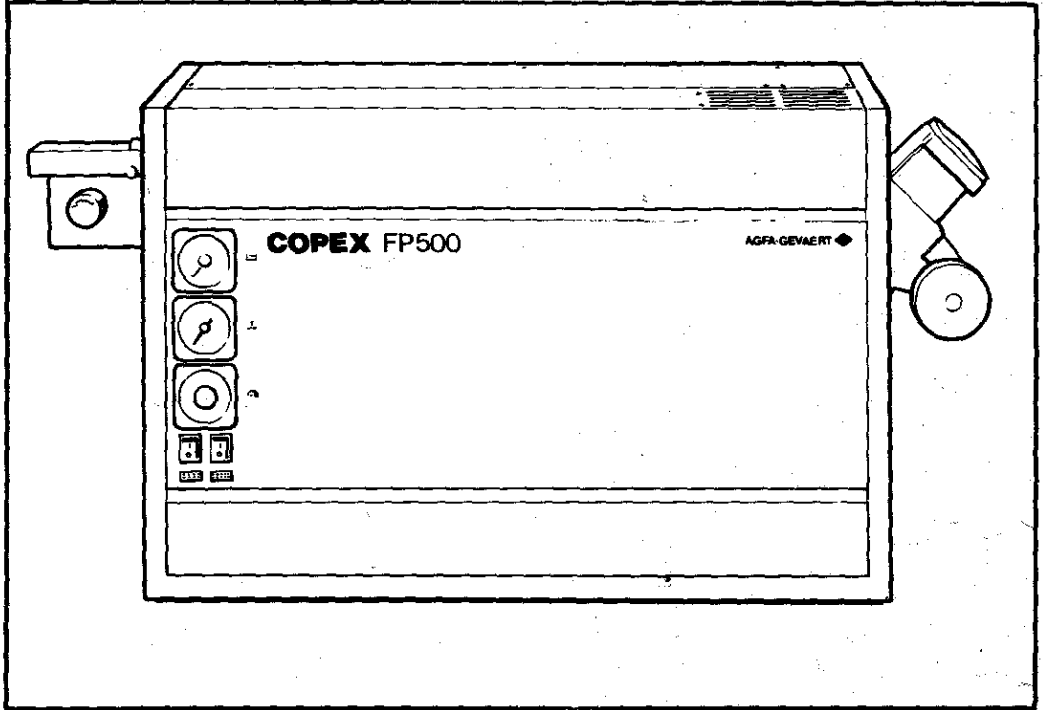




# COPEX FP 500

Roll film processor type 9520



## REPAIR INSTRUCTIONS

AGFA-GEVAERT

COPEX FP 500  
Type 9520  
Roll film processor

CONTENTS

	Page
I. 1. Basic outfit for starting operation	3
2. Specifications	4
3. Installing and connecting the processor	7
a. Selecting the place of installation	7
b. Wiring and plumbing	7
c. Completing the machine	8
d. Adjusting the water flow rate for intermediate and final washing	8
II. 1. Functional diagram	10
2. Flow chart	11
3. Trouble-shooting	13
III. 1. Testing and adjusting instructions	15
2. Servicing instructions	20
3. Cleaning directions	21
IV. 1. Tubing diagram	23
2. Reference diagram	24
3. Circuit diagram motor regulation	25
4. General circuit diagram COPEX FP 500	26
V. Installation and modification instructions	
1. Cooling pipe for developer supply tank	29
2. Collecting chemicals separately in waste vessels	30
VI. Film racks type 9520/870	
1. Specifications	31
2. General	31
3. Changing the roller pairs	
4. Adjusting the friction on the drying rack	
5. Lock washers for axles	
VII. Film supply cassettes, 16 mm type 9520/911	
35 mm type 9520/931	
1. Application	
2. Specifications	

## 1. BASIC OUTFIT FOR STARTING OPERATION

- |   |               |
|---|---------------|
| 1 microfilm processor<br>COPEX FP 500<br>(including viewer, take-up arm, PVC strip<br>and developer tray) | Type 9520/110 |
| 1 set film racks for PET and triacetate<br>film 16 mm and 35 mm wide                                      | Type 9520/870 |
| 1 film cassette 16 mm<br><br>and/or   | Type 9520/911 |
| 1 film cassette 35 mm   | Type 9520/931 |

### Processing material

- |   |                         |
|---|-------------------------|
| COPEX leader  | Type 9520/915           |
| - 1 pack of 10 leaders 35 mm wide, 500 mm long  |                         |
| - TESA adhesive tape, type 104 black, 12 mm;<br>or 3M tape "Metalized Splice, 0.05 x 12,<br>No. 850 F silver        | Order No. 9.9520.9990.0 |
| - TESA roller, type 6057, for 66 m rolls<br>(these two TESA products are not included in<br>the Agfa-Gevaert range) |                         |
| - Film retaining wedges, pack of 100  | Type 9553/305           |

### Recommended accessories

- |   |                          |
|---|--------------------------|
| - Base for COPEX FP 500<br>Laboratory table with cleaning vessel and shower | Type 9520/510            |
| - Water mixer, e.g. supplied by Fuhr<br>(with integral pressure reducer)    |                          |
| - Supply valve with return trap, vent and hose coupling                     | Spart part 9.9520.9991.0 |

## 2. SPECIFICATIONS

Order designation: COPEX FP 500, TYPE 9520/110

Dimensions:           Length: 900 mm  
                          Height: 600 mm  
                          Width: 400 mm  
  
                          Base area: 880 x 330 mm

Working area (min.):   Length: 1,300 mm  
                          Height: 1,000 mm  
                          Width: 1,000 mm

See also Fig. 1, page 6.

Weights:               Machine ready for operation   86 kg  
                          Basic machine without accessories 61 kg  
                          Film cassette, 16 or 35 mm   0.5 kg  
                          Film racks (complete set)   9.0 kg

Noise emission:       max. 67 dB (A) at full load

Power supply:         220 V, 50 Hz  
                          Power fuse 16 A slow-blow

Power consumption:   max. 2,100 W

Heat emission:       max. 1,500 J/s

Air throughput:       103 m<sup>3</sup>/h

The COPEX FP 500 is suppressed in compliance with VDE 0875 and is tested for safety (GS symbol) under the rules of the Technical Supervisory Board for Bavaria.

Readiness for operation: This is reached not later than 20 minutes after switching on for the first time, provided the developer has a room temperature of 20°C. The transport switch has to be turned on for about 3 minutes together with the developer heating so as to fill the water tanks for the first time.

Water consumption:   3.0 ± 0.2 litres/minute, adjustable at the ballcock on the hose nozzle. The water supply pressure must be constant for this purpose.

Water supply:         Supply line with a free water outlet in compliance with DVGW working rule W503.

Water heating:        By an external system providing 20 to 32°C.

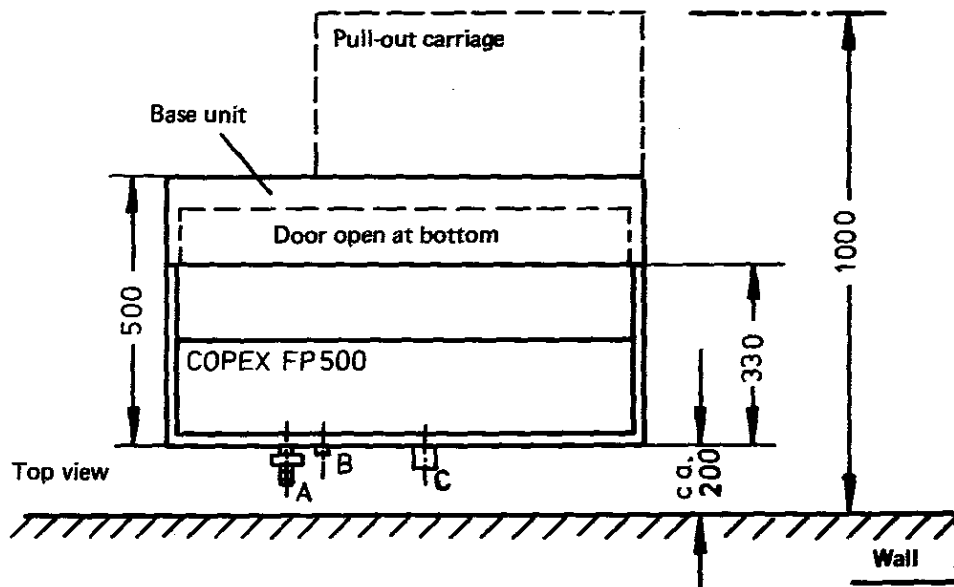
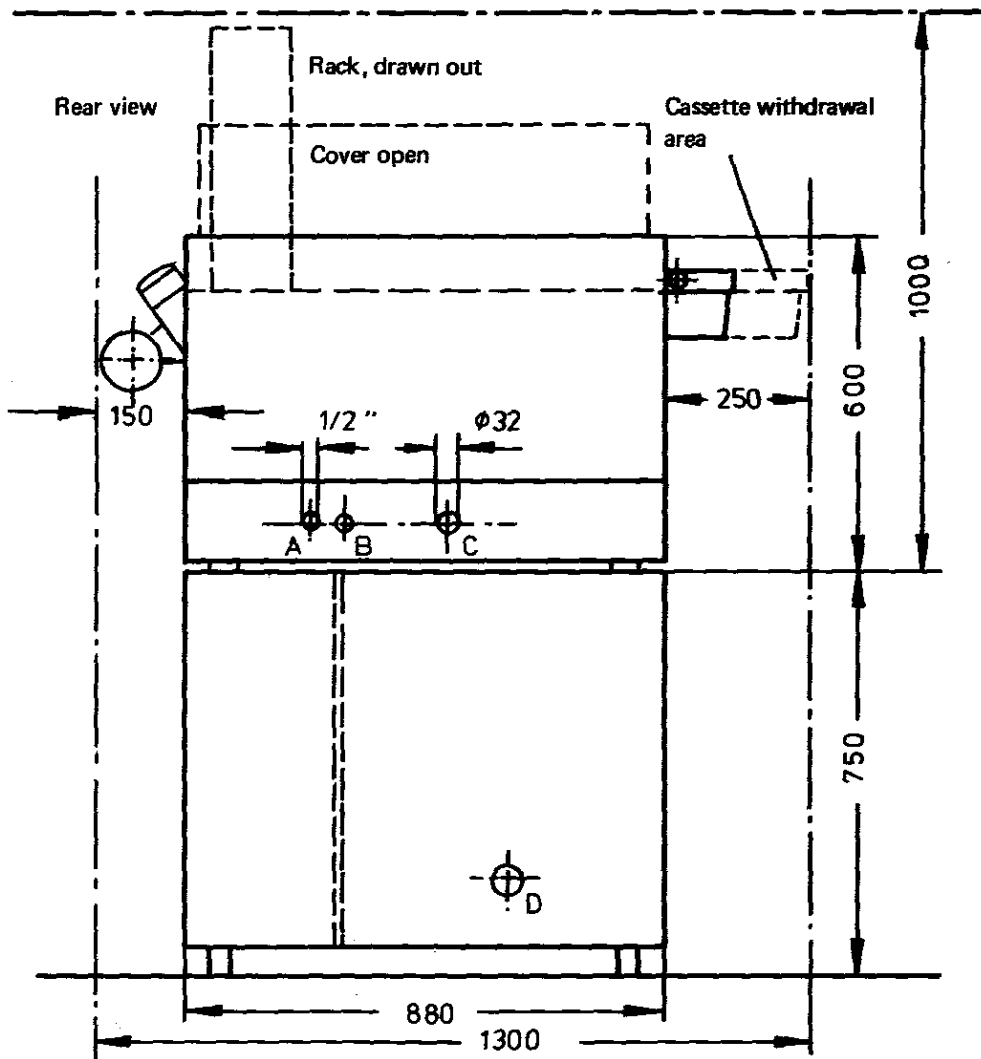
Washing action:      Cascade arrangement, in opposite direction to film transport

Capacities:           Developer tank           4 litres  
                          Fixer tank               2 litres  
                          Water tank               approx. 9 litres

- Film transport:** By racks working with a leader; film is not loaded mechanically.
- Racks suitable for film widths of 16 mm and 35 mm, and film thicknesses of 0.06 – 0.13 mm.
- Film feed:** In daylight from film cassette for 16 or 35 mm, with spliced leader.
- Film transport rate:** 0.5 m/min. to 4.0 m/min., adjustable in 8 steps of 0.5 m/min. each
- Transport m/min.:** 0.5 1 1.5 2 2.5 3 3.5 4
- Processing time in s:** 98 48 33 24 20 16 14 12
- Film drying:** Traces of water removed by jets of air blown at either side of the film at 25<sup>o</sup> opposite to the direction of film transport; final drying by hot air at 30 – 70<sup>o</sup>C. Heating for the hot air supply can be adjusted in 5 steps.
- Film viewer:** Detachable; film viewing with a swivel-mounted magnifying glass over a screen illuminated from below.
- Film take-up** Take-up spindle designed to hold ready-made film spools. The winding direction is reversible; changeover has to be made during transport.
- Film length detection:** By length sensor with 4 solenoids on the film cassette and reed contact on the cassette chute of the COPEX FP 500. Length indicated in cm by 6-digit counter. Counter can be reset.
- Developer temperature:** Adjustable at a regulator which controls the bath temperature within  $\pm 0.5^{\circ}\text{C}$ . To observe this tolerance and maintain effective control, it is essential to keep the necessary rinsing water temperature and room temperature at least 3<sup>o</sup>C below the desired developer temperature so that the developer temperature will not be influenced.
- Fixer temperature:** This is adjusted to the rinsing water temperature with a slight delay.
- Safety devices, monitors:**
- When machine cover is opened the film rack drive is switched off.
  - A float switch in the free water supply closes the solenoid valve and stops the water supply in response to any fault in the rinsing water outlet drain.
  - Thermostat switches turn off the developer heating, the drier heaters and the main drive motor in response to overheating.
  - A pressure switch monitors the operation of the developer circulation pump and the level in the developer tank. A buzzer indicates any fault acoustically.
  - 2 pilot lamps come on in response to defects in the developer heating circuit or drier heating circuit.
- Protection from splashing water:** All parts of the machine which might be reached by splashing water when cleaning or working on the machine in some other way, are protected by covers and seals.  
(from serial No. 1016)

Fig. 1:

Dimensions of the working area (minimum)	Length	1300 mm
	Height	1750 mm
	Width	1000 mm
Minimum machine spacing from the wall		200 mm



### 3. INSTALLING AND CONNECTING THE PROCESSOR

#### a. Selecting the place of installation

The COPEX FP 500 is a table model and can be run in daylight. Direct sunlight on the processor should be avoided, therefore choose a location along a wall away from windows.

Small rooms should have means of ventilation and air extraction. To avoid heat spots in the processor, leave a minimum clearance of 200 mm between wall and back of machine.

Install the COPEX FP 500 on a stable and level base which does not wobble. The type 9520/510 base unit, which satisfies all these requirements, should be recommended to all customers.

For machine dimensions and minimum working area please refer to Fig. 1.

#### b. Wiring and plumbing

All the preparatory work needed in the building shall be arranged for and handled by the customer in accordance with our specifications.

##### Electric wiring:

The machine can be connected electrically either direct (permanent) or via a socket outlet (detachable), using the power cord (Fig. 1, B). Direct connection to the power supply system must be left to an electrician approved by the local electricity supply company.

A 16 A slow-blow fuse is required on the line side.

##### Plumbing:

A water mixer matched to the customer's requirements (e.g. as supplied by Fuhr) must be provided for the COPEX FP 500 water supply.

This water mixer should incorporate a pressure reducing valve so that the rinsing water consumption can be set to a constant rate of  $3 \pm 0.2$  l/min. at a water supply pressure of 4 bar. The rinsing water temperature must be capable of adjustment to 20 to 32°C, with deviations of  $\pm 3$ °C from the desired value.

##### Note:

In the COPEX FP 500, a pipe separator (free water outlet) is incorporated as standard in the water supply line.

The connections for the water supply and waste water outlet should be flexible so that processor and base unit together can be pulled away from the wall for maintenance or repair.

The rinsing water supply line should be a 1/2" pressure hose (Fig. 1, A), while the waste water outlet should be PVC tubing because metal pipes are unsuitable on grounds of severe corrosion (Fig. 1, C). The waste water outlet should be sloped off evenly to a siphon at the main pipe.

Note:

Hoses and hose clamps for COPEX FP 500 water connections (hose available by the meter only):

Pressure hose; PVC hose with synthetic fibre 14 x 3, associated hose clamp dia. 21/16,	Part No. 3.8864.1003.0	3-9520.2911.0.
Drain connection; PVC hose 32 x 4 associated hose clamp dia. 41/36	Part No. 7.0371.9510.1	
or	<del>Part No. 3.9520.2923.0</del>	3-8972.7060.0.
	Part No. 7.0371.9560.1	
	Part No. 7.0371.9628.0	

Address for ordering water mixers:

Fuhr GmbH	Tel. 0 61 21/54 00 11-12
Elektro-Sanitär-Spezialbau	Telex 04 18 61 87
König-Adolf-Str. 8	
D-6200 Wiesbaden-Sonnenberg	

c. Completing the machine

Fitting the take-up arm (in the accessory package):

- Detach covering at film exit end. For this purpose release 3 Phillip head-screws, 2 hex-head screws above and beneath La 3/4.
- Detach the lamphouse from the frame after releasing 2 countersunk screws.
- Take out two M8 hex-head screws (13 mm).
- Remove take-up arm from the accessory package. Toothed belt for driving the film spool take-up spindle is to be run around the main drive sprocket.  
Caution. The square film spool spindle must point towards the operator.
- Fasten the take-up arm to the gear plate, using two M8 screws. Be sure to insert the upper screw first.
- Now put back the lamphouse and the covering.

Attaching the viewer:

- Take illuminated box out of the accessory package, attach mounting bracket to the opening in the covering at the film exit and, pressing gently against the covering, latch the illuminated box onto the studs.
- If the latching force of the studs is inadequate, adjust the latch springs slightly with tweezers.

d. Adjusting the water flow rate for intermediate and final film washing

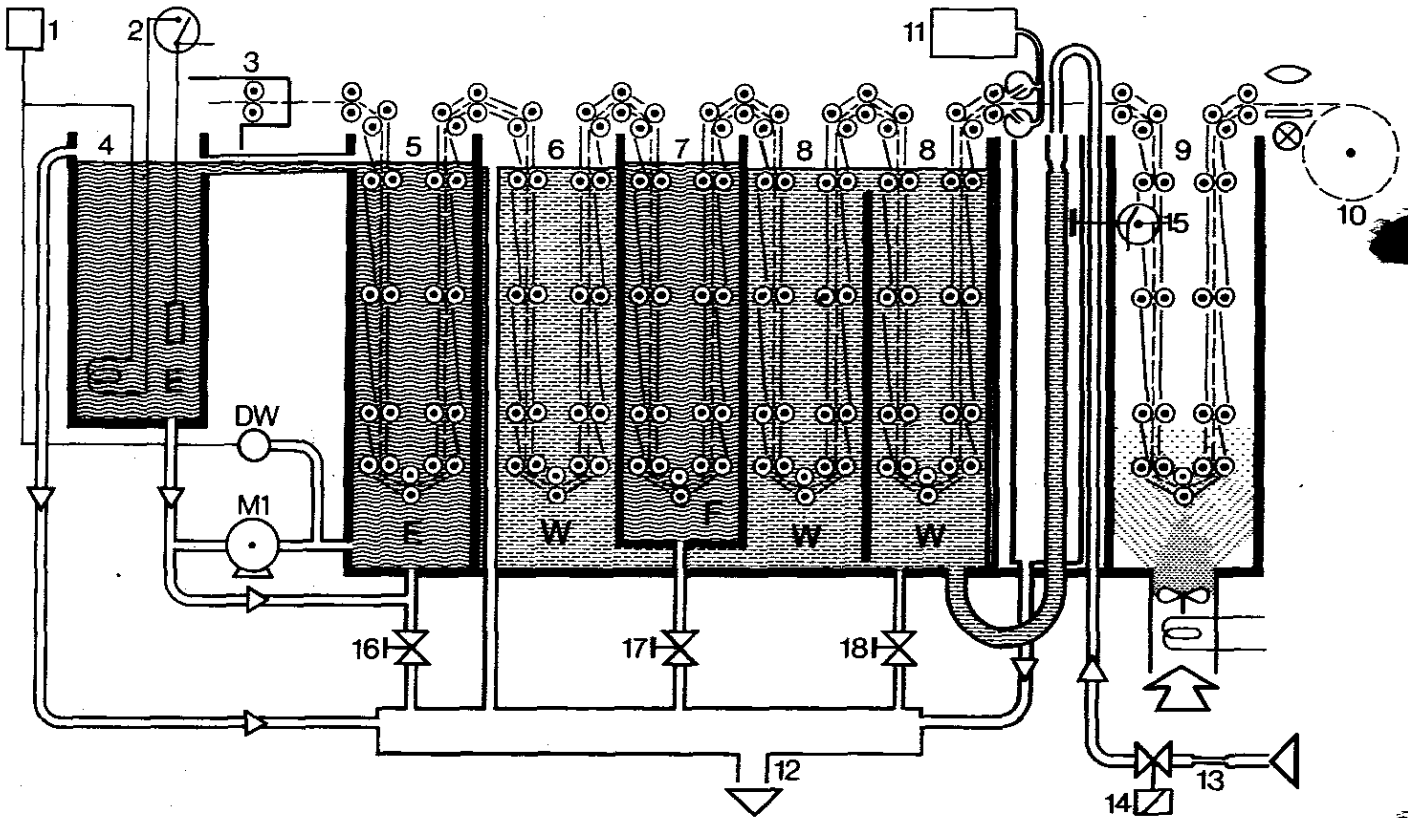
Note:

The COPEX FP 500 incorporates an integral solenoid valve as standard in the wash water supply line (see item 14 in functional diagram). The solenoid valve closes the supply line when film transport is switched off. As a result, the full water pressure is applied to the connecting hose between solenoid valve and water mixer. For this reason also,

- a) the maximum water supply pressure should be reduced to 4 bar by a pressure reducing valve, and
- b) the connecting hose on old and existing water mixers should be checked for leakage and firm seating.

- Detach rear panel.
- Open the main water tap on the water mixer.
- Turn on the switches "developer heating" and "film transport". The solenoid valve then opens the water supply line.
- Wait for the water tanks to fill; this takes about 5 minutes.
- Using a screwdriver, adjust the ballcock at the water supply nozzle. Turning counterclockwise increases the water flow rate, turning clockwise reduces the rate. Set the ballcock so that water just fails to overflow at the riser overflow of the free water supply (see functional diagram). This represents a water throughput rate of 3.0 litres/minute.
- Attach rear panel, turn off switch "film transport "
- The processor is ready for use now.

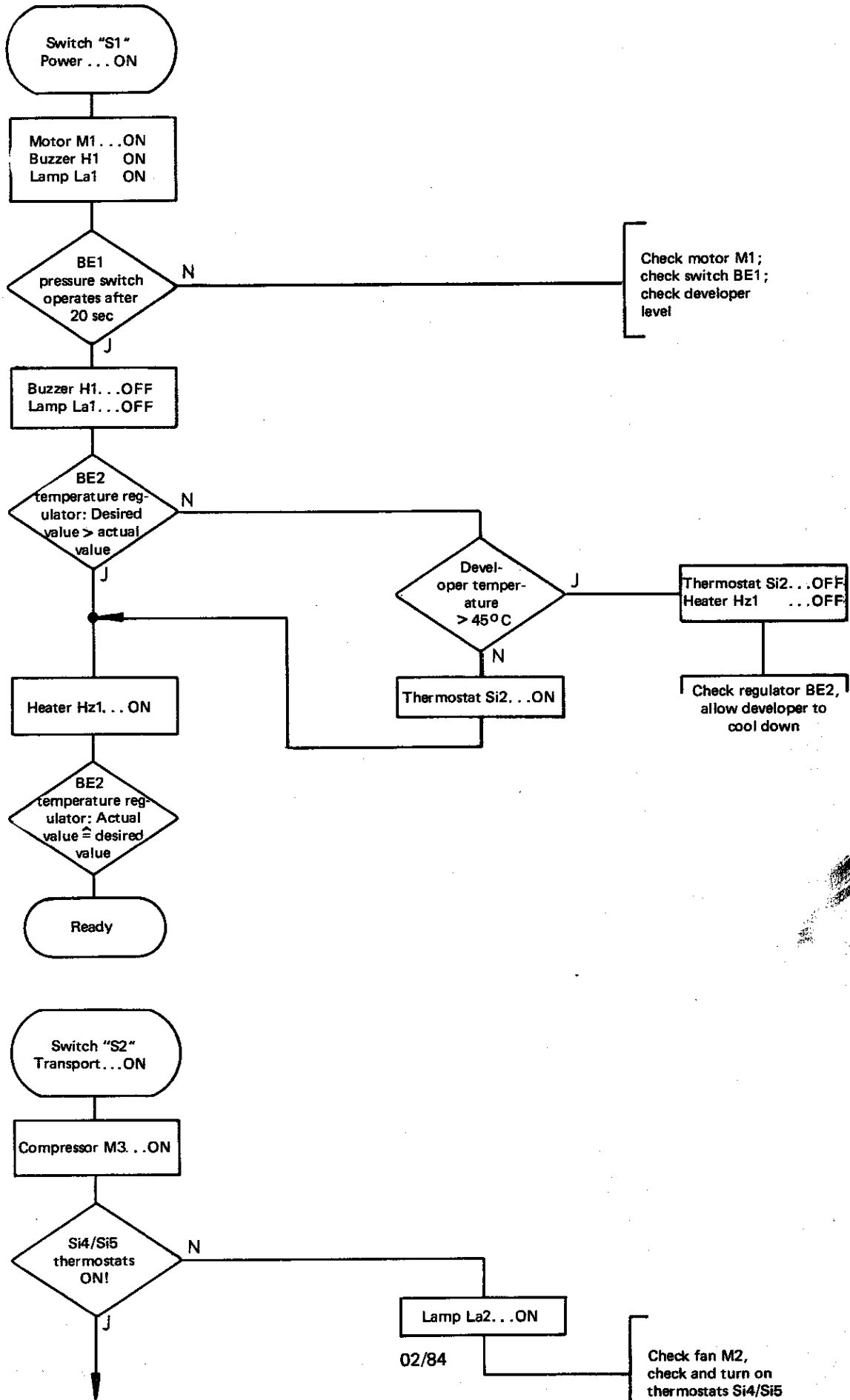
FUNCTIONAL DIAGRAM

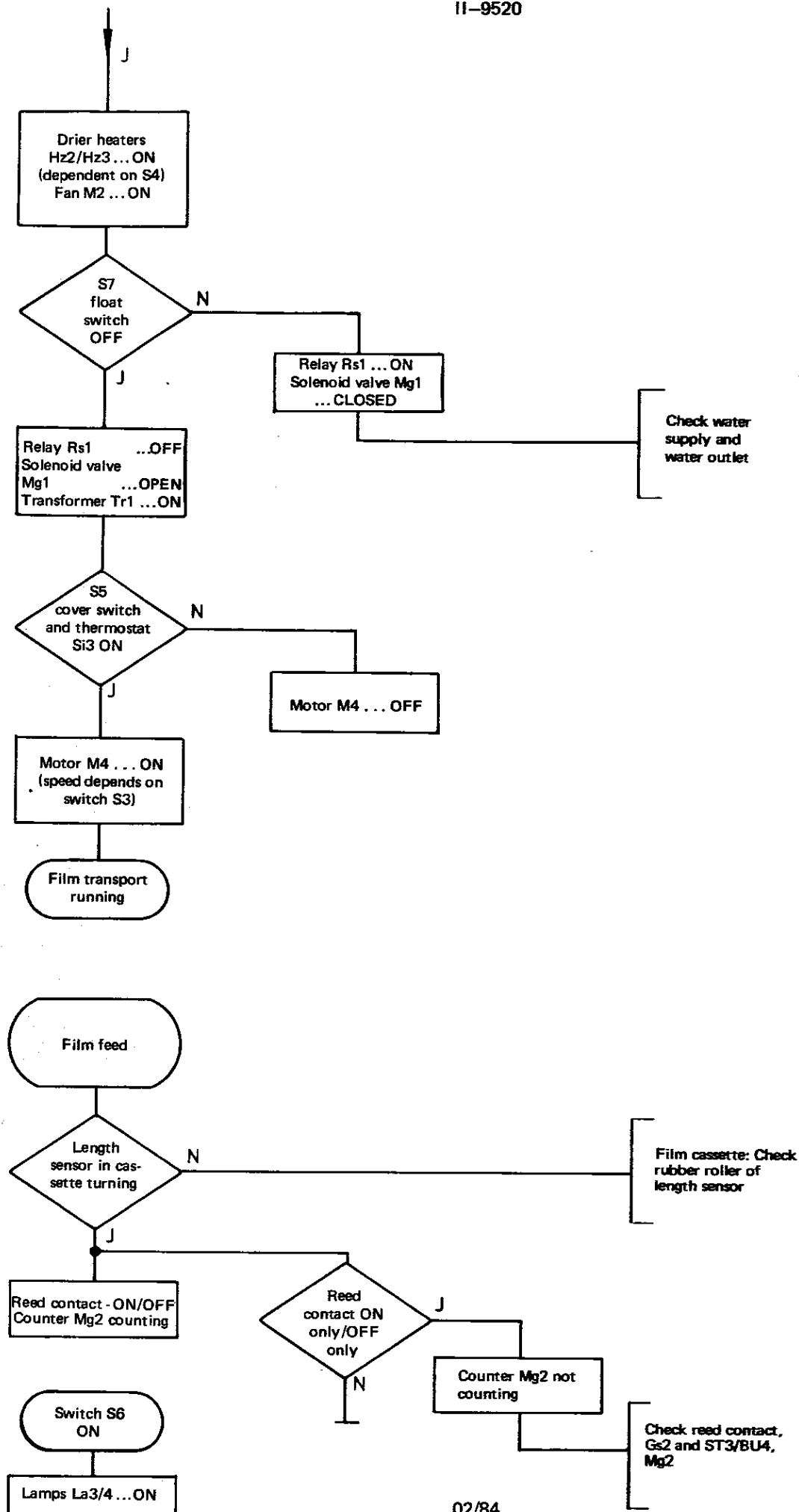


Capacities: Developer tank 4 litres  
 Fixer tank 2 litres  
 Water tank approx. 9 litres

- |           |                        |                             |                                     |
|-----------|------------------------|-----------------------------|-------------------------------------|
| Captions: | 1 Buzzer               | 8 Washing                   | 15 Free water outlet, safety switch |
|           | 2 Contact thermometer  | 9 Drier                     | 16/17/18 Drain taps                 |
|           | 3 Film cassette        | 10 Film take-up with viewer | M 1 Developer circulation pump      |
|           | 4 Heating vessel       | 11 Air squeegee             | DW Pressure monitor                 |
|           | 5 Developer tank       | 12 Waste pipe               |                                     |
|           | 6 Intermediate washing | 13 Water supply, ballcock   |                                     |
|           | 7 Fixer tank           | 14 Solenoid valve           |                                     |

## 2. FLOWCHART





### 3. TROUBLE-SHOOTING

#### Fault:

20 seconds after switching on: Lamp still on, buzzer still sounding

Developer temperature too far away from desired temperature

Developer temperature not reached

Lamp on, film not being dried

Film is still damp, surface shows water marks

Rinsing water supply closed

Solenoid valve Mg1 fails to open or closes

Main drive motor M4 does not start/runs irregularly/runs too slow

Film length counter counts irregularly/not at all

Film stops at entrance to the developer rack

#### Cause:

- Inadequate developer level
- Pressure monitor defective (BE1)
- Developer circulation pump defective (M1)
  
- Temperature regulator defective (BE2)
- Rinsing water temperature/room temperature too high (desired = min. 3° below developer temperature)
  
- Temperature regulator defective (BE2)
- Developer heater defective (Hz1)
- Thermostat (Si2) is defective or has operated at a temperature higher than 45°C
  
- Fan M2 defective, thermostat Si4 or Si5 has switched off heaters Hz2 and Hz3 (overheating trip).
- Heater Hz2/Hz3 defective
  
- Drying temperature setting too low
- Compressor M3/air squeegee defective
- Air filter clogged at inlet or outlet end
  
- Solenoid valve Mg1 defective
- Main water tap not open
  
- Float switch S7 has operated because water outlet is defective or water supply > 3.0 litres/minute (water supply pressure fluctuating)
- Regulator board GS1 defective; failure of 26 V DC low-voltage supply. Si1 defective.
  
- Si1 defective, low voltage missing
- Regulator board GS1 defective
- Thermostat Si3 has tripped
- M4 defective (tachogenerator)
- Current limitation setting for M4 too low (R6 on GS1)
- Potentiometer R1 incorrectly set on GS1
  
- Film cassette not fully inserted
- Roller on length sensor axle in cassette is dirty
- Reed contact on GS2 defective
- Film cassette type 9520/910 or 930 for COPEX FP400 has been used (without length sensor solenoids)
- Length sensor axle: Solenoids not fastened with alternate polarity
  
- Leader kinked
- Leader too short; not 500 mm long any more

Fault:

Cause:

Film jamming in the racks

- Leader has come off because it is not spliced to specification, or incorrect splicing tape has been used
- Drier rack friction has inadequate torque
- Roller has been forced out of bearing in plate by the preceding film jam
- Transport track obstructed by pieces of torn-off film
- Rubber rollers smeared with gelatine

Racks from developer to water climbing, drive gears disengaging

- PVC strip not fitted
- Drying rack friction has excessive torque; causes film to be pulled too taut
- Stop plate maladjusted?

Film coiled too loose on take-up spool/wound tight

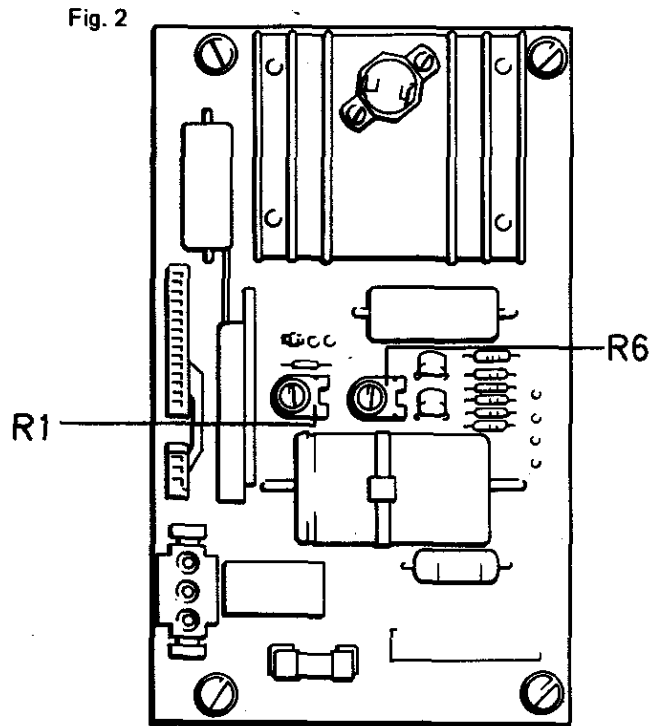
- Disk clutch on the main drive shaft has inadequate/excessive torque

Viewer:

Irregular illumination

- Lamp defective

## 1. TESTING AND ADJUSTING INSTRUCTIONS



### a. Film transport rate (R1)

— Check:

Set rate to 2 m/min = stage 4, using S3. Run in a 2 m long strip of film and record the time taken by beginning and end of film to move past a certain, easily observed point.

— Adjustment:

Adjust accordingly with potentiometer R1 if the 2 m long strip of film fails to satisfy the desired transport rate of 60 seconds.

### b. Current limitation for motor M4

— Check:

Release cable from terminal "A" (see reference diagram) on motor M4 and insert an ammeter.

Switch on heating and transport.

Set drier heater (S4) to stage 5.

Set transport rate (S3) to 3 m/min.

Run machine for about 1/2 hour because a correct reading is obtained only when all components have reached their maximum operating temperature.

Switch off transport.

Applying a pipe wrench to the collar, brake a bevel gear on the drive shaft close to M4 so as to subject the motor to high torque.

Switch on transport.

The maximum current is obtained after a certain amount of time.

- Adjustment:

If the current flowing through M4 differs from the desired setting of 3.0 A to 3.5 A, adjust accordingly with potentiometer R6.

Note:

If the current is limited to values below 3 A, the transport rate might fluctuate severely under elevated torque demand.

In order to work on the processor with the cover open, but with the film transport running, the safety switch S5 will have to be set with a plug, part No. 9.9520.9805.0.

Warning. Rotating parts

c. Film take-up drive friction

The torque of the disk clutch for the film take-up drive should be  $4.5 \text{ Ncm} \pm 10\%$ .

- Check:

Prepare 30 m film spool according to drawing. Slip film spool onto winding spindle and fasten spring balance to a cord.

Turn on the machine transport system.

Observe the spring balance and read the force needed to halt the film spool.

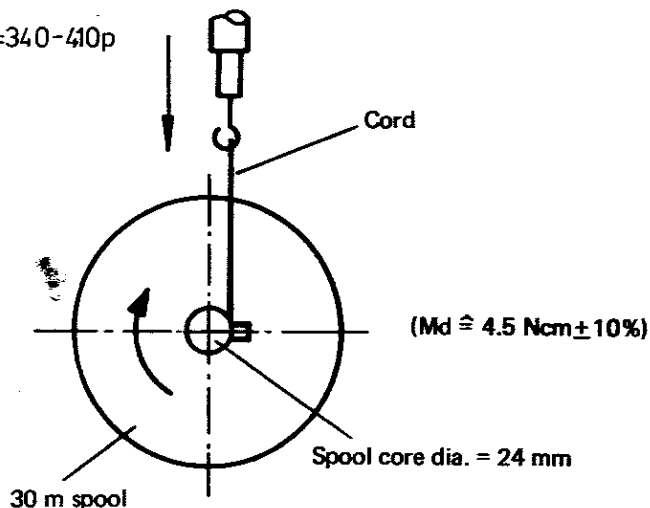
The reading should be min. 340 p and max. 410 p (see Fig. 3).

- Adjustment:

Release nuts holding the clutch mount on the main drive shaft. By turning the nuts, change the spring pressure on the clutch plate until the film take-up spindle has the right torque. Lock the nuts again now.

Fig. 3

$F=340-410\text{p}$

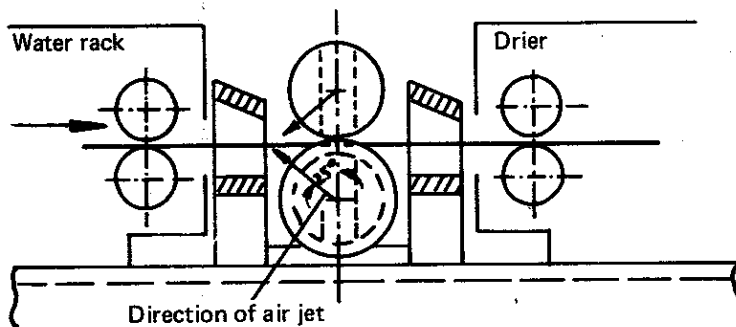


d. Air squeegee

Preliminary drying is provided by air jets directed at either side of the film to remove traces of water. The air jet angle is  $25^{\circ}$  opposite to the direction of film transport (see Fig. 4). This angle is obtained automatically when the upper and lower air pipes are aligned with the pin per part No. 7.9520.2604.1. This pin is kept either in the flap at the bottom or in the actual air pipes (see Instruction Manual, Fig. 12).

Fig. 4

Adjusting the air squeegee



- Adjustment:

The air pipe holder is fastened to the back of the gear plate.

Release the fastening screws.

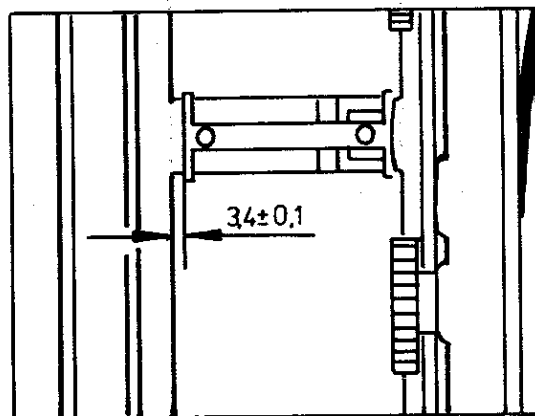
Run film into the racks.

If the film is kept taut as it is transported between water rack and drier rack, change the height of the air pipe holder so that the film is centred between the two air pipes (see Fig. 4). Now tighten screws again.

e. Adjusting the supporting strips

A gap of  $3.4 \pm 0.1$  mm is needed between the front edge of the supporting strip and the edge of the opening in the stop plate. The racks are aligned, i.e. racks E to W II can be aligned and weighted with the PVC strip.

Fig. 5



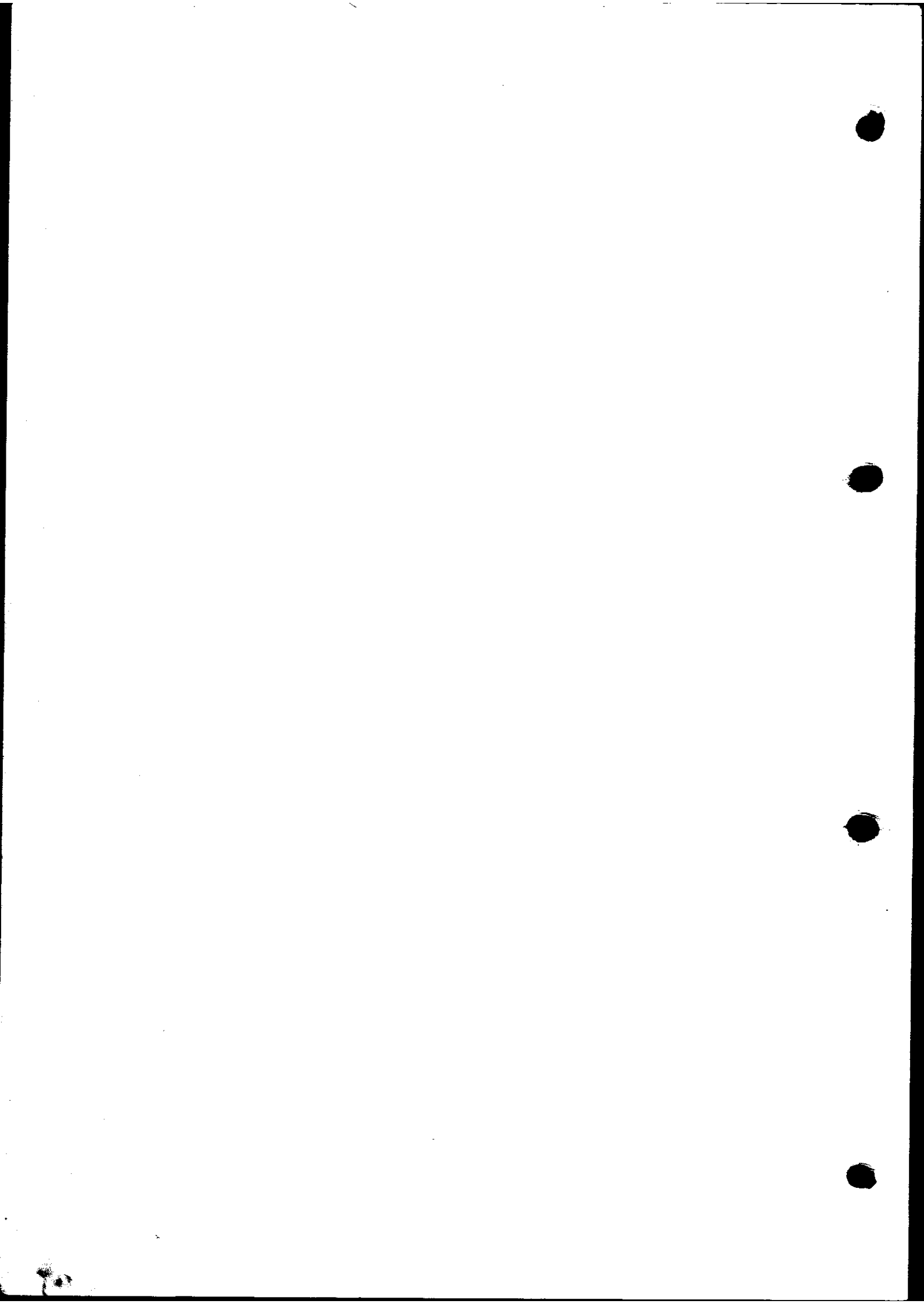


Fig. 6

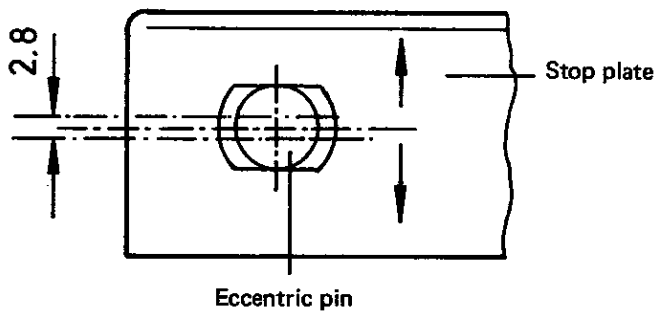
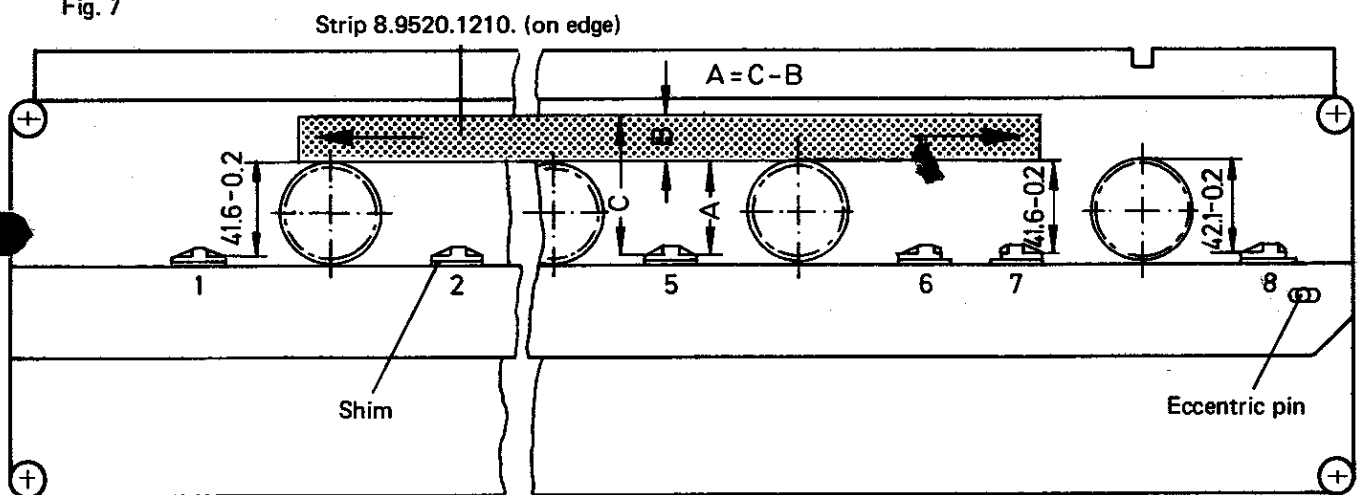


Fig. 7



Adjusting the stop plate

f. Adjusting the stop plate and supporting strips

The spur gears in the drive system must engage sufficiently well to guarantee smooth film transport.

Gear meshing is ensured when, at all supporting strips except for supporting strip 8 (see Fig. 7), a clearance of  $41.6 - 0.2$  mm is observed between the rack bearing points and the addendum circle of the spur gears in the gear plate.

This dimension is set during manufacture.

Note:

Shims of 0.1/0.2 and 0.5 mm thickness serve to correct full-length stop plate irregularities.

The bearing pins (see Fig. 6) are eccentric and allow the stop plate to be adjusted by up to 2.8 mm in height at either side.

Sequence of operations for fully re-adjusting the stop plate:

- Fit bearing pins and tighten so that they can still be turned with a certain amount of force.
- Slip the stop plate onto the bearing pins and secure with retaining rings.
- Unscrew bracket for drier rack latch pins from the gear plate.
- Mount supporting strips 1, 7 and 8 (see Fig. 7) on the stop plate with one 0.5 mm thick shim each (spare part No. 7.9520.2895.0).
- Lay black PVC strip on edge on the spur gears and measure actual size A for supporting strips 1 and 7 (see Fig. 7).
- By turning the bearing pins at left and right, obtain the desired dimension  $A = 41.6 - 0.2$  mm. Then apply the final tightening torque to the bearing pin nuts, ensuring that the pins do not turn. Make sure that the dimension A has not been altered by tightening the nuts.
- Mount supporting strips 2 – 6 with shims as required (7.9520.2895. = 0.5 mm thick, 7.9520.2896. = 0.2 mm thick, 7.9520.2897. = 0.1 mm thick) so as to obtain the desired dimension A. During this operation, be sure to consider the supporting strip adjustment according to item e.  
Put back bracket for latch pins.
- When starting up the processor, check the film transport system for correct operation under extreme conditions: 35 mm film and 4.0 m/min. transport rate.

## 2. SERVICING INSTRUCTIONS

The processor needs servicing 4 times a year. Please check the following points on these four occasions:

a. Disk clutch on the main drive shaft for driving the film take-up:

The felt clutch disks must not be allowed to run dry because otherwise the winding torque of the film take-up will rise too severely. In order to re-impregnate the felt disks it is necessary to detach the sprocket. For this purpose, remove the hexagon nuts and the compression spring. Use silicone oil Baysilon M1000, spare part No. 9.9999.9018.0, for re-impregnation. Having assembled the unit again, re-adjust the film take-up torque (see adjusting instructions, item 1101 c.).

b. Compressor

Check the filter at the suction side for dirt deposits, as well as the filter at the blowing side. Access to the filter at the suction side is gained by releasing the grey nut.

Note:

The filter at the blowing side is fitted so that the arrow on the casing is opposite to the direction of air flow. The filter at the suction side needs cleaning with a brush.

c. Drier rack:

Check the friction for correct torque  $M_D = 20 \text{ Ncm} \pm 20\%$  (see adjusting instructions, item VI-4 and Fig. 10).

d. The bevel gears on the main drive shaft need lubricating with universal grease "LZ" (spare part No. 9.9999.9007.) as the need arises.

e. Piano band (cover)

To avoid stiffness, apply a few drops of oil to the piano band as required. Oil must not be allowed to drip into the baths.

f. Cleaning the rubber rollers

Use COPEX cleaner "K" (spare part No. 7.0372.1520.0) to clean dry-running rollers in the film cassette and at the exit bracket.

Caution:

Do not use petrol for cleaning because the rollers swell. Instruct customers on this point.

Check rollers and bearings in the film racks for dirt deposits, and clean as required (see cleaning directions).

g. Machines upward of serial No. 1016 are protected against splashing water. Ensure that the measures for sealing the machine against splashing water are complete and effective (for details see spare parts list COPEX FP 500, page 16). Replace any part/seal which is damaged.

Note:

Retrofitting of splash protection to machines up to serial No. 1015 is not planned.

h. Filters/lime removal system

Instruct the customer that the water mixer filters need replacing at regular intervals. Lime removal systems have to be checked for effectiveness (servicing by manufacturer).

### 3. CLEANING DIRECTIONS

#### a. Cleaning chemicals

- COPEX bleaching bath G445c is supplied in concentrated form (supplier: Agfa-Gevaert dealers). Two litres of bleaching concentrate are diluted with 20 litres of water to make 22 litres of ready solution. COPEX bleaching bath G445c serves to remove silver and gelatine residue from tanks and racks. One solution can be used several times.

- Acetic acid

Acetic acid is available from dealers as a 60% solution. To remove lime deposits, it can be diluted to 5%. Preparation: 1 part 60% acetic acid + 11 parts water make 5% acetic acid.

- COPEX cleaner "K"

This is available from ETV Munich, spare part No. 7.0372.1520.0; it is needed for removing deposits from rubber rollers.

Note:

When handling chemicals, protect eyes and hands, and avoid splashing.

#### b. Standard cleaning

- Daily

Empty the water tanks at the end of every day and rinse out with clean water. Having removed the racks from the water tanks, also rinse off with water or place in the water tank in the base unit. The water has to be drained off so as to avoid the growth of algae in tanks and on racks.

- When changing chemicals:

Before preparing new solutions, first empty developer and fixer tanks, then fill the tanks with water. Run the processor with the racks for 10 minutes at 4 m/min. Finally empty the tanks, take out developer and fixer racks, and fill tanks with solutions (it is preferable to change the solutions in the morning).

#### c. Special cleaning

Special cleaning ought to be carried out at intervals of 4 weeks.

- Fill chemical and water tanks with bleaching bath G445c, prepared with warm water at 35°C in accordance with the directions (see cleaning chemicals). Insert the racks and run the processor for at least 30 minutes, with developer heating and transport switched on.

Caution. Do not turn on water mixer.

- Having drained the bleaching bath, thoroughly rinse out all tanks with water, 3 times for 5 minutes each, with the processor running. Be sure to insert the drier rack also in a rinsing bath. Exchanging the whole volume of water three times is sufficient to remove all traces of the bleaching bath solution from tanks and pipes. Thoroughly rinse off the racks once again with water.

Caution.

Make sure that no traces of bleaching bath or cleaning agent are left in the developer pump or tanks because this will ruin new solutions.

— Air squeegee

If lime deposits have formed, withdraw the air pipes with the aid of the pin and clean the air holes with a 5% solution of acetic acid. Then moisten the O-rings slightly, put back the air pipes and align with the pin. This pin is kept in the machine door or air pipe opening.

— Rubber rollers in COPEX FP 500 and film cassettes

Use COPEX cleaner "K" to remove severe deposits from rollers.

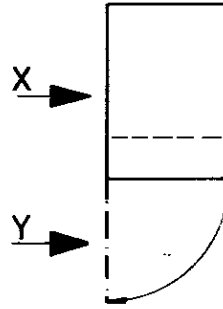
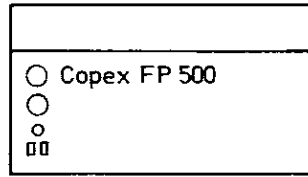
— The optionally available laboratory table is recommended for cleaning the racks. It offers all possibilities for efficient cleaning.

Note:

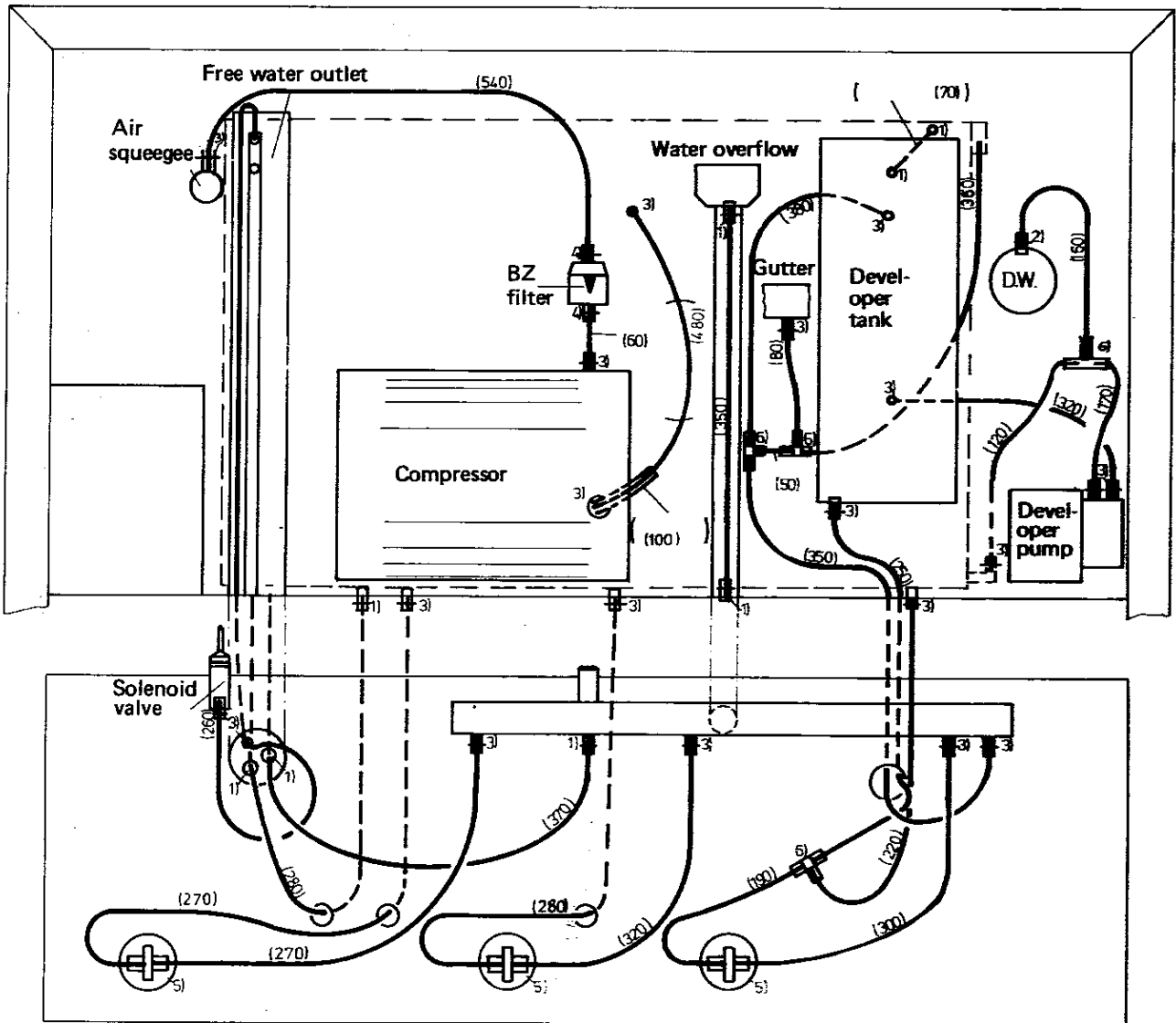
The water mixer filters must be changed in accordance with the maker's directions. This also applies to any lime removal systems.

Disposal of waste chemicals and bleaching bath G445c must conform to water supply authority rules and regulations.

COPEX FP 500  
Tubing diagram



View X



View Y

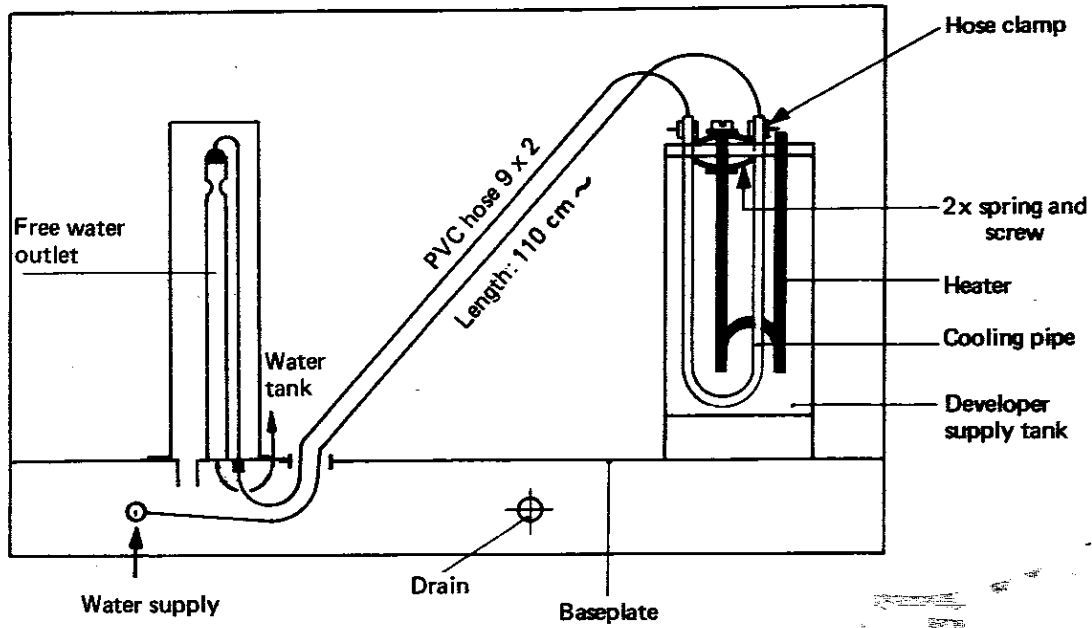
1)	7.0371.9626.0	5)	7.9520.2608.X
2)	7.0371.9510.1	6)	7.9520.1246.0
3)	7.0371.9860.0		
4)	7.0371.9490.1		

- For hose materials see spare parts list, page 10.
- The digits in brackets ( . . . ) indicate the length of each particular hose.
- Hose clamps and T-piece; for spare part No. see adjacent table.

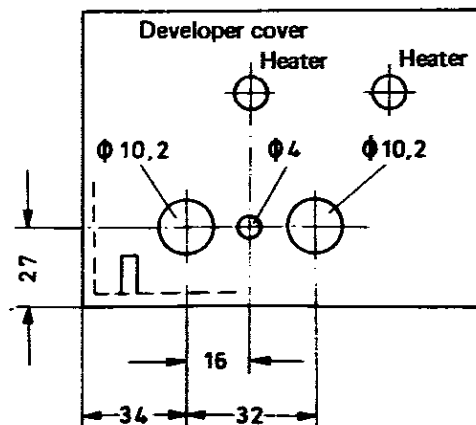
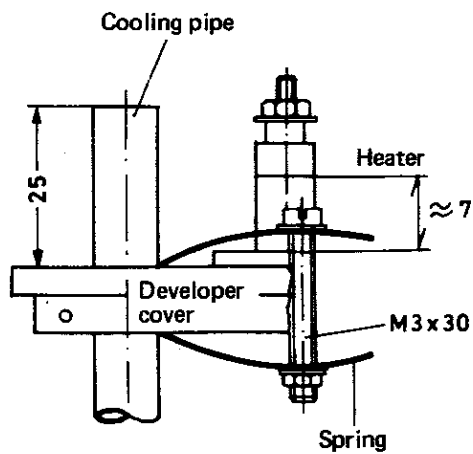
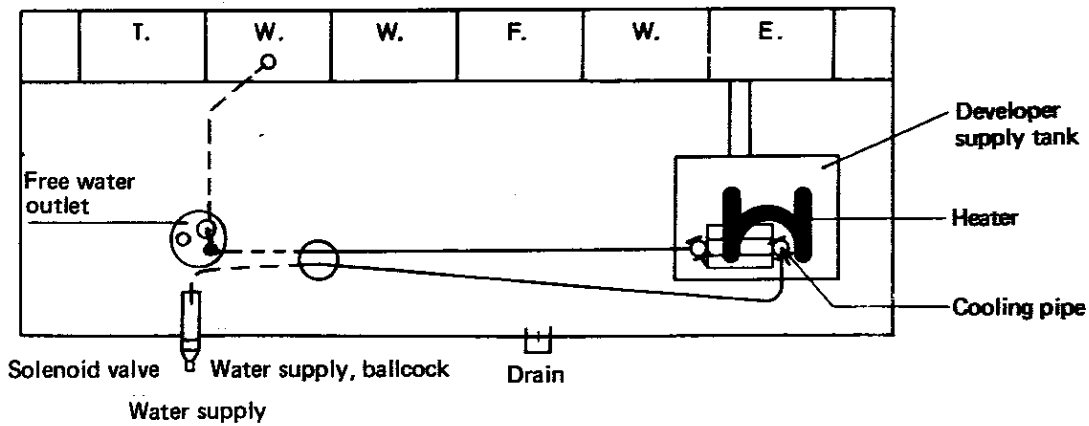


Rear view

Fig. 8

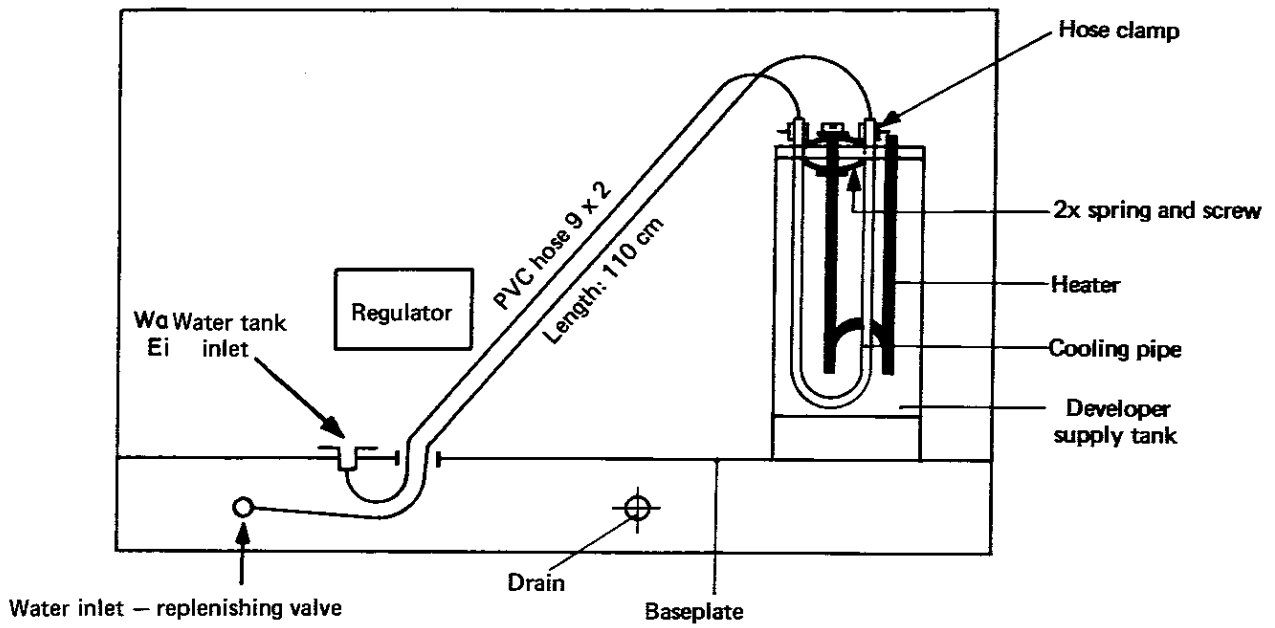


Top view

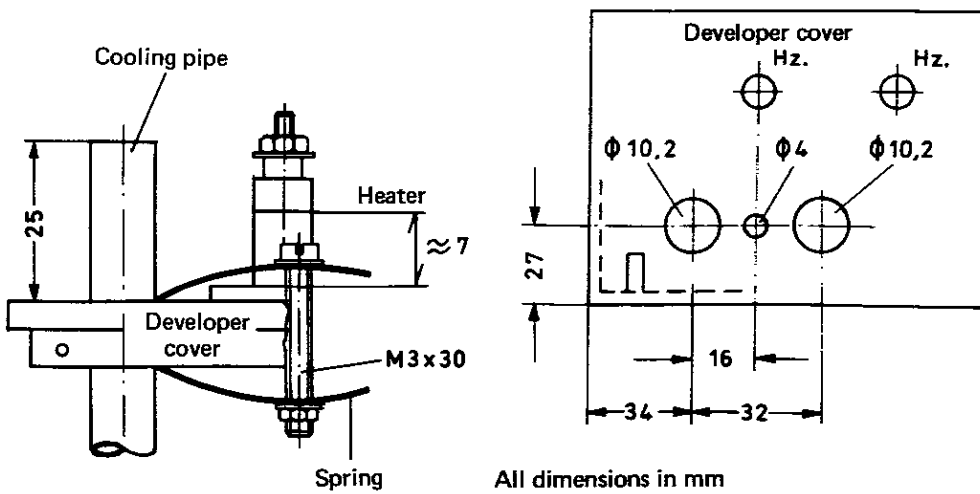
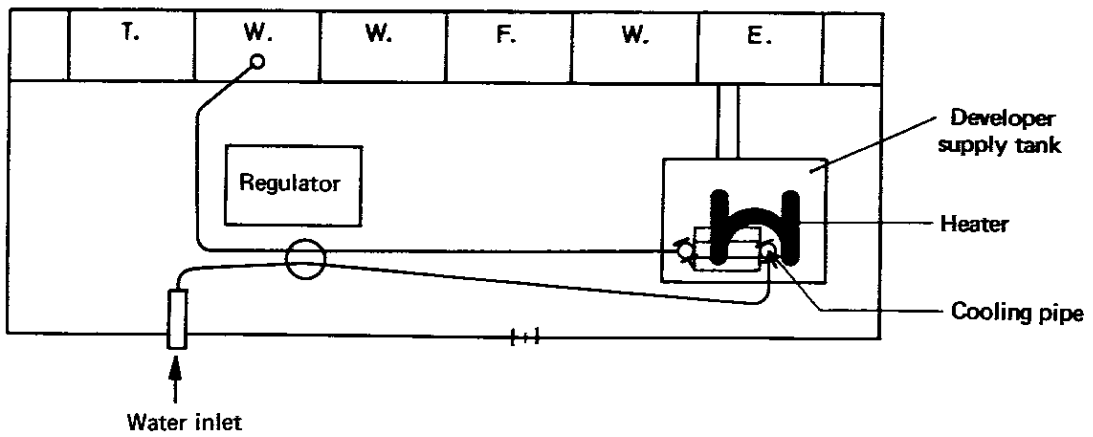




Rear view



Plan view



Drawing

## 1. INSTALLATION INSTRUCTIONS

### Cooling pipe for developer supply tank

The developer has to be cooled down so that its temperature can be regulated when the ambient or room temperature is above the setting on the regulator. For this purpose, a cooling pipe through which the film wash water flows is installed in the developer supply tank. The temperature of the wash water must be 3°C below the developer temperature setting.

Installation (see Fig. 8)

The cover of the developer tank is prepared for fitting the cooling pipe. This pipe is attached to the cover by 2 leaf springs and a clamping screw. Lay the PVC hoses over the cooling pipe in a radius of sufficient size. They pass beneath the developer supply tank and run through the hole in the baseplate to the connecting nozzles.

The following parts are needed for installation:

3 m	<del>7.0620.1237.0</del>	PVC hose 9 x 2
2 x	7.0371.9500.1	Hose clamp Noridex N17 . . . 12 dia.
1 x	7.8160.4151.0	Cooling pipe
2 x	7.9520.4155.0	Spring
1 x	6.0202.106.00	Cheese-head screw DIN 84-M3 x 30 - 1.4401
2 x	6.0096.421.00	Washer DIN 125-3.2 not shown - 1.4401
1 x	6.0097.972.00	Hexagon nut DIN 934-M3-m-1.4305

(These parts are available from ETV Munich.)

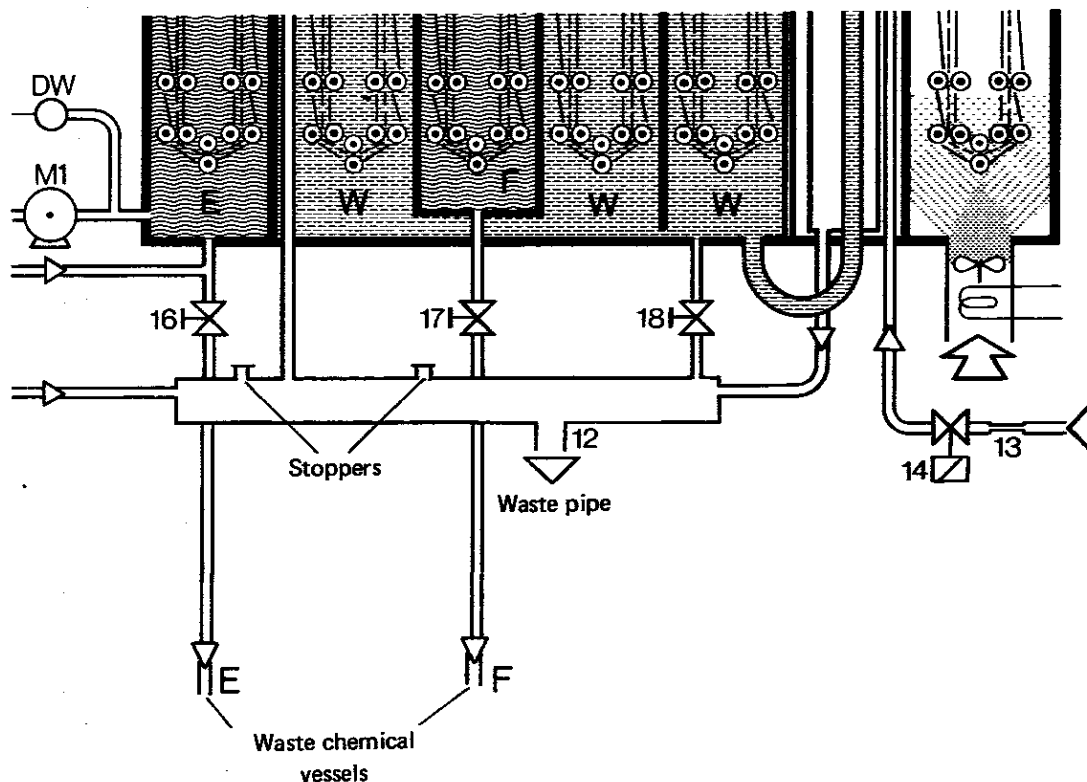
## 2. MODIFICATION INSTRUCTIONS

### Collecting chemicals separately in waste vessels

If waste chemical solutions are not allowed in the sewers, they will have to be collected separately in waste vessels. (These vessels are normally supplied by local disposal companies.)

Modification is as follows (see Fig. 9):

Fig. 9



Remove the connecting hoses between drain taps 16, 17 and waste pipe 12. The nozzles on the waste pipe need closing reliably with stoppers according to DIN 12871-12/20, spare part No. 6.0228.501.00.

Attach 2 new hoses of the necessary length (PVC hose 9 x 2) to drain taps 16 and 17. They emerge at the back of the machine through the holes provided there. The hoses themselves need colour-coding to avoid confusion, i.e. "red" for developer and "blue" for fixer. Mark with adhesive tape or fix adhesive labels to the back of the machine (for adhesive labels see spare parts list, page 17).

## VI. FILM RACKS

### 1. Specifications

- Scope of application:** Document films on polyester or triacetate, 0.06 – 0.13 mm thick, 16 and 35 mm wide, perforated and unperforated.
- Service life:** approx. 10,000 films of 30.5 m length each.
- Film transport:** Film transport is through 6 individual racks in the sequence developer/water/fixer/water/water/drier. Only the drying rack is locked at the working position. The first 5 racks are aligned and weighted by means of a PVC strip. All racks except for the developer and drier racks can be interchanged.
- The leading end of the film is drawn on a spliced leader through the processor. The leader is required for 16 and 35 mm wide films.
- 16 mm film is centred in the racks by convex rollers, of which there are three per rack at the film turnaround points.
- The rollers of a roller pair are held apart at a fixed distance of about 0.2 mm which is set by the bearings. Most of the rollers act as guides alone; there is no mechanical load on the film.
- To make the convex rollers work efficiently, the drying rack runs about 1% faster than the preceding racks (drive ratio 41 teeth: 39 teeth), thereby exerting a certain pull on the film.
- This pull is limited by a friction on the drying rack drive shaft.
- Pairs of rollers are easy to exchange.
- Load moment:** Max. 2.5 Ncm = 250 pcm for each rack
- The total load moment for the main drive with 6 racks amounts to max. 15 Ncm = 1,500 pcm.

### 2. General

The stated service life of about 10,000 films relates to the plates and guides with proper handling. Rubber rollers and bearings are subject to wear and tear. The life of the rollers may vary and depends on the care given to the racks. Frequent film jamming due to incorrect splicing of the leader will also affect the service life.

For rack care and cleaning please refer to the cleaning directions.

### 3. Changing the roller pairs (see Fig. 10)

Damaged rollers must always be changed in pairs with bearings. To remove roller pairs, pull hard on the roller bearings – the bearings are latched in the plates and a force of at least 20 N = 2.0 kp has to be overcome.

First remove any locking plates with which the bearings are additionally secured.

Carefully insert the new roller pair with its bearings between the plates and press so that the bearings latch in the plates.

At the left and right-hand ends of each rubber roller there must be at least 1 plastic washer to prevent the rollers running against the bearings and unnecessarily increasing the load moment.

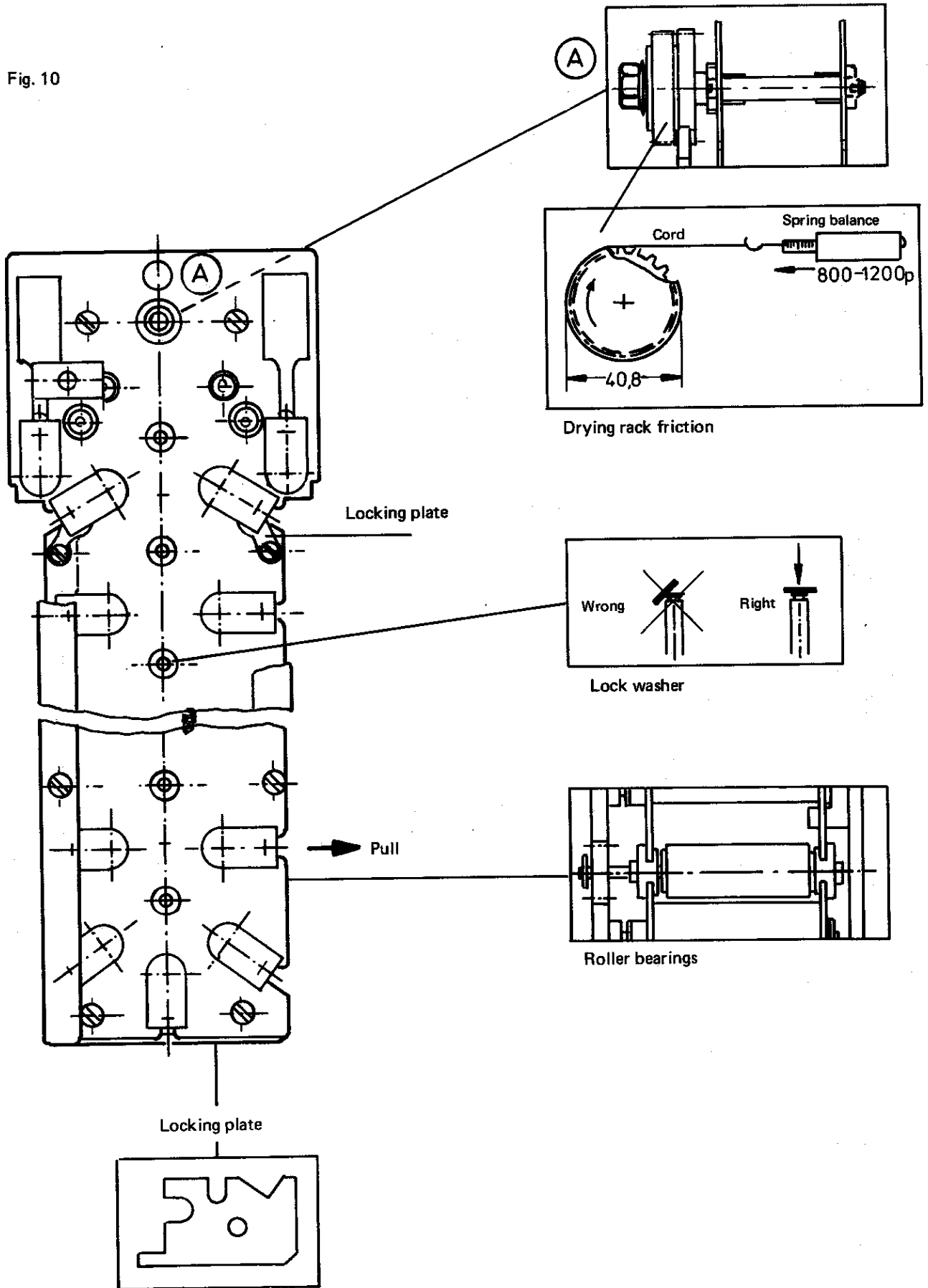
4. Adjusting the friction on the drying rack

The friction on the drive shaft has a desired torque setting of  $M_D = 20 \text{ Ncm} \pm 20 \% (= 2,000 \text{ pcm} \pm 400 \text{ pcm})$ . In order to measure the torque, hold the inner half of the friction. The friction must work smoothly without jerking. Torque corrections can be made by releasing or tightening the self-locking M5 nut (for method of measurement and readings see Fig. ).

5. Lock washers for axles

The lock washers must never be used twice. Fit washers with tool No. 7.9820.0068.4. Replace any lock washer which is cracked.

Fig. 10



## VII FILM SUPPLY CASSETTES

### 1. Application

The film supply cassettes are daylight-loading cassettes and serve to feed 16 and 35 mm wide film into the COPEX FP 500.

The cassettes will accept any film thickness between 0.06 and 0.14 mm, but can be used only in conjunction with leader type 9520/915.

Note: The cassettes can also be used in the COPEX FP 400 provided the machine has been converted for the use of type 9520/870 film racks. It is absolutely essential to use the leader.

### 2. Specifications

- |                             |   |
|-----------------------------|---|
| Film spool mounting         | <ul style="list-style-type: none"><li>— Spools of 16/35 mm wide microfilm</li><li>— 16 mm spool is mounted in the centre</li><li>— Stub axle mounting</li></ul>   |
| Stub axle with knurled knob | <ul style="list-style-type: none"><li>— Latches at either end position</li><li>— Braking torque of stub axle can be varied with adjustment screw at underside of red bearing flange<br/>(braking torque 0.5 – 1.0 Ncm = 60 – 100 pcm)</li></ul>                     |
| Film length detection       | <ul style="list-style-type: none"><li>— In cm, using a length sensor to which solenoids are affixed (alternate polarity).<br/>One revolution = 4 cm.</li><li>— Counting roller:<br/>Convex rubber roller for 9520/911<br/>Hard fabric roller for 9520/931</li></ul> |
| Pressure roller in cover    | <ul style="list-style-type: none"><li>— Positioned by its own dead weight in model 9520/911;<br/>Pressure can be increased by pressing the knob in the cover.</li><li>— Spring-mounted in model 9520/931</li></ul>  |
| Film pull-out force         | <ul style="list-style-type: none"><li>— 0.3 N – 0.6 N = 30 – 60 p,<br/>max. 1.3 N = 130 p when the film/leader splice is between counting and pressure rollers.</li></ul>   |
| Rewinding the leader        | Having spliced the film, turn the knurled knob in direction of arrow. Film spool is driven by spring on the stub axle.  |
| Cover locking               | The cover is engaged by latch pins when it is closed.   |

RUNDSCHREIBEN  
CIRCULAR  
CIRCULAIRE

12/86

Marketing Mikrografie  
Technischer Service München

25.06.86, 42-ke-hu

COPEX FP 500 - Base Unit, Type 9520/510  
COPEX FP 500 - Replenishment, Type 9520/520

### Fault

The drain cocks and pumps of the replenishment system may get clogged by foreign bodies such as film scraps and splicing tape rests. Pumping the tanks empty is then impeded or made impossible.

### Remedy

Insertion of a sieve into each drain opening at the tank bottom. The sieves can be ordered from ETV Munich as of now under the P/N 8.9520.5570.0

### Remark

The sieves must be retrofitted without fail into all machines in the field. The customer should check the sieves once a week for foreign bodies.

*i. A. Rauffer*

Rauffer

*Katte*

Katte

