Olympia Service

electronic compact

Funktionsbeschreibung
Description of function
Description de fonctionnement
Descripción de Funciones

Olympia International

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Supplement to Function Description 1/14/042/10

Please use the following instead of the last paragraph on Page 15:

The ribbon change lever A12 can sense the type of ribbon cassette. If a normal carbon ribbon cassette is used, the arm of ribbon change lever would not operate and enables the full stroke of the ribbon feed arm A6 for 4 teeth on the feed wheel A8. At this location the multi-carbon ribbon cassette has a lug. It pushes the ribbon change lever, so that the transport stroke will be 1 tooth only.

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1. Technical Data

Type of machine	Electronic typewriter with typewheel
Approvals	UL, CSA, CEE, VDE
Voltage	
Primary circuit	115V / 60Hz or 220V / 50Hz $\pm$ 15%
Secondary circuit	UH = + 36V UL = + 12V ULL = + 6V UC = + 5V GND = Ø - potential control PCB
Consumption	60 W Rated load 21 W Stand-by
Motors	1 Stepping motor 36V/12V Typewheel selection 1 Stepping motor 36V/12V/6V Horizontal drive (Printer) 1 Stepping motor 36V/6V Vertical drive (Index, paper feed) 1 Stepping motor 36V/6V Ribbon

Fuses

	115V / 60Hz	220V / 50Hz
Primary circuit	1 1,25A slow-blow 1 Thermal fuse 125°C	1 1,25A slow-blow 1 Thermal fuse 125°C
Secondary circuit	1 1,25A slow-blow (VH) 1 2,5A slow-blow (UL) 1 2,0A slow-blow (ULL) 1 Thermal fuse 125°C	1 1,25A slow-blow (UM) 1 2,5A slow-blow (UL) 1 2,0A slow-blow (ULL)

Printer	Typewheel with 96 or 100 characters, interchangeable, positioning by stepping motor, typing speed 11 cps, impression control switchable 3 grades, original + 4 copies, Typing pitch Pica 10/inch = 2.54 mm Elite 12/inch = 2.2 mm Micro 15/inch = 1.69 mm

Ribbons	Special cassette Correctable carbon ribbon (lift-off), colour code yellow 13 mm x 105 m, 80,000 strikes Carbon ribbon normal, colour code red 13 mm x 105 m, 80,000 strikes Carbon ribbon multi, colour code blue 13 mm x 105 m, 320,000 strikes
Correction ribbon	Lift-off ribbon 7 mm x 7 m, 1700 corrections
Keyboard	48 alphanumeric keys, mechanical switch, buffer memory 11 characters, repeat function on every key except dead keys Function keys: Margin release key, Margin set key (L&R), Back space key*, Correction key*, Relocation key, Tab set key, Tab clear key, Index key* Reverse index key*, Return key*, Shift key (L&R), Shift lock key (LED), Express key, Space bar*, Half space key, Repeat key Key with * repeats its function by pressing the key deeper or pressing the repeat key after the operation of each key. Slide switches: Pitch selector 10, 12, 15 Line space selector 1, 1-1/2, 2 Impression control 3 grades
Paper holder	Platen size Length 346 mm (13.62 in) Diameter 40.3 mm (1.59 in) Paper capacity 355.6 mm (14 inches) Typing capacity 292.1 mm (11.5 in) Pica 115 characters Elite 138 characters Micro 172 characters Line spacing 4.23 mm at selection 1, variable line spacer, paper injector, paper end gauge, paper release lever
Electronic control	Single chip microcomputer System 8049 (or microprocessor 8039 with external EPROM)
Correction memory	46 characters (46 spaces)
TAB memory	16 settings

Present margin	Left 20 Right 85 on Pica
Self demonstration for service	Prints out all characters, space, back space, correction, carrier return, relocation express
Dimension	Width 491 mm (19.3 in) Length 376 mm (14.8 in) Height 137 mm (5.4 in)
Weight	9 kg

2. General characteristics

This electronic typewriter model ELECTRONIC COMPACT consists of the following six major assemblies

- Chassis and platen unit
- Keyboard
- Printer assembly
  with typewheel motor, hammer solenoid, photo interrupters for typewheel and printer home position, ribbon feed mechanism, correction mechanism
- Power pack
  to transform AC to regulated DC
- Control Print Circuit Board
  with 8 bit microcomputer for controlling all functions, driver device for stepping motors and hammer solenoid, buzzer
- Housing

3. Description of function

3.01 Power pack
(Circuit Diagram D)

The power pack is transforming the power voltage with the ferro-magnetic constant voltage transformer T1. This transformer is keeping its iron core with a resonance circuit within the saturation phase, so that the voltage changes within permissible range of +15% will not influence the secondary voltages.

At the power input, a filter consisting of coil L1 and capacitor C1 works against interfering frequencies.

The primary winding in the constant voltage transformer T1 is protected by a thermal fuse which functions at 125°C and a delay fuse 1.25A.

Voltage for the secondary circuit is rectified by the bridge rectifiers D1 and D2. The ripple voltage generated in the secondary circuit is smoothed by the capacitors C4, C5, C6, C8. High frequency noise is attenuated by the capacitor C7.

5V DC for the microcomputer system (UC) is regulated from the 12V (UL) via ICI.

3.02 Switching-on routine

All control lines outgoing from the CPU (IC4) are set to logic Ø (+5V) when switching on the machine (See 3.06).
The printer is moved to the left until the arm of reset plate is pulled out of the photo interrupter PH2. After recognizing the left end, the horizontal step motor is activated by the microcomputer so as to move the printer 20 spacings to the right from Ø on the margin scale (on Pica). This pre-set margin is programed to set at 20 on the left, 85 on the right (on Pica).
The typewheel is turned by the switching-on routine to the basic position via its stepping motor.
The ribbon step motor also moves to its base position.

3.03 Keyboard, Key scanning

The key switch modules are mechanical contact switches and they close and open at the cross points of the key matrix 8x9 (See circuit Diagram H).
When a key is depressed, the contact is closed and effecting the connection between the columns and rows. The microprocessor IC4 is scanning the lines Sp 0 ... Sp 8 and Ze 0 ... Ze 8 every 12.6 ms in the BCD code. Its output pin 35 ... 38 send the scanning pulse one after another to the columns Sp 0 ... Sp 8 via the binary decoder IC 5 by tapping 4 ports to 10 with H-signal (+5V). The signal scanned forms

an octal code, which is read via the keyboard buffer IC 1 by the input pin 12 ... 19 of the IC 4 (See Circuit Diagram F).
A signal is recognized as correct after two times scanning for one time key operation.
The octal codes (8 bits data) of the last 11 characters or functions are memorized in the RAM of IC 4 as the key operation memory (key buffer memory). At the same time, the 8 bits data in the IC 4 is the address for the command which is written in the 2K-ROM (or EPROM IC 2). The command makes the microcomputer activating the machine functions via the driver circuit and the actuators.

3.04 Microcomputer

The 8 bits microcomputer 8049 is a single chip type computer with N-MOS system. It is replaced during the introduction by the pin-compatible microprocessor 8039 (Identification IC 4 on the control circuit board, see Diagram F) with external EPROM IC 2.
The microcomputer is including the ALU, 2K x 8 bits programme memory, 128 x 8 bits RAM data memory, 27 I/O lines (3x8 bits I/O ports, 1 interrupt input and 2 test inputs), multiplex address/data bus. The internal clock generator in CPU is clocked by means of a quartz with 6 MHz.

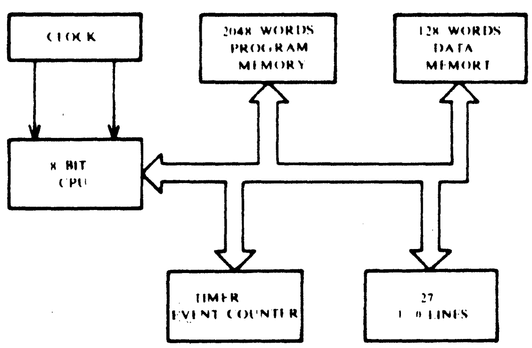


Fig-1

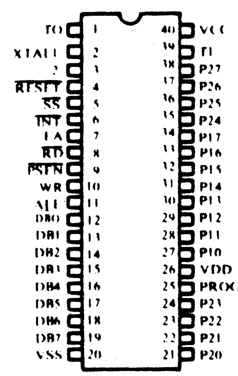


Fig-2

The IC 4 processes the information from the keyboard, the operation keys and photo interrupters and controls stepping motors and buzzer (See Circuit Diagram F).

3.05 Control circuit board
(Circuit Diagram F)

The IC components of the control circuit board are:

IC 1 - Keyboard buffer
IC 2 - EPROM (programme memory) 2716 D
IC 3 - Address latch (octale 3-state D-latch)
IC 4 - CPU
IC 5 - 4 to 10 decoder
IC 6 - I/O expander
IC 7 - NOR Gate 4001 BC for CPU reset and delay-1
NOR Gates for shift control (flip flop)-2
IC 8 - NAND Gate for buzzer
IC 9
IC 10 - Inverter for driver circuit activation
IC 11
TRA1 - Transistor Array 2004C

The control circuit board includes the drivers for the motors and the hammer solenoid beside the control components (See G).

The plug arrangement is:

Cone 1 Keyboard output Ze
2 Keyboard input Sp
3 Horizontal motor (printer)
4 Vertical motor (index)
5 Printer PCB
6 Power pack
7 Paper injector switch

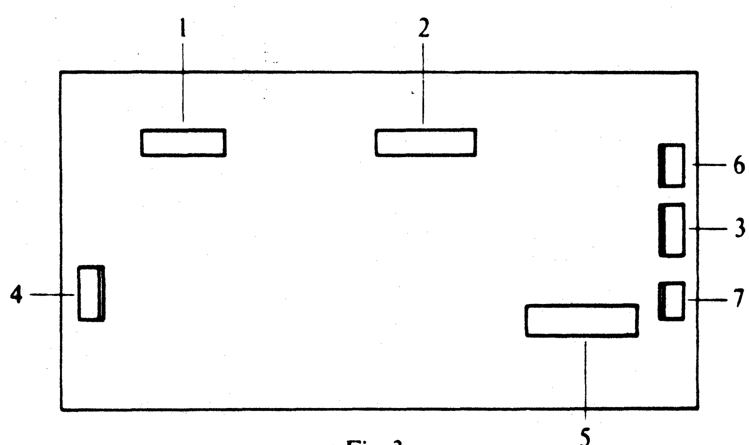


Fig-3

3.06 Delay circuit, Reset circuit
(Circuit Diagram F)

Since the voltage UL +12V and then UC +5V are not soon available when switching on the machine, a switching-on delay circuit is effected to UC +5V which activates the motors and the hammer solenoid.
The CPU (IC 4) has H-level at its pin 33 and the NOR gate IC 7 at pin 13 when the machine is switched on. During increasing of the UL to +12V, the Zener diode ZD 1 gives 4.5V (UL-7.5V) to the base of transistor Tr 3 . And its collector comes to L-level when the UL reaches 10V or more. The L-level goes to the pin 12 of NOR gate IC 7 . The L-level is led to the base of Tr 31 from the output of IC 7 and the Tr 31 is opened. In the meantime Tr 6 for the driver circuit still keeps opening.
Then the capacitor C 2 is charged, the reset input pin 4 of CPU comes to H-level and the CPU initiates its programme. After the CPU has initiated the programme, the pin 33 comes to L-level and the pin 13 of IC 7 also comes to L-level. The output of IC 7 comes to H-level. Then the transistor Tr 31 and Tr 6 open and the control voltage +5V is switched through to the driver circuit.
When the machine is switched off or when the UL drops below 9V, Tr 3 opens and pin 12 of IC 7 comes to H-level. The output of IC 7 comes to L-level. Then the transistors Tr 31 and Tr 6 open and the control voltage +5V for the driver circuit is switched off.
The switched-through transistor (Tr 3) gives H-level to the base of Tr 4, which makes the pin 4 of CPU L-level via the reset line. Then the reset is effected by means of the capacitor C 2.

3.07 Shift
(Circuit Diagram F)

The emitter of transistor Tr 1 has H-level from the CPU (IC 4) via the pin 9 of IC 5.
When pressing the shift lock key, +5V goes to the pin 1 of IC 7 via the cone 1 pin 9 and the cone 2 pin 1, and the flip flop is set. Since the output of flip flop comes to H-level and one of the TRA 1 is inverted, L-level goes to the LED via the cone 1 pin 10 and the LED lights on. In the meantime H-level goes to the keyboard diode D Ø via the collector of Tr 1 and cone 2 pin 3, and goes to the keyboard buffer IC 1 via the cone 1 pin 4. Thus the key scanning from CPU detects the shift lock key being depressed.

When one of the shift keys is depressed, +5V goes to the pin 6 of IC 7 via the cone 2 pin 1, and the flip flop is reset. Since +5V goes through the diode D 2 and inverts one of the TRA 1, L-level goes to the LED via the cone 1 pin 10 and the LED lights on. And the key scanning from CPU detects the shift key being depressed. While the shift key is depressed, the current keeps flowing via D 2 to TRA 1 and the LED keeps lighting on. However, the output of IC 7 keeps L-level.

When the shift key is released, the input of the IC 7 comes to L-level and the output is keeping its L-level. Since the base of Tr 1 comes to H-level and it opens, the LED has no voltage and lights off. In the meantime L-level goes to the keyboard diode D Ø via the cone 2 pin 3, and goes to the keyboard buffer IC 1 via cone 1 pin 4. Thus the key scanning from CPU detects the shift key being not depressed.

3.08 Buzzer
(Circuit Diagram F)

The buzzer is operated by a single shot multi-vibrator consisting of the lower 2 NAND gates of the IC 8.
The CPU (IC 4) applies a L-impulse to the multi-vibrator from the pin 34. A H-level is formed for about 0.5 second at the pin 3 of IC 8 and operates the oscillator (higher 2 NAND gates) which activates the buzzer BUZ via the transistor Tr 2.

3.09 Hammer solenoid, Impression
(Circuit Diagram F)

The CPU (IC 4) applies continuously H-level to its pin 31.
The base of T 29 comes to L-level via one of TRA 1. It locks and keeps the hammer solenoid. The pin 31 of CPU comes to L-level for character printing. The base of Tr 29 comes to H-level with +5V from Tr 6. Then the current from +36V flows to the magnet coil via the cone 5 pin a8 and to the collector of Tr 29 from another end of the magnet coil via the one 5 pin b7. Thus the striking of plunger for printing is activated.

After striking, the Zener diode ZD 6 limits the fly-back voltage to 51V.

The current flows the solenoid for constant printing is limited by the Tr 30 under the control of the Tr 29 base. The total printing impression can be adjusted by the variable resistor VR 1, which changes the volume of current flowing to the hammer solenoid.

Impression

The different type contour of characters is considered so that the current will flow to the hammer solenoid for a different time.
It is divided into 3 stages:

- Normal : All normal capital and small letters and symbols.
- Strong : Large space letters (for example Ww Mm & §).
- Weak : Small space symbols (for example ,.-_').

The necessary time for the concerned characters are filed in the ROM of CPU or EPROM. It controls the output time of L-level from the CPU.

The print impression can be selected with the slide switch on the keyboard according to the number of copies. It also controls the output time of L-level from the CPU.

- Position 1 Normal impression
  No contact and therefore no signal to the CPU.

- Position 2 Higher impression
  Slide switch contact S2 in the keyboard matrix is closed. The CPU detects it by key scanning as described in paragraph 3.03.

This makes the output time of L-level 0.38 ms longer from the pin 31.

- Position 3 Highest impression
  Slide switch contact S1 in the keyboard matrix is closed. The output time of L-level is 0.59 ms longer.

3.10 Expander circuit

Since the 8039 (IC 4) has only 27 I/O lines, extension of the output lines port 20 ... 23 (pin 21 ... 24) is effected to the ribbon, vertical, typewheel and horizontal motors via the I/O expander IC 6.

The IC 6 has a programme port with one line, 4 input and 4 output ports each with 4 lines. The 4 output ports operate the driver circuit.

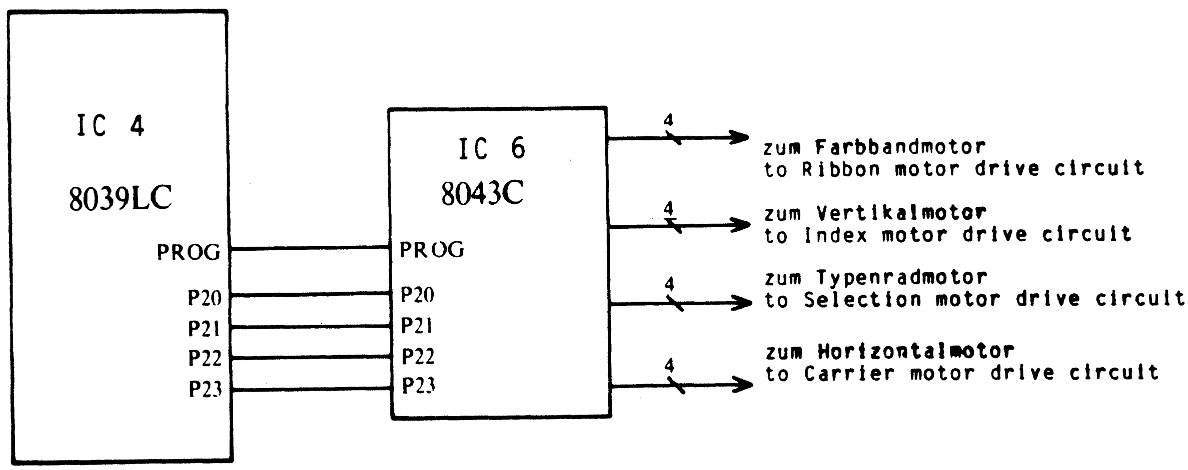


Fig-4

3.11 Motors, driver circuit

The stepping motors make movements with following step spaces:

Typewheel positioning

1 full step of motor = 3.6° = 1 spoke of typewheel

Horizontal positioning

1 full step of motor = 7.5° = 1/60 in = 0.423 mm
6 full steps of motor = 1 pitch 10 cpi = 2.54 mm
5 full steps of motor = 1 pitch 12 cpi = 2.12 mm
4 full steps of motor = 1 pitch 15 cpi = 1.69 mm

Vertical positioning

1 full step of motor	=	7.50 = 1/72 in = 0.3528 mm
8 full steps of motor	=	1 line spacing = 1/6 in = 4.23 mm
12 full steps of motor	=	1-1/2 line spacing = 1/4 in = 6.35 mm
16 full steps of motor	=	2 line spacing = 1/3 in = 8.46 mm

Ribbon motor

For cassette ribbon feed and lift, 11 steps = 82.5° from basic position in both directions

For correction tape feed and lift, 30 steps = 225° from basic position in one direction and back.

For the typewheel motor, a bit pattern is transmitted from the CPU via the port 10 ... 13 of IC 6 to the 4 control lines. It is inverted by the inverter IC 9 and switches on the basis of Tr 12 ... Tr 15. The motor works by changing the bit patterns in order.

Above description also applies to other stepping motors under the consideration of each switching time and driving device.

Bitmuster/Timing Chart

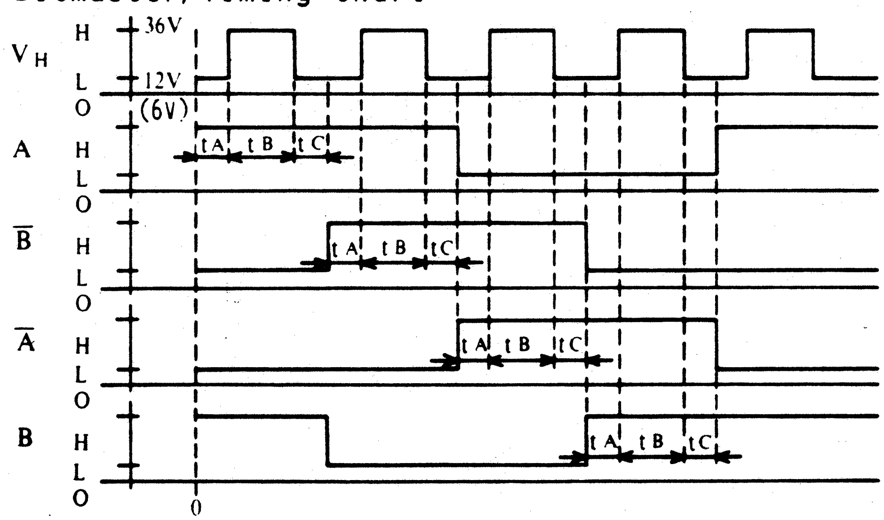


Fig. 5

t_A = 10 µs const, t_B = x ms const, t_C = 130 µs ... 5 ms
Typewheel motor x = 500 ms, horizontal motor x = 1.3 ms,
vertical motor x = 1.6 ms

The power control for motors is effected from the port 1 of CPU to the basis of Tr 8 ... Tr 11 via inverting in the transistor arrey TRA 1. Since the horizontal motor needs 3 different voltages, Tr 7 is activated exclusively for this motor.

During motor functioning the operation voltage switches continuously between VHH and VHL via the transistors Tr 7 ... Tr 11 (See Fig. 5).

Motors	Operation voltage		Keeping voltage
	VHH	VHL	
Typewheel motor	36 V	12 V	0 V
Horizontal motor	36 V	12 V	6 V
Vertical motor	36 V	6 V	0 V
Ribbon motor	36 V	6 V	0 V

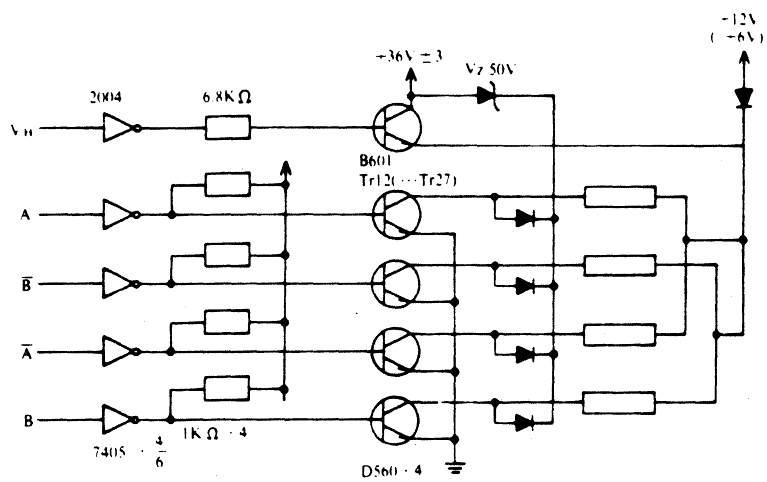


Fig. 6

3.12 Photo interrupters

The basic positions of the step motors except the vertical motor are detected by the CPU via the photo interrupters.

Motor	Photo interrupter
Typewheel motor	PH 3 on the printer head
Horizontal motor	PH 2 on the printer PCB
Ribbon motor	PH 1 on the printer PCB

When printer head is pulled backward for ejection of the typewheel, its arm releases the reset crank and the reset plate leaves the PH 2 (See Drawing B).

3.13 Character printing

After pressing a key (paragraph 3.03), the typewheel motor controlled by the CPU (paragraph 3.11) brings the typewheel to the position for printing of the selected character. The shortest turning distance from the last typewheel position will be selected. At the same time the ribbon lift and feed are effected by the ribbon motor.
After a certain waiting time, the hammer solenoid is powered and strikes the plunger with the hammer and the typewheel spoke against the platen. Then the carrier transport starts the spacing step selected by the pitch selector slide switch. At the same time the ribbon is lowered. If no further signal of key operation follows, the typewheel turns back after 1.3 sec. to its home position (See Fig 7).

Typenabdruck/Typing

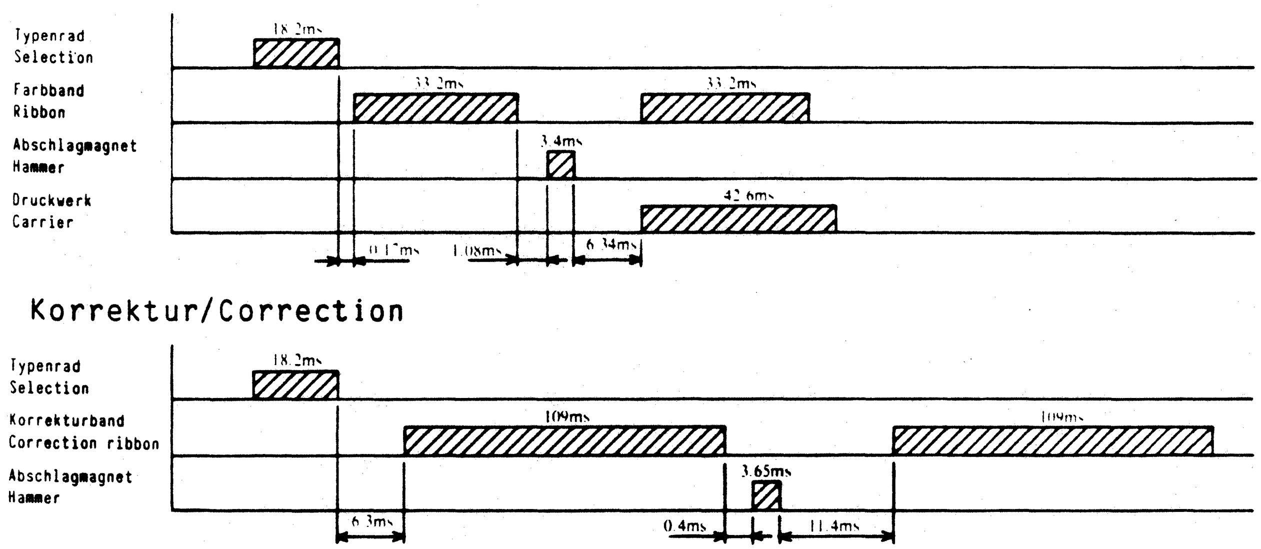


Fig-7

3.14 Ribbon transport, ribbon lift

The ribbon motor A1 moves from its home position 11 steps = 82.5° in one direction.
The ribbon lift cam A2 swings the ribbon center guide-R B4 via the cam follower and the ribbon lift crank B5. The center guide-L is turned together by means of the tooth connection. Thus the ribbon is lifted to the printing position.
The ribbon feed cam A5 moves the ribbon feed arm A6 via the cam follower and the cam lever A7. The ribbon feed arm pushes the finger plate, so that the feed wheel A8 turns counterclockwise. The ribbon is transported by the rubber roller A9.
The ribbon feed spring A10 turns the ribbon feed pulley A11 and the used ribbon is wound up.
After printing, the ribbon motor turns back its home position. For

the next character printing, the motor will move 11 steps in the opposite direction.

The ribbon change lever A12 can sense the type of ribbon cassette. If a normal carbon ribbon cassette is used, the arm of ribbon change lever gets into a opening of the cassette and enables the full stroke of the ribbon feed arm A6 for 4 teeth on the feed wheel A8. In the meantime, the multi-carbon ribbon cassette has no opening on the referring section, it pushes the ribbon change lever, so that the transport stroke will be 1 tooth only.

3.15 Correction tape transport and lift

When pressing the correction key, the information from the keyboard matrix is transmitted to the CPU (paragraph 3.03). The typewheel motor and the ribbon motor are activated according to the 46-correction memory stored in the RAM range.

The ribbon motor turns counterclockwise 30 steps = 225° from its basic position. The correct cam A13 lifts the correct arm A14 at the end of the movement. At the same time the correct feed pawl A15 feeds the correct feed ratchet A16 and the correction tape is transported. The brake spring A17 keeps the correction tape tension at the correct tape spool.
After the correction performed, the ribbon motor turns back to its home position.

3.16 Paper feed

If the paper bail shaft is pulled forward beyond its pressure point for activating of the paper feed, the angle of right paper bail arm closes the first contact S 10 of the paper feed switch.

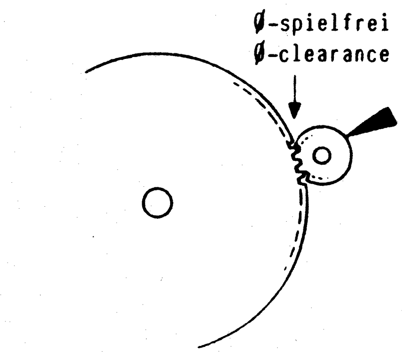
The key scanning by the CPU transmits H-level via the decoder IC 5, connector 7 pin 1, switch S 10, buffer IC 1 to the input pin 17 of CPU (see paragraph 3.03). Then the horizontal motor activated in single function.

When pulling the paper bail further forward, the second contact is closed. H-level is transmitted via the cone 7 pin 3, switch S 11 buffer IC 1 to the input pin 19 of the CPU. Thus the horizontal motor is activated in repeat function.

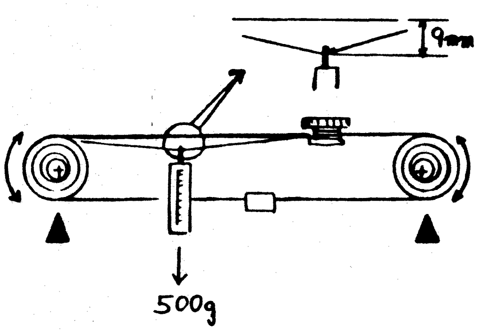
The horizontal motor drives the platen via the drive gear, drive pulley, drive cog belt and platen pulley.

The index key (forward) and the reverse index key (backward) activates the corresponding platen movement via the contacts on the keyboard matrix.

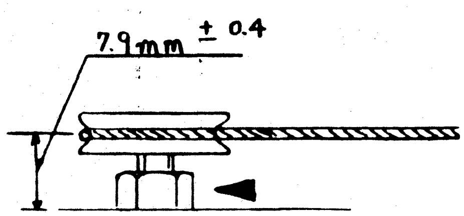
4.01 Chassis, horizontal drive



Function/assembly	: Horizontal motor
Clearance between	: Pinion of horizontal motor / Drive pulley
Clearance	: Ø mm, Ø-clearance
Adjustment	: Repositioning of horizontal motor
Note	: Motor must have slight heaviness at 4 points of way of printer by manual movement of the drive wire.

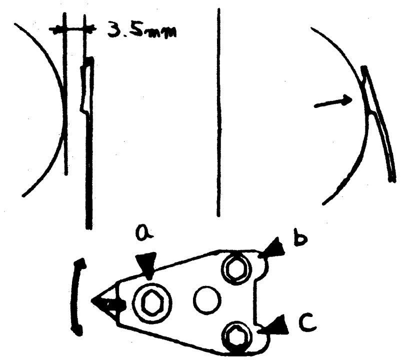
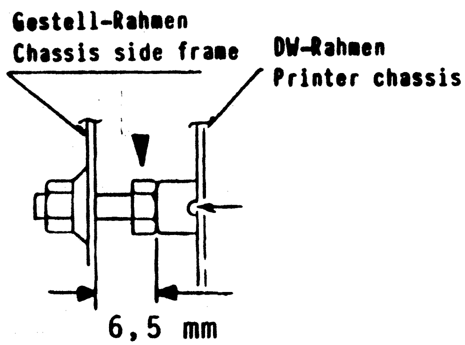
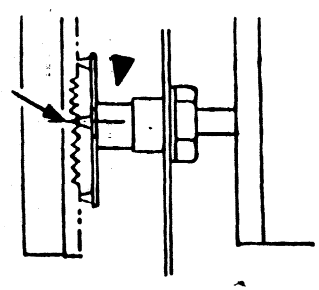


Function/assembly	: Tension of drive wire
Clearance	: 9 mm slack by 5 N (500g) load
Adjustment	: Both tension pulleys should be adjusted equally (symmetrically) to outside
Note	: The wire must be parallel to the chassis support. For assembly see 5.08
Gauge	: Spring balance

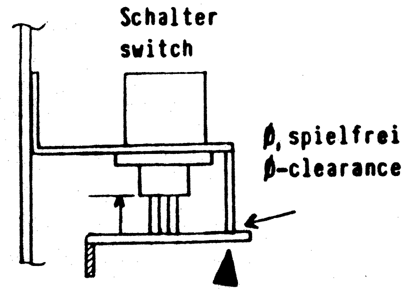


Function/assembly	: Drive wire / Chassis support
Clearance	: 7.9 $\pm$ 4 mm
Adjustment	: Adjust the excentric bearing screw after slacken-off the nut.
Note	: The height of both tension pulleys should be even so that the wire will be parallel to chassis support.

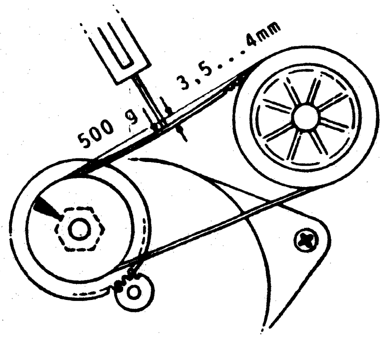
4.01 Chassis, horizontal drive

	Function : Printing, type distance Clearance between : Typewheel / Platen Clearance : 3.5 mm Adjustment : At adjustplate even left and right by slacken-off the set screws Screw c is fixed fulcrum, screws a and b must be loosed --- Function : Motion adjustment Clearance : Printout uniform of complete characters Adjustment : Screw b is fixed fulcrum, screws a and c must be loosed.
	Function/assembly : Final position of printer / Chassis frame Clearance between : Chassis frame outside / Adjust screw Clearance : ≈ 6,5 mm Adjustment : Screw on ≈ 6,5 mm.Position the printer to the left end so that the guide hole of reset plate will be hidden half. Excite the horizontal motor (see 4.05.1) and adjust the screw again so that the guide hole will be hidden half.
	Function : Line space detent Clearance between : Platen pulley / Variable spring Clearance : When vertical motor is excited (see 4 05.1), the tips of the variable spring must engage in teeth of platen pulley. Adjustment : Excite the vertical motor, slacken off the nut (spanner size 17 mm), turn the bushing (spanner size 10 mm) of variable spring.

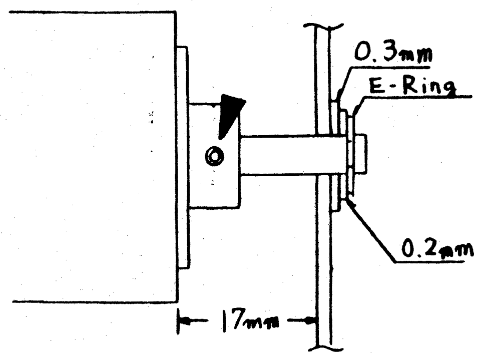
4.02 Chassis, paper injector



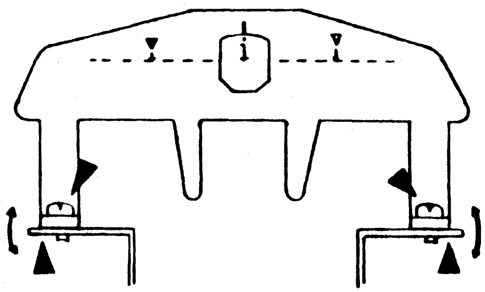
Function/assembly	: Paper injector switch
Clearance between	: Paper injector switch final position / Paper bail arm right
Clearance	: 0 mm, contact
Adjustment	: Adjust the paper bail arm right
Note	: If switch is pressed into second stage, the paper bail arm must contact the switch holder just before final position.



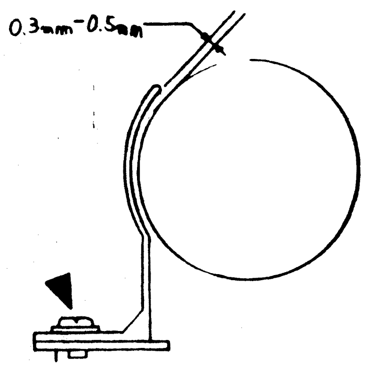
Function/assembly	: Tension of drive belt / Vertical drive pulley
Clearance	: 3.5 ... 4 mm slack at 5N (500g) load
Adjustment	: At eccentric bearing screw and nut (spanner size 13 mm)
Note	: Ensure detent of platen and engagement of motor pinion / drive pulley
Function	: Vertical motor pinion / drive pulley
Clearance	: 0.1 mm backlash
Adjustment	: Repositioning of vertical motor
Note	: Motor must be able to be rotated by hand freely.



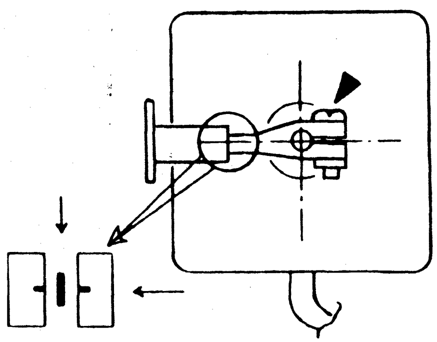
Function/assembly	: Platen / Chassis plate
Clearance between	: Right side of rubber portion / inside of chassis plate
Clearance	: 17 mm distance 0.02 mm lateral play of platen
Adjustment	: 2 set screws right and 2 set screws left on platen



Function/assembly	: Line locator / Printer chassis
Clearance between	: Line locator / typing line
Clearance	: Adjust after typing lilili lilili
Adjustment	: Lateral : Repositioning after slacken-off the screws Height : Forming the arms of printer chassis

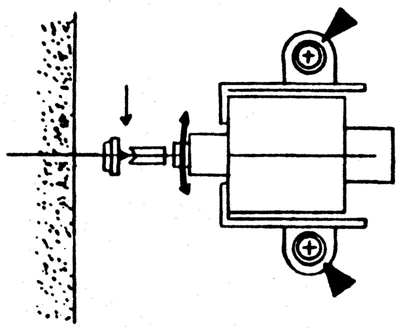


Function/assembly	: Line locator
Clearance between	: Line locator / platen
Clearance	: 0.3 ... 0.5 mm
Adjustment	: Repositioning of the line locator



Function/assembly	: Typewheel motor / Photo interruptor
Clearance	: Position detector must be in the middle of the light barrier if motor is in home position.
Adjustment	: Repositioning of position detector
Note	: Excitation of typewheel motor (see 4.05.1)

4.03 Printer



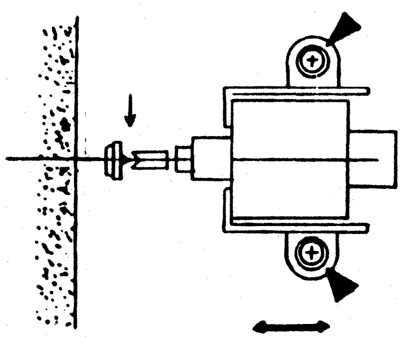
Function/assembly : Printerhead, hammer solenoid

Clearance between : Hammer / Typewheel

Clearance : The notch of hammer must strike the prism of the spoke central.

Adjustment : Excitation of typewheel motor (see 4.05.1) and
Repositioning of solenoid bracket

Note : Ensure printout of complete characters (see 4.01.1, 4.03.5).
A clearance of typewheel must exist.



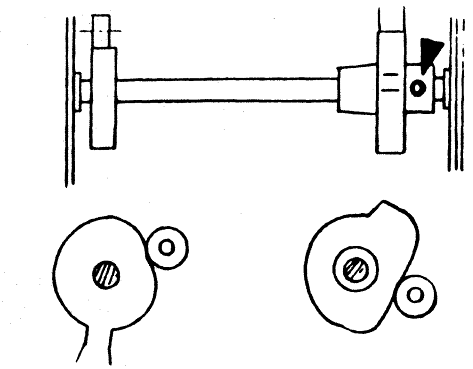
Function : Printing

Clearance : Printout uniform of complete characters (see 4.01.1)

Adjustment : Excitation of typewheel motor (see 4.05.1)
Repositioning of solenoid bracket
Move the hammer forward to the platen: bottom of characters darker
Move the hammer rearwards: top of characters darker

Note : A clearance of typewheel must exist.

4.04 Printer, Ribbon/Correction Ribbon

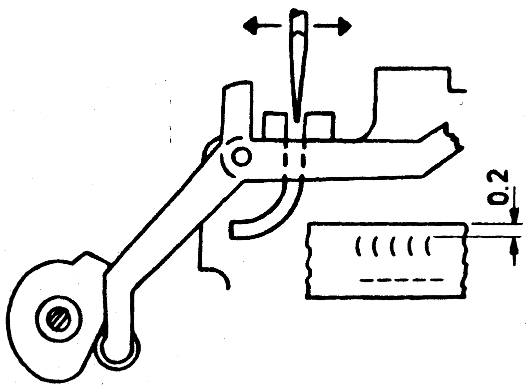


Function/assembly : Ribbon lift cam, ribbon feed cam / printer chassis

Clearance : Home position see drawing

Adjustment : Excitation of ribbon motor (see 4.05.1), 3 socket screws slacken-off
Repositioning of the ribbon lift cam

Note : Center position is reached, if height of two strokes is equal.



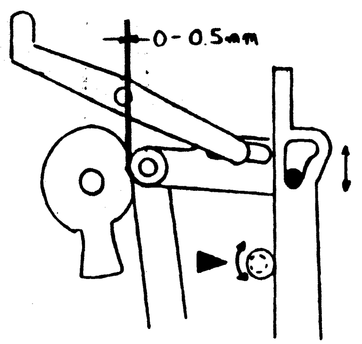
Function/assembly : Ribbon height / printer head

Clearance between : Upper edge of carbon ribbon / printout of characters

Clearance : min. 0.2 mm at ((pica

Adjustment : By forming the bearing arm of center guide lift crank.
Widening of adjusting slot raises carbon ribbon.
Narrowing of adjusting slot lowers carbon ribbon.

Note : Underscoring stroke must impact on carbon ribbon.
Bottom edge of raised carbon ribbon must overlap top edge of correction ribbon.



Function/assembly : Follower arm home position / cam shaft (feed cam)

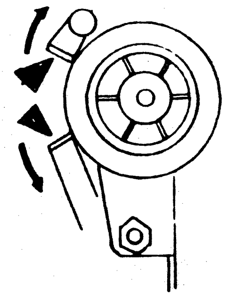
Clearance between : Cam shaft / Cam follower

Clearance : 0 ... 0.5 mm

Note : In basic position

Adjustment : With eccentric screw at printer chassis

4.04 Printer, Ribbon/Correction Ribbon

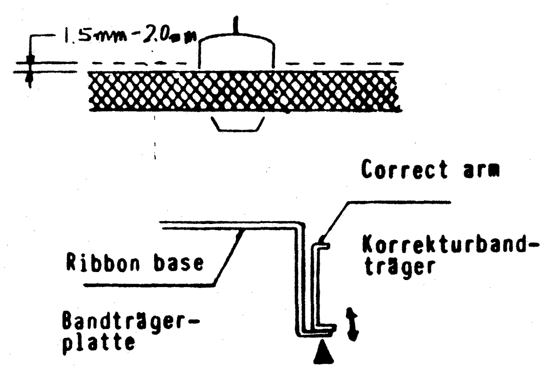


Function/assembly : Ribbon feed / ribbon base

Clearance : Ribbon feed gear
4-2/3 teeth for correctable carbon ribbon
1-2/3 teeth for multicarbon ribbon

Adjustment : See fine-adjustment of follower arm home position (4.04.3).

Note : Following multicarbon ribbon adjustment correct if necessary.

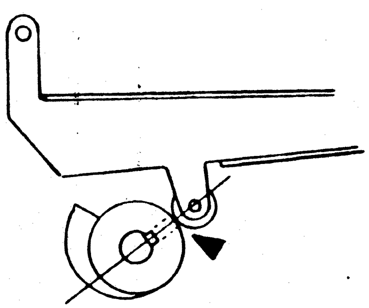


Function/assembly : Correction ribbon - basic position

Clearance between : Edge of the ribbon / line locator scale

Clearance : 1.5 ... 2.0 mm

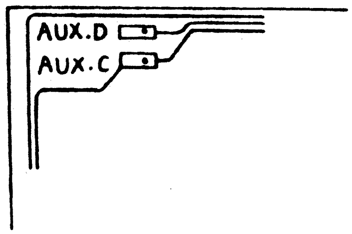
Adjustment : By forming the stopper portion on right side of ribbon base



Function/assembly : Correction ribbon lift

Adjustment : Excitation of ribbon motor (see 4.05.1)
Repositioning of correct cam so that neutral surface
of cam contacts the cam follower of correct cam

4.05 Motor excitation, impression, resistance of coils

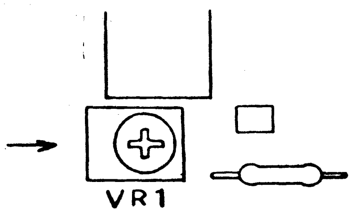


Function/assembly : Stepping motors / Keyboard PCB

Adjustment : Excitation (hold at the stepped point) of all stepping motors with lower voltage VHL (see 3.11) for mechanical adjustments

Release : By shorting the contact points Aux D and Aux C under surface of keyboard PCB at right side of keyboard (with metal tape)

Note : Excitation of motors should be completed within 10 min, or the motors will heat up!



Function/assembly : Impression / Control PCB

Adjustment : Variable resistor VR 1 on control PCB
Turning clockwise: Higher impression
Turning counterclockwise: Lower impression

Resistance of coils :

Typewheel motor	18 Ohm
Horizontal motor	18 Ohm
Vertical motor	36 Ohm
Ribbon motor	36 Ohm
Hammer solenoid	7 Ohm

(at each winding)

5. Disassembly and assembly

5.01 Housing

1. Pull out the platen knob and remove the top cover.
2. Loosen the bottom pan fastening screws (2 pcs) at the rear side of the main cover.
3. Latch off the main cover from the bottom pan by pressing both lower sides of the main cover at the same time. Remove the main cover by lifting off from the right side.
4. Remove 4 nuts which fasten the chassis to the bottom pan.
5. Assemble in the reverse sequence.

5.02 Printer

1. Remove the housing.
2. Remove the keyboard assembly if necessary (see 5.10).
3. Disconnect the flat cable from the control board and remove the cable clamps.
4. Remove the wire holder set screws (2 pcs) from the bottom of the printer.
5. Remove the right side adjust plate after removing the screws and washers.
6. The printer unit will be removed from the guide shaft by pulling it out to right.
7. Assemble in the reverse sequence. Adjustment of ring and and cylinder by the adjust plate is required after the installation (see 4.01.4)!

5.03 Ribbon mechanism

1. Remove the top cover.
2. Remove the ribbon feed spring B 10 and correct arm spring A 3.
3. Remove the ribbon base set screws (3 pcs) and a nut.
4. Remove the ribbon base unit from the printer.
5. Assemble in reverse sequence.

5.04 Printer head

1. Remove the ribbon base unit (see 5.03).
2. Unhook the toggle lever spring A 4 from the printer chassis.
3. Disconnect from printer PCB the connector sockets wired from the typewheel motor, hammer solenoid and photo-interrupter.
4. Remove the printer head unit after loosening the center screw and nut.
5. Assemble in the reverse sequence. Adjust the play between the center screw and the head frame shaft so that the printer head functions properly without any rickety.

5.05 Typewheel motor

1. Remove the printer head assembly (see 5.04).
2. Take the lead wires off the slits of printer head frame.
3. Remove the photo-interrupter B 10 by slacking-off set screw.
4. Remove the nut B 6 on right hand. Pull out the head frame

shaft B 9 to left and remove the spacer B 7.

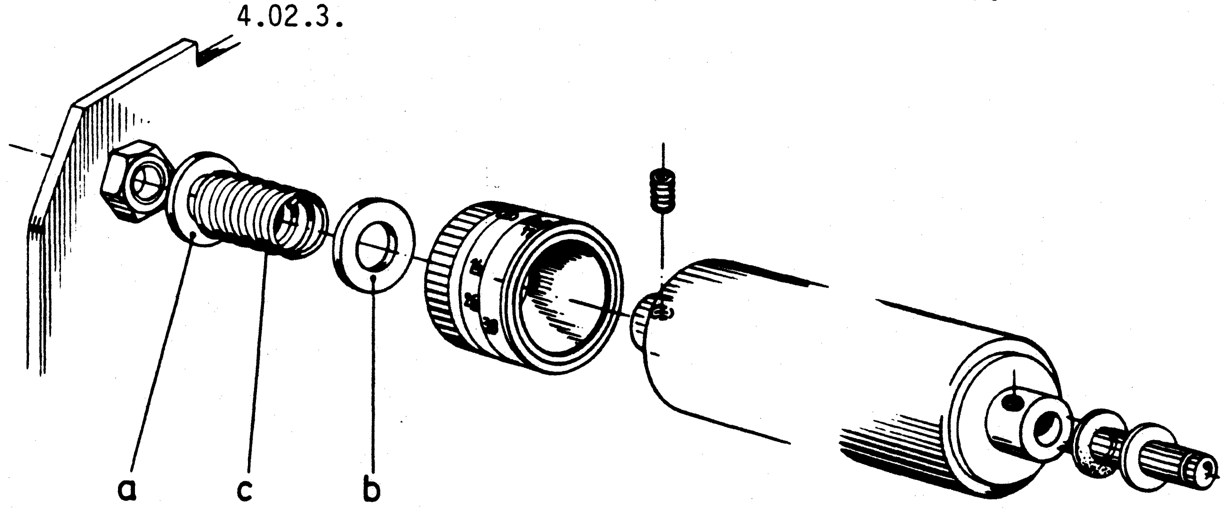
5. Remove the motor set nuts (3 pcs).
6. Remove the typewheel motor by pressing downward.
7. Assemble in the reverse sequence. Adjustment of positioning typewheel motor and photo-interrupter will be required (see 4.03.3).

5.06 Printer PCB, Flat Cable

1. Remove the printer assembly (see 5.02).
2. Remove the ribbon motor A 1 by slacking-off 2 screws and disconnect the connector socket 13 from the printer PCB.
3. Remove the cam shaft B 5 if it was not removed together with the ribbon motor.
4. Disconnect the connector sockets from the printer PCB. Remove the shoulder screw and tooth washer.
5. The printer PCB may be removed.
6. After slacking-off the flat cable holder, remove the flat cable. Ensure to avoid bending and rubbing the flat cable.
7. Assemble in the reverse sequence. Check the positioning of photo-interrupters.

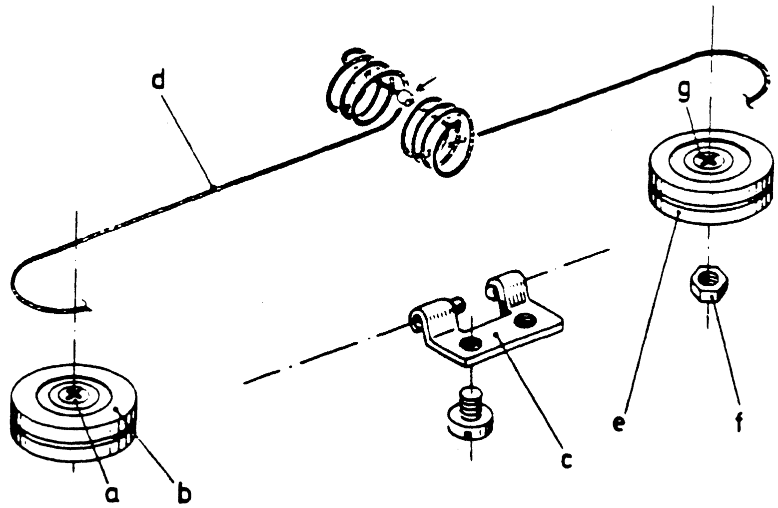
5.07 Platen

1. Move the paper end gauge to left and slacken-off the platen socket screws (2 pcs).
2. Pull out the platen knob comp. to left.
3. Remove the paper end gauge with washer and spring.
4. Remove the platen shaft set c-clip on the right side.
5. Lift off the platen to upper left.
6. Assemble in the reverse sequence. Ensure for adjustments 4.02.3.



5.08 Drive unit (wire and pulleys)

1. Remove the top cover.
2. Slacken-off the tension pulley set nuts left and right.
3. Slacken-off the drive wire by driving both eccentric tension pulley screws to the center.
4. Remove the drive wire from the wire holder and the tension pulleys.



5. Remove the drive pulley from the shaft after removing c-clip.
6. Pull the drive wire out of the drive pulley.
7. When assembling, ensure: The drive wire is divided into two parts by the metal stopper. Wind the longer end 3-1/2 turns clockwise and the shorter end 3-1/2 turns counter-clockwise around the drive gear. Ensure coils not crossed. When the drive wire is hooked around the tension pulleys, holding the wound wire by adhesive tape will be suggested.

5.09 Horizontal motor

1. Remove the housing.
2. Remove the keyboard unit (see 5.10).
3. Disconnect the connector cone 3 from the control PCB.
4. Remove the motor set screws (2 pcs) at rear of chassis.
5. Remove the motor from the bracket.
6. Assemble in the reverse sequence. Follow the adjustment for positioning motor in 4.05.1 !

5.10 Keyboard with control PCB

1. Remove the housing.
2. Remove the keyboard set screws (2 pcs) from the bottom pan.
3. Stand the keyboard up and disconnect the flat cable connector (cone 5) and 4 lead wire connectors (cone 3,4,6,7) from the control PCB.
4. Disconnect 2 flat cable connectors (cone 1,2).
5. Remove 4 control PCB set nuts and a tooth washer. Remove the board by holding edges.
   Note: The control PCB should be wrapped up in conductive foil or aluminum foil for electrostatic shielding.
6. Assemble in the reverse sequence. Check all functions after the installation.

5.11 Key switch, Keyboard diodes

1. Remove the keyboard with the control PCB (see 5.10).
2. Pull out the individual key top straight upward.
3. Pull out the key switch straight upward after removing 2 soldered points on the reverse side of keyboard. 5 keys with repeat function have 4 soldered points.

4. The diode corresponding to each key will be accessible through the slit on the keyboard panel. Remove 2 soldered points of the diode.
5. Assemble in the reverse sequence.

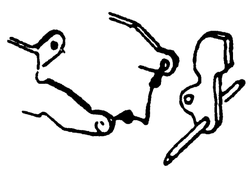
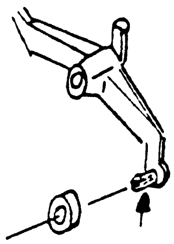
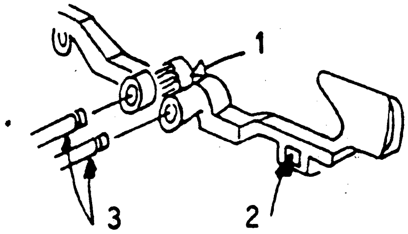
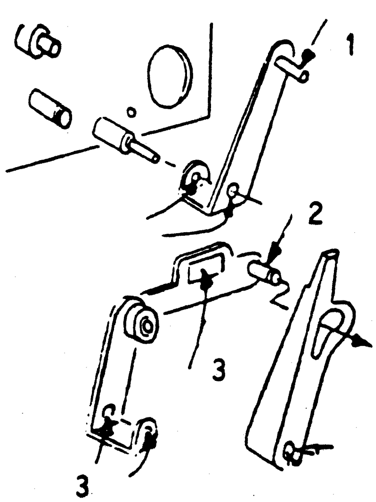
5.12 Power pack

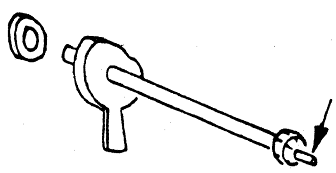
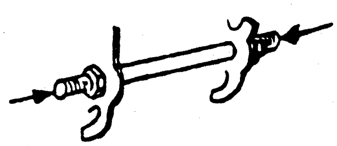
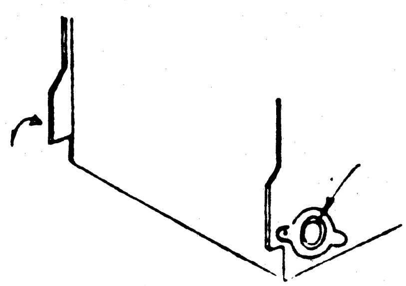
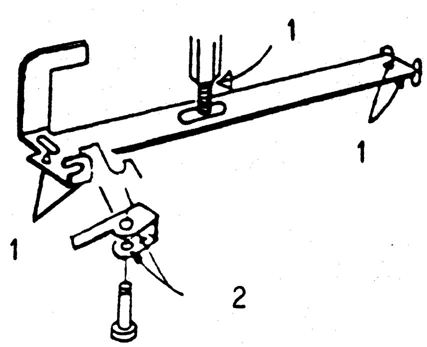
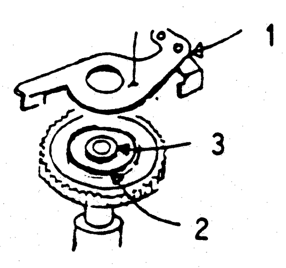
1. Disconnect the power supply cord from the outlet. Remove the housing.
2. Remove the switch cover by removing the switch cover set screw. Take out the switch and power inlet with wires.
3. Remove the wire clamps and disconnect the connector 6 from the control PCB (Remove the control PCB if necessary - see 5.10).
4. Remove the 4 power pack set screws located around the transformer.
5. Remove the power pack cover by slacking-off 2 set screws.
6. Remove the power pack from the bottom pan.
7. Assemble in the reverse sequence. Check electrical safety!

5.13 Fuses

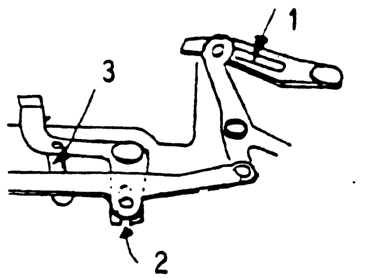
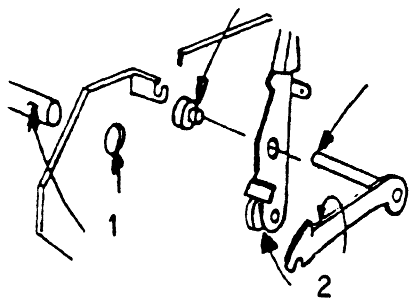
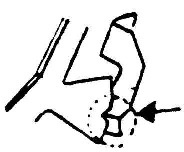
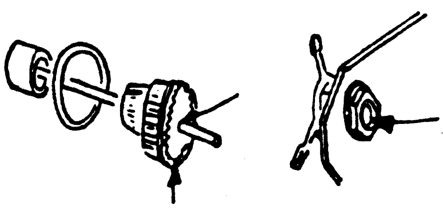
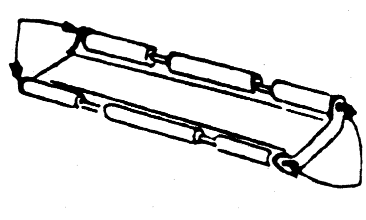
1. Disconnect the power supply cord from the outlet. Remove the top cover.
2. Remove the power pack cover set screws (2 pcs). Remove the power pack through the room between the paper pan and the bottom pan.
3. Check the cause of the fuse functioned.
4. Assemble in the reverse sequence.

6. Schmierplan/Lubrication chart

		Öl/Oil W	Öl/Oil Mz	Fett/Grease FW	Fett/Grease F
	Hammer-Lagerstellen Hammer bearings			X	
	Rolle am Farbband-Hubarm Roller at ribbon change lever			X	
	Farbbandheber (1 u. 2) Ribbon center guide			X	
	Farbbandheber-Lagerstellen (3) Shaft for ribbon center guide		X		
	Farbbandtransport (1)			X	
	Lagerstellen (2 u. 3)			X	
	übrige Stellen	X			
	Ribbon transport (1)			X	
	pins, slot (2 & 3)			X	
	other holes	X			

		Öl/Oil W	Öl/Oil Mz	Fett/Grease FW	Fett/Grease F
	Bandtransportkurve Lager Cam shaft			X	
	Druckerachse Head frame shaft			X	
	Druckwerk-Gleitbuchsen Carrier slide bushes	X			
	Steuerschieber (1) Reset plate			X	
	Steuerhebel (2) Reset crank		X		
	Farbband-Schaltrad (3)			X	
	(1 u. 2) Ribbon feed roller	X			

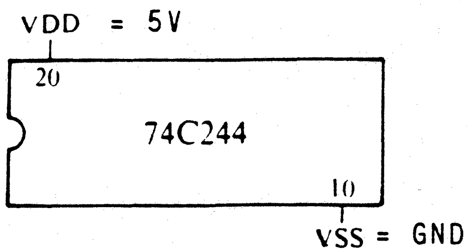
Bestellnummern/Reference Number
W = 4/511/0041 F = 4/521/0044
Mz = 4/502/0021 FW = 4/521/0107

	Öl/Oil W	Öl/Oil Mz	Fett/Grease FW	Fett/Grease F
 Kassettenhalte-Mechanismus (1, 2, 3) Cassette hold mechanism			X	
 Papierlöser (1 u. 2) Paper release übrige Lagerstellen other bearing points	 X		X	
 Papierhaltearm-Rastung Paper bail arm right			X	
 Schreibwalzenlager links u. rechts Platen bearing left and right Walzenrastfeder Variable spring for platen			X	 X
 Papierführungsrollen Paper feed roller			X	
Alle übrigen Lager- u. Gleitstellen And all other bearing and sliding points	X			

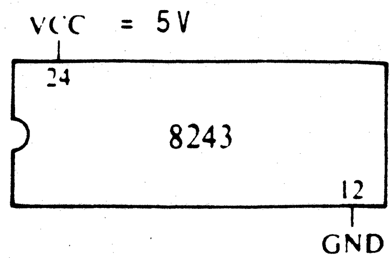
7. Trouble shooting

7.1 Supply voltage

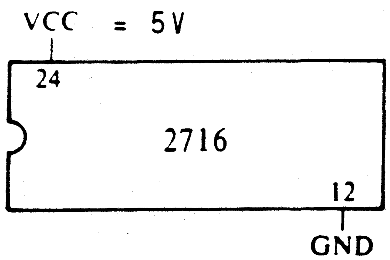
IC1



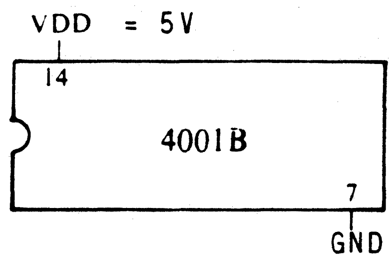
IC6



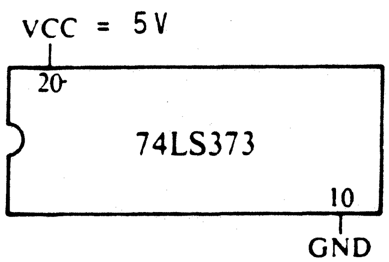
IC2



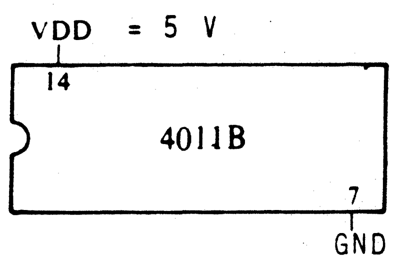
IC7



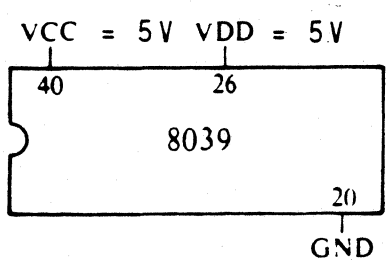
IC3



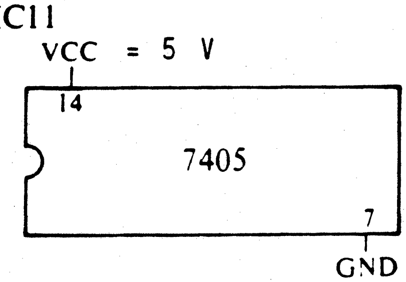
IC8



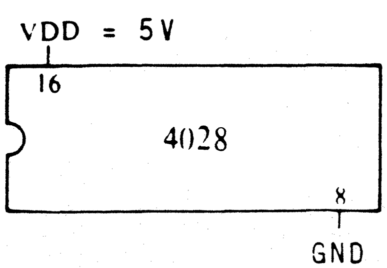
IC4



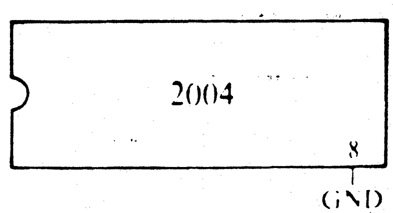
IC9..IC11



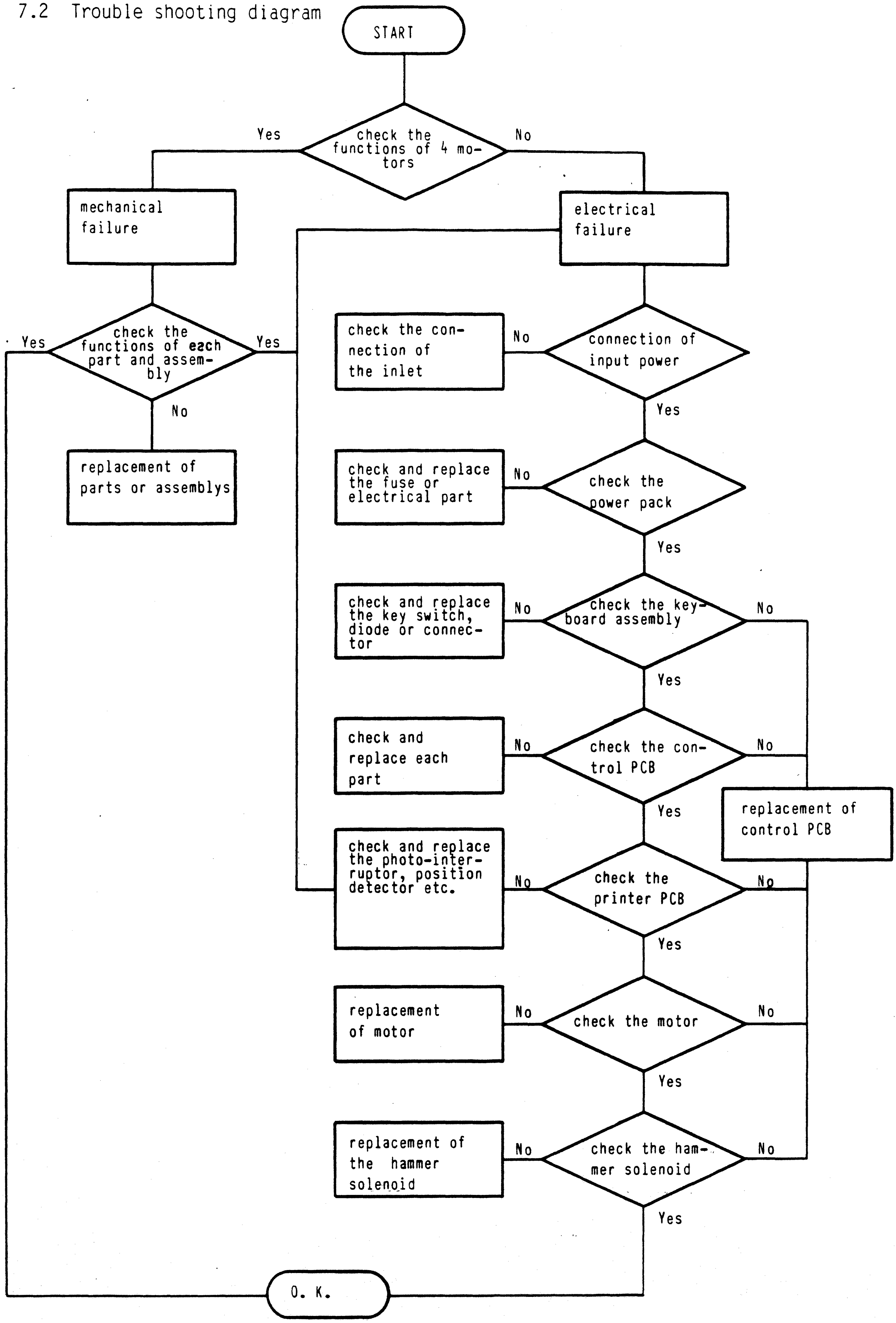
IC5



TRA 1



7.2 Trouble shooting diagram



8. Acceptance check

1. Packing

   Check the packing for signs of damage

2. Housing

   Following the removal of the transit safety devices the housing should be checked for signs of damage

3. Operating controls

   The operating controls such as the platen release lever, platen knobs, paper release lever, paper retaining bails etc. should be checked for signs of damage

4. Feed-in and transport of the paper

   Check the correct feed-in and transport of the paper

5. Paper release

   Check the paper release function. In the released setting it should be possible to reposition the original and four duplicates

6. Print

   Commence the automatic reproduction of the range of characters by the simultaneous operation of the margin release and on/off keys, repeating this process for all the pitches and settings of the impression energy switch. During this process check the backspacing, printer return and correction functions.

7. Corrections

   Corrections must be made so as to lift-off the complete character from the paper without leaving traces. The correction ribbon must transport one tooth and remain tensioned.

8. Ribbon lift/ribbon transport

   Ribbon lift must take place correctly in both halves of the ribbon.
   Check the transport of the ribbon for correction functioning depending on the type of cassette used.

9. Typewheel

Check the interchangeability and the freedom of movement of the typewheel

10. Keyboard functioning test

Check all the functions of the keyboard

Check :

- the operation of all keys, spacing trip, backspace key
- the shift and shift lock functions
- the set and clear functions of the tabulator

Farbbandhebung, -Transport
Ribbon lift, feed

1 Farbband Motor
Ribbon motor

2 Bandhubkurve
Ribbon lift cam

3 Zugfeder f. Korrekturbandträger
Correct arm spring

4 Zugfeder für Führungshebel
Toggle lever spring

5 Bandtransportkurve
Cam shaft

6 Transportarm
Ribbon feed arm

7 Koppel
Cam change lever

8 Bandschaltrad
Feed roller

9 Transportrolle
Rubber roller

10 Transportfeder
Feed spring

11 Transportrad
Ribbon feed gear

12 Transportwechsler
Ribbon change lever

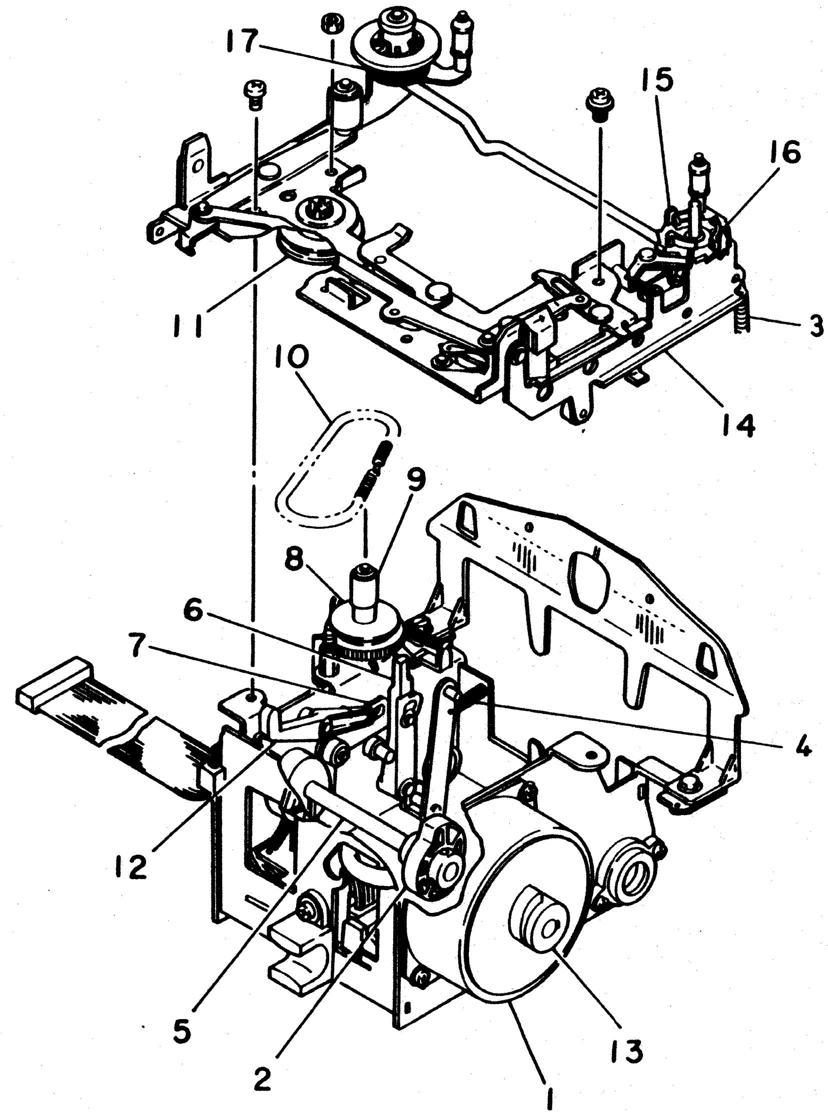
13 Korrekturbandkurve
Correct cam

14 Korrekturbandträger
Correct arm

15 Transportklinke f. Korrektur
Feed pawl

16 Korrekturschaltrad
Correct feed ratchet

17 Bremsdrehfeder
Brake spring



Druckwerkskern
Printer head

1 Farbbandheber links
Center guide left

2 Abschlagmagnet
Hammer solenoid

3 Hammer
hammer

4 Farbbandheber rechts
Center guide right

5 Farbbandhubarm
Center guide lift crank

6 Mutter
Nut

7 Distanzrohr
Spacer

8 Positionsfinder
Position detector

9 Druckerachse
Head frame shaft

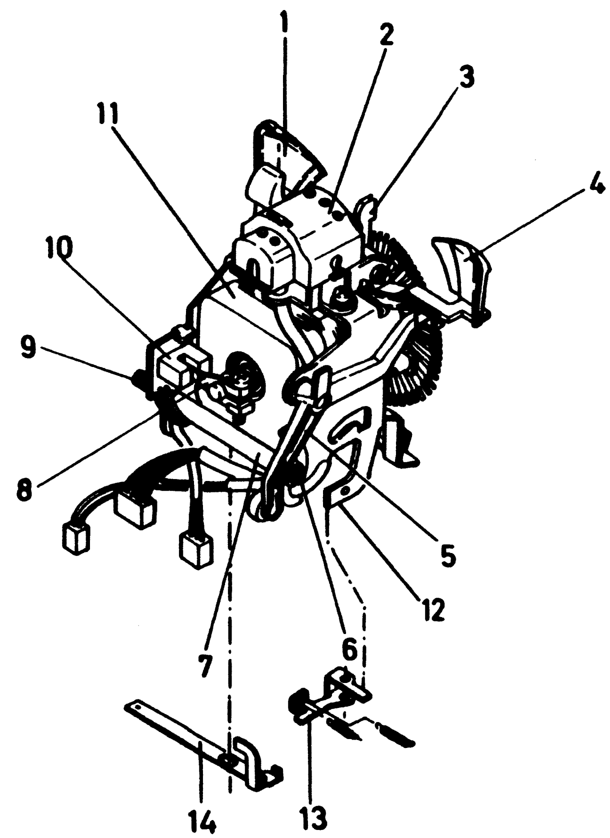
10 Gabellichtschranke
Photo interrupter

11 Typenradmotor
Selection motor

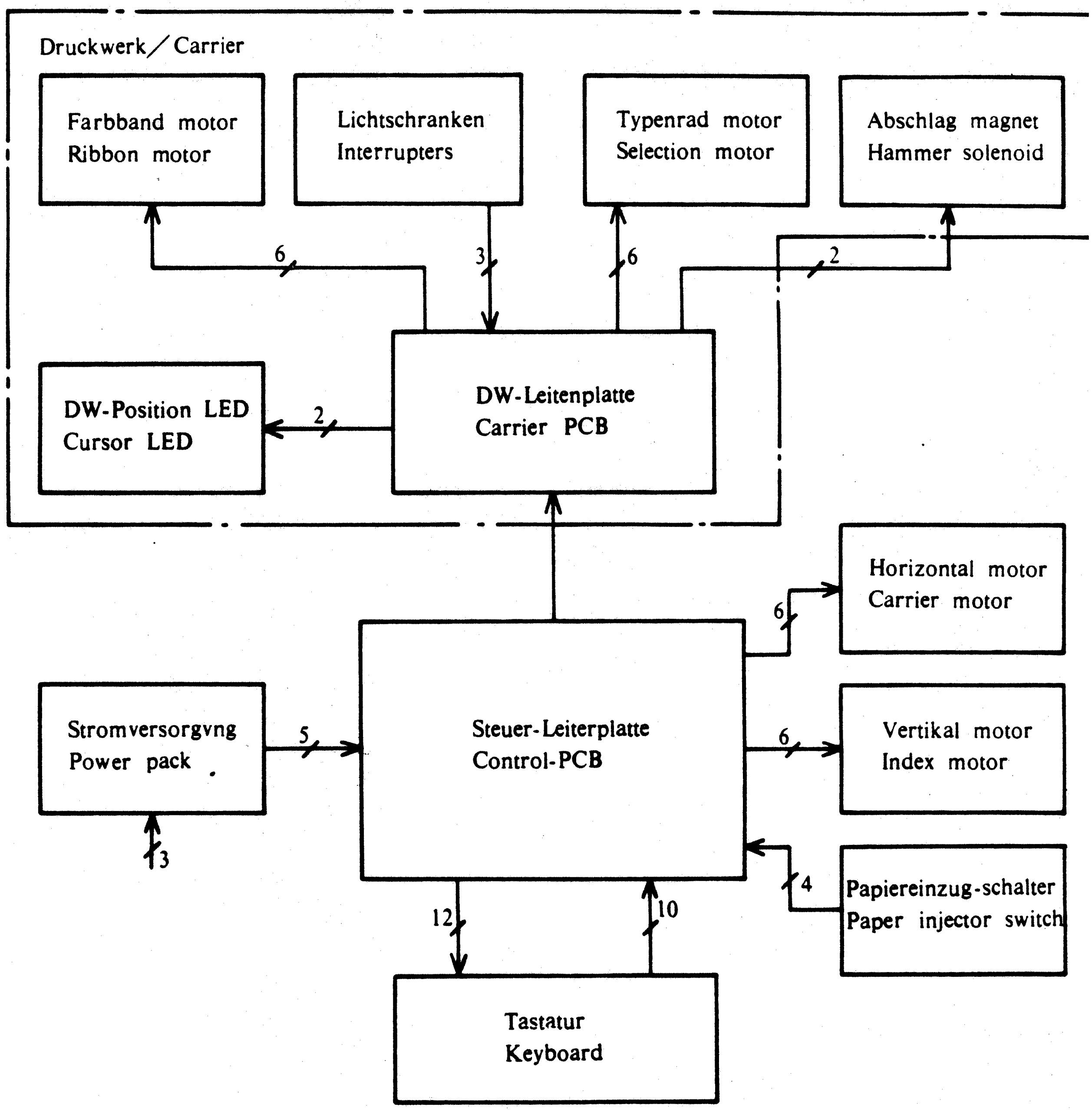
12 Arm am Rahmen für Druckwerkskern
Arm at printer head chassis

13 Steuerhebel
Reset crank

14 Steuerschieber
Reset plate

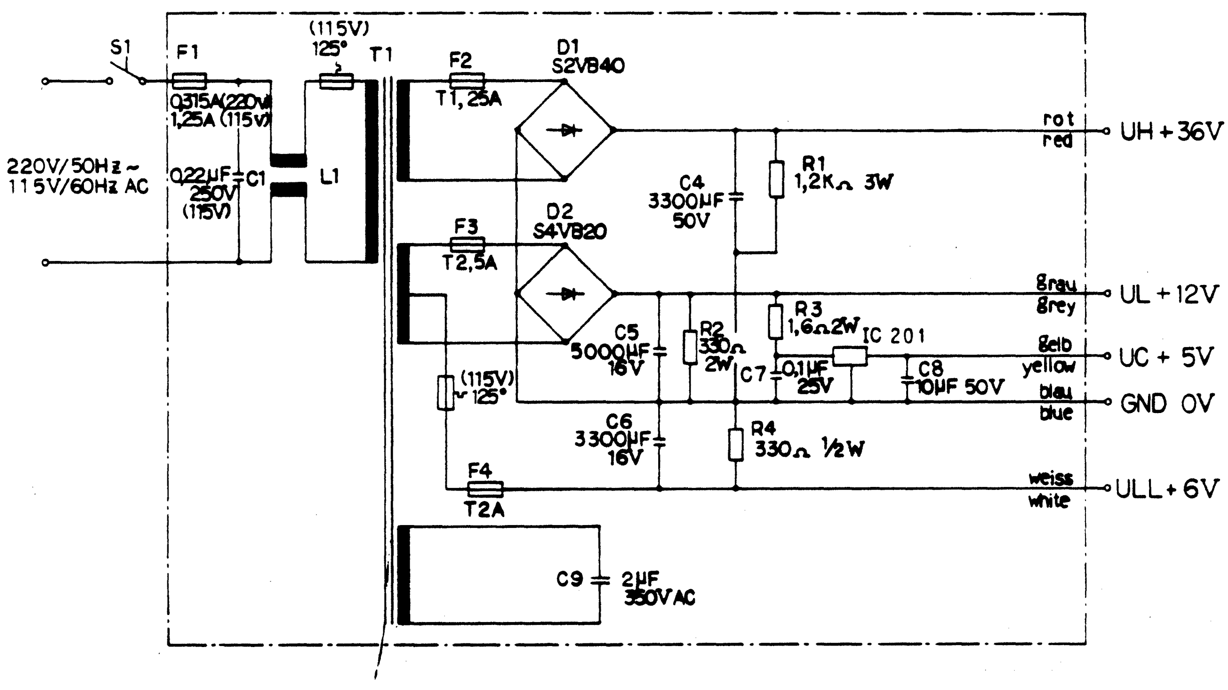


Blockschaltbild
Block circuit diagram

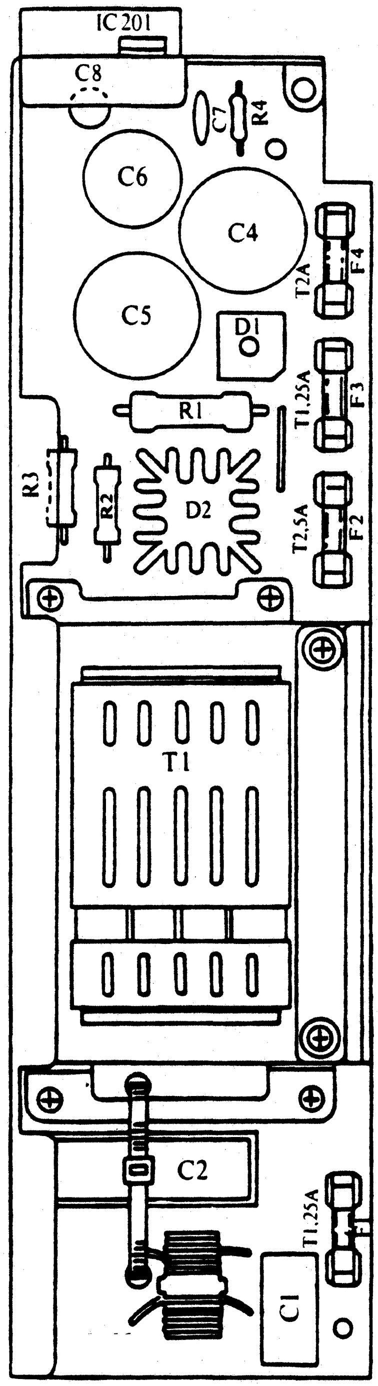


D

Stromlaufplan Stromversorgung
Circuit diagram power pack

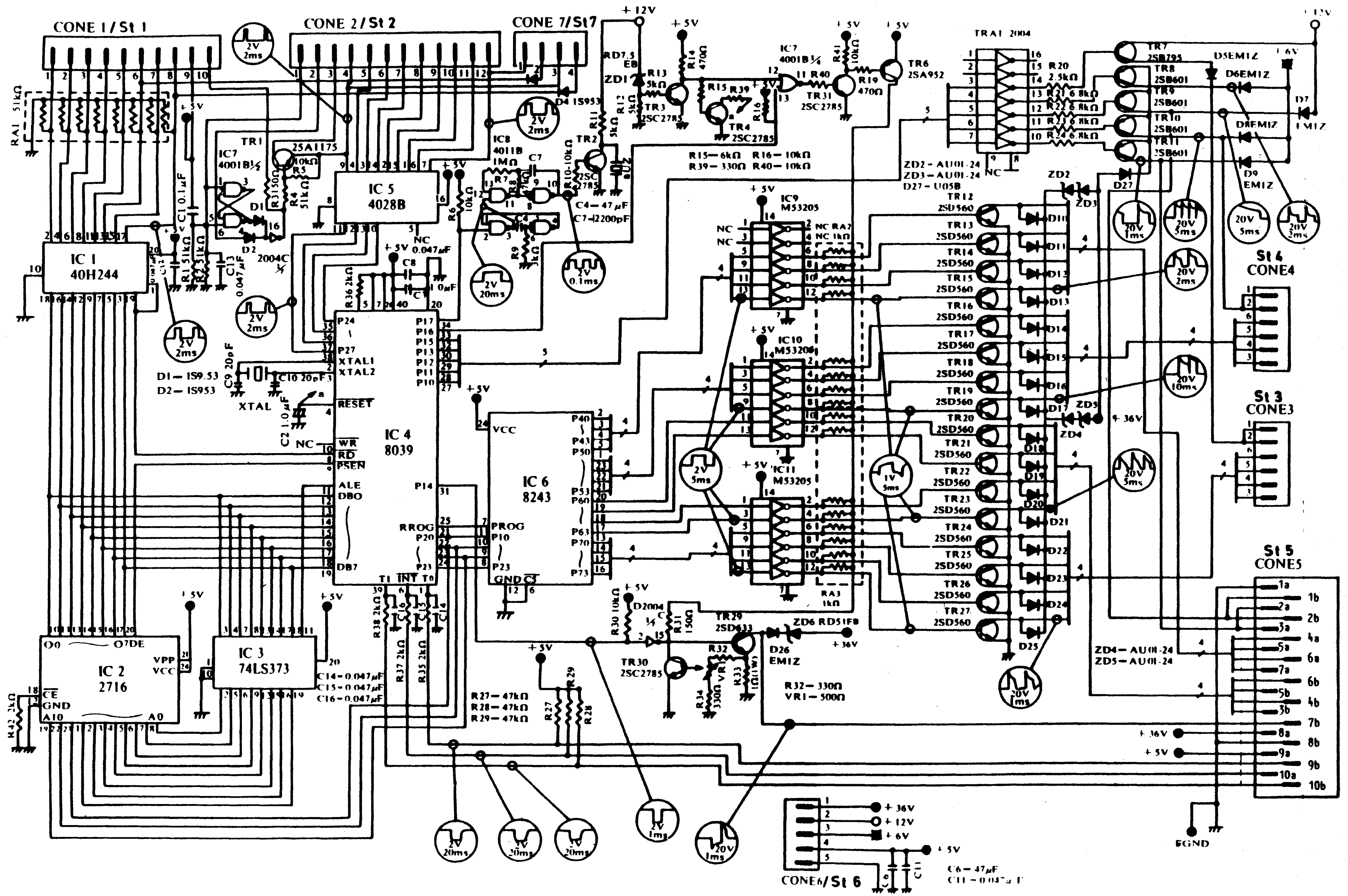


Lageplan Stromversorgung
Layout of components, power pack

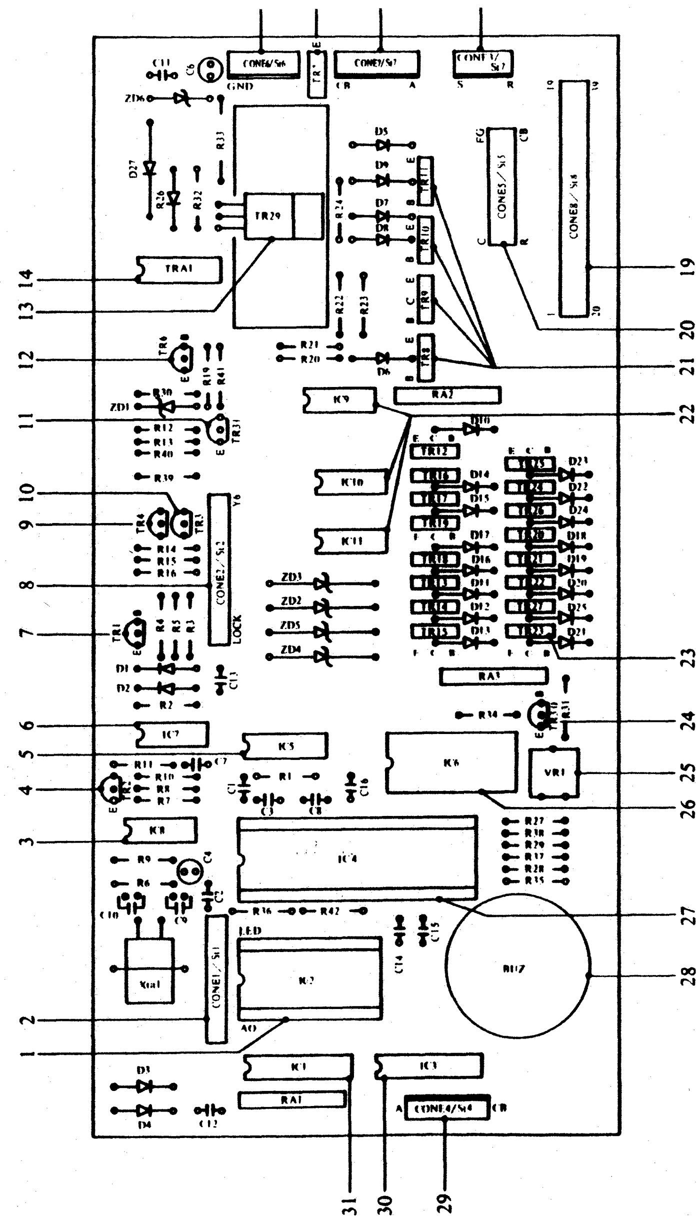


Stromlaufplan Steuer-Leiterplatte
Circuit diagram, control PCB

F

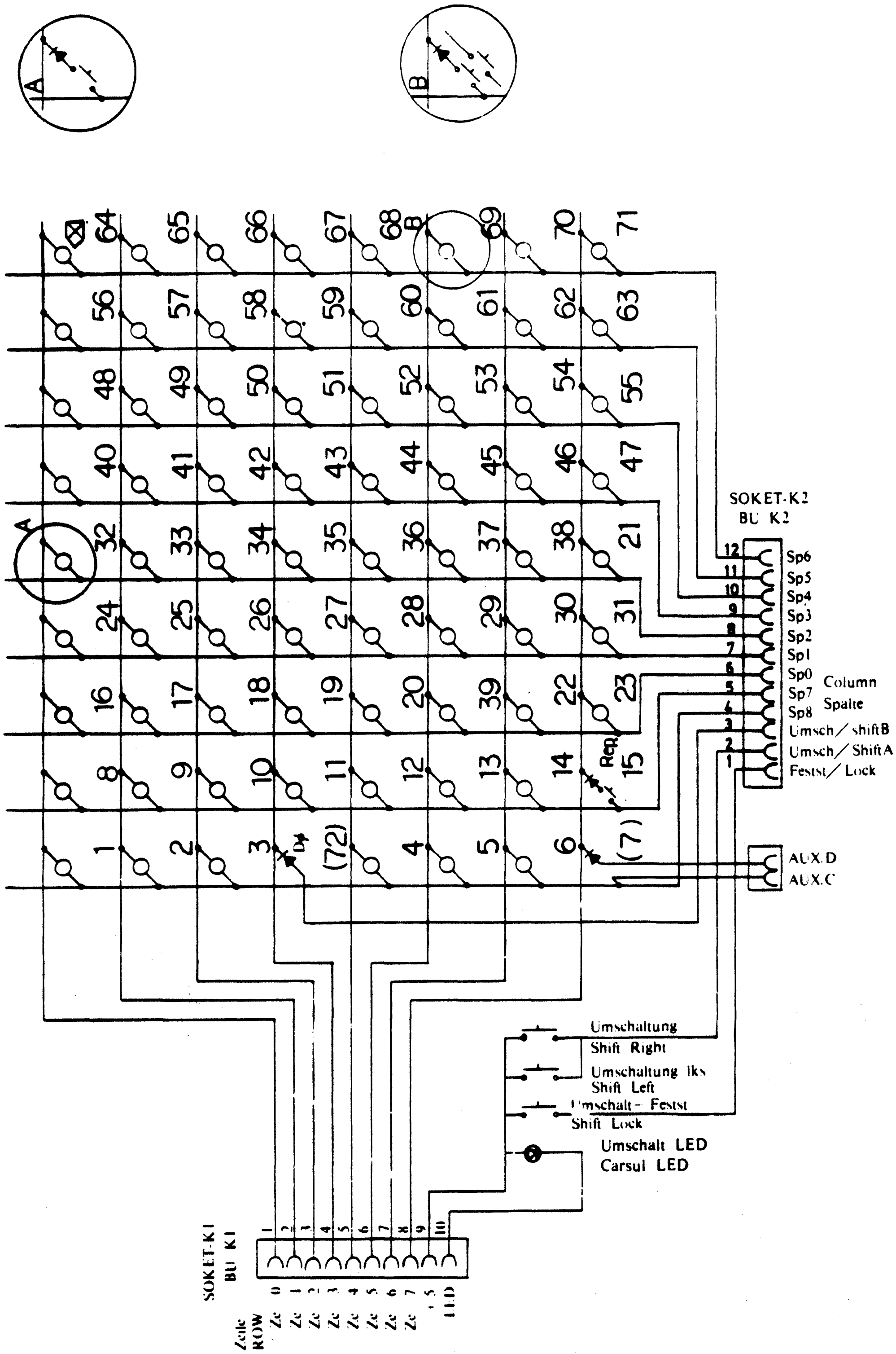


1	IC 2	EPROM
2	St 1 CONE 1	Stecker Tastatur Connector keyboard
3	IC 8	NAND-Gate Summer Buzzer
4	Tr 2	Summer-Transistor Buzzer-Transistor
5	IC 5	4 to 9 Decoder
6	IC 7	Input NOR Gate CPU reset
7	Tr 1	Transistor Umschaltung/Shift
8	St 2 CONE 2	Stecker Tastatur Connector keyboard
9	Tr 4	Transistor Reset CPU
10	Tr 3	Transistor 5 V-Verzögerung/Delay
11	Tr 31	Transistor 5 V-Verzögerung/Delay
12	Tr 6	Transistor 5 V-Verzögerung/Delay
13	Tr 29	Leistungstransistor Abschlagmagnet/Hammer drive transistor
14	TAR 1	Transistor-Array für Anpassung CPU an Leistungstransistoren Transistor-Array for matching CPU to power transistors
15	St 6 CONE 6	Stecker Stromversorgung Connector power supply
16	Tr 7	Transistor Transistor power down mode
17	St 3 CONE 3	Stecker Horizontalmotor Connector carrier motor
18	St 7 CONE 7	Stecker Papiereinzugsschalter Connector paper feed switch
19	St 8 CONE 8	Testanschluß für Leiterplatte Testpin for PCB
20	St 5 CONE 5	Stecker Druckwerks-Leiterplatte Connector carrier PCB
21	Tr 8...Tr 11	Leistungstransistoren Motoren Power transistors for motors
22	IC 9...IC 11	Inverter für Anpassung CPU an Motor-Treiberstufen Inverters for matching CPU to motor power transistors
23	Tr 12...Tr 27	Leistungstransistoren für Schrittmotoren Drive transistors for stepping motors
24	Tr 30	Transistor Abdruckkonstanz Constant current (impression)
25	VR1	Trimmer für Abdruckenergie Variable resistor for impression
26	IC 6	I/O Expander D 8243 C
27	IC 2	CPU 8 bit-Mikroprozessor 8039 CPU bit Microcomputer 8039
28	Buz	Summer/Buzzer
29	St 4 CONE 4	Stecker Vertikalmotor Connector indexmotor
30	IC 3	Octal 3-state latch für Adressen
31	IC 1	Tastaturbuffer (Octal 3-state bus buffer) for keyboard

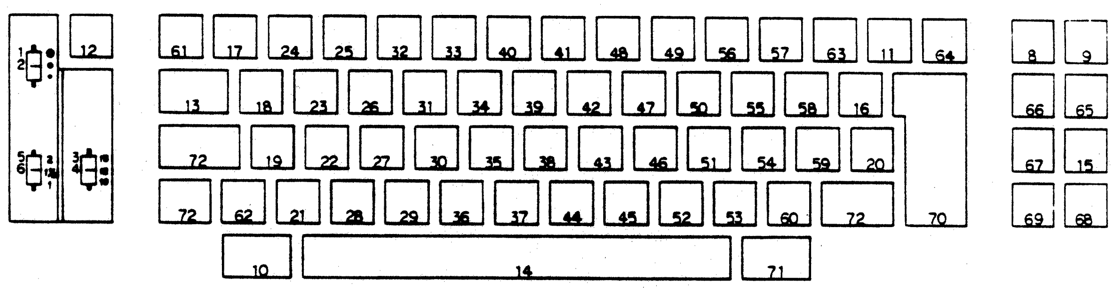


Stromlaufplan Tastatur
Circuit diagram, keyboard

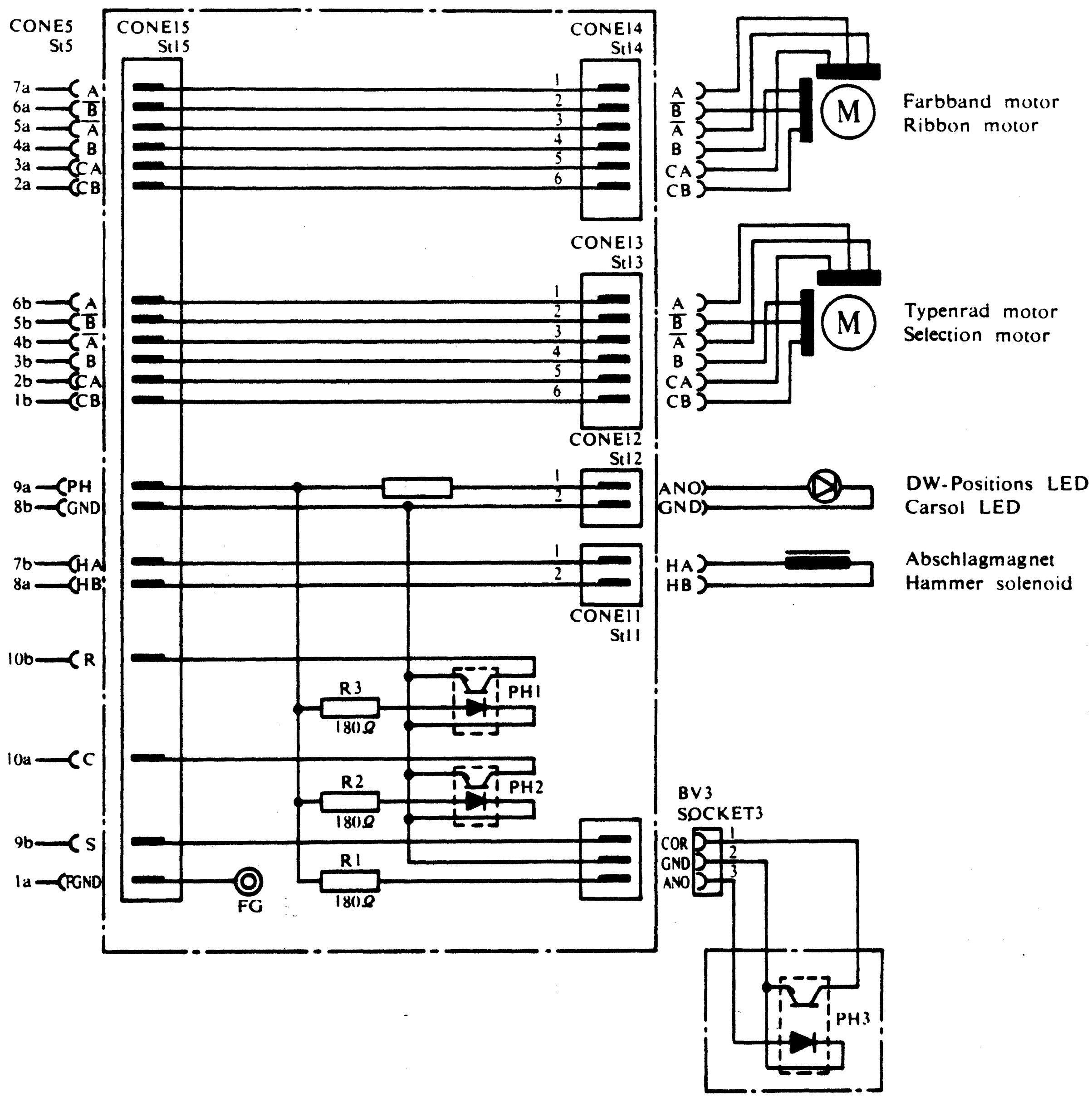
H



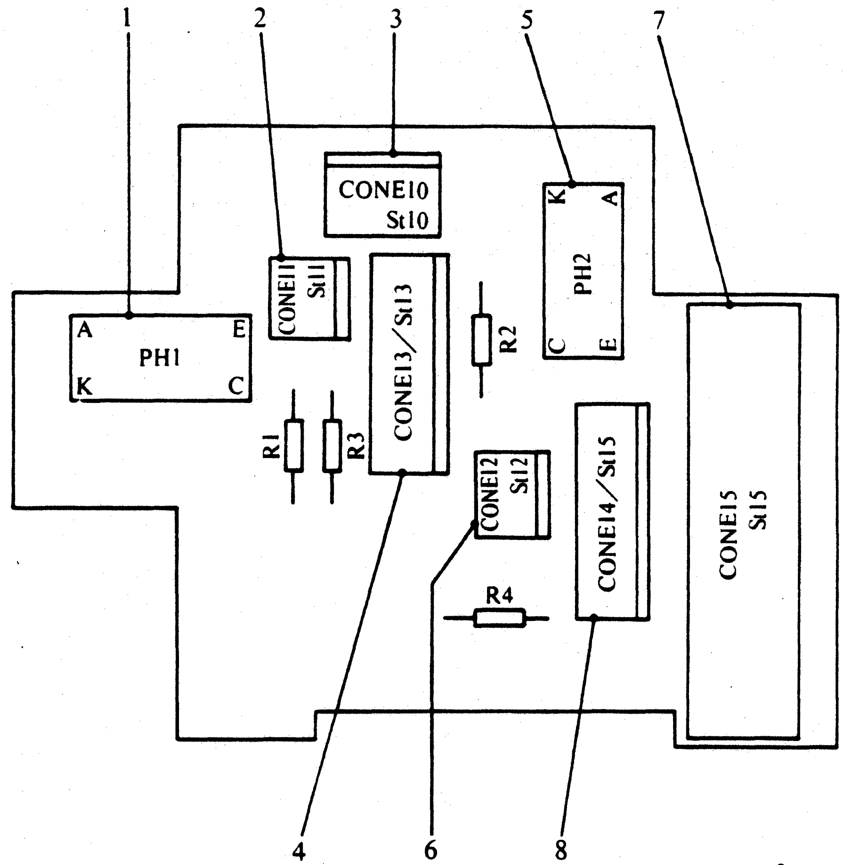
Lageplan Tastatur
Layout of components, keyboard



Stromlaufplan Druckwerk
Circuit diagram carrier



Lageplan Druckwerk-Leiterplatte
Layout of components, carrier PCB



1	PH 1	Farbband-Lichtschranke/Ribbon sensor
2	St 11 CONE 11	Stecker Abschlagmagnet Connector Hammer solenoid
3	St 10 CONE 10	Stecker Typenrad-Lichtschranke Connector selection sensor
4	St 13 CONE 13	Stecker Typenrad-Motor Connector selection sensor
5	PH 2	Druckwerk-Lichtschranke/Carrier sensor
6	St 14 CONE 14	Stecker Farbbandmotor Connector ribbon motor
7	St 15 CONE 15	Stecker Steuer-Leiterplatte Connector control PCB
8	St 12 CONE 12	Stecker DW-Positions LED Connector carsol LED

Stecker-Anschlußplan
Connection diagram

L

St1/CONE1
Tastatur/keyboard

1	Z0
2	Z1
3	Z2
4	Z3
5	Z4
6	Z5
7	Z6
8	Z7
9	+ 5
10	LED

St2/CONE2
Tastatur/keyboard

1	LOCK
2	SHIFT A
3	SHIFT B
4	Sp8
5	Sp7
6	Sp0
7	Sp1
8	Sp2
9	Sp3
10	Sp4
11	Sp5
12	Sp6

St3/CONE3
Horizontal motor
Carrier motor

1	A
2	$\overline{B}$
3	$\overline{A}$
4	B
5	CA
6	CB

St4/CONE4
Vertikal motor
Index motor

1	A
2	$\overline{B}$
3	$\overline{A}$
4	B
5	CA
6	CB

St5/CONE5
Druckwerks-Leiterplatte
Carrier P.C.B

1a	FGND	1b	CB
2a	CB	2b	CA
3a	CA	3b	B
4a	B	4b	A
5a	$\overline{A}$	5b	B
6a	$\overline{B}$	6b	A
7a	A	7b	HA
8a	HB	8b	GND
9a	PH	9b	S
10a	C		R

St6/CONE6
Stromversorgung
Powerpuck

1	+ 35
2	+ 12
3	+ 6
4	+ 5
5	GND

St7/CONE7
Papiereinzugschalter
Paperfeed switch

1	SINGLE(A)
2	SINGLE(B)
3	REPEAT(A)
4	REPEAT(B)

St10/CONE10
Typenrad-Lichtschranke
Selection sensor

1	COR
2	GHD
3	AHO

St11/CONE11
Abschlagmagnet
Hammer solenoid

1	HA
2	HB

St12/CONE12
DW-Positions-LED
Carsol LED

1	ANO
2	GND

St15/CONE15
Steuer-Leiterplatte
Control P.C.B

1a	FGND	1b	CB
2a	CB	2b	CA
3a	CA	3b	B
4a	B	4b	$\overline{A}$
5a	$\overline{A}$	5b	$\overline{B}$
6a	$\overline{B}$	6b	A
7a	A	7b	HA
8a	HB	8b	GND
9a	PH	9b	S
10a	C	10b	R

Bu3/SOCKET3
Typenrab-Lichtschranke
Selection sensor

1	COR
2	GND
3	ANO

St13/CONE13
Typenrad motor
Selection motor

1	A
2	$\overline{B}$
3	$\overline{A}$
4	B
5	CA
6	CB

St14/CONE14
Farbbandmotor
Ribbon motor

1	A
2	$\overline{B}$
3	$\overline{A}$
4	B
5	CA
6	CB