the cylinder.

Position "B" is the distance from the top of the bearers to the print begin line of the impression cylinder.

Positions "A" and "B" are equal to the zero position of the machine, with the type bed in end position at the inking unit side.

### EXACT SETTING OF THE PRINT BEGIN

Lock two pieces of rules against the front edge of the chase at O.S. and D.S. and ink them up.

Turn the machine by hand with impression on, until you can see a print of both lines on the packing (1,2 mm packing thickness). The distance from the cylinder edge including packing to the printed line must be 3,2 mm. If a correction is necessary, loosen the screws of the upper bed drive rack S/SBD 0702 and move the type bed in longitudinal direction.
POSITIONING THE ROLLER CARRIAGE TO THE TYPE BED

The engagement of teeth of the gears S 0609 to the racks SBD 0728 and S/SBD 0117 must be chosen as to have a clearance between the guide blocks S/SBD 0720/0727 O.S. and D.S. and the gear housing S/SBSBD 0607 at the type bed end positions inking unit side and delivery side. Backlash of teeth gear vs. upper rack must be equal to gear vs. lower rack.

SETTING OF BEARER PRESSURE BETWEEN THE BED DRIVE PINION AND THE UPPER DRIVE RACK S/SBD 0702

The clearance between the bearers S 0116 and the bearer rings S 0306 at the main pinion is checked with a feeler gauge. In order to achieve the correct bearer pressure 0,05 mm must be added to the obtained measurement. Shims S 0722 of various thicknesses are used to fill up the clearance between the type bed and the rack.

ADJUSTMENT OF THE GUIDE BLOCKS S/SBD 0720/0726/0727

Between the guide plates S/SBD 0714 and the lower guide paths at the base the clearance must be 0,05 mm. This clearance is achieved by putting shims S/SBD 0739 (various thicknesses) between the type bed and the guide blocks. The lateral play of the guide blocks to the guide paths should also be 0,05 mm. The type bed is pushed slightly and parallel against the operator side. The guide blocks at the drive side are loosened and set accordingly.
ADJUSTMENT OF THE CYLINDER PACKING CLAMP S/SBB/SBD 1108

A parallel distance of 1.2 mm must be set between the clamping surfaces of the impression cylinder and the packing clamp. In the same position the height adjustment of the gripper bar surface is carried out. The distance from the surface of the cylinder to the gripper pads should be 1.7-1.8 mm. Underlay the bearing brackets of the packing clamp with shims accordingly.

ADJUSTMENT OF THE ROLLER LEVER S/SBD 1149

Open the packing clamp by 1.2 mm. At machines fitted with fixed grippers at O.S. and D.S. a shim of 0.8 mm must be put between one of the fixed grippers and the gripper pad. At machines with all grippers springloaded, this shim is omitted.

Measurement A = distance from the cylinder trunnion to the roller S 1162:
As of serial No. 4301-30750 105 mm
As of serial No. 30751- 109 mm

Measurement B = distance from the bearer ring to the roller S 1162:
As of serial No. 4301-30750 63 mm
As of serial No. 30751- 59 mm

Set the roller lever S/SBD 1149 and pin it.

SETTING OF THE CYLINDER SEGMENT GEARS

The setting of the segment gears depends upon the print begin on the surface of the impression cylinder. The print begin line is 2 mm behind the front edge of the cylinder (see sketch above). The position of the segment gears for the various serial ranges is shown in the sketches opposite.
ALIGNMENT OF THE TOP PLATE S 1207 VS. IMPRESSION CYLINDER BEARING

The top plate is aligned laterally to the outside edges of the cylinder bearing (see sketch opposite).

SCRAPING OF IMPRESSION CYLINDER BEARINGS (LOWER HALVES)

Remove the spring bolts S 1216 from the side frames so that the bearings can rest on the adjustable impression wedges. Insert the cylinder into the lower bearing halves. The parallel position of the cylinder to the type bed is obtained by the adjustable impression wedges S 1256/1257 which can be adjusted laterally.

When scraping the bearings, care must be taken that the bearing surface along the edges "A" is scraped free to a width of approx. 12-15 mm.

SCRAPING OF IMPRESSION CYLINDER BEARINGS (UPPER HALVES)

The upper halves of the bearings with the top plate S 1207 are screwed to the lower halves. The screws must be tightened equally. A perfect picture of scraping/inking marks should appear on the bearing surface when the press is running under normal pressure. This condition can be simulated by using the gauge VEm 712. With this gauge the bearing is loaded with a pressure of 150 kg/cm². Repeat the procedure until the scraping/inking marks are acceptable and the impression cylinder can be turned by hand easily, respectively falls back to the centre of gravity by its own weight.
ADJUSTMENT OF THE SPRING BOLTS S 1216

The distance "A" (see sketch opposite) between the adjustable impression wedges and the cylinder bearings must be adjusted before the impression cylinder is fitted finally. "A" is at

- O.S. = 11 mm,
- D.S. = 13 mm.

Adjust the screw S 1260 at the spring bolt S 1216.

SETTING OF THE IMPRESSION SETTING BOLTS S 1208

A distance of 5 mm, as shown in sketch opposite, must be set before the top portions of side frames are put on to the side frames.

MOUNTING THE TOP PORTIONS S 1203/1204 OF THE SIDE FRAMES

When mounting the top portions of side frames choose the engagement of teeth from the impression operating pinions to the impression operating racks S 1210/1224, with the racks projecting by 2 1/2 teeth at "A" (see sketch opposite).
POSITIONING AND ALIGNMENT OF THE TOP PORTIONS OF SIDE FRAMES

Up to serial no. 23 700

Insert the gripper shaft into the top portions and tighten the four screws connecting the top portions to the side frames. Set the interior edge of the gear segment S 1230 parallel to the cylinder side frame (see "A" in sketch) and block it by inserting an appropriate object (e.g., a piece of furniture). Turn the impression setting bolts S 1209 O.S. and D.S. clockwise until the cylinder bearings are sitting on the impression wedges, and tighten the nuts and counternuts. Then the shaft for impression lever S/SBD 1213 should turn easily by hand, otherwise repeat the whole procedure.

As of serial no. 23 701

Position the cam SB 1155 with its highest point showing to the last third of the impression cylinder surface. Turn the cylinder till the pawl KSZ 1276 reaches the lowest point and push the main impression lever SB 1281 by hand, until the stop KSZ 1285 touches the pawl (see sketch opposite). Tighten the nuts and counternuts at the impression setting bolts in this position.

ENGAGEMENT OF TEETH BETWEEN IMPRESSION LEVER SHAFT AND GEAR SEGMENT

Up to serial no. 26 716

see sketch opposite.

As of serial no. 26 717

see sketch opposite.
DISMANTLING THE GEAR BOX

Remove the brake shoe and pull off the flywheel S/SBD 0404 by means of dismantling device VE 1305. Lay the gear box on to the flywheel side (see sketch opposite). Turn the extension of the crankshaft until the crank lever S/SBD 0503 with the connecting link S/SBD 0433 is inside the double driving gear S/SBD 0427. Mark the engagement of teeth from the intermediate gear S/SBD 0423 to the double driving gear S/SBD 0427. As of serial no. 11 201 this engagement of teeth is marked "0". Lift the flange cover S/SBD 0403 with double driving gear off the gear box.

Knock out the taper pin 16 Ø x 180 at the extension of crankshaft/crank lever.

DISMANTLING THE DOUBLE DRIVING GEAR

Fix the coupling flange of the crankshaft on to a base. The shaft S/SBD 0432 is to be pulled out after removing the locking screw (see sketch opposite).

In order to attach the dismantling device bring the crank lever and the double driving gear in correct position to each other (see sketch opposite).
DISMANTLING AND MOUNTING OF THE CRANK LEVER S/SEB 0503

The following devices can be used:

VP 85 mechanical device with crank handle (see sketch opposite).

VP 85/1 hydraulic device.

CHECKING THE CRANKSHAFT FOR DISTORTIONS

Press the crank lever back on to the extension of crankshaft and screw it to the crankshaft.
Place the complete crankshaft on to a plane table for checking as shown in sketch opposite.

<table>
<thead>
<tr>
<th>MASCH.NR.</th>
<th>X  ± 0.15</th>
</tr>
</thead>
<tbody>
<tr>
<td>751-1660</td>
<td>257.44</td>
</tr>
<tr>
<td>1661-4300</td>
<td>270.60</td>
</tr>
<tr>
<td>4301-11200</td>
<td>283.20</td>
</tr>
<tr>
<td>11201-30750</td>
<td>289.70</td>
</tr>
<tr>
<td>30751-</td>
<td>333.10</td>
</tr>
</tbody>
</table>

The measurement "X" for the various serial ranges is given in the table opposite.
If any deviations exceed the tolerance of ± 0,15 mm the complete crankshaft must be replaced by a new one.
ADJUSTMENT OF THE BACKLASH OF TEETH AT THE GEARS S/SBD 0423, S/SBD 0417 AND S/SBD 0410

Up to serial No. 30750
the backlash of teeth is adjusted by setting the flange bushings S 0424 and the bracket for shaft S 0401 (bearings of above mentioned gears).
The gears must be adjusted without play but without pressure between the teeth.

Engagement of Teeth I
Observe the marked teeth when meshing the gear S/SBD 0423 to the double driving gear S/SBD 0427.
The measurements "A" and "B" (see sketch above) for the various serial ranges are given in the table opposite. With this setting the backlash must be adjusted.

Engagement of Teeth II and III
In both cases it does not matter which teeth are engaging which ones. At the engagement of teeth II a maximum backlash of 0.05 mm is allowed.

As of serial No. 30751
this procedure is no more possible since the bushing holes in the gear box shell are already finished true to measurement under consideration of the correct backlash. Should it however be necessary to make corrections in some exceptional cases, gears with plus/minus tolerances must be fitted. Any existing tolerances are marked, either plus + for the upper or minus - for the lower limit, at the double driving gear S/SBD 0427 (see sketch opposite) and at the end plane of the double intermediate pinion gear S/SBD 0417.
ADJUSTMENT OF BEARER PRESSURE BETWEEN IMPRESSION CYLINDER AND TYPE BED

Without use of a pressure gauge
Adjust two printing plates with one solid each to correct type height and create normal printing conditions. Remove the bearers from the type bed.

Put one sheet of the run on to the printing plates.

Set the lever S 1212 to the upper stop (see sketch opposite) and the machine to position "impression on" (please observe automatic impression control mechanism as of serial No. 23 701).

Turn the machine by hand until the printing strip of the cylinder is over the centre of the solids.

Check the bearer pressure in this position. You should just be able to push in the bearers between the type bed and the bearer rings at D.S. and O.S. and pull them out again.

Attention! The bearers are tapered at both ends.

PROCEDURE OF ADJUSTMENT

Put machine to "impression off".
The adjustable impression wedges S 1256/1257 are to be moved according to necessity (see sketch opposite). Lateral movement of 1 mm at the wedge = approx. 0.01 mm adjustment of height of the impression cylinder.

Set the lever S 1212 to position "heavy forme" and impression cylinder to position "impression on".
Re-set the impression setting bolts S 1209 at D.S. and O.S., press the cylinder bearings on to the impression wedges by turning the impression setting bolts clockwise.
Check bearer pressure, and if the setting is not correct repeat the procedure.
Adjustment of bearer pressure using the pressure adjustment gauge VKm 668/1

Remove the gear racks and the bearers from the type bed. Set the lever S 1212 to position "heavy forme" and the impression cylinder to position "impression on".

Place the pressure gauges on the type bed according to information given in the table opposite. Turn the machine by hand until the printing strip of the cylinder is over the centre of the pressure gauges. Actuate the hydraulic pump until the dial reaches 50 atū pressure. 

\[ 50 \text{ atū} = 2,500 \text{ kg} = 5,512 \text{ lbs.} \]

Transfer measurement A (bearer height) to the height gauge and set its dial to zero.

The measurements shown in the table opposite must be taken into consideration when the height gauge is used. These figures indicate how much the impression cylinder bearer rings should be lower than the bearers. Take care to observe the correct reading at the dial. For example, in this case the dial should read at D.S. + 0,062 and at O.S. + 0,060.

If necessary, adjust the height of the impression cylinder as described already under "procedure of adjustment" on page 11.
AUTOMATIC IMPRESSION CONTROL MECHANISM

As of serial No. 23 701

Adjustment

A. Before adjusting set the cylinder to position "impression off" and the lever S 1212 to position "heavy forme". Turn the machine until the pawl KSZ 1276 reaches the lowest point.

B. Loosen the nuts and counter nuts at the impression setting bolts S 1209 at D.S. and O.S. and turn the impression setting bolts one turn counter-clockwise. Swing the pawl KSZ 1276 against the upper stop SB 1280. Push the main impression lever SB 1281 by hand until the pawl touches the upper stop.

There is a hole in the main impression control lever for inserting a rod to increase leverage.

C. Swing the pawl KSZ 1276 downwards. In this position the lower stop KSZ 1285 is so adjusted (loosen both screws) that there is a gap of 2.7 mm between the swung-in pawl and the stop. Tighten the screws at the stop again after adjusting.
D. Push up the main impression lever SB 1281 in direction of arrow (see sketch opposite) so that the lower stop KSZ 1275 is pressed against the pawl KSZ 1276.

In this position the impression setting bolts S 1209 at D.S. and O.S. are turned clockwise, in order to press the cylinder bearings against the impression wedges.

The nuts and counter nuts at the impression setting bolts are tightened afterwards.

E. Turn the machine by hand in direction of rotation until the pawl KSZ 1276 can be swung in easily against the upper stop SB 1280.

F. Any play still existing should be eliminated by pressing the main impression lever in direction of arrow (see sketch opposite). Loosen the lower stop KSZ 1276 and adjust 2,3 mm between stop and pawl.

The stop must be tightened again.

Thus, a pressure of 0,4 mm is created to eliminate the play within the impression control mechanism.
ADJUSTMENT OF SYNCHRONIZATION OF SPEED
TYPE BED - IMPRESSION CYLINDER

A. Timing of stroke for printing cycle

TOTAL WAY OF TYPE BED
GESAMTWEG DES SCHRIFTFUNDAMENTS

<table>
<thead>
<tr>
<th>Serial No.</th>
<th>Start A</th>
<th>Synchronized B</th>
<th>Slow down for Return C</th>
<th>Way D</th>
</tr>
</thead>
<tbody>
<tr>
<td>4300-11200</td>
<td>103 mm</td>
<td>789 mm</td>
<td>78 mm</td>
<td>970 mm</td>
</tr>
<tr>
<td>11200-30750</td>
<td>265 mm</td>
<td>700 mm</td>
<td>65 mm</td>
<td>1030 mm</td>
</tr>
<tr>
<td>30750-</td>
<td>196 mm</td>
<td>800 mm</td>
<td>81 mm</td>
<td>1077 mm</td>
</tr>
</tbody>
</table>

Beginning of synchronized printing stroke after dead-end point of the type bed at the inking unit side. End of synchronized printing stroke before dead-end point of the type bed at the delivery side.

B. Checking procedure of the synchronized speed by means of gauge VK 187 S 07.

Loosen the rack carrier S/SED 0109 at D.S.
Connect the auxiliary device (tension spring with cable) to the rack carrier S/SED 0108 at O.S. This will force the roller S 0112 to run on the main cam S 0505.
Remove the bearers and the racks S/SED 0703/0704 from the type bed.
Fix the gauge to the type bed at D.S. (see sketch "B").
The metal tape (0.05 mm thick) is put around the bearer ring and fixed with slight tension to the cylinder.
Machine in position "impression on".
Turn the machine by hand in direction of rotation and check the synchronization of speed.
The permissible difference of speed is 0.2 mm.
C. Checking procedure of synchronized speed without gauge

VK 187 S 07

Remove the bearers at D.S. and O.S. and the gear rack S/SBB 0704 at O.S. from the type bed.
Loosen screws at the gear rack S/SBB 0703 at D.S.
The gear rack should move easily in longitudinal direction.
Fix a magnet stand to the gear rack. The tip of the dial gauge should point to the end plane of the type bed.
Machine in position "impression on".
Turn the machine by hand in direction of rotation and check synchronization of speed.

Adjustment procedure.
Up to serial No. 11 200
Correction of synchronized travel can only be made by re-setting the main cam S 0505. Loosen the main cam and set it accordingly. Set rack carrier S 0109 D.S. back to auxiliary cam S 0506. (Adjustment possible at connection to bed drive rack). The roller S 0112 at the rack carrier should run evenly around the whole circumference of the auxiliary cam. Check by holding the roller by hand, you should just be able to hold it. The auxiliary cam S 0506 must be re-set if necessary and the rack carrier adjusted to it accordingly.

As of serial No. 11 201 the synchronized travel can be altered by moving the cover plate S/SBD 0426.
The speed of the type bed is increased by moving the cover plate in direction "A" (delivery side). The gear box must be lowered and the backlash adjusted to 0,05 mm at the engagement of teeth "C" between the cylinder gear S/SBD 1107 and gear S/SBD 0423. The speed of the type bed is decreased by moving the cover plate in direction "B" (inking unit side). The gear box must be brought up accordingly. (Observe the backlash of teeth at the engagement of teeth "C").
ADJUSTMENT OF THE CYLINDER GEAR RACKS S/SBD 0703/0704

Machine in position "heavy forme" and "impression on".

Fix the gear racks so that they can be moved easily longitudinally and twisted slightly in lateral direction.

Turn the machine by hand to print begin, observe mesh and backlash of teeth. In this position the gear racks at O.S. and D.S. are adjusted to the segment gears. They should stand 0.02 mm (backlash) lower than the segment gears. At the end of the printing area the racks are adjusted without backlash. A correct check-up is carried out with a dial gauge (see sketch opposite). The gear racks should mesh without pressure and without much backlash over the whole length of travel.

Height adjustment is made by screws DIN 915 M 8 x 35 (see sketch opposite).

Attention! The shape of the first teeth of the gear racks is corrected, i.e. they are smaller.

S up to serial No. 11200 no tooth correction
S as of serial No. 11201 10 teeth
S/SBG/SBB 12 teeth
SBD 10 teeth

In this range the racks must not be adjusted.

Tightening of the gear racks

For tightening the racks turn the machine by hand in direction of rotation and pull the type bed by hand in counter-direction.

Afterwards the racks should enter the segment gears without a knock when the machine is running.

Repeat procedure, if necessary.

SETTING OF THE TRACKS S/SBB 0163

Position "A" 0.05 mm clearance between roller S 0724 and track.

Position "B" No clearance between roller and track.

Set tracks S/SBB 0163 D.S. and O.S. accordingly.
SETTING OF PAPER TRANSFER
IMPRESSION CYLINDER - DELIVERY GRIPPER BAR

1. Adjustment of the grippers at the delivery gripper bar

S/SB/SBB/SBD 1403

All grippers S 1407 must be closed (set grippers accordingly).

Set them evenly with tissue paper.

From the underside of the roller GT 2027 to the screw-on surface of the roller lever S 1407 a distance of 45,0 mm must be observed.

2. Position of the impression cylinder

Put a packing of 1,2 mm on to the cylinder.

Machine in position "impression off".

Fix a pointer to the cylinder axle and turn the machine until the mark at the cylinder gear S/SBD 1107 (delivery side) reaches a distance of 23,56 mm (normal type height) to the top of the gear box.

In this position the pointer is set to mark "B".

3. Adjusting the delivery gripper bar to the impression cylinder

Impression cylinder in position "B".

There should be a distance of 1,0 mm between the clamping surface at the impression cylinder (including packing) to the gripper pads.

Method of adjustment:

Up to serial no. 11200

Adjustment is carried out by setting the gear S/SB 1430 accordingly.

As of serial no. 11201

Adjust by setting gear S/SB 1430 on flange S/SB 14184 accordingly.
4. Turn the machine backward and then again in direction of rotation to position "A". The cam S/SBD 1440 is set to the roller GT 2027. The roller should just touch the cam, but move easily when turned by hand.

Cross-check:

Turn the machine by hand in direction of rotation to position "A" once more. The grippers should close in this position.

Turn the machine by hand in direction of rotation to position "C", the cylinder grippers must open in this position.

The cylinder grippers and the delivery grippers should travel in closed condition for 4 mm. The sheet should not be released during this transfer.

Check with impression on and off.

5. During this transfer the front edge of the sheet must be straight, the sheet should not lie wavy in the grippers.

6. Means of adjustment

The height of the delivery gripper bar can be corrected by putting in or taking out shims S 1406 (various thicknesses) at the connection of the gripper bar to the chain.
SETTING OF PAPER TRANSFER
DELIVERY GRIPPER BAR - DELIVERY CARRIAGE

A. Adjustment of the grippers S 1451 at the delivery carriage

All grippers S 1451 must be closed, adjust them evenly with tissue paper.

There must be a distance of 11 mm from the upper edge of the roller S 10151 to the upper surface of the driving rack for delivery carriage S/SBB 1450.

B. Setting of the delivery carriage in end position above the delivery pile

Turn the machine till the angle pieces with the delivery gripper bar are in line with the upper edge of the delivery side frames at the pile side.

The measurement "A", see sketch opposite, from the centre of the chain wheel shaft S/SB/SBB 1424 to the end of the gripper pads should be:

204 mm from serial No. 4301 to serial no. 11200
212 mm as of serial No. 11201.

The distance from the back plate for delivery S/SB/SBB 1515 to the end of the gripper pads is 6 mm.

The screws connecting the gears S 1461 to the flanges S/SBB 1457 should be approx. in the centre of the elongated holes.

Choose the mesh of teeth accordingly.

Procedure of setting:

Move the gears S 1461 on the flanges S/SBB 1457.
C. Setting the delivery carriage drive

Delivery carriage in end position, see under B.
Turn the gear S 1468 so that there is a distance of 170 mm from the bottom of the delivery side frame to the centre of the stud for the connecting rod S 1465. When fitting the intermediate gear S 1474, the mesh of teeth to the gears S 1468 and S 1418 must be chosen accordingly.
The segment gear S 1448 and the connecting rod S 1465 are fitted in this position (see sketch above).

D. Adjustment of paper transfer

Turn the machine in direction of rotation until the grippers of the delivery carriage are closed and the roller S 10151 just leaves the cam lever S 1475. In this position the delivery gripper bar should be 1 mm ahead of the delivery carriage (see sketch opposite).

Cross-check and correction

Clamp a sheet of paper parallel by 4 mm into the grippers of the chain gripper bar and transfer it to the delivery carriage by turning the machine in direction of rotation. There should be 3.5 mm paper parallel in the delivery carriage grippers.
The gripper bite is corrected by moving the gear S 1418 on the flange S 1458 (elongated holes in gear). The parallelity of the sheet is re-set at the gears S 1461. During the paper transfer the grippers of the delivery gripper bar and the grippers of the delivery carriage should travel in closed condition for approx. 4 mm (set cam S 1439 accordingly). The sheet may not be lost during the transfer.
ADJUSTING THE STROKE OF THE TRAVELLING GRIPPERS

First of all, the adjustment of the stroke is carried out without the cam pieces S 16101.

The length of the stroke, without these cam pieces, should be:

- S/SBB/SBG 491 mm
- SBD 569 mm

Adjustment is done by means of eccentric stud S/SBB 1651 (see following page).

At the upper end position of the travelling gripper carriage, there should be a clearance of 0,5-0,7 mm between the roller S 2019 and the cam piece S 16100 (see sketch opposite). This can be achieved by adjusting the connecting rod S/SBB/SBD 2056 (see following page).

At the lower end position of the travelling grippers there should be a clearance of 0,1-0,2 mm between the roller and the cam piece (see sketch opposite). Adjustment is also done at connecting rod.

The above mentioned settings are interdependent. Therefore, it is essential to check all the other settings and correct them again after each adjustment has been carried out.
The procedure for adjusting the connecting rod to achieve the correct setting of the distances from the roller to the cam piece is shown and described in the sketch opposite.

The eccentric stud for adjusting the length of the stroke of the travelling grippers is also shown in the sketch opposite.

Both cam pieces S 16101 are so set to the cam S 16100 that the roller S 2019 passes in-between without play.

The final length of the stroke should then be:

S/BB/SBD 492 mm
SBD 570 mm

(see sketch on following page).
ADJUSTMENT OF TRAVELLING GRIPPERS

There should be a distance of 67 mm from the underside of the roller T 1311 to the gripper pads (see sketch above).

SETTING THE TRAVELLING GRIPPER BAR TO THE FEED TABLE

The travelling gripper bar should be 2,5 mm above the feed table at the upper end position and 0,5 mm at the lower end position, see sketch above. This slope is set by means of eccentric bolt S 2060. The overall height can be adjusted at the bolt S 2054 at the guide rail S/SBD 2046.

The distance from the front edge of the feed table to the edge of the grippers should be 31,5 mm when the travelling gripper bar is at the lower end position. Set the gripper bar at the plate S/SBB 2031 accordingly. Approx. 6-7 mm paper should be in the grippers.

SETTING THE SUCKER BAR

An average distance of 10,3 mm from the front edge of the suckers to the front standards should be achieved. Set the coupling S 1609 accordingly. The sucker bar is set parallel to the front standards by means of sucker bar carrier S/SBD 1606.

The height of the suckers to the feed table (see sketch opposite) is adjusted by setting the roller lever S 1619.
ADJUSTMENT OF THE PUSH SIDE LAYS

The travelling grippers are positioned to "A" on the backstroke, see sketch opposite. In this position the side lays stop pushing.

Insert an object of 5 mm thickness between the brackets S 2230 and S 2233.

Press the tongues of the side guide bearings S 2204/05 against the feed table and set a clearance of 0,1 mm between the adjusting screws and the shaft S/SB/SBB 2233.

Turn the side lays at O.S. and D.S. to their lowest height adjustment position and insert 0,5 mm feeler gauges between the cover plates and the tongues of the side guide bearings. Tighten the lever S 2219 at O.S. and the bracket S 2214 at D.S.

Between the side guide rocker arms S 2216/S 2232 at O.S. and D.S. and the stop screws at the side guide cam levers S 2212/13 a clearance of 0,5 mm is set.
ADJUSTMENT OF PULL SIDE LAYS - SBD -

Old version:

a. Adjust the side lay so that a strip of paper of 0,1 mm thickness is pulled properly.

b. Turn the machine in direction of rotation until the strip of paper (0,1 mm thickness) is released by the pull roller.

The swinging gripper must remain in the standstill position at the feeder during the pulling procedure (check with a dial gauge).

Precise adjustment is done at connecting rod SBD 2254.

New version:

a. Set a clearance of 0,2 mm between cover plate and feed table by means of the adjustment screw.

b. The adjustment procedure of the side lay to the swinging gripper is the same as described under b. above.

Any correction is carried out by re-setting the eccentric bolt SBD 2255.
SETTING THE FEED TABLE TO THE SWINGING GRIPPER

Adjust the height of the swinging gripper to position "paper" (lowest setting).

Turn the machine till the swinging gripper is in resting position at the feed table.

There must be a clearance of 0.8 - 1.2 mm, parallel at O.S. and D.S., between the swinging gripper and the feed table.

Setting is made by inserting or removing shims S/SBD 1690 (various thicknesses) between the screw-on surfaces of the feeder side frame and the top portion of the cylinder side frame at O.S. and D.S.

The feeder must be set laterally so that there is an equal clearance between the grippers S/SBD 1342 and the cut-outs at the feed table. The grippers and the front lays may not touch the feed table.

Mounting and setting the complete bearing bracket S 1646

Turn the machine in direction of rotation until the type bed has reached position "B".

Position "B" = Position of the type bed after end position at inking unit side.

Turn the feeder in direction of travel to position "A".

Position "A" = The travelling grippers must be brought to this position in direction of running, they must not stand below the feed table.

Mount the bearing bracket S 1646.

Choose engagement of teeth from the intermediate gear S 1649 to the gear S 1431 as well as from the intermediate gear S/SBD 1650 to the gear S/SBD 1644 so that the basic settings of the type bed and the feed grippers remain on the position mentioned above. Backlash of teeth approx. 0.05 mm.

The measurements of the positions "A" and "B" for the various models are shown in the table opposite.
ADJUSTMENT OF FEED PILE LIFT

Set the tilt of the sucker bar and the feed pile lift to position "cardboard".

The feed pile must stop lifting up at a distance of 0.5 mm to the suckers, when the suckers are in lowest position to the feed board (see sketch opposite).

Set the adjustment of the feed pile lift to position "tissue paper". At a distance of 13.5-17 mm between the suckers and the feed board the feed pile lift must stop.

Corrections can be made by resetting the feed control rod S 1734 and if necessary the lever for feed control S 1758.

The spring rod S 1737 must be so set that there is a clearance of 0.5 mm between lever S 1742 and stop lever S 1735 during the lifting process (see sketch opposite).

Minor corrections of the feed pile lift can also be made by increasing or decreasing the spring-load of the compression spring S 1738. Increased spring-load: feed pile lift reacts faster. Decreased spring-load: feed pile lift reacts slower.

Loosen the collar DIN 705 A 8 and set it as required.
ADJUSTMENT OF PAPER TRANSFER
SWINGING GRIPPER - IMPRESSION CYLINDER

1. Position of the impression cylinder

Impression cylinder with 1,2 mm packing.
Machine position "impression on".
Attach a pointer to the centre of the cylinder axle.

Paper transfer
Position "B" = Setting position for swinging gripper.
Turn the machine until the mark at the cylinder gear S/SBD 1107 reaches a distance of 23,56 mm to the top of the gear box (inking unit side).
In this position the pointer is set to mark "B" and clamped.

Position "A" = Beginning of paper transfer.
Turn the machine backward a little bit and then in direction of rotation to mark "A".
Cylinder grippers S/SBD 1127 are closing.
Check with tissue paper.

Position "C" = End of paper transfer.
Turn the machine in direction of rotation to position "C".
Grippers S/SBD 1342 are opening.
Check with tissue paper.

2. Setting of the swinging gripper to the impression cylinder

Turn the impression cylinder to position "B".
Loosen the levers S 1306/07/08.
Set the swinging gripper to the impression cylinder.
There should be a clearance of 0,8-1,2 mm parallel at O.S. and D.S. from the impression cylinder including packing to the grippers S 1342.
Use feeler gauge WLM 517!
3. **Tightening of swinging gripper levers S 1306/07/08**

Press the swinging gripper lever S 1306 and the lever S 1303 laterally against the top portion of side frame S 1203 at D.S.

Tighten the swinging gripper levers S 1306/07/08.

Check lateral play.

Both levers S 1303 and S 1306 must be set without play to the top portion of side frame, however without being too tight.

4. **Adjustment of the stop pins S 1320**

Set the adjusting screws S 1346 to position "paper" (lowest position of the swinging gripper).

Between the stop pins S 1320 and the bearer rings at O.S. and D.S. a parallel distance of 0.4-0.5 mm should be adjusted.

**Procedure of adjustment**

Loosen the counternuts at the stop screws S 1351 at O.S. and D.S.

Adjust the distance of 0.4-0.5 mm by turning the screws S 1351.

Lock the counternuts.

After each such procedure the distance from the grippers S 1342 to the impression cylinder edge must be rechecked and if necessary reset as described under 2.
5. Setting of cam lever S 1253

a. Turn the machine in direction of rotation to position "C".
Grippers S/SBD 1342 still closed.
The levers S/SBD 1341 must just touch the gripper rods S/SBD 1342 evenly.
The cam lever S 1252 is set slightly against the roller S 1353.

Means of adjustment
Remove the pin connecting the roller lever S/SBD 1220 to the shaft.
The roller at the roller lever must touch the opening cam for swinging gripper S/SBB/SBD 1106 when setting the cam lever S 1253. The roller lever must be clamped to the shaft by means of a screw, a threaded hole is provided in the lever.
Turn the machine in direction of rotation, the grippers S/SBD 1342 must open evenly.
Check with tissue paper and straighten the gripper levers S/SBD 1341 if necessary.

b. Turn the machine backward and then in direction of rotation to position "D".
Between the levers S/SBB 1341 and the gripper rods S/SBD 1342 should be a clearance of 3 mm.
Setting is done by moving the opening cam for swinging gripper S/SBB/SBD 1106. When this cam was moved, the setting mentioned under a. must be checked again and repeated if necessary.

Checking procedure
Feed a sheet to the front lays.
Turn the machine in direction of rotation from position "D" to position "C". During this time of transfer the sheet must be held by the grippers.
Checking is made with the machine on position "impression on" and on position "paper".
The roller lever S 1220 is reamed and pinned again when all settings are correct.
ADJUSTMENT OF SHEET DROP

Set both outside front lays to position "minimum gripper margin".
Suck one sheet of paper from the pile and transfer it to the feed grippers.
Inch the machine until the feed grippers are beginning to stand still at the lower end of stroke.
Mark the tail end of the sheet with pencil marks at the feed table at O.S. and D.S.
Inch the machine till the grippers open and the sheet drops to the front lays. The sheet drop should be 1 mm and parallel.

Procedure of adjustment

In order to readjust the sheet drop, the clamping screws at the swinging gripper levers S 1306/07/08 must be loosened and the whole swinging gripper moved either forward or backward as required.
However, the basic setting of the swinging gripper is lost by doing this (see page 29, paragr. 2).
Corrections of the basic setting are made by moving the cam for swinging gripper movement S/SBD 1105 either in or against direction of rotation (see arrow B/C in sketch opposite).
Distance A must be approx. 1 mm again.

Procedure of adjustment when sheet drop is not parallel

Loosen the support bar and move the complete front standard at O.S. or D.S. until sheet drop is parallel.
ADJUSTMENT OF FEED AIR

Turn the machine with "impression on" in direction of rotation until the feed grippers are closed. Check with tissue paper.

1. Loosen the cam segment S 1637 and move it in direction of arrow, away from roller T 1644. See sketch "B".

2. Set a clearance of 1 mm between cam lever S 1823 and roller T 0453. See Sketch "A".

3. Move the cam segment T 1644 in direction of arrow, against the roller S 1825, see sketch "D", until the valve cap S 1825 is released. See sketch "C".
ADJUSTMENT OF BEARER PRESSURE
IMPRESSION CYLINDER - ROTARY
FORME CYLINDER

Position the rotary cylinder to -0,1 mm, see sketch opposite. Machine to position "impression on".

Application of the plunger pressure device VKm 750
A = pressure device VKm 750
B = distance piece VKm 750 - 6
VKm 750 - 21 is used with SBDZ.

Both pressure devices are positioned between the rotary cylinder and the impression cylinder at an equal distance, approx. 150 mm, to the side frames. Release the plunger pressure in order to press out any existing play at the bearings. There should be a clearance of 0,1 mm between the bearer rings of the impression cylinder and the bearer rings of the rotary cylinder (see sketch opposite). You should just be able to pull out a metal tape of 0,1 mm thickness.

Adjustment is carried out by means of setting the turn buckles SZ 1214 at O.S. and D.S.
Loosen the counter nuts S 1218 and S 1219 before setting.
The feeder of the Original Heidelberg Cylinder feeding the sheets without tapes or rollers guarantees a 100% register for many years. It very seldom happens that the printer has to face difficulties in this respect. Since such register problems very rarely occur with the Original Heidelberg Cylinder, most mechanics do not know how to treat such cases. For this reason we should like to deal with the causes which might create register problems and provide you with hints for their remedy.

When register problems appear, first of all one has to find out whether they were caused by influences that have nothing to do with the function of the machine. It would be too much within the scope of these instructions if we also would refer to register problems provoked by operational mistakes of the printer.

This information was compiled using already existing technical circulars; therefore all the mentioned part numbers are given with S prefixes. Please observe this when using this information for SB/SBB/SG/SBD models. The prefixes are already altered in the sketches.

REGISTERING IN GENERAL

Before we are going to speak about the elimination of register problems we should like to explain when the register of a machine is good and when it has to be looked upon as poor. It is evident that there is no rule which can be applied to all cases, since it is not the machine alone but the quality of the paper and the climate in the printshop which also have a considerable influence upon the register.

For checking the register of a machine, a forme with four register crosses has to be looked. Two of the register crosses should be positioned at the head of the chase with a distance of approximately 10 cm from the left and the right edge of the sheet; the other two crosses should be positioned near the leaving edge with the same lateral distance. Along the register crosses approximately 5 cm towards the middle of the sheet a pica rule is locked at both sides so that the sheet is guided a little and conditions are created according to a normal forme.
With this forme a certain number of sheets are printed twice, and the four register crosses should look like the sheet had only passed the machine once. With good stock and under normal climatic conditions in the printshop a correct register will be obtained without difficulties at all speeds. When the register crosses at the grip edge are doubling one can almost be sure that there is something wrong with the feeding of the machine. If, however, the front register crosses are correct while the crosses at the leaving edge are doubling it can be assumed that very likely the cause for this is to be found in the quality of the stock or in the temperature and humidity in the printshop. Of course, variations of the register crosses can also be caused by defects in the machine, if, for example the bristles of the brush are worn up or if the brush does not work in the correct rhythm or if it is not pressed against the cylinder sufficiently.

The exact covering of the register crosses also depends upon the relation of the running speed to the structure and the weight of the stock to be printed. It is obvious that a light and flabby paper can be printed somewhat slower with a 100% perfect register or faster with a less exact register. To what extent the register can be neglected in favour of the speed depends upon the quality of the individual job.

To avoid misunderstandings we should like to emphasize here once more that the register mechanism of the Original Heidelberg Cylinder is unique in every respect and that everything we said about registering so far expresses general principles which have nothing to do with the mechanism of the machine. One should not forget that forme, ink, and paper are components which also influence the register and the quality of the individual job.
There always will be cases in which the printer will be of the opinion that each dot of a screen should cover exactly when a screen block is printed twice. Theoretically this opinion is absolutely correct but in practical printing such a claim can only be reached fairly exact because again each single sheet of a run acts individually during printing. If under the most favourable conditions a number of sheets are run through the machine the screen dots will cover but not uniformly well with each sheet. With a big number the covering will be 100%, with other sheets the dot which was printed the second time will overlap on one side. In the most unfavourable case there also may be sheets where the dots lie side by side. Next to the paper again the forme (rough or fine screen) and the ink are of definite influence.

If, therefore, the mechanic checks a machine for its exactness of registering the best thing is to take an art paper of 100 g per square meter (i.e. an art paper of medium quality) from which he knows that it was stored correctly and which lies absolutely plane. Further it has to be taken care that the register crosses just print and do not show any impression on the rear side of the sheet as a little too much impression is already sufficient with free standing rules to warp the sheet so that the register crosses cannot cover exactly.

FORME AND PACKING

Register problems can be caused by creeping of the packing. The packing creeps if the forme has been adjusted too high or too low so that the packing is accordingly too thin or too thick. Consequently there is no more a true rolling, i.e. the printing level lies no more in the prescribed height so that the cylinder including packing is no more of the prescribed diameter.

If the forme is too low so that the packing has to be increased to more than its prescribed thickness to get the necessary impression the circumference speed of the packing is faster than the circumference speed of the cylinder bearers and of the pitch line of the cylinder segment gears. The block which is adjusted too low moves at the same speed as the circumference of the cylinder bearers and the pitch line of the cylinder segment gears. If, therefore, the block on its travel to impression comes below the cylinder dressed with a packing which is too thick the printing surface of the cylinder together with the packing will try to force its speed upon the forme. On the other hand, however, the type bed bearers and the type bed racks keep their normal velocity so that the packing as the weakest point has to give way. The block itself has the same speed as the type bed and pulls at the faster moving packing so that the packing is stretched in direction to the leaving edge. A sheet which is printed under these circumstances is exposed to a twisting which results in register problems. This is the same appearance which also leads to slur.
A very good method to check that the base of a machine rests correctly with all its contacting surfaces on the floor is the use of carbon paper as it is used with typewriters. The procedure is as follows:

The Original Heidelberg Cylinder is underlaid with pieces of card so that it seems to be levelled. A sheet of carbon paper is placed between the cards and under the carbon paper a light art card as it is used for printing post cards. Every spot which gets pressure will mark on the art card. These spots have to be cut off and a new art card in the full size is again laid on the card which was cut. The carbon paper again will show the spots which get pressure on this new art card with the difference that the area this time will be wider than before. The carrying area again is cut off the second card and, if necessary, a third art card in the full size is laid on to the already cut ones. This is continued till the carbon paper marks the whole area of the last art card. The art card pieces, of course, have to be glued together with the complete card underlay. This kind of levelling the base is founded on the same principle as the make-ready of a forme in the machine.

If, therefore, the condition of the floor is unfavourable the customer under all circumstances has to be informed regarding the consequences this may have. When selling a machine it is the duty of the representative to inspect the place where it is going to be erected and to tell the customer that he should have a proper foundation made before the machine is supplied.
PICKING UP OF THE SHEET

Further checking should take care of the travel of the sheet through the machine, i.e. from the feed pile to the delivery pile. At first the sheet is lifted by the suckers on the sucker bar and transferred to the mechanical grippers of the feed table. If the sheet transfer is correct the adjustments have to be as follows:

1) The vertical bars for the front lay standard S 1711/12/13 against which the front edge of the pile lies should not form a right angle with the feed pile board but a slightly acute angle. This position of the bars S 1711/12/13 guarantees that the top sheet of the pile lies actually against the bars.

![Diagram of S 1711/12/13 with 90° and 1mm marks]

2) The distance from the front edge of the top sheet to the front edge of the suckers on the sucker bar should be 9 to 10 mm to ensure that the sheet is correctly transferred to the mechanical feed grippers (see page 24).

If the sheet is not transferred to the travelling grippers with this distance it will not fall correctly into the swinging grippers when released by the travelling feed grippers. If the margin from the front edge of the sheet to the front edge of the suckers is not big enough the fall of the sheet from the travelling grippers to the swinging grippers is not big so that the sheet will jump back from the swinging grippers. If the distance which the sheet jumps back is bigger than the travel which the swinging grippers make for registering the sheet will be gripped but it will only lay against one of the two front lays or against none.

If the margin from the front edge of the sheet to the front edge of the suckers is too big there is the possibility that the travelling feed grippers still hold the sheet while the swinging grippers have already started with the registering movement. The sheet then will be bulged at the front lays. It may be, therefore, that the sheet is thrown back by the
tension in the paper when it is released from the travelling feed grippers or the sheet remains with dents at the front lays. In both cases register problems will result.

3) If the distance (margin) from the front edge of the sheet to the front edge of the suckers at the feed pile is not correct the sheet will already be bulged when it is transferred from the suckers to the travelling grippers. The reason for this is that the distance between the aluminium feed table and the foot of the suckers is not 2.7 mm as prescribed but smaller. When the travelling feed grippers come up from the slots in the aluminium feed table the small surfaces on which the grippers close hit against the paper and lift it in four places. The consequence may be that the sheet with very light or inferior stock is damaged by tearing or waves are created in the spaces between the mechanical feed grippers. In both cases register problems will be caused.

The reason for the maladjustment described under point 2) and 3) is a bending of adjustable lever S 1653 in the control mechanism for the sucker bar. Such a damage to the control mechanism can already be caused by the mechanic when erecting the machine or by an assisting person who turns unauthorized at the wheels of the feeder. Another possibility is that the feed pile was turned too high up so that the sucker bar could not reach its normal position and hit against the feed pile. This resistance was then transmitted by the control mechanism and caused a bending of the adjustable lever S 1653.
The adjustable lever S 1653 which is connected with its one end to a roller following a curved slot in a cam below the aluminium feed table has to be taken out of the machine and straightened. Please keep to the following instructions:

1) The aluminium feed table has to be removed. (It is not absolutely necessary to remove the aluminium feed board as the lever S 1653 can be reached also without doing so.)

2) Screw and threaded pin with which the adjustable lever S 1653 is screwed and pinned to the lever S 1611 have to be removed. (With older machines the adjustable lever S 1653 is only fixed with a normal taper pin and not with a threaded pin. As there is not sufficient space between the side frame of the feeder and the lever S 1611 to knock out the pin a hole has to be drilled through the side frame opposite the lever S 1611. Through this hole the pin can be knocked out by means of a punch.)

3) Turn the fly wheel till the adjustable lever S 1653 is in such a position that it is possible to knock it out of the lever S 1611 by means of a long punch. When doing so it has to be taken care that the roller at the lower part of the lever does not jam in the curved slot of the cam.

4) After the lever has been removed, straighten it.

5) The lever is assembled and the feed table fixed again to the machine. The sucker bar then should have its prescribed position. Should there be still a small deviation of the parallelism of the sucker bar and the vertical bars for the front lay standard at the feed pile this deviation can be eliminated by loosening the two screws at the sucker bar carrier S 1606 on the drive side and by turning the sucker bar accordingly.

SHEET-FALL FROM THE TRAVELLING FEED GRIPPERS TO THE SWINGING GRIPPERS

At the moment when the travelling feed grippers open and release the sheet it falls against the front lays at the
swinging grippers. The sheet-fall should cover a distance of 3 mm when the front lays are adjusted for the biggest gripper margin and a distance of 1 mm when the front lays are adjusted for the smallest gripper margin. If the sheet-fall does not cover these distances despite the fact that the distance from the front edge of the sheet to the front edge of the suckers on the sucker bar was correct the whole swinging gripper mechanism has to be checked and readjusted.

An alteration of the sheet-fall may have happened during a repair which had nothing to do with the swinging gripper mechanism but during which the adjustment was altered unintentionally.

To be able to check and adjust the sheet-fall and the travel of the sheet till it reaches the position where it is transferred from the swinging grippers to the cylinder grippers the following has to be observed:

A sheet is laid on the feed pile board in such a position that it can be picked up by the sucker bar. When doing so it has to be taken care that the sheet lies with its front edge against the vertical bars S 1711/12/13. If the sheet does not lie against the bars and is picked up it is transferred already to the travelling feed grippers with too small a gripper margin so that the sheet-fall will be too big.

The machine should be stopped at the moment at which the sucker bar has transferred the sheet to the mechanical feed grippers. For further checking of the sheet-transfer an assistant should turn the fly wheel very slowly. As soon as the travelling feed grippers holding a sheet have reached the position where they come to a stop together with the sheet while the whole other mechanism of the machine is still moving the assistant has to stop turning the fly wheel immediately. This position has to be fixed by marking the rear sheet edge left and right by two pencil lines on the aluminium feed table. Further two of the four front lays at the swinging grippers are screwed back so that the sheet only is registered by two lays as this is usually done when printing. The two lays which are used for registering should be adjusted for the smallest gripper margin. The assistant now continues turning the fly wheel till the sheet is released by the travelling feed grippers and falls against the two front lays at the swinging grippers. As soon as the sheet has fallen the machine has to be stopped again and the fitter checks the distance between the rear sheet edges as marked previously on the feed table and the actual edge of the fallen sheet on both sides. The difference should be 1 mm (see page 32).

If the sheet-fall is not 1 mm it is possible that the swinging gripper levers S 1306, S 1307 and S 1308 are not clamped correctly on the swinging gripper shaft S 1310. In that case it is very easy to adjust the swinging gripper levers in such a way that a sheet-fall which is too big or too small is corrected.
The altered position of the swinging gripper levers has also changed the position of the gripper bridge S 1309 to the impression cylinder, i.e. the distance between the cylinder front edge with packing and the front edge of the gripper shoes of the swinging grippers is no longer 1 mm ± 0.2 mm measured at the second gripper on drive and operator's side.

If the swinging gripper bridge had to be swung too far up to decrease the sheet-fall, i.e. if this shifting upward covered more than 1 mm the gripper shoes of the swinging grippers come too late when they swing into the cylinder gripper position and damage the front edge of the printing surface on the cylinder. If the shifting of the swinging gripper bridge covers less than 1 mm or if the swinging gripper bridge had to be adjusted in the opposite direction, i.e., if it had to be swung downward, nothing can happen.

To find the correct distance between the front edge of the gripper shoes and the front edge of the impression cylinder, including packing, the cylinder is put on "impression". Furthermore, the swinging gripper bridge and the cylinder have to be brought to a position in which the swinging grippers as well as the cylinder grippers are closed. The machine must remain in this position during the readjustment which now has to be made with the cam for the swinging gripper movement S 1105.

The pins have to be removed from the cam S 1105 and the three fixing screws loosened, but the latter ones should not be removed. When doing so the cam has to be held with a crow bar which is used as a lever as otherwise the pressure of the big compression spring might slip the cam for the play of its screw holes. It is best to stick the crow bar through one of the cut-outs between the spokes of the cylinder drive gear, i.e., through that cut-out which enables the mechanic to press against the straight part of the cam. By pressing the crow bar the cam can be moved within the play of its screw holes. In this way the distance between the front edge of the gripper shoes of the swinging grippers and the front edge of the impression cylinder can be increased. As soon as the measuring of 1 mm is reached the three screws for fixing the cam are tightened.

If the swinging gripper bridge for reaching the correct sheet-fall had to be readjusted upward for more than 1 mm it cannot be swung back to the cylinder without taking care because the printing surface of the cylinder might be damaged as already mentioned above. Before the swinging gripper bridge is swung back it has to be ensured by an alteration of the position of the cam S 1105 that the swinging gripper bridge does not hit the printing surface of the cylinder. For this purpose again a crow bar has to be used as a lever and stuck through the cut-outs between the spokes of the cylinder drive gear so that the straight part of the cam is reached. Also in this case the crow bar is pressed against the straight part of the cam after the fixing screws were loosened. By pressing the cam the swinging gripper bridge will swing downward and the mechanic should press against the cam S 1105 as much as
the play in the screw holes allows. Then the screws for fixing the cam are tightened again. Now the fly wheel can be turned without any danger till the swinging gripper bridge swings into the cylinder gripper position. As the cam was pressed back for the whole play of the screw holes the distance between the front edge of the gripper shoes of the swinging gripper bridge and the front edge of the cylinder, including packing, will in any case be more than 1 mm. To get the right distance of 1 mm the cam which was turned around for the whole play of the screw holes has to be let back a little.

The mechanic inserts the crow bar once more and presses against the cam already before loosening the screws as otherwise the big compression spring S 1312 would shift back the cam at once for the whole play of the screw holes. The mechanic, however, uses the crow bar as a brake against the pressure of the compression spring and does not allow the cam to slip more than it is necessary to get the correct gripper distance of 1 mm in the sheet transfer position.

We should like to point out that the prescribed measurement of 1 mm allows tolerances of ± 0,2 mm.

When the mechanic is convinced that he has gained the correct distance from the front edge of the swinging gripper shoes to the front edge of the cylinder in the sheet transfer position, all screws fixing the cam S 1105 are tightened definitely. If a final checking has proved the correct distance from the front edge of the swinging gripper shoes to the front edge of the cylinder and that the sheet-fall from the travelling feed grippers to the front lays at the swinging grippers is still exact the cam can be repinned. (Ream pin holes.)

Now the sheet-fall and the transfer from the swinging grippers to the cylinder grippers are adjusted again as indicated.

SIDE LAY

The side lay is of first-rate importance for the exactness of the register because it is responsible for the lateral adjustment of the sheet. It might happen with old machines that the rollers of the side lay cam levers S 2212 and S 2213 which are checked by cams are worn and that, therefore, the side lay movement is no longer executed smoothly and uniformly. By this uneven movement the sheets are also registered unequally.

It is also possible that the side lay cam lever S 2212 or S 2213 on the shaft S 1616 has a play which might cause register problems, too. In this case a new side lay cam lever has to be built in.

It has to be checked, therefore, that the movement of the side lay is correct. To facilitate the checking and prevention of any irregularities the mechanic will find on the following pages all adjustments for the whole group S 22.
First, it has to be pointed out that the side lay should have finished its lateral movement when the travelling grippers are on the backstroke and have reached the correct distance to the lower edge of the aluminium feed table S 2001 (measurements see page 25).

In this position it has to be checked whether the adjusting screws in the side lay cam levers S 2212 and S 2213 still just touch the side lay rocker arms. If the fly wheel is turned further so that the travelling feed grippers continue their travel up to the sucker bar for another 20 to 30 mm it should be possible to move the adjusting screws together with the side lay cam levers just slightly after the travelling feed grippers have covered the above mentioned distance, i.e. a 0,05 mm play should be noticed between the adjusting screws and the side lay rocker arms S 2216/2232.

If the adjusting screw together with the side lay cam lever cannot be moved in the position just mentioned this shows that the side lay cam lever with the adjusting screw still laid against the side lay rocker arm at 360 mm resp. 265 mm distance (see page 25) off the front edge of the travelling feed grippers from the lower edge of the aluminium feed table and that the side lay was still pushed when turning the fly wheel instead of having reached already the end position of its travel.

To remedy this maladjustment the travelling feed grippers have to be positioned to the distance (see page 25) off the lower edge of the feed table and the adjusting screws of the side lay cam levers S 2212 and S 2213 should be adjusted in such a way that they lay against the side lay rocker arms S 2216 without pressure.

We should like to point out especially the following two items:

1. In order to spare unnecessary trouble to the mechanic it should be mentioned that the travel which the feed table grippers can make until there is a play of approximately 0,05 mm might differ in length with each machine and that is why we indicated above the travel with 20 to 30 mm.

2. At the distance (see page 25) from the lower edge of the aluminium feed table it must be observed that the feed table grippers are on their way back. This can be checked very easily as the grippers in this case are below the feed table and do not jut out of the slots.

Faults with the group S 22 also may result from the fact that the mechanic did not take sufficient care to reset the dismantled group S 22 absolutely exact to its original position with a previous repair.

To avoid such maladjustments every appropriate measures have to be taken already when the group is dismantled so that after the original position can be refound easily. Before, therefore, the group S 22 is dismantled the feed grippers
have to be turned to the distance (see page 25) from the lower edge of the feed table, i.e. to the position where the side lay has ended its lateral movement. The distance between the two brackets S 2230 and S 2233 to which the side lays for printing two-up are fixed is exactly 5 mm. The mechanic sticks a 5 mm drill between the two brackets in such a way that the point touches the feed table. At the place where the point of the drill touches the aluminium feed table a short line should be marked. This line indicates the exact centre of the table and of the whole feeder. Now the group S 22 can be taken off as the line which was marked and the drill always will show the correct position. If, therefore, the group S 22 has to be dismantled for any reason this should be done in the way we just described. Then a maladjustment may never occur.

If the mechanic notices that the travel of the side lay can not be corrected by simply readjusting the set screw on the side lay cam levers S 2212 and S 2213 because, for instance, the scaled tubes jam, the whole group S 22 has to be readjusted from the beginning. One has to proceed as follows:

The screws with which the bearing blocks S 2201 are fixed at the operator's side and S 2202 at the drive side have to be loosened. If the scaled tube or the shaft are jammed in the bearing blocks the jamming is eliminated as soon as the screws are loosened. Now the screws of the bearing blocks are tightened again exactly whereby it has to be checked permanently whether the scaled tube and the shaft can be moved freely while the individual screw is tightened.

If the distance of the shoe of the side lay gauge S 2228 F to the side lay clamp plate S 2204/2205 which slides in the recess of the feed table is too large or too small, the screw of the lever for the side lay clamp S 2219 at the operator's side has to be loosened so that the shaft can be moved with the side lay. By lifting or lowering the side lay the distance from the side lay clamp plate can be decreased or increased. Before measuring the correct distance the micrometer adjustment of the side lay has to be turned down to its lowest position. Then a piece of card being 0,5 mm thick is put between the side lay clamp plate and the shoe of the side lay gauge. The lever for the side lay clamp is then tightened again and it has to be observed that the hand presses the card while the lever is tightened.

Before carrying out this adjustment the feed table grippers have to be turned to a position where the front edge of the feed grippers has the correct distance (measurements see page 25) from the lower edge of the feed table S 2001.

At the operator's side the guide bearing S 2215 limiting the lateral travel is pinned so that nothing can move out of position. If, therefore, a correction has to be made in this respect it has to be carried through from the drive side. The lateral travel of both side lays is 9 mm. As soon as the feed grippers on their way back have reached with their front edge the correct distance (see page 25) to the lower edge of
the feed table both side lays should have made a lateral travel of 9 mm and in the middle between the brackets S 2230 and S 2233 for the side lays when printing two-up should be a gap of 5 mm. If the gap is wider or closer this shows that the two side lays travel unevenly. The lateral travel of the side lay at the drive side, therefore, has to be corrected by loosening the guide bearing S 2214. When doing so the pressure of the spring will press the two brackets S 2230 and S 2233 together so that there is no gap at all any more. Now a piece of material being 5 mm thick or as already mentioned a 5 mm drill is pushed between the two brackets S 2230 and S 2233 and the clamp lever is tightened whereby it should be taken care that it lies against the bearing block S 2201. When making this adjustment it should especially be observed that the metal piece or the drill which was stuck between the brackets S 2230 and S 2233 does not fall into the machine what can happen very easily. It is, therefore, best to have an assistant holding the metal piece or the drill.

Now it has to be checked whether the set screws on the two side lay cam levers S 2212 and S 2213 lie correctly against the side lay rocker arm S 2216 at the drive side or at the side lay rocker arm S 2232 at the operator's side. As we have already stated the lever S 2212 or S 2213 respectively should just kiss the side lay rocker arms S 2216 and S 2232 when the feed gripper on its way back with its front edge shows the correct distance (see page 25) to the lower edge of the feed table S 2001. This light touch is right if a play of 0.05 mm is created between the set screw and the stops on the side lay rocker arms S 2216 and S 2232 when the distance of the front edge of the feed grippers to the lower edge of the feed table was extended to 20 to 30 mm.

CAM FOR SWINGING GRIPPER MOVEMENT S 1105

A few cases have occurred in which vibrations were caused by the cam S 1105 and then were transferred through the roller of the roller lever S 1301 to the swinging gripper. These vibrations were provoked by small uneven spots on the cam track which had formed through years at high speeds. As told before, this is an appearance which was noticed very seldom but which should be stated here for the sake of completeness.

The uneven spots on the track of the cam S 1105 can be remedied easily.

For this purpose a steel band of approximately 0.2 mm thickness and of 30 mm width is necessary. This steel band is prepared with touching-up ink and then should be pulled twice or three times over the small radius of the cam. The uneven spots on the cam will be marked by the blue ink. Now each of these spots has to be filed away separately. It is not advisable to try to file all spots at a time by moving the file over the whole radius of the cam as this will bring no improvement. After the individual spots have been filed down a repeated checking with the steel tape is necessary. The cam can then be equalized by one stroke in filing over the whole
radius of the cam. Special care has to be taken with the last part of the radius because this is the part of the cam which checks the registering of the sheet before the grippers close. Finally the cam has to be polished with emery paper.
SWINGING GRIPPER BRIDGE S 1309

With old machines at which the sheet smoothers were not arrested in such a way that the flat springs could only be located to a certain height it sometimes happened that the shoes of the swinging gripper bridge were damaged, i.e. the flat springs rapped against the aluminium shoes causing grooves in same. These grooves might cause register problems and, therefore, have to be equalized by filing. The wear of the swinging gripper shoes can be avoided if the sheet smoothers are adjusted correctly. If the flat springs of the sheet smoothers were bent the swinging gripper shoes can also be grooved with machines where the smoothers are arrested in a certain position.

The grippers S 1342 resp. S 1343 glide in bushes in the gripper bridge. Sometimes it has happened that such a bush projected so that the grippers could not close completely and the paper was not gripped correctly. This may be another reason for register problems. In such a case the projecting end of the bush has to be refiled.

Due to the very frequent use of dry spray the machine gets much more dirty. This is especially the case with the grippers of the swinging gripper. Thus, when looking for the reasons of register problems it always has to be examined whether the grippers of the swinging gripper bridge are not hampered by powder deposits to close correctly so that the sheet cannot be gripped in the right manner. Besides there exists always the possibility that the shafts of the grippers do not glide smoothly in their bushes because of powder deposits so that the grippers cannot close correctly when the sheet is transferred. As the correct gliding of the gripper shafts in their bushes sometimes cannot be clearly seen by the mechanic it is advisable in any case to clean the swinging gripper bridge very thoroughly to remove all powder deposits and to oil the shafts with a thin film.

A further cause for register problems at the swinging gripper bridge might be found in the fact that it is located too high or too low. To check this the cylinder is put on impression and the swinging bridge is moved to the position in which the cylinder grippers as well as the swinging grippers are closed, i.e. to the position in which the sheet is already gripped by the cylinder grippers but still held by the swinging grippers. In this position the distance between the cylinder bearers and the stop pins S 1320 which lift the swinging gripper bridge when impression is off should be 0,4 to 0,5 mm (see page 30).

If the distance is smaller or bigger the swinging gripper bridge has to be adjusted higher or lower by means of the two stop screws S 1351 at the drive and operator's side. It should not be overlooked, however, that the swinging gripper bridge alters its position on both sides even if only one of the screws is turned. If it was found, therefore, that the stop pin S 1320 is correctly set on one side but that it is too high on the other side, it is not sufficient to
readjust only one screw but both screws have to be loosened and then the swinging gripper bridge has to be set parallel to the specified height by adjusting both screws. If the readjustment is only carried through by readjusting one screw the swinging gripper bridge may also be turned to the desired position. However, there is the danger that the opposite stop screw is not lying any more against the stop. It is quite obvious that in such a case there is no setting at all on this side and that consequently the swinging gripper bridge is vibrating with every movement. The mechanic would have then created a further source of error which is causing register problems. On the other hand, it might be that a source of error at the machine itself produces register problems the mechanic is looking for.

When the height of the swinging gripper bridge is set correctly, i.e. are the stop pins S 1320 on both sides in the correct distance from the cylinder bearers while the sheet is transferred, a final checking has to be made. The mechanic uses a sheet of heavy art paper in the maximum size and registers it. Then he turns the swinging gripper bridge to the position where the sheet is transferred to the cylinder (impression on) so that the cylinder grippers as well as the swinging grippers hold the sheet. The edge of the sheet must be absolutely a straight line, i.e. the sheet edge should not lie wavy in the grippers; this would be the case if the swinging grippers were not in the same level with the cylinder grippers.

A main reason for lateral register faults very often results from the fact that there is a play between the lever S 1303 on the drive side and the top portion S 1203. This play must be eliminated (see page 30).
Register problems may also arise from the cut-out plungers, respectively from one of the cut-out plungers S 1375 which stop the machine automatically when no sheet arrives at the front lays if the latter ones project somewhat out of the swinging gripper shoes. The sheet might then hit against the projecting cut-out plunger during its travel to the front lays so that it does not reach them correctly. For a correction of this fault the following instructions should be observed:

First, put the cut-out plungers to the position where they are out of action. In this position the cut-out plungers are pulled up so that they do not project out of the swinging gripper shoes. However, if they do project the eccentric bolts S 1378 at the head of the cut-out plungers have to be turned in such a way that the cut-out plungers are pulled up in the gripper shoe for a distance of approximately 0,2 to 0,3 mm.

After having corrected the position of the cut-out plungers the swinging gripper bridge is swung to the position in which the sheet is transferred from the feed grippers to the swinging grippers. If the automatic cut-out now is switched on by tipping up the instruction plate the guidance of the cut-out plungers is taken over by the roller levers S 1365 and S 1366 as well as by the cam S 1225 at the top position at the operator's side of the machine. It is possible that one or both of the cut-out plungers project again since the
cam S 1225 is positioned a little too low and consequently the roller falls too far. As long as the automatic cut-out is out of action, the plunger is inside the swinging gripper shoe because the control of the roller and the cam is switched off and the plunger is kept back by the operation plate which rests on a stop.

Since the position in which the swinging gripper bridge is fixed at this moment does not allow to check whether the cut-out plunger projects, the automatic cut-out is again turned off by tipping down the instruction plates. Then it can be seen whether there is a play between the instruction plate and the stop on which it rests. This play guarantees that the rollers of the roller levers really lie against the cam S 1225. If there is no play between the instruction plate and the stop, the screws of the cam S 1225 have to be loosened a bit and the cam itself has to be knocked by gentle strokes to the roller. If the two instruction plates jump somewhat from their stops when the cam is knocked this shows that the cam touches the roller and has taken over the guidance. The cam has to be fixed again in this position.

With very thin stock it may happen that the cut-out plungers rest too heavily on the sheet and that they press the edge of the sheet down by their weight. (With very poor stock it may happen that the paper tears so that the cut-out plungers fall through and stop the machine.) Even if the paper is only dented register problems will be caused and, therefore, counter weights S 48 can be supplied as extra equipment for balancing the weight of the cut-out plungers. The counter weight consists of a forked end with a screw for fixing on the cut-out rod S 1369 resp. S 1370. By means of two adjustable round nuts the effect of the lever can be increased or reduced for taring the weight of the cut-out plungers and to suit it to the individual stock.

When running thin stock difficulties may arise because the paper is very flabby and the grain runs vertical to the impression cylinder. Should it be possible to purchase stock with the grain running parallel to the cylinder, this would be of great advantage. In general, however, the mechanic and the printer have no influence on this matter.

We assume that most mechanics know how to determine the grain in the paper; on the other hand, we are also convinced, however, that there are some mechanics who do not know how to proceed.

The simplest and most reliable checking of the grain is made by laying the edge of the sheet against the top of the index finger to which it is pressed by the thumbnail. Now the sheet edge is pulled through the grip of the index finger and the thumb nail several times. If the edge gets very wavy the grain runs vertical to the edge. The wavy edge is caused by the fact that the grain lying side by side can be pulled from each other.
Is no wavy edge received by pulling the edge through the grip of the index finger and the thumb nail the test has to be repeated with the other edge. In any case it is advisable to check both edges and to compare them.

If the direction of the grain is unfavourable it is recommendable, contrary to the general rule, to use four front lays at the swinging gripper instead of two ones. The thin sheet then glides better when being registered since its weight is distributed on four points instead of two ones only so that the pressure of the sheet edge against the individual front lay is less. Besides the distance from front lay to front lay is considerably reduced so that the sheet cannot sag which means that an additional difficulty for the lateral registering is eliminated. For large sheets also the auxiliary lays S 2809 F may sometimes be used.

It is, of course, most important when using four front lays that all the four lays are absolutely in the same level. For this purpose a steel ruler has to be used which is laid against the front lays. The swinging gripper bridge has to be turned to its dead center position at the feeder side as the grippers are opened completely in this position so that there is sufficient space to place the steel ruler against the front lays.
Two front lays were already adjusted by the printer and the two other ones are turned to the same level by means of the steel ruler. For checking whether all front lays lay against the steel ruler a strip of air mail paper is used which is placed between front lay and steel ruler. When this strip is pulled out it can be noticed whether the steel ruler touches the front lay or whether there is no contact. This checking has to be carried through at all four front lays.

If a steel ruler is not available the lays can be positioned as well by a sheet of card; its front, however, must be absolutely straight. Naturally, it is very essential that the sheet rests on all four lays evenly and that it does not swing beyond the centre lays. For this reason a sheet of card has to be used for adjusting the lays as normal or thin stock gives way in the middle so that a higher positioning of the centre lays may not be noticed at all.

**CYLINDER GRIPPERS S 1127 F**

Register problems may in many cases result from the fact that the rubber pads on the cylinder grippers are worn unevenly. If only card had been run on the machine during a longer period the rubber pad will wear where the gripper rests on it. A consequence is that thinner stock is not gripped correctly any more so that register problems may already arise when the sheet is transferred from the swinging grippers to the cylinder grippers. In very unfavourable cases the sheet will be twisted in the grippers while it passes the cylinder brush or when being printed.

In cases where the pad is worn very badly it is better to replace the grippers.
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