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## MAINTENANCE MANUAL



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LIST OF TOOLS

Description	Part number
<u>STANDARD TOOLS (MECHANICS)</u>	
- Screwdriver, Allen, 2.5 mm across flats	
- Screwdriver, watchmaker's, 3 blades	
- Allen Key, angle, 2.5 mm across flats	
- Socket wrench, 2.5 mm	
- Socket wrench, 5.5 mm	
- Socket wrench, 7 mm	
- Open-end wrench, 5 mm	
- Open-end wrench, 5.5 mm	
- Flat nosed pliers	
- Tweezers	
- Double spring hook	
- Set of shims	
- Oiler	
<u>STANDARD TOOLS (ELECTRONICS)</u>	
- Dual-trace oscilloscope	
- D.C. power supplies 5 V, 15 V, 24 V, 30 V.	
<u>SPECIFIC TOOLS (ELECTRONICS)</u>	
- 5-unit code rule	
- Portable maintenance equipment EMP2	
- Portable maintenance equipment EMP3	
- Tape punch cable	27 356 416-4
- Extender boards :	
. "ALIMENTATION"	23 101 935-8
. "ASSERVISSEMENT" and "PIA IMP"	23 101 931-6
. "PIA ERD + IT.ADA" and "PIA LECTEUR + AMPLI" and "PIA PERFO + AMPLI" and "PERSONNALISATION"	23 101 921-2
. "PIA CLAVIER + MPU" and RAM + RPROM" and "NUMEROTATION ABREGEE"	23 101 927-5
. "ADAPTATION"	23 101 942-3
<u>SPECIFIC TOOLS (MECHANICS)</u>	
- Contact extractor (MOLEX PRODUCTS CORP.)	HT 2285
- Pliers for installing and removing 4mm lock rings (GRIP RING)	
- Rod, $1.8 \pm 0.02$ mm diam (2 pieces)	
- Spring-balance, 0 to 4 N strength	

# LIST OF TOOLS (Contd.)

- Gauges :		
• Sprocket wheel/feelers alignment and tape lid position, sprocket wheel and feelers protrusion		23 106 759-9
• Punch travel adjustment, and punch setting lever return shaft adjustment		27 356 345-6
• Lower neutral point		27 338 119-3
• Tape presser/sprocket wheel clearance (mylar tape)		27 356 417-2
• Synchronization (rod 4mm diam, 60mm length)		27 356 418-5
• Punch pitch		27 338 121-3
• Pressure rollers		23 106 762-7
• Ribbon assembly (left)	- Initial position	23 106 763-0
	- Shaft adjustment	23 106 764-8
• Ribbon assembly (right)		23 106 765-1
<u>INGREDIENTS</u>		
Oil (can)	ESSO MILKOTE K 55	23 007 213-2
Grease (tube)	ESSO GREASE L	23 007 214-0

DESCRIPTION AND USE OF SPECIFIC TOOLS : See special document

## CAUTION

During dissassembly, do not remove painted screws without the previous surety of specific tooling availability.

In case of removal of such screws, do not omit to varnish them again during assembly.

## 1 - OPERATIONAL CONSOLE

### 1.1 INITIAL TESTING

- Test the various circuits of the card using a connection built from a receptacle for a 17-pin plug-in connector.

### 1.2 DISASSEMBLY - ASSEMBLY

- Replace the defective element(s) making sure not to bend the leads of diodes and resistors too near to their bodies.

### 1.3 FINAL TESTING

- Test all the applications of the board once again using the same connection.

## 2 – PUNCH BACK-SPACER (TAPE PUNCH)

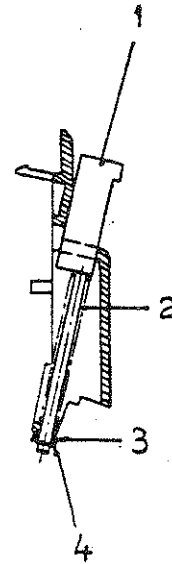
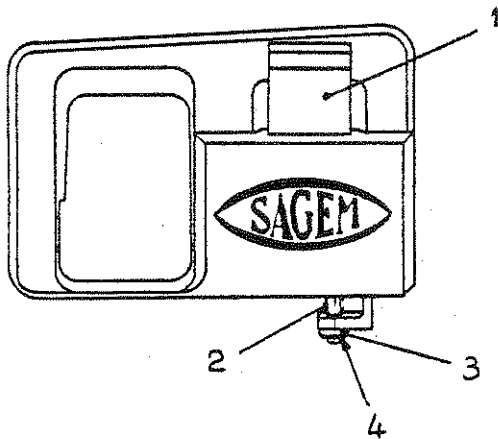
### 2.1 INITIAL TESTING

- Visually check the condition of the parts.
- Check the operation of the key.

### 2.2 DISASSEMBLY - ASSEMBLY

#### 1) Disassembly

- Remove lock ring (4) and bushing (3).
- Remove key (1) and spring (2).



#### 2) Assembly

- Proceed in the opposite order to disassembly.

### 2.3 FINAL TESTING

- Repeat the initial test described above.



### 3 – KEYBOARD

#### 3.1 INITIAL TESTING

##### 1) Static testing

- Visually check the condition of the parts.
- Operate the keys one by one to detect any sticking.
- Check the resistors, diodes, capacitors and contacts on an ohmmeter.

##### 2) Dynamic testing

- If none of the parts shows signs of hard and fast failure, connect a 23-pin connector to plug P1.
- Supply the card with + 5 V and - 15 V using two stabilized power supplies.
- Test the reference voltages : - 9 V and - 12 V.
- Test the element values (CCITT code No. 2) for each key and check the PC1 and PC2 Character Presence pulses.

#### 3.2 DISASSEMBLY - ASSEMBLY

- Replace the defective part(s) making sure not to bend the leads of resistors, diodes and capacitors too near to their body.
- To replace a diode located near a key :
  - . remove the cap from the key by pulling it upwards,
  - . unsolder and remove the key body from its recess,
  - . unsolder the defective diode and remove it with tweezers,
  - . assemble the new diode and key following the disassembly procedure in the opposite order.

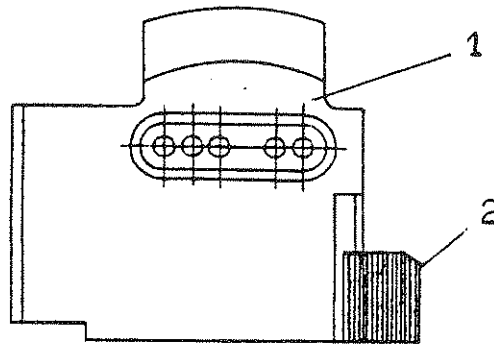
#### 3.3 FINAL TESTING

- Test all the functions and all the moment codes using the set-up described in the first paragraph.

#### 4 – TAPE READER

##### 4.1 INITIAL TESTING

- Visually check the condition of the parts.
- Check the opening and closing of tape lid (1) by pressing lock (2).



- Manually test the rotation of the motor-sprocket wheel assembly.
- Check the condition of the wiring (connector or wires broken).
- On an ohmmeter, check the windings of the motor as shown in the following table :

Measurement points on connector	Resistance value (typical)
12/11	500 $\Omega$
10/9	500 $\Omega$
9/8	250 $\Omega$
10/8	250 $\Omega$
12/8	250 $\Omega$
11/8	250 $\Omega$

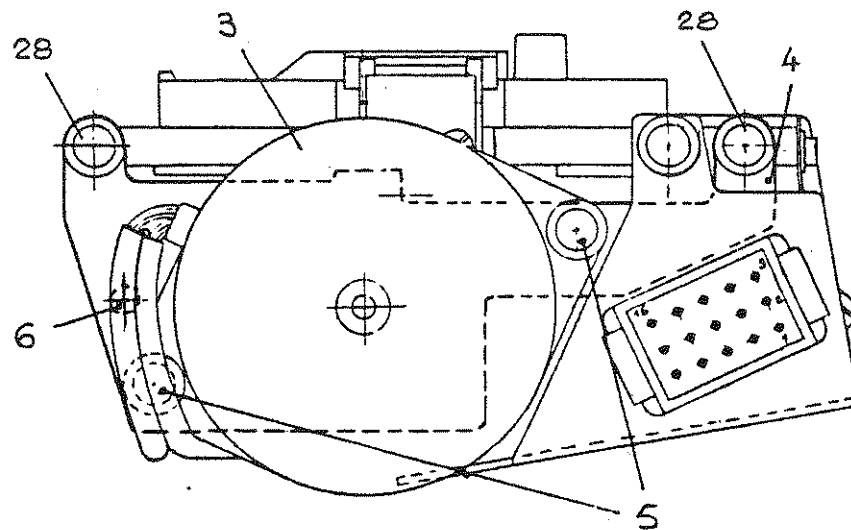
## 4.2 DISASSEMBLY - ASSEMBLY - ADJUSTMENT

### 1) Disassembly

#### MOTOR (3)

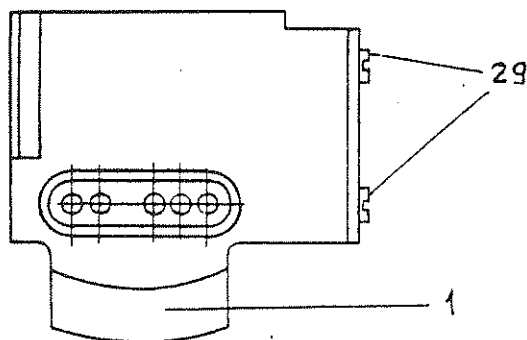
- Remove the screw (6) and the two attaching screws (5) from the motor flange (4).

NOTE : During the removal of the wired motor, use an extractor to remove the male contacts of the connector, associated with the motor.



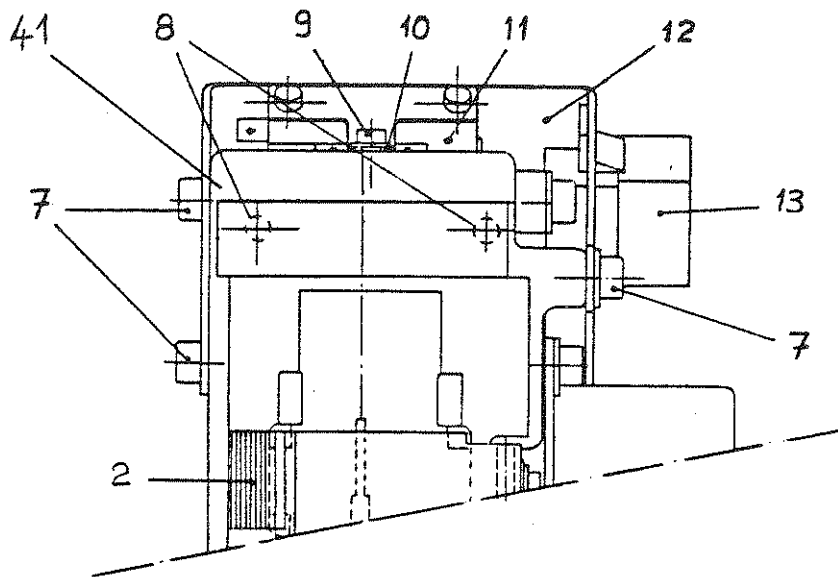
#### TAPE LID (1)

- Remove motor (3).
- Remove two attaching screws (29).
- Remove tape lid (1).



### FEELERS BLOCK ASSEMBLY (11)

- Unhook the tape lid lock (2) return spring from the metal cover (12).
- Release connector (13) from its recess.
- Remove three screws (7) and remove the metal cover (12).
- Remove screw (9) holding adjusting bracket (10) to main casting (41).
- Remove both screws (8) and remove the feelers block assembly (11) together with the attaching clamp.



NOTE : When removing the feelers block assembly, remove the relative male contacts from connector (13) using the appropriate extractor.

### CONTACT BLOCK (17)

- Remove feelers block assembly (11).
- Unsolder the six wires from the contacts (19).
- Remove both screws (18), the adjusting bracket (10) and the contact block (17).

### ELEMENT FEELERS (21), TAPE OUT FEELER (14) AND FELT PACKINGS (15)

- Remove the feelers block assembly (11).
- Remove the contact block (17).
- Withdraw shaft (16) equipped with feelers (14 and 21) and felt packings (15) from its recess (20).
- Remove element feelers (21), tape out feeler (14) and felt packings (15).

### 54-TOOTH GEAR (22) AND 36-TOOTH SPROCKET WHEEL (24)

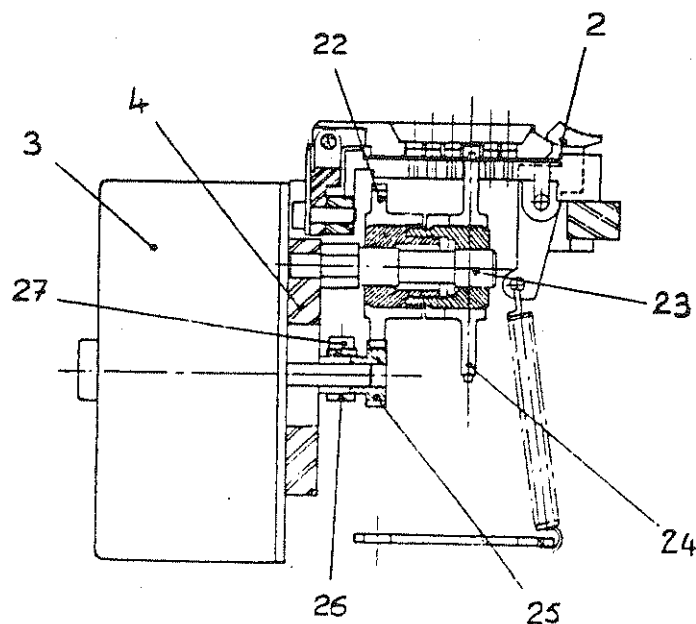
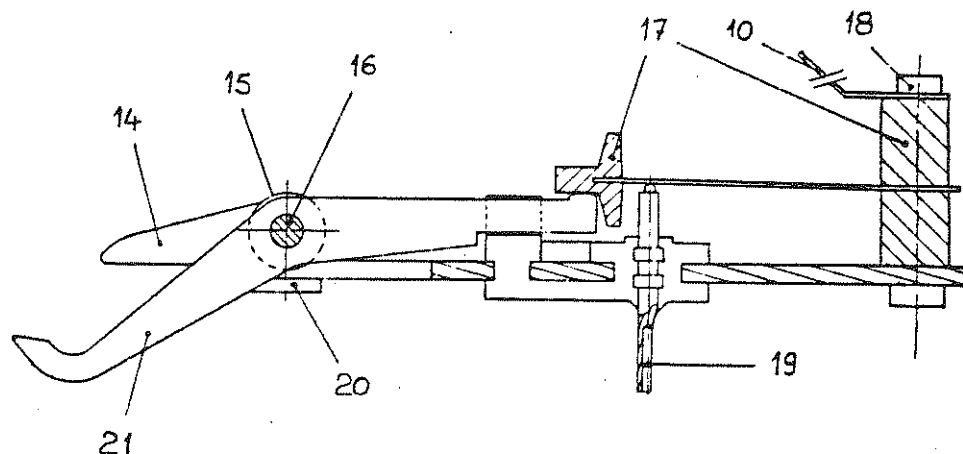
- Unhook the tape lid lock (2) return spring from the metal cover (12).
- Remove metal cover (12) and the motor and flange assembly (4).
- Remove the 54-tooth gear (22) and the 36-tooth sprocket wheel (24).

### SHAFT (23) OF 36-TOOTH SPROCKET WHEEL (24)

- Remove 54-tooth gear (22) and 36-tooth sprocket wheel (24).
- Unscrew and remove shaft (23).

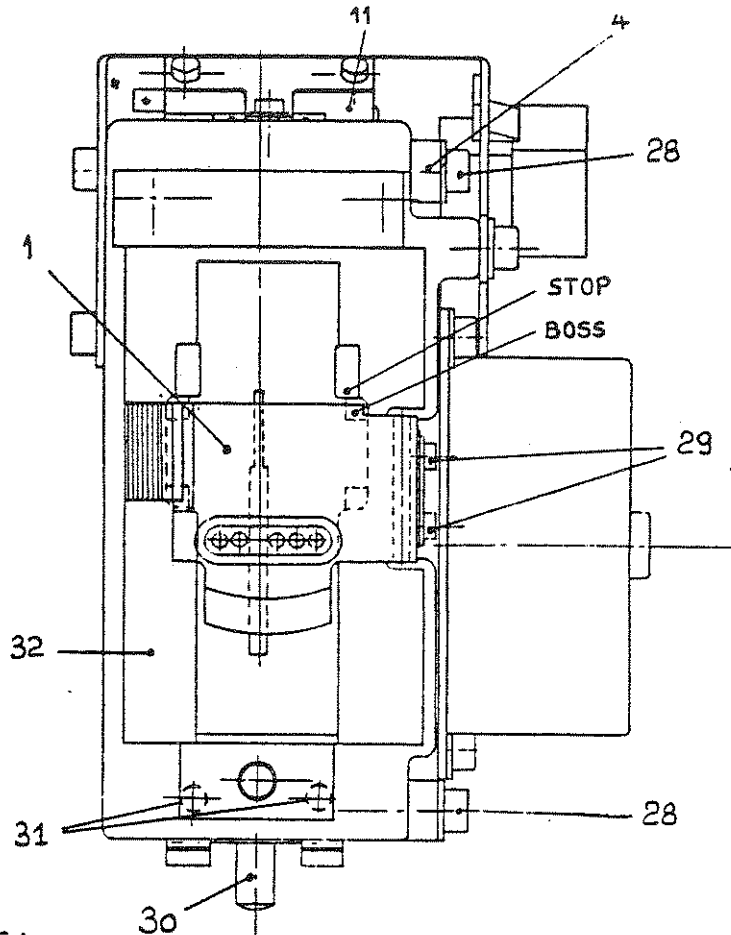
### 18-TOOTH PINION (25)

- Detach the two screws attaching motor (3) to disengage pinion (25) from the 54-tooth gear (22).
- Loosen screw (29) from the clamp (26).
- Remove the 18-tooth pinion (25).



## TAPE GUIDE PLATE (32)

- Remove feelers block (11) without removing the contacts from the connector.
- Remove both attaching screws (28) and remove the motor and flange assembly (4).
- Remove both screws (29) and remove tape lid (1).
- Remove both screws (31) and remove plunger (30).

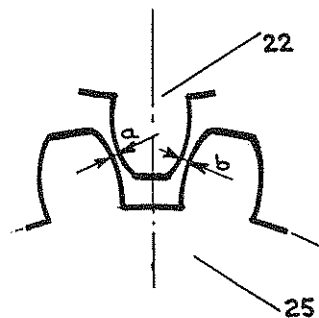
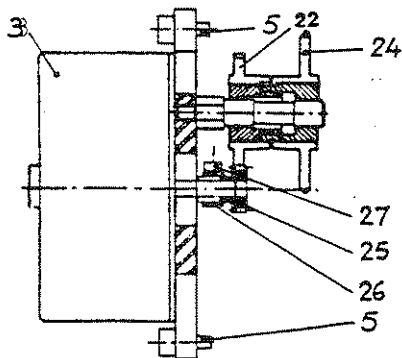


## 2) Assembly - Adjustment

### MOTOR (3)

a) Assemble by following the disassembly procedure in the opposite order.

- After assembling motor (3):
- adjust a clearance of 0.1mm maxi between motor pinion (25) and the 54-tooth sprocket wheel gear (22),
  - lock the two attaching screws (5),
  - check for restraint-free rotation, readjust the clearance, if necessary.

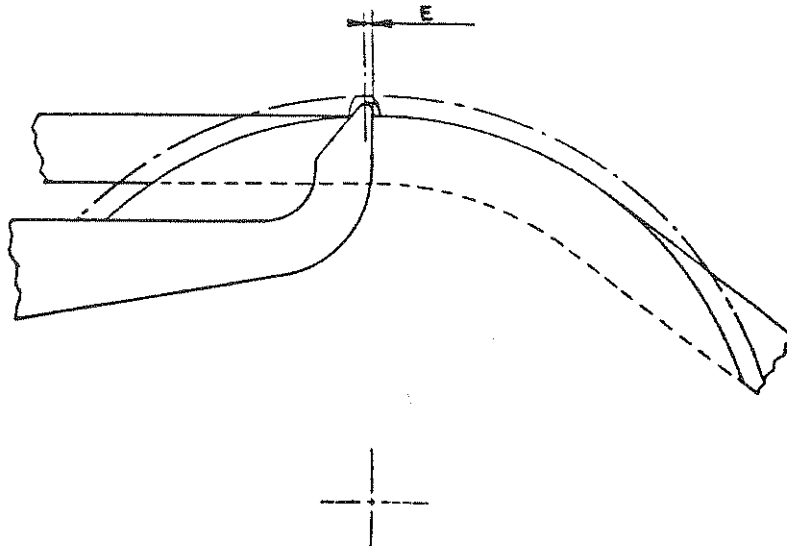


$$a + b = 0,1\text{mm. maxi}$$

b) Loosen screw (27) on clamp (26) retaining the 18-tooth pinion (25).

Apply power to feed motor (3) (+ 12 V) (see diagram of "PIA LECTEUR + AMPLI" board).

Turn the 18-tooth pinion (25) to obtain a dimension E between 0.25 and 0.45 mm between the centre of one sprocket and the end of the feelers.



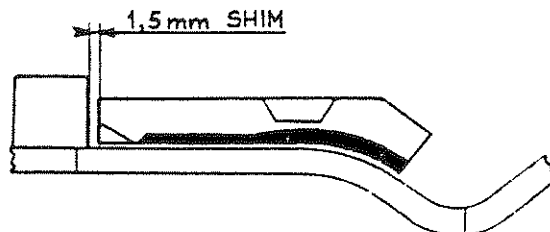
Lock screw (25) of clamp (26) retaining the 18-tooth pinion (25).

Disconnect the power supply from feed motor (3).

NOTE : This adjustment can be made using the tool 23 106 759-9.

#### TAPE LID (1)

- Install tape lid (1) without tightening screws (29).
- Bring tape lid (1) to bear against the four bosses of the tape guide plate (32).
- Insert a 1.5 mm shim between the two stops of tape guide plate (32) and tape lid (1).
- Bring tape lid (1) to bear against the shim.
- Tighten the two attaching screws (29).

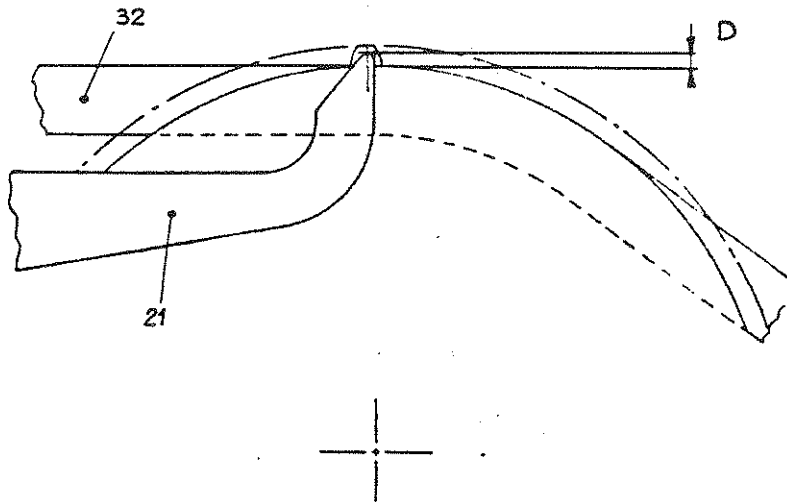


NOTE : This adjustment can be made using the tool 23 106 759-9.

- Install motor (3) and carry out the corresponding adjustments.

### FEELERS BLOCK ASSEMBLY (11)

- Assemble by following the disassembly procedure in the opposite order.
- Before tightening screw (9) of adjusting bracket (10), adjust the protrusion of feelers (21) to obtain :
  - Opening of element contacts (—●—●—) for protrusion D of feelers (21) AT LEAST equal to 0.5 mm.
  - Closing of element contacts (—●—●—) for protrusion D of feelers (21) AT MOST equal to 0.75 mm



**NOTE :** This adjustment can be made using the tool 23 106 759-9.

### CONTACT BLOCK (17)

- Assemble by following the disassembly procedure in the opposite order.
- During assembly of the feelers block assembly (11), adjust the protrusion of feelers (21).

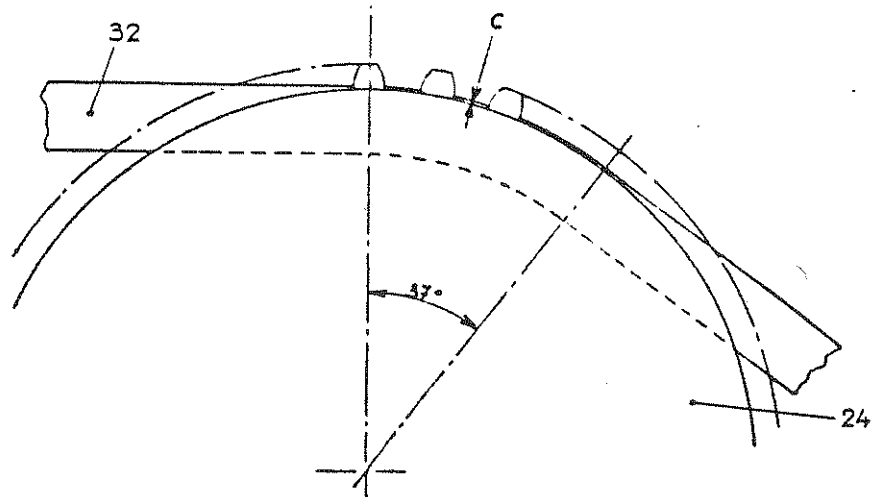
### ELEMENT FEELERS (21), TAPE OUT FEELER (14) AND FELT PACKINGS (15)

- Assemble by following the disassembly procedure in the opposite order.
- During assembly of the feelers block assembly (11), adjust the protrusion of feelers (21).

### 54-TOOTH GEAR (22) AND 36-TOOTH SPROCKET WHEEL (24)

- Assemble by following the disassembly procedure in the opposite order.
- Before locking both attaching screws (28) of motor and flange assembly (4), adjust the position of the tape guide plate (32) :
  - Within the 37° curved section of the tape guide plate (32), adjust motor and flange assembly (4) to obtain a clearance C of 0.1mm MAXIMUM between the top of the tape guide plate and the rim of the 36-tooth sprocket wheel.





**NOTE :** This adjustment can be made using the tool 23 106 759-9.

- Lock both attaching screws (28) of the motor and flange assembly (4).
- Complete the assembly and PROCEED TO ADJUSTMENT (paragraph : MOTOR, adjustment b).

#### SHAFT (23) OF 36-TOOTH SPROCKET WHEEL (24)

- Assemble by following the disassembly procedure in the opposite order.
- During assembly, check the corresponding adjustments.

#### 18-TOOTH PINION (25)

- Assemble by following the disassembly procedure in the opposite order.
- Before tightening both attaching screws (5) of motor (3), perform the adjustments described in the paragraph : MOTOR.

#### TAPE GUIDE PLATE (32)

- Assemble by following the disassembly procedure in the opposite order.
- Before locking both attaching screws (29), adjust the tape lid (1) (paragraph : TAPE LID).
- Before locking both attaching screws (28) of the motor and flange assembly (4), adjust the position of the tape guide plate (paragraph : 54-TOOTH GEAR AND 36-TOOTH SPROCKET WHEEL).
- Before assembling feelers block assembly (11), PERFORM ADJUSTMENT (paragraph : MOTOR, adjustment b).
- Before locking screw (9) of adjusting bracket (10) of feelers block assembly (11), adjust the protrusion of these feelers (21) (paragraph : FEELERS BLOCK ASSEMBLY).

### 4.3 FINAL TESTING

- Repeat the initial testing described previously.

## 5 - TAPE READER (WITH TIGHT TAPE DETECTOR)

### 5.1 INITIAL TESTING

- Perform the checks described in the paragraph entitled TAPE READER.
- Check the tight tape detector contact movement by means of an ohmmeter.

### 5.2 DISASSEMBLY - ASSEMBLY - ADJUSTMENT

#### 1) Disassembly

The parts are disassembled in the same way as for the TAPE READER except for :

#### FEELERS BLOCK ASSEMBLY (11)

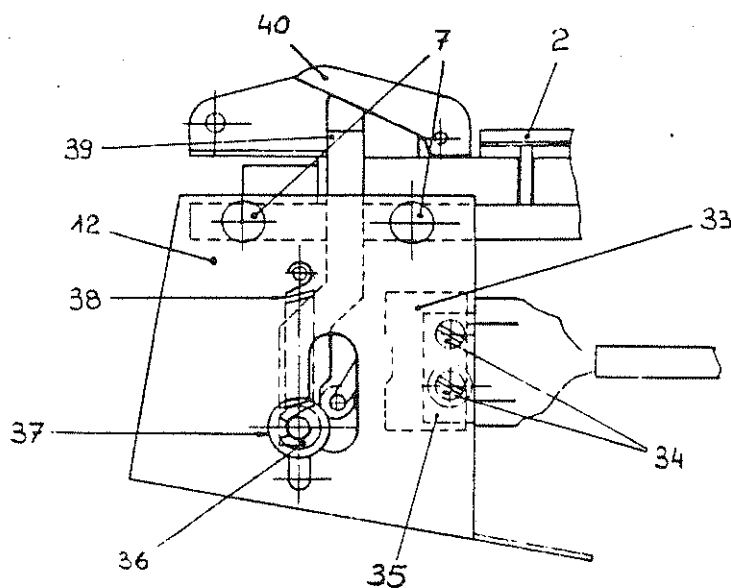
When removing the casing, remove from connector (13) the male contacts corresponding to the switch of the tight tape lever, using appropriate extractor.

#### 54-TOOTH GEAR (22) AND 36-TOOTH SPROCKET WHEEL (24)

The casing is removed as above.

#### CONTROL LEVER (39) AND SWITCH (33) DETECTING TIGHT TAPE

- Unhook the tape lid lock (2) return spring from the metal cover (12).
- Release the connector (13) from its recess.
- Remove the three screws (7) and metal cover (12).
- Remove from the connector (13) the male contacts corresponding to switch (33).
- Remove both screws (34), board (35) and remove switch (33).



- Unhook and remove spring (38).
- Remove lock ring (36), washer (37) and remove lever (39).

## 2) Assembly - Adjustment

Assembly and adjustment of the parts are performed in the same way as for the TAPE READER except for :

### FEELERS BLOCK ASSEMBLY (11)

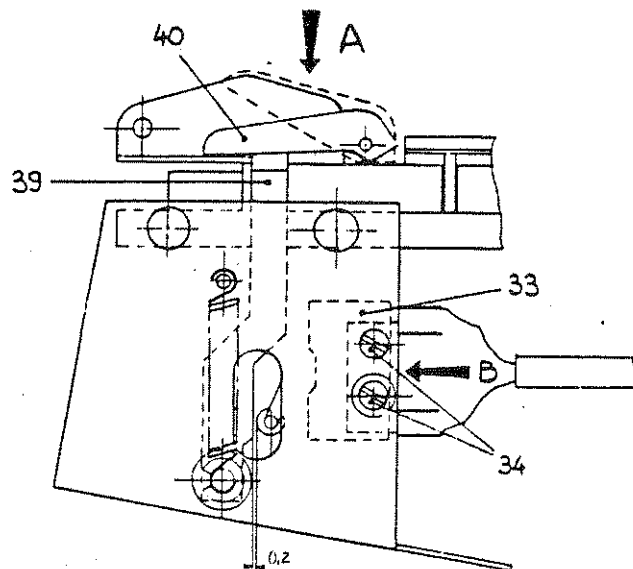
Before installing the casing, insert in the connector the male contacts corresponding to switch (33) of the tight tape lever.

### 54-TOOTH GEAR (22) AND 36-TOOTH SPROCKET WHEEL (24)

The casing is installed as above.

### CONTROL LEVER (39) AND SWITCH (33) DETECTING TIGHT TAPE

- Assemble following the disassembly procedure in the opposite order, without locking the two attaching screws (34) of switch (33).
- Press hard on tight tape lever (40) as shown by arrow (A).
- Insert the 0.2 mm shim in the gap provided for this purpose between lever (39) and switch wafer (33).
- Press fully on switch (33) as shown by arrow (B) but without excessive force.
- In this configuration, lock both attaching screws (34) of switch (33).
- Release tight tape lever (40) and remove the 0.2mm shim.
- Check the operation of switch contact (33) by pressing tight tape lever (40)



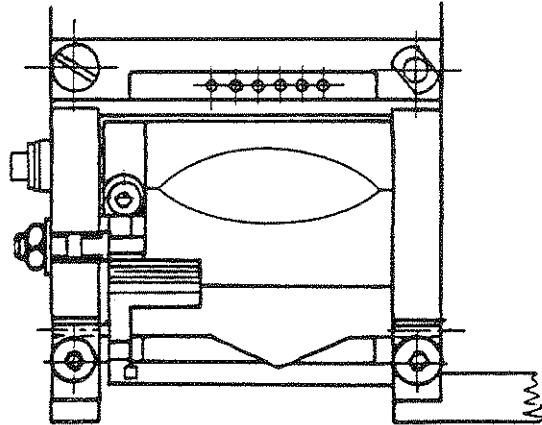
## 5.3 FINAL TESTING

- Repeat the initial testing described previously.

## 6 – TAPE PUNCH

### 6.1 INITIAL TESTING

- Check the condition of the parts.
- Check that the tape presser opens and closes.



- Withdraw the drive pawl from the ratchet and, holding it back, check the movement of the parts.
- Check the condition of the wiring (connector or wires broken).
- Using an ohmmeter, check the windings of the solenoids and motor as shown in the table below :

Measurement points of connector	Resistance value (typical)
1/7 EL 1	40 $\Omega$
2/7 EL 2	40 $\Omega$
3/7 EL 3	40 $\Omega$
4/7 EL 4	40 $\Omega$
5/7 EL 5	40 $\Omega$
6/7 FEED HOLE	40 $\Omega$
9/10 P.U.	1500 $\Omega$ *
11/12 TAPE FEED	14 $\Omega$
13/12	$\infty$
13/14 MOTOR	25 $\Omega$

\* punch connected to unit.

The adjustments can only be checked after some of the parts have been removed. The following paragraph describes disassembly allowing the detection of any defect and their gradual adjustment during assembly.

## 6.2 DISASSEMBLY - ASSEMBLY - ADJUSTMENT

### 1) Disassembly

#### CHAD GUIDE

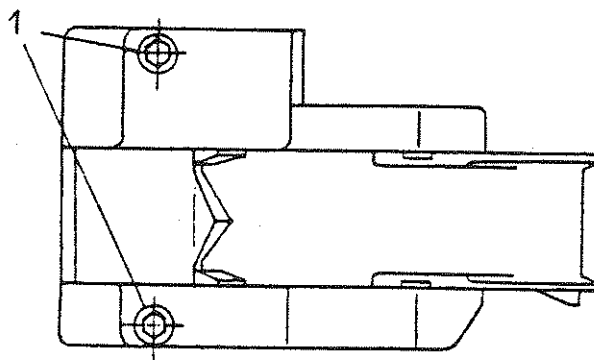
- Remove the knurled knob from the chad guide.
- Remove the chad guide.

#### BASE PLATE

- Remove the three attaching nuts from the base plate of the TAPE PUNCH.
- Remove the connector from its recess.
- Remove the base plate.

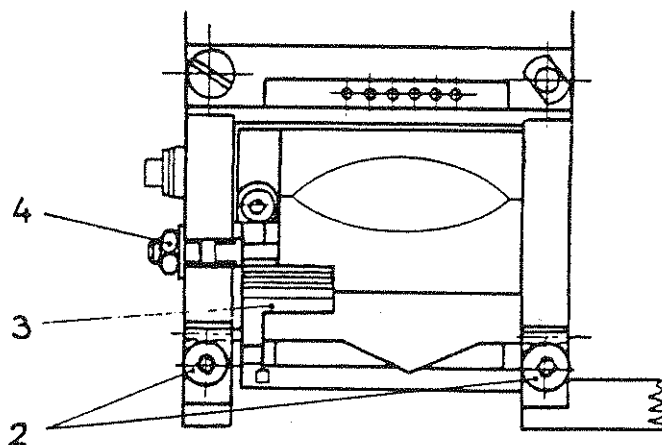
#### TAPE GUIDE

- Remove both attaching screws (1).
- Remove the tape guide.



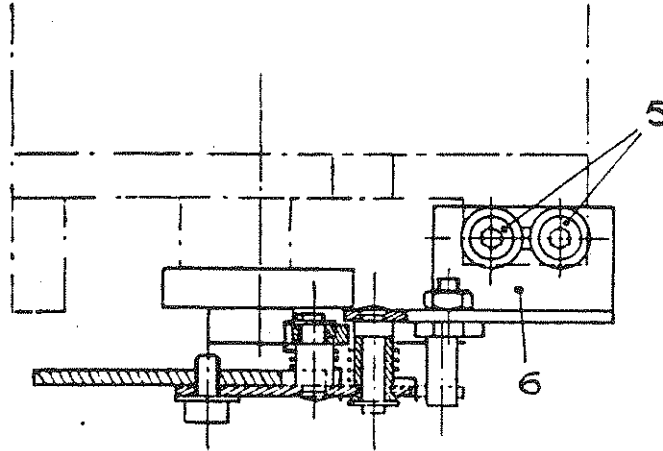
#### TAPE PRESSER

- Remove both attaching screws (2) together with the retaining plates.
- Release attaching nut (4) on the shaft of the locking pawl (3).
- Remove the tape presser assembly by tilting it to the front of the TAPE PUNCH.



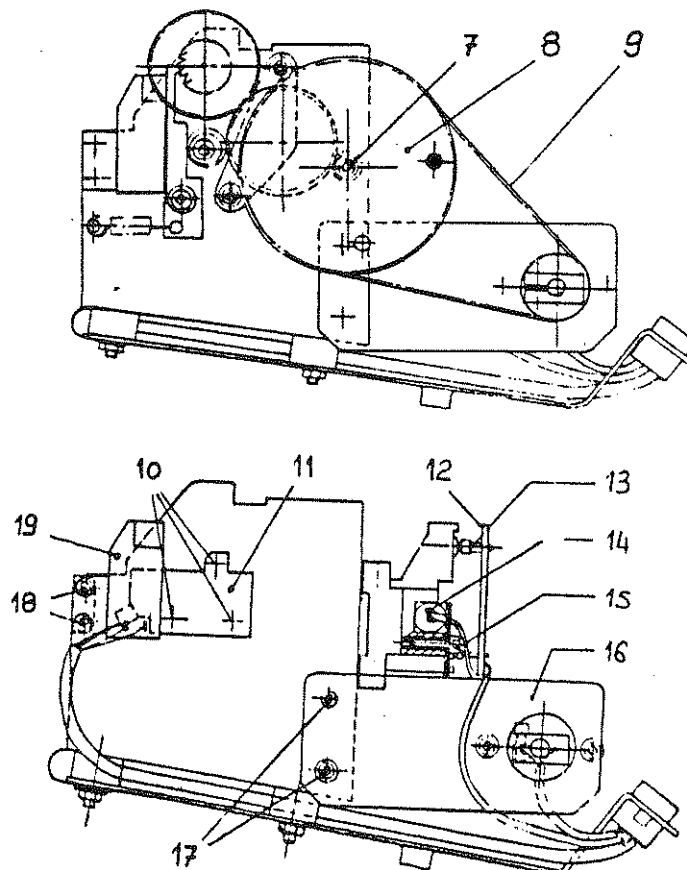
### PUNCH BACK-SPACER (6)

- Remove the two attaching screws (5).
- Remove punch back-spacer (6).



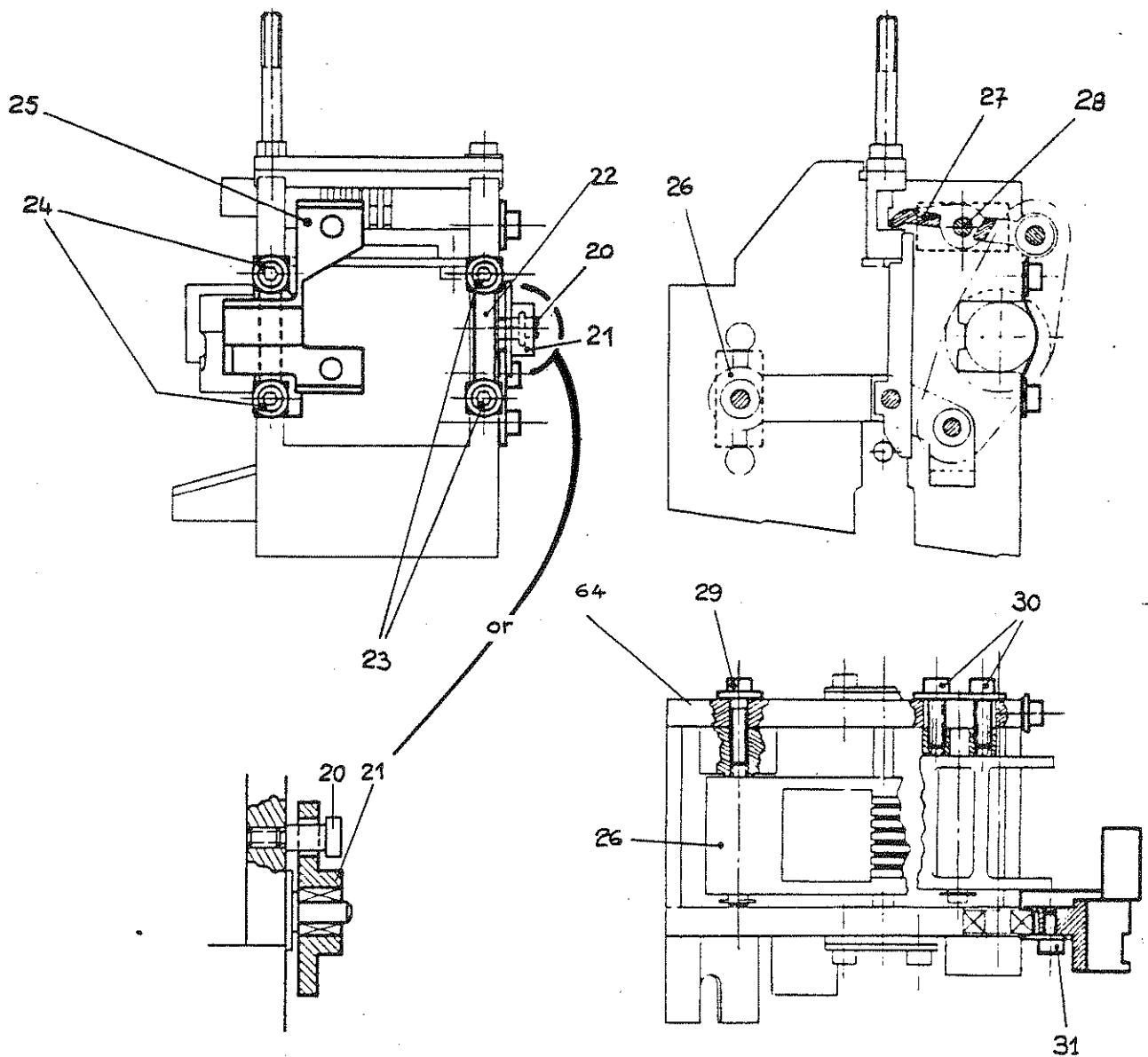
### ELECTRICAL ASSEMBLY

- Release belt (9) from the 90-tooth pulley (8) and remove it.
- Remove screw (7) and remove the 90-tooth pulley (8).
- Remove both attaching screws (18) and release the electromagnet (19).
- Remove the three punch solenoid attaching screws (10) and the block of six electro-magnets (11).
- Remove attaching screw (15) and the retaining plate, and release the coil (14).
- Squeeze the lock of each board support (13) and release the "synchronisation" board (12).
- Remove both attaching screws (17) and release the motor and flange assembly (16).

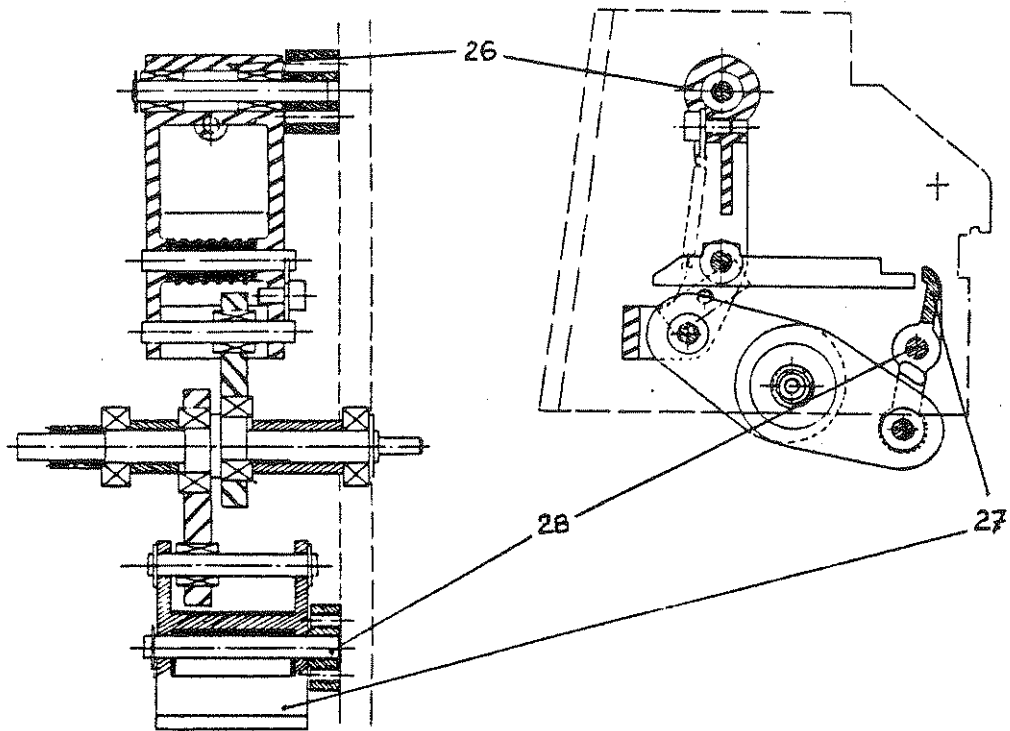


### CONNECTING ROD ASSEMBLY

- Remove retaining screw (20) with its spacer and remove the anti-backlash clutch (21).
- Loosen the screw (31), remove two attaching screws (24) and the ball bearing retaining clamp.
- Remove both attaching screws (23) and remove the retaining clamp.
- Remove both attaching screws (29) from pivot point (26) of the connection rod assembly and the plate (64).
- Remove both attaching screws (30) from shaft (28) of the punch return lever (27) and the plate (64)
- Release the punch return lever (27) upwards and remove the connecting rod assembly.

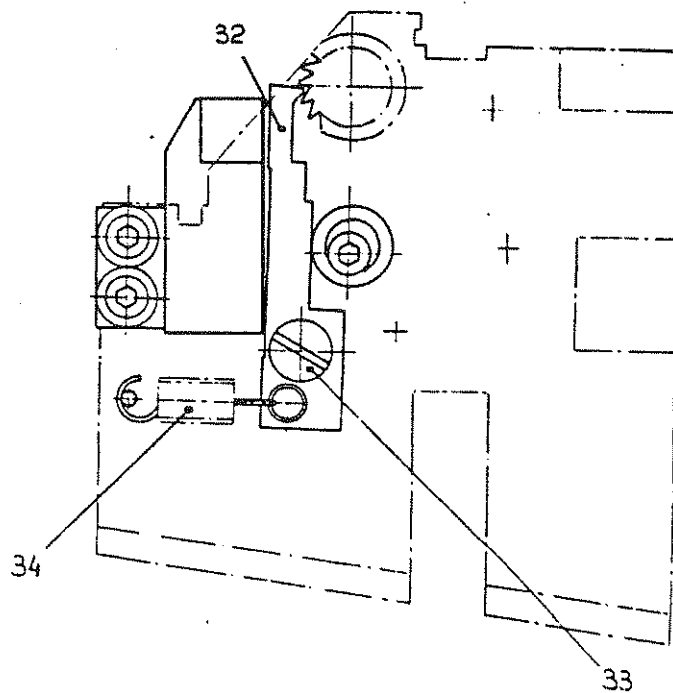


- In disassembling the connecting rod parts, refer to the following figure.



#### DRIVE PAWL (32)

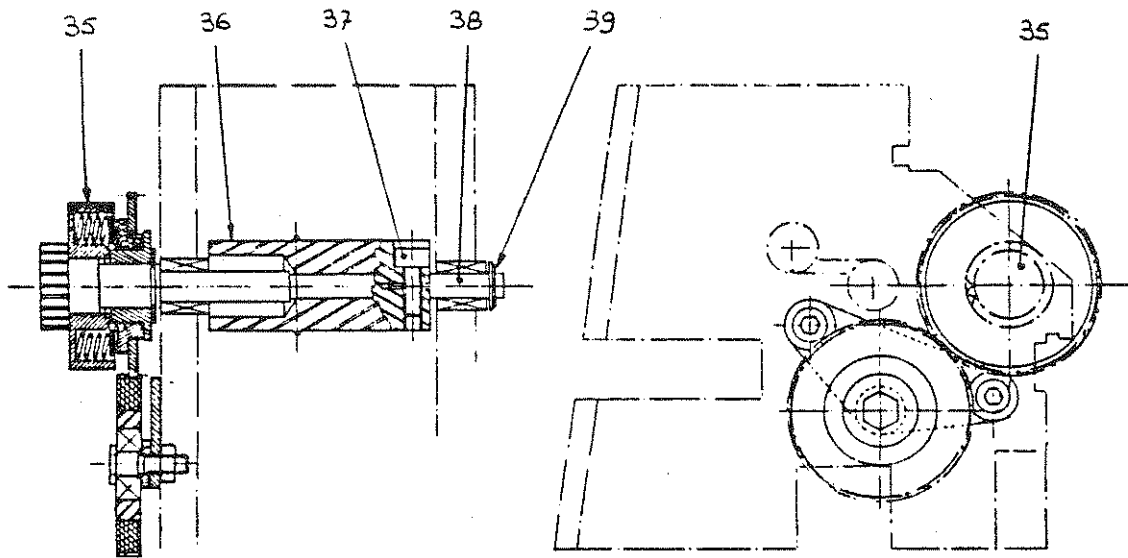
- Unhook the return spring (34).
- Remove the screw-shaft (33) by holding constantly the lever against the head of the screw (needle bearing).
- Remove the drive pawl (32) and its screw-shaft without separating them.





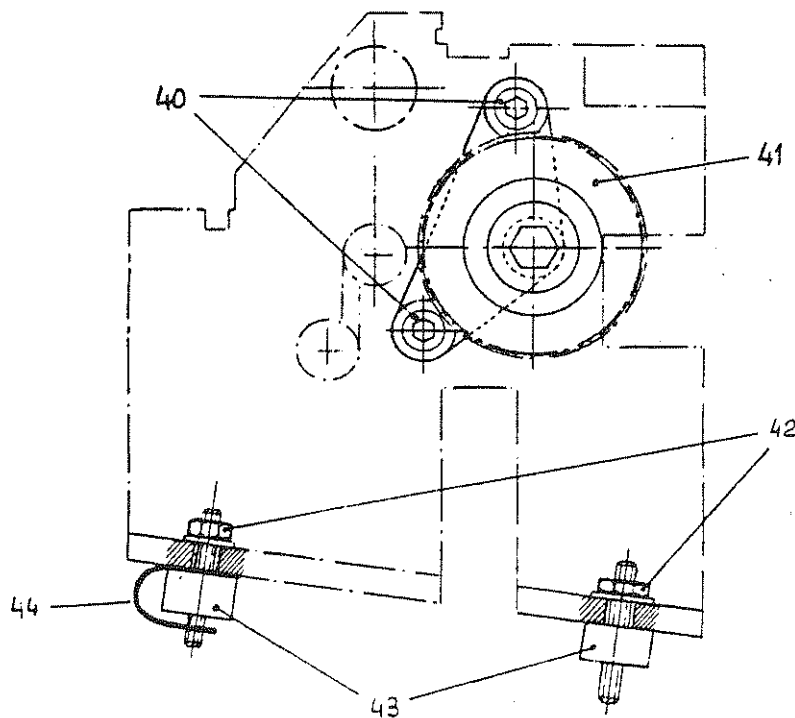
### FRICTION (35)

- Loosen locking screw (37) from sprocket wheel (36).
- Remove the "GRIP RING" locking ring (39) using the specialized pliers.
- Hold sprocket wheel (36) and remove shaft (38).
- Remove friction assembly (35).



### PINION (41) AND DAMPERS (43) ASSEMBLY

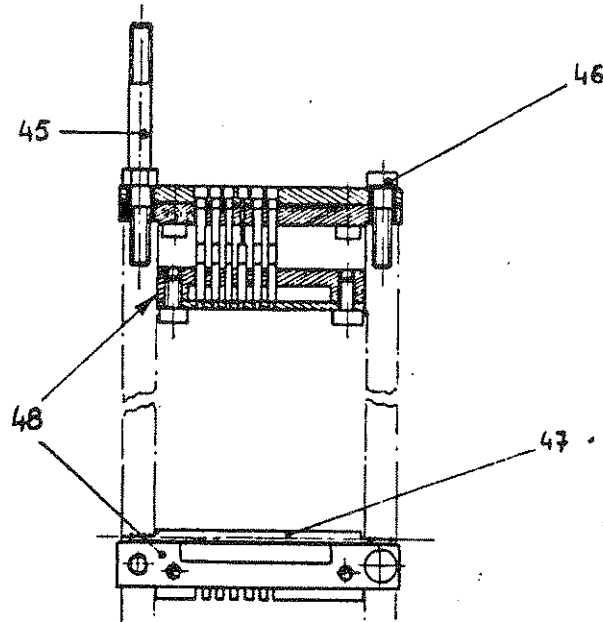
- Remove both attaching screws (40) and pinion assembly (41).
- Remove the three attaching nuts (42) from the dampers (43) and their washer.
- Remove the three dampers (43) taking care of the ground interconnection (44).



### PUNCH BLOCK (48) AND DEFLECTOR SHAFT (47)

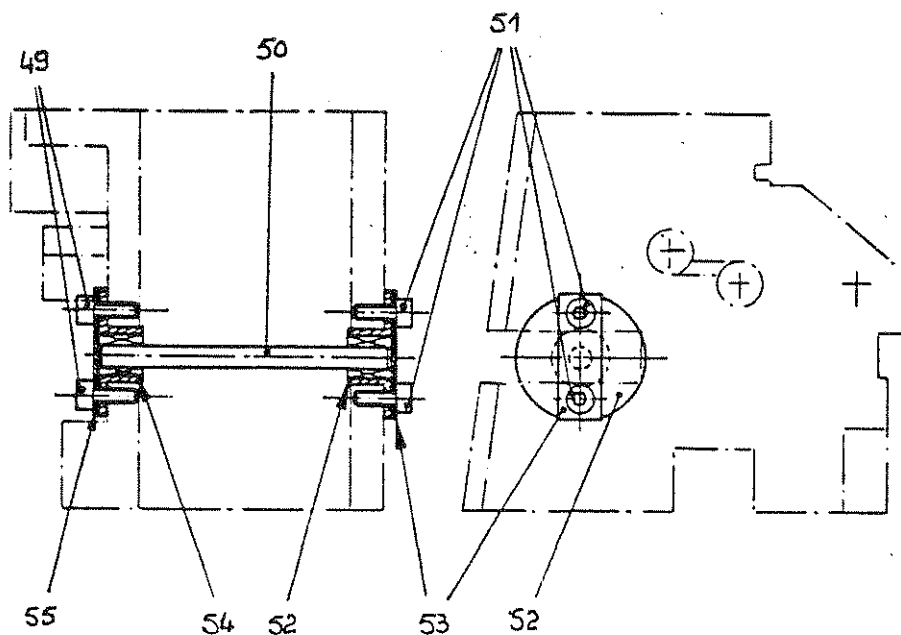
- Remove the attaching screw (46).
- Remove the column (45) attaching the chad guide.
- Release and remove the punch block (48) and deflector shaft (47).

CAUTION : The punch block assembly (48) cannot be disassembled.



### PUNCH SETTING LEVER RETURN SHAFT (50)

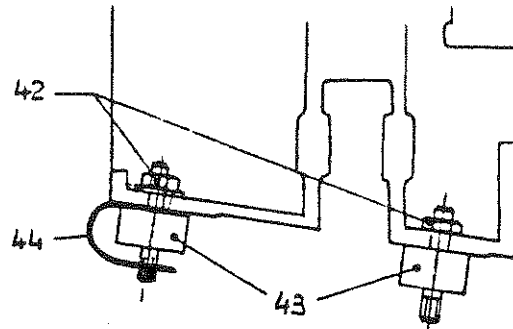
- Remove both attaching screws (49) and plate (55).
- Remove both attaching screws (51) and plate (53).
- Remove bearings (52) and (54).
- Remove the punch setting lever return shaft (50).



## 2) Assembly - Adjustment (the part indexes are identical to those relating to disassembly)

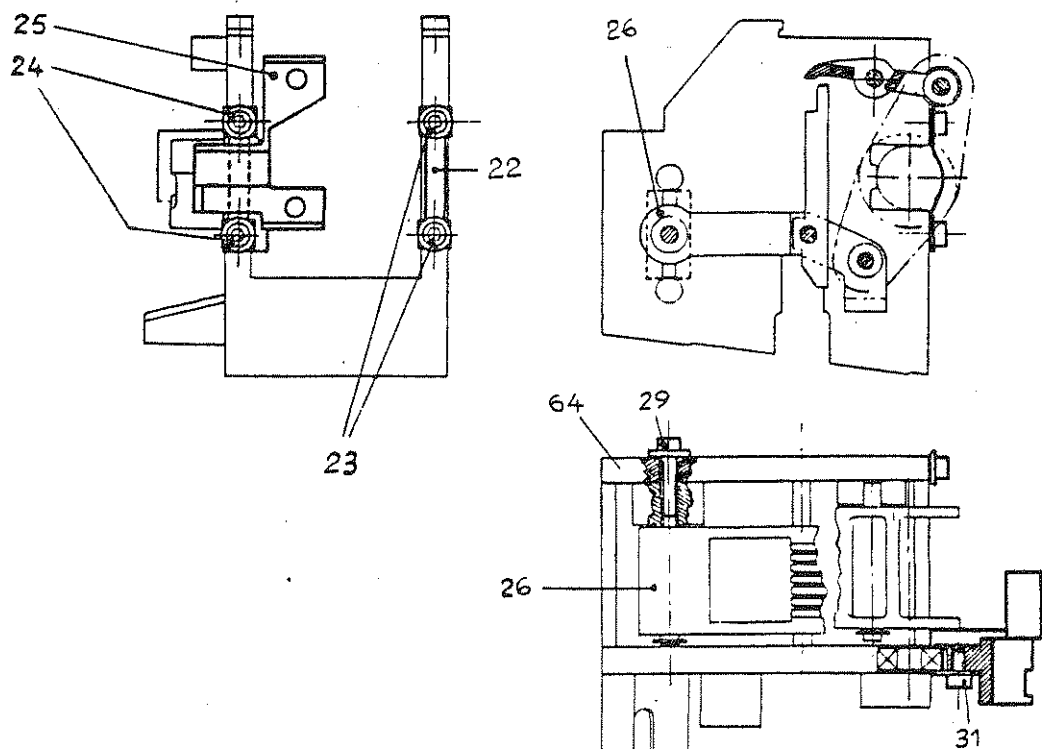
### DAMPERS (43)

- Replace the three dampers (43) by inserting the ground-link (44).
- Install the washers and the three attaching nuts (42) and lock them.
- Insert the free end of the ground-chassis link (44) into the lower threaded rod of damper (43).



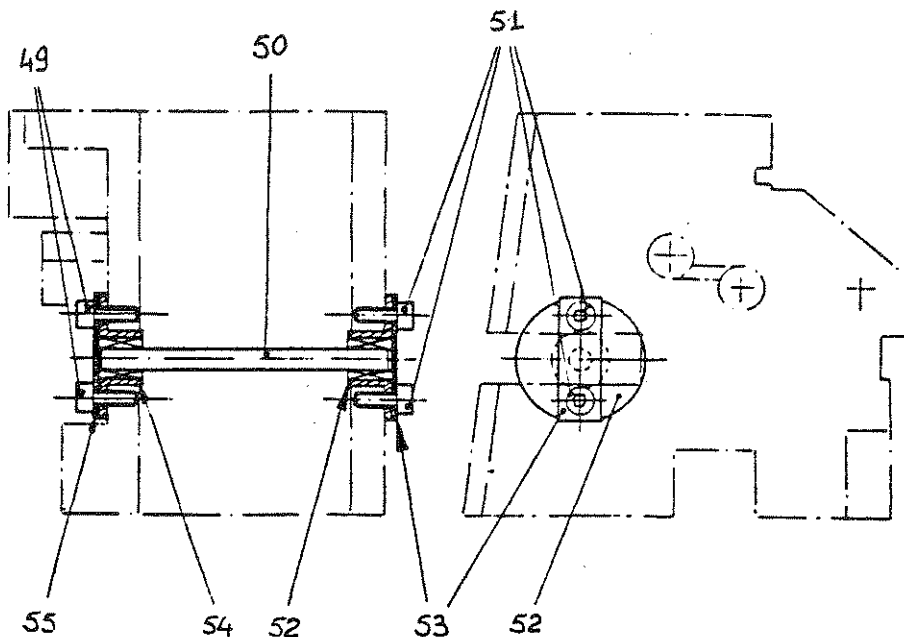
### CONNECTING ROD ASSEMBLY

- Insert the connecting rod in the structure and install the two attaching screws (29) of pivot point (26) with the plate (64).
- Moderately tighten these two screws while placing pivot point (26) approximately at the center of the hole.
- Place the connecting rod bearings in their recess.
- Install the clamp, the support (25) and both attaching screws (24) without locking them.
- Install clamp (22) and both attaching screws (23), fitted with their washers, without locking them.
- Tighten locking screw (31) and lock the attaching screws (23) and (24).
- Check that all the punch setting lever return springs are properly hooked.



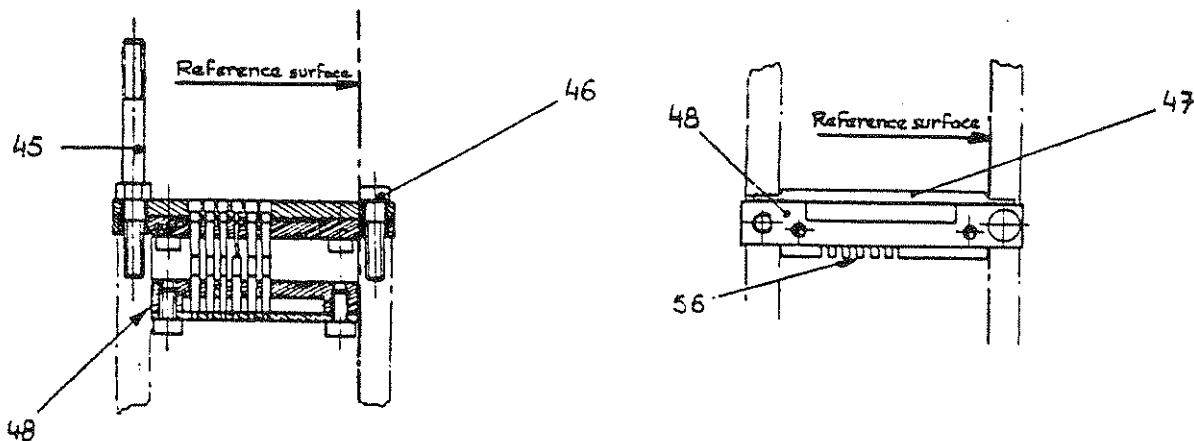
### PUNCH SETTING LEVER RETURN SHAFT (50)

- Lubricate the grooves of bearings (52) and (54) and the punch setting lever return shaft (50) along its entire length.
- Install bearing (52) fitted with plate (53) without tightening the attaching screws (51).
- Move the punch setting levers forwards to clear the location of shaft (50) and insert shaft (50) in bearing (52).
- Place bearing (54) fitted with plate (55) without tightening the attaching screws (49).



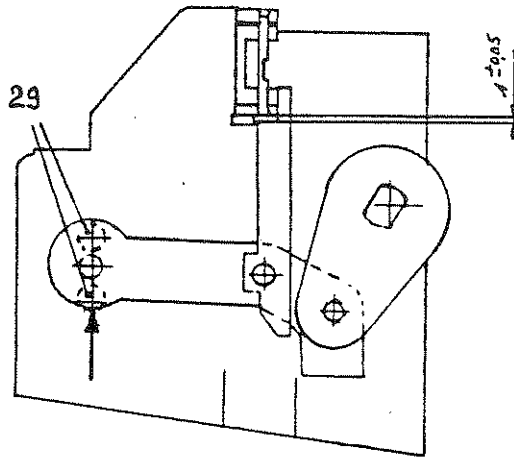
### PUNCH BLOCK (48) AND DEFLECTOR SHAFT (47)

- Install and center deflector shaft (47) in the grooves provided for it.
- Place the punch block (48) in its recess and engage the punch setting levers in comb (56).
- Install attaching screw (46) and column (45) retaining the chad guide.
- Lock screw (46) and column (45) while holding the punch block (48) against the reference surface.



### ADJUSTMENT OF PUNCH TRAVEL

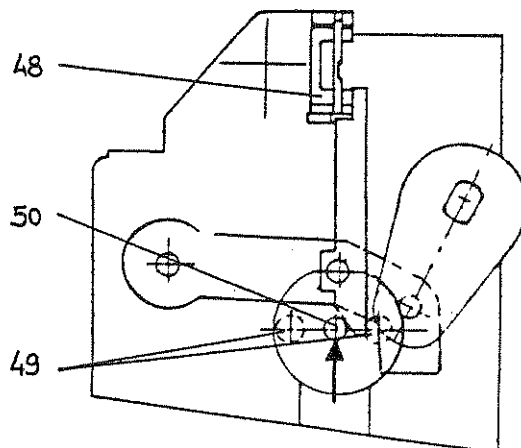
- Using the 90-tooth pulley wheel, bring the excentric to the lower neutral point and hold it in this position (see paragraph SETTING AND RETAINING OF LOWER NEUTRAL POINT).
- Engage the end punch setting levers under the punches and hold them in this position.
- Loosen the two attaching screws (29) and turn the assembly to obtain 0.95 to 1.05 mm between the heel of the punches and the punch setting levers.
- Lock the two attaching screws (29).



NOTE : This adjustment can be made using the tool 27 356 345-6.

### ADJUSTMENT OF THE PUNCH SETTING LEVER RETURN SHAFT

- Retain the eccentric at the lower neutral point.
  - Maintain the punch setting levers against the punch block (48) without any clearance.
  - Loosen the four attaching screws (49) and (51) of the punch setting levers return shaft bearings.
  - Bring return shaft (50) to bear hard against the punch setting levers heels.
  - Lock the four attaching screws (49) and (51).
  - Using tweezers, make sure there is no clearance between the punch setting levers and the punch block (48).
- IF ANY PLAY WHATSOEVER IS DETECTED, READJUST ACCORDINGLY.



NOTE : This adjustment can be made using the tool 27 356 345-6.

## ELECTRICAL ASSEMBLY

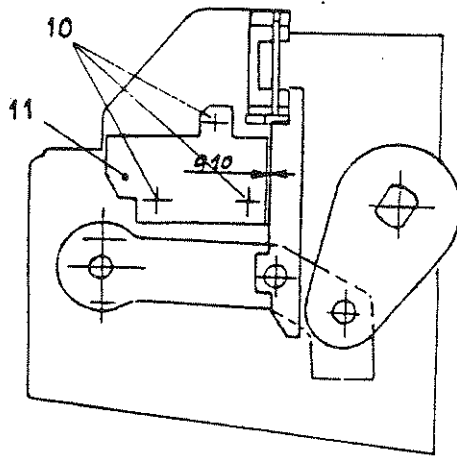
- Perform assembly by following the removal procedure in the opposite order, but do not install the 90-tooth pulley.

## BASE PLATE

- Carry out assembly following the disassembly procedure in the opposite order.

## ADJUSTMENT OF BLOCK OF 6 ELECTROMAGNETS (11)

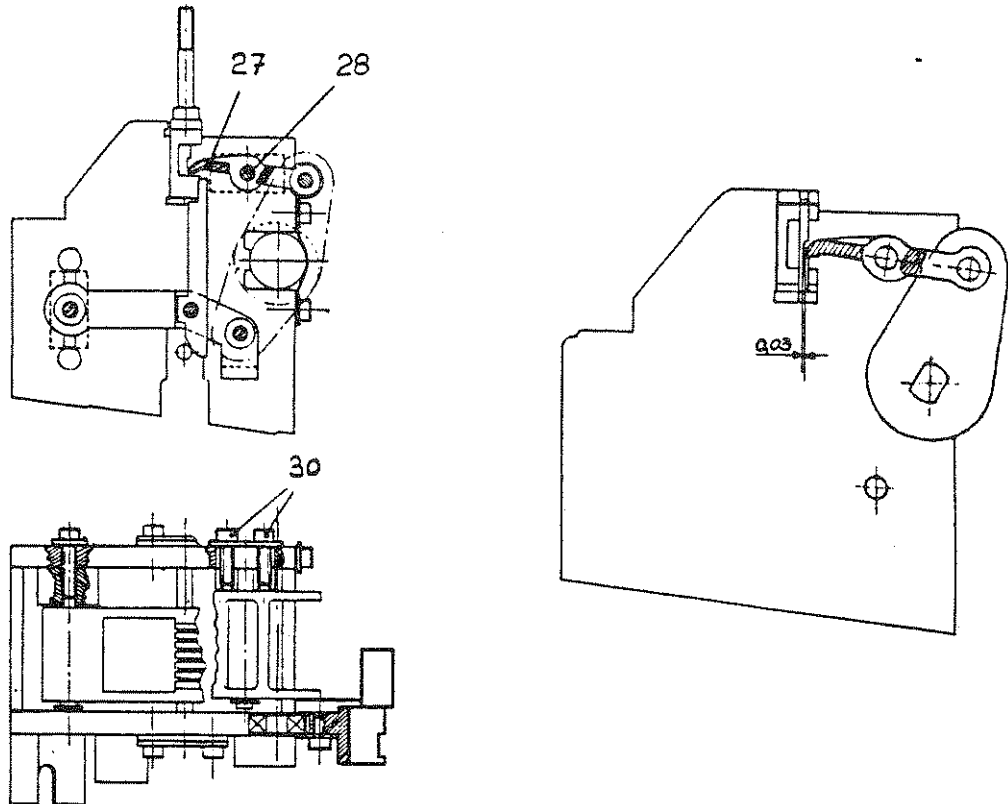
- Using the 90-tooth pulley, bring the eccentric to the lower neutral point and hold it in this position.
- Insert a 0.1 mm shim between the punch setting levers and the block of 6 electromagnets (11) through the hole provided for this purpose.
- Loosen the three attaching screws (10) of the block of 6 electromagnets.
- Energize the block of 6 electromagnets with 5 V d-c.
- Lock the three attaching screws (10), taking care that the block of 6 electromagnets does not move during locking.
- Check size 0.1 mm over the whole surface of the block of 6 electromagnets after the screws have been locked.
- Cut off the power supply to the block of 6 electromagnets.



NOTE : This adjustment can be made using the corresponding tools : spring balance, 0.1 mm shim, 5 V power supply, cable 27 356 416-4.

## ADJUSTMENT OF THE PUNCH RETURN LEVER

- Align the punches so that their flat surfaces are turned towards the return lever (27) and hold the eccentric at the lower neutral point.
- Bring the return lever (27) towards the punches.
- Place the two attaching screws (30) of shaft (28) of return lever (27) with the flat of the bushing turned upwards and install their plate, without locking them.
- Place a 0.03 mm shim under the end of the return lever (27) and the flat of the punches.
- Hold lever (27) against the shim and press hard towards the bottom of the punches.



- Lock the two attaching screws (30).
- Remove the 0.03 mm shim.
- Using tweezers, check that there is no clearance between return lever (27) and the lower flat of the punches.  
IF ANY PLAY IS DETECTED ON THE PUNCHES, READJUST ACCORDINGLY.
- Turn the 90-tooth pulley shaft and check that the return lever (27) does not drive the punches in its upwards motion.  
IF THE PUNCHES ARE DRIVEN BY THE RETURN LEVER, READJUST ACCORDINGLY.

**NOTE :** The adjustment can be made using the tool 27 338 119-3.

#### PINION ASSEMBLY (41)

- Assemble by following the disassembly procedure in the opposite order.

#### FRICTION (35)

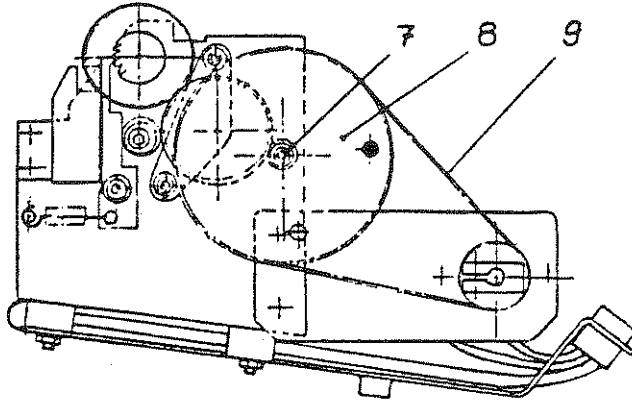
- Assemble by following the disassembly procedure in the opposite order.
- While installing the "GRIP RING" locking ring (39), do not forget to :
  - . insert the 0.5 mm washer between the bearing and the locking ring,
  - . provide a 0.05 to 0.1 mm lateral clearance between the locking ring and the washer abutting against the bearing.
- Do not tighten locking screw (37) of the sprocket wheel.
- Loosen the attaching screw of pinion assembly (41) and move it to obtain friction free meshing of the three pinions with minimum clearance.

### DRIVE PAWL (32)

- Assemble by following the disassembly procedure in the opposite order.

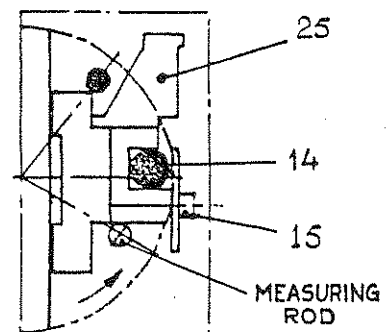
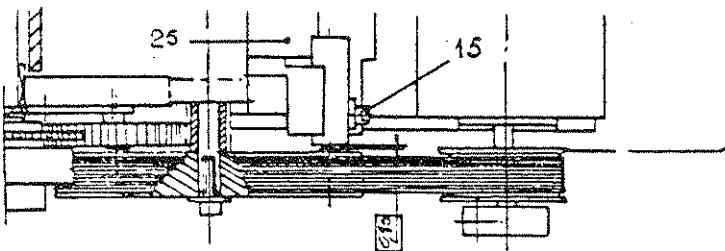
### 90-TOOTH PULLEY (8) AND BELT (9)

- Install 90-tooth pulley (8), its attaching screw (7) and its washer.
- Install belt (9) and check its tension by lifting it away from the motor.



### SYNCHRONIZATION (PICK-UP) DEVICE ADJUSTMENT

- Using the 90-tooth pulley, bring the eccentric to the lower neutral point and hold it in this position.
- Loosen the attaching screw (15) of the coil (14) and back off the coil slightly.
- Insert a 0.1 mm shim between the soft iron core of the 90-tooth pulley and the coil (14).
- Bring the coil to bear against the shim ensuring that the magnetic core and the coil are perpendicular.
- Lock attaching screw (15) in this configuration and remove the 0.1 mm shim.
- With the eccentric still held at the lower neutral point, loosen screw (7) attaching the 90-tooth pulley.
- Insert a 4 mm rod in the smooth hole of the 90-tooth pulley and bring it to abut against the lower part of support (25) of the coil.
- Lock screw (7) attaching the 90-tooth pulley.

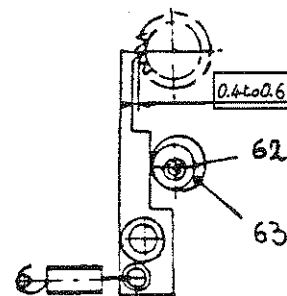
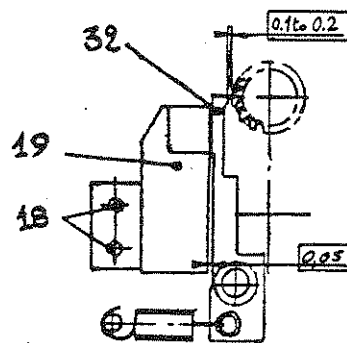


NOTE : This adjustment can be made using the tool 27 356 418-5.



### ADJUSTMENT OF DRIVE SYSTEM

- Loosen the two screws (18) attaching electromagnet (19) of the drive system.
- Place a 0.05 mm shim between the drive lever (32) and the lower part of electromagnet (19).
- Energize the electromagnet at 5 V.
- Make sure there is 0.1 to 0.2 mm clearance between the end of the drive lever and the top of the nearest tooth, by moving the electromagnet.
- Lock the two attaching screws (18) of the electromagnet in this configuration.
- Cut off the power supply of the electromagnet.
- Loosen the attaching screw (62) of out-of-center stop (63) of the drive lever.
- Adjust the eccentric to obtain 0.4 to 0.6 mm clearance between the drive lever and the bottom of the ratchet tooth.
- Lock attaching screw (62) of the out-of-center stop.
- Remove the adjusting shims.



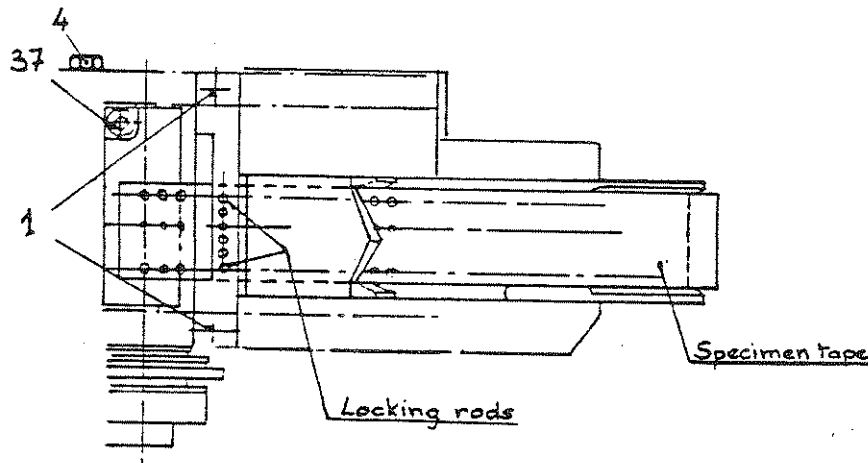
### TAPE GUIDE

- Assemble by following the disassembly procedure in the opposite order, but without locking the attaching screw (1).

### ADJUSTMENT OF PUNCH PITCH

- Make sure that screw (37) locking the sprocket wheel is loose and visible.
- Using another TAPE PUNCH, punch approximately 200 mm of "Z" combination and make sure that the tape obtained complies with specification DIN66016.
- Energize the motor at 24 V d-c.
- Insert the specimen tape through the punch block and over the sprocket wheel.

- Place two locking rods with a diameter of  $1.80 \pm 0.02$  mm in the end holes of the punch block and in the punched specimen tape.
- Move the tape guide so that the punched tape moves freely without unilateral friction or any fault in alignment.
- Lock the two attaching screws (1) of the tape guide.
- Insert the pins of the sprocket wheel in the sprocket holes of the specimen tape.
- Hold the tape engaged over the pins of the sprocket. **CAUTION** : Do not apply traction or translation movement to the tape while holding it on the sprockets ; the holes placed in the punch block would become oval thus making the tape unserviceable for this adjustment.
- Lock attaching screw (37) of the sprocket wheel.
- Remove the specimen tape.
- Cut off the power supply of the TAPE PUNCH motor.



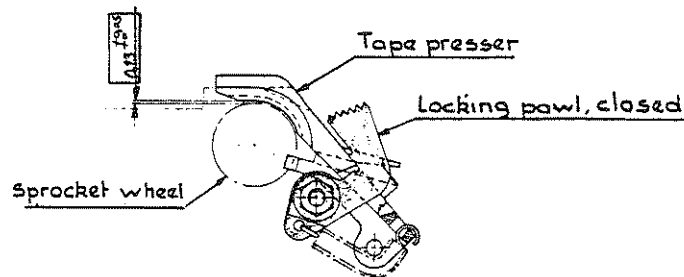
**NOTE :** This adjustment can be made using the corresponding tools: 2 rods, 1.8 mm diameter, and 27 338 121-3 .

#### TAPE PRESSER

- Assemble by following the disassembly procedure in the opposite order without locking nut (4) attaching the locking pawl.
- Make sure the tape presser shaft does not touch the drive electromagnet.

#### ADJUSTMENT OF TAPE PRESSER - SPROCKET WHEEL CLEARANCE

- Open the tape presser.
- Insert mylar tape (27 356 417-2), sprocket holed :
  - . length : approximately 200 mm
  - . width : 17.4 mm
  - . thickness : between 0.15 mm and 0.17 mm
- Close the tape presser.
- Insert a 0.05 mm shim between the tape presser and the lock.
- Press the lock.
- Lock the attaching nut (4) of the locking pawl.



#### CHAD GUIDE

- Make sure there is no chads in the punch block.
- Assemble by following the disassembly procedure in the opposite order.

#### TESTING OF PUNCH PITCH

- Assemble the TAPE PUNCH on a unit.
- Make at least 60 "letter" punchings.
- On the tape, make sure that the intervals between the center-to-center distances of the end holes of any sequence whatever of :

- . 10 pitches is between 25.15 and 25.65 mm
- . 50 pitches is between 126.1 and 127.9 mm

IF EITHER OF THE TWO MEASUREMENTS IS OUT OF TOLERANCES :

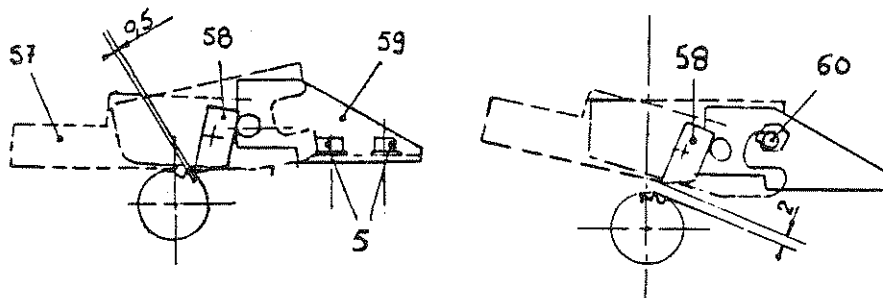
- . remove THE TAPE PUNCH from the unit,
- . remove the chad guide,
- . remove the tape presser,
- . RE-ADJUST THE PUNCH PITCH.

### PUNCH BACK SPACER

- Assemble by following the disassembly procedure in the opposite order, without locking the two attaching screws (5).

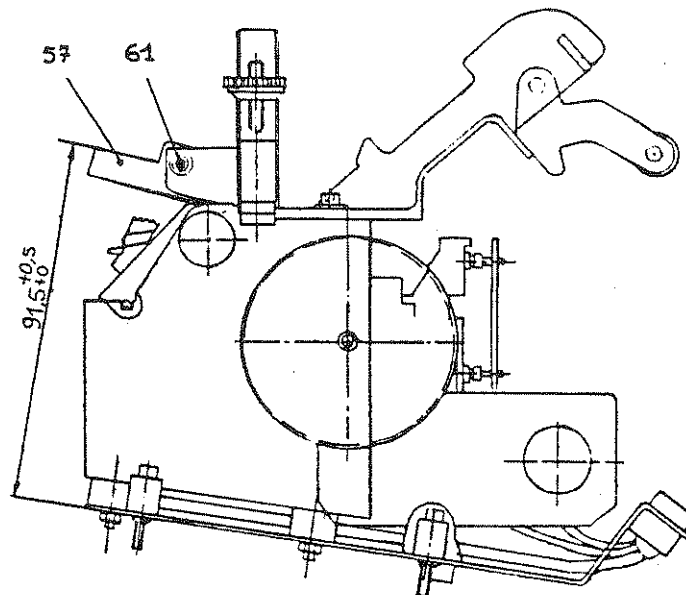
### ADJUSTMENT OF PUNCH BACK SPACER

- Energize the motor at 24 V.
- Place a 0.5 mm shim under the ratchet tooth.
- Press lever (57) and, by translating assembly (59), bring pawl (58) to abut against the shim.
- Lock the two attaching screws (5) of assembly (59).



- Release eccentric (60) and, with the eccentric moved forward, bring the pointer of pawl (58) to bear against a 2 mm shim placed over the tip of the tooth.
- Lock eccentric (60).
- Cut off the power supply of the motor.

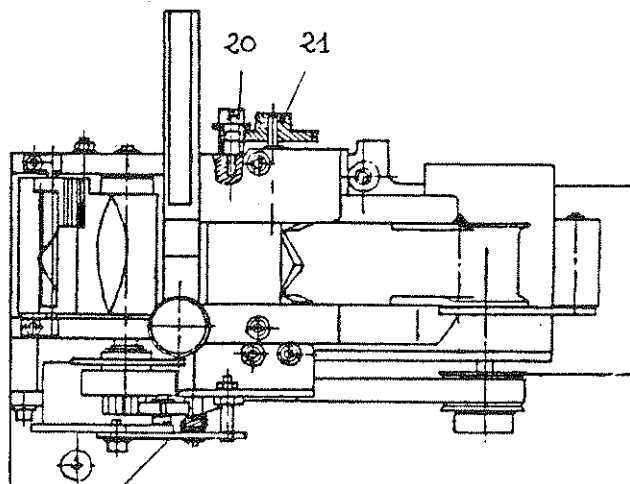
- Release screw (61) and, through the hole, move lever (57) to obtain 96.5 mm to 98 mm between the point of the lever and the bottom of the TAPE PUNCH base plate.



- Lock screw (61).

#### ANTI-BLACKLASH CLUTCH (21)

- Install anti-blacklash clutch (21).
- Install locking screw (20) and its spacer in the slot of anti-backlash clutch (21), provided for this purpose.
- Lock screw (20).



### 6.3 FINAL TESTING

- Repeat the initial testing described previously.

### SETTING AND RETAINING OF LOWER NEUTRAL POINT

In the paragraph entitled "Assembly - Adjustment" mention is made of the lower neutral point of the TAPE PUNCH. Proceed as follows :

- remove electronic board (12) from the synchronization device after gripping the lock of each support (13) (see "Disassembly" of ELECTRICAL ASSEMBLY),
- remove retaining screw (20) with its spacer and remove anti-backlash clutch (21) (see "Disassembly" of CONNECTING ROD ASSEMBLY),
- using the shaft of the 90-tooth pulley, bring the eccentric to the lower neutral point,
- check that the setting is correct by moving the 90-tooth pulley each side of the setting point.

The adjustment of this lower neutral point is facilitated by the use of tool 27 338 119-3.

## 7 – TAPE STORE

### 7.1 INITIAL TESTING

- Visually check the condition of the mechanical parts.
- Manually check the operation of the parts.

### 7.2 ASSEMBLY - DISASSEMBLY

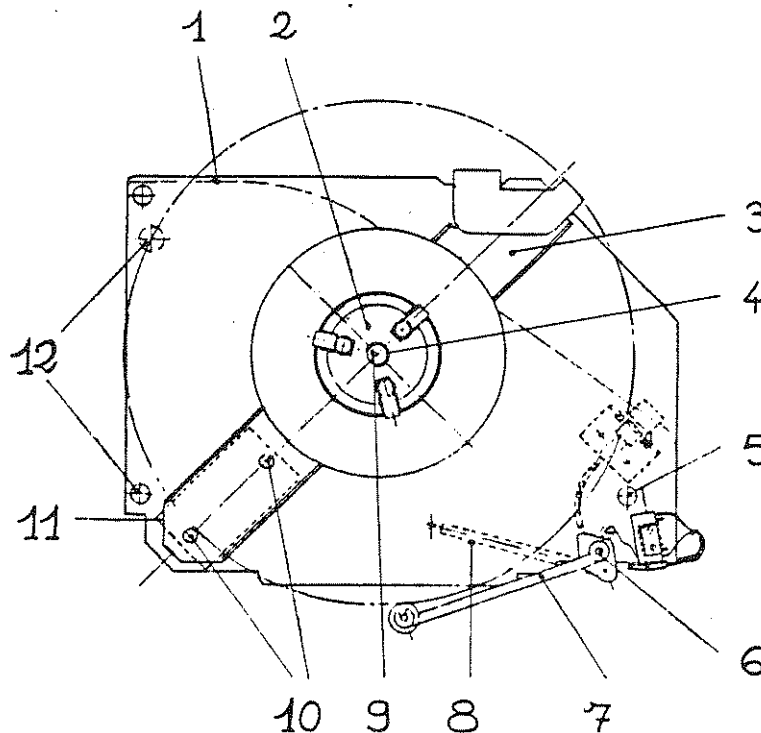
#### 1) Disassembly

##### GUIDE (3)

- Remove locking ring (4) and hub (2).
- Remove the two attaching screws (10) and plate (11).
- Remove guide (3).

##### COUNTER PLATE (1)

- Unhook and remove spring (8).
- Remove locking ring (6) and tape low lever (7).
- Remove three attaching screws (5) and (12).
- Remove counter plate (1).

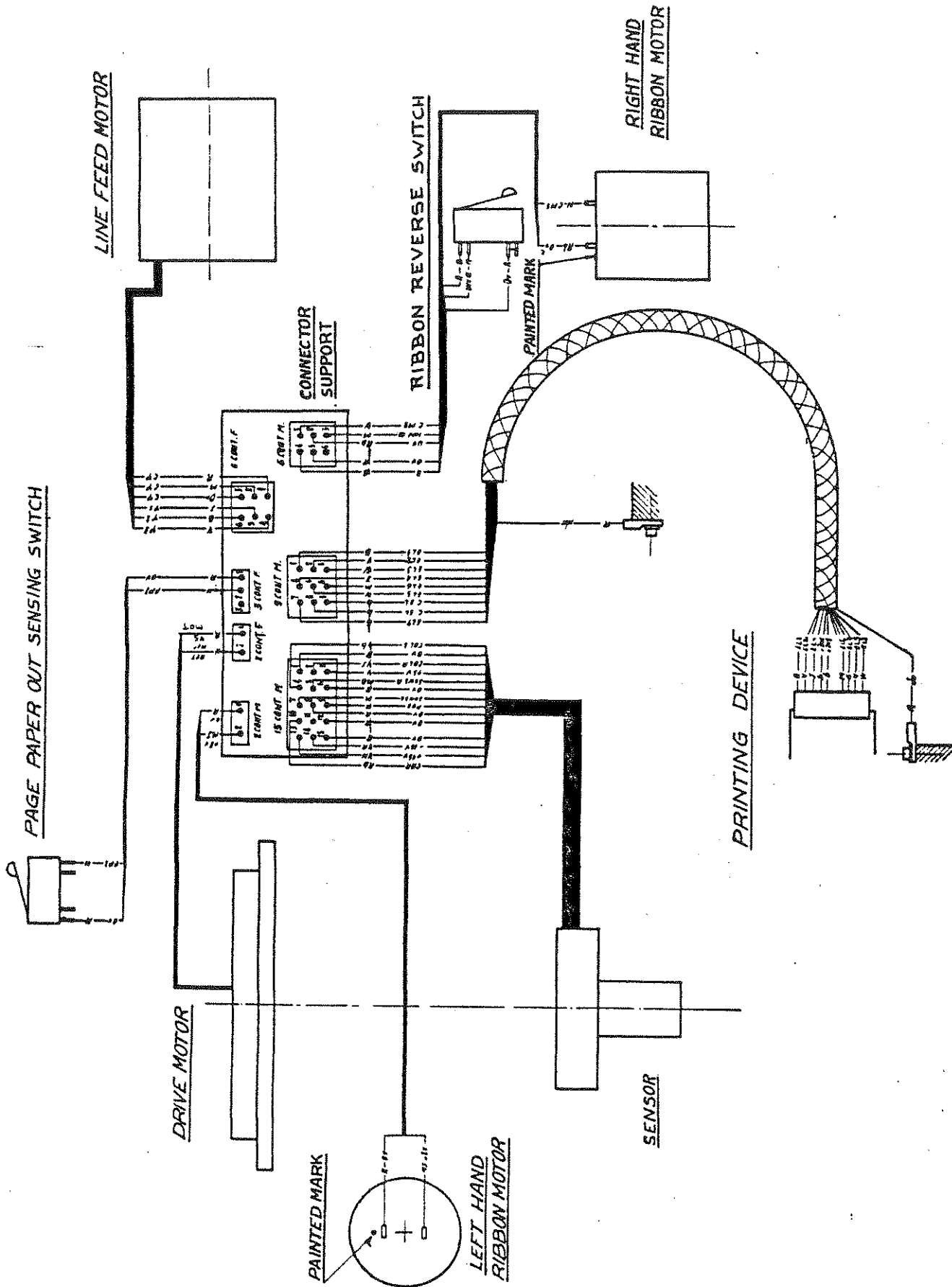


#### 2) Assembly - Adjustment

- Assemble by following the disassembly procedure in the opposite order while lightly lubricating shaft (9) of hub (2).

### 7.3 FINAL TESTING

- Repeat the initial testing described above.





## 8 – PRINTER

### 8.1 INITIAL TESTING

#### 1) Static testing

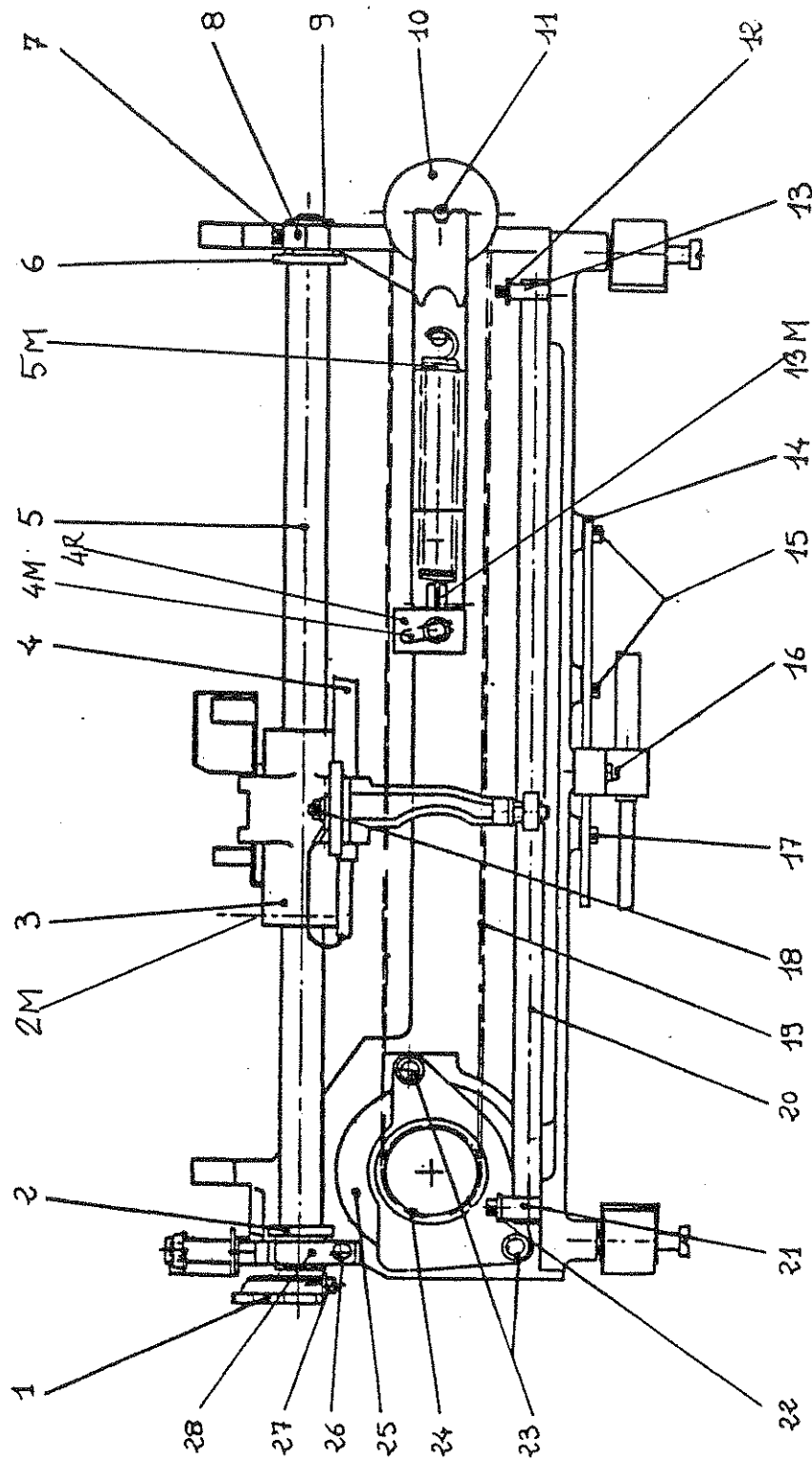
- Visually check the condition of the mechanical parts.
- Manually test the mechanical operation of all the parts.
- Check the continuity of the wiring, the movement of the switches, the operation of the motors and the inputs and outputs of the SENSOR, using an ohmmeter.

#### 2) Dynamic testing

##### TESTING OF DRIVE MOTOR, CARRIAGE AND SENSOR

- Energize the SENSOR with + 15 V, - 15 V, + 5 V and 0 V.
- Load the "CAR", "SENS L" and "COL L" outputs with a 3.9 K $\Omega$  resistance at + 5 V.
- Energize the DRIVE MOTOR with a 0 to + 12 V d-c power supply initially held at 0 V.
- Remove the belt (19).
- Gradually increase the voltage across the terminals of the DRIVE MOTOR until it moves very slowly and continuously.
- Check the signals supplied by the SENSOR ("CAR", SENS L" and "COL L").
- Reverse the direction of movement and check once again the signal supplied by the SENSOR.
- Replace the belt and check that the movement of the carriage is free of friction points by checking that the current passing through the DRIVE MOTOR is more or less constant.

NOTE : "CAR", "SENS L" and "COL L" signals phase relationship and voltages are indicated in the TECHNICAL DESCRIPTION, "SENSOR" paragraph.



### Testing of ribbon feed and reversal

- Set up the test connection using the "PIA IMP" board connected to the RIGHT HAND RIBBON and LEFT HAND RIBBON.
- Install a PRINTING DEVICE on the CARRIAGE with a ribbon.
- Energize the card with + 12 V, - 12 V, + 5 V and 0 V.
- Set the "Cde AV. RUB" input to + 5 V through a 2.2 k resistor.
- Apply 0 V to the "Cde AV. RUB" input ; the ribbon moves.
- Check the operation of reversal in both directions.
- Alternately set the "Cde AV. RUB" input to 0 V and + 5 V to check the feed and stoppage of the ribbon.

## 8.2 DISASSEMBLY - ASSEMBLY - ADJUSTMENT

### 1) Disassembly

To remove the PRINTER modules, refer to the Field Maintenance Manual except as concerns the BASE ASSEMBLY described below.

CAUTION : During removal, do not loosen the painted screws, mainly items (12), (13), (20), (21), (22).

To disassemble a removed module, refer to the relative chapters of this document.

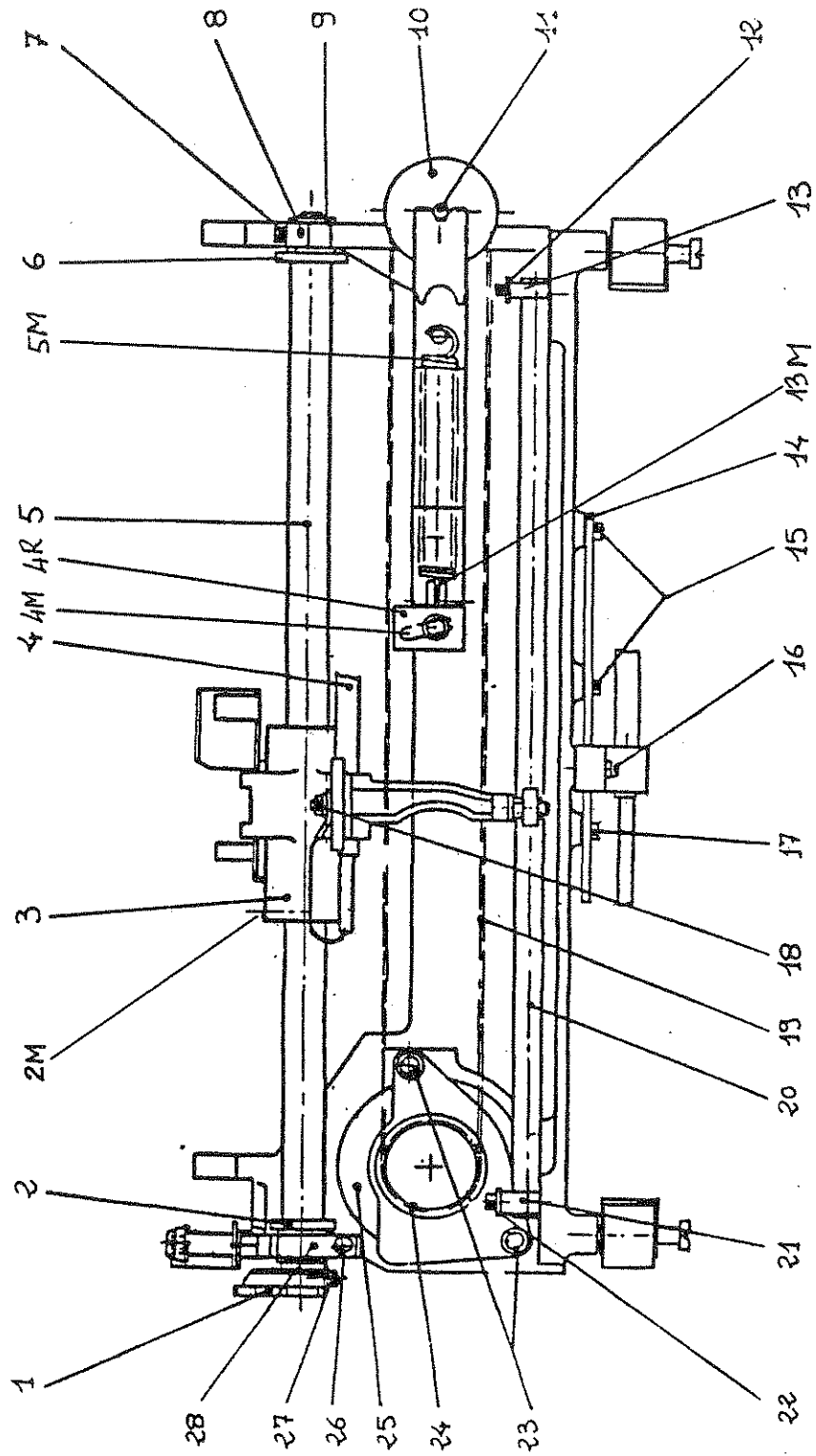
CAUTION : The PRINTING DEVICE, DRIVE MOTOR and SENSOR are not repairable in the workshop and must be returned to the factory.

### BASE ASSEMBLY

- Remove all PRINTER modules (refer to the Field Maintenance Manual).
- Remove screws (15) and (17) and remove connector support (14).

### CARRIAGE

- Remove screw (16) and remove sheath clamp.
- Loosen the screw (4 M) and release the stop (4 R).
- Tighten the spring slightly so that the pulley wheel (10) can be released.
- Take care of the pulley wheel (10) and its shaft (11) which are only held by the belt (19).



- Release the belt (19) from the pulley (24).
- Remove the spring (5M) taking care not to loose shaft (13 M).
- Remove screws (7) and (26) and clamps (8) and (28).
- Remove guide shaft (5) fitted with (1) (2) (3) (6) (9) (27).
- Disconnect CARRIAGE (3) from its guide shaft (5).
- Remove screw (18) and power supply cable (4).
- Remove the belt (19) by taking care to locate where the belt has been fixed on the carriage.
- Remove ribbon-guide after having removed the attaching screw (2 M).
- Detach the screws from the deformable body in order to install the ball sockets.
- Remove the other parts.

## 2) Assembly-Adjustment

### CARRIAGE(3)

- Assemble by following the disassembly procedure in the opposite order.
- Install the fixing of the belt (19) on the CARRIAGE at the same location.

CAUTION : Final tightening of the deformable body of the ball sockets is to be accomplished when the CARRIAGE is in position on its guide shaft, to obtain free movement, without clearance on the shaft.

### BASE ASSEMBLY

- Assemble by following the disassembly procedure in the opposite order.
- During assembly, lubricate the bearings, ball bearings and shafts lightly.

### PRINTER UNIT

- Disassemble the printer unit and carry out any adjustments required as defined in the Field Maintenance Manual.

## 8.3 FINAL TESTING

- Repeat the tests described under "Dynamic Testing".

#### 8.4 PRINTING HEAD

This module cannot be repaired in a workshop and must be returned to the factory.

#### 8.5 SENSOR

This module cannot be repaired in a workshop and must be returned to the factory.

#### 8.6 DRIVE MOTOR

This module cannot be repaired in a workshop and must be returned to the factory.

## 8.7 PAPER ADVANCE

### 8.7.1 Initial testing

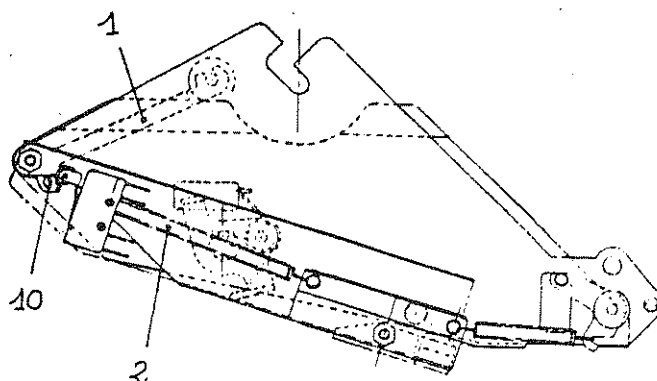
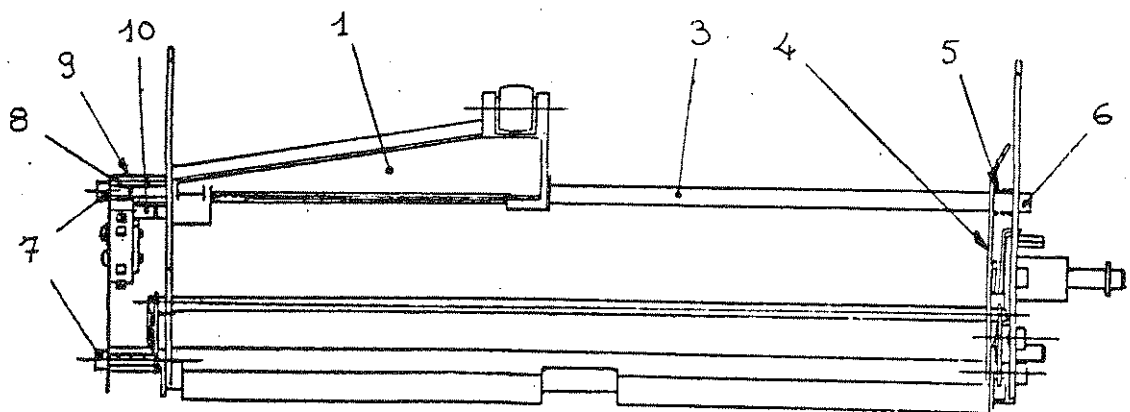
- Visually check the condition of the mechanical parts.
- Manually test the mechanical operation of the parts.

### 8.7.2 Disassembly - Assembly -Adjustment

#### 1) Disassembly

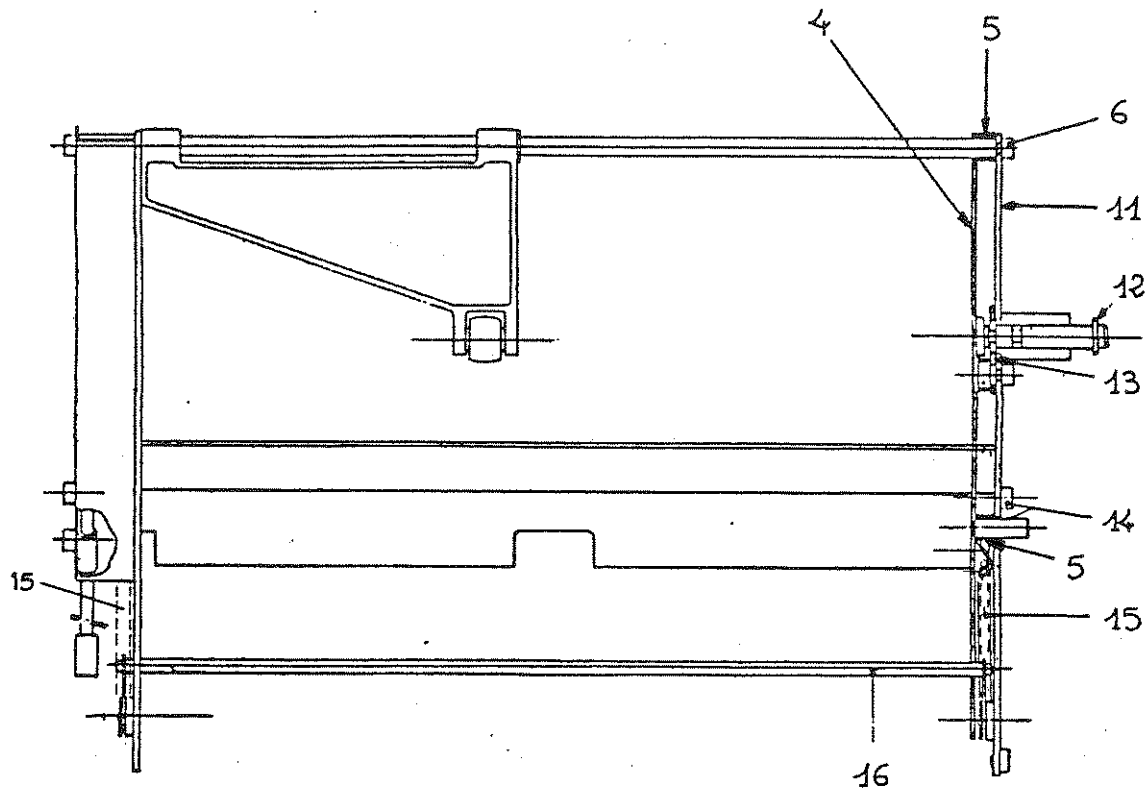
##### PAPER LOW LEVER (1)

- Remove the two attaching screws (7) from the casing (9) and remove the latter.
- Remove the screw (6) securing the shaft (3) of the paper low lever (1).
- Unhook spring (2) from its attaching point (10) on paper low lever (1).
- Remove spacer (8).
- Release the paper low lever (1) and its shaft (3) taking care of compression spring (5) pushing against moving flange (4).
- Remove the paper low lever (1) by releasing it from its shaft (3).



### COMPRESSION SPRINGS (5)

- Unhook return springs (15) of the tension bar (16).
- Remove locking ring (12).
- Remove the 3 screws (6) and (14) attaching flange (11).
- Release flange (11) by operating locking lever (13) of moving flange (4).
- Remove the compression springs (5) from their shaft.



### 2) Assembly

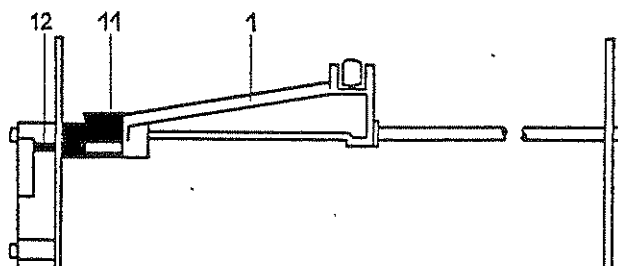
- Follow the disassembly procedure in the opposite order.
- Before assembling the compression springs (5), lubricate lightly the lock shaft of moving flange (4).

### 8.7.3 Final testing

- Manually check the mechanical operation of the parts.

### 8.7.4 Complementary data

PAPER LOW LEVER (1) with push (11)





### 1) Disassembly

- Remove the two attaching screws (7) from the casing (9) and remove the latter.
- Remove the screw (6) securing the shaft (3) of the paper low lever (1).
- Unhook spring (2) from its attaching point (12) on the push (11) of the paper low lever (1).
- Remove spacer (8).
- Release the push (11), the paper low lever (1) and its shaft (3) taking care of compression spring (5) pushing against moving flange (4).
- Remove the push (11) by releasing it from its shaft (3).
- Remove the paper low lever (1) by releasing it from its shaft (3).

### 2) Assembly

- Follow the disassembly procedure in the opposite order.

## 8.8. PRESSURE ROLLERS

### 8.8.1 Initial testing

- Visually check the condition of the mechanical parts.
- Manually test the mechanical operation of the parts.
- Check the pressure rollers adjustments, i.e. :

A = 24.9 mm to 25.1 mm

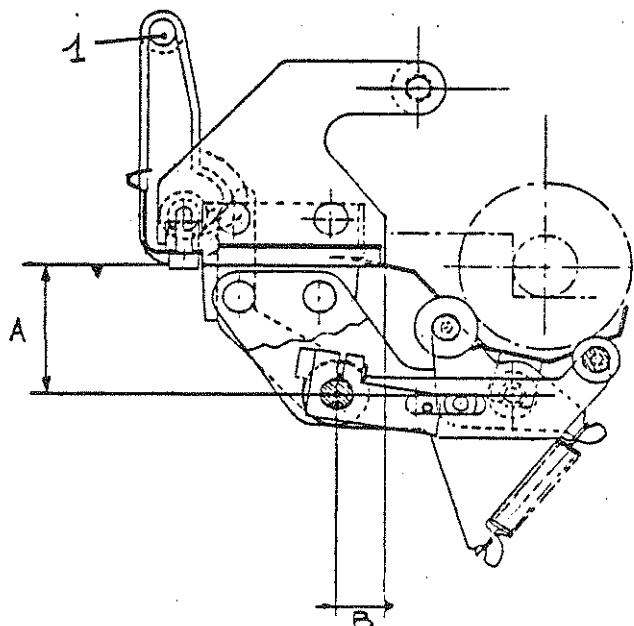
B = 8.9 mm to 9.1 mm

Refer to the following drawing and check both sides of the module.

NOTE 1 : The side marked " ▲ " is the reference surface.

NOTE 2 : The check can be made using the tool 23 106 762-7.

- Assemble the module on a PRINTER and check that the PRESSURE ROLLERS clear or press against the PLATEN depending on the position of control lever (1).

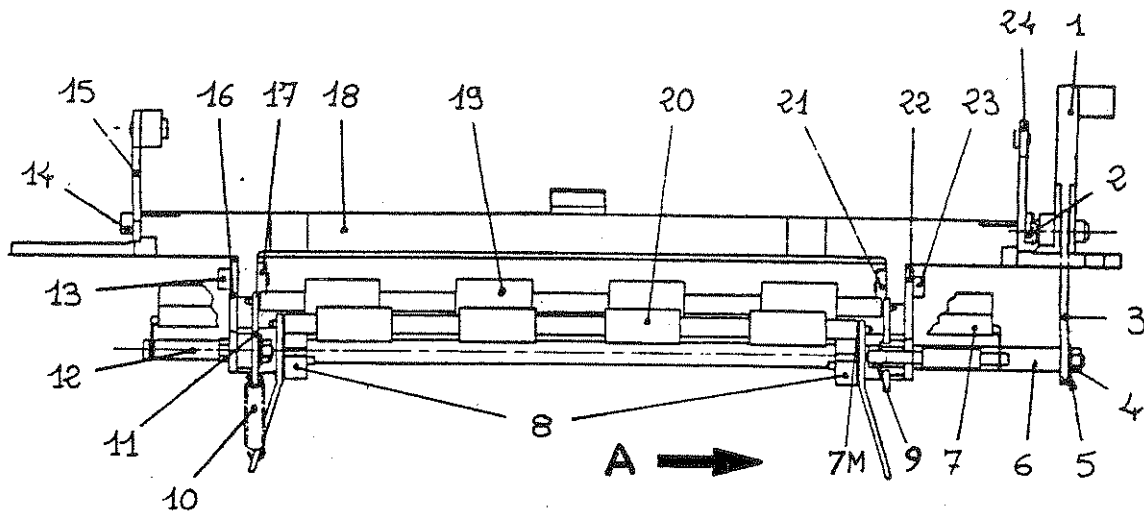


## 8.8.2 Disassembly - Assembly -Adjustment

### 1) Disassembly

#### CONTROL LEVER (1)

- Press spreader lever (3) of PRESSURE ROLLERS (19) and (20) to clear the groove of control lever (1).
- Release control lever (1) from its pivoting shaft.



NOTE : See at end of paragraph the pressure rollers replacement.

#### PIVOTING SHAFT (6) OF PRESSURE ROLLERS (19) AND (20)

The assembly :

- Remove deflector, tear-blade and holding clamps of the platen.
- Remove the deformable hub of the line feed motor pulley.
- Release belt at the line feed motor level.
- Remove platen.
- Remove nut (4) and washer (5).
- Release spreader lever (3) of PRESSURE ROLLERS (19) and (20).
- Loosen the clamps (8).
- Release pivot shaft (6) of PRESSURE ROLLERS (19) and (20) taking care of the parts which come free.

#### PRESSURE ROLLERS (19) AND (20)

- Remove pivoting shaft (6) of PRESSURE ROLLERS (19) and (20).
- Unhook the two springs (10).
- Remove the smaller diameter PRESSURE ROLLER (20).
- Remove nut (9) securing shaft (12) and its washer.
- Remove shaft (12) and PRESSURE ROLLER (19) pivoting arm (11).
- Release and remove large diameter PRESSURE ROLLER (19).

### BASE (18)

- Remove control lever (1).
- Remove the two attaching screws (14) and remove the support (15).
- Remove the two attaching screws (2) and remove the support (24).
- Remove the two attaching screws (13) and plate (17) while holding flange (16) in position.
- Remove both attaching screws (23) and remove plate (21) while holding flanges (16) and (22) in position.
- Remove the pivoting assembly of PRESSURE ROLLERS (19 and 20) WITHOUT LOOSENING OR REMOVING ANY OF ITS PARTS.
- Remove base (18).

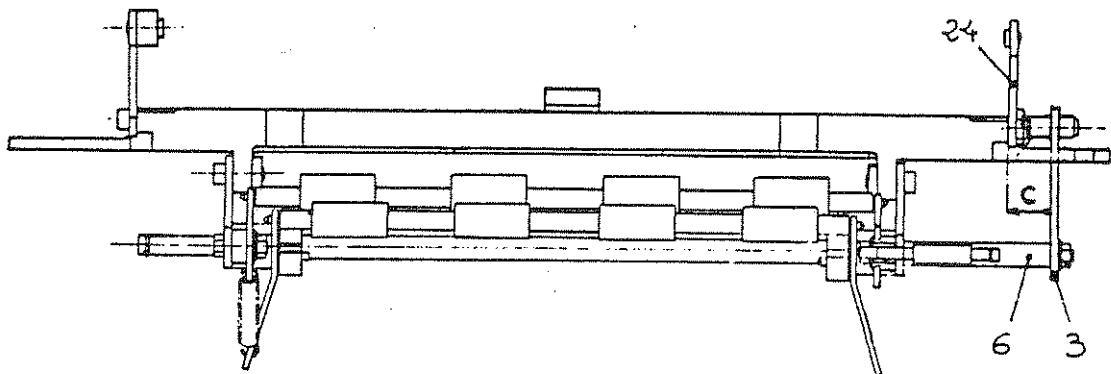
## 2) Assembly - Adjustment

### CONTROL LEVER (1)

- Assemble the control lever in the same order as for disassembly.

### PIVOTING SHAFT (6) OF PRESSURE ROLLERS (19 AND 20)

- Assemble by following the disassembly procedure in the opposite order, but :
  - do not tighten clamps (8),
  - do not fit channel (7) and control lever (1),
  - lubricate shaft (6), the shafts of PRESSURE ROLLERS (19) and (20) and the pivoting points.
- Adjust the pressure rollers spreader lever (3) :
  - assemble the PRESSURE ROLLERS on a without platen,



- move pivoting shaft (6) of the PRESSURE ROLLERS to obtain a dimension (C) of 11 to 12 mm between the inner surface of flange (24) and the inner surface of PRESSURE ROLLERS spreader lever (3),
- do not tighten the clamps (8) and make sure the dimension does not change.

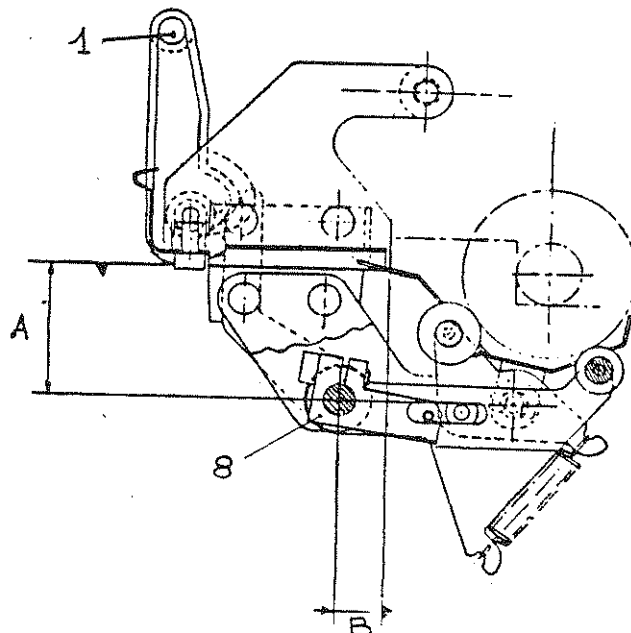
- Adjust the PRESSURE ROLLERS :
  - with the PRESSURE ROLLERS still assembled on the PRINTER,
  - install control lever (1),
  - fit the PLATEN on the PRINTER,
  - make sure that all the PRESSURE ROLLERS bear on the PLATEN,
  - make sure that the previous adjustment size has not changed,
  - tighten clamps (8),
  - operate control lever (1) and check that the PRESSURE ROLLERS clear the PLATEN along its entire length.  
IF NOT, CARRY OUT THE ADJUSTMENTS IN FULL AGAIN.
  - install channel (7).

NOTE : These adjustments can be made using the corresponding tools (23 106 762-7).

- PRESSURE ROLLERS (19) AND (20)
  - Assemble by following the disassembly procedure in the opposite order.

#### CASTING (18)

- Assemble by following the disassembly procedure in the opposite order, but :
  - do not tighten attaching screws (13) and (23),
  - do not fit control lever (1).
- Carry out the ADJUSTMENT OF THE FLANGES :



- ensure that dimension (A) is 24.9 to 25.1 mm and dimension (B) 8.9 to 9.1 mm,
- install control lever (1).

#### 8.8.3 FINAL TESTING

- Repeat the initial testing described above.

## 8.9 PLATEN

### 8.9.1 Initial testing

#### 1) Static testing

- Visually check the condition of the mechanical parts.
- Manually test the operation of the parts.

#### 2) Adjustment

- Using shims, check the 0.1 to 0.2 mm clearance between bushing (3) and spacer (12) (see Assembly-Adjustment).

### 8.9.2 Disassembly - Assembly - Adjustment

#### 1) Disassembly

##### BUSHING (3)

- Remove locking ring (1) and washer (2).
- Remove bushing (3).

##### PLATEN (6)

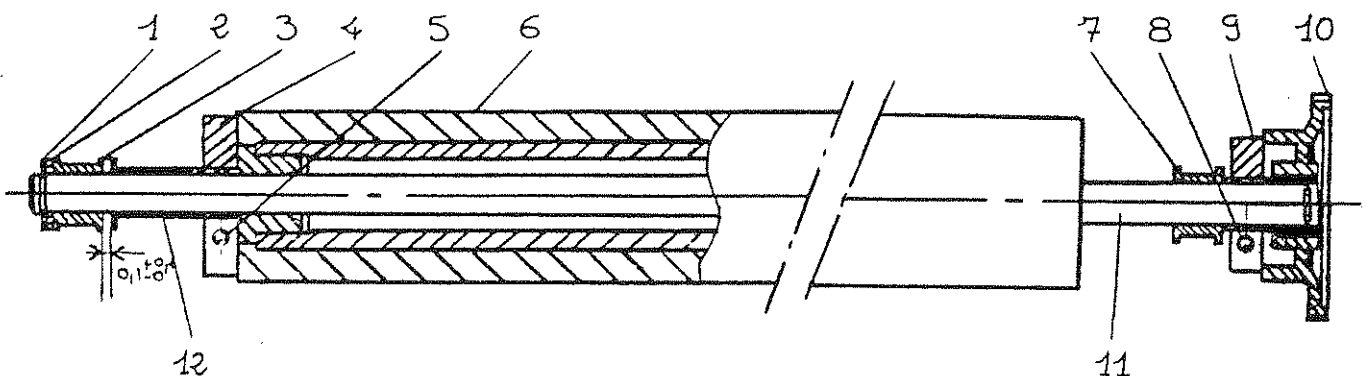
- Remove bushing (3).
- Remove spacer (12) and loosen screw (5) of clamp (4).
- Remove the PLATEN (6).

##### CAST 45-TOOTH PULLEY (10)

- Loosen screw (8) of clamp (9).
- Remove the 45-tooth pulley (10).

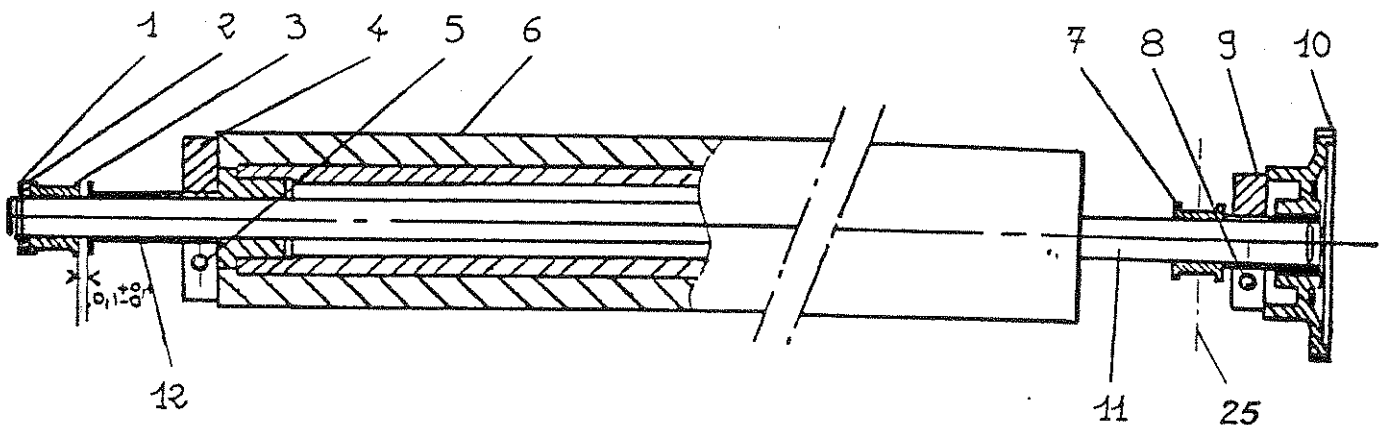
##### BUSHING (7)

- Remove 45-tooth pulley (10).
- Remove bushing (7).



## 2) Assembly - Adjustment

- Assemble by following the disassembly procedure in the opposite order.
- During the assembly of bushings (3) and (7), lubricate lightly shaft (11).
- During the assembly of the PLATEN (6) or of the 45-tooth pulley (10), adjust the clearance between bushing (2) and spacer (12) as follows :
  - assemble the PLATEN on a PRINTER base,
  - insert a 0.1 mm shim between bushing (2) and spacer (12),
  - tighten screw (5) of clamp (4),
  - bring the 45-tooth pulley (10) to bear against bushing (7),
  - tighten screw (8) of clamp (9).



### Replacement of PRESSURE ROLLERS (19) and (20) (See figure page 48)

- Remove assembly comprising : deflector, PLATEN holding clamps, strip and strip supports, by removing screws such as (25).
- Remove the clamp of the LINE FEED MOTOR pulley in order to release the belt.
- Remove the PLATEN.
- Remove channel (7).
- Apply a slight pressure on the shaft support of the front PRESSURE ROLLERS (19 and 20), at (7M) as indicated by arrow A, in order to release it.
- Loosen nut (9).
- Release the shaft of large diameter PRESSURE ROLLERS, proceeding in the same way as for the small diameter PRESSURE ROLLERS.

NOTE : This operation requires no adjustments.

### 8.9.3 Final testing

- Manually check the rotation of bushings (3) and (7), of washer (2) and of spacer (12).

#### 8.9.4 Complementary data

##### 8.9.4.1 PLATEN (Assembly reversed)

###### 1) Disassembly

###### BUSHING (2)

- Remove locking ring (1).
- Remove bushing (2).

###### PLATEN (6)

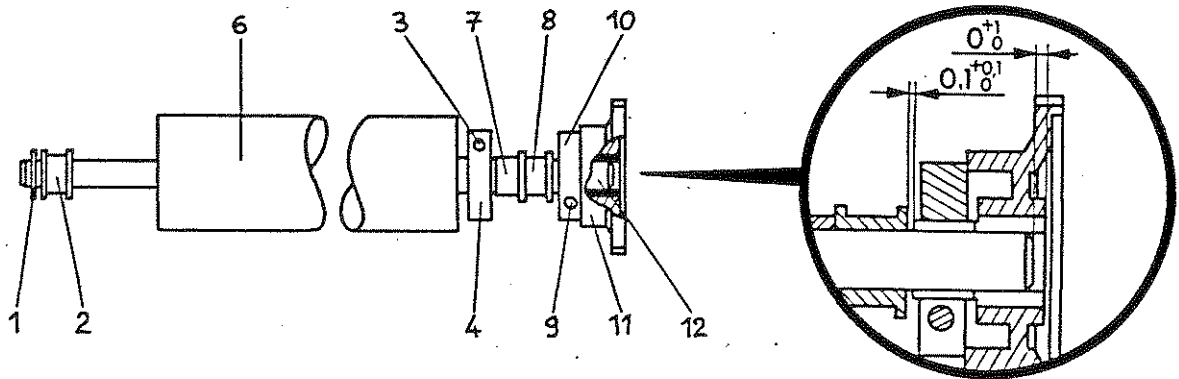
- Remove bushing (2).
- Loosen screw (3) of clamp (4).
- Remove the platen (6).

###### CAST 45 - TOOTH PULLEY (11)

- Loosen screw (9) of clamp (10).
- Remove the 45-tooth pulley (11).

###### BUSHING (8)

- Remove the 45-tooth pulley (11).
- Remove bushing (8) and spacer (7).



###### 2) Assembly - Adjustment

- Assembly by following the disassembly procedure in the opposite order.
- During the assembly of bushing (2) and (8), lubricate lightly shaft (12).
- During the assembly of the 45-tooth pulley (11), adjust the clearance between bushing (8) and the 45-tooth pulley (11) as follow :
  - . assemble the PLATEN on a PRINTER base,
  - . insert a 0.1 mm shim between bushing (8) and the 45-tooth pulley (11),
  - . tighten screw (3) of clamp (4),
  - . tighten screw (9) of clamp (10).

#### 8.9.4.2 PLATEN (Moulded around the shaft)

##### 1) Disassembly

###### BUSHING (2)

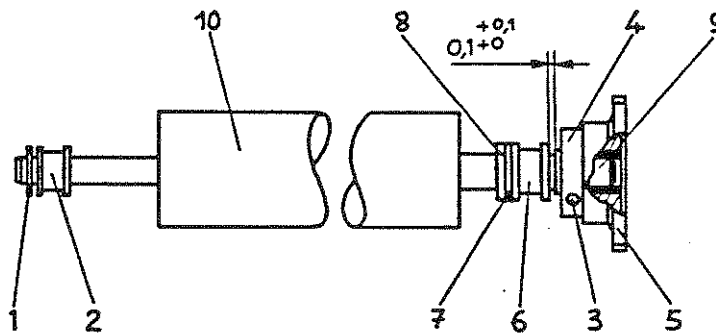
- Remove locking ring (1).
- Remove bushing (2).

###### CAST 45-TOOTH PULLEY (5)

- Loosen screw (3) of clamp (4).
- Remove the 45-tooth pulley (5).
- Remove the bushing (6), the washer (7) and the locking ring (8).

###### PLATEN (10)

- Remove bushing (2).
- Remove 45-tooth pulley (5).



##### 2) Assembly - Adjustment

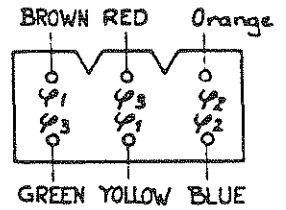
- Assembly by following the disassembly procedure in the opposite order.
- During the assembly of bushings (2) and (6), lubricate lightly shaft (9).
- During the assembly of the 45-tooth pulley (5), adjust the clearance between bushing (6) and the 45-tooth pulley (5) as follow :
  - . assemble the PLATEN on a PRINTER base,
  - . insert a 0.1 mm shim between bushing (6) and the 45-tooth pulley (5),
  - . tighten screw (3) of clamp (9).



## 8.10 LINE FEED MOTOR

### 8.10.1 Initial testing

- Visually check the condition of the mechanical parts.
- Manually test the running of motor (5).
- Check the continuity of motor (5) windings using an ohmmeter :



The value read on the meter should be approximately  $20\Omega$ .

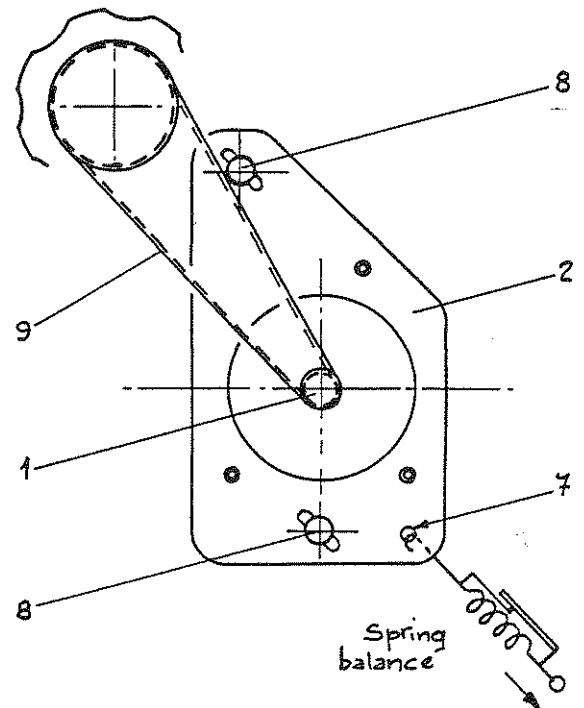
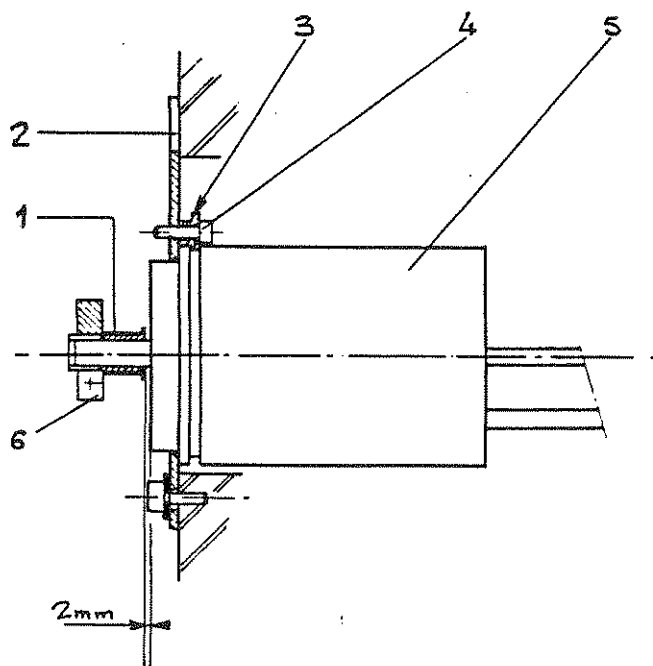
### 8.10.2 Disassembly - Assembly - Adjustment

#### 1) Disassembly

- Remove screws (4), clamps (3) and release support (2).
- Loosen clamp (6) and free the 15-tooth pulley (1) from the shaft of motor (5).

#### 2) Assembly - Adjustment

- Assemble by following the disassembly procedure in the opposite order.
- Insert a 2 mm shim between motor (5) and 15-tooth pulley (1).
- Bring the 15-tooth pulley (1) to bear against the shim and lock clamp (6).
- Adjust the belt (9) tension at 3.5 to 4 N, using a 0 to 4 N strength spring balance, hooked in hole (7). Tighten screws (8).



## 8.11 RIBBON ASSEMBLY (LEFT)

### 8.11.1 Initial testing

#### 1) Static testing

- Visually check the condition of the mechanical parts.
- Manually test the rotation of the LEFT HAND RIBBON loaded with a spool.
- Remove the spool and check the locking of plate (2).
- Check the continuity of the winding of motor (5).  $R = 6 \Omega_{typ}$ .

#### 2) Testing of adjustment

- Check the adjustment of shaft (1) (see paragraph 2 "Assembly - Adjustment").

#### 3) Dynamic testing

- Place a spool on plate (2) and lock it.
- Energize motor (5) by applying + 5 V d-c.
- Check that operation is correct.

### 8.11.2 Disassembly - Assembly - Adjustment

#### 1) Disassembly

##### PLATE (2)

- Remove screw (10) and index (9).
- Remove plate (2) taking care of compression spring (3) which is no longer held in position.

##### RIBBON BASE (7)

- Remove plate (2) and remove the two attaching screws (4).
- Remove the left-hand ribbon base (7).

##### SHAFT (1)

- Remove plate (2) and two screws (8).
- Remove shaft (1).

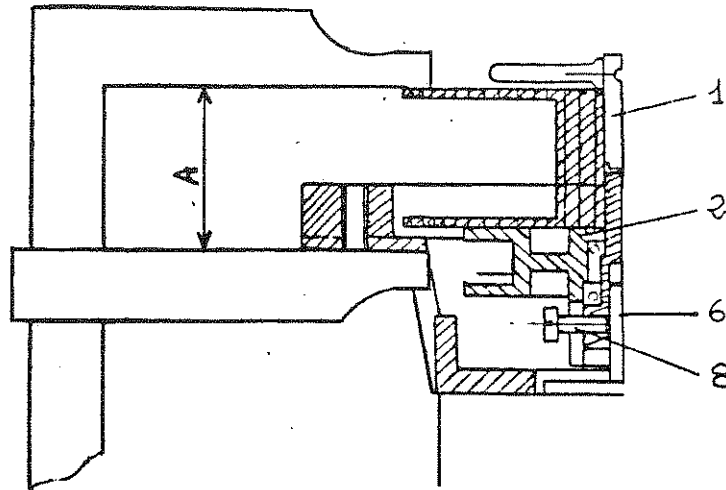
##### MOTOR (5)

- Remove plate (2), RIBBON base (7) and shaft (1).

#### 2) Assembly - Adjustment

- Assemble by following the disassembly procedure in the opposite order.

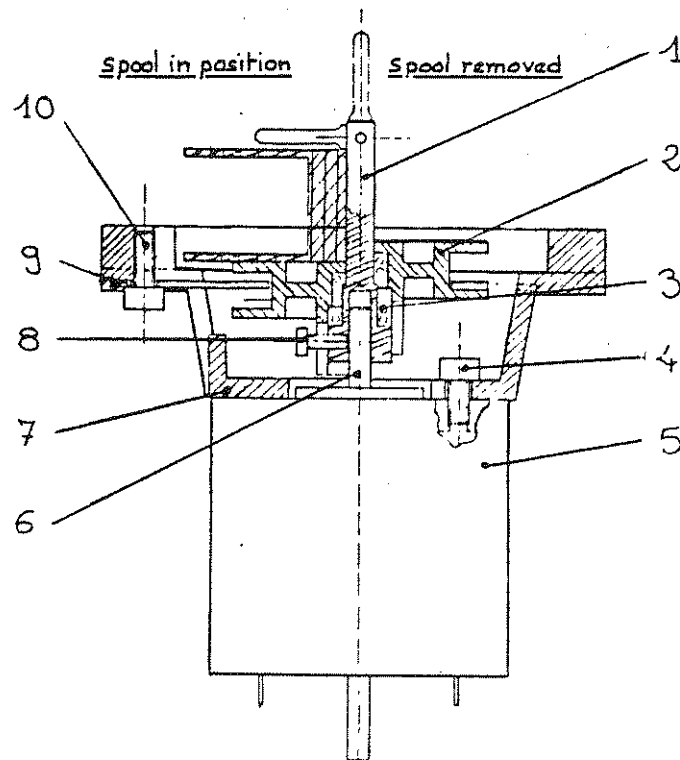
- During assembly of shaft (1), adjust its height.
- Place shaft (1) on motor shaft (6) without tightening screws (8).
- Place plate (2) and one spool in position.
- Using a caliper gauge (see figure below), adjust the height of the shaft to obtain a dimension (A) between 19.2 and 19.4 mm.
- Tighten screws (8) and assemble index (9) and screw (10).



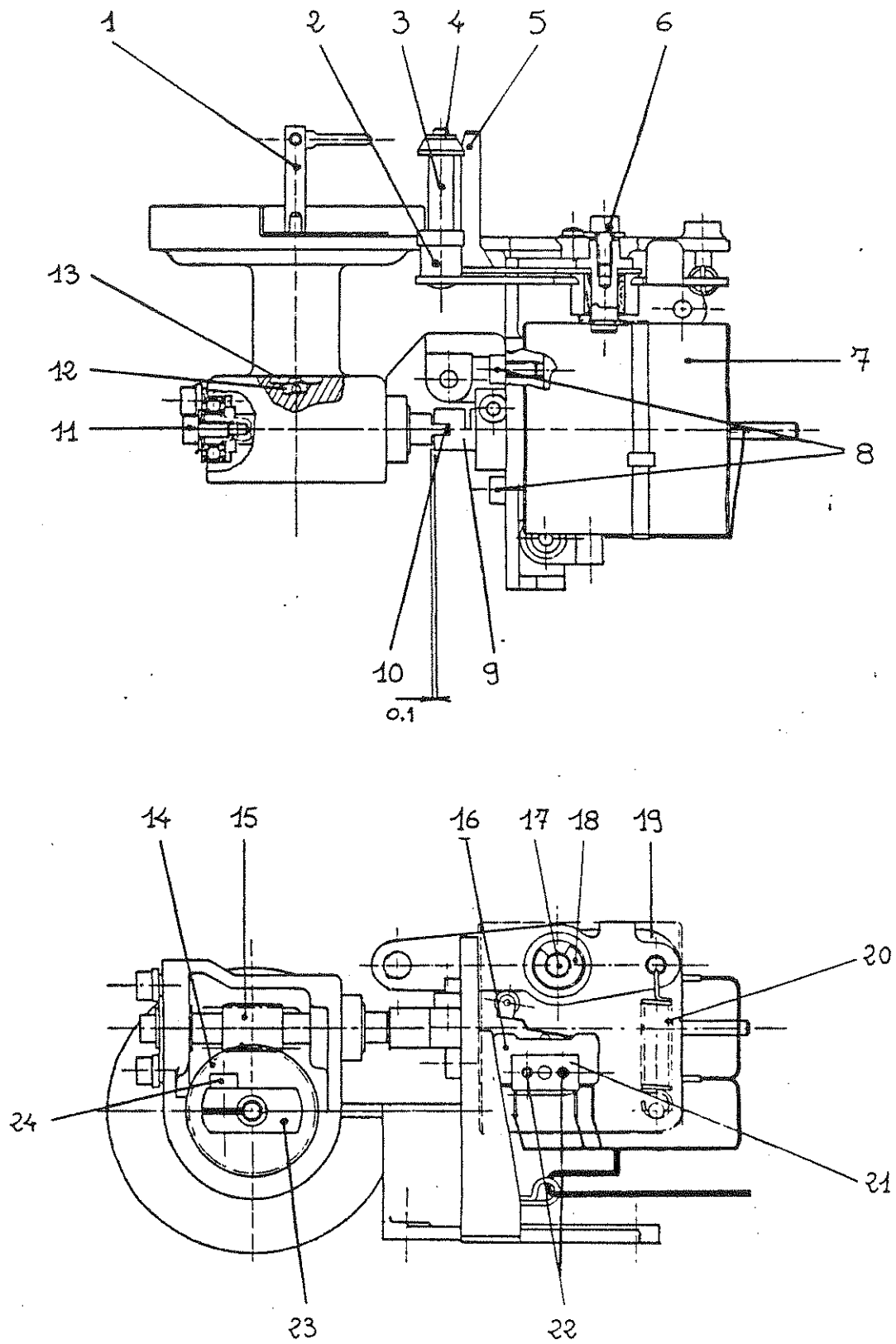
NOTE : this adjustment can be made using the tools 23 106 763-0, and 23 106 764-8.

#### 8.11.3 Final testing

- Repeat the dynamic test described above.



RIBBON ASSEMBLY (LEFT)



RIBBON ASSEMBLY (RIGHT)

## 8.12 RIBBON ASSEMBLY (RIGHT)

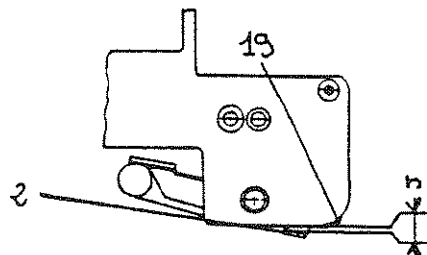
### 8.12.1 Initial testing

#### 1) Static testing

- Visually check the condition of the mechanical parts.
- Manually test the mechanical operation of the reversal and drive system of control shaft (1).
- Check the operation of the ribbon reversal control switch (16) and the continuity of the drive motor winding (7) using an ohmmeter.  $R = 6 \Omega$  typ.

#### 2) Testing of adjustment

- Check the end play of wormscrew (15) by inserting a 0.1 mm shim between end (10) of worm screw (15) and drive assembly (9).
- Check the operation of the ribbon reversal control switch (16) by inserting a 1.6 mm shim between plate (19) and lever (2).



Operation established  
clearance = 1.6 mm

NOTE : This adjustment can be made using the tool 23 106 765-1.

#### 3) Dynamic testing

- Check the operation of the ribbon feed by applying + 12 V d-c across the terminals of motor (7).
- Reverse the voltage polarity to check the operation in the opposite direction.

### 8.12.2 Disassembly - Assembly - Adjustment

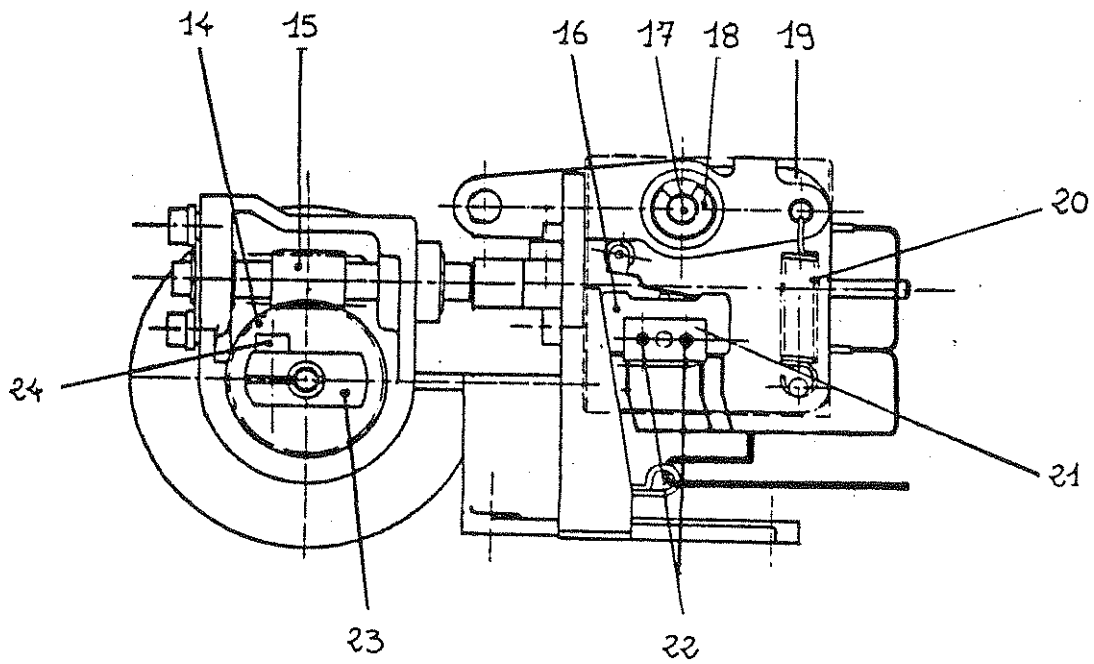
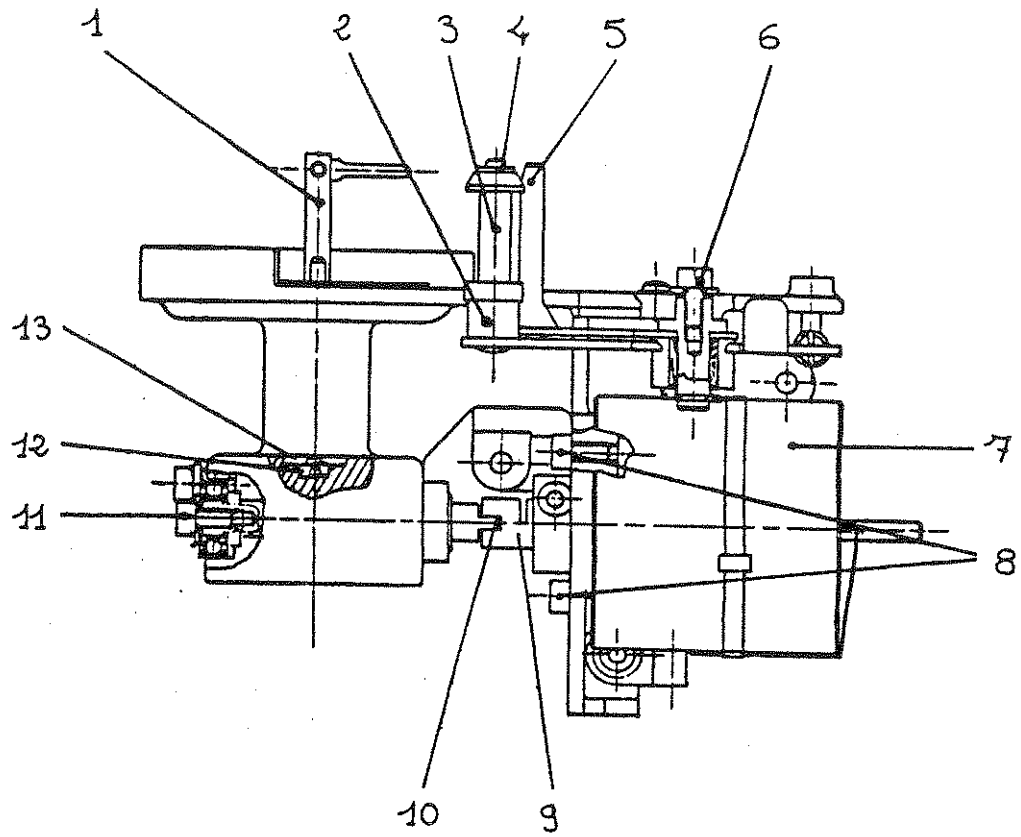
#### 1) Disassembly

##### MOTOR (7)

- Remove the two attaching screws (8) and withdraw motor (7) from its housing.

##### WORM SCREW (10)

- Remove motor (7).
- Remove screw (11) and extract worm screw (10).



RIBBON ASSEMBLY (RIGHT)

#### SPIRAL WHEEL (14)

- Loosen screw (24) of clamp (23) and remove spiral wheel (14).

#### CONTROL SHAFT (1)

- Remove the spiral wheel (14).
- Remove screw (12) and plate (13).
- Remove control shaft (1).

#### TENSION (2) OR EYELET (5) DETECTOR LEVERS

- Remove motor (7) and traction spring (20).
- Remove screw (6) and remove the tension (2) or eyelet (5) detector levers.

#### ROLLER (3)

- Remove locking ring (4) and withdraw roller (3).

#### SHAFT (17)

- Remove the tension (2) or eyelet (5) detector levers.
- Remove locking ring (18) and withdraw shaft (17).

#### CONTROL SWITCH (16)

- Remove two screws (22) and tapped plate (21).
- Remove control switch (16).

### 2) Assembly - Adjustment

Assemble by following the dissassembly procedure in the opposite order.

CAUTION 1 : When replacing screw (12), take care not to constrict control shaft (1).

2 : When assembling drive assembly (9) on motor shaft (7), make sure that the motor brush pressure springs still operate, by pressing longitudinally against drive assembly (9).

- On reassembly, slightly lubricate control shaft (1), shaft (17) and worm screw (10).
- Check the axial clearance of worm screw (10) and the operation of the ribbon reversal control switch (16) as indicated in the paragraph : "Testing of Adjustment".

### 8.12.3 Final testing

- Repeat the "Dynamic Testing" described above.

## 9 – ELECTRONIC BOARDS

Electronic boards maintenance is facilitated through the use of extender boards.

### 9.1 "ALIMENTATION" BOARD

The dynamic testing of this board is carried out in the following order :

- testing of power supplies,
- testing of initialization,
- testing of DRIVE MOTOR amplifier.

#### 9.1.1 Initial testing

- Visually check the condition of the components.

#### 1) Testing of power supplies

##### Static testing

- Use an ohmmeter to check the order of magnitude of the following values :

CAUTION : The printed circuit board can be a double surface board.

Power supplies	Measurement terminal (see NOTE)	Value
+ 5 V ; 2,7 A	P2 2/6	> 3Ω
	P1 10/8	> 1MΩ
	P1 7/8	> 1MΩ
+ 15 V ; 400 mA	P2 9/5	> 50Ω
	P2 5/10	> 50Ω
- 15 V ; 200 mA	P1 6/5	> 1MΩ
	P1 4/3	> 1MΩ
30 V ; 500 mA	P3 16/19	> 500Ω
	P1 2/1	> 1MΩ

##### Dynamic testing

- If the measured values are correct, make the TRANSFORMER, "ALIMENTATION" board and POWER AMPLIFIER connection.
- Apply voltage and check the power supply voltages off-load using a voltmeter.
- Switch the equipment off.

NOTE : (P2-2/6) corresponds to the measurement to be made across terminal (2) with respect to terminal (6) of connector (P2).



- Successively connect the load resistor of each power supply (see table below) and check the output voltage.

Power supply	Load resistor
5 V ; 2,7 A	$R = 2\ \Omega . P = 15\ W$
+ 15 V ; 400 mA	$R = 40\ \Omega . P = 10\ W$
- 15 V ; 200 mA	$R = 75\ \Omega . P = 5\ W$
30 V ; 500 mA	$R = 60\ \Omega . P = 15\ W$

- If the power supplies are correct, disconnect the set-up.

## 2) Testing of initialization

### Static testing

- Check the components of the initialization section using an ohmmeter.
- Check that all the terminals (1-7) and (14-8) of relay (K1) are short-circuited.

### Dynamic testing

- Make the TRANSFORMER, "ALIMENTATION" board and POWER AMPLIFIER connection.
- Apply voltage to the equipment.
- Check the power supplies of the various integrated elements.
- During initialization, check that (1-7) and (14-8) terminals are short-circuited.
- With an oscilloscope, observe  $\overline{RES}$  signal at (P2-11) : at initialization  $\overline{RES}$  signal is at "0" level and goes up to "1" level 50 to 100 ms later.
- Check that terminals (1-7) and (14-8) are no longer short-circuited.
- If the initialization circuit is correct, disconnect the set-up.

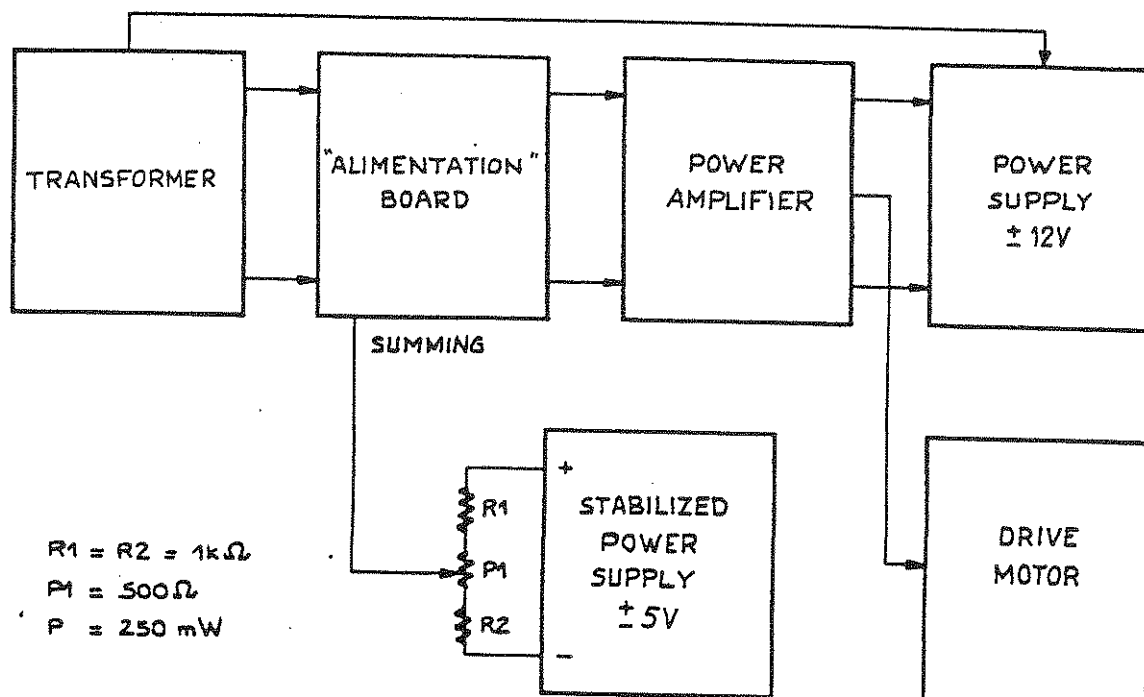
## 3) Testing of DRIVE MOTOR amplifier

### Static testing

- Check the components of the amplifier section of the DRIVE MOTOR using an ohmmeter.

### Dynamic testing

- Connect as shown on the next page.



- Apply voltage to the equipment.
- Apply 0 V to the input of summing circuit (P2-1) : the DRIVE MOTOR does not run.
- Connect the stabilized power supply (+ 5 V and - 5 V) and bring the potentiometer to abut in one direction : the DRIVE MOTOR runs.
- Bring the potentiometer to abut in the other direction : the DRIVE MOTOR turns in the opposite direction.

### 9.1.2 Disassembly - Assembly

- Replace the defective part(s) making sure that the outputs are not bent too close to their body during assembly.

### 9.1.3 Final testing

- Test as indicated in the first paragraph.

## 9.2 "ADAPTATION" BOARD

- Refer to the technical document "ADAPTOR SYSTEM"

## 9.3 OTHER ELECTRONIC BOARDS

- For testing and trouble shooting of electronic boards, refer to the UTILIZATION MANUAL of the PORTABLE MAINTENANCE EQUIPMENT EMP 2.
- For programming the answer-back code in the answer-back code memory, refer to the UTILIZATION MANUAL of the PORTABLE MAINTENANCE EQUIPMENT EMP 3.

## 10 – POWER SUPPLY

### 10.1 MAINS FILTER AND LIGHTNING ARRESTOR "PARAFOUDRE" BOARD

#### 10.1.1 Initial testing

- Visually test the condition of the parts.
- Use an ohmmeter to check that the parts are not cutoff or short-circuited.

#### 10.1.2 Assembly - Disassembly

- Replace the defective part(s).

#### 10.1.3 Final testing

- Test as indicated in the first paragraph.

### 10.2 TRANSFORMER

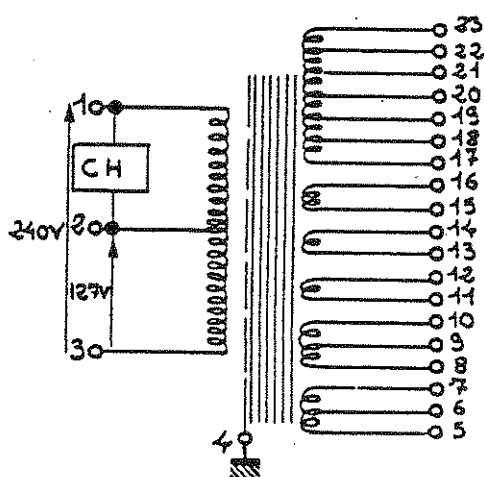
#### 1) Static testing

- Visually check the condition of the TRANSFORMER.
- Check the continuity of the windings according to the following diagram, using an ohmmeter.
- Check that the windings are not short-circuited.

#### 2) Dynamic testing

- Energize the TRANSFORMER and check the output voltages off-load.

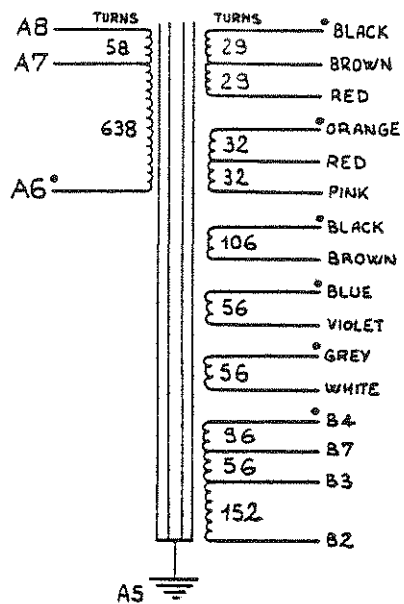
##### a) Transformer «SAGEM»



Measurement Point	Typical Resistance	Typical Voltage
6/7	0.07 $\Omega$	10.6 V
6/5	0.07 $\Omega$	10.6 V
9/10	0.1 $\Omega$	11.8 V
9/8	0.1 $\Omega$	11.8 V
11/12	0.7 $\Omega$	20.7 V
13/14	1.7 $\Omega$	20.7 V
15/16	0.6 $\Omega$	39.6 V
20/22	15 $\Omega$	56.8 V
20/18	15 $\Omega$	56.8 V
20/17	} NOT USED	} NOT USED
20/19		
20/21		
20/23		

NOTE : Terminals (1) to (23) are marked on the winding of the TRANSFORMER. The hour counter (CH) is wired to terminals (1) and (2) of the TRANSFORMER.

b) Transformer «CENTRE INDUSTRIES»



MEASUREMENT POINT (TAGS)	VOLTS	RESISTANCE	AC TEST VOLTS		
			Nominal	+ 3 % (Maxi)	- 3 % (Mini)
BLACK LEAD BROWN LEAD	+ 12	0,04	10	10,3	9,7
RED LEAD	- 12	0,05	10	10,3	9,7
ORANGE LEAD RED LEAD	+ 5	0,10	11,03	11,36	10,7
PINK LEAD	- 5	0,10	11,03	11,36	10,7
BLACK LEAD BROWN LEAD	30	0,68	36,55	37,65	35,45
BLUE LEAD VIOLET LEAD	+ 15	0,75	19,31	19,89	18,73
GREY LEAD WHITE LEAD	- 15	1,93	19,31	19,89	18,73
B4 - B7	33,30	7,46	33,10	34,10	32,11
B7 - B3	19,42	4,39	19,31	19,89	18,73
B3 - B2	52,70	11,99	52,41	53,99	50,84

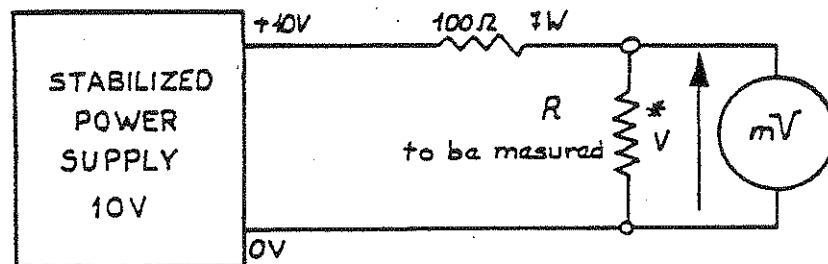
- Switch the equipment off.
- Make the TRANSFORMER, "ALIMENTATION" board, + 12 V\*, POWER AMPLIFIER, DRIVE MOTOR and load resistors connection (see the table of the paragraph "ALIMENTATION" board).
- Switch the equipment on and check the power supply outputs using a voltmeter.

### 10.3 POWER AMPLIFIER

#### 10.3.1 Initial testing

##### 1) Static testing

- Visually test the condition of the parts.
- Using an ohmmeter, test that the power transistors and resistors are not short-circuited with respect to ground.
- On an ohmmeter, check the power transistors and resistors.
- Check the condition of resistors using the principle described below.



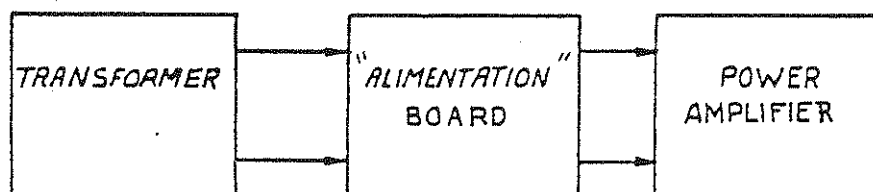
\* across the terminals of the 0.1 resistor :  $U = 10 \text{ mV}$

\* across the terminals of the 0.22 resistor :  $U = 22 \text{ mV}$

- Check that the 4.7 kΩ resistor condition (take care of position of jumper).
- Check the condition of the wiring.

##### 2) Dynamic testing

- Connect as shown below :



- Apply voltage to the equipment and use a voltmeter to test the + 5 V and + 30 V voltages.
- Switch the equipment off.
- Connect a load resistor to the + 5 V ( $R = 2\ \Omega$ ,  $P = 15\ \text{W}$ ) and to the + 30 V ( $R = 60\ \Omega$ ,  $P = 15\ \text{W}$ ).
- Apply voltage to check the + 5 V and + 30 V voltages.
- Then, proceed as indicated with respect to the testing of the DRIVE MOTOR amplifier.

#### 10.3.2 Disassembly - Assembly

- Replace the defective part(s).

**CAUTION** : During the assembly of the power transistors, do not forget the insulating bushings placed in the attaching holes of the transistors.

#### 10.3.3 Final testing

- Test as indicated in the first paragraph.

### 10.4 $\pm 12\ \text{V}^*$ POWER SUPPLY

#### 10.4.1 Initial testing

##### 1) Static testing

- Visually check the condition of the  $\pm 12\ \text{V}^*$  POWER SUPPLY parts.
- Check the parts using an ohmmeter.

##### 2) Dynamic testing

- Connect the  $\pm 12\ \text{V}^*$  POWER SUPPLY to the TRANSFORMER and switch the equipment on.
- Test the + 12 V\* and - 12 V\* voltages off-load using a voltmeter.
- Switch the equipment off.
- Connect a load resistor of  $8\ \Omega/20\ \text{W}$  (rheostat) at the output.
- Apply voltage and check the output voltage (carry out this operation for the + 12 V\* and the - 12 V\*).

#### 10.4.2 Disassembly - Assembly

- Replace the defective part(s) taking care not to bend the leads too near to the body during assembly.

#### 10.4.3 Final testing

- Test as indicated in the first paragraph.

## 11 – COMPLEMENTARY EQUIPMENTS

### 11.1 COVER

#### 11.1.1 Initial testing

- Visually check the condition of the parts.
- Operate the handle hinges and the top section of the COVER.

#### 11.1.2 Disassembly - Assembly

##### 1) Disassembly

From a TX20 assembly :

- Remove the top section of the COVER and the FRONT PANEL ASSEMBLY as described in the field maintenance manual.
- Free the side handle pins and remove them.
- Rock the unit and stand it on the RADIATOR.
- Unscrew the four captive feet and remove the bottom protective grid.
- Remove the four tapped screws attaching the lower section of the COVER.
- Remove the lower section of the COVER by releasing the RADIATOR guides.
- Remove the damaged part(s).

##### 2) Assembly

- Assemble by following the disassembly procedure in the opposite order.

#### 11.1.3 Final testing

- Check the correct operation of all the pivoting points.

### 11.2 FRONT PANEL ASSEMBLY

#### 11.2.1 Initial testing

- Visually check the condition of the parts.

#### 11.2.2 Disassembly - Assembly

##### 1) Disassembly

- Remove the OPERATIONAL CONSOLE, the PUNCH BACK-SPACER, the KEYBOARD and the TAPE READER as described in the field maintenance manual.

- Remove the module attaching plates.
- Remove the FRONT PANEL.

## 2) Assembly

- Assemble by following the disassembly procedure in the opposite order.

### 11.2.3 Final testing

- Check that the keys on the OPERATIONAL CONSOLE and on the KEYBOARD are operating correctly.

## 11.3 RADIATOR

### 11.3.1 Initial testing

- Visually check the condition of the RADIATOR.

### 11.3.2 Disassembly - Assembly

#### 1) Disassembly

On a TX20 assembly :

- Remove the COVER assembly.
- Remove the POWER AMPLIFIER and MAINS FILTER as described in the field maintenance manual.
- Remove the three screws attaching the RADIATOR to the FITTED MOUNTING PLATE.
- Remove the RADIATOR.

#### 2) Assembly

- Assemble by following the disassembly procedure in the opposite order.

## 11.4 MAIN BASE AND ELECTRONIC BOARD RACK

### 11.4.1 Initial testing

From a TX20 assembly :

- Apply the functional test program described in the field maintenance manual.

### 11.4.2 Disassembly - Assembly

#### 1) Disassembly

- Remove the COVER and RADIATOR assembly.



- Remove the electronic printed boards and the modules remaining on the MAIN BASE (see Field Maintenance Manual).
- Remove the two attaching screws and free the LINE STRIP.
- Remove the four attaching screws and the two board guide flanges.
- Remove the two attaching screws and release the "ADAPTATION" board connector.
- Remove the four attaching screws from the connector support and remove the ELECTRONIC BOARD RACK.
- If necessary, remove the other parts.

## 2) Assembly

- Assemble by following the disassembly procedure in the opposite order.

### 11.4.3 Final testing

- Apply the functional test program described in the field maintenance manual.

## 11.5 PROTECTION MODULE

### 11.5.1 Initial testing

- Visually test the condition of the parts.
- Use an ohmmeter to check the fuse cartridges.

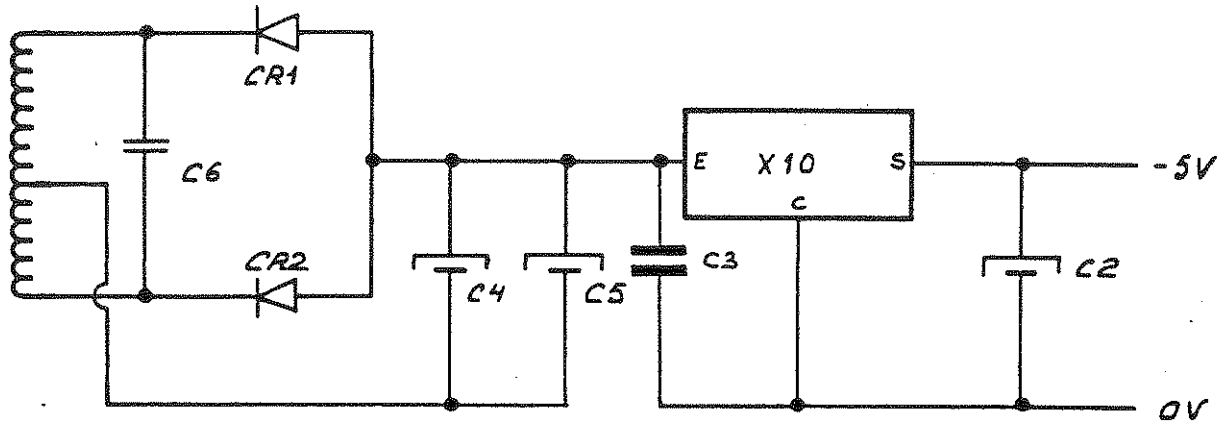
### 11.5.2 Disassembly - Assembly

- Replace the defective part (s).

### 9.2 - 5 V, 200 mA POWER SUPPLY

("RAM + RPROM" board, TRANSFORMER)

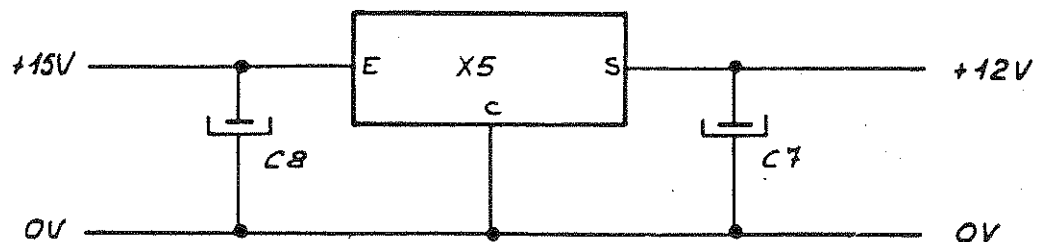
The voltage from the "5 V" (TRANSFORMER) secondary winding is rectified by diodes (CR1 and CR2) and filtered by capacitors (C4 and C5). Regulation is provided by regulator (X10). Capacitor (C2) filters the output voltage of regulator (X10).



### 9.3 + 12 V, 250 mA POWER SUPPLY

("RAM + RPROM" board)

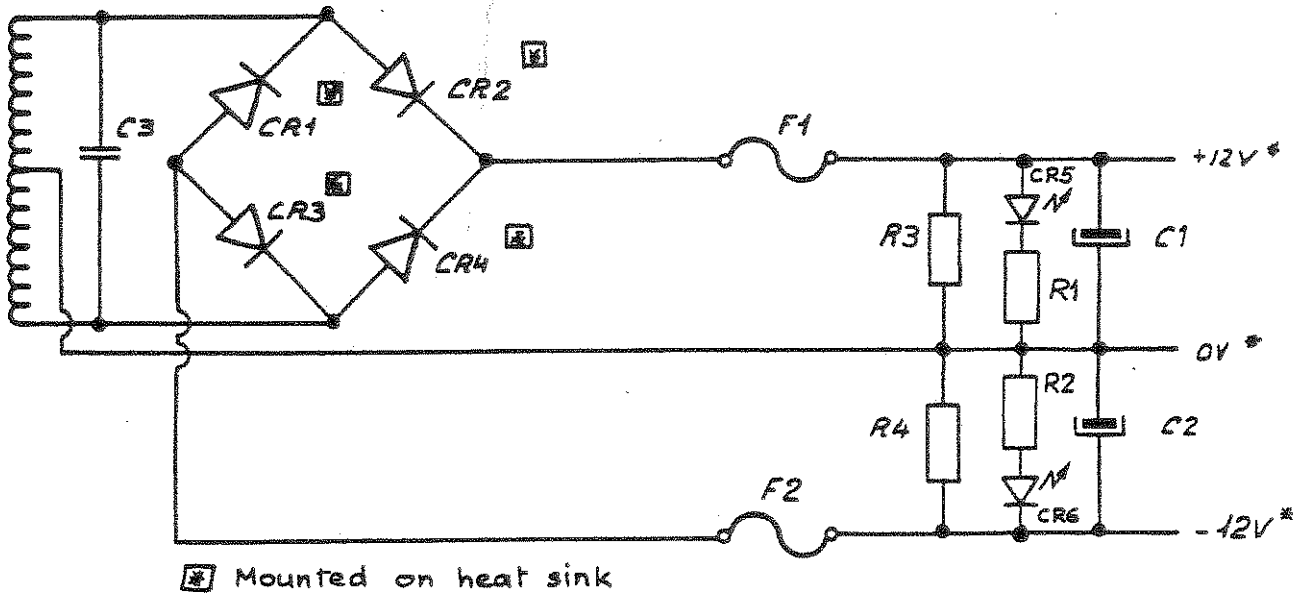
The voltage from the + 15 V is filtered by capacitor (C8) then regulated by regulator (X5). The output voltage is filtered by capacitor (C7).



# 9.4 $+12\text{ V}^*$ AND $-12\text{ V}^*$ , 1.5 A POWER SUPPLY (see NOTE)

( $\pm 12\text{ V}$  POWER SUPPLY, TRANSFORMER)

These two voltage sources are obtained from one of the secondary windings whose midpoint is connected to electrical zero. The voltages are rectified by diodes (CR1 to CR4) then filtered by capacitors (C1 and C2). Resistors (R3 and R4) placed across the terminals of capacitors (C1 and C2) improve their discharge when the mains is off. The fuses (F1 and F2) protect the circuit. Light-emitting diodes (CR5 and CR6), supplied through resistors (R1 and R2), display the correct operation of the  $\pm 12\text{ V}$  POWER SUPPLY.

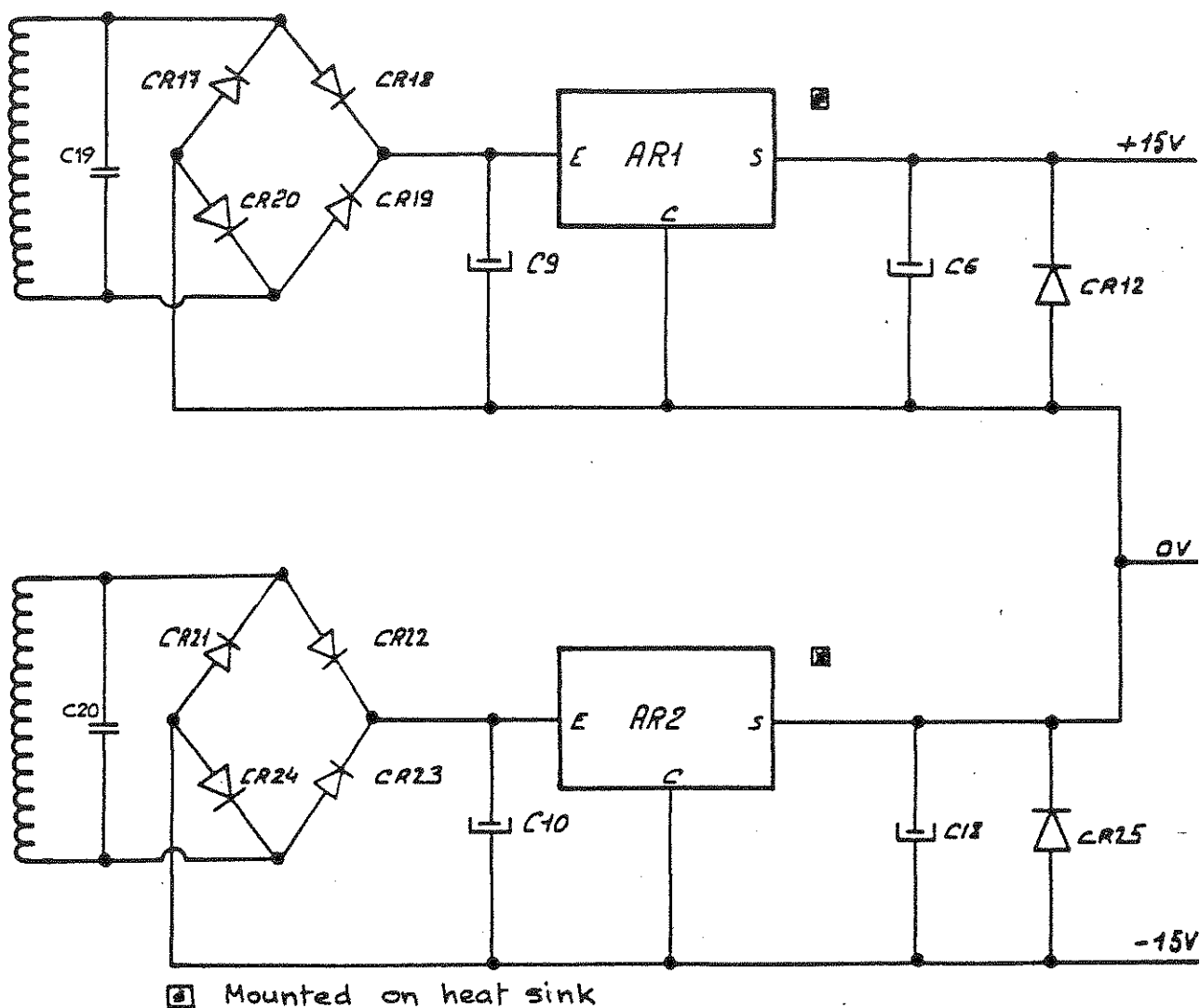


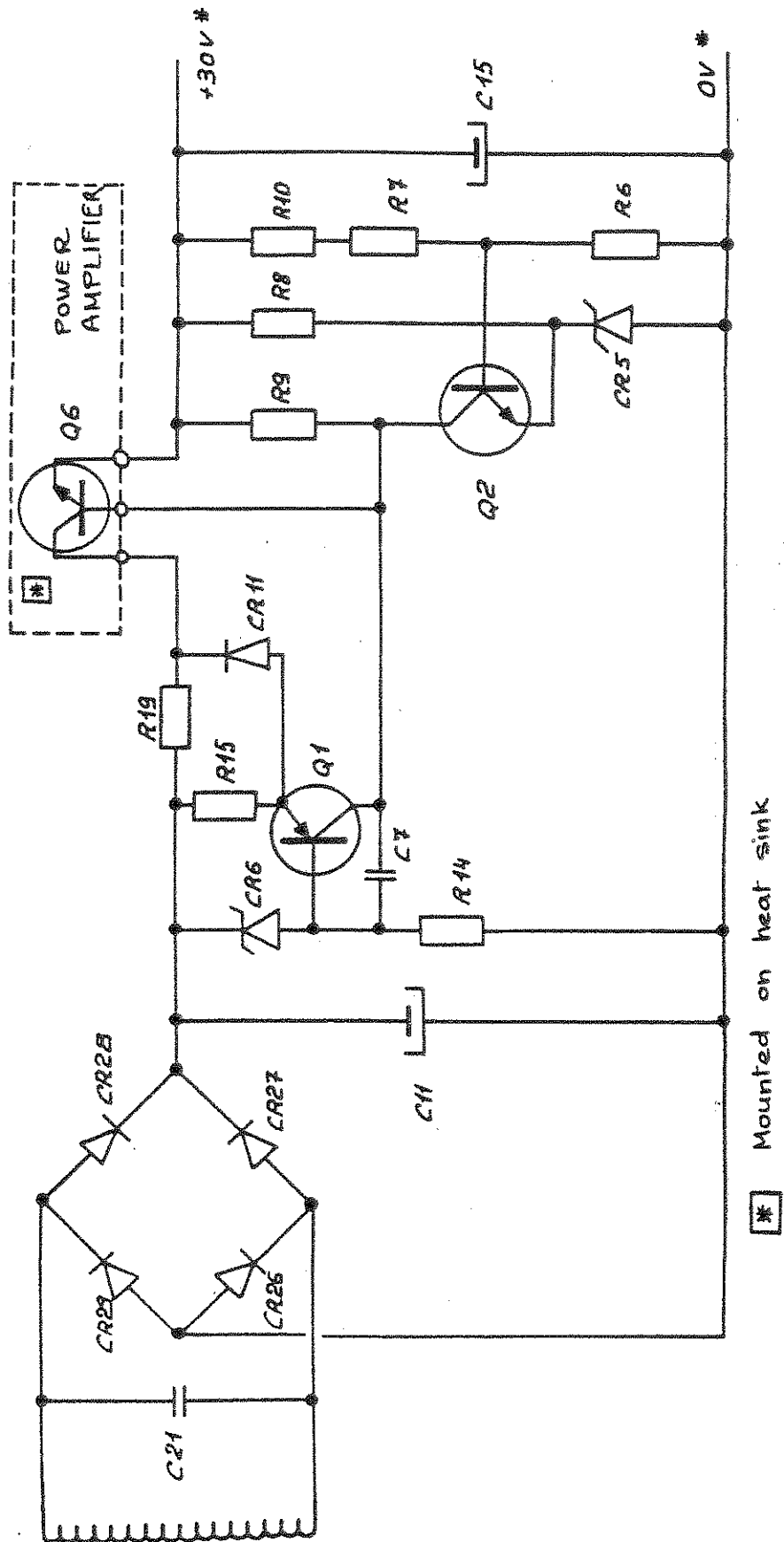
NOTE : The  $12\text{ V}$  power supply voltage assigned with the symbol  $*$  is a "high current" circuit.

# 9.5 + 15 V AND -15 V, 500 mA POWER SUPPLY

("ALIMENTATION" board, TRANSFORMER)

The power supply consists of two identical circuits. The voltage from the secondary winding of the TRANSFORMER is rectified by the diodes (CR17 to CR20) which are bridge-connected. The voltage is then filtered by capacitor (C9) and regulated by regulator (AR1). The output voltage is filtered by capacitor (C6). Feedback-connected diode (CR12) protects regulator (AR1) against short-circuits between the + 15 V and - 15 V.





+30V 500mA POWER SUPPLY

9.6 + 30 V\*, 500 mA POWER SUPPLY (see NOTE)

("ALIMENTATION" board, POWER AMPLIFIER, TRANSFORMER)

The voltage from one the secondary windings of the TRANSFORMER is rectified by diodes (CR26 to CR29) then filtered by capacitor (C11). Series regulation using a ballast transistor (Q6) controlled by transistors (Q1 and Q2) is employed. Transistor (Q2) compares the output voltage to a reference voltage determined by diode (CR5). A fraction of the output voltage is re-injected at the base of transistor (Q2) by means of resistors (R6, R7 and R10).

Transistor (Q1) operates as a constant current generator with its base current determined by diode (CR6) and resistors (R14 and R15).

Assembly (R19, R15 and CR11), forms a current limiting circuit to (Q6). The voltage developed across the terminals of (R19) with respect to the load limit current enables diode (CR11) to be conductive so that the current of transistor (Q1) is decreased thus resulting in a decrease of the control current of (Q6). Capacitor (C15) filters the output voltage.

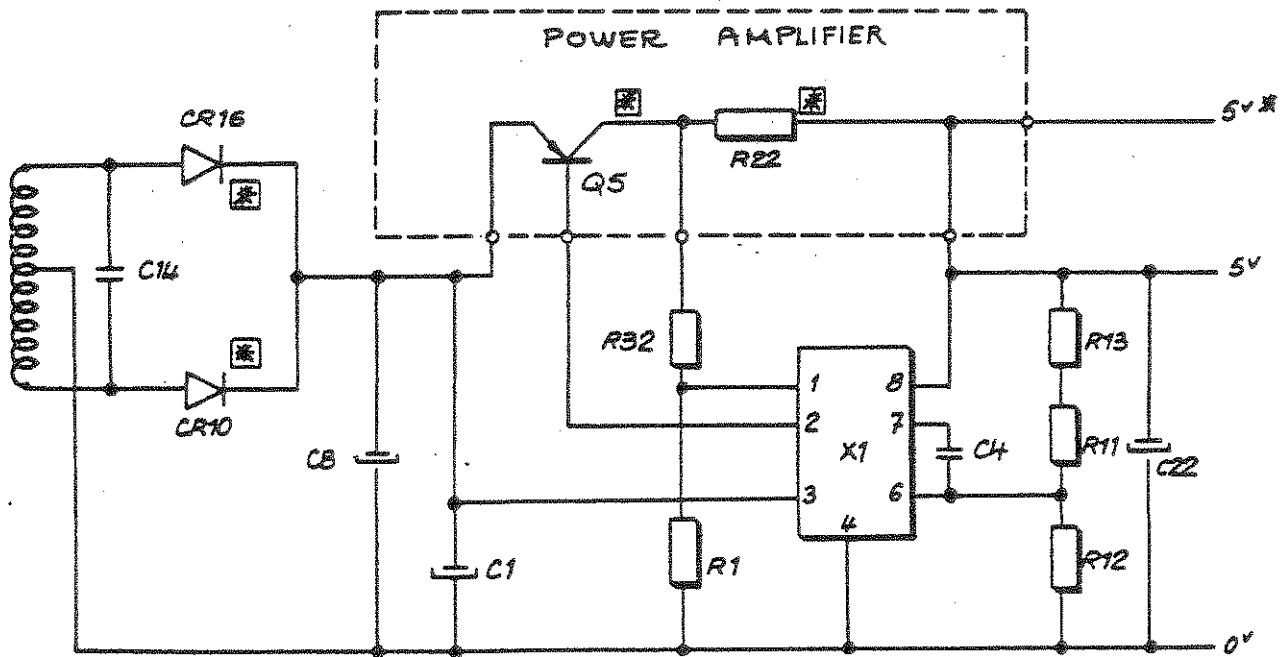
NOTE : The 30 V power supply voltage assigned with symbol \* is a "high current" voltage.

### 9.7 + 5 V\*, 2.7 A POWER SUPPLY (see NOTE)

("ALIMENTATION board, POWER AMPLIFIER, TRANSFORMER)

The + 5 V voltage from one of the secondary windings of the TRANSFORMER is rectified by diodes (CR10 and CR16), then filtered by capacitors (C1 and C8). The voltage is regulated by regulator (X1) with which power transistor (Q5) is associated. Resistors (R1, R22 and R32) provide the feedback for regulator (X1) in order to limit the output current.

The resistor bridge (R11, R12 and R13) is used for adjusting and fixing the output voltage which is filtered by capacitor (C22).



■ Mounted on heat sink

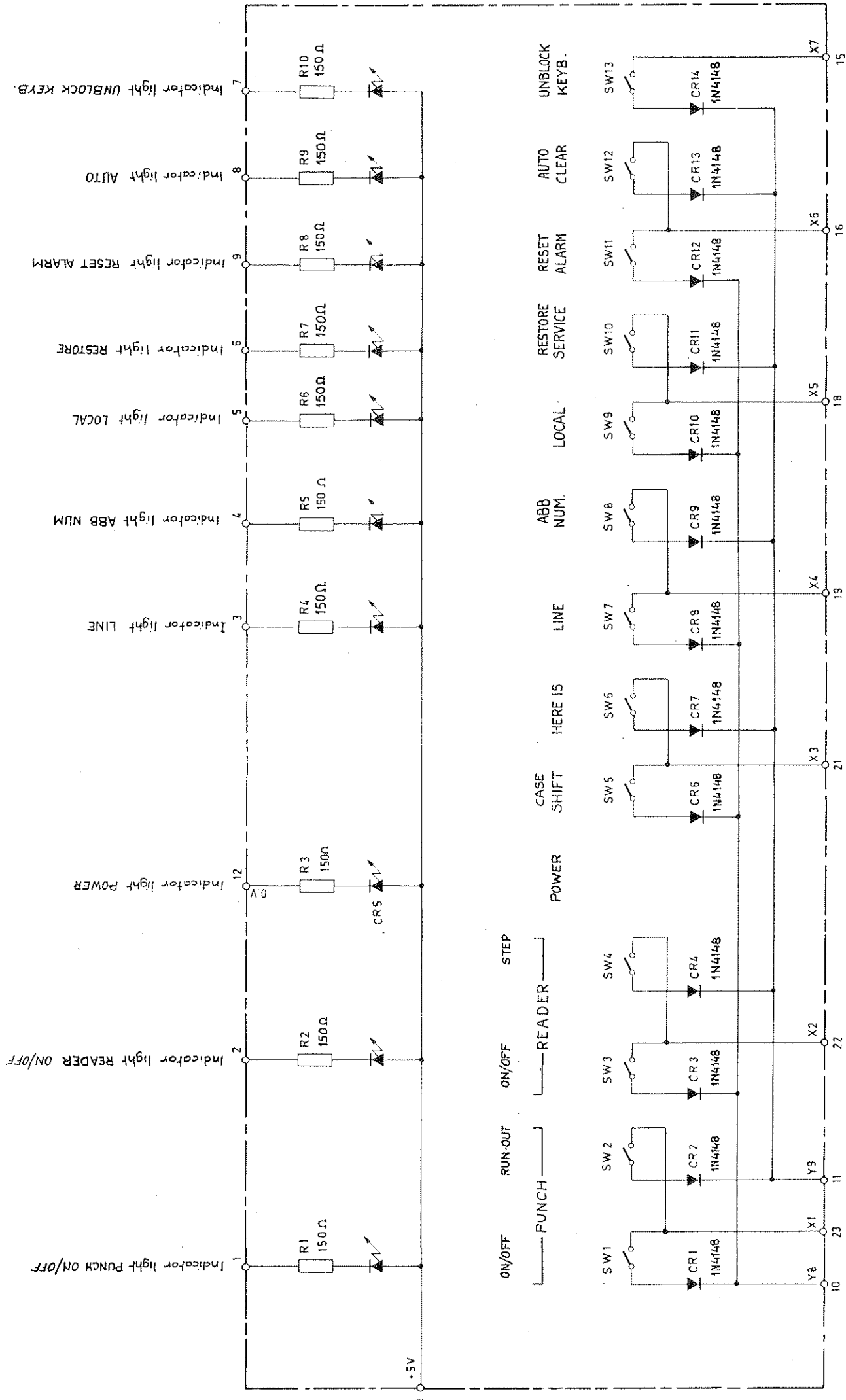
NOTE : The 5 V power supply voltage assigned with symbol \* is a "high current" voltage.

### 9.8 PROTECTION MODULE (Plate 3-3)

A protection module mounted between the secondary winding of the transformer and the different power supplies, ensures the protection of every winding of the secondary.

The module is holded under the base and consists of :

- 2 fuse cartridges 0,31 A TD (Yellow) for the TG board
- 1 fuse cartridge 0,4 A TD (Black) for the - 15 V
- 1 fuse cartridge 0,8 A TD (Blue) for the + 15 V
- 1 fuse cartridge 2 A TD (Green) for the + 30 V
- 1 fuse cartridge 4 A TD (Red) for the + 5 V



# PLATE 1



"OPERATIONAL CONSOLE" BOARD 23074375-7

TX 20



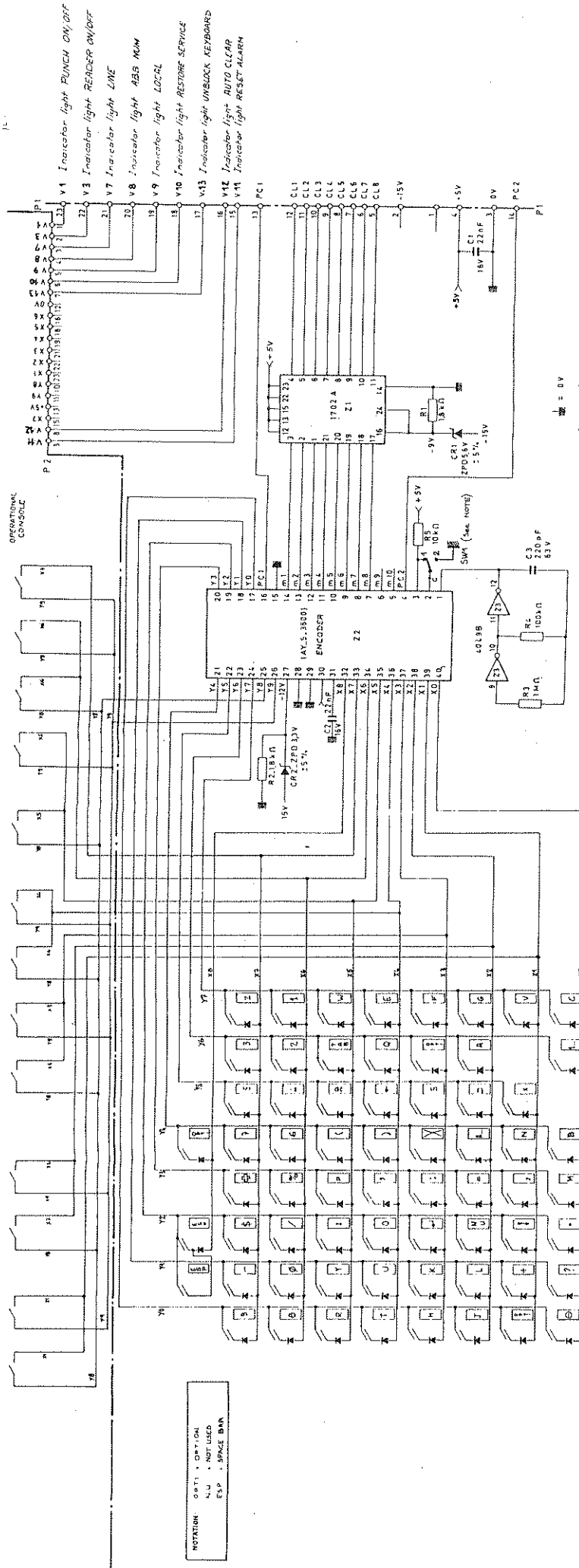


PLATE 2.1

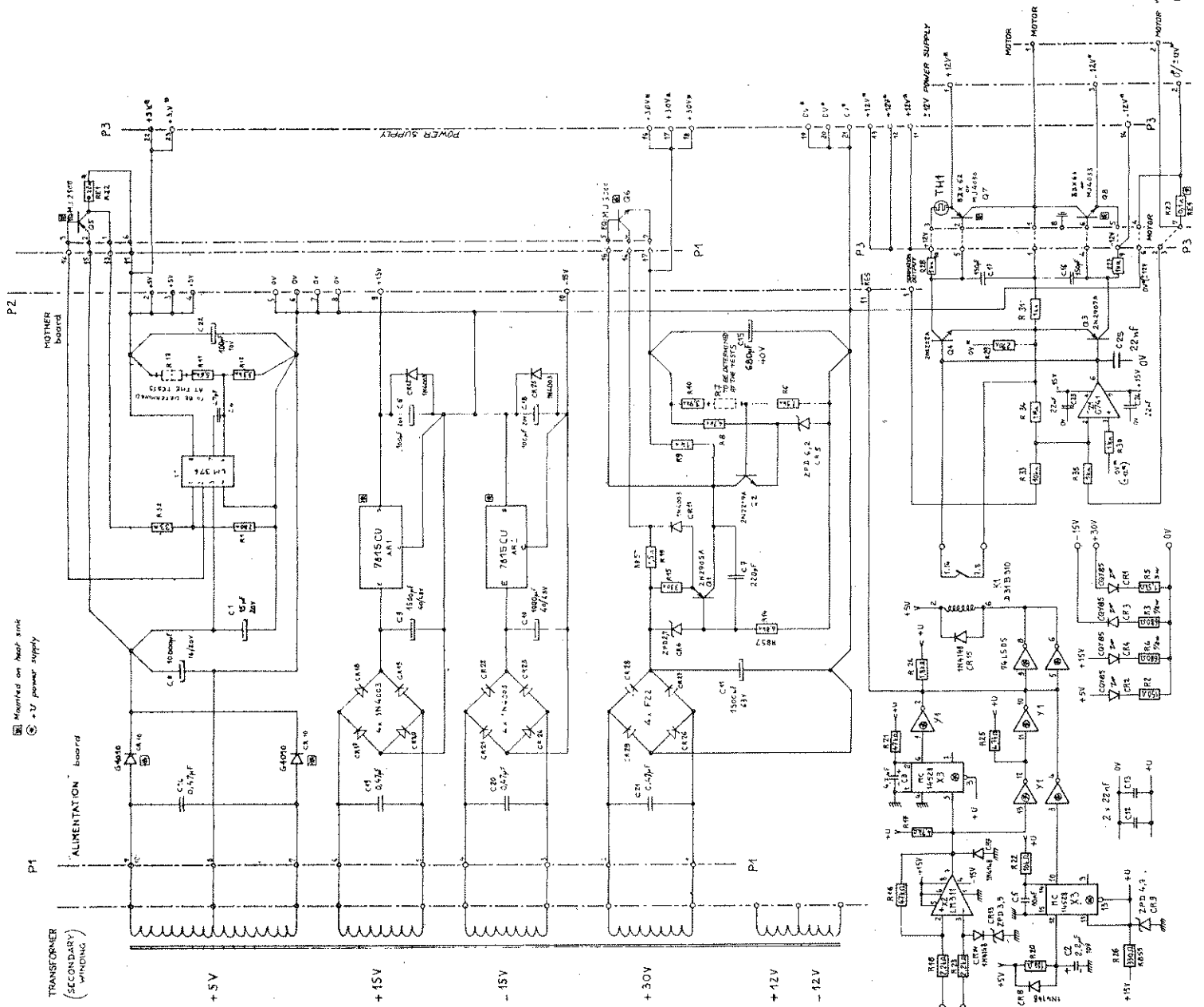
"KEYBOARD" Board 23074795\_8

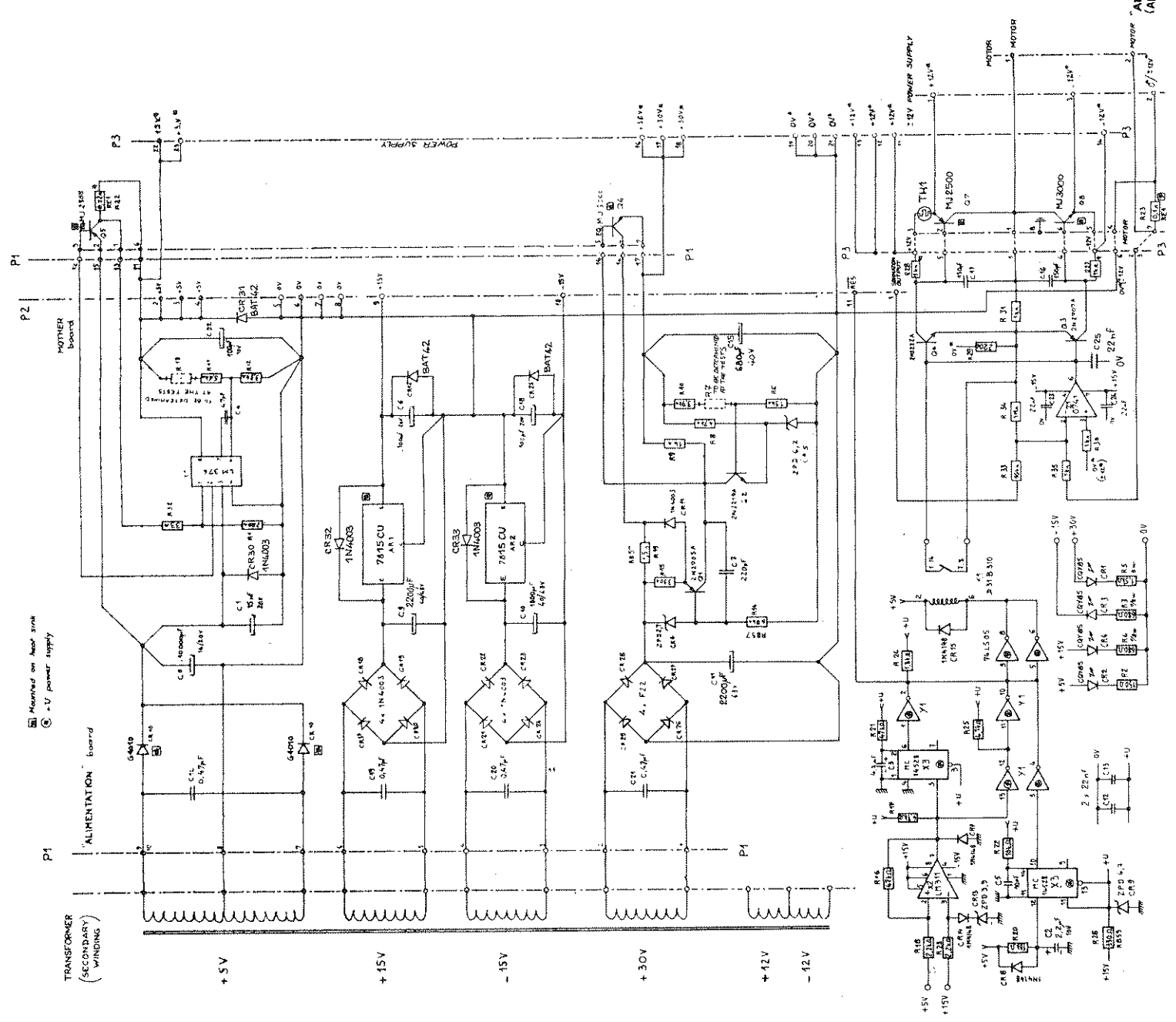
TX 20

NOTE: SW1 1 - Fast Typing 2 keys  
2 - Fast Typing N keys

0V = 0V  
-15V = -15V







Measured on heat sink  
 +U power supply

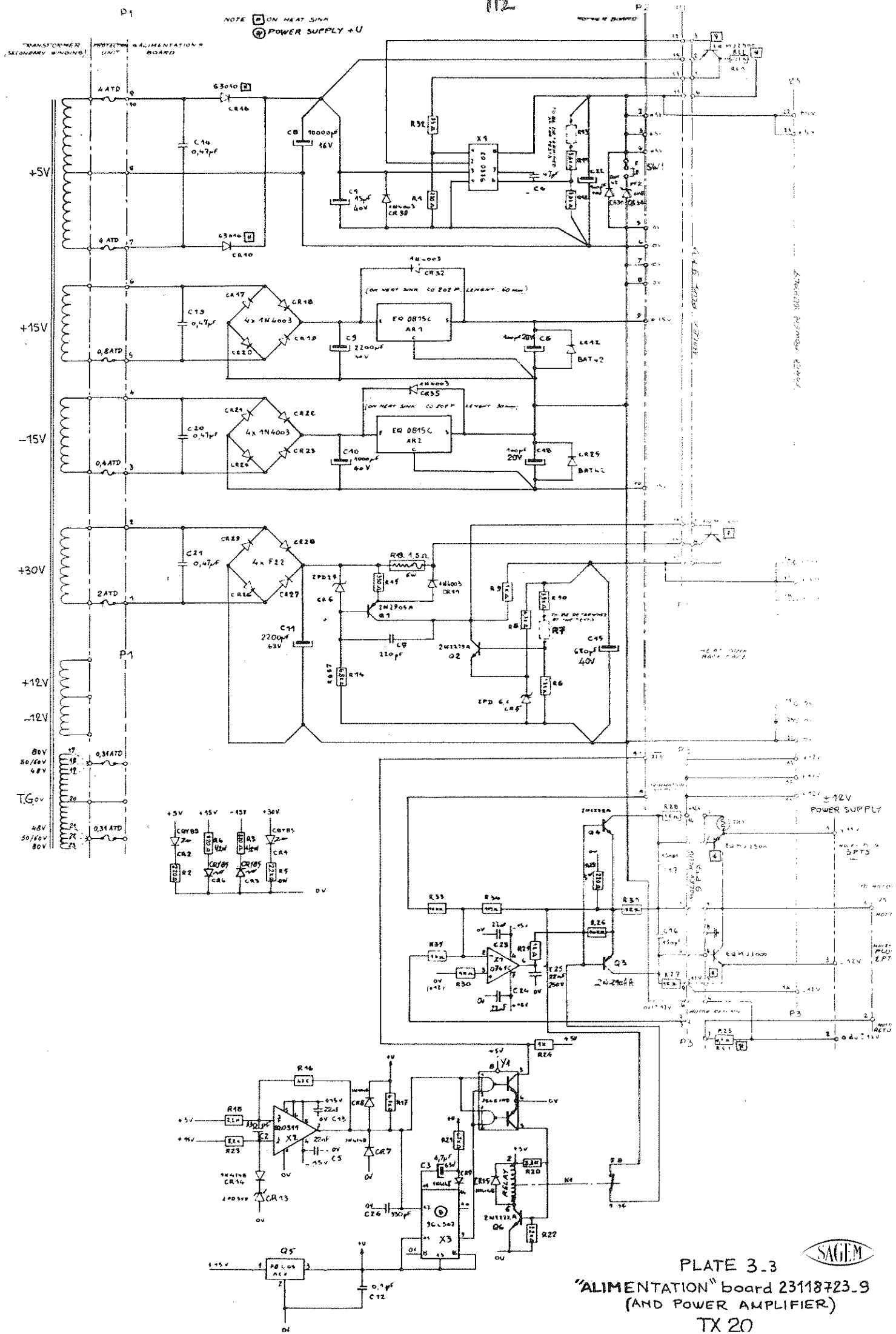
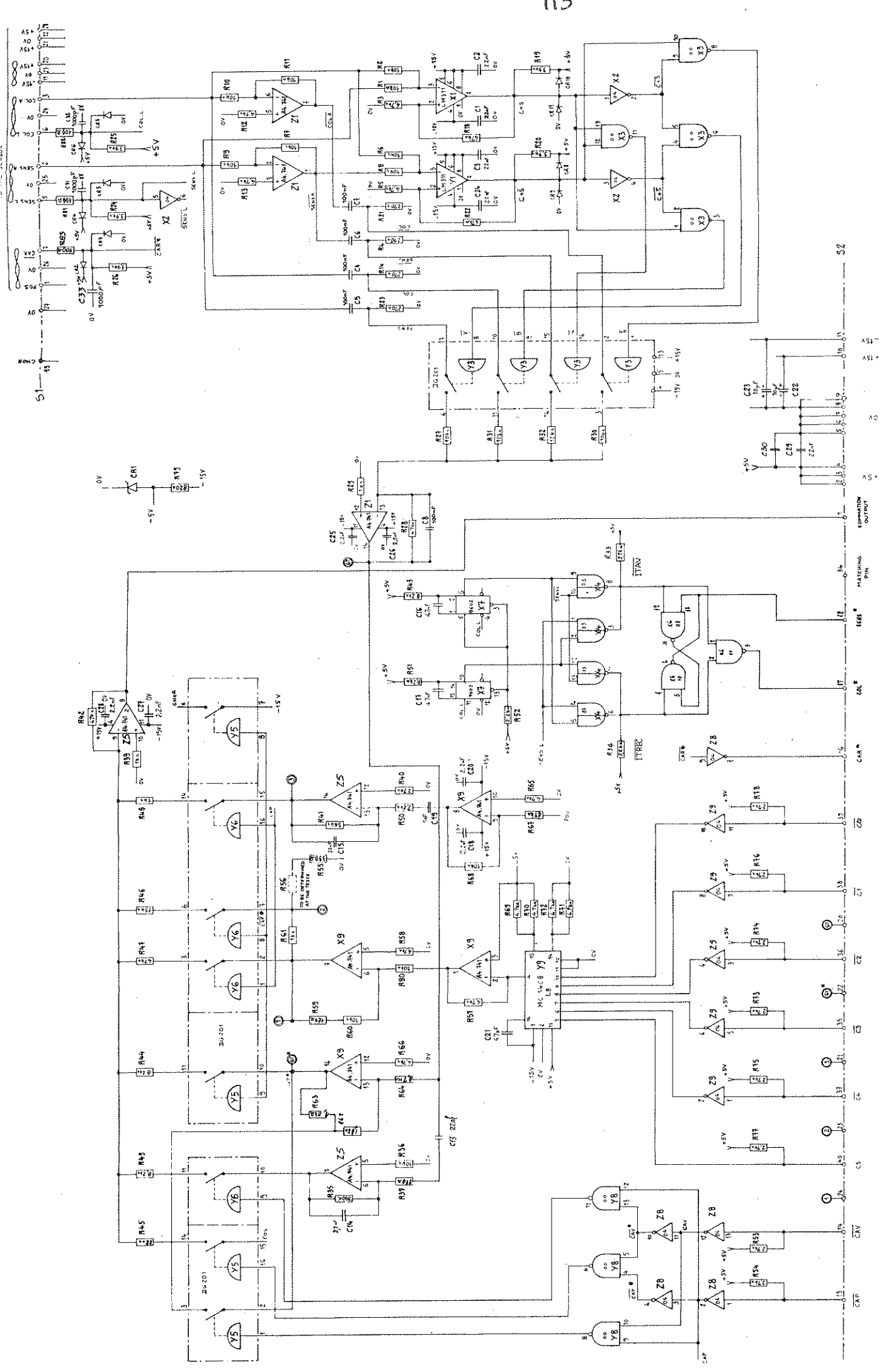
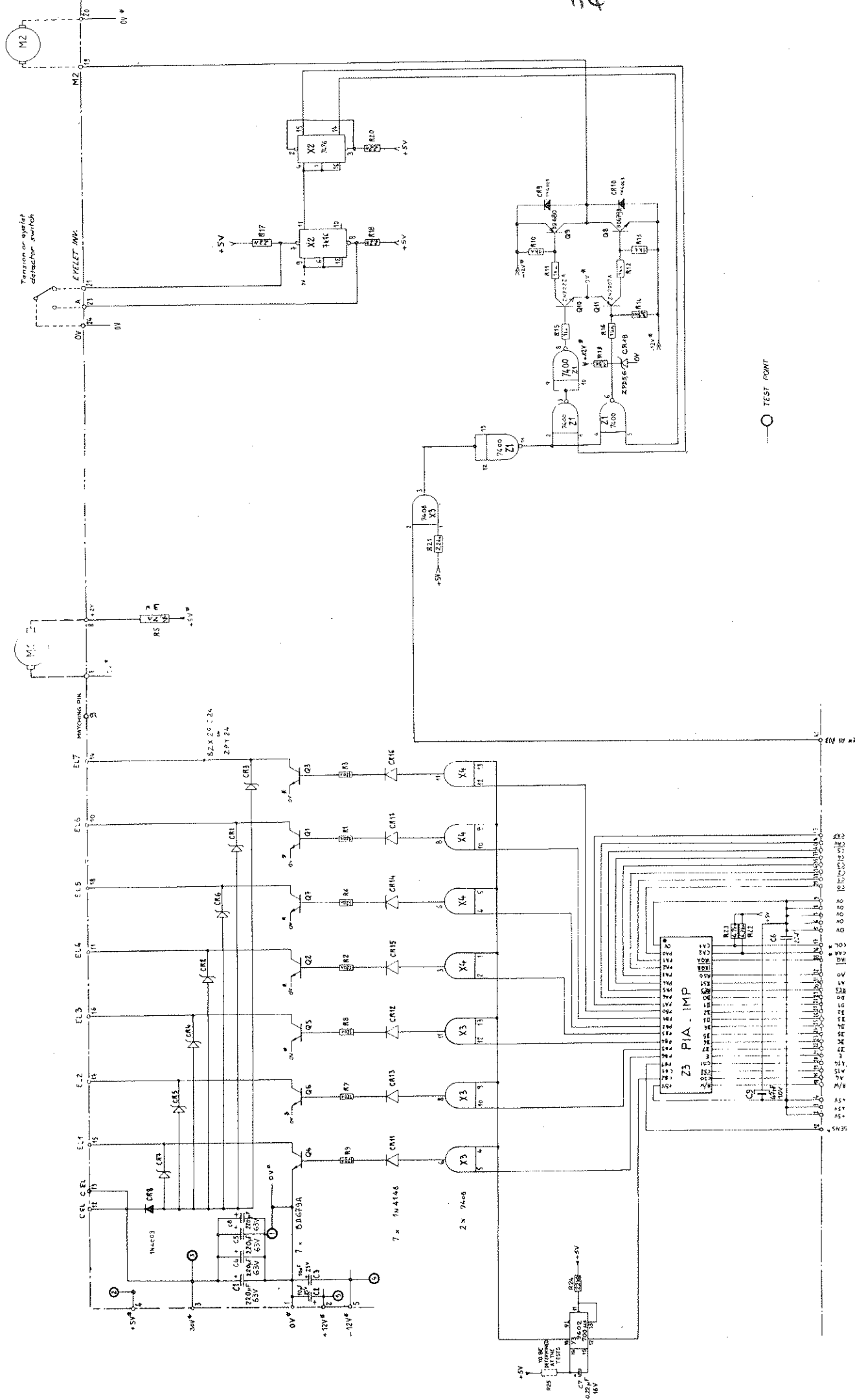


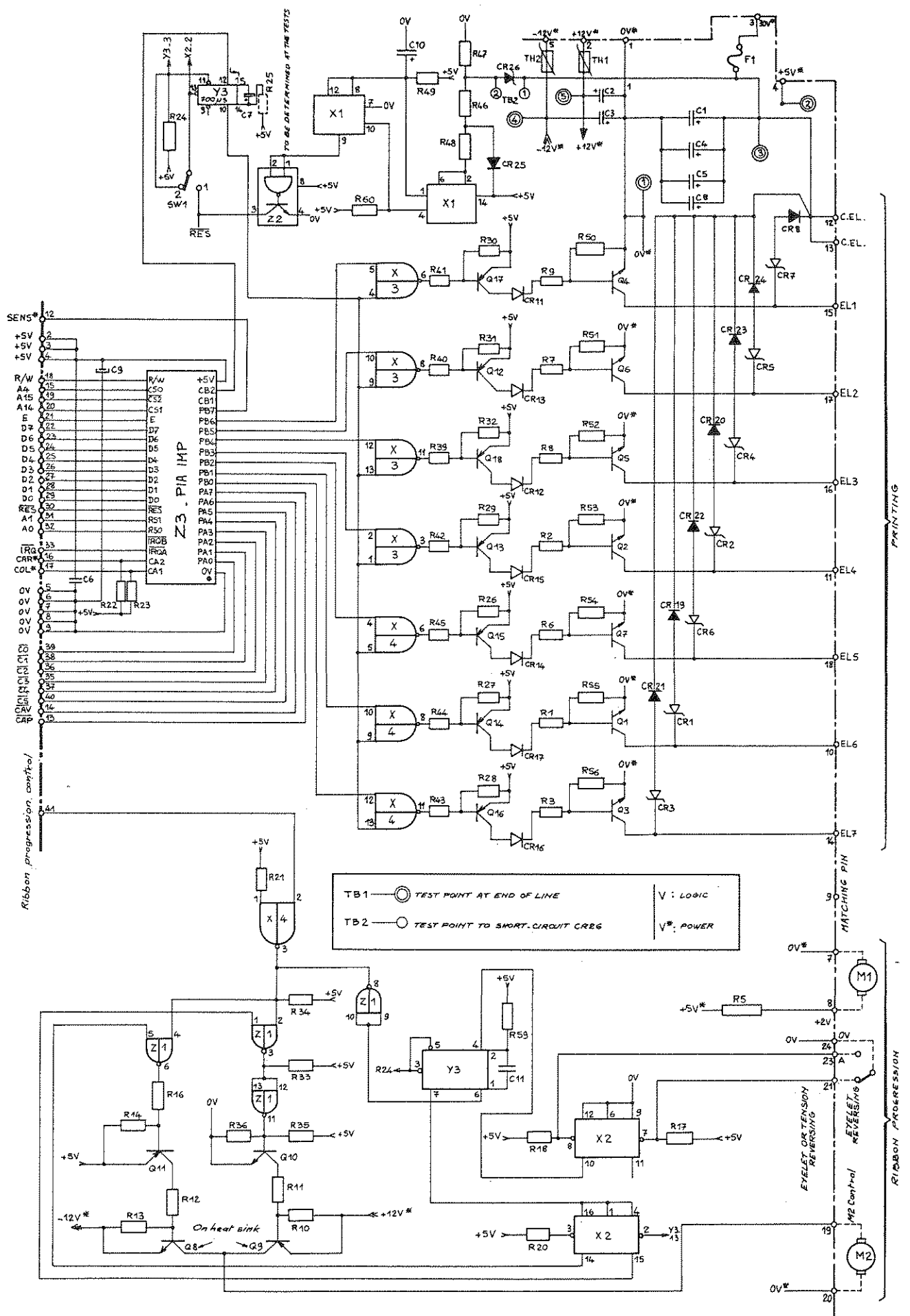
PLATE 3.3  
 "ALIMENTATION" board 23118723.9  
 (AND POWER AMPLIFIER)  
 TX 20





MOTHER BOARD

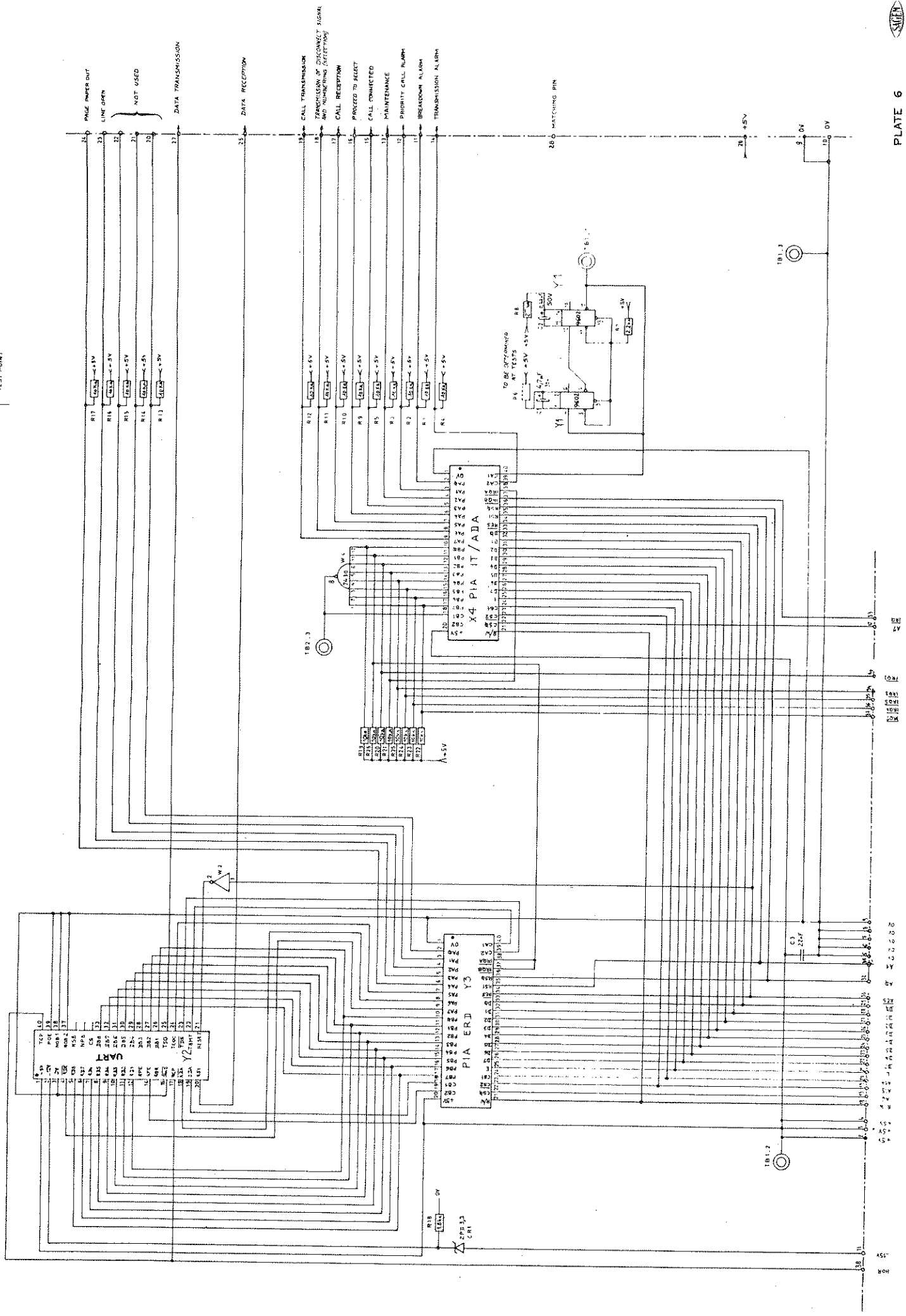


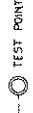


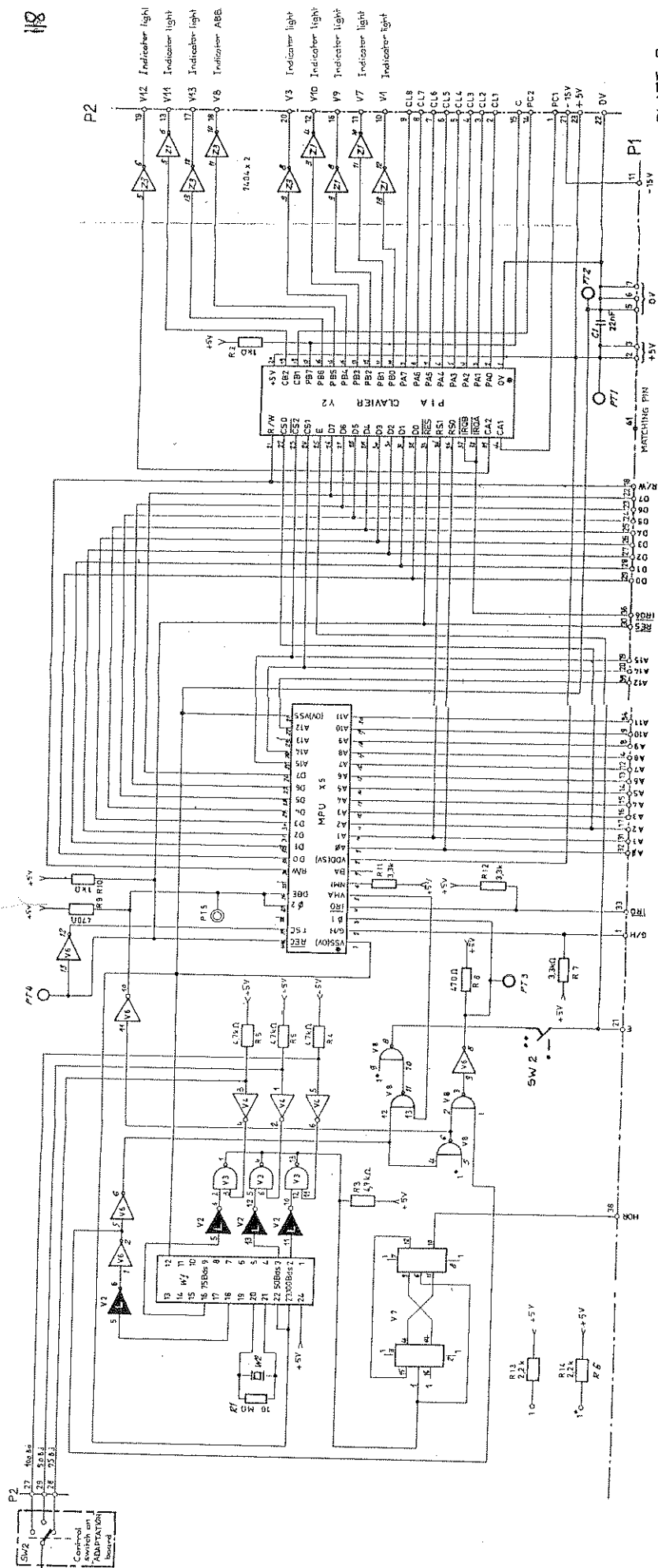


TEST POINT

116









[illegible]

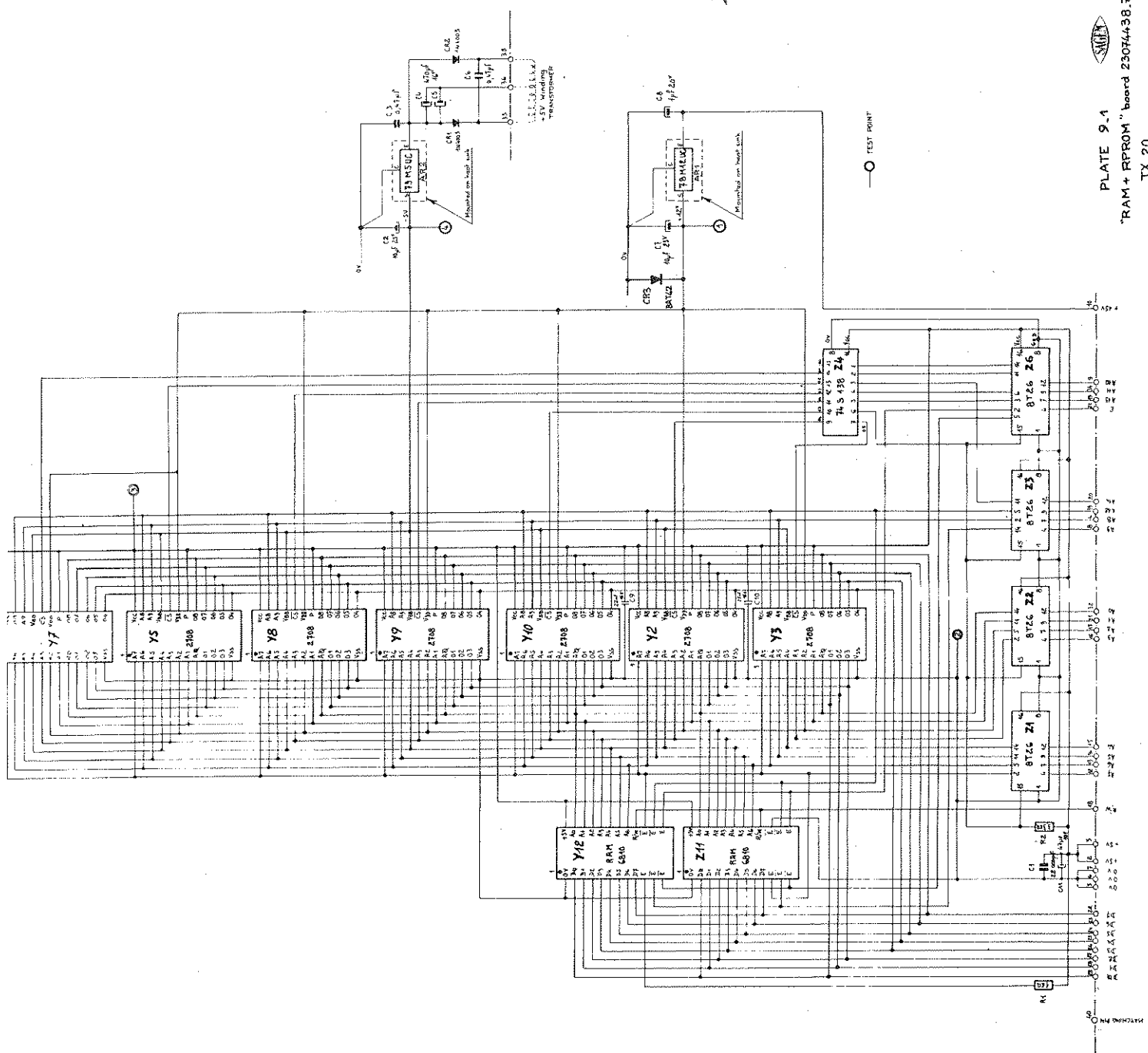
PLATE 8.3

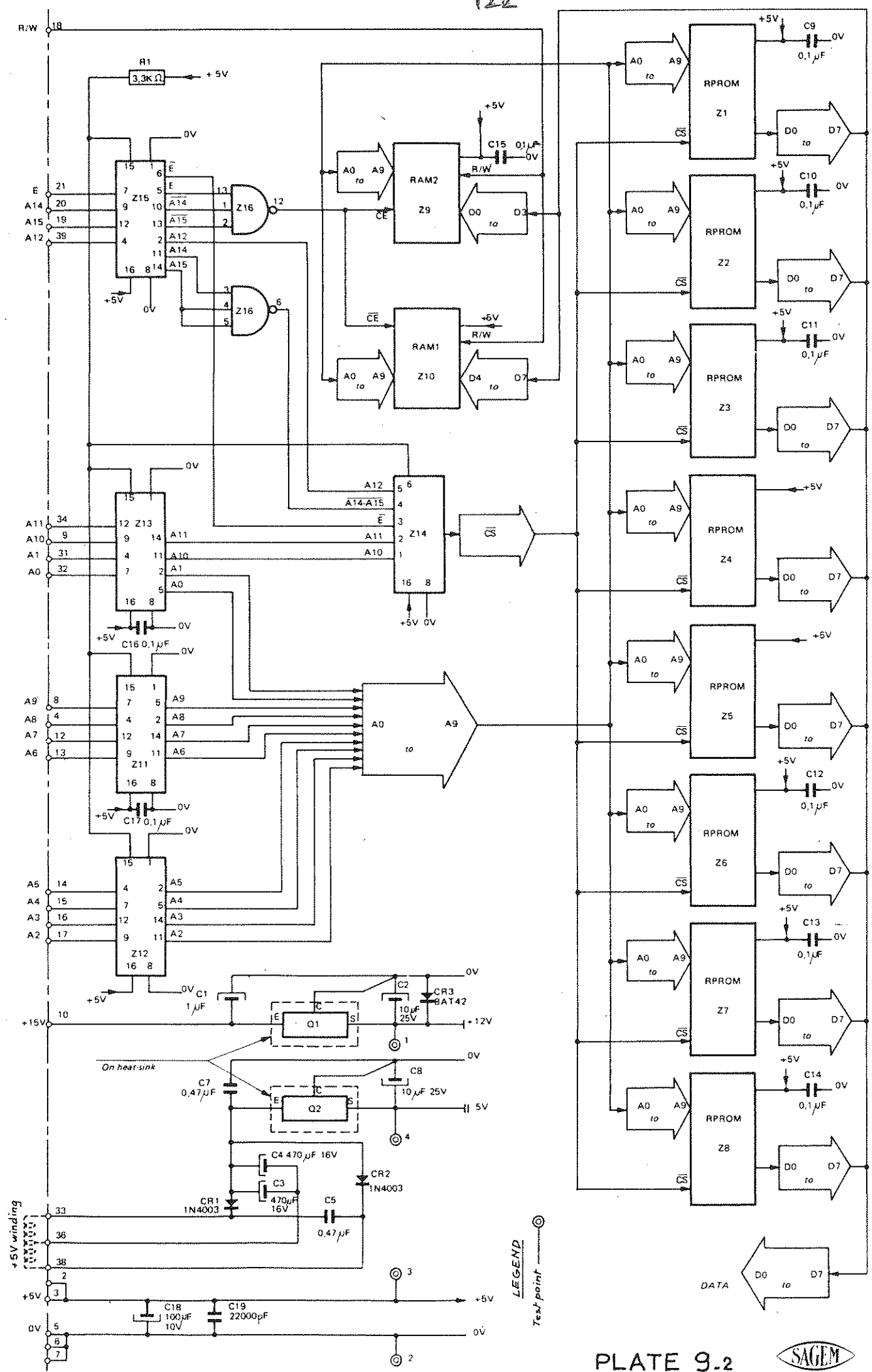
\*PIA CLAVIER+MPU \* board 23106892.6

TX 20

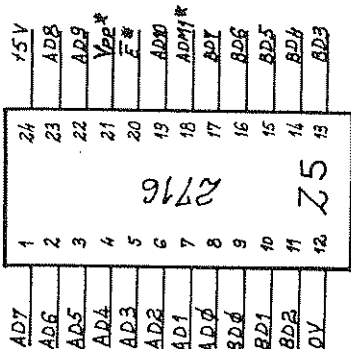
NO. 157 OV

121

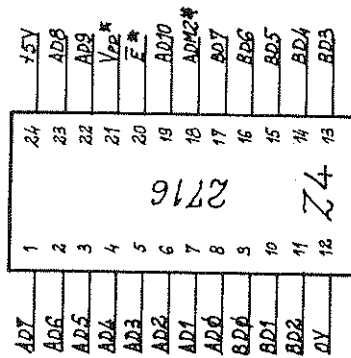




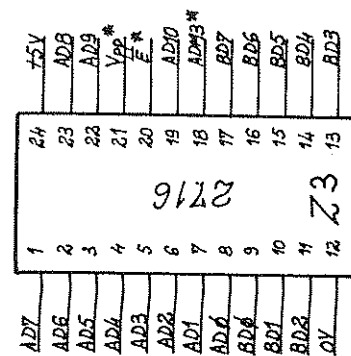
C1 0V +5V



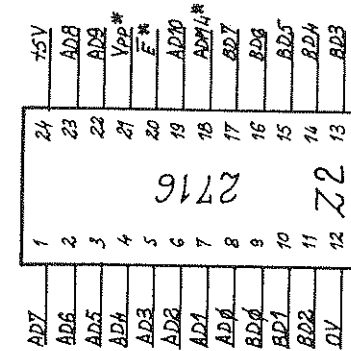
C2 0V +5V



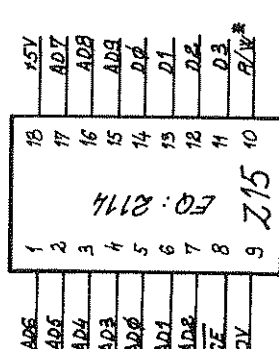
C3 0V +5V



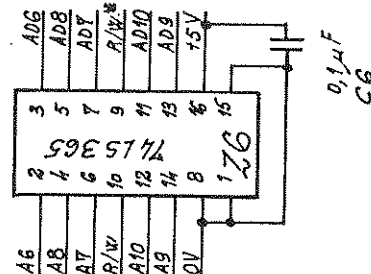
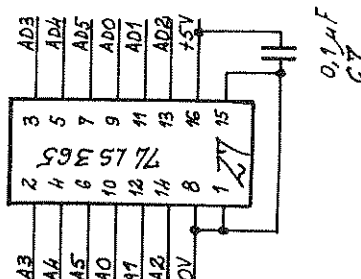
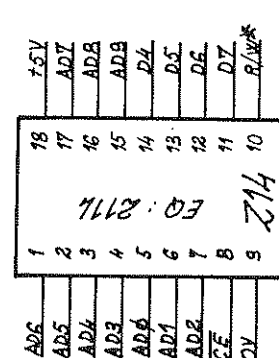
C4 0V +5V



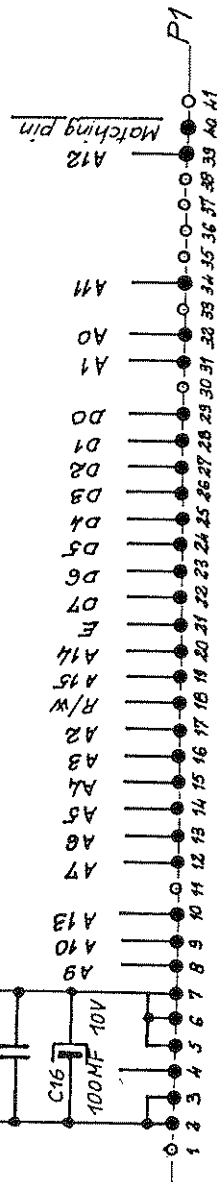
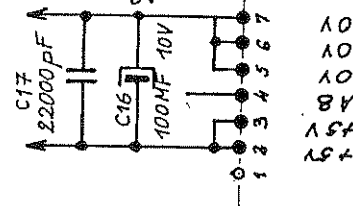
C15 0V +5V



C13 0V +5V



123A



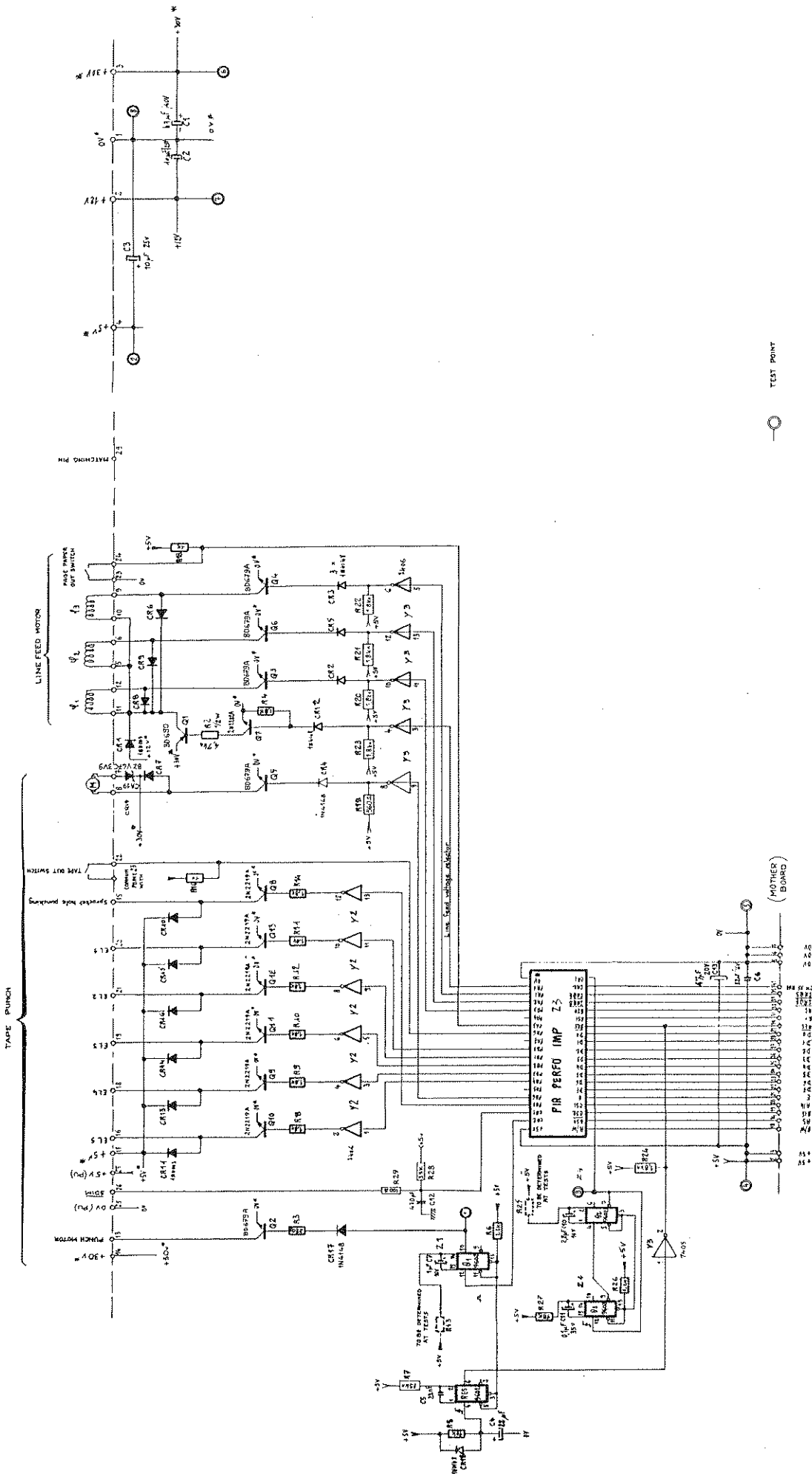
NOTE:

PLATE 9.3

"RAM + RECON" board 23118714-3







TEST POINT

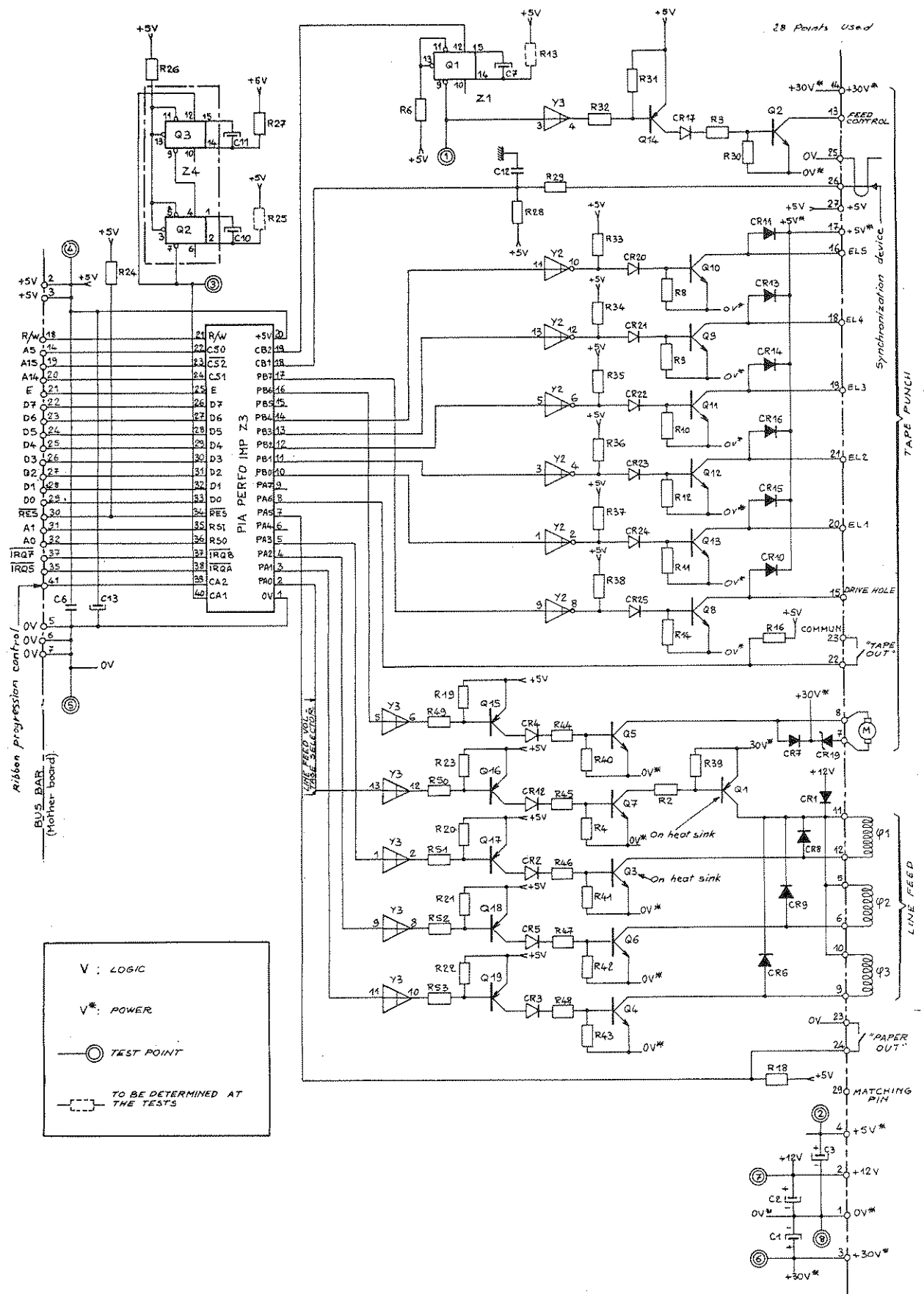
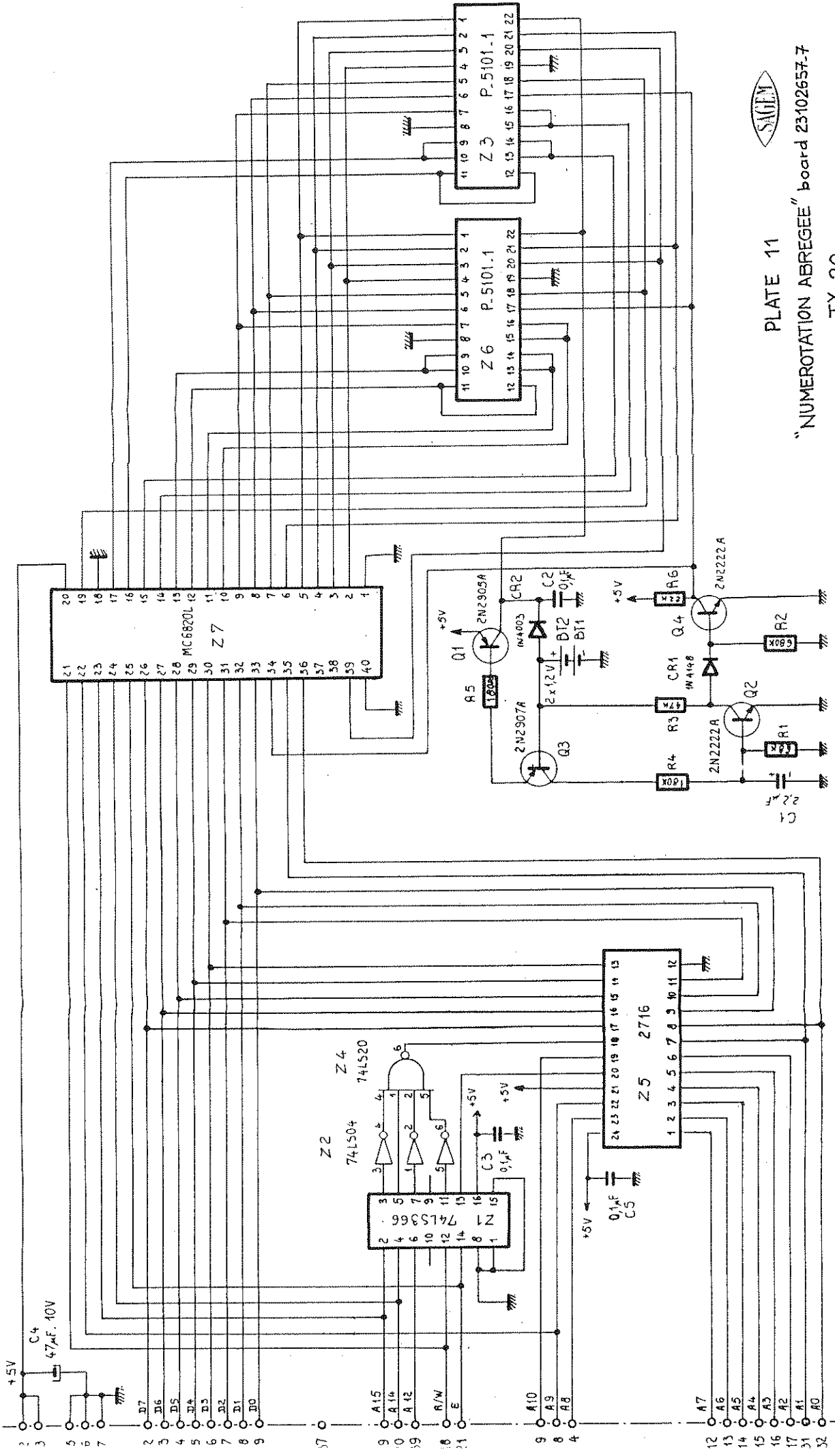


PLATE 10.2



"PIA PERFO + AMPLI" board 23119272.7

TX20



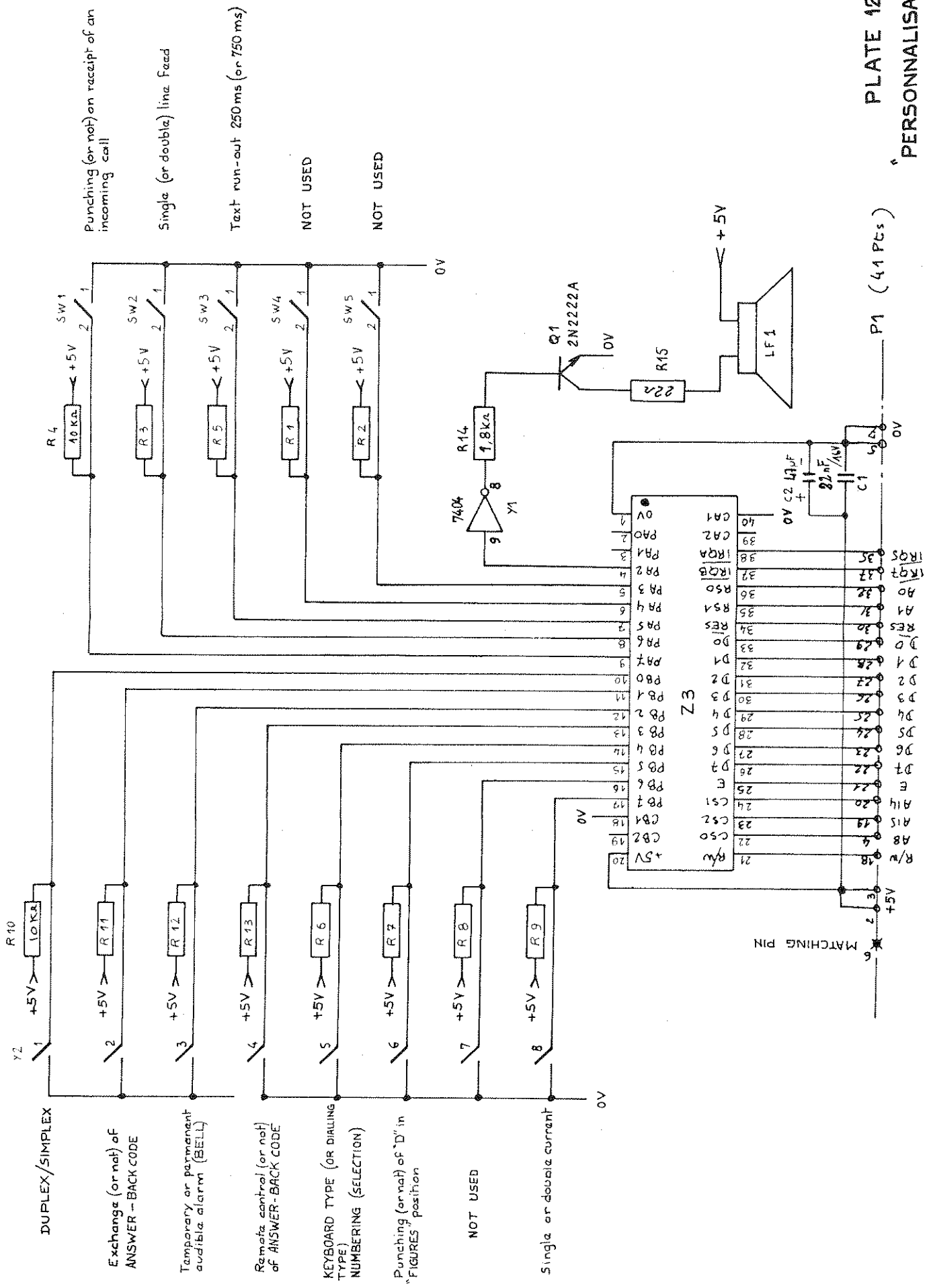


PLATE 12

"PERSONNALISATION" board

TX 20

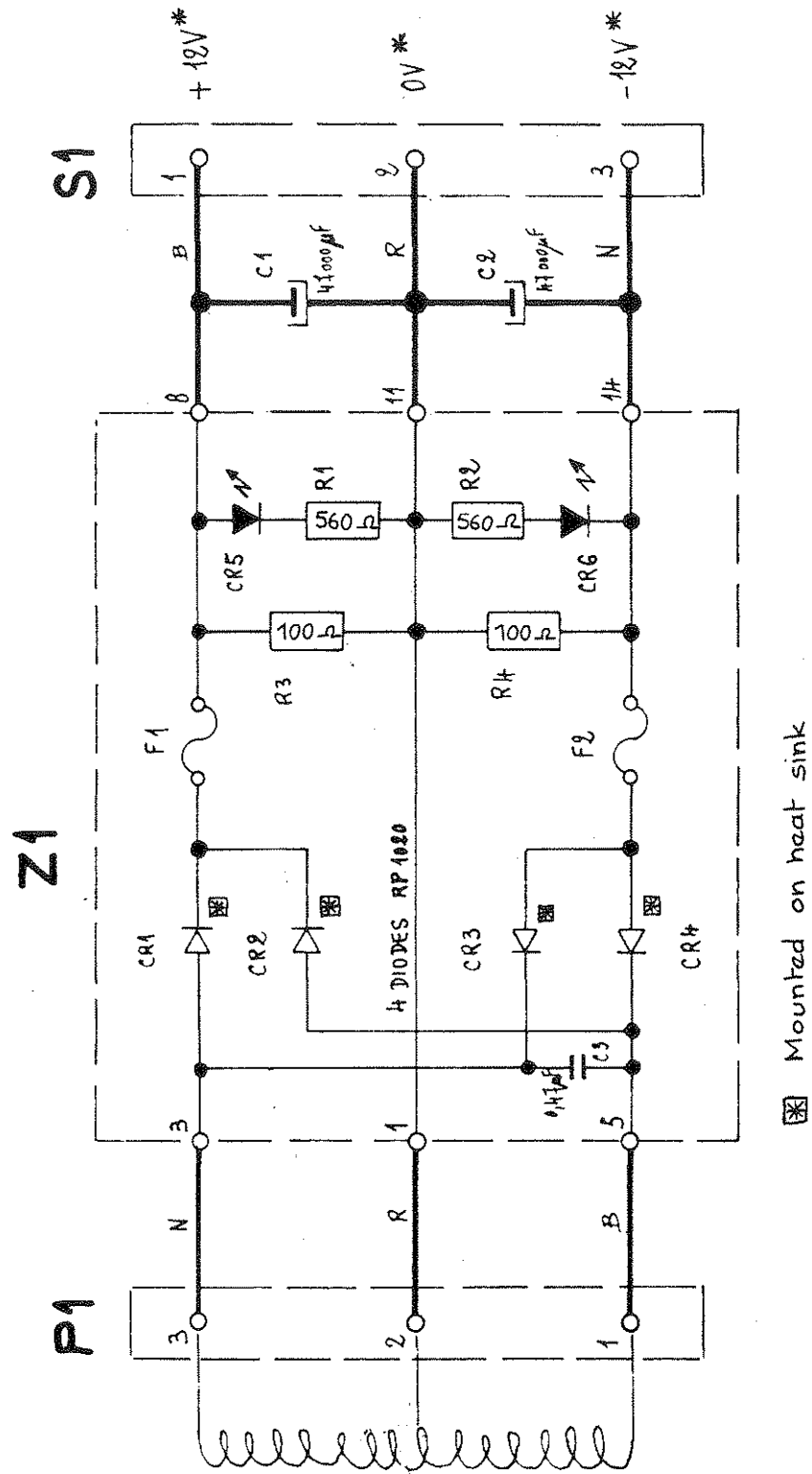
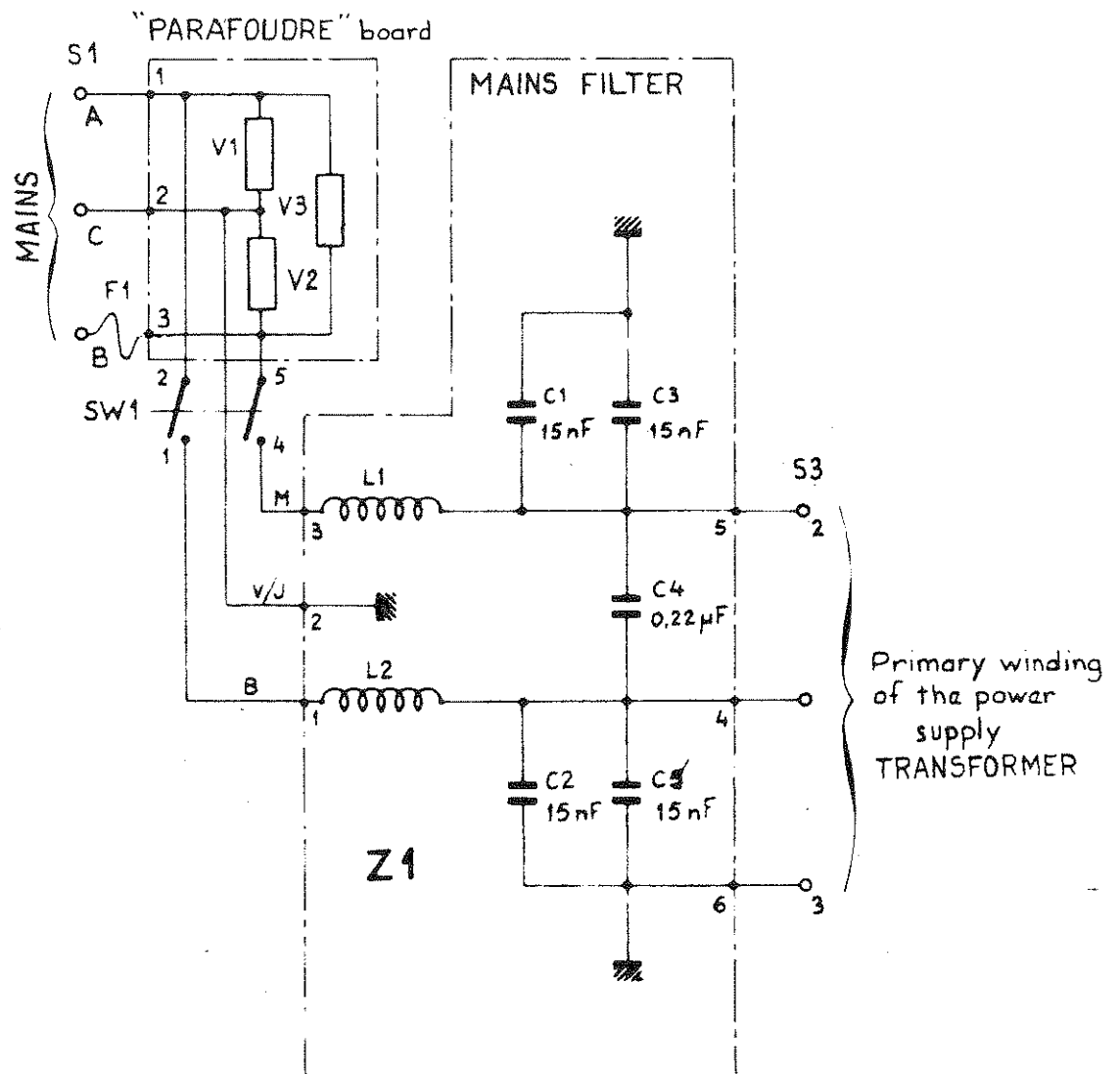


PLATE 13  
±12V POWER SUPPLY  
TX 20



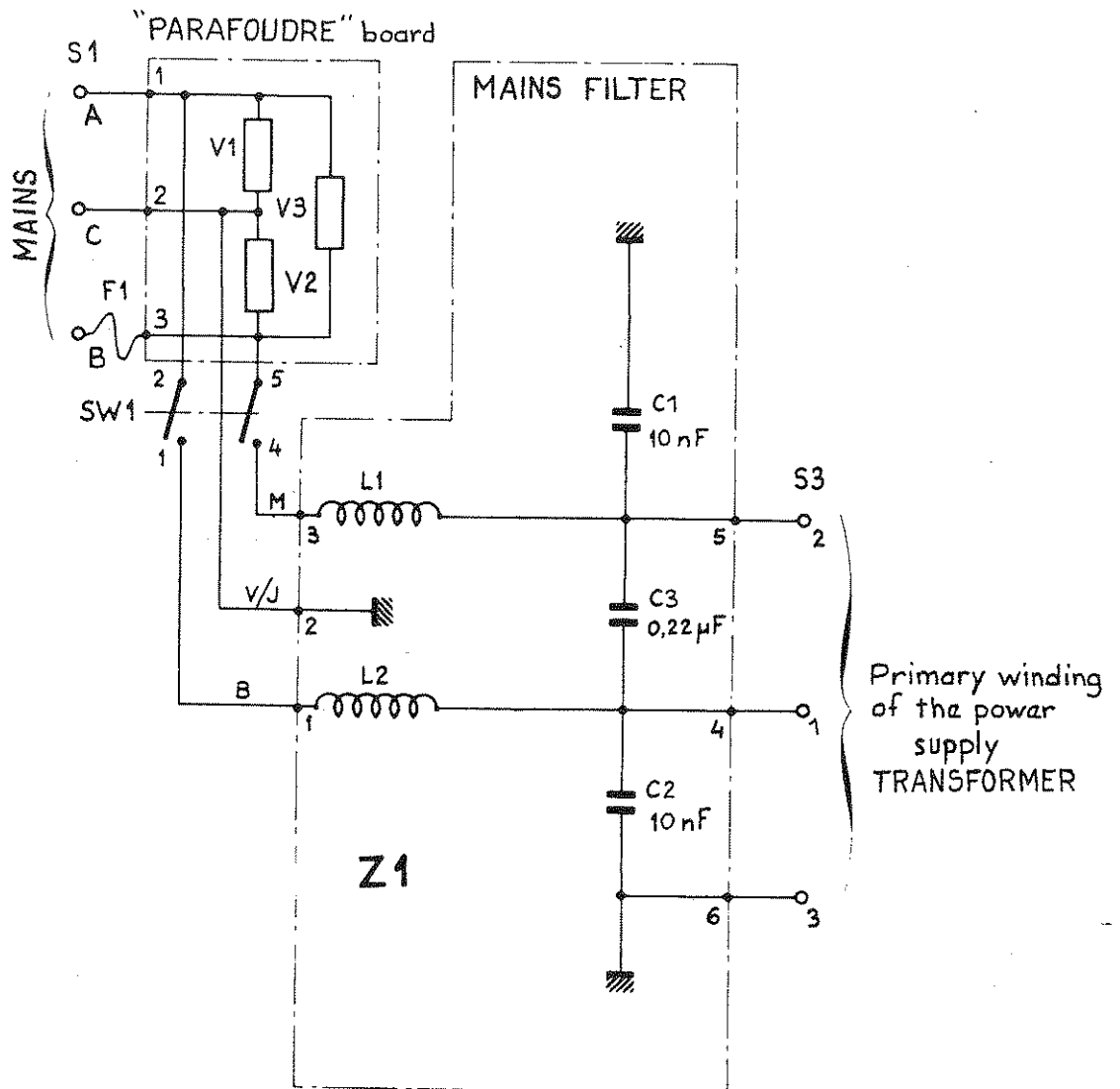


# PLATE 14.1

MAINS FILTER 23074393-4  
AND "PARAFOUDRE" BOARD

TX 20





# PLATE 14.2

MAINS FILTER 23100200-6  
AND "PARAFOUDRE" BOARD

TX 20





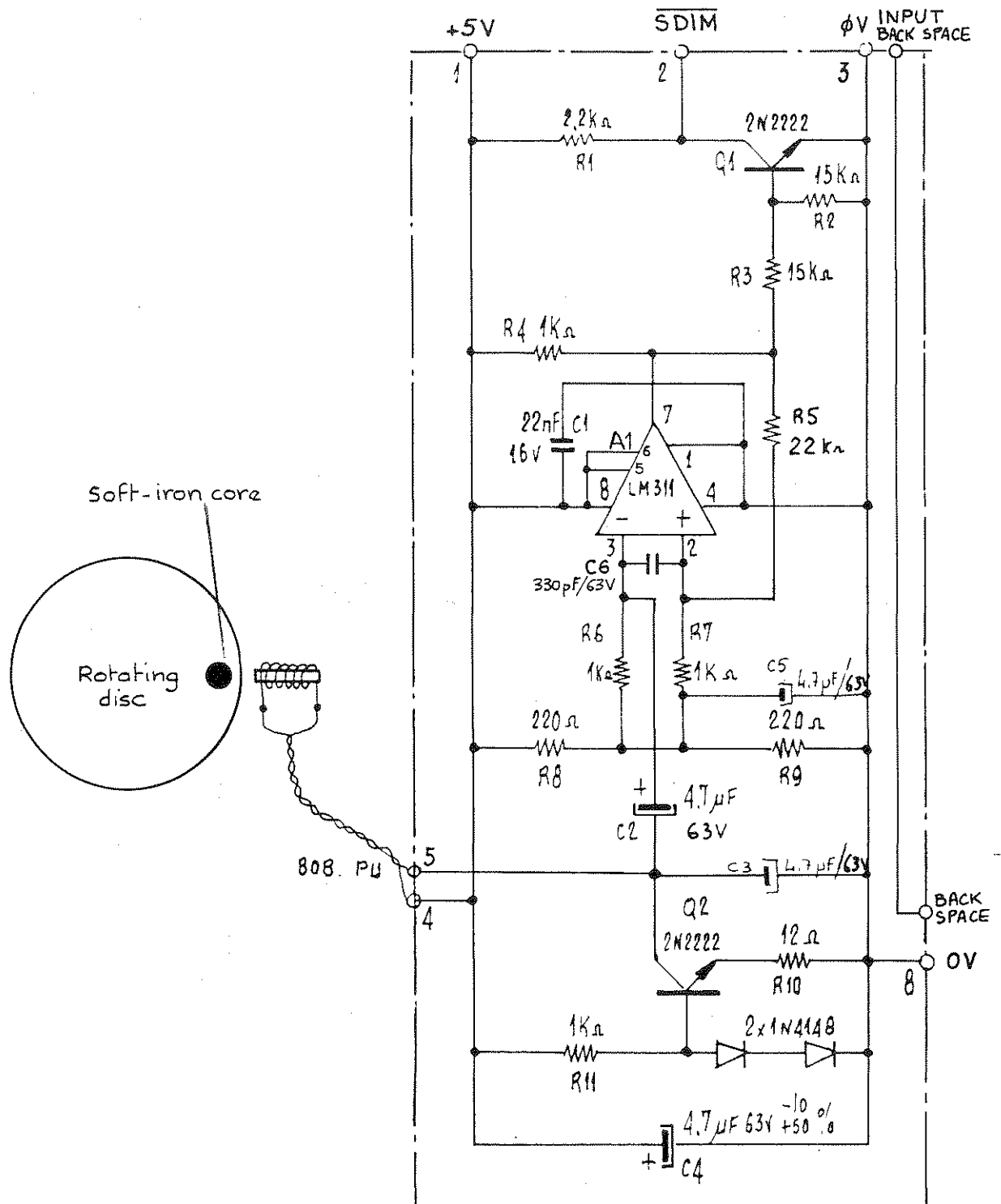


PLATE 15  
 SYNCHRONIZATION DEVICE  
 (TAPE PUNCH)  
 TX 20

