

PHILIPS WSFA
AROFLEX
Teleprinter 1000 mil
3^e echelons

KONINKLIJKE LANDMACHT

3 TH 11-953/2

TECHNISCHE HANDLEIDING

VERCIJFER/ONTCIJFERINGSUITRUSTING
KL/TGA-5841 (AROFLEX)

BAND 2

3e ECHELONS ONDERHOUD

TELEPRINTER T1000



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TELEPRINTER T1000



DIENTSTGEHEIM

STAAT VAN WIJZIGINGEN

WIJZ. NO.	DATUM v.d. WIJZIGING	AANGEBRACHT DOOR NAAM	DATUM WAAROP AANGEBRACHT

TELEPRINTER MODEL 1000 mil

SERVICE MANUAL

Ref.-No.:
L22957-X1051-K100--7692

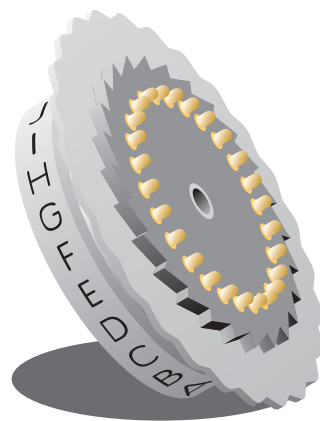
1 OPERATING INSTRUCTIONS

2 UNPACKING INSTRUCTIONS INSTALLATION INSTRUCTIONS

3 SERVICE INSTRUCTIONS

4 DESCRIPTION

5 INSTRUCTION REPLACEMENT OF MODULES



KL/TGA-5841 AROFLEX Teleprinter Model 1000 mil DEEL 1

Teleprinter Model 1000 mil

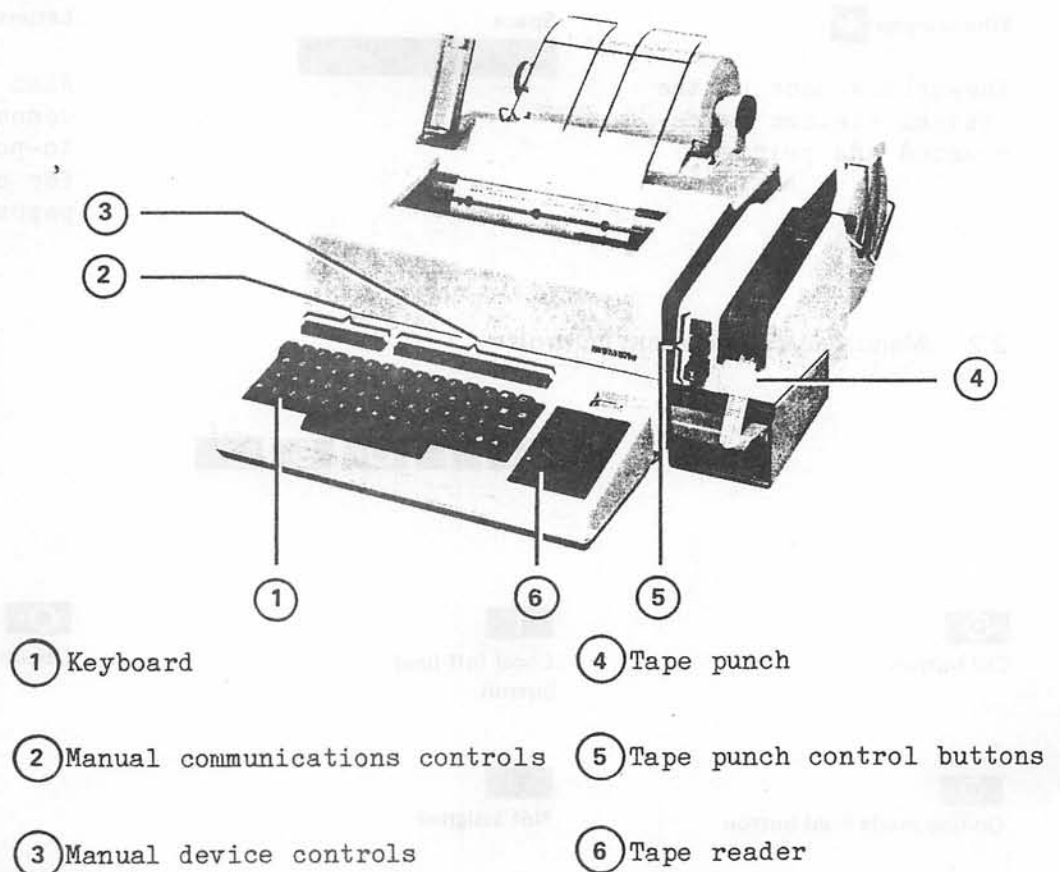
Operating Instructions

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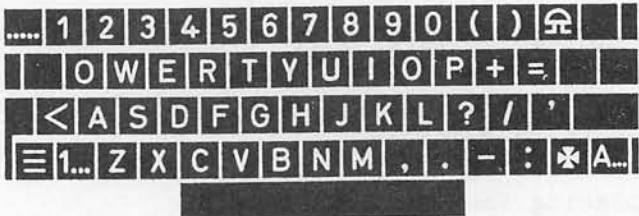
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1 TELEPRINTER



2 KEYBOARD CONTROLS

2.1 Keyboard



Bell

The distant station operator is called to the teleprinter.

Run-out

The last character or the last character of the sequence entered is repeated as long as this key is held depressed, except in the case of new line.

Carriage return

New line

Depending on the programming, this key generates the character sequences

, or

Line feed

Figures shift

2



Who-are-you

Answerback code of the distant station is requested and printed.

Space

Letters shift

Also for setting up a connection via point-to-point circuit and for correcting the paper tape.

2.2 Manual communications controls



Call button

Local (off-line) button

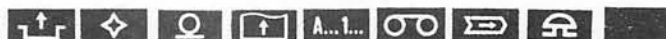
Disconnect button

On-line mode hold button

Not assigned

3

2.3 Manual device controls



Unblock keyboard button

Blocking of keyboard is indicated by lamp if

1. maximum typing speed is exceeded
 - deletion by pressing the unblock keyboard button;
2. line end is reached
 - deletion by pressing the carriage return key.



Here-is button

The answerback of home station is transmitted and printed out.



Printer ON/OFF button

Printer is deactivated, tape punch is activated and all characters received are punched (including Figs. side D).

4



Paper feed button

The paper of the home machine only is fed forward for as long as the button is held depressed. When the paper feed button is pressed briefly, the paper is advanced by 1/4 of the line spacing.



Letters/figures shift button

Effective only for the home machine and shifts it from upper case to lower case and vice versa.



Data medium ON button

Tape punch is constantly ON.



Output inhibition button

Text is read, but not printed, punched or sent.



Reset alarm button

Bell alarm is deactivated.



Answerback inhibition switch

The answerback code cannot be called in by the distant station.

Power ON indicator

Lamp lights to indicate that ac power voltage is applied.

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3 LOCAL MODE

3.1 Preparation of a perforated tape



1. Press local button.

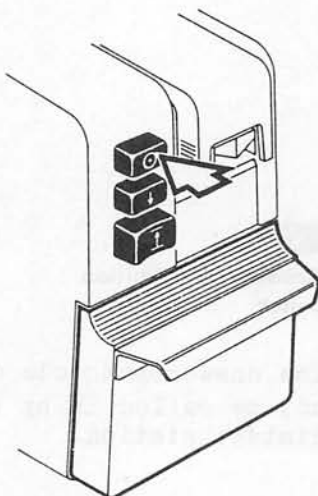
Lamp comes on.



Printer carriage moves to beginning-of-line position.

Paper is advanced by one line.

Internal illumination is turned on.

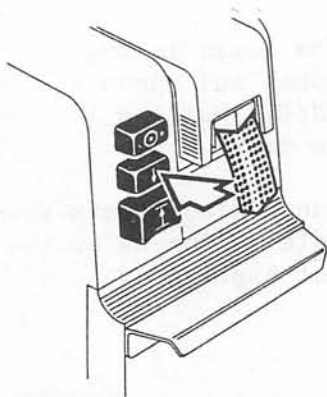




2. Press punch ON/OFF button

Lamp comes on.



7




 or


3. Hold tape feed button depressed until several LTRS code combinations (5 x hole) have been punched.

4. Press new line key.

Paper is advanced by one line.

Character commands are punched according to programming:

CR LF CR

or

CR LF

or

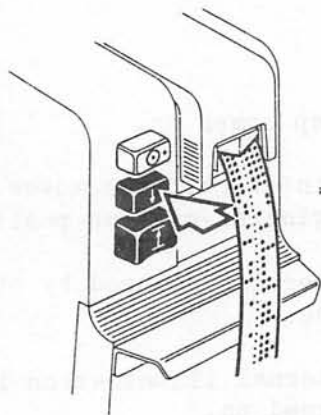
CR CR LF

or

Press carriage return and line feed keys.



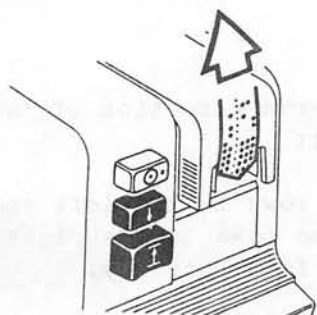

8



5. Enter text by means of keyboard.

Text is punched and printed.

6. Hold tape feed button depressed until several LTRS code combinations (5 x hole) have been punched.



7. Tear the tape off by pulling it upwards.

9



8. Press disconnect button

The lamps in the local and punch ON/OFF buttons go dark.



Punch disconnects when the data medium ON button is not depressed.

Note:

Off-line operation is interrupted by an incoming message.

The on-line mode is activated.

After each depression of the tape feed button the corresponding case shift key (**A** or **1**) on the keyboard must be pressed before typing is continued.

Possible functions:

Tape verification

Tape duplication

Printer deactivation.

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3.2 Verification of a perforated tape



1. Press local button.

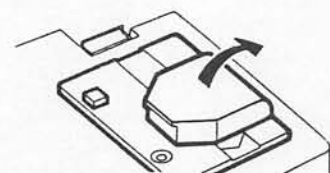
Lamp comes on.



Printer carriage moves to beginning-of-line position.

Paper is advanced by one line.

Internal illumination is turned on.



2. Open tape retainer lid of tape reader.

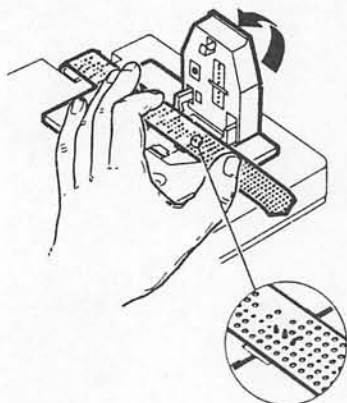
3. Insert perforated tape and press it down.

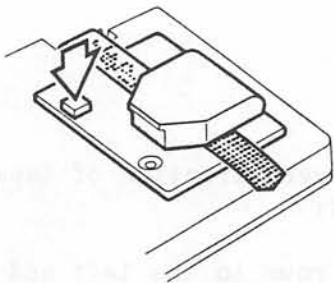
Observe direction of tape feed:

Two rows to the left and three rows to the right of the feed hole row.

Close tape retainer lid.

The pins of the sprocket wheel must engage in the feed holes.





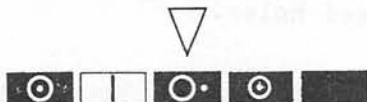
4. Press ON/OFF button of tape reader.

Lamp comes on.



Tape is read and its contents printed.

When the end of the tape is reached, the reader stops automatically.



5. Press disconnect button.

Lamp goes dark.



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3.3 Duplication of a perforated tape



1. Press local button.

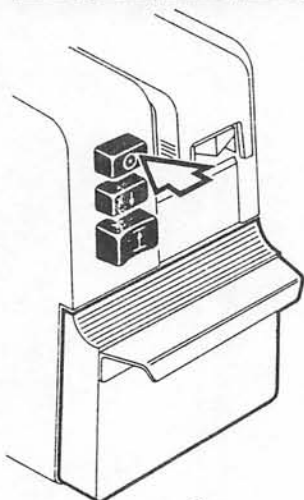
Lamp comes on.



Printer carriage moves to beginning-of-line position.

Paper is advanced by one line.

Internal illumination is turned on.

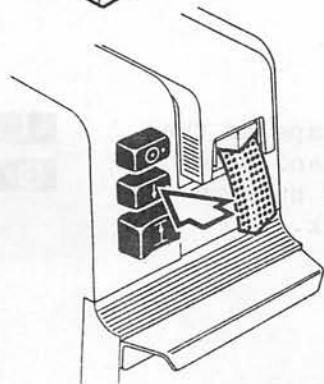


2. Press ON/OFF button of tape punch.

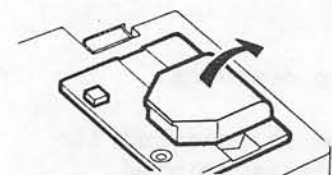
Lamp comes on.



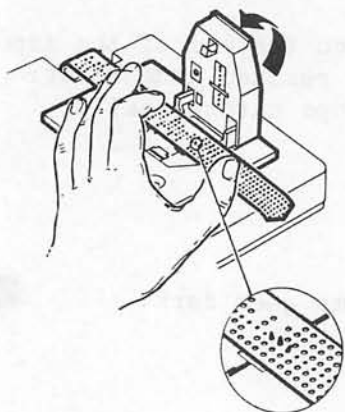
3. Hold tape feed button depressed until several LTRS code combinations (5 x hole) have been punched.



13

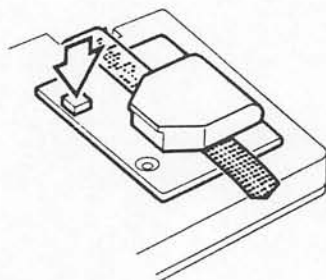


4. Open tape retainer lid of tape reader.



5. Insert perforated tape and press it down.

Close tape retainer lid.



6. Press ON/OFF button of tape reader.

Observe direction of tape feed:

Two rows to the left and three rows to the right of the feed hole row.

The pins of the sprocket wheel must engage in the feed holes.

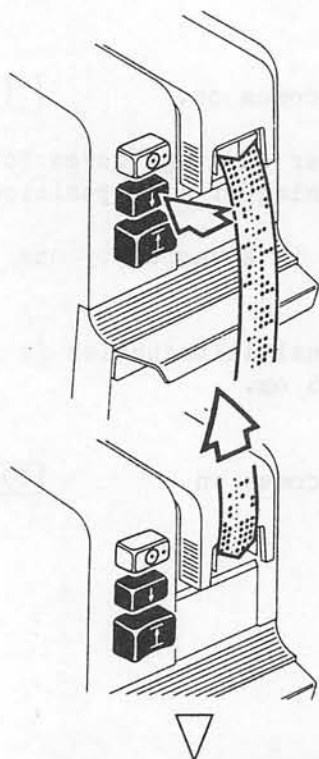
Lamp comes on.



Tape is read, the text is printed, and a new tape is punched.

When the end of the tape is reached, the reader stops automatically.

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7. Hold tape feed button depressed until several LTRS code combinations (5 x hole) have been punched.

8. Tear the tape off by pulling it upwards.

9. Depress disconnect button.

The lamps in the local and punch ON/OFF buttons go dark.

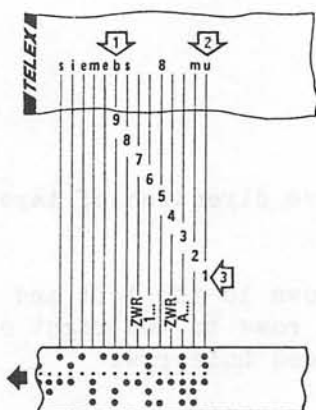


Possible functions:

Printer deactivation.

15

3.4 Correction of a perforated tape by overpunching



1. Wrong character keyed here.

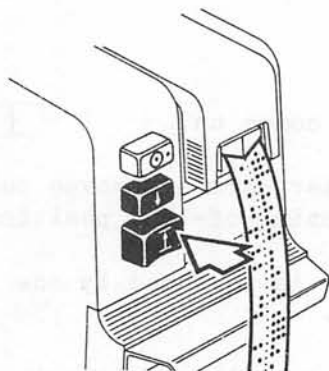
2. Wrong character detected here.

3. Counting the character spaces from


→ →



Result: 9 character spaces.

16



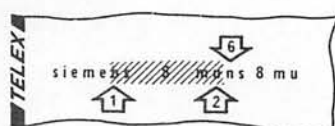
4. Press backspace button 9 times as far as it will go.

Note: When changing the line with the new line key  :
Press backspace button 2 or 3 times depending on programming
(See Section 3.1, point 4).

When changing the line with ,  :
Press backspace button twice.

A...

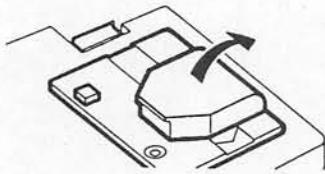
5. Press letters shift key 9 times.



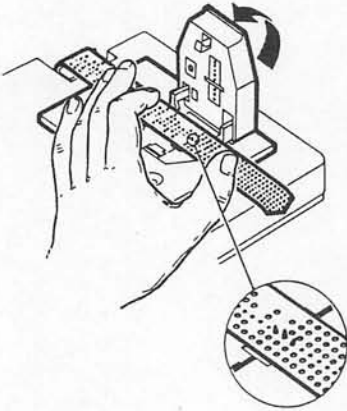
6. Type the incorrect character correctly, retype the following text, then continue typing the message.

17

3.5 Correction of a perforated tape by duplicating



1. Open tape retainer lid of tape reader.



2. Insert paper tape and press it down.

Close tape retainer lid.

Observe direction of tape feed:

Two rows to the left and three rows to the right of the feed hole row.

The pins of the sprocket wheel must engage in the feed holes.

18



3. Press local button.

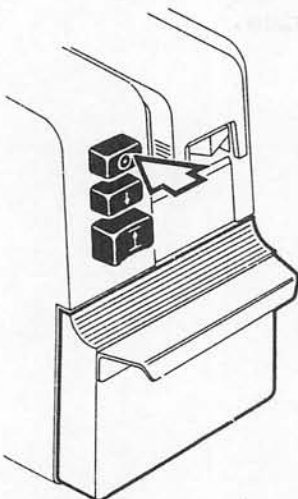
Lamp comes on.




Printer carriage moves to beginning-of-line position.

Paper is advanced by one line.

Internal illumination is turned on.

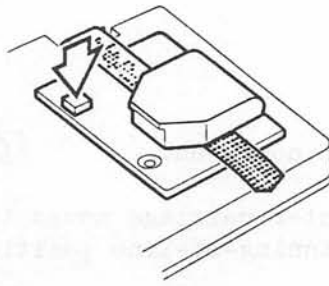


4. Press punch ON/OFF button.
(Not necessary if "data medium ON" button  is pressed.)

Lamp comes on.



19



5. Press ON/OFF button of tape reader.

Lamp comes on.



Tape is read, the message is printed out and a new tape is punched.


Single-character feed:
Press ON/OFF button briefly.

and

6. Depress button several characters before the first incorrect character.

Tape reader stops.

7. Briefly press reader ON/OFF button as many times as required (single character feed) until last correct character is printed.

8. Keep output inhibition button  depressed and simultaneously perform single-character feed operations until the last undesired character has been read.
Release output inhibition button.

20



or:

If output inhibition button is not installed, deactivate tape punch as long as undesired characters are read.

9. Type correct characters into the keyboard if necessary.
10. Press punch ON/OFF button if output inhibition button is not installed.

11. Press ON/OFF button of tape reader,

Reading of tape is continued.

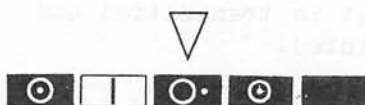
When the end of the tape is reached, the reader stops automatically.

12. Press disconnect button.

The lamps in the local and punch ON/OFF buttons go dark.



Punch remains activated if the data medium ON button is depressed.



21

4 COMMUNICATION (e.g. via a point-to-point circuit)

4.1 Transmitting a message via the keyboard



1. Press call button.

Lamp comes on.



Printer carriage moves to beginning-of-line position.

Paper is advanced by one line.

Internal illumination is turned on.

or



Press letters shift key.



2. Press Who-are-you key.

Answerback code of distant subscriber is printed.

Answerback code is automatically printed.

22



3. Press Here-is key.

Local answerback code is transmitted and printed.



or



4. Press new line key.

Printer carriage moves to beginning-of-line position.

Paper is advanced by one line.

or



Press carriage return and line feed keys.

5. Type text on keyboard.

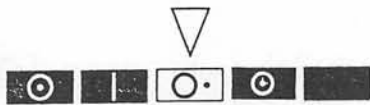
Text is transmitted and printed.



6. Press Who-are-you key.

The answerback code of the distant subscriber is printed.

23



7. Press disconnect button.

Lamp goes dark.



or

Teleprinter is turned off automatically 40 seconds after transmission of the last character.

Possible functions:

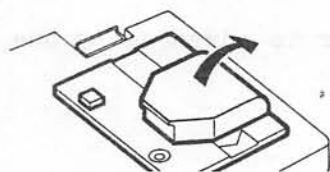
Transmission of a tape

Printer deactivation

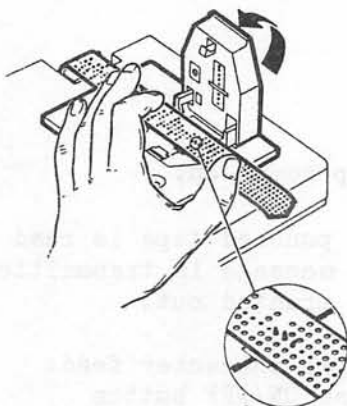
Starting continuous on-line working.

24

4.2 Transmitting the punched tape



1. Open tape retainer lid of tape reader.



2. Insert paper tape and press it down.

Close tape retainer lid.

Observe direction of tape feed.

Two rows to the left and three rows to the right of the feed hole row.

The pins of the sprocket wheel must engage in the feed holes.

25



3. Press call button.

Lamp comes on.



Printer carriage moves to beginning-of-line position.

Paper is advanced by one line.

Internal illumination is turned on.

or



Press letters shift key.



4. Press Who-are-you key.

The answerback code of the distant subscriber is printed out.



5. Press Here-is key.

The answerback code of the local station is transmitted and printed out.

26



or



6. Press new line key.

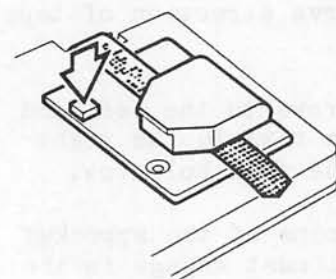
Printer carriage moves to beginning-of-line position.

Paper is advanced by one line.

or



Press carriage return and line feed keys.



7. Press ON/OFF button of tape reader.

Lamp comes on.



The punched tape is read
The message is transmitted and printed out.

Single-character feed:
Press ON/OFF button briefly.

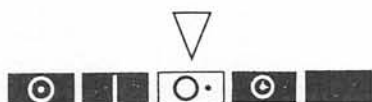
When the end of the tape is reached, the reader stops automatically.

27



8. Press Who-are-you key.

The answerback code of the distant subscriber is printed out.



9. Press disconnect button.

Lamp goes dark.



or

Teleprinter is turned off automatically 40 seconds after transmission of the last character.

Possible functions:


Printer deactivation

Starting continuous on-line working.

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5 OPTIONAL FEATURES

Printer deactivation

Press printer ON/OFF  button.

Printer is turned off. Tape punch is turned on. Text is punched but not printed.

Punching the outgoing/incoming messages into paper tape.

Press data medium ON  button.


As long as button is depressed, all incoming/outgoing messages are punched into tape.


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Breaking-in

Reception of a tape message can be interrupted by the receive-station operator by pressing button **T** or **E** several times.

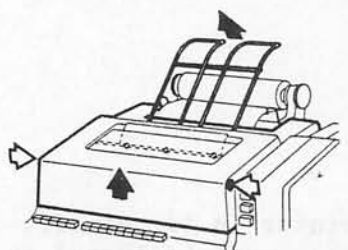
Starting continuous on-line working

Press on-line mode hold button  while transmitting or receiving:

On-line mode can only be ended  by pressing the disconnect button.

30

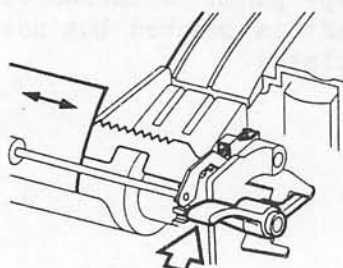
6 REPLACING THE PAPER ROLL



When a colored stripe appears on the edge of the paper, the paper roll must be replaced before the next message is sent or received.

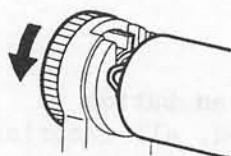
1. Open top cover.

Swing paper deflecting frame to the front.



2. Move paper pressure lever backwards.

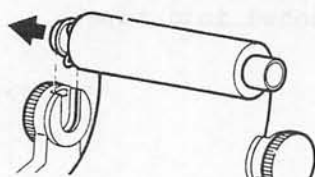
Remove the old paper roll and pull the rest of paper backwards and out.



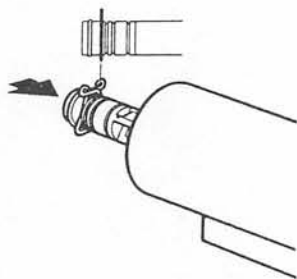
Pull paper roll axle out of the old roll.

For mobile use only:

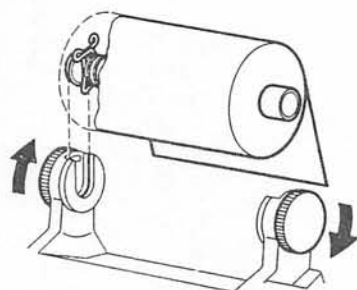
Unlatch paper roll axle on both sides.



31

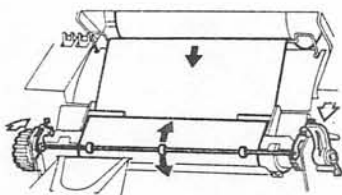


3. Push the paper roll axle into the new paper roll until it makes contact with the wire clip. The paper must unwind as shown in the picture. The wire clip always rests in the outermost groove.



4. Load the new paper roll into the holder. Ring-shaped collar must always rest in the groove of the left-hand roll holder.
(Latch the paper roll when the teleprinter is in mobile use.)

32



5. Feed the paper over the pull relief rod and insert it under the platen.

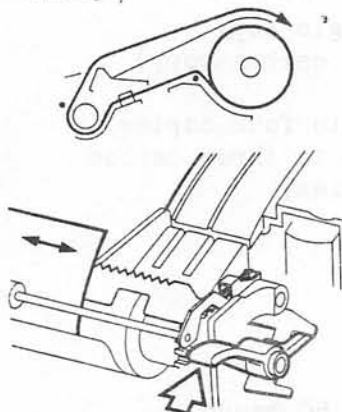
Swing the paper pressure lever to the front.

Swing the paper pressure rod upwards.

Wind the paper around the platen and feed it under the paper pressure rod.

Swing the paper pressure rod downwards.

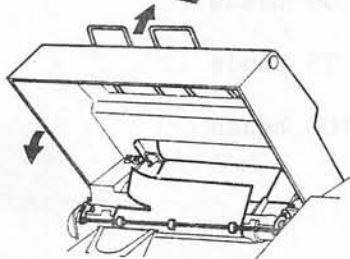
(To align the paper, swing the paper pressure lever backwards.)



6. Tear off paper along the tear-off edge.

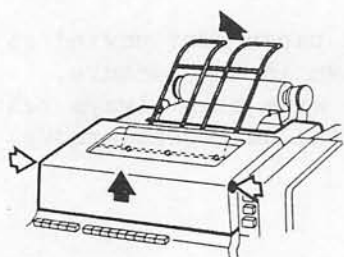
Close top cover.

Move paper deflecting frame backwards.



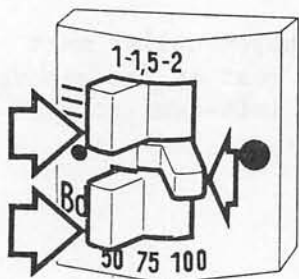
33

ADJUSTING THE LINE SPACING, PRINT FORCE AND SIGNALLING SPEED



1. Open top cover.

Swing paper deflecting frame to the front.



2. Line spacing

1: single line spacing

1,5: 1 1/2 line spacing

2: double line spacing

34



3. Print force

Left position of lever: single copy
(no carbon copy)

Right position of lever: up to four copies
(up to three carbon copies)

4. Signalling speed

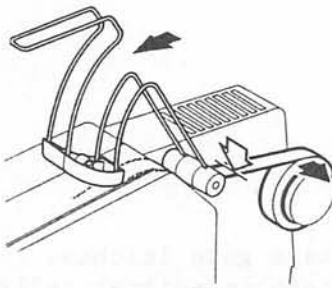
50: signalling speed 50 bauds

75: signalling speed 75 bauds

100: signalling speed 100 bauds

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8 REPLACING THE PAPER TAPE ROLL

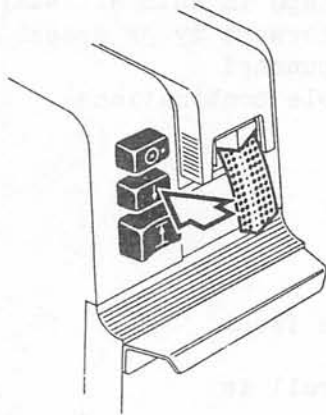


When the colored warning stripe becomes visible while the tape is being unwound, the paper tape roll must be changed before the next message is sent or received.

1. Swing guide rod upwards.

Tear off paper tape.

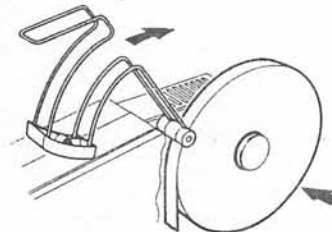
Remove the old tape roll from core.



2. Press the tape feed button until the rest of paper tape has run out of the tape punch.

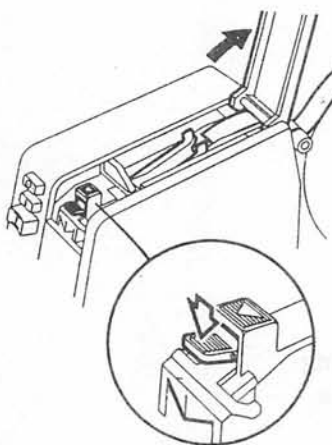
3. Place the new paper tape roll over core.

The tape must unwind as shown in the picture.



Swing guide rod back into position.

36



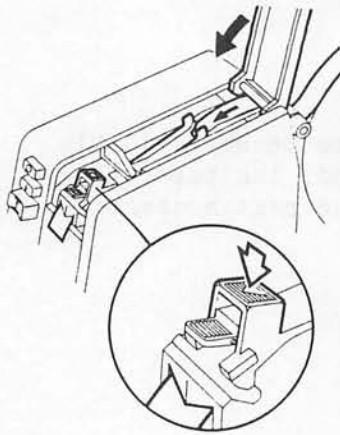
4. Advance paper tape in the tape punch until it has reached the beginning of the tape guide.

Open the cover.

Press on tape gate.

The tape gate swings upwards.

37

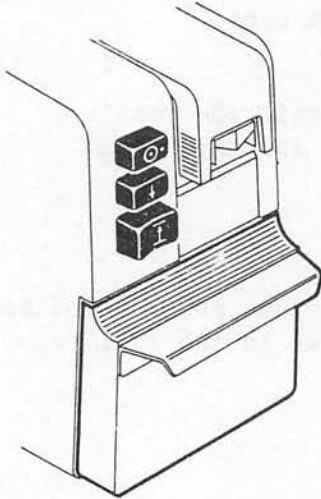


5. Push the tape further until it emerges from the punch at the front.

Press on the tape gate. The tape gate latches. The tape is automatically fed forward by 32 spaces and punched (5-hole combinations).

Close the cover.

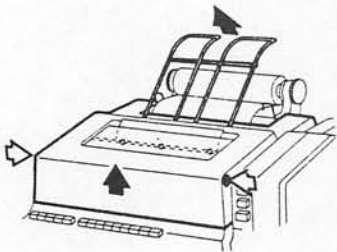
Tear off punched tape upwards.



6. Pull chad waste box out to the front and empty. (Do this every time the tape roll is changed.)

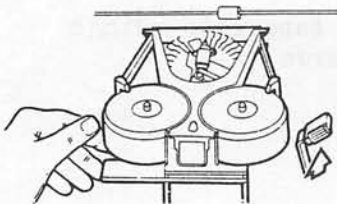
38

9 REPLACING THE INK RIBBON

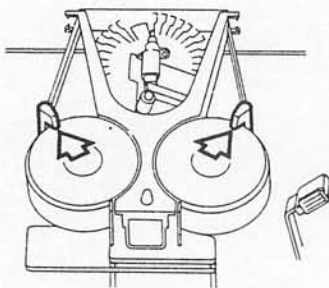


1. Open top cover.

Swing paper deflecting frame to the front.

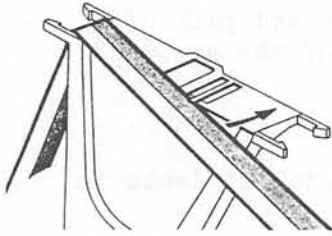


2. Press lever backwards and swing the printing mechanism upwards until it latches.

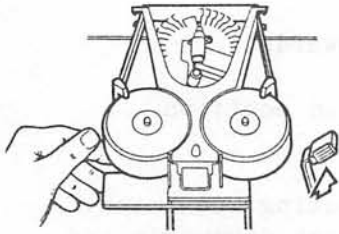


3. Press lever in the direction of the arrow and pull ribbon spools off the guide pins. Remove ink ribbon from lateral guides and pull upwards and out of guide plate slot.

39



4. Hook free ribbon end of new ribbon spool to an empty spool just as you do when replacing a typewriter ribbon. Place one ribbon spool in position. Ensure red side of ribbon points upwards. Insert ink ribbon in the first lateral guide on the ribbon guide fork, in the guide plate slot and the second lateral guide. Install second ribbon spool.



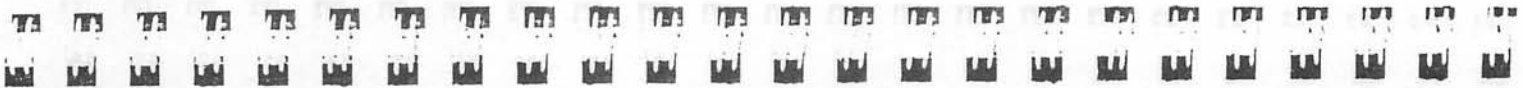
5. Press lever backwards. Printing mechanism swings downwards and latches.

6. Tear paper off along the tear-off edge.

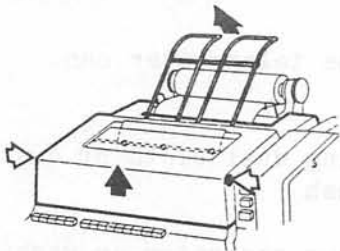
Close top cover.

Move paper deflecting frame backwards.

40

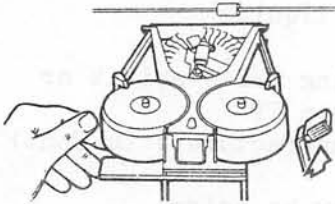


10 REPLACING THE PRINTWHEEL

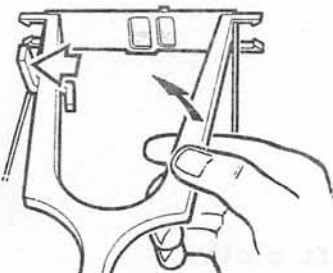


1. Open top cover.

Swing paper deflecting frame to the front.

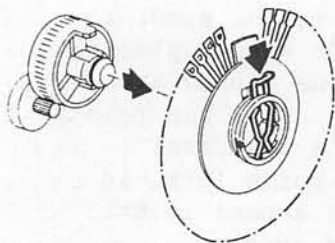


2. Press lever backwards and swing the printing mechanism upwards until it latches.

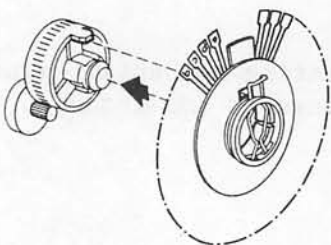


3. Disengage ribbon guide fork and swing upwards.

41



4. Press down wire clip radially and pull off printwheel in the direction of the arrow.

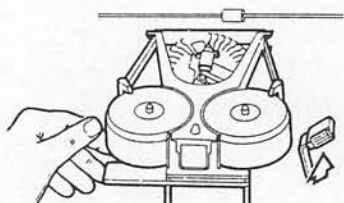


5. Push the new printwheel in until it locks in position.
(The driver must engage in the appropriate opening of the printwheel.)

6. Swing ribbon guide fork downwards.

Ribbon guide fork is locked in position.

7. Press lever backwards. Printing mechanism swings downwards and latches.



8. Tear paper off along the tear-off edge.

Close top cover.

Move paper deflecting frame backwards.

42

11 CLEANING THE TELEPRINTER

If required, the exterior of the teleprinter can be cleaned:

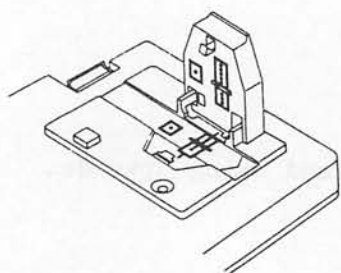
when dusty:

using dust cloth or dust brush

when contaminated slightly: using soapwater or washing-up liquids

when contaminated heavily: using white spirit or Freon TF
(manufacturer: Du Pont)

(Do not clean the viewing window by using cleaning agents containing white spirit or alcohol.)



Cleaning the tape reader

Open tape retainer lid.
Clean reading position with soft cloth.
Close tape retainer lid.

43

12 ORDERING DATA

Paper roll

Roll as per
DIN Std. 6720

Paper with:
209 or 216 mm

Number of plies:
max. 4 (when multi-
ply paper is used,
ensure original is
outermost)

Outer diameter of
roll:
120 mm (or 170 mm
with accessory parts
for holder)

Paper tape roll

1. Ordering data as
per DIN Std.

Paper L3 DIN 6720
(0.1 mm thick, oiled)
or

Paper L1 DIN 6720
(0.08 mm thick,
unoiled)

2. Ordering data for
ISO quality

Paper tape roll as
per ISO 1729

Paper tape:
17.4 mm wide
0.1 mm thick

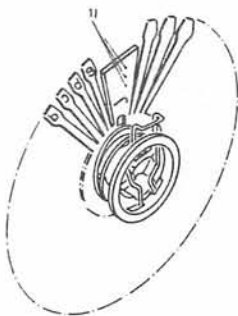
Ink ribbon

Usable are commercially
available ink ribbons,
nylon, black or black/red,
without ribbon-reverse
actuator

1. We recommend ordering
from Siemens AG
Ordering nos:
C20136-Z14-C967
(nylon ribbon, black)
or
C20136-Z14-C968
(nylon ribbon,
black/red)

2. Ordering nos. as per DIN
Ink ribbon SM 13x54
DIN 2103-N-sw
(nylon ribbon, black)
or
Ink ribbon SM 13x54
DIN 2103-N-sw/rt
(nylon ribbon, black/red)

44

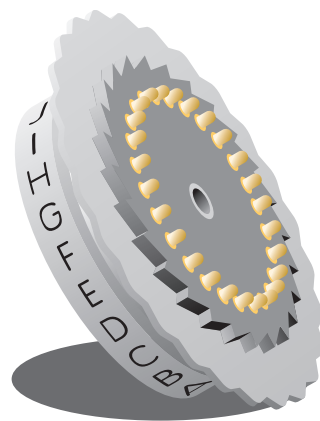


Printwheel

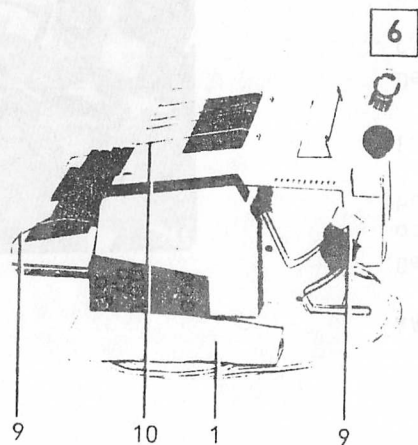
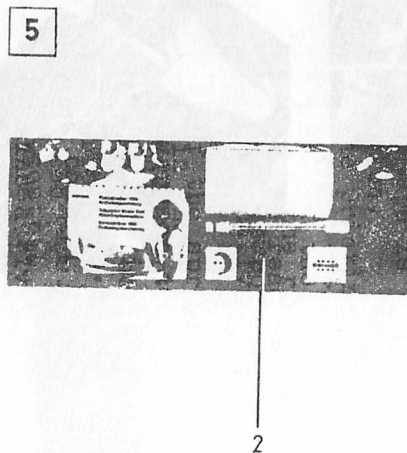
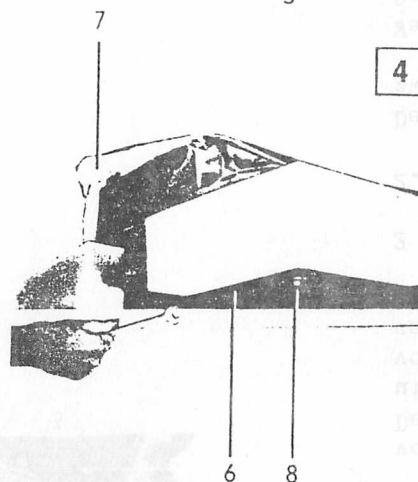
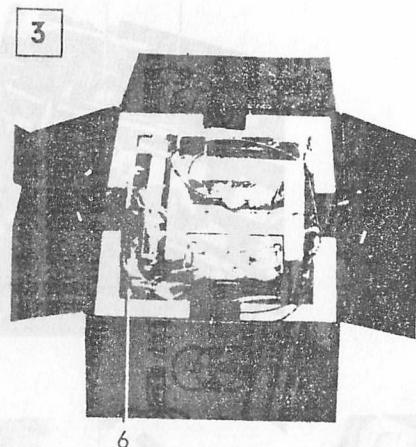
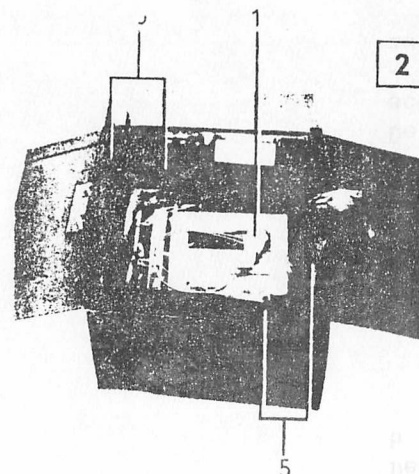
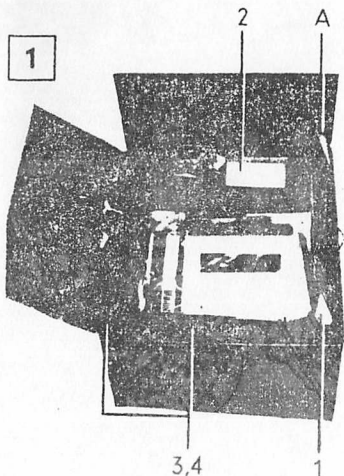
Ordering number: S22711-J1-J¹⁾

1) Read figures from printwheel

Please address your orders to your local
Siemens representatives.



KL/TGA-5841 AROFLEX Teleprinter Model 1000 mil DEEL 2



UITPAKKEN VAN DE VERRESCHRIJVER

Na openen van de opvouwbare verpakking en verwijderen van de uitpakhandleiding A:

Afbeelding 1 Aansluitkabels met verpakte stekers 1 op de verreschrijver leggen (zie ook afb. 2) en het toebehoor 2 wegnemen.

Brochures 3 en (eventueel) toegevoegde pakketten 4 verwijderen.

Afbeelding 2 Opsluitdelen 5 aan de vier zijden er uittrekken.

Afbeelding 3 Verreschrijver met transportplank 6 uit de doos nemen en op een tafel plaatsen.

Afbeelding 4 Omhulsel 7 afnemen en de aansluitkabels met de verpakte stekers 1 weer op de machine leggen.

Zeskantschroeven 8 (max. 4 met sleutelwijdte 13) - aan de onderkant van de transportplank 6 - losschroeven en de plank wegnemen.

Afbeelding 5 Verpakking van het toebehoor 2 opensnijden en de losse delen (papiergeleidingsbeugel, papierrol enz.) uitpakken.

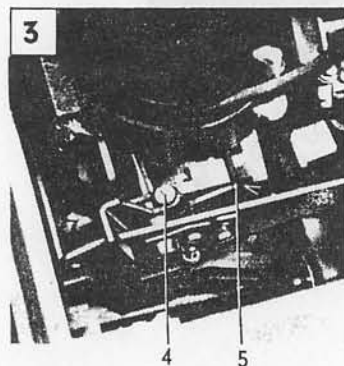
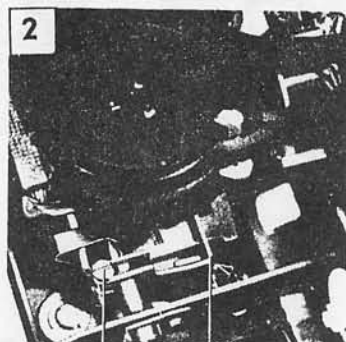
Afbeelding 6 Transportbevestiging 9 (rubberringen - indien toegepast) van de verreschrijver verwijderen

Papiergeleidingsbeugel 10 op de aangegeven wijze in de uithollingen vat het deksel van de kap inklinken en achterwaarts zwenken.

Verpakte stekers 1 uitpakken.

Opgelet!

Voor eventueel later volgende transporten garandeert alleen deze verpakking een transport zonder beschadiging.



AANWIJZING VOOR HET PLAATSEN

De wandcontactdoos van het sterkstroomnet moet - met het oog op een eventuele gevarentoestand - gemakkelijk te bereiken zijn.

1 OPSTELLEN OP DE GEWENSTE PLAATS

De verreschrijver - in de nabijheid van de aansluitdozen - c en bureau of schrijftafel opstellen.

De gebruik van een konsole:

Stand van de console met de twee voorste (verstelbare) voeten instellen. Het toebehoor op de console monteren. De verreschrijver met de gummivoeten in de overeenkomstige uithollingen van de konsole plaatsen en daarna met de ster-vormige greep vergrendelen. De afdekking van de kabelruimte van de rechter konsolevoet verwijderen; de aansluitkabel er in leggen en vervolgens de kabelruimte weer afsluiten.

2 ONTGRENDELEN VAN DE DRUKKERWAGEN

2.1 DRUKKER MET AFDRUK v.l.n.r. (afb. 1)

Deksel van de kap openen en hefboom 1 in de pijlrichting zwenken.

Wanneer de drukkerwagen weer moet worden vergrendeld: De drukkerwagen naar links tegen de aanslag schuiven en hefboom 1 tegen de pijlrichting zwenken.

DRUKKER MET AFDRUK v.r.n.l. (afb. 2)

DRUKKER VOOR ZIGZAG-PAPIER (afb. 3)

Deksel van de kap openen. Schroef 2 (resp. 4) losschroeven, hefboom 3 (resp. 5) in de pijlrichting tegen de aanslag zwenken. Schroef 2 (resp. 4) weer vastzetten.

Wanneer de drukkerwagen weer moet worden vergrendeld: De drukkerwagen naar rechts tegen de aanslag schuiven en schroef 2 (resp. 4) losschroeven. Hefboom 3 (resp. 5) - tegen de pijlrichting - tot de aanslag, naar beneden zwenken. Schroef 2 (resp. 4) weer vastzetten.

3 LIJNAFSTAND, AFDRUKSTERKTE EN TRANSMISSIESNELHEID
KONTROLEREN EN INDIEN NODIG, INSTELLEN

zie opm. 3)

De transmissiesnelheid alleen dan instellen als het noodzakelijk en mogelijk is.

4 PROGRAMMEREN VAN DE NAAMGEVER

Kap afnemen,
drukker in hoogste stand, zie opm. 2)
naamgever verwijderen,

naamgever programmeren. zie opm. 3)

5 ZIJDELIJNSE PAPIERGELEIDING KONTROLEREN EN INDIEN
NODIG, INSTELLEN

Kap afnemen zie opm. 2)

papiergeleiding instellen. zie opm. 3)

6 BLADSCHRIJVERPAPIER INZETTEN

Zie inlegschemata in het deksel.

7 PONSROLPAPIER PLAATSEN

Zie inlegschemata op de zijkant van de ponser.

8 VERGELIJK DE NETSPANNING TER PLAATSE MET DIE WELKE
OP DE NAAMPLAATJES STAAN

Bij een afwijking:

Kap afnemen,
drukker in hoogste stand, zie opm. 2)
voeding demonteren,

voeding op de juiste zie opm. 3)
netspanning omstellen.

De gegevens van de spanning op de naamplaatjes aan de
achterzijde van de kap, bodemplaat en voeding, veranderen.

9 NET- EN LIJNSTEKER IN DE DOZEN STEKEN

Na de uitvoering van de genoemde werkzaamheden kan de
verreschrijver in dienst genomen worden.

10 OPMERKINGEN

De werkzaamheden betreffende de punten 3 t/m 8 staan in de
volgende drukschriften:

Opm. 1) Bedrijfshandleiding
Bestelnr.:
Verreschrijver 1000 : A22711-A1000-X1-*-9919

2) Uitwisselen van bouwgroepen
Bestelnr.:
Verreschrijver 1000 : A22711-A1000-X2-*-8620

Opm. 3) Service-handleiding
Bestelnr.:
Verreschrijver 1000 : A22711-A1000-X1-*-8620

**Transportgehäuse für
Fernschreiber 1000**

**Transport case for
Teleprinter 1000**

○ **Aufstellanleitung**
Installation Instructions

INHALT

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1 Allgemeines	1
2 Öffnen und Aufstellen des Transportgehäuses	2
3 Einsetzen des Halters für Fußtaster	3
4 Befestigung des Fernschreibers auf Einschub	4
5 Vorbereitung zum Einsetzen des Fernschreibers ins Transportgehäuse	5
6 Einsetzen des Fernschreibers in das Transportgehäuse	6
7 Vorbereitung zum Betrieb des Fernschreibers	8
8 Vorbereitung für Transport	9
9 Verschließen des Transportgehäuses	11
10 Bestückung der Zubehörbox	12
11 Ersatzteile	13
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3 Installing the pedal switch holder	3
4 Mounting the teleprinter on the supporting plate	4
5 Preparations for inserting the teleprinter in the transport case	5
6 Installing the teleprinter in the transport case	6
7 Preparations for placing the teleprinter in service	8
8 Preparations for transport	9
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10 Tools and spares for accessory box	12
11 Spares	13
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11.2 List of supporting plate components	14

1 ALLGEMEINES
GENERAL

Das Transportgehäuse dient dazu, den Fernschreiber weitgehend vor Stoß- und Schüttelbeanspruchung zu schützen. Es ist spritzwasserdicht und höhen-tauglich.

Das Transportgehäuse ist so konstruiert, daß aus Platzgründen das Unter-teil mit dem Fernschreiber in den abgenommenen Deckel eingesetzt werden kann. In diesem Zustand ist der Fernschreiber auch für mobilen Einsatz geeignet.

Hinweis:

Voraussetzung für den mobilen Einsatz im Transportgehäuse ist, daß der Fernschreiber mit einem hierfür festgelegten Papierableitbügel, einem Er-dungsblech und der Locher mit einem Umrüstsatz für mobilen Einsatz verse-hen ist.

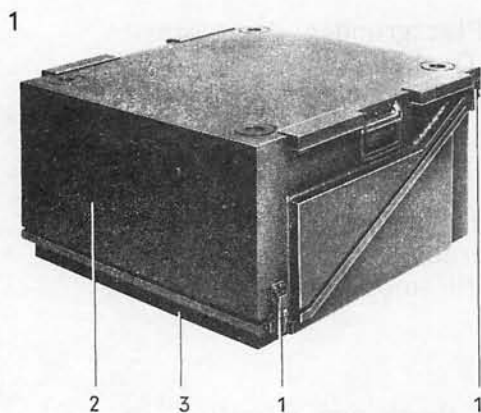
The transport case protects the teleprinter against shock and vibration. It is splash water proof and suitable for high-altitude flights.

To conserve mounting space, the case has been designed so that its base section can be fitted, together with the machine, in-to the previously removed cover. This set-up makes the teleprinter suitable for mobile service.

Note:

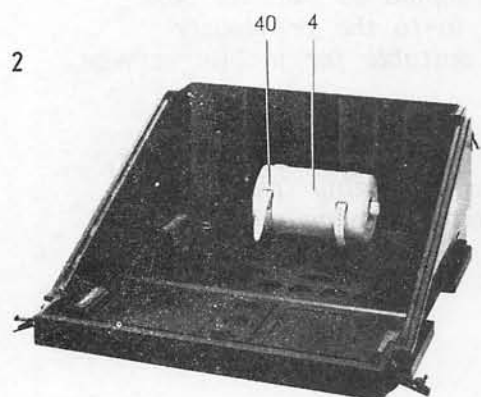
As a precondition for mobile service in connection with the transport case, the machine must be provided with a special paper deflecting frame and a grounding plate. A special conversion set for mobile service must be available for the tape punch.

2 ÖFFNEN UND AUFSTELLEN DES TRANSPORTGEHÄUSES OPENING AND SETTING UP THE TRANSPORT CASE



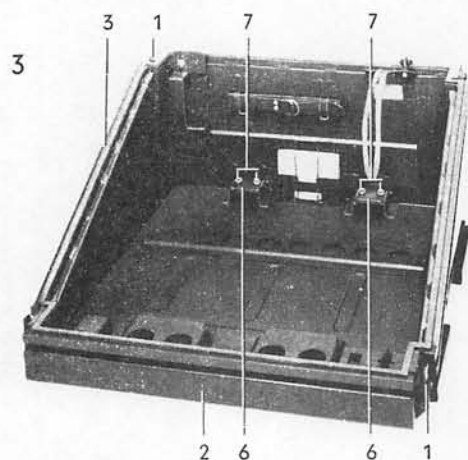
Vier Schnellspannverschlüsse 1 öffnen, Deckel 2 vom Unterteil 3 abheben und in Gebrauchslage (siehe Bild 2) drehen.

Open the four snap-action catches 1, lift cover 2 straight up and away from the base 3 and rotate it into working position (see Fig. 2).



Rolle Fernschreiberpapier 4 aus der Halterung im Deckel nehmen.

Remove paper roll 4 from the holding belts on the cover.



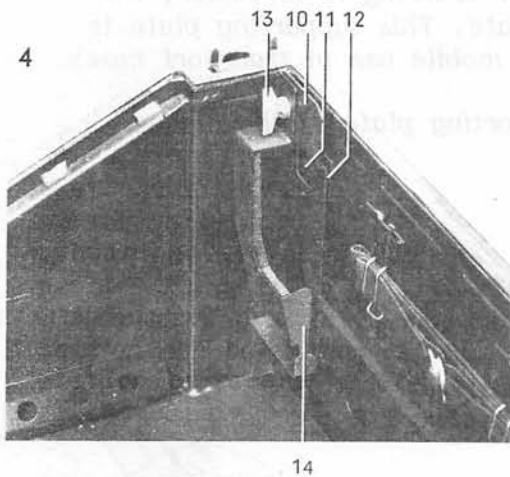
Unterteil 3 in Deckel 2 einsetzen, vier Schnellspannverschlüsse 1 schließen, vier Sechskantschrauben 7 lösen und zwei Befestigungsplatten 6 nach hinten schieben.

Insert base 3 in cover 2, close the four snap catches 1 and push the two hold-down plates 6 with their four hex head screws 7 to the rear.

3 EINSETZEN DES HALTERS FÜR FUSSTASTER INSTALLING THE PEDAL SWITCH HOLDER

Nur bei Transportgehäuse für Fernschreiber 1000 CA.

Only in transport cases intended for the Teleprinter 1000 CA



Halter für Fußtaster 10 mit abgewinkeltem Lappen 11 in Lasche 12 einsetzen, Schnellverschluß 13 durch Linksdrehung öffnen, Klappe 14 nach vorne schwenken, Halter 10 mit zwei Zylinderschrauben festschrauben, Klappe 14 schließen und mit Schnellverschluß 13 verriegeln.

Insert offset lug 11 of pedal switch holder 10 into bracket 12, open camlock 13 by turning it counterclockwise, swing hinged flap 14 to the front, secure holder 10 with two pan head screws, return flap 14 and lock it by means of camlock 13.

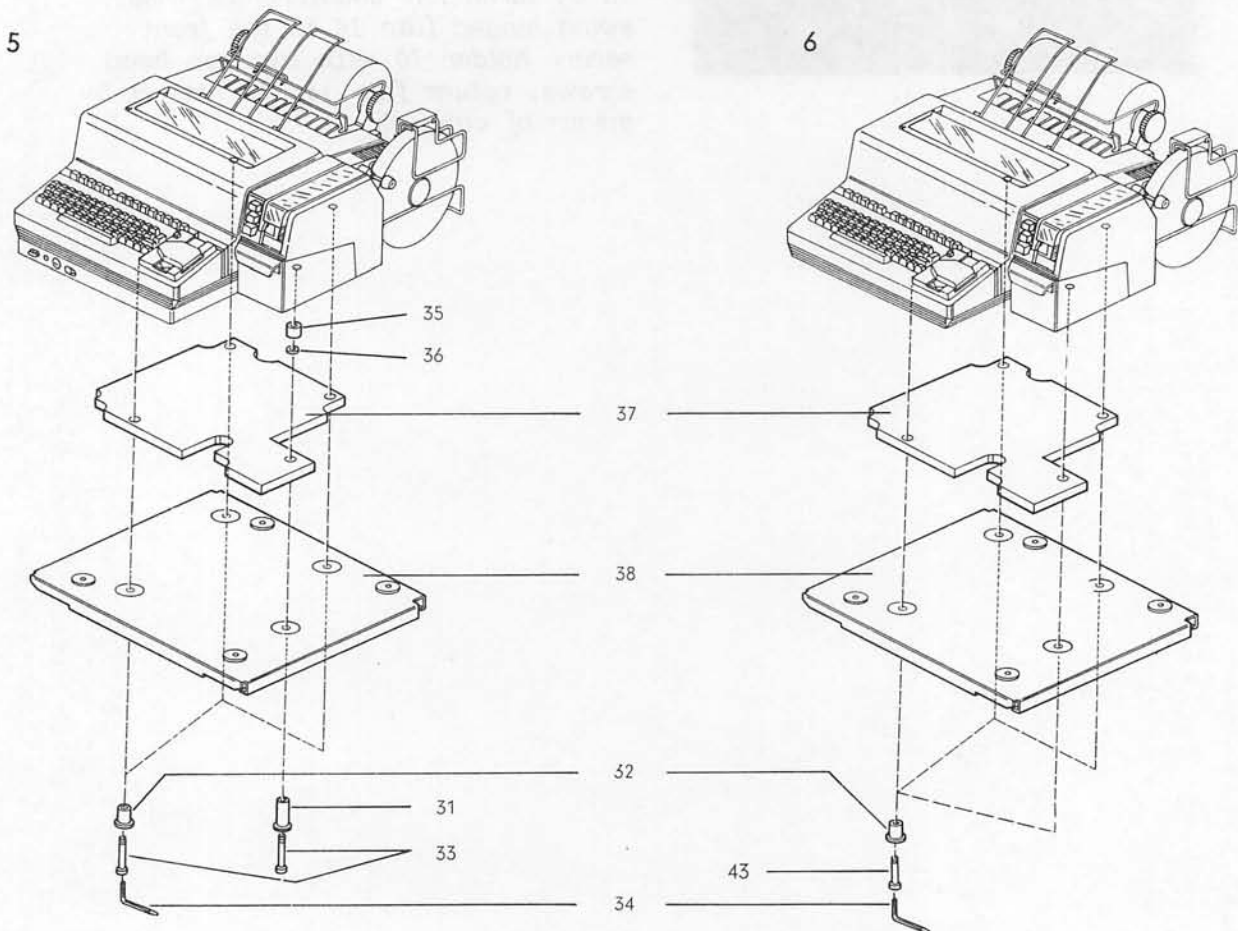
4 BEFESTIGUNG DES FERNSCHREIBERS AUF EINSCHUB MOUNTING THE TELEPRINTER ON THE SUPPORTING PLATE

Zum Schutz gegen Stoß- und Schüttelbeanspruchung, sowie zur Befestigung auf Tischen kann der Fernschreiber auf einem Einschub befestigt werden. Der Einschub wird ebenfalls benötigt, wenn der Fernschreiber für den mobilen Einsatz im Transportgehäuse vorgesehen ist.

Die Montage des Fernschreibers auf dem Einschub ist nach Bild 5 (T1000 CA) bzw. Bild 6 (T1000/T1000 mil) durchzuführen.

To protect it against shock and vibration or for securing it to tables, the teleprinter may be mounted on a supporting plate. This supporting plate is also required if the teleprinter is intended for mobile use in transport cases.

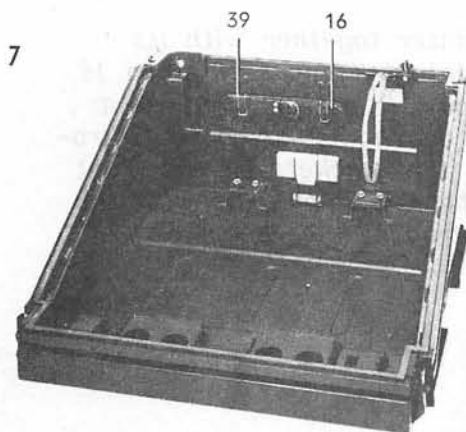
The teleprinter should be mounted on the supporting plate in the manner shown in Figs. 5 and 6.



5 VORBEREITUNG ZUM EINSETZEN DES FERNSCHREIBERS INS TRANSPORTGEHÄUSE
 PREPARATIONS FOR INSERTING THE TELEPRINTER IN THE TRANSPORT CASE

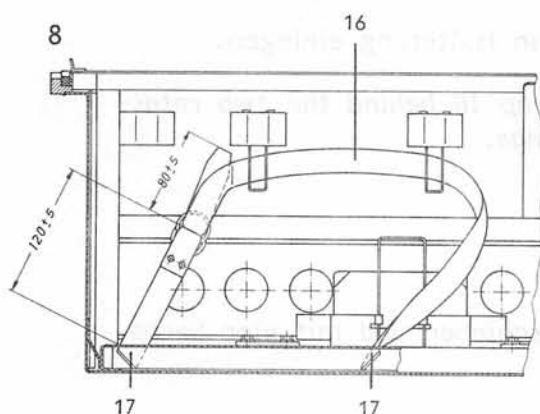
Zur besseren Handhabung des Einschubes im Transportgehäuse ist ein Gurt anzubringen.

A strap must be attached to facilitate positioning of the supporting plate within the transport case.



Gurt 16 aus dem Transportgehäuse nehmen.

Remove strap 16 from the transport case.

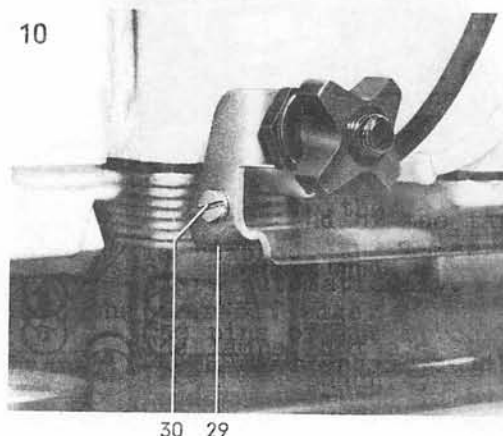
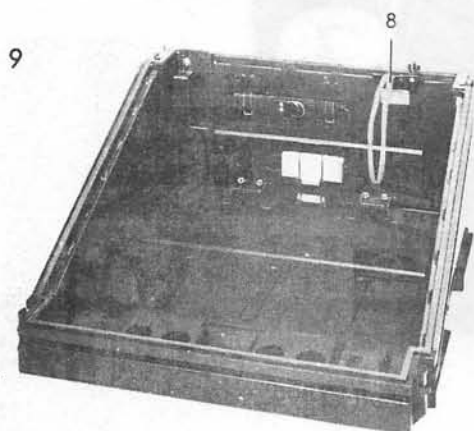


Gurt 16 in die Schlitz des Einschiebs 17 einziehen und Schnalle schließen, dabei die angegebenen Maße beachten.

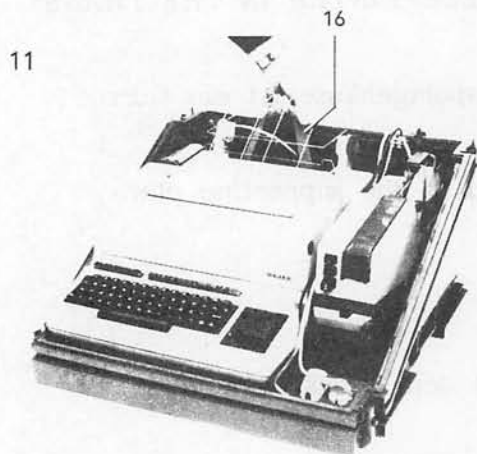
Insert strap 16 through the slots in supporting plate 17 and tighten it by means of the friction buckle (2 metal rings). Observe indicated dimensions.

Masseband 8 abnehmen und mit einem Ende am Erdungswinkel 29 des Fernschreibers mit Schraube 30 befestigen.

Remove bonding strip 8 and attach it with one end to grounding bracket 29 of the teleprinter, using screw 30.

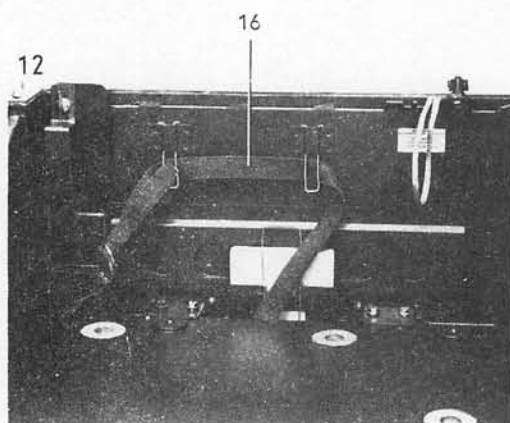


6 EINSETZEN DES FERNSCHREIBERS IN DAS TRANSPORTGEHÄUSE INSTALLING THE TELEPRINTER IN THE TRANSPORT CASE



Fernschreiber mit Einschub am Gurt 16 und vorne rechts unterhalb der Tastatur anheben. Vorne in die Bügel des Unter- teils einführen und nach hinten absen- ken.

Raise teleprinter together with its supporting plate by means of strap 16 and by grasping it at the front right hand corner below the keyboard. Intro- duce it into the brackets on the front end of the base and lower it with the aid of the strap at the rear.

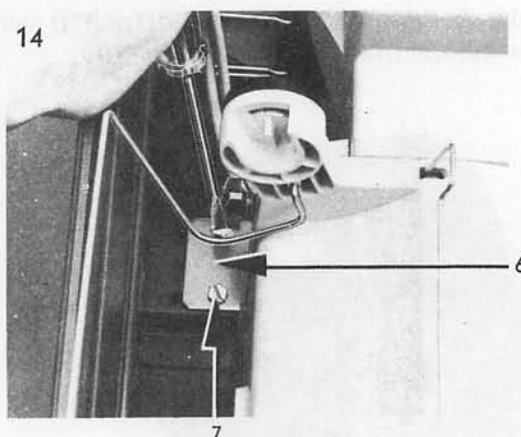
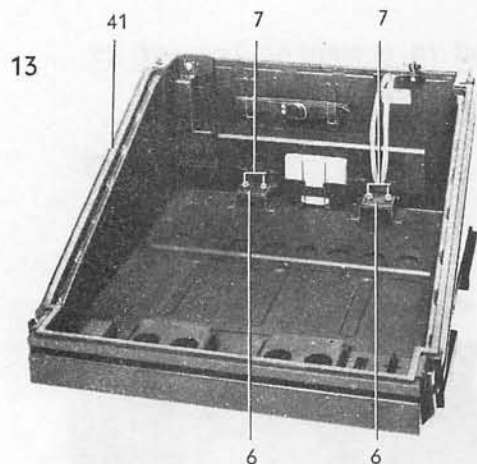


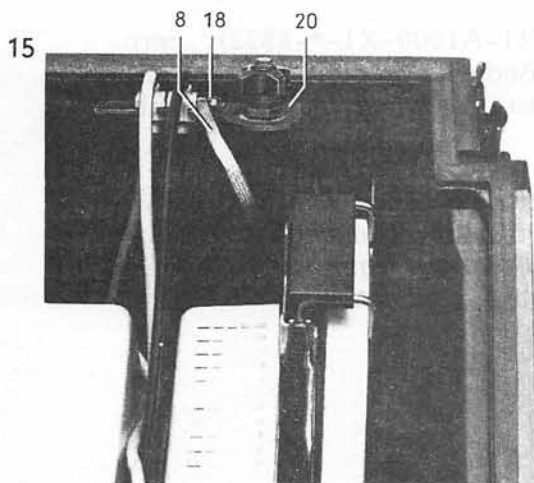
Gurt 16 in Halterung einlegen.

Insert strap 16 behind the two retain- ing springs.

Zwei Befestigungsplatten 6 über den Einschub schieben und mit vier Sechs- kantschrauben 7 sichern.

Slide the two hold-down plates 6 over the supporting plate and tie them down, using the four pan head screws 7.



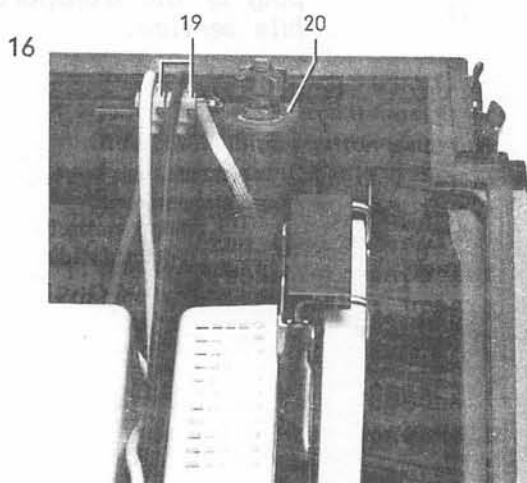


Freies Ende des Erdungsbandes 8 mit Erdungsschraube 18 am Winkel 20 des Transportgehäuses befestigen.

Attach free end of grounding strip 8 to bracket 20 of the transport case, using grounding screw 18.

Zwei Kabeltüllen 19 der Halterung 20 entnehmen. Die geschlitzte Seite der Tüllen auseinanderziehen und im Abstand von 150 mm von der Maschineneinführung über die Anschlußleitungen schieben. Tüllen mit Leitungen in die Halterung 20 einsetzen.

Remove the two grommets 19 from holding bracket 20. Expand the grommets at their slot and push them over the connecting lines at a distance of 150 mm from the cable entry point. Insert the grommets together with the lines in holding bracket 20.



7 VORBEREITUNG ZUR INBETRIEBNAHME DES FERNSCHREIBERS
PREPARATIONS FOR PLACING THE TELEPRINTER IN SERVICE

Drucker entriegeln (siehe Aufstellanleitung A22711-A1000-X1-*-8832), Fernschreiber- und Lochstreifenpapier entsprechend Bedienungsanleitung für Fernschreiber einlegen. Papierableitbügel 21 verrasten. Netz- und Fernschreibleitung aus Halterung nehmen und anschließen.

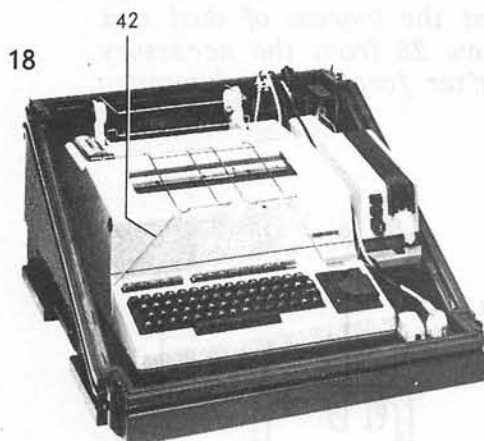
Unlatch printer unit (see installation instructions A22711-A1000-X1--8832), insert page copy paper and paper tape for punch in accordance with the applicable Operating Instructions. Lock paper deflecting frame 21. Remove power and telegraph lines from holding bracket and connect.*



An den Seiten des Transportgehäusedeckels sind Befestigungsholme 23 angebracht. In der Gebrauchslage können diese Holme mit Hilfe von Klemmstücken auf der Unterlage befestigt werden, um im mobilen Einsatz ein Verschieben des Transportgehäuses zu verhindern.

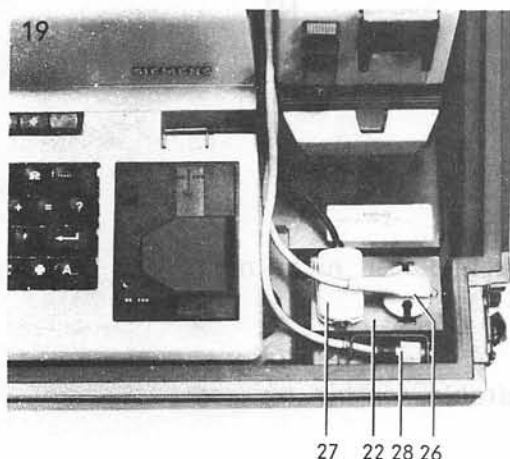
Mounting rails 23 are provided on either side of the transport case. With the machine in the desired working position, these rails can be tied down with the aid of clamping lugs on the mounting surface so as to prevent slipping of the transport case during mobile service.

8 VORBEREITUNG FÜR TRANSPORT PREPARATIONS FOR TRANSPORT



Rolle Fernschreiberpapier aus Fernschreiber entfernen. Papierableitbügel entrasten, nach vorne schwenken und mit Gummiring 42 über die Unterseite der Tastatur festlegen. Drucker im Fernschreiber nach Aufstellanleitung A22711-A1000-X1-*-8832 verriegeln.

Remove paper roll from teleprinter. Unlatch paper deflecting frame, swing it to the front and secure it by means of rubber ring 42 whose lower end is slung around the keyboard. Lock printing unit as described in Installation Instructions A22711-A1000-X1--8832.*

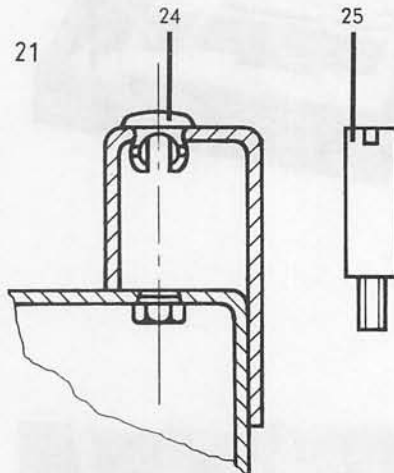
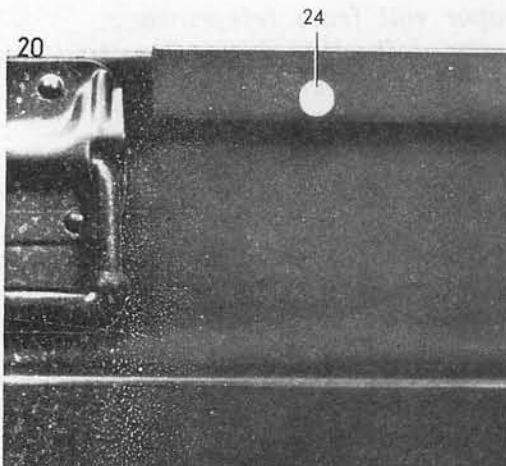


Anschlußleitungen des Fernschreibers (und des Fußtasters nur bei Fernschreiber 1000 CA) zwischen Empfangslocher und Fernschreiber einlegen. Netzstecker 26, Fernschreibstecker 27 und Anschlußstecker 28 des Fußtasters in Halter 22 stecken.

Place the connecting lines of the teleprinter (and of the pedal switch only in Teleprinter 1000 CA) in the free space between tape punch and teleprinter. Insert power plug 26, telegraph plug 27 and the plug 28 of the pedal switch in plug retaining bracket 22.

Für den Druckausgleich im geschlossenen Transportgehäuse während eines Lufttransports in größerer Höhe dient eine Gewindebohrung in der linken Seitenwand des Deckels. Sie kann jedoch gegen Staub- und Spritzwassereinflüsse verschlossen werden. Hierzu ist die Zylinderschraube 25 der Zubehörbox zu entnehmen und nach Entfernung des Verschlusstückes 24 von außen in den Deckel einzuschrauben.*)

For equalization of pressure in the closed transport case during air transport at high altitudes a tapped hole has been provided in the left hand wall of the cover. If required, this hole may be sealed against the ingress of dust and splash water. For this purpose remove sealing screw 25 from the accessory box and turn it from the outside into the cover after forcing out dummy plug 24.)*



***) Achtung!**

In diesem Zustand ist das geschlossene Transportgehäuse nicht mehr für den Lufttransport in großer Höhe geeignet.

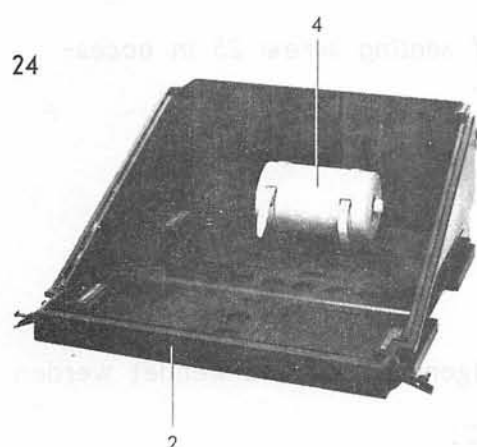
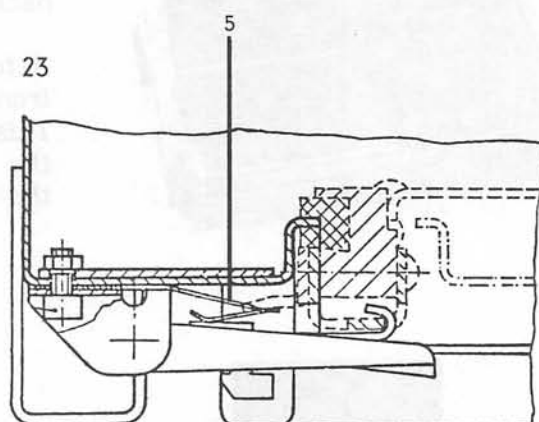
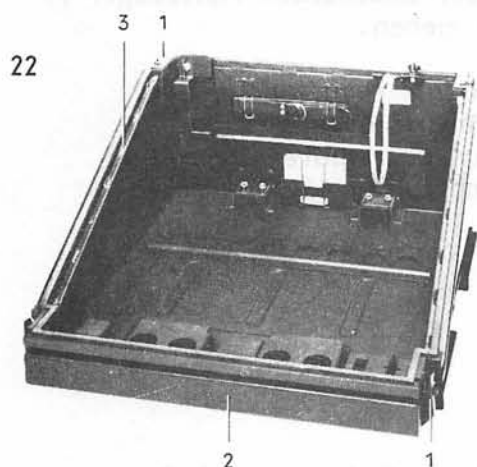
***) Note**

The closed transport case is now no longer suitable for air transport at high altitudes.

9 VERSCHLIESSEN DES TRANSPORTGEHÄUSES CLOSING THE TRANSPORT CASE

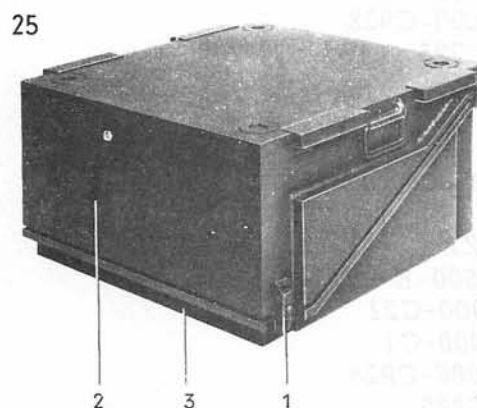
Vier Spannverschlüsse 1 öffnen. Unterteil 3 mit Fernschreiber vom Deckel 2 abheben.

Open the four snap-action catches 1. Lift base 3 together with the teleprinter straight up and away from cover 2.



Fernschreiberpapier 4 im Deckel 2 befestigen.

Attach paper roll 4 to cover 2.

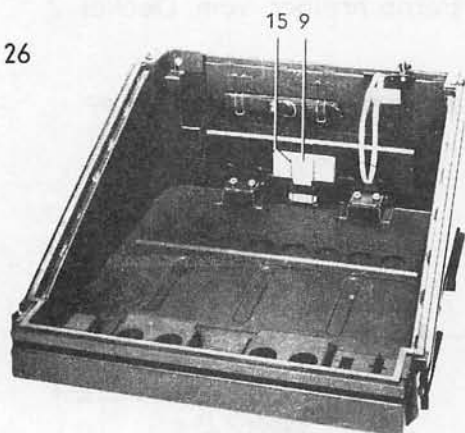


Deckel 2 von oben auf Unterteil 3 setzen. Vier Spannverschlüsse 1 schließen.

Place cover 2 onto base 3 and close the four snap-action catches 1.

10 BESTÜCKUNG DER ZUBEHÖRBOX
TOOLS AND SPARES FOR ACCESSORY BOX

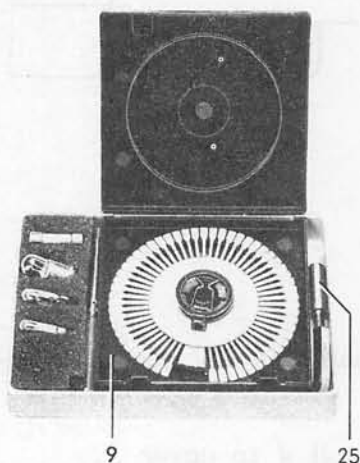
26



An der Rückwand des Transportgehäuses ist eine Zubehörbox 9 für Zubehör- und Bevorratungsteile untergebracht. Zur Entnahme der Zubehörbox Haltebügel 15 nach vorne ziehen.

Attached to the rear wall of the transport case is accessory box 9. This box can be removed by pulling the retaining spring 15 forward to the front.

27



Die Zubehörbox 9 dient zur Aufnahme der Zylinderschraube 25.

Location of sealing screw 25 in accessory box 9.

Die Zubehörbox kann außerdem zur Aufnahme folgender Teile verwendet werden

1 St Winkelschraubendreher	D911-A60-Z1
1 St Schmelzeinsatz	D41571-M2500-E
1 St Glühlampe	C22230-Z1000-C21
2 St Fernmeldelampe	C22230-Z1000-C1
1 St Schraube	C22165-A1000-C928
1 St Lampenzieher	V22199-Z-C225
1 St Typenscheibe komplett	S22711-J1-J...

The following parts may be accommodated in the accessory box:

1 ea offset screwdriver	D911-A60-Z1
1 ea fuse	D41571-M2500-E
1 ea incandescent lamp	C22230-Z1000-C21
2 ea telephone lamp	C22230-Z1000-C1
1 ea sealing screw	C22165-A1000-C928
1 ea lamp puller	V22199-Z-C225
1 ea printwheel, compl.	S22711-J1-J...

11 ERSATZTEILE
SPARES

Benennung	Bestellnummer
Transportgehäuse	S22713-T401
Einschub für T1000 mil	S22713-T402
Einschub für T1000 CA	S22713-T403
Halterung für Fußtaster für T1000 CA	S22713-T404
Nomenclature	Order No.
Transport case	S22713-T401
Supporting plate for T1000 mil	S22713-T402
Supporting plate for T1000 CA	S22713-T403
Holding bracket for pedal switch for T1000 CA	S22713-T404

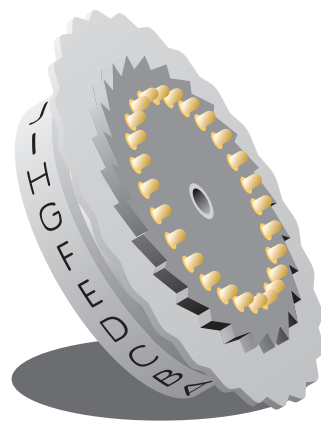
11.1 VERZEICHNIS DER ERSATZTEILE FÜR TRANSPORTGEHÄUSE
LIST OF SPARES FOR TRANSPORT CASE

Pos	Benennung	Bestellnummer	Bild
1	Spannverschluß	C22123-Z1000-C801	1
5	Winkel	C22165-A1000-C924	23
8	Masseband	C22195-A1000-B805	9
9	Box für Zubehör	C22165-A1000-B827	27
15	Bügel für Boxhalter	C22165-A1000-C918	26
16	Gurt für Einschub	C22165-A1000-C844	7
19	Tülle für Netz- und Fs-Leitung	C22165-A1000-C905	16
22	Halterung für Anschlußstecker	C22165-A1000-C912	19
24	Verschlußstück	C22165-A17-C231	20
25	Schraube für Dichtung Transportgehäuse	C22165-A1000-C928	21
39	Bügel für Gurthalter	C22165-A1000-C903	7
40	Gurt für Papierrolle	C22165-A1000-C846	2
41	Dichtung für Transportgehäuse	C22165-A1000-C909	13
42	Gummiring	C22365-A1000-C6	18
Item	Nomenclature	Order No.	Fig.No
1	Snap-action catch	C22123-Z1000-C801	1
5	Leaf spring	C22165-A1000-C924	23
8	Bonding strip	C22195-A1000-B805	9
9	Accessory box	C22165-A1000-B827	27
15	Box retaining spring	C22165-A1000-C918	26
16	Strap for supporting plate	C22165-A1000-C844	7
19	Grommet for power line and telegraph line	C22165-A1000-C905	16
22	Plug retaining bracket	C22165-A1000-C912	22
24	Dummy plug	C22165-A17-C231	20
25	Sealing screw	C22165-A1000-C928	21
40	Paper roll belt	C22165-A1000-C846	2
41	Sealing strip	C22165-A1000-C909	13
42	Rubber ring	C22365-A1000-C6	18

11.2 VERZEICHNIS DER EINZELTEILE FÜR EINSCHUB LIST OF SUPPORTING PLATE COMPONENTS

Pos	Benennung	Bestellnummer	Bild
31	Buchse (für Einschub CA)	C22156-A1000-C851	5
32	Buchse	C22156-A1000-C850	5;6
33	Zylinderschraube mit Innensechskant	D912-S600-G3	5
34	Winkelschraubendreher	D911-A60-Z1	5;6
35	Abstandsrohr (für Einschub CA)	C22156-A1000-C852	5
36	Scheibe (für Einschub CA)	D125-A210-S3	5
37	Platte (Schaumstoff)	C22156-A1000-C847	5;6
38	Befestigungsplatte	C22156-A1000-B814	5;6
43	Zylinderschraube mit Innensechskant	D912-S400-G3	6

Item	Nomenclature	Order no.	Fig.No
31	Bushing (for supporting plate CA)	C22156-A1000-C851	5
32	Bushing	C22156-A1000-C850	5;6
33	Hexagon socket head screw	D912-S600-G3	5
34	Offset srewdriver	D911-A60-Z1	5;6
35	Spacer (for supporting plate CA)	C22156-A1000-C852	5
36	Washer (for supporting plate CA)	D125-A210-S3	5
37	Foam rubber board	C22156-A1000-C847	5;6
38	Supporting plate	C22156-A1000-B814	5;6
43	Hexagon socket head srew	D912-S400-G3	6



KL/TGA-5841 AROFLEX Teleprinter Model 1000 mil DEEL 3

Teleprinter Model 1000 mil

Servicing Instructions

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1 General

Troubleshooting on the teleprinter in the field is performed by replacing the defective module, which is traced with the aid of the fault tracing flowchart (section 4).

Easily recognizable reasons for faults which do not make it necessary to replace a module are not shown in the fault tracing flowchart. These include a worn ink ribbon, a damaged or worn print wheel, a blown fuse and a burnt-out lamp, which should be replaced as is described in section 8, and a clogged paper tape channel in the tape punch, which should be cleaned out as is described in section 10.

The procedures for replacing the modules are described in the "Replacement Instructions".

Technicians concerned with troubleshooting in the field should be familiar with the following manuals:

Replacement Instructions
Operating Instructions
Description - General Section

If the teleprinter is fitted with a matching unit APE or signaling unit FSE which is not suppressed, troubleshooting is performed as per the Servicing Instructions for teleprinter model 1000.

DESIGNATION OF MODULES

All modules are assigned with designations which must be observed when replacing modules.

Equipment list item number (GÜ item) or Item code number	e.g. 91415 e.g. S22713-J102	}	has to tally with number on replaced module
Revision level or Equipment revision level	e.g. A1 e.g. GS1		

HANDLING MODULES INCORPORATING MOS DEVICES

Modules incorporating MOS devices are identified by a red label. ⚠ Potential differences at the pins of the plug connectors (due to electrical charging) can lead to destruction of the components. The usual precautions must be taken when handling MOS devices.

Therefore, before working on the modules the technician should ensure that he is electrostatically discharged. The easiest way to do this is to touch a metal part of the teleprinter.

For transportation, the modules must be wrapped in conductive foil or conductive foam rubber. If the original packing of the modules or the service case for the teleprinter is used, this safeguarding with protective material is already provided.

TEST AIDS (section 5)

The diagnostic unit (see section 5.1) is used to check the operating voltages and important control signals.

The test unit PRE (see section 5.2) is used to check the machine-side functions independently of the line interfacing equipment. In this way, fault localization is simplified.

NOTES

After elimination of the fault, a final test must be performed (see section 6).

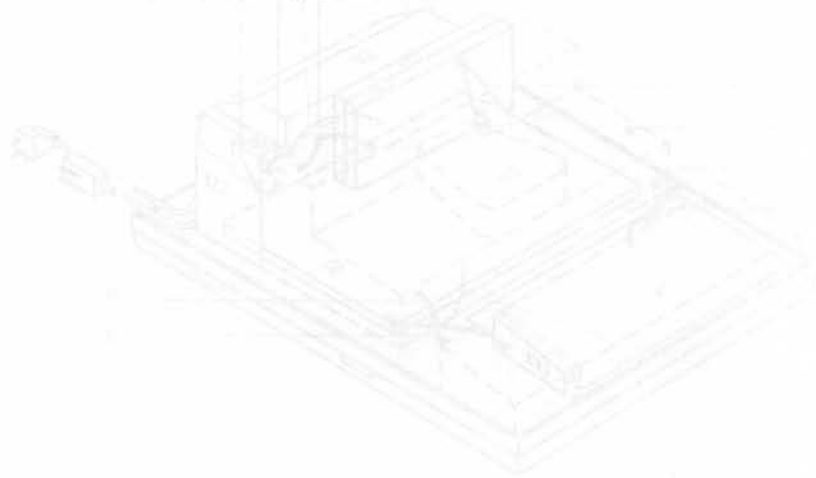
The tables (see section 7), which show the effects of the operating modes on the various modules, provide additional information for checking the proper reaction of the individual modules to the various operating states.

Section 8 contains a description of the replacement of individual parts such as lamps, device fuses and connecting cables.

The instructions for placing the teleprinter in service (see section 9) provide information on switch module settings, adjustments for the various paper widths, changeover to a different power voltage, programming the answerback module and setting the line interfacing equipment.

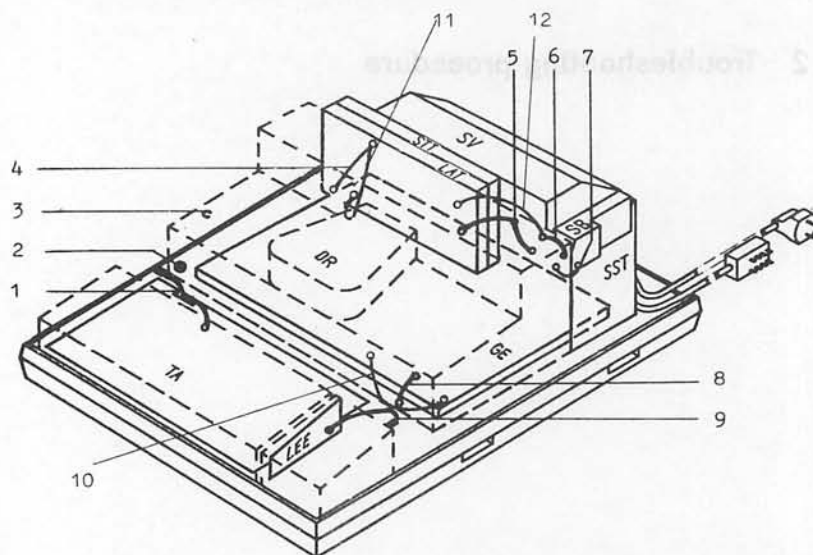
Section 10 contains instructions for servicing and maintenance such as cleaning the inside and outside of the printer and replacing expendables.

2 Troubleshooting procedure



1. Check the power supply to the pump.
2. Check the pump motor winding resistance.
3. Check the pump motor winding insulation resistance.
4. Check the pump motor winding temperature.
5. Check the pump motor winding vibration.
6. Check the pump motor winding noise.
7. Check the pump motor winding smell.
8. Check the pump motor winding color.
9. Check the pump motor winding texture.
10. Check the pump motor winding taste.
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95. Check the pump motor winding touch.
96. Check the pump motor winding sight.
97. Check the pump motor winding smell.
98. Check the pump motor winding taste.
99. Check the pump motor winding touch.
100. Check the pump motor winding sight.

- 1 REPRODUCE FAULT
Use the fault tracing flowchart (section 4) to trace the fault to certain suspected modules (normally two).
- 2 REPLACE THE SUSPECTED MODULES
Replace the modules in the order recommended until the fault has been eliminated.
See also the "Replacement Instructions".
- 3 RETURN MODULE(S) REMOVED UNNECESSARILY
- 4 CHECK CHASSIS GROUND CONNECTIONS

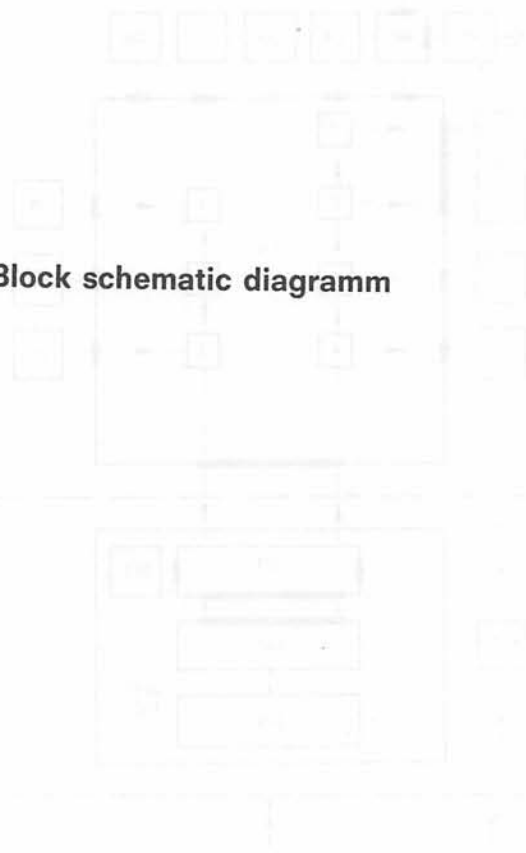


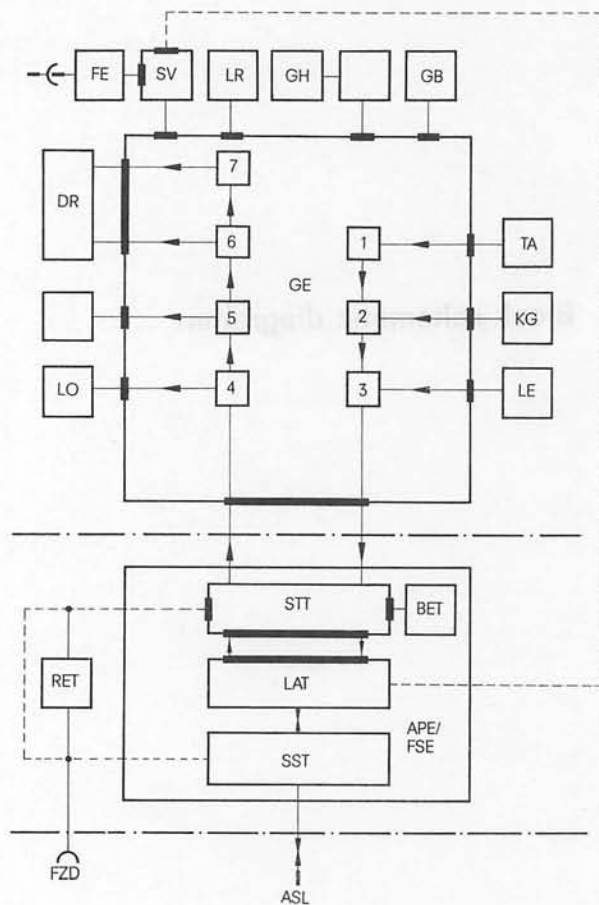
Chassis ground connections in the teleprinter

- | | | |
|----|---|----------------|
| 1 | Base tray - keyboard frame - keyboard board | (1 connector) |
| 2 | Printer vibration damper bypassed
(4 x, not visible) | (permanent) |
| 3 | Cable section - printer frame (2 x) | (permanent) |
| 4 | Base tray GE | (1 connector) |
| 5 | Base tray - GE - ac power network filter | (2 connectors) |
| 6 | DR - Power supply bracket (-B7 or -B15) | (1 connector) |
| 7 | SB - Power supply bracket (-B7 or -B15) | (1 connector) |
| 8 | Printer frame - DRE | (1 connector) |
| 9 | Base tray - LEE | (1 connector) |
| 10 | Printing mechanism trailing cable - printer
frame | (1 connector) |
| 11 | STT - Base tray | (1 connector) |
| 12 | LAT 41 - Power supply bracket (-B7 or -B15) | (1 connector) |
-
- 5 FINAL TEST
The final test (see section 6) ensures that the fault has been eliminated and the teleprinter is ready for operation.
 - 6 CLEAN THE TELEPRINTER
Clean the teleprinter if necessary and

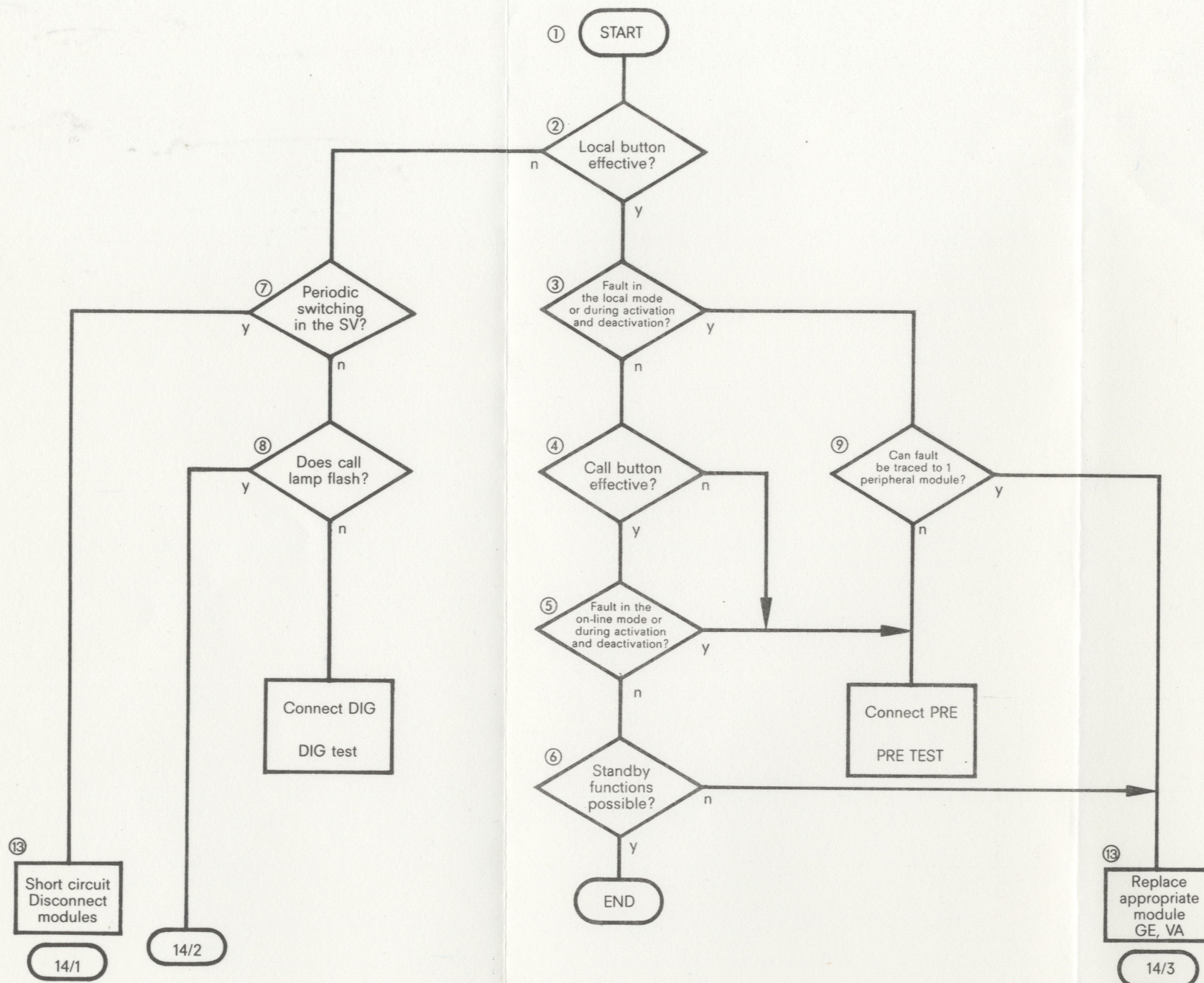
REPLACE EXPENDABLES
See section 10 "Servicing".

3 Block schematic diagram





DR	Printer	FSE	Signalling unit
FE	RF suppressor	APE	Matching unit
GB	Manual device controls	ASL	Connecting cable
GE	Basic electronics	BET	Manual communications controls
GH	Cover	FZD	Special signal socket
KG	Answerback module	LAT	Line adapter
LE	Tape reader	NEL	Power cable
LO	Tape punch	RET	Relay module
LR	Loudspeaker	SST	Protector
SB	Switch module	STT	Control module
SV	Power supply module		
TA	Keyboard	1...7	MOS devices
VA	Special-function module	S2	Interface



4 Fault tracing flowchart

4.1 GENERAL INFORMATION ON THE FAULT TRACING FLOWCHART

In the fault tracing flowchart the suspected modules are specified in the order of their fault probability.

Modules may not be disconnected or connected when they are under power. Pull the power plug.

The local mode has priority for fault tracing. Faults which rarely occur are listed as special cases on separate enclosed sheets, which may be extended as required.

NOTE: If the teleprinter is connected to an external signaling unit, the local and on-line modes should be activated and deactivated at this unit. The effect on the teleprinter is dependent on the line interfacing equipment. There may be differences from the information given, e.g. lamp in "local" button on teleprinter does not light when the local mode is activated.

4.2 NOTES ON THE FAULT TRACING FLOWCHART

It is assumed that the teleprinter is fully equipped, with LE, LO and DR.

Unless otherwise specified, proceed in corresponding manner for other configurations of the teleprinter.

- ① Assumption: teleprinter is ready to operate, i.e.
 - printer paper and paper tape loaded
 - top cover and tape gate closed
 - ASL and NEL plugged in
 - "printer ON/OFF" button not pressed (lamp off)
 - "power ON" lamp lit
(if provided; with external signaling unit only lights with operating mode activated)
- ② Before pressing the "local" button, move the printer carriage to the center-of-line position and turn the print wheel out of its visibility position so that the carriage return and print wheel synchronization can be observed.

Yes = at least one response when "local" button is ☐ pressed
(for normal response see below)

No = no response on pressing "local" button ☐
- ③ Operate the keyboard TA, answerback module KG and tape reader LE in the order specified and at the same time check the printer DR and tape punch LO in an attempt to reproduce the fault in the local mode.

The data flow is shown in the block schematic diagram (section 3). Proceed analogously if the teleprinter has no tape punch and no tape reader.

Yes = fault occurs in local mode or on activation/deactivation

No = fault does not occur in local mode or on activation/deactivation

Usual visible responses when the local mode is activated:

- | | | |
|---|---|--|
| - 1 x carriage feed performed | } | transition phase
"activation" |
| - 1 x line feed performed | | |
| - print wheel turns to visibility position | | |
| - ink ribbon vertical drive switches to visibility position | | |
| - cover lighting switched on | } | remains throughout
the operating
condition |
| - fan in operation | | |
| - lamp in "local" button <input type="checkbox"/> lights | | |

Usual visible responses when the local mode is deactivated:

- ink ribbon vertical drive switched to red print position
- cover lighting switched off
- lamp in "local" button ☐ switched off
- no reaction from carriage, platen and print wheel
- fan switched off

The fault is traced by actuating specific manual controls on the teleprinter, e.g.:

When the "local" button ☐ is pressed, no carriage return is performed. By pressing the "carriage return" key ☐, it can be ascertained whether this fault also occurs in the operating condition.

If the fault does not then occur, the basic electronics GE is defective.

④ Usual visible responses when the on-line mode is activated:

- | | | |
|--|---|--|
| - 1 x carriage return performed | } | transition phase
"activation" |
| - 1 x line feed performed | | |
| - print wheel turns to visibility position | | |
| - ink ribbon vertical drive switches to visibility position | | |
| - cover lighting switched on | } | remains throughout
the operating
condition |
| - fan is working | | |
| - lamp in "call" button <input type="checkbox"/> or
"disconnect" button <input type="checkbox"/> lights | | |

Yes = at least one response when "call" button ☐ or key A... on the keyboard is pressed

No = no response when "call" button is ☐ pressed

- ⑤ After setting up a connection an attempt is made to reproduce the fault in the on-line mode.

Yes = fault occurs in on-line mode, e.g.

- when setting up a connection
- when clearing down a connection
- fault in operating condition that is only recognizable in on-line mode such as no black copy produced by printer when receiving

No = fault does not occur in on-line mode or on activation/deactivation

- ⑥ Standby state functions:

- top cover open lamp in "call" button ☐ flashes slowly
- press "paper feed" button ☐ printer paper feed

With tape punch provided:

- close tape gate tape lead-in, Ltrs is punched
- press "tape feed" button ☐ tape feed, Ltrs is punched

Yes = standby state functions are performed correctly, teleprinter is not defective

No = standby state functions are not performed or are faulty

- ⑦ Periodic switching in the power supply (relay operates and drops out) indicates a secondary-side short

Yes = switching in the power supply

No = no response yet of the teleprinter

- ⑧ Slow flashing of the lamp in the "call" button ☐ indicates that the teleprinter is not ready for operation, i.e.:

- printer paper not inserted
- paper tape not loaded
- This condition is only signaled if the tape punch is switched on via the "data record ON" switch. ☐
- ASL not plugged in
- top cover open

Activation of the two operating modes is prevented.
(dependent on line interfacing equipment)

Yes = lamp in "call" button ☐ flashes slowly although the teleprinter is clearly "ready to operate" (reason for the fault: e.g. defective end-of-paper contact)

No = no response yet of the teleprinter

⑨ "Peripheral modules" in which faults can be observed are:

keyboard TA, answerback module KG, tape reader LE, manual device controls GB, manual communications controls BET, switch module SB, printer DR, tape punch LO, loudspeaker LR, power supply SV (fan)

The fault does not have to lie in the peripheral module, however, in which it is observed, but is just as likely to lie in the "electronic modules" basic electronics GE or control module STT, or even in the power supply SV or special-function module VA (see also block schematic diagram, section 3).

Printer eliminated by pressing the printer ON/OFF button

Y = fault can be isolated to one peripheral module, i.e. the fault occurs only when this particular module operates.

N = fault cannot be isolated to one peripheral module. Consequently, the fault can only be located in an electronic module.

⑩ If the teleprinter is connected to an external signaling unit, it must be switched on via this unit (local mode), or the teleprinter is switched on by connection of the power voltage.

⑪ With the local mode activated, the red/black changeover can be tested with switch ☐I>.

With key ☐ the audible alarm can be tripped.

⑫ With the on-line mode activated, duplex operation can be switched on with switch ☐Dx (black print).

With switch ☐I> the call forward mode can be checked. The call pulses are tripped with key ☐.

⑬ These are the modules which are usually suspected of being defective.

Exchange the modules one by one in the order given (not under power) until the fault is eliminated. The fault must lie in the last module removed.

Modules may not be disconnected or connected when they are under power. Pull the power plug.

The module that has replaced the defective module is left in the teleprinter, the modules that are not defective are returned to their places.

In rare cases faults can lie in other modules. Relevant information is given in points ⑭/1 to ⑭/6.

Note: Before installing the replacement modules printer DR or tape punch LO, connect the diagnostic unit.
Lamp DR/LO must light up. If not, first replace the basic electronics GE.

⑭ Notes relating to the special sheets (see ⑭/1 to ⑭/6); they contain:

- supplementary information on the corresponding (fault) branch of the flow chart
- fault examples classified as special cases, in which the fault may also/only lie in modules other than those listed in ⑬.

⑭/1 Tracing a short circuit in a module

The power supply SV is protected against sustained short circuits. If a short circuit occurs, the power supply switches off. After around 4 seconds, the power supply tries to switch on again (this is audible). If the short circuit is still present, the power supply is immediately switched off again. This cycle continues as long as the short circuit is present.

To trace the short circuit, plug in the diagnostic unit (possible under power with this unit). First press the "printer ON/OFF" button to determine if the short circuit is in the printer. Then disconnect the modules connected to the basic electronics GE in turn until voltage is again indicated.

Modules may not be disconnected or connected when they are under power. Pull the power plug.

⑭/2 Fault pattern: lamp in the "call" button flashes slowly although the teleprinter is "ready to operate"

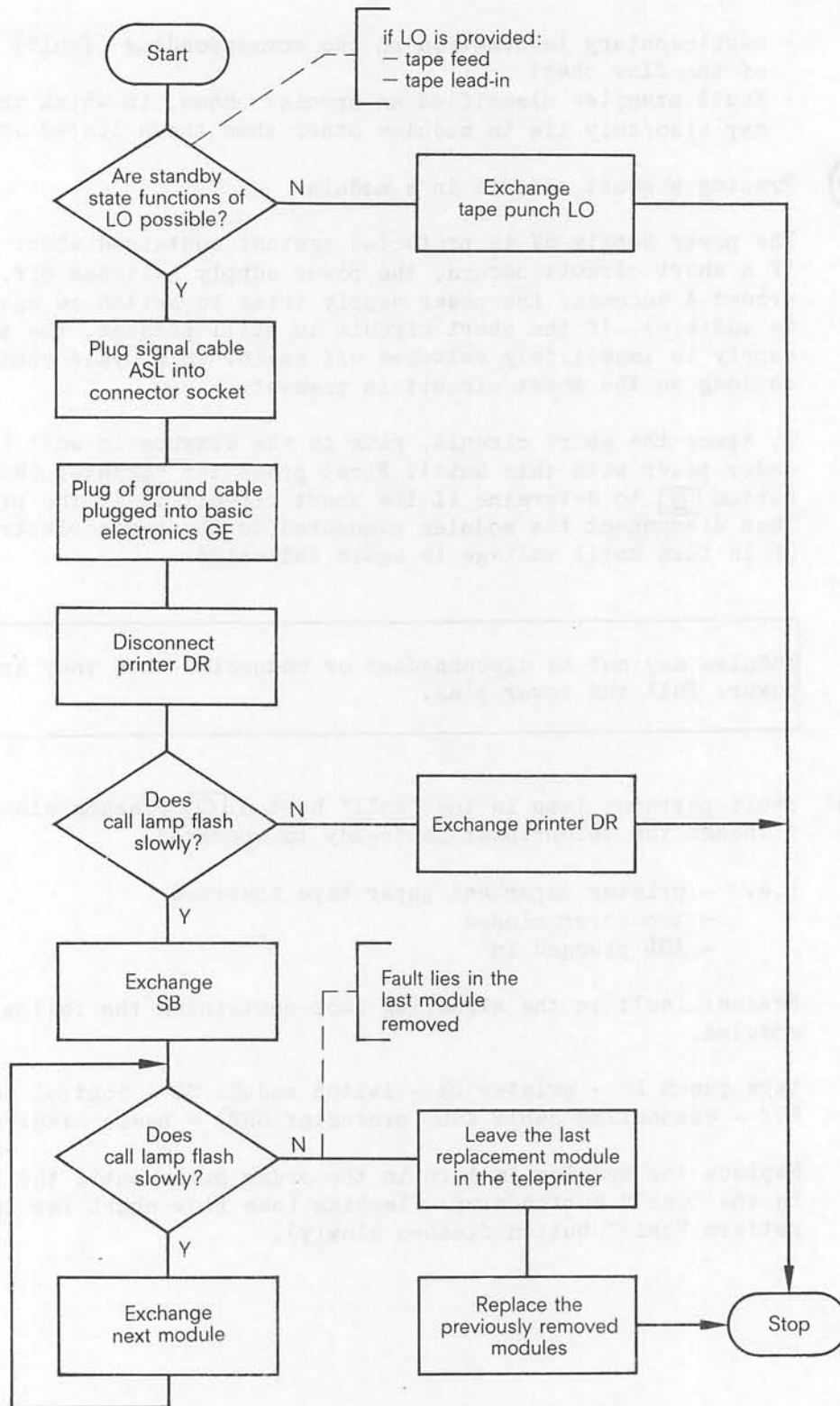
- i.e.
- printer paper and paper tape inserted
 - top cover closed
 - ASL plugged in

Reason: fault in the signaling loop containing the following modules:

tape punch LO - printer DR - switch module SB - control module
STT - connecting cable ASL (protector SST) - basic electronics GE

Replace the modules in turn in the order given until the lamp in the "call" button stops flashing (see flow chart for the fault pattern "call" button flashes slowly).

Fault pattern: Lamp in call button flashes slowly



Modules may not be disconnected or connected when they are under power. Pull the power plug.

14/3

Fault can be traced to one "peripheral module"

Fault pattern		Suspected modules
LE	tape reader transmits discrete characters only, i.e. continuous transmission is impossible	STT, LAT, GE (current in send circuit too low)
DR	no reaction when "printer ON/OFF" button is pressed <u>Q</u>	DR, GB, GE
	one character is not printed	print wheel
	print is too faint	ribbon, DR, SB, GE
	print is in black in local mode instead of red	DR, STT, GE, VA
LR	loudspeaker emits continuous signal which cannot be silenced	STT, GE
SB	all positions of the line spacing switch are not effective	SB, DR, GE
GH	cover lighting is not switched on or flashes	SB, SV, GE, GH
LO	one or more tracks are not punched	LO, GE
KG	characters are falsified	KG, GE

14/4

Fault pattern: all voltages are not indicated on diagnostic unit:

Fault lies in the SV, cable to the GE or in the GE.
Replace SV or GE and determine if fault is eliminated.

14/5

Fault lies on the apparatus side. To rule out a fault in the power supply (one voltage failed), the diagnostic unit should also be plugged in at this stage

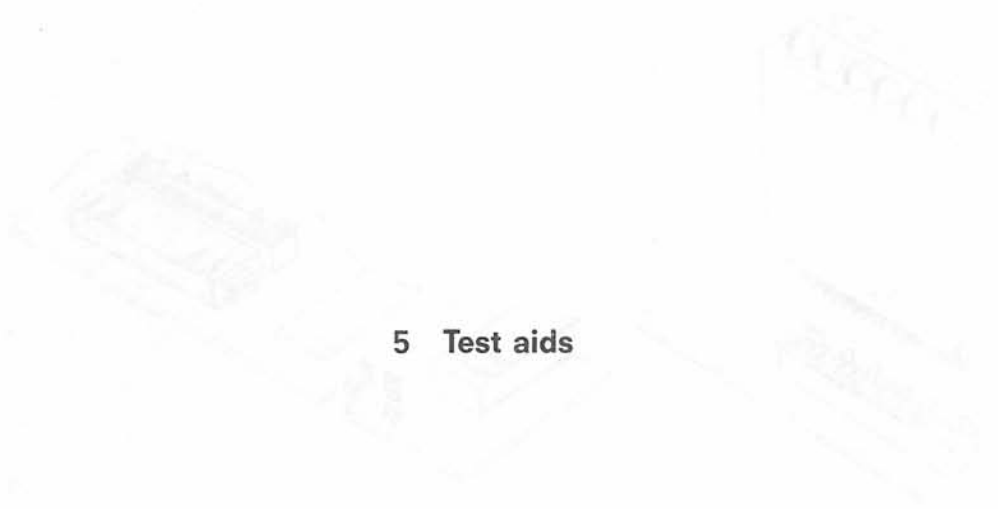
Fault pattern	Suspected modules
characters are falsified regularly (incorrect transmission speed!)	SB, GE
call forward mode is impossible	GE, VA
lighting and fan are not switched on	SV, GE

14/6

Fault lies on the line side

Fault pattern <u>before</u> connection of the PRE	Suspected modules
"local" button was ineffective	BET, STT
local mode was activated automatically	BET, STT
call forward mode was impossible	LAT, SST, STT (current in send and call circuits less than 40 mA)
teleprinter can only be switched on briefly and is then immediately switched off	GE (incorrect clock frequency)
tape reader transmits discrete characters only	LAT, SST (current in send circuit too low)
establishment of a connection was impossible (transmission of continuous start polarity)	LAT, SV (power supply for LAT failed)

The following information is for the user's reference only. It is not intended to be used as a substitute for the user manual. The user manual should be read carefully before using the device.



5 Test aids

The test aid is used to check the operation of the device. It is a small, rectangular device that is used to test the device. The test aid is used to check the operation of the device. It is a small, rectangular device that is used to test the device.

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6 Troubleshooting

The following information is for the user's reference only. It is not intended to be used as a substitute for the user manual. The user manual should be read carefully before using the device.

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5.1 DIAGNOSTIC UNIT

The control signals for the print hammer and the tape punch magnets and the operating voltages are indicated on the diagnostic unit. The signals for the tape punch magnets are combined in one display.

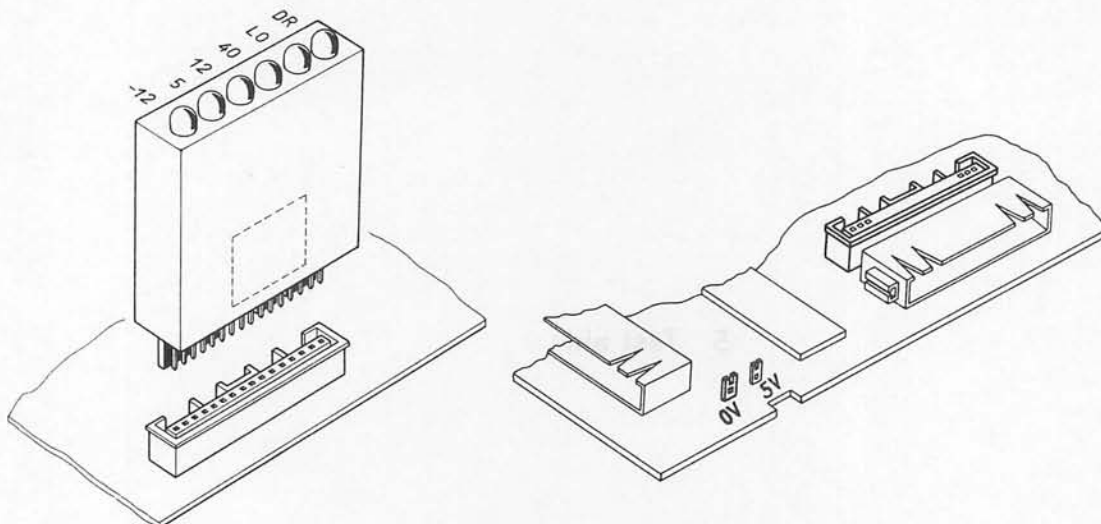


Fig. 1 Diagnostic unit Fig. 2 Diagnostic connector on the GE

The check must be performed before installation of DR or L0 replacement modules, as incorrect control signals from the basic electronics could cause damage to the new module.

The operating voltages should also be checked in problematical fault cases (e.g. with faults that only occur sporadically). Fault tracing may be simplified by checking the operating voltages before starting to replace modules.

CHECKING WITH THE DIAGNOSTIC UNIT

The diagnostic unit is plugged into the diagnostic connector on the GE (see Fig. 2). The device may be under power in this case. There is no fault present if all six LED indicators light uniformly in the idle state and the standby condition.

If a voltage exceeds the tolerance range of $\pm 10\%$, the 5 V LED indicator goes out.

In the printing condition, the indicators for L0 and DR flash when these modules are switched on and all the other indicators light uniformly.

If the indicators DR and L0 on the diagnostic unit do not light, first exchange the GE before installing a printer or tape punch replacement module.

5.2 TEST UNIT PRE

The test unit PRE is used for fault tracing on the apparatus- or line-oriented modules. By connecting the PRE to the interface S2 (connector X11) on the basic electronics GE in place of the control module (not under power), the modules STT, BET, LAT and SST are functionally isolated from the teleprinter. (If a crypto module is installed, it must also be disconnected - connector X15.)

If the fault cannot be reproduced with the PRE, the fault lies in the line-oriented modules. If the fault also occurs with the PRE, the fault lies on the apparatus side. (A monitoring loop is permanently wired on the PRE.)

Control and signal elements on the test unit PRE

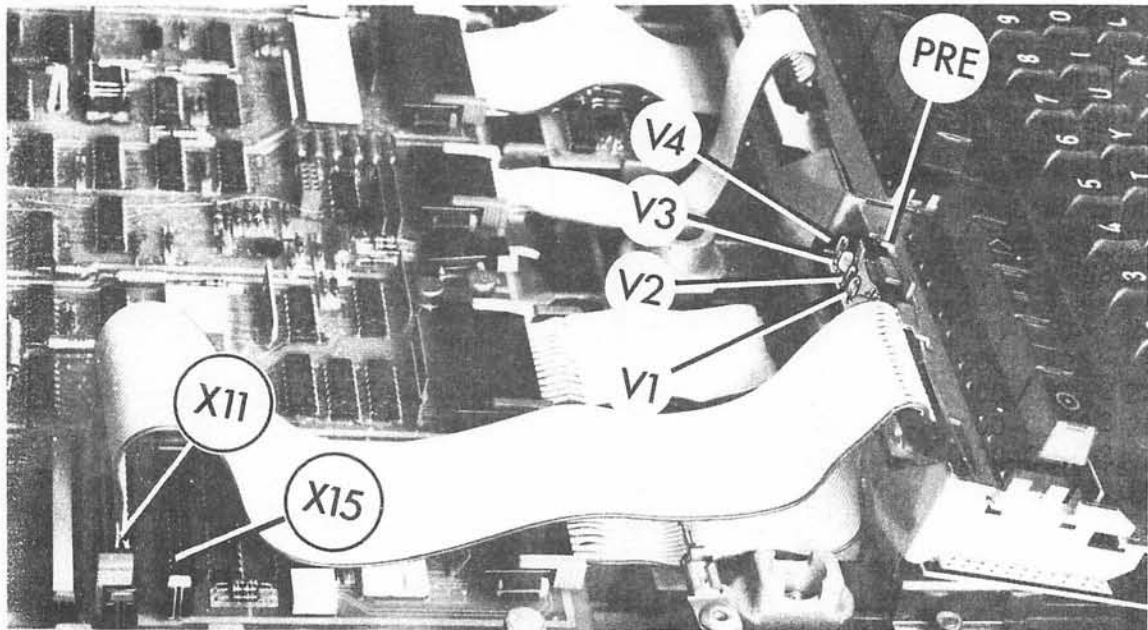


Fig. 3 Test unit PRE

- | | | |
|--------|-----------------------------|--|
| Switch | <input type="radio"/> | - activation of the on-line mode |
| Lamp | <input type="radio"/> | - lights when <input type="radio"/> is pressed and the GE signalizes "ready to operate" |
| Switch | <input type="checkbox"/> | - analogously as above |
| Lamp | <input type="checkbox"/> | - analogously as above |
| Switch | <input type="checkbox"/> Dx | - activation of duplex operation
(half duplex when <input type="checkbox"/> Dx is not pressed; monitoring loop is permanently wired) |
| Lamp | <input type="checkbox"/> Dx | - lights when <input type="checkbox"/> Dx is pressed (black print) |
| Switch | <input type="checkbox"/> I> | - activation of call forward operation
call forward operation only possible in the on-line mode (also red print, independent of other settings) |
| Lamp | <input type="checkbox"/> I> | - lights when <input type="checkbox"/> I> is pressed |
| Button | <input type="checkbox"/> | - button <input type="checkbox"/> is dependent on switch <input type="checkbox"/> I> :
a) <input type="checkbox"/> I> actuated (and <input type="radio"/> <input type="radio"/>):
with button <input type="checkbox"/> call pulses can be generated
b) <input type="checkbox"/> I> not actuated
<input type="checkbox"/> I> with button <input type="checkbox"/> audible alarm can be tripped |

LEDs:

- | | | |
|-------------|---|---------------------|
| V1 (green) | selection of relay module contact 2 | } special functions |
| V2 (red) | selection of relay module contact 3 | |
| V3 (yellow) | selection of relay module contact 4 | |
| V4 (red) | clock indication (clock from GE to STT) | |

6 Final test


The object of the final test is to verify that the fault has been eliminated and the teleprinter is ready to operate.

Before performing the test, check that all chassis ground connections are established and are correct (see 2.4).

6.1 STANDBY STATE FUNCTIONS (see section 4.2, point 6)

6.2 LOCAL MODE

6.2.1 CHECKING THE CONTACTS

Actuate the end-of-tape, end-of-paper and top cover contacts in turn to check the functioning of the contacts and to check the lamp in the "call" button  (lamp must flash).





6.2.2 CHECKING THE BUTTONS ON THE MANUAL DEVICE CONTROLS GB


Press the buttons on the GB to check that they function correctly.

6.2.3 KEYBOARD OPERATION (actuate tape punch if paper tape attachments are provided)

- Enter a standard test text.

If an overprint inhibition feature is provided:

Enter characters until the lamp in the "unlock keyboard" button  lights to indicate that the end of the line has been reached and the keyboard is blocked; release with , ( if provided) or .

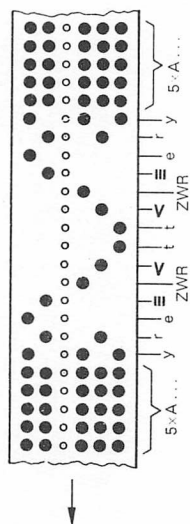
- Fill the keyboard buffer by pressing several keys at the same time and check the functioning of the "unlock keyboard"  button.

6.2.4 TAPE READER OPERATION

- Enter the punched tape generated under 6.2.3
- Check reader indicator
- Compare punched tape generated with test text entered via keyboard
- Enter test tape 1 (see page 6-2) with the tape punch activated
- Check that the two punched tapes are identical (visual examination)
- Enter test tape 2 (see page 6-2)
- Check print pattern of the printed text of test tape 2: start-of-line position, column spacing and line alignment (straight, parallel to each other), check that columns are complete and correct.

6.3.1 SETTING UP A CONNECTION

- Perform the test with the two test tapes/with the keyboard in the send and receive directions.



Test tape 1

[illegible]

Printout of test tape 2

7 Effects of the operating modes on the modules

7.1 EFFECTS OF THE OPERATING MODES ON THE COVER LIGHTING

Functional condition of the teleprinter	Standby condition	Operating condition	
	ac power voltage applied	local or on-line mode activated	
		idle	printing
		no input or output unit working	at least one input or output unit working
Lamps light	no	yes	yes


7.2 EFFECTS OF THE OPERATING MODES ON THE KEYBOARD TA

Functional condition of the teleprinter	Standby condition	Operating condition		
	ac power voltage applied	local or on-line mode activated		
		idle	printing	
		no input or output unit working	one input unit other than key- board working	no other input unit but one output unit working (reception)
Effects on: K E Y B O A R D				
All keys except Ltrs key (A...)	no effect	effective	no effect	effective
Ltrs key (A...)	effective	effective	no effect	effective
Here is key	no effect	effective	no effect	effective





When an operating mode is activated the following operations are performed automatically ("printer ON/OFF" button does not light):






- Carriage return to the beginning-of-line position
- Line feed by one line
- Print wheel set to visibility position; synchronization run if required
- Ink ribbon lowered into visibility position

Functional condition of the teleprinter	Standby condition	Operating condition	
	ac power voltage applied	local or on-line mode activated	
Effects on:	no current	idle	printing
		no input or output unit working	at least one input or output unit working
		P R I N T E R	
Photoelectric scanner	no current	current	current
Print hammer magnet HA	no current	no current	current with each character
Stepping motor M1 for print wheel positioning	no current	current; visibility position is assumed	current
Magnet SB for visibility position	no current	current <u>≡</u> visibility position	current or no current possible

Magnet SW for black print	no current \triangleq red	no current	no current \triangleq red current \triangleq black
Switch S5 for end-of-ink ribbon	effective; reverses ribbon magnet	effective; reverses ribbon magnet	effective; reverses ribbon magnet
Magnet FB for ink ribbon drive	current or no current possible	current or no current possible	current or no current possible
Switch S3 for beginning-of- line contact	no effect	effective	effective
Switch S2 for braking contact	no effect	effective	effective
Switch S1 for end-of-line contact	no effect	effective	effective
Switch S4 for end-of-paper contact	effective; dependent on the line interfacing equipment	effective; dependent on the line interfacing equipment	effective; dependent on the line interfacing equipment
Stepping motor M2 for carriage drive	no current	current	current
Stepping motor M3 for line feed	no current	current	current
Local printer paper feed 	effective	effective	effective
Local letters/ figures shift	no effect	effective	effective

7.4 EFFECTS OF THE OPERATING MODES ON THE MANUAL DEVICE CONTROLS GB


Functional condition of the teleprinter	Standby condition		Operating condition	
	ac power voltage applied		local or on-line mode activated	
Effects on: MANUAL DEVICE CONTROLS	no effect	no effect	idle	printing
			no input or output unit working	at least one input or output unit working
			effective, if keyboard buffer was full	effective, if keyboard buffer was full and at least one character has been called in
			effective	effective
Button S1 unlock keyboard 	no effect	no effect	effective	effective
Button S2 here is 	no effect	no effect	effective	effective
Button S3 printer ON/OFF 	no effect	no effect	effective	effective
Button S4 printer paper feed 	effective	effective	effective	effective

Button S5 local letters/ figures shift 	no effect	effective 2)	effective 2)
Switch S6 data record ON 	effective	effective	effective
Button S7 output inhibition 	no effect	no effect	effective 3)
Switch S8 reset bell  1)	effective	effective	effective
Switch S8 block answerback call-in  1)	effective	effective	effective
Lamp H9 (red or green) power ON (teleprinter under power)	effective	effective	effective

- 1) Alternative
2) Has effect on printer only
3) If one input unit is working

7.5 EFFECTS OF THE OPERATING MODES ON THE SWITCH MODULE SB

Functional condition of the teleprinter	Standby condition	Operating condition	
	ac power voltage applied	local or on-line mode activated	
		idle	printing
		no input or output unit working	at least one input or output unit working
S W I T C H M O D U L E			
Effects on:	Switch for line spacing	effective	effective
	Switch for print force	effective	effective
	Switch for telegraph speed	effective	effective
	Top cover contact	effective, irrespective of the line interfacing equipment	effective/no effect *), dependent on the line interfacing equipment




*) If the top cover or top cover contact is open, the lamp in the "call" button  on the manual communications controls flashes. The line interfacing equipment incorporated can be circuited so that neither the local nor the on-line mode can be activated. In the event of an incoming call, the teleprinter signals "not ready" (no transmission of continuous start clarity).

7.6 EFFECTS OF THE OPERATING MODES ON THE POWER SUPPLY MODULE SV

Functional condition of the teleprinter	Standby condition	Printing condition without/with attachment devices
	ac power voltage applied	local or on-line mode activated
Effects on: P O W E R S U P P L Y M O D U L E		
Power draw of the power supply	40 W	90/120 W
Reading lamps in cover of teleprinter	off	on

7.7 EFFECTS OF THE OPERATING MODES ON THE TAPE PUNCH LO

Functional condition of the teleprinter	Standby	Operating condition		
	ac power voltage applied	local or on-line mode activated		
		"data record ON" switch not pressed		"data record ON" switch pressed
		idle		printing
		idle	printing	idle
	no input or output unit working	at least one input or output unit working	no input or output unit working	

T A P E P U N C H Status: paper tape loaded, tape gate closed				
Effects on:		no effect	effective	no effect
ON/OFF button 		no effect	effective	no effect
Tape feed button 		effective	effective	effective
Tape backspacing button 		effective	effective	effective
Tape gate switch		effective	effective	effective
End-of-tape switch		effective *)	effective *)	effective *)

*) Only effective if the "data record ON" switch on the manual device controls has been pressed.

The rotary armature magnets are only energized during the printing condition in response to control signals. The lamp in the "ON/OFF" button remains lit as long as the tape punch is activated.

7.8 EFFECTS OF THE OPERATING MODES ON THE TAPE READER LE

Functional condition of the teleprinter	Standby	Operating condition	
	ac power voltage applied	local or on-line mode activated	
		idle	printing
Effects on:		no input or output unit working	at least one input or output unit working
	T A P E R E A D E R		
		cont. feed (250 ms)	discrete feed (250 ms)
	Stepping motor	no current	current
Sprocket wheel		assumes home position	in home position
	can be moved in both directions against slight resistance	can move clockwise or anti-clockwise by a max. of 1/2 character pitch to the home position (a pin of the wheel is then in alignment with the markings on the tape guide)	tape is fed forwards towards operator

ON/OFF button	no effect	effective	effective	effective
LEDs	no current	current	current	current
Taut tape switch			effective	effective
			if tape pull exceeds 1 N, tape feed and transmission are interrupted	





When the "disconnect" ☐ button on the manual communications controls has been pressed, the teleprinter is in the standby condition and the tape reader is switched off.

Break-in by the distant station stops the tape reader. It is then in the idle condition.


As long as the "output inhibition" ☒ button on the manual device controls is depressed, the information cannot be transmitted, printed or punched, but the tape reader continues with the reading operation.

7.9 EFFECTS OF THE OPERATING MODES ON THE MANUAL COMMUNICATIONS CONTROLS BET OF A MATCHING UNIT APE (EXAMPLE OF A FREQUENTLY USED APE) WITHOUT EXTERNAL SIGNALLING UNIT

Functional condition of the teleprinter	Standby	Operating condition			
		on-line mode		local mode	
		idle	printing	idle	printing
	ac power voltage applied data medium loaded top cover closed	no input or output unit working	at least one input or output unit working	no input or output unit working	at least one input or output unit working

Effects on: M A N U A L C O M M U N I C A T I O N S C O N T R O L S							
Call button	effective	no effect	no effect	no effect	no effect	no effect	no effect
Call lamp 	not lit	not lit	not lit	not lit	not lit	not lit	not lit
Local button	effective	no effect	no effect	no effect	no effect	no effect	no effect
Local lamp 	not lit	not lit	not lit	not lit	not lit	lit	lit
Disconnect button 	no effect	effective	effective	effective	effective	effective	effective
Ready-to-print lamp	not lit	lit	lit	lit	lit	not lit	not lit
Button for continuous on-line mode	no effect	effective			effective		
Lamp 	not lit	lit - but only if pressed			not lit		

Fault condition:

With the top cover open, printer paper and/or paper tape not loaded or connecting cable ASL not plugged in, the lamp in the "call" button  flashes. The line interfacing equipment is so circuited that neither the local mode nor the on-line mode can be activated; continuous start polarity is transmitted.

7.10 EFFECTS OF THE OPERATING MODES ON THE ANSWERBACK MODULE KG

Functional condition of the teleprinter	Standby	Operating condition			
	ac power voltage applied	local mode activated	on-line mode activated		
			idle	printing	
			no input or output unit working	at least one input or output unit working	
			here is	who-are-you?	
Effects on: A N S W E R B A C K M O D U L E					
	home position	home position	home position	in operation	in operation
Tape reader in operation	home position	home position	home position	home position	home position
Keyboard buffer not yet full	home position	home position	home position	home position	home position

8 Replacement of individual parts



8.1 REPLACEMENT OF THE LAMPS ILLUMINATING THE PRINT POSITION

Open the top cover.

Press down on the defective lamp in the holder, turn the lamp through 60° and remove the lamp.

Reverse the procedure to install a lamp.

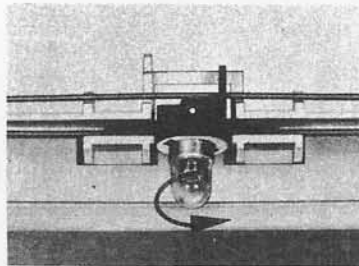


Fig. 1

8.2 REPLACEMENT OF THE LAMPS IN THE BUTTONS

Removal:

Pull off button cap.

Place a lamp extractor over the plug-in lamp and pull out the lamp.

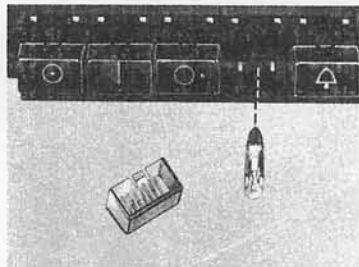


Fig. 2

Installation:

Insert the plug-in lamp as shown, applying slight pressure to the lamp until the button comes up against the stop. The lamp has now been correctly installed. Install cap with sloped side to the front.

8.3 REPLACEMENT OF THE DEVICE FUSE

Remove the teleprinter cover GH.

Unlatch and remove fuse holder 1 by turning it anti-clockwise with a screwdriver.

Exchange fuse and return fuse holder 1 to its place.

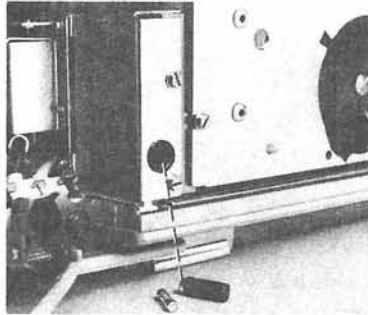


Fig. 3

The fuse rating is 2.5 A, medium lag (fuse link as per DIN 41571). The fuse rating does not depend on the supply voltage.

8.4 REPLACEMENT OF THE POWER CABLE

Remove the RF suppressor FE.

Unscrew mounting screw 1 holding down the ground wire.

Remove the cable from terminal block 2.

Press cable lead-through 3 out of the mounting plate in the direction of the arrow.

Pull sleeve 4 on the power cable out of the holder in the direction of the arrow.

INSTALLATION NOTE:

When installing a new power cable, ensure that the cable jacket protrudes from sleeve 3 by 5 ± 2 mm.

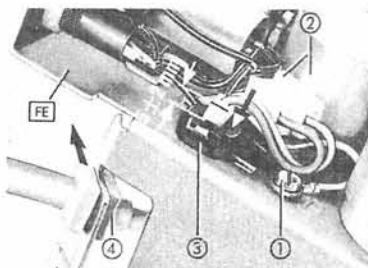


Fig. 4

See Figure 1 for details.

1. The unit is designed to be installed in a wall or ceiling. The unit is designed to be installed in a wall or ceiling. The unit is designed to be installed in a wall or ceiling.

2. The unit is designed to be installed in a wall or ceiling.

3. The unit is designed to be installed in a wall or ceiling.

9 Installation Instructions

See Figure 1 for details.

1. The unit is designed to be installed in a wall or ceiling.

2. The unit is designed to be installed in a wall or ceiling.



Figure 1

3. The unit is designed to be installed in a wall or ceiling.



Figure 2

9.1 SWITCH MODULE SETTINGS

Setting the line spacing

Move switch 1 to the appropriate position:

position 1	for single line spacing
position 1,5	for 1 1/2 line spacing
position 2	for double line spacing

Setting the print force

Move switch 2 to

its left-hand position for a single-ply paper roll
its right-hand position for up to four plies

Setting the telegraph speed

Move switch 3 to the appropriate position for:

50, 75 or 100 bauds

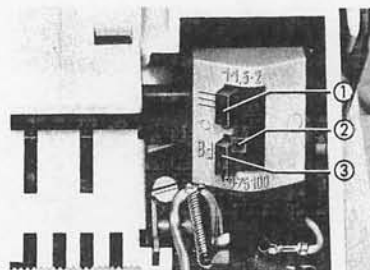
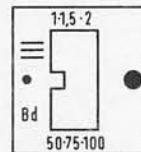
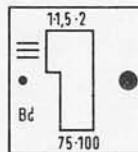
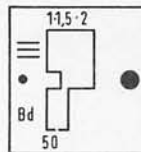


Fig. 1

Three caps are available for restricting the telegraph speeds that can be set.



Figs. 2, 3, 4

9.2 ADJUSTMENTS FOR THE VARIOUS PAPER WIDTHS

Guide brackets on the paper guide:

Paper width 209 mm:

Insert guide bracket 1 in slot B and
guide bracket 2 in slot D.

Paper width 216 mm (8.5"):

Insert guide bracket 1 in slot B and
guide bracket 2 in slot E.

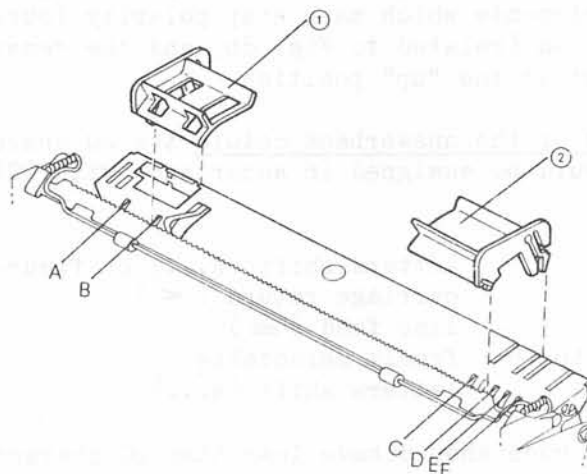


Fig. 5

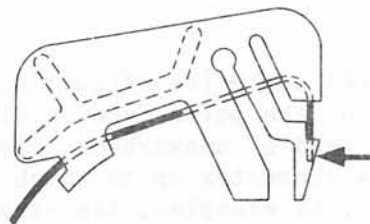


Fig. 6
Disengagement
of the guide
brackets

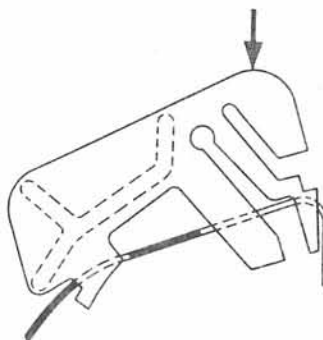


Fig. 7
Engagement
of the guide
brackets

Wire clip on the paper roll axle:

The wire clip must always be positioned in the far left groove.

9.3 PROGRAMMING THE ANSWERBACK MODULE KG

Answerback modules without miniature switches have a group of five diodes assigned to each of the 20 possible characters. The numbering of the diode groups 1 to 20 in Fig. 8a corresponds to the characters 1 to 20. The numbering of the individual diodes 1 to 5 in Fig. 8a corresponds to the code elements 1 to 5 of the character assigned. The characters are coded in accordance with the International Telegraph Alphabet No. 2 (Fig. 9); the desired character coding is obtained by cutting out the diodes for those code elements which mark stop polarity (current pulse).

Answerback modules with miniature switches have a miniature switch (each containing five switch elements) assigned to each of the 20 possible characters. The numbering of the miniature switches 1 to 20 in Fig. 8b corresponds to the characters 1 to 20. The numbering of the individual switch elements 1 to 5 in Fig. 8b corresponds to the code elements 1 to 5 of the character assigned. The characters are coded in accordance with the International Telegraph Alphabet No. 2 (Fig. 9); the desired character coding is obtained by setting the switch elements for those code elements which mark stop polarity (current pulse) to the "down" position (related to Fig. 8b) and the remaining switch elements must be set to the "up" position.

In both versions of the answerback module the 20 characters of the answerback code should be assigned in accordance with CCITT Recommendations as follows:

character 1:	letters shift (A...) or figures shift (1...)
character 2:	carriage return (<)
character 3:	line feed (≡)
characters 4 to 19:	freely selectable
character 20:	letters shift (A...)

If an answerback code should have less than 20 characters, a strap must be inserted on the answerback module.

Proceed as follows:

Solder terminals 1 (2) to 19 (see Figs. 8a, 8b) correspond to the characters 1 (2) to 19. On the parts face, a strap must be inserted between solder terminal KGE (end of answerback code) and the solder terminal corresponding to the character up to which the answerback is programmed. Figs. 8a and 8b show, as examples, the straps inserted for programming 12 and 19 characters.

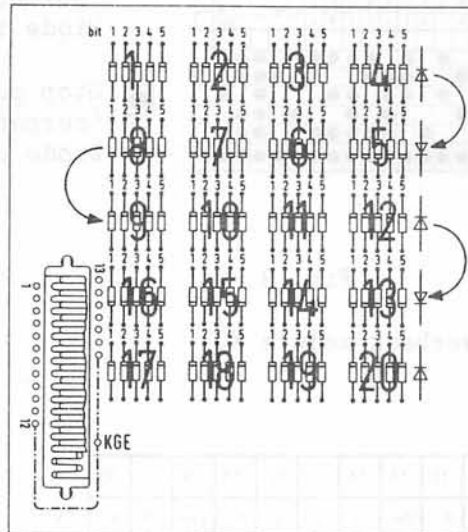


Fig. 8a Answerback module KG without miniature switches
 Diode inserted \triangle start polarity (no-current period)
 Diode cut out \triangle stop polarity (current period)

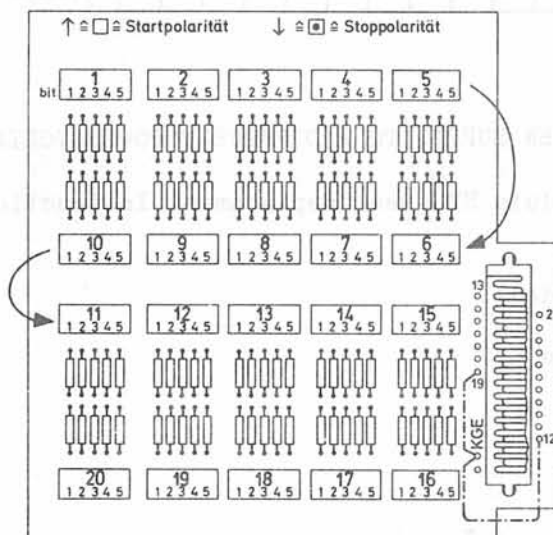


Fig. 8b Answerback module KG with miniature switches

International Telegraph Alphabet No. 2

No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
Letters case	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	<	=	A...	Zwr		
Figures case	-	?	:	.	+	3			8	9	0	1	4	5	7	=	2	/	6	+												
Start element																																
5-unit Combination	1	2	3	4	5																											
1,5-unit stop element																																

- ☐ Start polarity
(no-current period)
Diode inserted
- ☒ Stop polarity
(current period)
Diode cut out

Fig. 9

Table for programming the answerback module KG

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
A...	<	=	1...	5	2	8	8	2	3	5	A...	Zwr	S	I	E	A...	Zwr	D	A...	*)
																				*) Example

9.4 CHANGING OVER THE POWER SUPPLY TO A DIFFERENT POWER VOLTAGE

Remove the power supply module SV (see "Replacement Instructions").
Loosen screw 1.

Disengage wire 2 (if provided).

Open up power supply module SV.

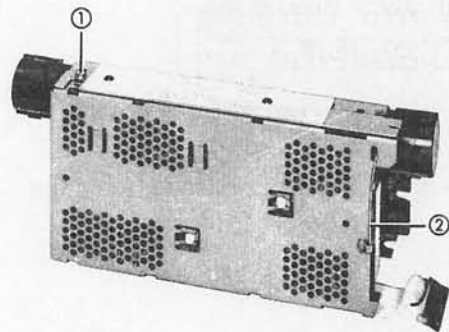


Fig. 10

Turn voltage selector with a screwdriver to the appropriate power voltage.

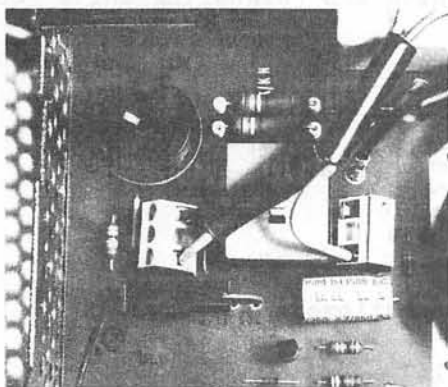


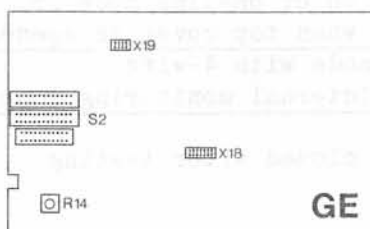
Fig. 11

Reverse the voltage indicator plate on the power supply module. For this purpose, push out the two rivets with the power supply module open.

The voltage specified on the plate must conform to the voltage setting.

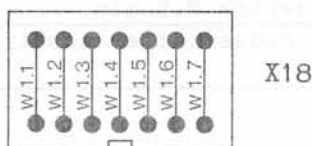
The voltage rating on the type designation plates must also be altered.

9.5 SPECIAL-FUNCTION CONNECTOR ON THE GE



Straps (special-function connector X18):

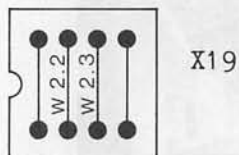
- W1.1 } automatic letters/figures shift with redundant shift signals
- W1.2 } (e.g. for interactive communication with a computer)
- W1.3 inserted: CR CR LF } on actuation of
- not inserted: CR LF CR } "new line"
- W1.4 tape contact of reader connected to contact 2 (special function 1)
- W1.5 tape contact of reader connected to contact 3 (special function 2)
- W1.6 taut tape switch of reader connected to contact 2 (special function 1) or contact 3 (special function 2); only with W1.4 or W1.5
- W1.7 reader stop with special function 3



Straps (special-function connector X19) clock TT to interface S2

W2.2 1 kHz - for matching units APE with special suppression measures
W2.3 264 kHz - for all other matching units APE (signaling units FSE)

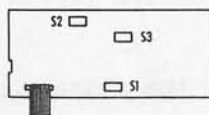
Note: The special-function connector X19 is not provided on all basic electronics GE.



R14 Volume control for loudspeaker (potentiometer)

9.6 SWITCH ASSIGNMENT OF THE STT AND LAT

9.6.1 SWITCH ASSIGNMENT OF THE STT 21 OF THE APE 26 AND APE 57



Socket	Switch	STT21 modes	Installation information A22717-B120- A100...A103-*-7631			
			A100	A101	A102	A103
X5	S1.1	No deactivation of on-line mode or on-line mode when top cover is opened	X	X	X	X
	S1.2	Half-duplex mode with 4-wire connection (internal monitoring loop)				
	S1.3					
	S1.4	Switches are closed after testing the STT21	X	X	X	X
	S1.8					
X6	S2.1	Manual communications controls effective		X	X	X
	S2.2					
	S2.3	Activation of the teleprinter on application of the ac power	X			
	S2.4	Visual indication of continuous start polarity (only for pt-to-pt circuits)		X	X	X
	S2.5	Transmission of continuous start polarity at end of data record				
	S2.6	Call forward mode			X	X
	S2.7	Duplex mode	X			X
X7	S2.8					
	S3.1	Electric time-out switch ineffective				
	S3.2	Local mode without forced termination in response to incoming call				
	S3.3	Switch-off time of the electric time-out switch 32 s		X	X	X
	S3.4	Switch-off time of the electric time-out switch 64 s				
	S3.5	Switch-off time of the electric time-out switch 8.5 min				
	S3.7	Switch is closed after testing the STT21	X	X	X	X

Located under the teleprinter (below the keyboard) is a pocket containing the following switch assignment card:

SIEMENS

Einstellung der Betriebsartenschalter auf dem STT 21																									
	S1								S2								S3								
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	
Handlocher	X	X	X	X				X	X	X	X						X							X	
Standverbindung																									
mit Abruf	X		X	X				X	X	X	X			X	X	X					X			X	
ohne mit ELCROTEL	X		X	X				X	X	X	X			X	X				X					X	
Abruf ohne ELCROTEL	X		X	X				X	X	X	X								X					X	
Wählverbindung mit FGT																									
mit ELCROTEL	X		X	X				X	X			X			X	X								X	
ohne ELCROTEL	X		X	X				X	X			X												X	

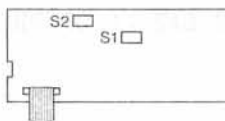
X" Schalter in Stellung „Ein“

Settings of the mode switches on the STT 21

Local mode (tape preparation)
Point-to-point circuit
with call-forward-mode
without call-with ELCROTEL
forward-mode without ELCROTEL
switched connection with
signalling unit FGT
with ELCROTEL
without ELCROTEL

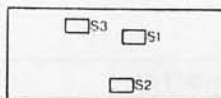
X = Switch in position "ON"

9.6.2.1 SWITCH ASSIGNMENT OF THE STT 10 OF THE APE 25 AND APE 35



Socket	Switch	STT 10 modes	Installation information	
			A22717-B109- A100...A101-*-7631	
			A100	A101
X5	S1.1	Line current monitoring		
	S1.3	Switch-off time of the electric time-out switch 32 s		
	S1.4	Switch-off time of the electric time-out switch 64 s	X	X
	S1.5	Switch-off time of the electric time-out switch 8.5 min		
	S1.6	Switch-off time of the electric time-out switch 12.75 min		
	S1.7	Switch is closed after testing the STT10	X	X
	S1.8	Local mode without forced termination in response to an incoming call		
	S1.2	Time-out switch ineffective		
X6	S2.7	Duplex mode set permanently		
	S2.1	Manual communications controls effective	X	X
	S2.8	Button selection - duplex mode	X	X
	S2.2	Call forward mode		X
	S2.3	On-line mode activated by switching on the ac power		
	S2.4			

9.6.2.2 SWITCH ASSIGNMENT OF THE LAT 20 OF THE APE 35
AND THE LAT 28 OF THE APE 25



Switch	Mode	Installation information A22717-B224- A100...A102-*-31		
		A100	A101	A102
S1.5 S1.8	With 1st order output filter as per MIL-STD-188C	X		X
S1.5 S1.6 S1.7	With 3rd order output filter		X	
S2.3 S2.8	With input sensitivity > 0.15 mA			
S2.1	A-polarity in receive circuit in event of line break			
S3.8	Suppression of noise pulses < 0.5 ms			X

Strap W1 on the LAT 28 is always inserted
"X" denotes that the switch contact is closed

9.6.3 SWITCH ASSIGNMENT OF THE LAT 21 OF THE APE 9



The adjacent adhesive label is
attached to the cover above
the LAT 21 and specifies the
significance of the switches
and the associated position.

S 1	●	○	Lokal
S 2	●	○	FGt
S 3	●	○	Abruf
S 4	○	●	dx fest
S 5	●	○	KW-7

Possible settings of the switches:

Mode	S1	S2	S3	S4	S5
Local mode (tape preparation)	●	x	x	x	x
Operation with signaling unit without crypto equipment	○	●	○	○	○
Operation with signaling unit with crypto equipment	○	●	○	●	●/○
Operation without signaling unit without crypto equipment	○	○	○	○	○
Operation without signaling unit with crypto equipment	○	○	○	●	●/○
Operation with transmission protection equipment (ARQ) and with/without crypto equipment	○	○	●	●	●/○

x position has no significance

...the ... of the ...
...the ... of the ...
...the ... of the ...

...the ... of the ...
...the ... of the ...

...the ... of the ...
...the ... of the ...

...the ... of the ...
...the ... of the ...

10 Servicing



...the ... of the ...
...the ... of the ...
...the ... of the ...

10.1 CLEANING (when required)

The outside of the teleprinter should be cleaned by the user. Cover parts may be cleaned with a cloth moistened with soapy water or with a household detergent. Severe contamination should be removed with Freon. Cleaning agents containing alcohol (such as white spirit) should be avoided as they can crack the viewing window.

No liquids may be applied to internal functional areas. A dry brush or a dry lintfree cloth should be used.

Use a plastic chad removing tape for rough cleaning of the tape channel in the tape punch. To avoid damaging the sprocket wheel, do not move the chad removing tape beyond the position shown (see Fig. 2).

Fine paper dust should be removed with a dust brush. First remove the cover A as shown in Fig. 1. Any paper remnants adhering to the sprocket wheel (a result of incorrect operation only) should be removed with a brush or, if necessary, with tweezers. For this purpose, pull the tape gate B of the tape channel from its latch in the direction of the arrow. The sprocket wheel then becomes visible.

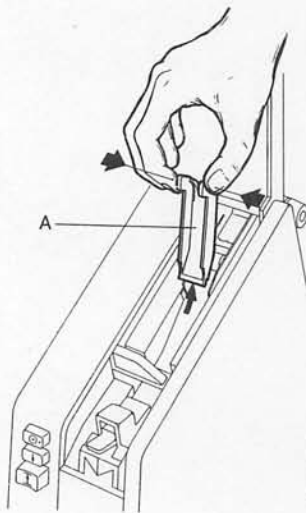


Fig. 1

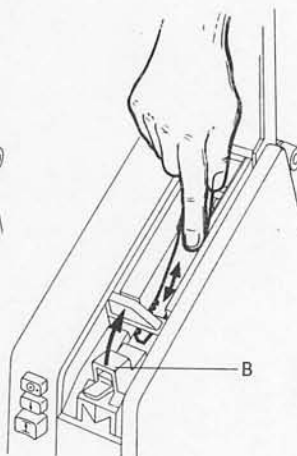
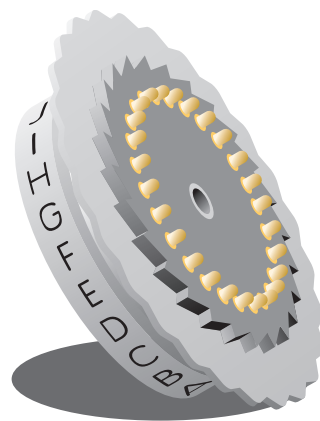


Fig. 2

10.2 REPLACEMENT OF EXPENDABLES

- Replace ink ribbon when worn out
- Renew printer paper and paper tape
- Replace damaged or worn print wheel

11 Notes



KL/TGA-5841 AROFLEX Teleprinter Model 1000 mil DEEL 4

Teleprinter Model 1000 mil

Description
General Section

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1



1 General

The teleprinter is an electronic page teleprinter for communication in 5-bit codes. It corresponds largely to the Teleprinter Model 1000 that is primarily employed in the telex network.

The teleprinter is preferably employed to meet rigorous requirements in respect of climatic stability and RF suppression. It is suited for stationary and mobile operation.

The teleprinter incorporates future-oriented technologies such as LS/MOS technology, robust stepping motors and wear-resistant plastics. Its plug-in boards are covered with a protective varnish to satisfy the requirements imposed by service in severe environments.

The mechanical equipment has been reduced to a minimum. A central drive, necessarily involving a great number of gear elements, has been ruled out right from the outset. This has permitted a maintenance-free teleprinter to be designed with consistently efficient telegraphic capabilities. It is quiet in operation and is characterized by its low volume.

The teleprinter incorporates human engineering features and is very easy to operate. For instance the operator's typing speed is not limited because the electronically coding keyboard, in conjunction with a buffer, has no need for a keyboard inhibition at speeds even as low as 50 bauds. Letters/figures shift is carried out automatically. Only one key must be struck for the New Line function (carriage return and line feed). The same applies to national characters e.g. umlauts ä, ö and ü which are transmitted as combinations ae, oe and ue.

The teleprinter is an impact printer, uses commercial ink ribbon and ordinary paper and is characterized by its outstanding print quality. The types are arranged on a print wheel (type disk) which can be easily replaced.

The two-color print control permits transmitted text to be printed out in red and received text in black.

An essential feature of the teleprinter is that it is constructed throughout of modules. All modules are connected to the basic electronics (central control unit) via cables and plugs and can be exchanged very easily and quickly without the need for mechanical or electrical adjustments. In the case of a fault condition, the faulty module can be located and replaced quickly and without any difficulties on the subscriber's premises, no special tools being necessary. The faulty module is repaired in a central workshop.

The teleprinter can be fitted with an answerback unit, tape punch and tape reader without the basic configuration having to be altered.

The line interfacing modules are integrated in the teleprinter. Replacement of these modules permits the teleprinter to be adapted to a wide variety of signalling types, line conditions and communications networks.

A large number of special functions can be easily realized by simple alterations to the special-functions module without any special equipment - also on site.

The teleprinter is capable of working in the local and on-line modes:

When working in the local mode, the signalling speed of the teleprinter is invariably 100 bauds (800 characters/minute) irrespective of the signalling speed used on the line. When working on line, the teleprinter can be set to operate at 50, 75 or 100 bauds.

The teleprinter is capable of working in the character release mode in response to external signal call pulses or in response to an external continuous signal. The answerback unit, the reader or the keyboard can operate in the character release mode.

If the teleprinter is required in its receiving-only (RO) configuration, it comes without keyboard and is accommodated in a modified cover.

2. TECHNICAL DATA

Telegraph alphabet	International Telegraph Alphabet No. 2 ITA and other 5-bit codes.	
Signalling speed	50 bauds, if required switchable to 75 bauds 100 bauds	
in local mode	100 bauds invariably	
Character synchronization	start-stop mode	
Stop element length for trans- missions	without character release mode 1.5 unit with character release mode in response to single pulses 1 unit with character release mode in response to continuous signal 1.5 unit	
Minimum length of stop element for signals received	1.0 unit	
Deviation from rated signalling speed	< 10/100	
Receive margin	+44 %...+49 % depending on the line interfacing equipment	
Transmit distortion	<+1 %...<+5 % depending on the line interfacing equipment	
AC power voltage and frequency	187 V...264 V; 40 Hz...70 Hz/400 Hz } adjustable by or } operating a 93.5 V...140 V; } switch on the 40 Hz...70 Hz/400 Hz } power supply module or as an alternative 21 V...34 V dc power voltage	
Device fuse	2.5 A medium lag (at 110 V or 220 V)	
Power draw without/with attachment devices	in standby condition 40 W in operating condition 90/120 W	
at 24 V dc voltage	in standby condition 42 W in operation condition max 160 W	
RF suppression	Grade K in accordance with the VDE standards 0875 laid down in the Fed- eral Republic of Germany Suppression of compromising radiation	

Printer

Printable characters 56 characters max.
 Number of plies 1 original and 3 carbon copies
 Ink ribbon 13 mm wide typewriter ribbon
 (DIN Standard 2103)

Type style upper or lower case letters
 type font Pica block
 other type styles on request

Character spacing 2.54 mm (1/10")
 Line spacing adjustable by operator

single	1 1/2	double
4.23 mm 1/6"	6.35 mm 1/4"	8.46 mm 1/3"

Two-color print control outgoing transmission - red print
 incoming transmission - black print
 external control if required

Number of characters/line 69 or 72
 adjustable for paper widths of 210 or
 216 mm

Teleprinter paper to DIN Standard 6720 sh. 1
 Width of teleprinter 210 mm, 216 mm (8.5")
 or
 fanfold paper on request 216 mm (8.5") with or without margin
 perforations

Diameter of supply roll outer: 120 mm (5"), 170 mm max. on
 request

Paper supervision end-of-paper contact,
 paper-out condition signalized to the
 line interfacing equipment for appro-
 priate action

Keyboard four-row standard keyboard
 or
 three or four-row condensed keyboard

n-key rollover function to customer's specification
 Keyboard layout 0.8 N
 Key release force 5 mm approx.
 Key stroke automatic
 Letters/figures shift audible signal at the 59th character
 End-of-line warning after 69 or 72 characters possible
 Overprint lock

Answerback code	up to 22 freely selectable characters
Transmission of answerback code	162.5 ms after reception of "who are you" (relative to the start element)
Line interfacing equipment	to customer's specification
Call mode criteria	
Call pulse	
pulse duration	1.5...5 units
pulse magnitude	as line current (stop pol. $\hat{=}$ call mode)
pulse sequence	spacing of similar pulse edges at least 7 units
Continuous call mode	
pulse magnitude	as line current
Punched tape	17.4 mm to DIN Standard 6720, sh. 2
Roll diameter	max. 210 mm
Perforation	to DIN Standard 66106, sh. 1
Operating noise level without/ with attachment devices at 100 bauds (DIN Standard 45635)	< 51/53 dB (A)
Ambient conditions	tested in accordance with VG 95332 Standards, device classes 2 and 3
Dry heat (operation)	+55°C
Vibration 2)	10...500 Hz 2 g
Humid heat (operation)	55/95 1 day
Cold (operation)	-10°C
Vacuum (operation)	0.6 bar = 3500 m
Operating position relative to horizontal	+25°
Humid heat (storage)	40/95 4 days
Shock 2)	50 g/11 ms
Impact 2)	25 g/500 impacts
Air transport	-40°C, 0.15 bar
sand and dust 1)	300 g in 30 minutes
dry heat (storage)	+70°C
Low temperature (storage)	-40°C
1)	Tests are conducted with the equipment accommodated in the transport case.
2)	Tests are conducted with the equipment mounted on a vibration-absorbing chassis.

Cover dimensions without/with
paper roll (120 mm Ø)

Width: approx. 415/415 mm
Height: approx. 208/300 mm
Depth: approx. 545/600 mm

with tape punch
receiving-only machine
without/with paper roll
(120 mm Ø)

Width: approx. 525 mm
Depth: approx. 440/495 mm

Weight

receiving-only (R0)
machine
keyboard send/receive (KSR)
machine
with paper tape devices

approx. 17 kg

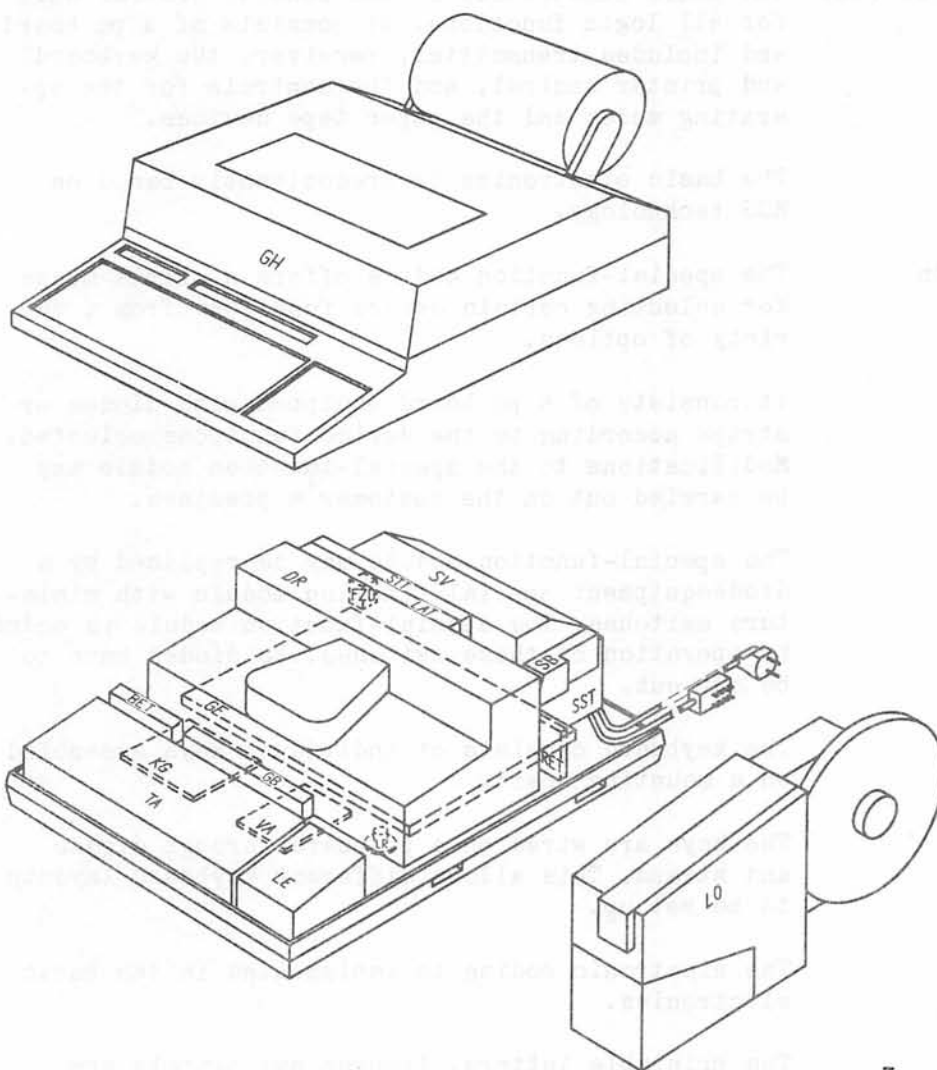
approx. 19 kg
approx. 24 kg

Repair

In the event of a fault by replacement
of modules. Fault tracing in the field
with the aid of the fault tracing flow-
chart, by systematic testing of various
operating modes and by means of the
teleprinter diagnostic unit.
MTTR \leq 30 minutes

3 Construction of the teleprinter

(Figure 3)

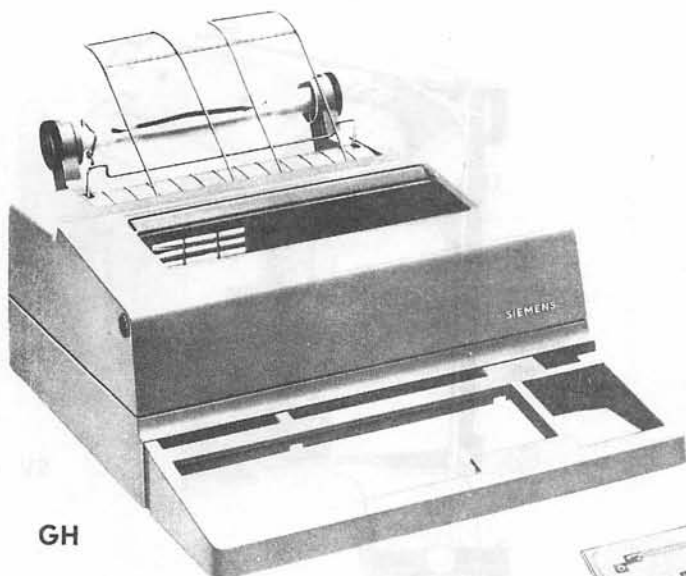


3

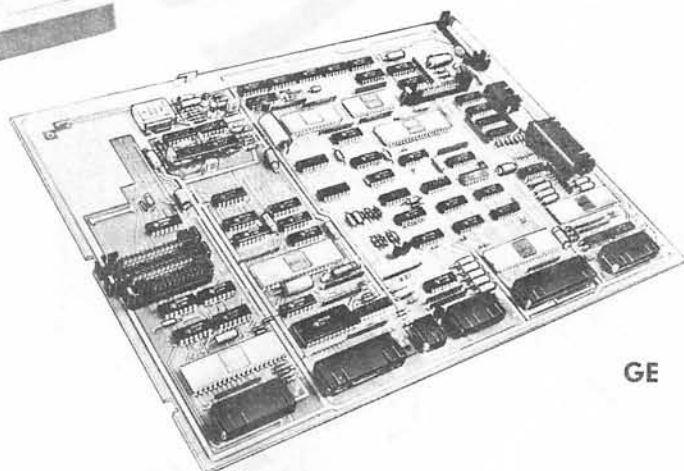
BET	Manual controls for switching functions	LO	Tape punch
DR	Printer	LR	Loudspeaker
FZD	Special signal socket	RET	Relay module
GB	Manual device controls	SB	Switch module
GE	Basic electronics	SST	Protector
GH	Cover	STT	Control module
KG	Answerback module	SV	Power supply
LAT	Line adapter	TA	Keyboard
LE	Tape reader	VA	Special-function module

The teleprinter is made up of the following modules:

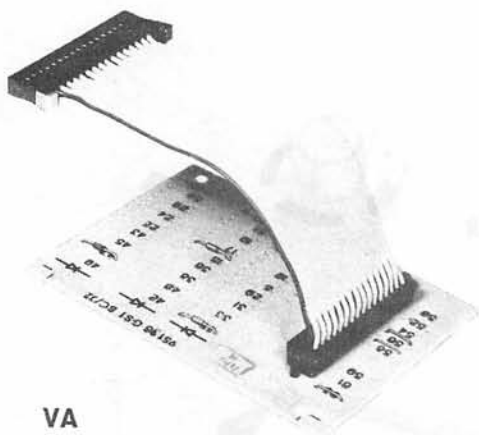
- Cover (GH) The cover consists of light-weight injection-moulded plastic parts. It carries the paper roll holder and holds the lamps which illuminate the print position.
- Basic electronics (GE) The basic electronics is the central control unit for all logic functions. It consists of a pc board and includes transmitter, receiver, the keyboard and printer control, and the controls for the operating modes and the paper tape devices.
- The basic electronics is predominantly based on MOS technology.
- Special-function module (VA) The special-function module offers a simple means for selecting certain device functions from a variety of options.
- It consists of a pc board equipped with diodes or straps according to the device functions selected. Modifications to the special-function module may be carried out on the customer's premises.
- The special-function module may be replaced by a diodeequipment special-function module with miniature switches. The special-function module is coded by operation of these switches. No diodes have to be cut out.
- Keyboard (TA) The keyboard consists of individual keys assembled on a mounting board.
- The keys are wired on a pc board through diodes and straps. This allows different keyboard layouts to be set up.
- The electronic coding is implemented in the basic electronics.
- Printer (DR) The printable letters, figures and symbols are arranged on a print wheel of special wear-resistant plastic. This is rotated to the print position by a stepping motor. Printing takes place via an electronically controlled print hammer, the print wheel being stationary. Two stepping motors are used, one for line feed and the other for carriage feed. When the direction of rotation of the latter is reversed it also performs the carriage return function. 4-ply papers can be printed with perfect legibility.
- The print force is adjustable.
- The ink ribbon and print wheel can be easily replaced by the operator.
- A contact signalizes the end-of-paper condition. Different responses to this signal are possible.



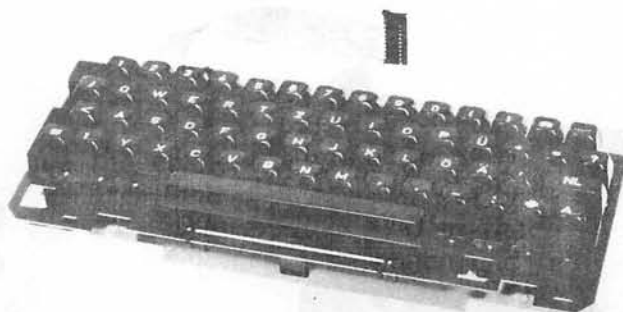
GH



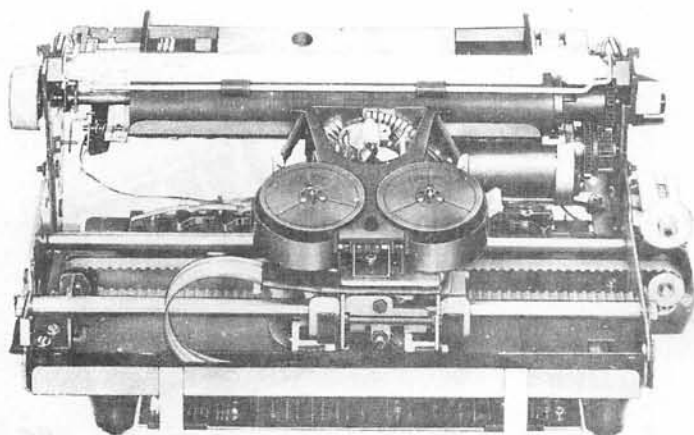
GE



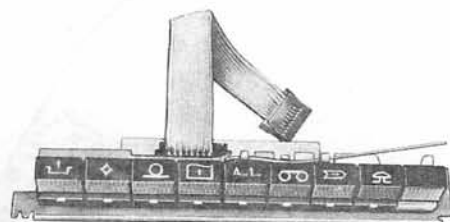
VA



TA

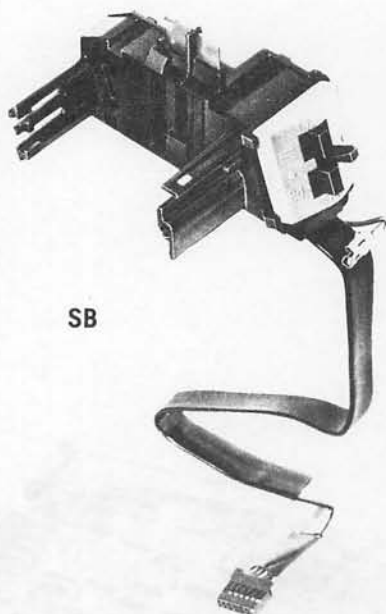


DR

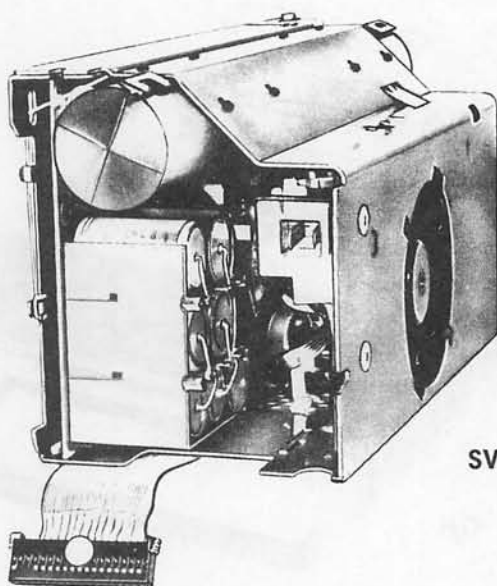


GB

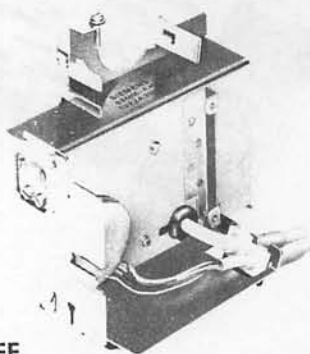
4



SB



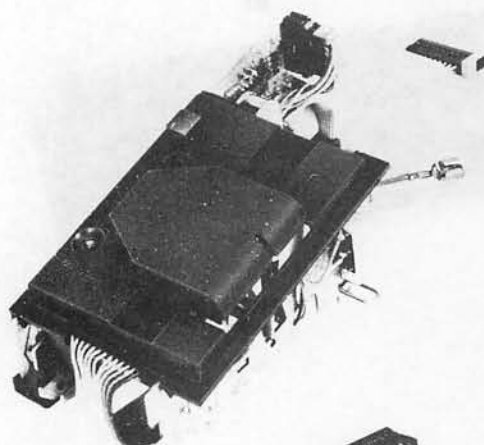
SV



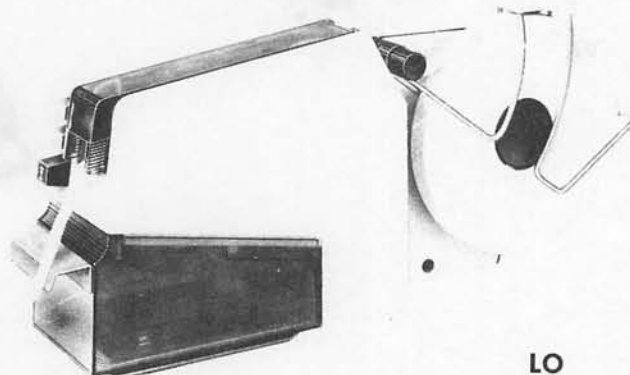
FE



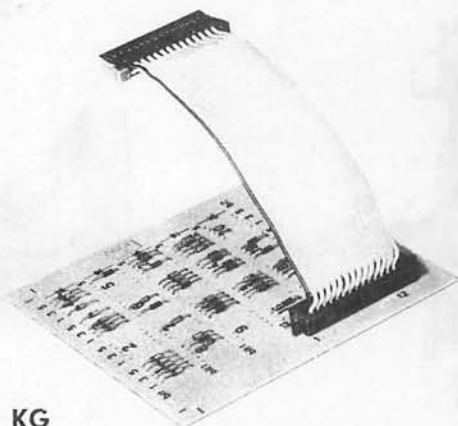
LR



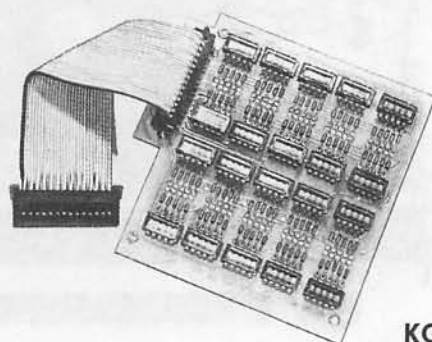
LE



LO



KG



KG

5

Manual device controls (GB)	This module comprises the control and indicator elements for the device functions such as unblocking of the keyboard, tripping of the home answer-back unit or setting the tape punch to continuously ON.
Switch module (SB)	Located on the switch module is a multiple switch by means of which the print force, the line spacing and, if required, the signalling speed can be set. It also includes the lid contact which, for switching-oriented purposes, signalizes whether the cover lid is open or closed.
Power supply (SV)	<p>The power supply provides all the voltages and currents required for operation of the teleprinter. The new principle it applies ensures low-loss operation. Protection facilities against short-circuiting and excessive heat generation guarantee the reliable operation of the power supply.</p> <p>Measures taken in respect of power supply and RF suppression guarantee protection against transients.</p>
RF suppressor (FE)	<p>With the RF suppressor grade K is complied with at the mains side of the power supply.</p> <p>It also contains overvoltage arresters protecting the power supply against external influences such as lightning or overvoltage.</p>
Loudspeaker (LR)	The audible signals at the end of a line and for an incoming call are given over a loudspeaker.
Tape punch (LO)	<p>The tape punch comes in a separate cover and can be retrofitted to the teleprinter, if so desired, without the need for mechanical or electrical adjustment.</p> <p>Identical rotary armature magnets drive the punch needles and the feed sprocket wheel for transporting the punched tape.</p> <p>Control buttons on the tape punch enable connecting and disconnecting of the tape punch blank tape feed with comb. 29 (ltrs.) and tape backspacing.</p> <p>The chad waste box in the tape punch is large enough to collect the cuttings from a whole roll of paper tape.</p>

Tape reader (LE) The reader can also be retrofitted without the need for mechanical or electrical adjustment. It is incorporated in the right of the teleprinter next to the keyboard. If no reader is installed in the teleprinter, its position is covered with a panel.

The reader employs a photoelectric reading method the tape being fed forward either continuously or by one character at a time. A sprocket wheel driven by a stepping motor feeds the tape forward.

Answerback module (KG) The answerback module consists of a pc board with a diode matrix in which up to 20 characters can be stored. The coding of the answerback module can also be undertaken on the customer's premises. This is done by cutting out diodes from the diode matrix.

The answerback module may be replaced by a diode-equipped answerback module with miniature switches. The answerback module is coded by operation of these switches. No diodes have to be cut out.

Mounting plate (not shown) For installation and operation in vehicles, the teleprinter may be mounted on a vibration-damping mounting plate.

Modules of the line interfacing system (Figure 6)

Different versions of the following modules form different "matching units".

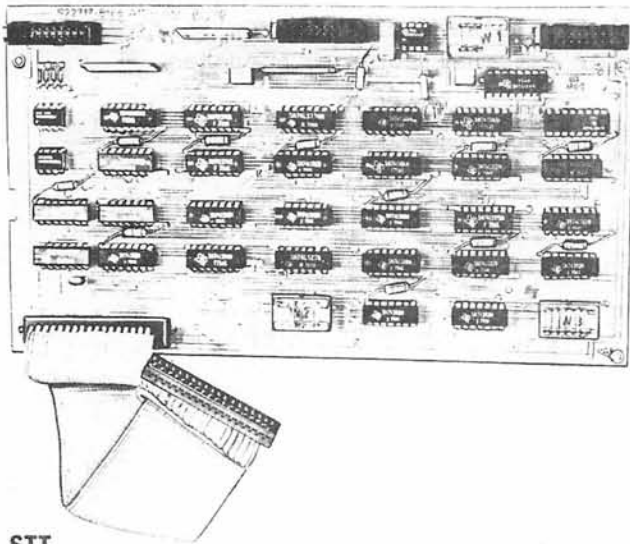
The matching units (APE) are used for connecting the teleprinter to point-to-point circuits or external transmission equipment.

Control modules (STT) The control module is a pc board containing the digital circuits for the control functions, such as activation of on-line or local mode.

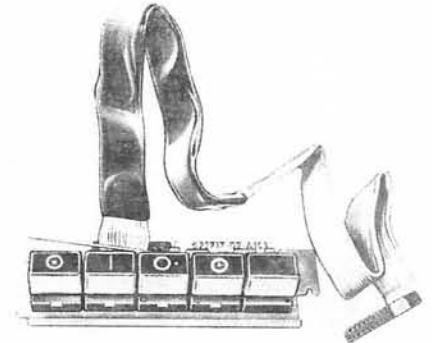
Manual controls group (BET) The manual controls group works together with the control module. It comprises the controls and indicators for the matching units, e.g. the local button.

Line adapter (LAT) The line adapter is a pc board which converts the internal voltage levels of the teleprinter to the level on the line. Here, too, dc-decoupling between line and teleprinter takes place.

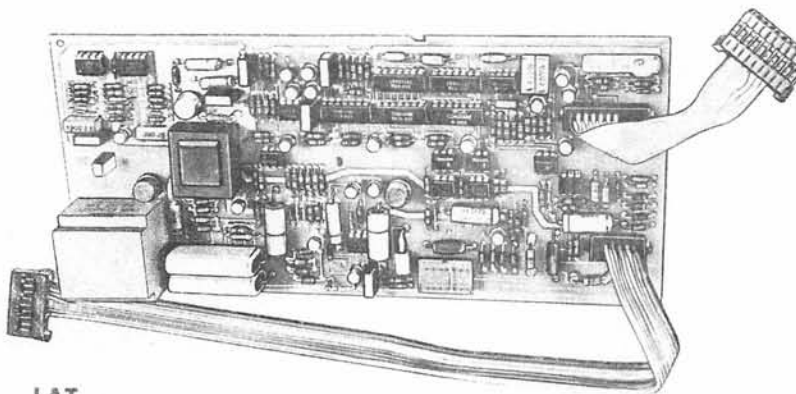
Protector (SST) This module ensures that the RF suppression K level standard is satisfied. In addition, protective facilities against overvoltage on the telegraph line are incorporated.



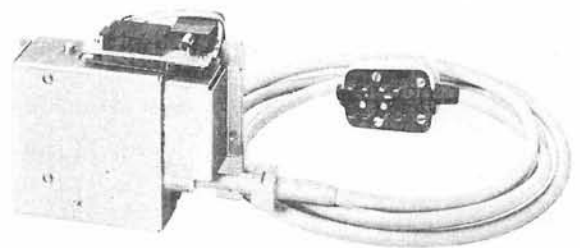
STT



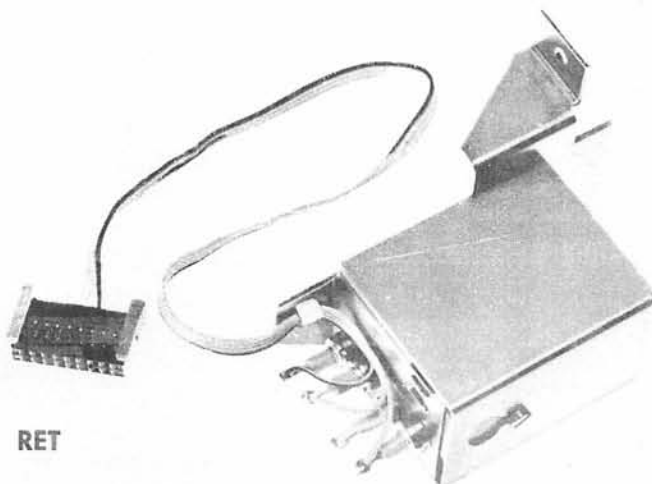
BET



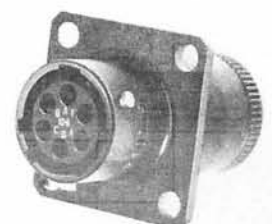
LAT



SST



RET



FZD 6

The matching unit can be supplemented by the relay module and the special signal socket.

Relay module (RET)

This module contains four relays with floating contacts for external control purposes.

Special signal socket (FZD)

The 8-point special signal socket is used for wiring out the floating contacts.

4 Functional conditions

A distinction is made when operating the teleprinter between the standby condition and the operating condition. In the operating condition the teleprinter is set to the local or the on-line mode. In the standby condition, the teleprinter still remains connected to the mains power voltage.

4.1 STANDBY CONDITION

Approximately 200 ms after application of the ac power voltage, the teleprinter is in the standby condition which is defined as follows:

- the control electronics has voltage applied to it in order to be able to recognize control signals,
- the input units (keyboard, answerback module, tape reader) and
- the output units (printer, tape punch) are blocked,
- the lighting and blower are switched off and
- all stepping motors and all magnets are deenergized.

4.2 OPERATING CONDITION

In the operating condition, a distinction is made between idle and printing condition:

Idle: The teleprinter is ready to operate at the latest 0.5 ms after an operating mode, either local or on-line, has been activated. Keyboard and printer are released, the other input and output units can be activated, the blower starts to operate and the print position light is switched on.

Printing: Same as idle condition, but at least one input or output unit is in operation.

4.2.1 LOCAL MODE

Local operation is activated by pressing the local button, which is included in the manual controls for switching functions.

The following functions can be performed during local operation:

- Typing of text via the keyboard or the tape reader
- Preparation and correction of punched tape
- Duplication of punched tape.

The operating speed in the local mode is invariably 100 bauds. Messages are printed in red only.

In local operation, the information passes from the input units via the basic electronics to the control module and from there, again via the basic electronics board, to the output units.

An incoming call causes the loudspeaker to start, the tape reader and punch to stop automatically and the on-line mode to be activated. Characters stored in the keyboard buffer are erased while characters held in the printer buffer will be printed.

The exact operational procedure is dependent on the particular line interfacing equipment used.

4.2.2 ON-LINE OPERATION

In the on-line mode, the information being transmitted passes from the input units via the basic electronics and the signalling unit or matching unit to the telegraph line. In half-duplex operation, the information to be transmitted is also passed to the home output units, just as in local operation.

In the receive direction, the information comes in from the telegraph line via the signalling unit or matching unit and the basic electronics to the output units.

During on-line operation in the half-duplex mode, the incoming message may be interrupted by the receiving subscriber by his breaking in on the transmission.

4.2.2.1 POINT-TO-POINT CIRCUIT

In a point-to-point circuit, on-line working is activated by a start element appearing on the send or receive path. This start element is released by depressing the calling button ☐ in the manual controls module for switching functions (BET) or by depressing the Letters key ☐ on the keyboard.

Lighting of the clearing button ☐ in the BET indicates an existing connection.

On-line working is deactivated either by depressing the clearing button ☐ in the BET or automatically when communication breaks exceed the preset disconnect delay of the time-out switch (line interfacing equipment).

4.2.2.2 POINT-TO-POINT CIRCUIT OPERATING IN CHARACTER RELEASE MODE

When operating in the character release mode, e.g. using ARQ equipment, the characters to be transmitted are released via the ASL either in response to external signal call pulses or to an external continuous call signal.

In the step-by-step release mode, a character is transmitted only upon reception of a call pulse.
The call pulse should equal 1.5...5 element lengths.
The minimum interval between two call pulses must be seven element lengths.

In the continuous release mode in response to an external continuous call signal, characters are sent for as long as the call signal is applied. When call pulses are no longer received, the teleprinter will complete transmission of the last character started.

4.2.2.3 OPERATION IN SWITCHED NETWORKS

If the teleprinter is used in switched networks, on-line working is activated by an incoming call or depression of the calling button ☐ in the BET. The subscriber's number to be selected is entered on the keyboard also in the case of dialplate selection. After the proceed-to-dial signal has been received from the exchange, the keyboard of the teleprinter is then inoperative, except for the Figures keys. In the send control (module 2, Fig. 3), the dial pulses are generated and the dial digit is caused to be transmitted and printed out. As soon as the connection to the dialled subscriber is established, the entire keyboard is automatically unblocked for message transmission. With pulse selection, the keyboard is not blocked during the selection phase.

5 Principle of operation

(Figure 7)

The operational procedure is dependent on the particular line interfacing modules.

5.1 TRANSMISSION

Information is entered in the teleprinter via the following units:

keyboard TA,
answerback module KG, or
tape reader LE

and is supplied as input information to the basic electronics board GE.

A device control ensures that only one of the aforementioned units is in operation at any one time. During this time, the remaining units are blocked.

If the information is input to the teleprinter via the keyboard TA by depressing a key, a precoded combination is passed into the keyboard control in module 1. It is here that the information is properly encoded, e.g. to conform to ITA No. 2. The information then passes through the keyboard buffer in module 1 and reaches the send control in module 2.

In the send control, the appropriate case shift signal, i.e. "Letters" or "Figures" is automatically generated and sent before the character, if necessary.

Part of the send control is the answerback control, which, when the answerback module KG is tripped, generates the code combinations programmed on the answerback module. These are then passed on to the transmitter in module 3. In addition, the answerback control transfers the information unhindered to the transmitter during keyboard operation.

The transmitter supplements the code combinations by adding start and stop elements to form complete telegraph signals. It then transmits these in bit-serial fashion and at the present time intervals.

Module 3 also contains the tape reader control. This ensures that when the tape reader LE is in operation, the information recorded on the punched tape is read, converted to telegraph signals and transferred to the transmitter.

The information to be transmitted reaches the signalling unit FSE or matching unit APE via the internal interface S2. Once here, the information passes through the control module STT on its way to the line adapter LAT. In half-duplex operation, the information, having reached the control module STT, is transferred back to the basic electronics GE and the output units to obtain a monitoring copy.

Via the line adapter LAT, the information is sent to line. Radio interference voltages are filtered out in the protector SST.

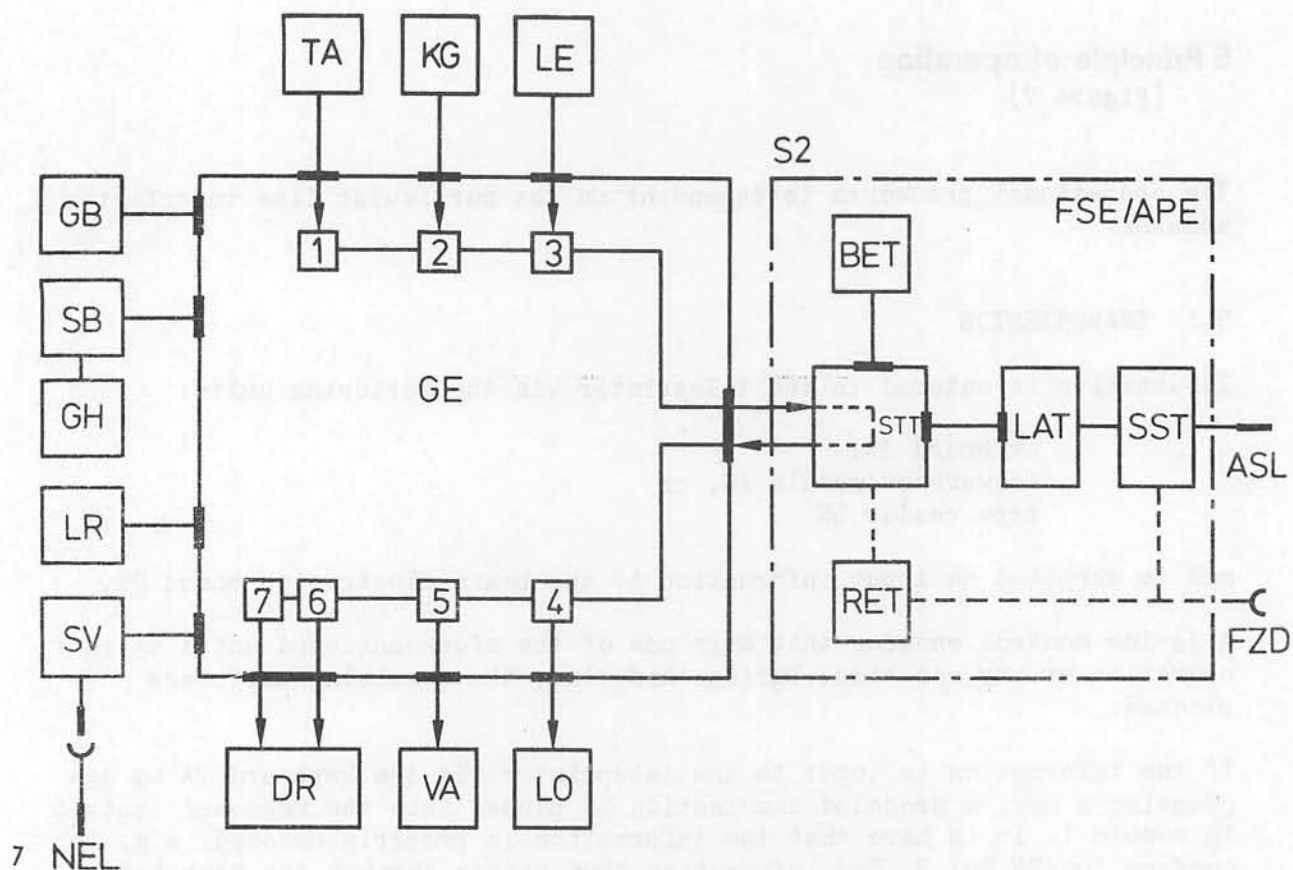


Figure 7

Teleprinter - Block schematic diagram

ASL	Terminal connecting line
APE	Matching unit
BET	Manual controls for switching functions
DR	Printer
FE	RF suppressor
FSE	Signalling unit
FZD	Special signal socket
GB	Manual device controls
GE	Basic electronics
GH	Cover
KG	Answerback module
LAT	Line adapter

LE	Tape reader
LO	Tape punch
LR	Loudspeaker
NEL	Power cable
RET	Relay module
SB	Switch module
SST	Protector
STT	Control module
SV	Power supply
TA	Keyboard
VA	Special-function module

1...7	MOS modules
1	Keyboard control
2	Send control
3	Transmitter
4	Receiver
5	Decoder
6	Printer control
7	Carriage travel and line feed control

5.2 RECEPTION

Information is output by the teleprinter via the following units:

printer DR or
tape punch LO.

The output information reaches the output units by way of the basic electronics GE. The printer DR always provides a printed record of the information, and the tape punch LO records the information on paper tape.

By depressing the "Printer on/off" button ☐ the printing of the characters received may be suppressed. In this case, however, the characters are forcibly recorded by the tape punch.

The information arriving from the line passes through the protector SST and reaches the line adapter LAT. In the protector SST, radio interference voltages are filtered out and overvoltages drained off. The line adapter converts the line level to the internal signal level. Having passed through the control module STT, the information is transferred to the basic electronics GE via the S2 interface.

The receiver in module 4 converts the bit-serial information into bit-parallel information which is forwarded to the tape punch. At the same time, the information is transferred to the decoder in module 5.

The decoder interprets the received information and adds to it the commands necessary for operating the printer. The information is then forwarded to the printer control in module 6. Certain device functions can be programmed on the special-function module VA for coded information which is not assigned defined functions in CCITT recommendations.

The printer control uses the received information to derive the number of stepping pulses for the stepping motor which rotates the print wheel to the required print position. It also determines the instant the print hammer is to be triggered. The printer control is also responsible for driving the carriage and line feed control in module 7, which generates the pulse sequences for carriage feed, carriage return and line feed. Characters received during the carriage return traverse action are held by a buffer in module 6.

6 Servicing concept

The servicing concept is characterized by the following principal features:

- The teleprinter requires no preventive maintenance.
- Faults in the teleprinter are cleared easily through the exchange of the faulty module.
- Modules undergo efficient repair in workshops equipped for this purpose.

In order that these basic requirements may be satisfied, the teleprinter has therefore been constructed in modular form throughout. The modules are removed by means of a screw-driver only, no adjustments being necessary.

The Service Technician locates the faulty module on site and exchanges it. Fault tracing is aided by service instructions with simple Yes-No decisions. The fault removal procedure, including final testing of the modules, generally takes less than 30 minutes.

The teleprinter diagnostic unit provides a further major simplification in the fault finding process. The diagnostic unit is plugged into the diagnostic connector of the basic electronics and permits quick testing of the secondary voltages and of the potentials on essential interface lines with the aid of several indicator lamps.

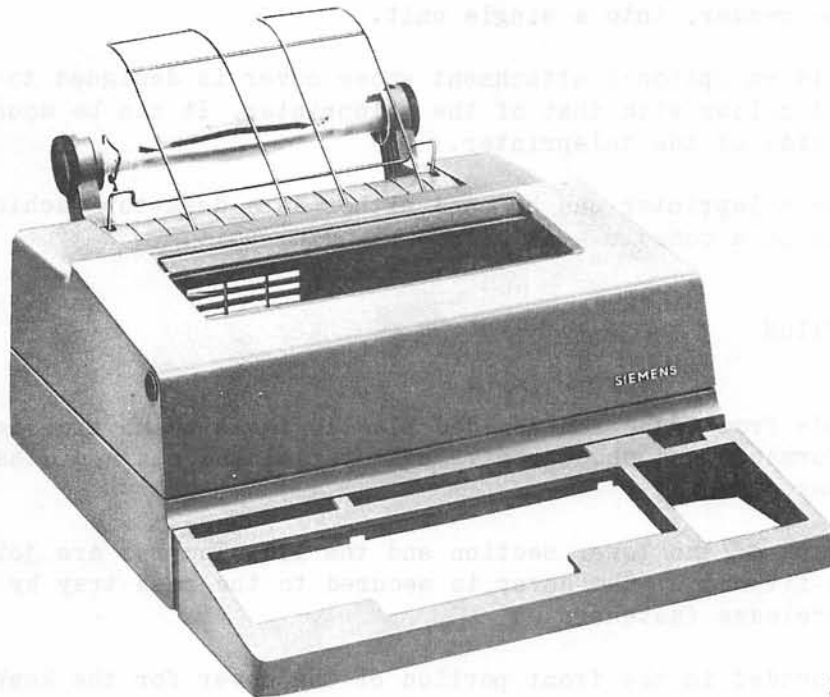
The Workshop Technician repairs in a central workshop the modules he receives from the service technician. The scope of the workshop equipment to be used depends on the number of teleprinters to be repaired:

- Workshop equipment with commercial measuring devices such as oscilloscopes and voltmeters.
Investment costs for this type of equipment are the lowest, however, the time taken for fault location is relatively long.
This method does not permit testing of the repaired modules if tolerances are adverse, since only a teleprinter is available for making a functional check of the modules.
- Workshop equipment comprising testing devices and oscilloscopes developed specifically for the teleprinter.
Investment costs are low and the time taken for fault location is relatively short.
Functional checks as well as tests can be carried out at the limits of the tolerance ranges.
- Workshop equipment comprising computer and program-controlled automatic testers.
Investment costs are high, however, this type of equipment offers the quickest method of fault location and testing.

Service technicians and workshop technicians receive instruction in special training courses. The workshop technician's course is based on that of the service technician.

7 Operating principle of the modules (without line interfacing equipment)

7.1 Cover GH



8

7.1.1 GENERAL

The cover (Figure 8) of the teleprinter integrates all the modules, including the tape reader, into a single unit.

The tape punch is an optional attachment whose cover is designed to harmonize in form and colour with that of the teleprinter. It can be mounted to the right-hand side of the teleprinter.

In its cover the teleprinter can be used either as a desk-top machine or - by mounting it on a console - as a free-standing unit.

7.1.2 CONSTRUCTION

The cover is made from injection-moulded plastic parts which are lightweight, non-deformable and shockproof. The material and shape of the cover permit easy cleaning.

The cover consists of the lower section and the lid. The two are joined by means of a push-fit hinge. The cover is secured to the base tray by means of three quick-release fasteners.

Openings are provided in the front portion of the cover for the keyboard, the tape reader and the two manual controls modules.

At the rear, the roll holders for teleprinter stationery with a roll diameter up to 120 mm are fixed in position. Paper rolls with a diameter up to 170 mm can be inserted in the roll holders by means of extension pieces.

At the rear of the lower cover section, to the left of the ventilation grille, are the type and origin label or the Customer Code. To the right of the ventilation grille is a plate for the owner marking. The cover of teleprinters fitted with the special signal socket (FZD) has an opening at the rear right. It is also possible to produce this opening subsequently by breaking off the plastic at the moulded splitting line.

The printed text can be read through a viewing window in the cover lid. The viewing window has a sharp rear edge for tearing off the paper. The paper is fed out from the cover and passed over the paper deflector. The cover lid is opened by pressing the two buttons located one at either side.

Affixed to the inside of the lid are the instruction labels for inserting ink ribbon and paper.

Three lamps situated in the lid illuminate the copy. The lamps are connected in parallel and receive current via the lid contact. When the lid is open the lamps do not light.

To help suppress the operating noise of the machine, the cover is lined with foam rubber sheets.

The receiving-only version of the teleprinter, which has no keyboard and tape reader, comes in a modified cover. In material and design this cover corresponds to the one described, except that the front portion for accommodating the keyboard and tape reader is omitted. Neither of these two modules can be retrofitted.

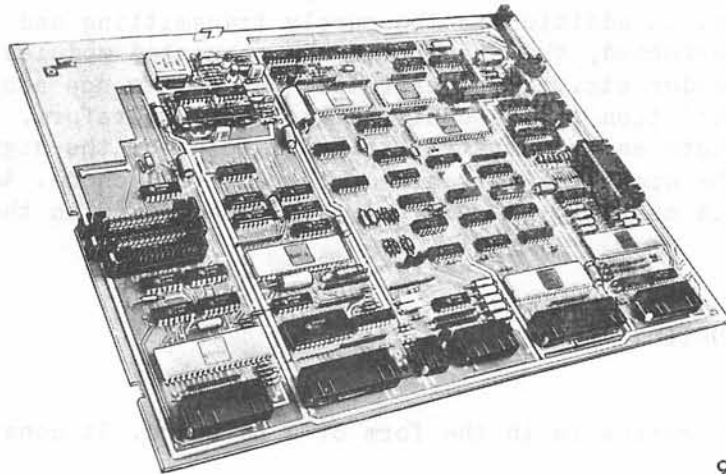
The tape punch on the other hand, can be mounted to this cover. The cover can also be converted for using marginally-punched fanfold paper.

A special space-saving console can be supplied for the receiving-only machine.

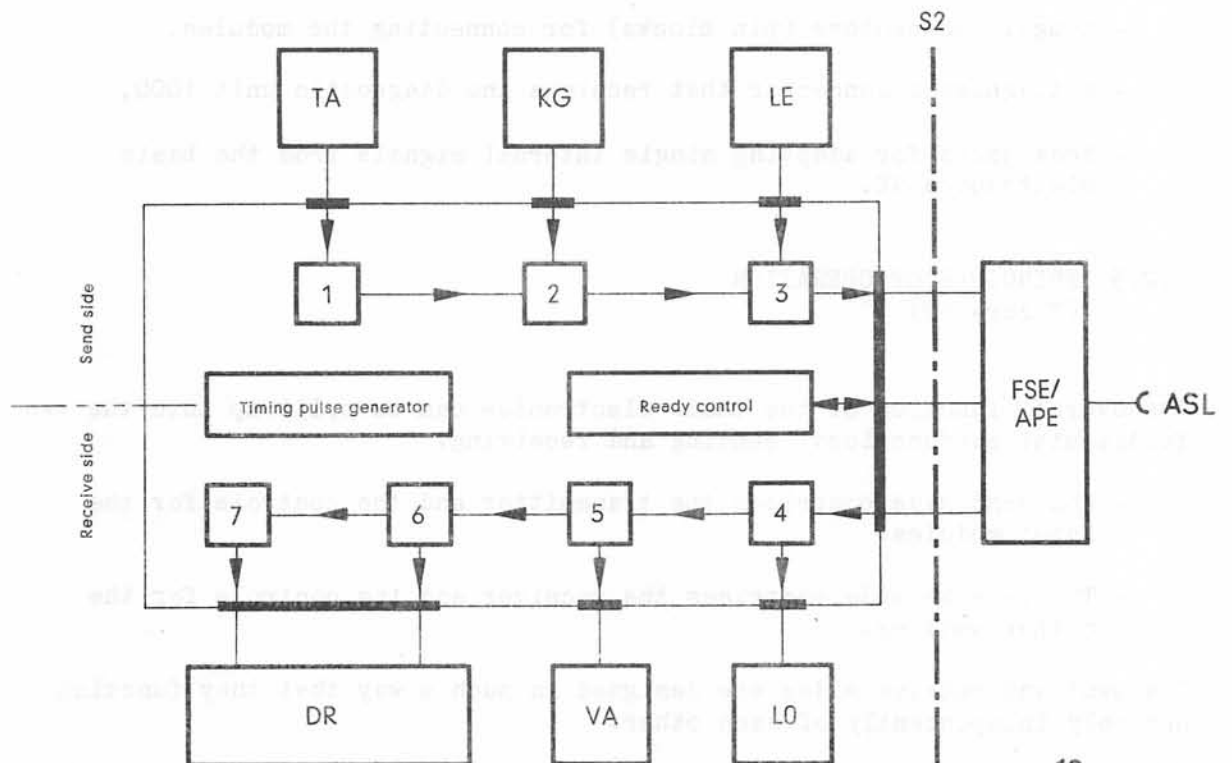
7.1.3 EFFECTS OF THE OPERATING MODES ON THE COPY LIGHTING

Functional state of the teleprinter	Standby	Operating condition	
	AC power voltage applied	Local or on-line working enabled	
		Idle	Printing
		no input or out- put module in operation	at least one input or out- put module in operation
Lamps light	No	Yes	Yes

7.2 Basic electronics GE



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7.2.1 GENERAL

The basic electronics (Figure 9) is the central electronic control unit of the teleprinter. It is here that the major part of the information is processed, i.e. in addition to the purely transmitting and receiving functions to be performed, the signals of the connected modules such as tape punch, tape reader etc. are interpreted, matched to one another and distributed. In addition to its control functions, therefore, the basic electronics also acts as a central distributor both for the signalling criteria and for the operating voltages of the entire machine. Additional wiring which would normally be required is not necessary in the case of the teleprinter.

7.2.2 CONSTRUCTION

The basic electronics is in the form of a pc board. It consists of:

- a multi-layer, plated-through circuit board,
- electrical components, i.e. seven MOS components, film circuitry, TTL circuitry, discrete components and a crystal,
- plug-in connectors (pin blocks) for connecting the modules,
- a diagnostic connector that receives the diagnostic unit 1000,
- test jacks for adapting single internal signals from the basic electronics GE.

7.2.3 PRINCIPLE OF OPERATION (Figure 10)

The overall function of the basic electronics can be split up into the two fundamental subfunctions, sending and receiving.

- The send side comprises the transmitter and the controls for the input modules.
- The receive side comprises the receiver and the controls for the output modules.

The send and receive sides are designed in such a way that they function entirely independently of each other.

The individual functional sequences are mainly under the control of the seven MOS components.

Each MOS component contains the control for a particular input or output module:

MOS component 1	is assigned to the keyboard,
MOS component 2	to the answerback module,
MOS component 3	to the tape reader,
MOS component 4	to the tape punch,
MOS component 5	to the special-function module,
MOS component 6	} to the printer
MOS component 7	

Only the timing pulse generator, the ready control for interface S2 and the matching circuits are not implemented in MOS technology.

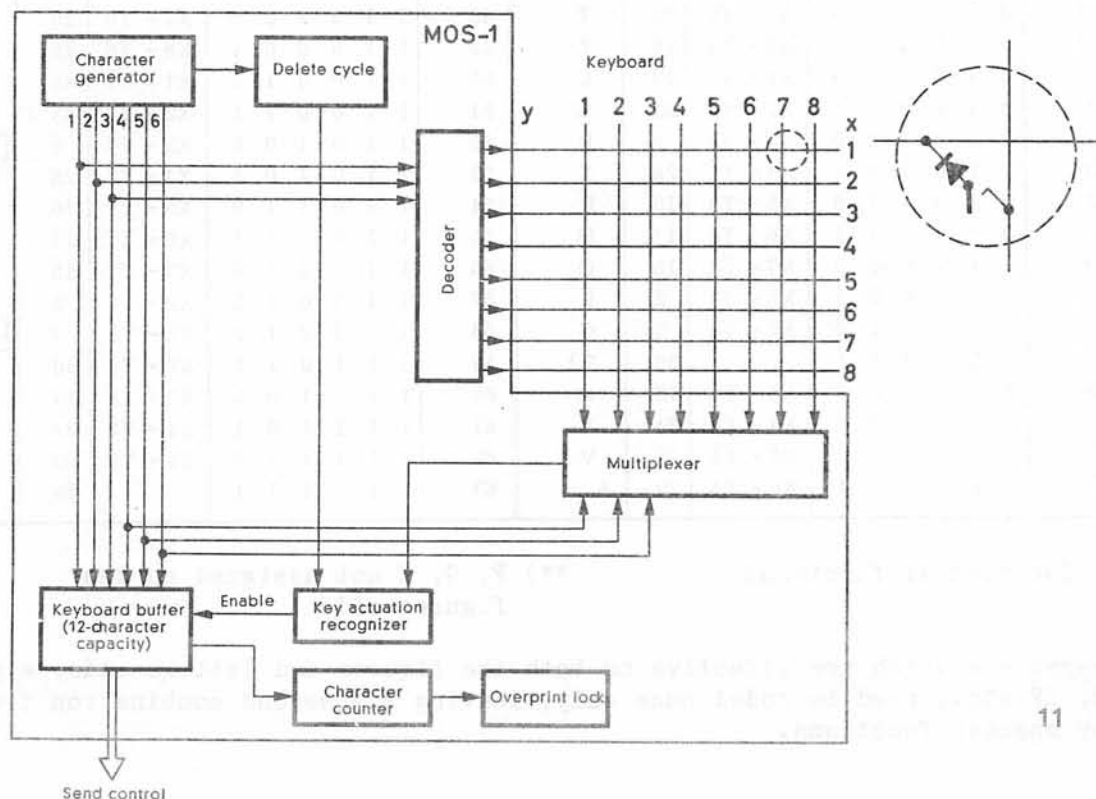
Superordinate functional units such as the transmitter, the receiver and the coordinating controls are integrated into some of the MOS components mentioned.

The information is interchanged bit-serially between the MOS components so as to minimize the number of terminal pins in the individual components.

7.2.3.1 KEYBOARD CONTROL

The keyboard control (MOS1, Figure 11) contains the following functional units:

- character generator,
- scanner (decoder, multiplexer),
- key actuation recognizer,
- character counter,
- overprint lock.



7.2.3.1.1 CHARACTER GENERATOR

A 6-bit character counter, referred to in the following as the character generator, counts continuously from 0 to 63. Each of these binary numbers represents at the same time the bit combination for a telegraph character, the first five bits forming the actual character and the sixth bit indicating whether the character belongs to the letters case or to the figures case.

Code table:

Decimal no.	Binary no.						Key con- nection Diode to X...	Telegraph character as per ITA No. 2		Deci- mal no.	Binary no.						Key con- nection Diode to X...	Telegraph character as per ITA No. 2			
	Information bits							No.	Letters		Information bits							No.	Letters		
	5	4	3	2	1	0					5	4	3	2	1	0					
	Code combina- tion of telegraph character										Code combina- tion of telegraph character										
	5	4	3	2	1						5	4	3	2	1						
0	0	0	0	0	0	0	X7 - Y8	32		32	1	0	0	0	0	0	X7 - Y4	32			
1	0	0	0	0	0	1	X8 - Y8	5	E	33	1	0	0	0	0	1	X8 - Y4	5	3		
2	0	0	0	0	1	0	X1 - Y1	28	≡	34	1	0	0	0	1	0	X1 - Y5	28	≡		
3	0	0	0	0	1	1	X2 - Y1	1	A	35	1	0	0	0	1	1	X2 - Y5	1	-		
4	0	0	0	1	0	0		31	*)	36	1	0	0	1	0	0	X3 - Y5	31	ZWR		
5	0	0	0	1	0	1	X4 - Y1	19	S	37	1	0	0	1	0	1	X4 - Y5	19	'		
6	0	0	0	1	1	0	X5 - Y1	9	I	38	1	0	0	1	1	0	X5 - Y5	9	8		
7	0	0	0	1	1	1	X6 - Y1	21	U	39	1	0	0	1	1	1	X6 - Y5	21	7		
8	0	0	1	0	0	0	X7 - Y1	27	*)	40	1	0	1	0	0	0	X7 - Y5	27	<		
9	0	0	1	0	0	1	X8 - Y1	4	D	41	1	0	1	0	0	1	X8 - Y5	4	✕		
10	0	0	1	0	1	0	X1 - Y2	18	R	42	1	0	1	0	1	0	X1 - Y6	18	4		
11	0	0	1	0	1	1	X2 - Y2	10	J	43	1	0	1	0	1	1	X2 - Y6	10	⌂		
12	0	0	1	1	0	0	X3 - Y2	14	N	44	1	0	1	1	0	0	X3 - Y6	14	,		
13	0	0	1	1	0	1	X4 - Y2	6	F	45	1	0	1	1	0	1	X4 - Y6	6	<input type="checkbox"/> **		
14	0	0	1	1	1	0	X5 - Y2	3	C	46	1	0	1	1	1	0	X5 - Y6	3	:		
15	0	0	1	1	1	1	X6 - Y2	11	K	47	1	0	1	1	1	1	X6 - Y6	11	(
16	0	1	0	0	0	0	X7 - Y2	20	T	48	1	1	0	0	0	0	X7 - Y6	20	5		
17	0	1	0	0	0	1	X8 - Y2	26	Z	49	1	1	0	0	0	1	X8 - Y6	26	+		
18	0	1	0	0	1	0	X1 - Y3	12	L	50	1	1	0	0	1	0	X1 - Y7	12)		
19	0	1	0	0	1	1	X2 - Y3	23	W	51	1	1	0	0	1	1	X2 - Y7	23	2		
20	0	1	0	1	0	0	X3 - Y3	8	H	52	1	1	0	1	0	0	X3 - Y7	8	<input checked="" type="checkbox"/> **		
21	0	1	0	1	0	1	X4 - Y3	25	Y	53	1	1	0	1	0	1	X4 - Y7	25	6		
22	0	1	0	1	1	0	X5 - Y3	16	P	54	1	1	0	1	1	0	X5 - Y7	16	0		
23	0	1	0	1	1	1	X6 - Y3	17	Q	55	1	1	0	1	1	1	X6 - Y7	17	1		
24	0	1	1	0	0	0	X7 - Y3	15	O	56	1	1	1	0	0	0	X7 - Y7	15	9		
25	0	1	1	0	0	1	X8 - Y3	2	B	57	1	1	1	0	0	1	X8 - Y7	2	?		
26	0	1	1	0	1	0	X1 - Y4	7	G	58	1	1	1	0	1	0	X1 - Y8	7	<input type="checkbox"/> **		
27	0	1	1	0	1	1		30	*)	59	1	1	1	0	1	1	X2 - Y8	30	1...		
28	0	1	1	1	0	0	X3 - Y4	13	M	60	1	1	1	1	0	0	X3 - Y8	13	.		
29	0	1	1	1	0	1	X4 - Y4	24	X	61	1	1	1	1	0	1	X4 - Y8	24	/		
30	0	1	1	1	1	0	X5 - Y4	22	V	62	1	1	1	1	1	0	X5 - Y8	22	=		
31	0	1	1	1	1	1	X6 - Y4	29	A...	63	1	1	1	1	1	1		29	*)		

*) for special functions

**) F, G, H not assigned on the figures side

Characters which are effective on both the figures and letters side, e.g. CR, LF etc., need be coded once only, leaving the second combination free for special functions.

7.2.3.1.2 SCANNER (DECODER, MULTIPLEXER)

Each key in the keyboard is connected to an X and a Y conductor and thus assigned to a code combination or telegraph character. As the character generator cycles the scanner checks all the contacts one by one to see whether one is closed. Each contact is scanned once per millisecond. Fluctuations in the contact resistance when the contact is closed are tolerable to a relatively large degree, i.e. up to 2 kilohms. At the same time the bit combination associated with the key is present at the input of the keyboard buffer.

By pressing, say, the "A" key, the X2 and Y1 conductors are shorted via a wire strap and diode. If the character generator arrives at the bit combination 000011 during one of its cycles, and if the "A" key is depressed, the character "A" is signalled by means of a pulse to the key actuation recognizer.

7.2.3.1.3 KEY ACTUATION RECOGNIZER

As a safeguard against malfunctions and to avoid bouncing of the key contact being interpreted as multiple keying of a character, the key actuation recognizer waits until the character generator has completed its second cycle since the "A" key was depressed before sending the enable pulse, which causes the bit combination to be transferred to the keyboard buffer. Bouncing of the key contacts for up to 30 milliseconds is admissible (bounces lasting for one to two milliseconds are typical). This operating principle makes the generation of undesired garbled characters impossible even with the fastest keying bursts.

7.2.3.1.4 KEYBOARD BUFFER

As it is possible for brief spaces to key in characters faster than they can be sent to line, the keyboard is assigned a buffer with a twelve character capacity.

All keyed-in characters pass through the keyboard buffer; from there they are transferred at maximum speed and in correct sequence to the transmitter.

As long as information is contained in the keyboard buffer, the tape reader cannot be activated nor can the answerback be tripped.


If, in exceptional cases, the twelve character capacity of the keyboard buffer is insufficient, the keyboard is inhibited electronically, thus rendering further keying ineffective. This condition is indicated by a lamp in the unlock button in the manual device controls module of the teleprinter. When this button is depressed, the keyboard is unlocked. After all characters have been transmitted from the buffer, the lamp extinguishes and the keyboard becomes operable again.





7.2.3.1.5 CHARACTER COUNTER

The character counter counts all keyed-in characters which result in the printer moving forward one column space. After the 59th character the counter triggers an audible signal which announces the approaching end of the line.

7.2.3.1.6 OVERPRINT LOCK

An overprint lock can be installed, if required, to be effective after the 69th or 72nd character depending on the version of printer. The keyboard is then blocked for all characters which trigger a column feed. This prevents overprinting of characters at the end of a line. Characters which produce no feed can still be entered.

A lamp in the unlock button  of the manual device controls module indicates when the overprint lock is effective.

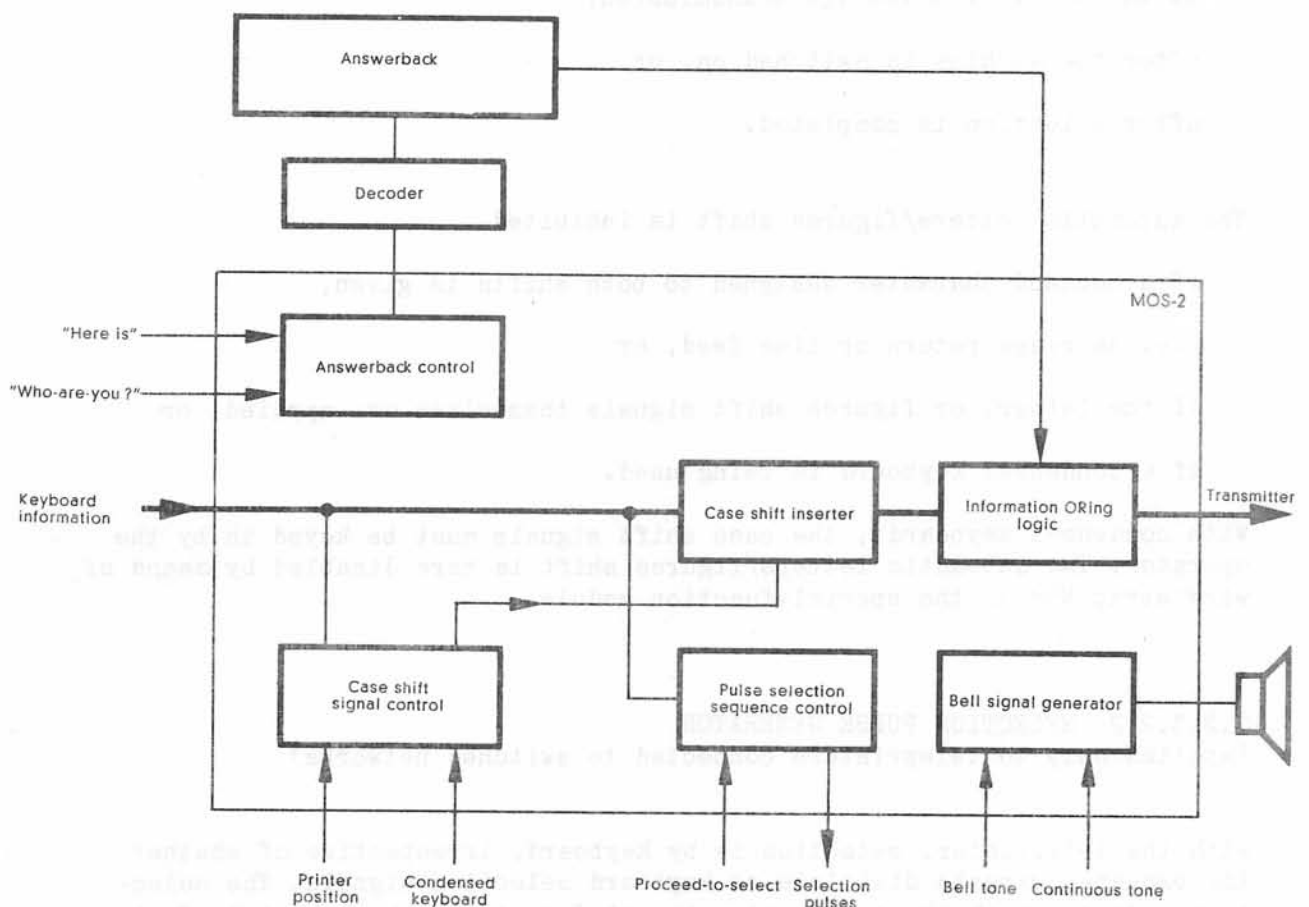
When the Carriage Return key  or New Line key  /  is depressed, the character counter is reset to 0 and the overprint lock cancelled. The lamp in the unlock button  goes out.

To correct a punched tape produced when keying-in, the overprint lock can be cancelled and the keyboard unblocked. To effect this, the unlock button must be depressed together with a key on the keyboard. The lamp in the unlock button goes out; however, the character counter is reset to 0 only upon carriage return.

7.2.3.2 SEND CONTROL (Figure 12)

The send control (MOS2) contains the following function blocks, which are largely independent of each other:

- Automatic letters/figures shift
- Selection pulse generator
- Answerback control
- Bell signal generator.



7.2.3.2.1 AUTOMATIC LETTERS/FIGURES SHIFT

For typing operations on standard keyboards, the automatic letters/figures shift automatically inserts the case shift characters: Letters (A...) or Figures (1...), which are necessary due to the dual assignment of the 5-bit code (letters and figures case).

The character arriving from the keyboard control is first checked in the case shift signal control to determine whether it belongs to the letters or the figures case, i.e. it is compared with the character sent or received previously. If no case identity is found, a command is sent to the case shift inserter and this prefixes the appropriate shift character to the information.

The case shift signal control also ensures that the correct shift signal is given before the transmission of the first character

at the start of a message transmission,

after the machine is switched on, or

after selection is completed.

The automatic letters/figures shift is inhibited

if a command character assigned to both shifts is given,

i.e. carriage return or line feed, or

if the letters or figures shift signals themselves are applied, or

if a condensed keyboard is being used.

With condensed keyboards, the case shift signals must be keyed in by the operator. The automatic letters/figures shift is here disabled by means of wire strap W58 on the special-function module.

7.2.3.2.2 SELECTION PULSE GENERATOR

(applies only to teleprinters connected to switched networks)

With the teleprinter, selection is by keyboard, irrespective of whether the exchange expects dialplate or keyboard selection signals. The selection mode to which the teleprinter is set depends on the line interfacing equipment used.

With dialplate selection, all keys with the exception of the figures keys are ineffective during the selection phase. Only when the connection has been set up is the keyboard unblocked again.

The selection pulses for each digit and the interdigital intervals are generated electronically.

The arrival of a proceed-to-select signal from the exchange enables the selection to begin. As the selection digits are now entered via the keyboard, the pulse selection sequence control supplies the selection pulses for the first keyed-in digit. The pulse length is 60 ms, the pause length 40 ms. A counter then generates the interdigital interval of 640 ms before the next selection digit. These times are derived from the crystal-controlled timing pulse rate and display a correspondingly high level of accuracy. Each selection digit is printed out by the home printer so that the keyed-in telex no. can be checked.

7.2.3.2.3 ANSWERBACK CONTROL

The answerback is tripped by pressing the "Here is" button ☐ or by reception of the "Who-are-you?" signal. The answerback control initiates the transmission of the answerback code stored in the diode matrix of the answerback module and simultaneously inhibits the other input modules, i.e. the keyboard and tape reader.

A more detailed explanation is to be found in section 7.12, "Answerback module".

7.2.3.2.4 BELL SIGNAL GENERATOR

This unit controls a small loudspeaker which produces the normal audible signals:

- When a call comes in during local mode working, it produces a continuous 500 Hz tone lasting about 3 seconds. If a call signalization facility is provided, this continuous tone is changed into a periodically-recurring tone of 1 second length.
- A gong-like tone of about 2 kHz sounds for end-of-line warning and "bell-signal".

If the teleprinter is connected to switched networks:

- After a subscriber has been dialled, it produces a continuous tone of 500 Hz and approximately 3 seconds length when the call is switched through. The busy condition of the distant station is indicated by a short tone and besides by the ready-to-operate lamp in the disconnect button ☐ which lights up briefly. This lamp stays lit if the connection continues to exist.
- If a call signalization facility is provided, an incoming call is indicated as a periodically-recurring tone of 1 second length which can be silenced with the delete button for the call signal ☐ or suppressed with the inhibit switch for the call signalization ☐.

The loudspeaker is described in 7.9.

7.2.3.3 TRANSMITTER WITH TAPE READER CONTROL (Figure 13)

This MOS circuit (MOS3) incorporates the following functional units:

- information and command ORing logic,
- transmitter,
- tape reader control,
- stepping motor control,
- feed hole detector,
- break-in detector.

7.2.3.3.1 INFORMATION AND COMMAND ORING LOGIK

It is here that the code combinations read by the tape reader are injected into the information path for the send direction. Depending on which of the three input modules is activated at the moment, the information arriving from the keyboard or the answerback unit or offered by the tape reader is transferred to the transmitter.

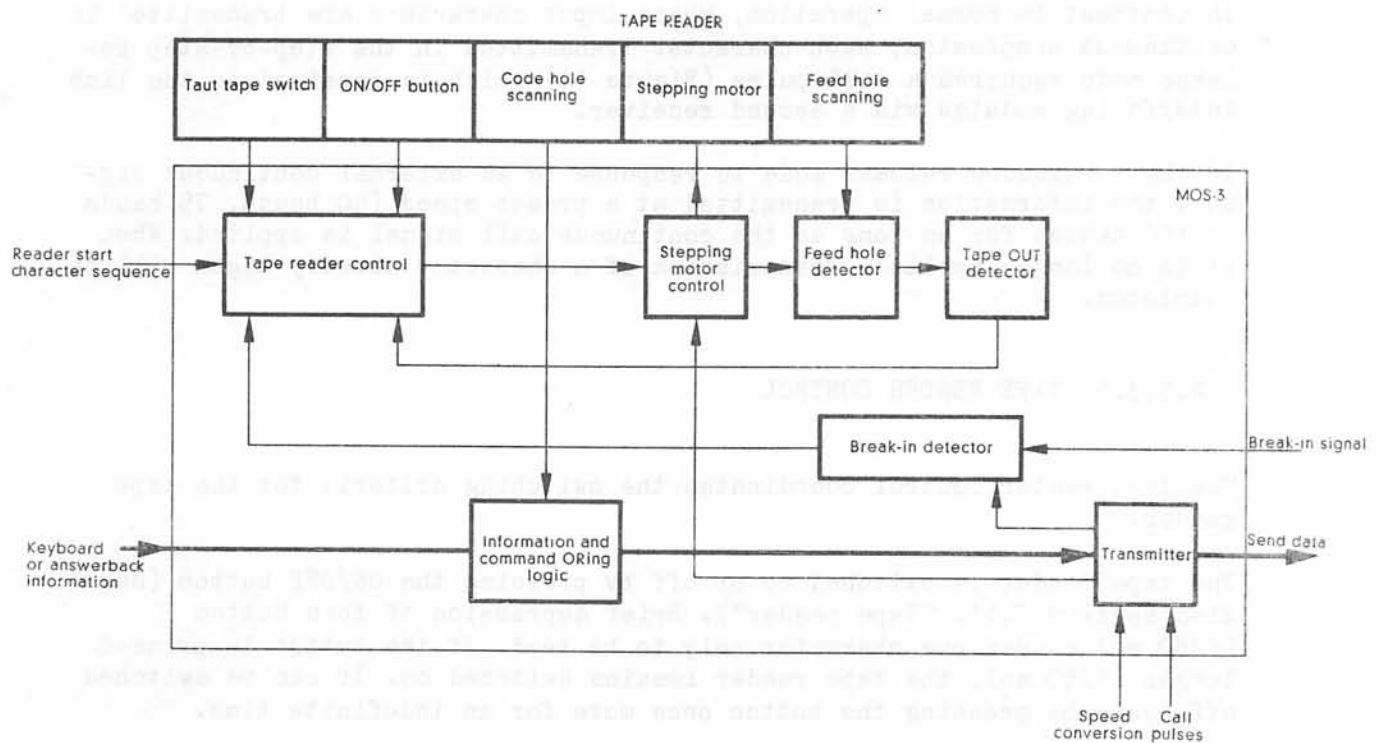
7.2.3.3.2 TRANSMITTER

A shift register incorporated in the transmitter converts the information offered in bit-parallel format by one of the three input modules (reader, answerback unit, keyboard) into serial form. In addition, the five information elements are supplemented with a start element (1.0 unit length) and a stop element (1.5 unit length) to form a telegraph character. The clocking rate of the shift register corresponds to the set telegraph speed. The start-stop distortion of the transmitter is determined only by the deviation of the timing pulse rate (crystal-controlled oscillator) and is therefore very slight (approx. 0.3 %).

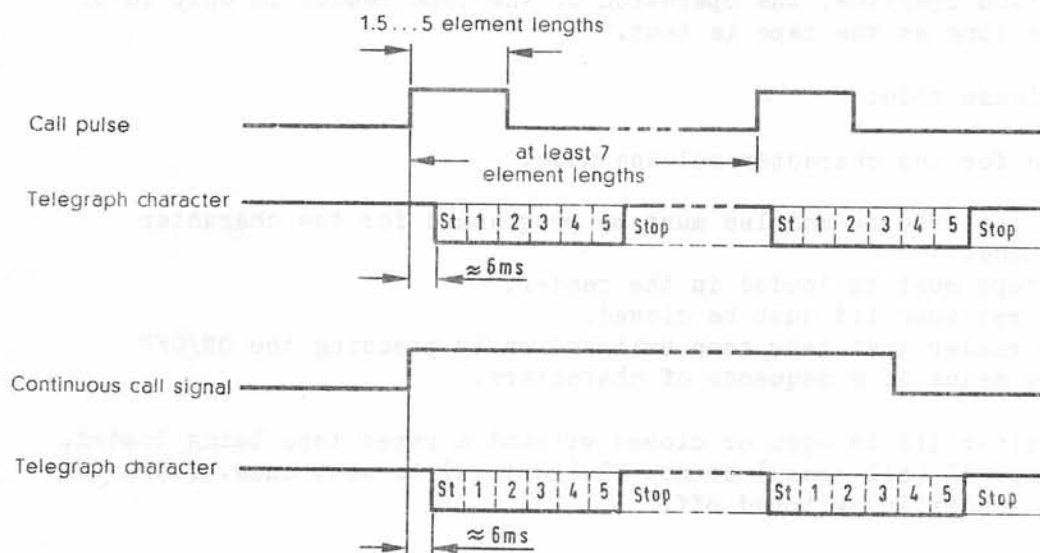
Character release mode:

A special feature which the transmitter allows is step-by-step release mode in response to external single call pulses or continuous release mode in response to an external continuous signal.

- | | |
|---|--|
| Programming of character release mode | - on the line interfacing modules, |
| Programming of step-by-step release mode or continuous release mode | - by means of wire strap W53 on the special-function module. |



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In contrast to normal operation, where input characters are transmitted in continuous succession, each character transmitted in the step-by-step release mode requires a call pulse (Figure 14) which is received in the line interfacing modules via a second receiver.

In the continuous release mode in response to an external continuous signal, the information is transmitted at a preset speed (50 bauds, 75 bauds or 100 bauds) for as long as the continuous call signal is applied. When it is no longer applied, transmission of a character already began will be completed.

7.2.3.3.3 TAPE READER CONTROL

The tape reader control coordinates the switching criteria for the tape reader.

The tape reader is switched on or off by pressing the ON/OFF button (see also section 7.11, "Tape reader"). Brief depression of this button (<250 ms) causes one character only to be read. If the button is pressed longer (>250 ms), the tape reader remains switched on. It can be switched off again by pressing the button once more for an indefinite time.

The tape reader can also be activated by recognizing four identical characters received as a sequence. This function is programmed on the special-function module.

The tape reader is switched off at the end of the tape or when breaking in by the distant station is recognized (see section 7.2.3.3.6). When the taut tape switch operates, the operation of the tape reader is only interrupted for as long as the tape is taut.

Character release mode:

Preconditions for the character release mode:

- the line interfacing modules must be programmed for the character release mode,
- a paper tape must be loaded in the reader,
- the tape retainer lid must be closed,
- the tape reader must have been switched on by pressing the ON/OFF button by means of a sequence of characters.

When the retainer lid is open or closed without a paper tape being loaded, combination no. 32 (all space) or no. 29 (letters) is sent once. Thereafter, the tape reader is switched off.

7.2.3.3.4 STEPPING MOTOR CONTROL

The stepping motor control supplies the stepping motor with the pulses it requires to feed the tape forward. A status signal from the transmitter and the status of the tape reader control determine the appropriate pulses to be transferred to the tape reader. The pulses are amplified in the tape reader and then used to control the stepping motor.

7.2.3.3.5 FEED HOLE DETECTOR

The feed hole track in the tape is scanned continuously while the tape reader is in operation. The tape reader recognizes the end of the tape has been reached when there is no longer an alternation of light and dark in the tape. Feed hole scanning lags eight feed hole pitches behind code hole scanning so that the end-of-tape signal can only be given when the ninth code perforation is being scanned. This signal causes the tape reader control to switch the tape reader off.

7.2.3.3.6 BREAK-IN DETECTOR

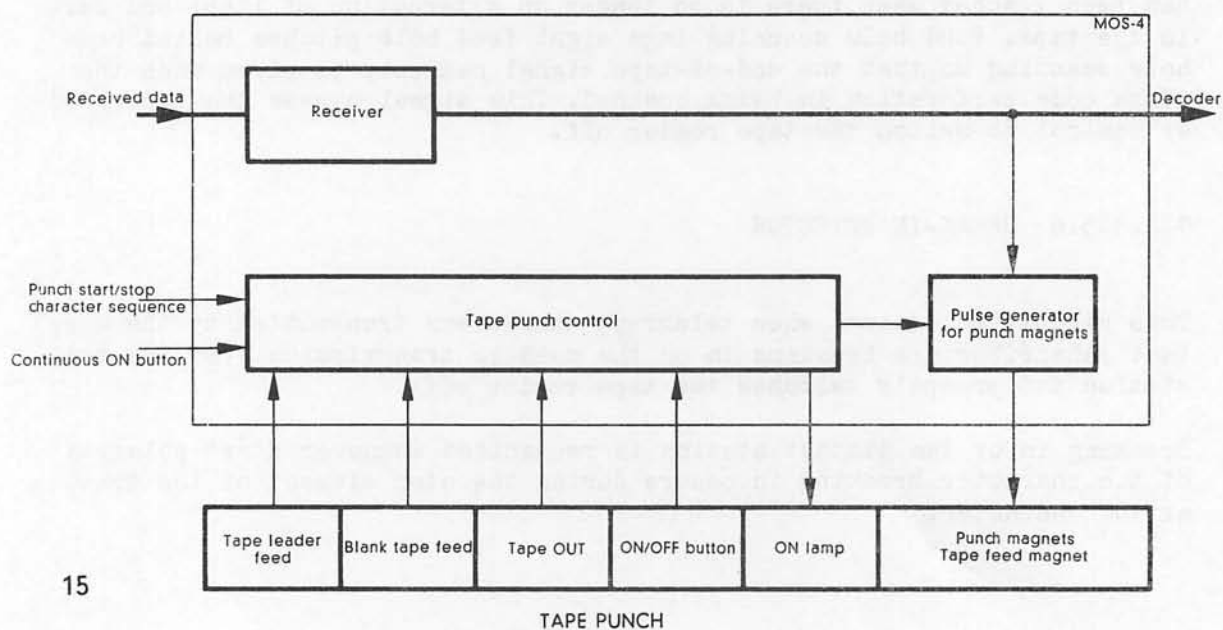
This circuit recognizes when telegraph characters transmitted by the distant subscriber are breaking in on the message transmission from the home station and promptly switches the tape reader off.

Breaking in by the distant station is recognized whenever start-polarity of the character breaking in occurs during the stop element of the transmitted character.

7.2.3.4 RECEIVER WITH TAPE PUNCH CONTROL (Figure 15)

This MOS circuit (MOS4) includes the following functional units:

- Receiver,
- tape punch control,
- pulse generator for the tape punch magnets.



7.2.3.4.1 RECEIVER

The function of the receiver is to derive the exact information from the received pulses, which are frequently heavily distorted during transmission. At the same time, the information arriving bit-serially must be converted to parallel format.

For this purpose, the receiver telegraph character, beginning with the start element, is written into a shift register, the clocking rate corresponding exactly to the telegraph speed. The moment of shifting the character always occurs in the middle of the element.

During the stop element the received information is available in parallel format for a short time for further processing. The shift register is then erased and prepared for reception of the next character.

The crystal-controlled timing pulse generator ensures that the synchronizing error of the receiver is less than 0.01 %. The timing error which arises due to the arriving telegraph character being out of synchronism with the timing pulse is less than 1 %. This produces a receive margin of more than +44 %.

A special feature ensures that the receiver does not cycle continuously when continuous start polarity is applied, e.g. during line interruptions.

7.2.3.4.2 TAPE PUNCH CONTROL

This circuit block is where the various commands are generated for the tape punch.

The tape punch (described in section 7.10) can be switched on or off manually by pressing the ON/OFF button.

The tape punch control switches the tape punch on or off also by recognizing four identical characters received as a sequence (CCCC for "ON" and FFFF for "OFF", according to CCITT Recommendations). This function can be programmed on the special function module.

The tape punch can also be switched on by means of the "data medium ON" switch in the manual device controls module. In this case it is switched on continuously and is not switched off automatically by an incoming call, as is the case when it is activated by means of the ON/OFF button.

When a new roll of tape is being loaded into the tape punch, the accuracy of the code hole spacing in the tape must be ensured. Once the tape gate is closed, therefore, the tape punch control causes the tape leader to be fed through und punched automatically 32 times with code combination 29 (5 holes).

Code combination 29 is also punched for as long as the blank tape feed button is held depressed.

The tape punch is turned off whenever the tape supply is exhausted.

7.2.3.4.3 PULSE GENERATOR FOR THE TAPE PUNCH MAGNETS

This circuit uses the received information to generate the control pulses for the magnet amplifiers. The magnet amplifiers control the punch magnets and the tape feed magnet, which drive the punch pins and the sprocket wheel respectively.

The operation of the punch pins for the five information tracks is staggered in time so as to reduce the punching noise.

The time taken to punch one character and feed the tape forward is dependent on the set telegraph speed, i.e.:

120 ms	at 50 bauds
90 ms	at 75 bauds
70 ms	at 100 bauds.

7.2.3.5 DECODER (Figure 16)

The function of the decoder (MOS-5) is to allocate the teleprinter signals arriving from the receiver to the associated machine function; i.e. the decoder supplies the information for setting the print wheel and determines which machine commands - e.g. print, column feed, line feed, etc. - must be carried out. Allocation of the teleprinter signals to the different functions is variable for some of these signals and can be fixed through the diode matrix of the special-function module.

In the most common version of the teleprinter, read-only memory 1 supplies the machine functions for the 64 possible teleprinter signals, i.e. the basic functions.

The basic functions of read-only memory 1 can be modified via the contents of read-only memory 2. In accordance with the 49 mounting positions on the diode matrix on the special-function module, it offers 49 modification possibilities which become effective through the insertion of diodes.

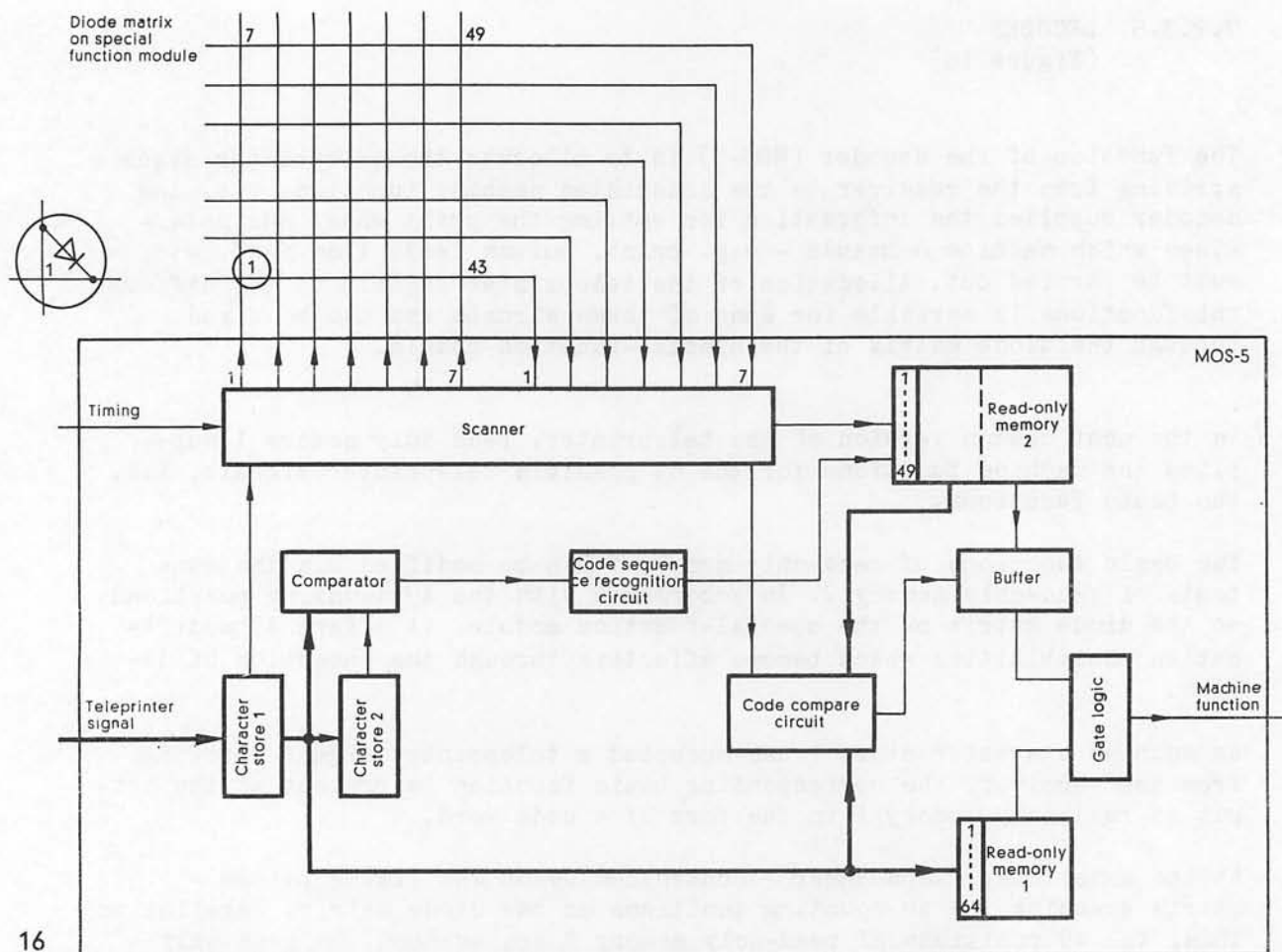
As soon as character store 1 has accepted a teleprinter signal arriving from the receiver, the corresponding basic function is present at the output of read-only memory 1 in the form of a code word.

At the same time, the scanner - controlled by 66 kHz timing pulses - starts scanning the 49 mounting positions on the diode matrix. Parallel to this, the 49 positions of read-only memory 2 are scanned. On read-only memory 2, each diode position is assigned a specific code combination with predetermined change information, in relation to the basic information contained in read-only memory 1.

The code combination from read-only memory 2 is compared, in a code compare circuit, with the teleprinter signal being applied. If the code combination tallies with the teleprinter signal and, at the same time, notification of the insertion of a diode is received, the change information present at the output of read-only memory 2 is transferred to the buffer. If all 49 locations of read-only memory 2 are scanned, the entire basic function change is held in the buffer in the form of a second code word. By combining the two code words from read-only memory 1 and the buffer, the definitive machine function is generated and fed to the appropriate points in the teleprinter.

In some cases, specific machine functions can also be initiated through the receipt of a number of identical teleprinter signals (code sequence). To this end, the teleprinter signal just received (character store 1) and the preceding signal (character store 2) are stored and compared. If the two signals tally, the signal just received is entered in a shift register. When the specified number of identical, consecutive signals has been attained, the code sequence recognition circuit emits a signal. Combined with the information from the scanner, the signal addresses the relevant location in read-only memory 2. The ensuring procedure, i.e. the transfer to the buffer and generation of the definitive machine function, has already been described.

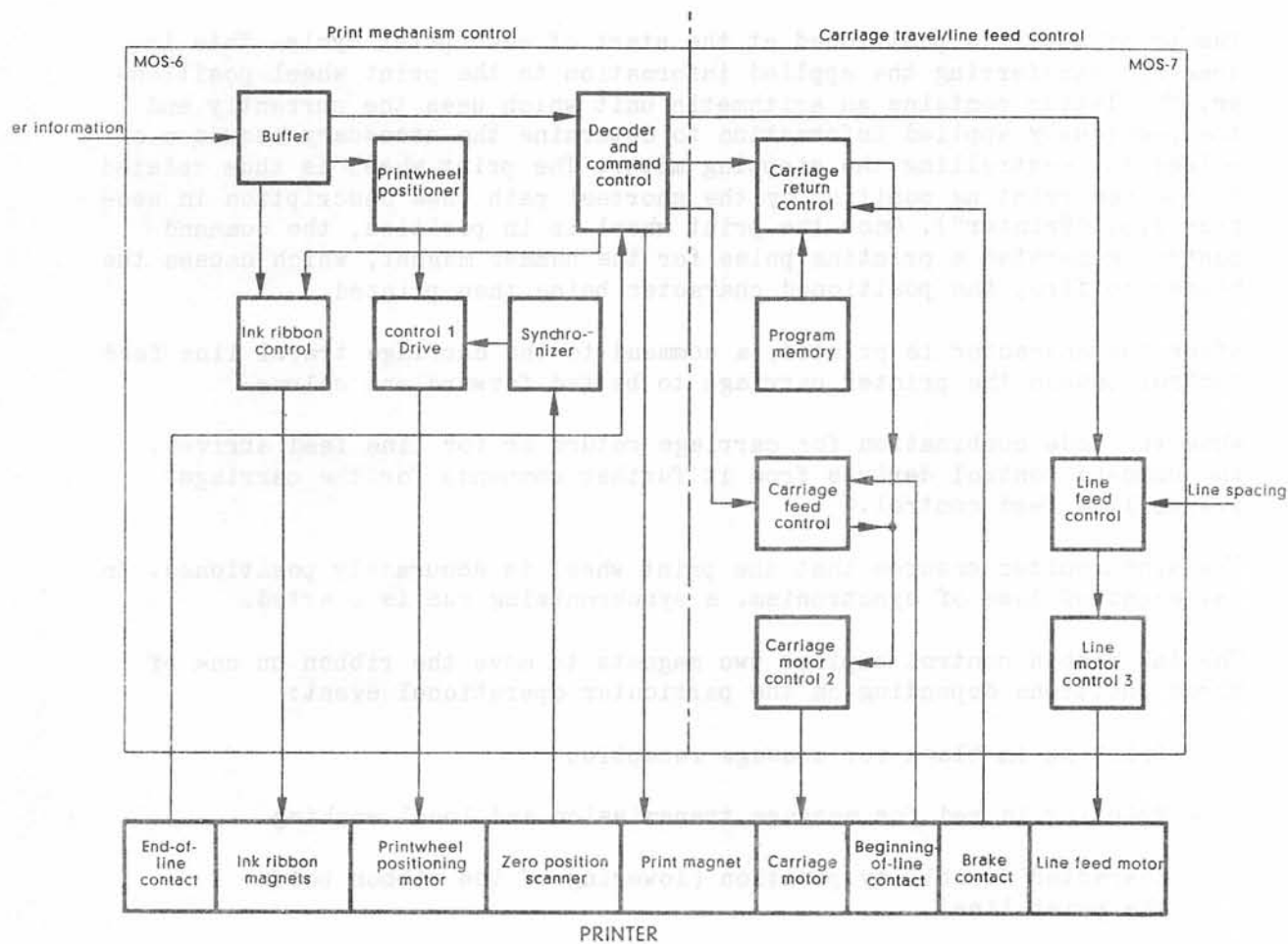
After receipt of an entire code sequence, the information in the shift register is deleted together with the next signal, which does not belong to the code sequence.



7.2.3.6 PRINTER CONTROL (Figure 17)

The printer control is accommodated in two MOS components (MOS-6 and MOS-7).

The MOS-6 circuit incorporates the print unit control; MOS-7 contains the carriage travel/line feed control.



7.2.3.6.1 PRINT MECHANISM CONTROL

The received information arriving from the decoder and including the commands for operation of the printer is first transferred to a 5-character buffer whose function is to store the characters received during carriage return. Every print character applied at the buffer output initiates a print cycle lasting 65 ms at all three telegraph speeds.

The print cycle is subdivided into the functions:

Positioning of the print wheel,
printout of the character, and
carriage feed.

The print wheel is positioned at the start of each print cycle. This is done by transferring the applied information to the print wheel positioner. The latter contains an arithmetic unit which uses the currently and the previously applied information to determine the necessary sequence of pulses for controlling the stepping motor. The print wheel is thus rotated to the new printing position by the shortest path (see description in section 7.5, "Printer"). Once the print wheel is in position, the command control generates a printing pulse for the hammer magnet, which causes the hammer to fire, the positioned character being then printed.

After the character is printed, a command to the carriage travel line feed control causes the printer carriage to be fed forward one column.

When the code combination for carriage return or for line feed arrives, the command control derives from it further commands for the carriage travel line feed control.

The synchronizer ensures that the print wheel is accurately positioned. In the event of loss of synchronism, a synchronizing run is started.

The ink ribbon control employs two magnets to move the ribbon on one of three positions depending on the particular operational event:

- Printing in black for message reception
- Printing in red for message transmission and local working
- Character visibility position (lowering of the ribbon below the print line).

7.2.3.6.2 CARRIAGE TRAVEL/LINE FEED CONTROL

This functional unit controls the carriage movement and line feed of the printer. The carriage feed control generates a train of three pulses per column for the column feed function of the printer carriage. These pulses are transferred to the carriage motor via carriage motor control 2.

An acceleration and a deceleration program with increasing and decreasing frequency respectively are included in the program memory to control the acceleration and deceleration of the stepping motor.

When a line feed is to be executed, the line feed control sends the appropriate number of stepping motor pulses to the line feed motor via line motor control 3. The number of stepping motor pulses is dependent on the line spacing set on the switch module.

Four pulses are required for 1-line spacing,

six pulses are required for 1 1/2-line spacing, and

eight pulses are required for 2-line spacing.

7.2.3.7 TIMING PULSE SUPPLY

The entire timing for the teleprinter is derived from a crystal-controlled oscillator with a frequency of 2.112 MHz. Whatever the operational conditions, therefore, the timing pulse generator has the same high accuracy, thus ensuring exceptional telegraphic values in respect of start-stop distortion, receive margin and synchronism.

All time-dependent functions within the basic electronics are also derived from the timing pulse supply, so precluding tolerances dependent on components.

The MOS components require a two-phase timing pulse, which is derived from the oscillator frequency by means of a special circuit.

7.2.3.8 INTERFACE S2 TO THE LINE INTERFACING EQUIPMENT

Interface S2 represents the line of demarcation between the device control functions, which remain largely the same for all applications, and the line interfacing system, which exists in many configurations and is determined by the particular circuit type.

Interface S2 is the point via which

- the send and receive data are interchanged,
- the signalling criteria are transferred for the operating mode control of the teleprinter, e.g. local, on-line, half-duplex and full-duplex modes,
- the alarm criteria, e.g. "bell" signal and end-of-tape condition, and
- the signals for subscriber selection, e.g. dialplate pulses, are transmitted.

Apart from these signalling criteria, the line interfacing equipment must also be supplied with the necessary operating voltages:

+12.8 V $\pm 5\%$, max. 650 mA,

-12.8 V $\pm 5\%$, max. 580 mA,

+5 V $\pm 5\%$
 $\pm 3\%$, max. 700 mA.

7.2.3.8.1 EXTENSION OF THE INTERFACE S2

On special versions of the teleprinter, a certain number of the interface signals of interface S2 is applied to a special connector X15 permitting the connection of accessory features in the circuit between the basic electronics and the line interfacing equipment of the teleprinter.

7.2.3.9 DIAGNOSTIC UNIT

A clip connector with appropriate test points is provided on the basic electronics board as a quick means of checking the supply voltages and important signalling criteria.

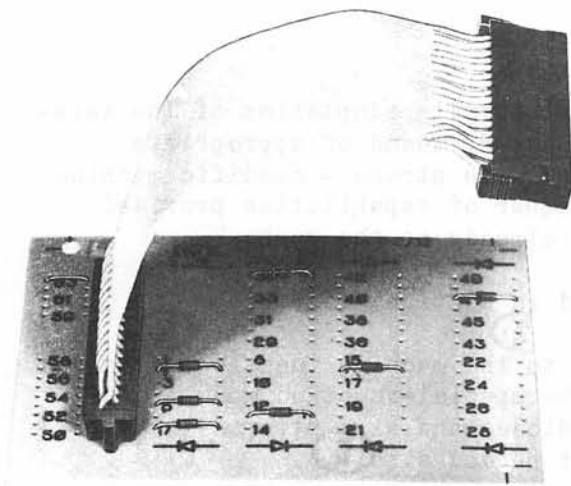
The test points can be checked by means of the teleprinter diagnostic unit, which has a light-emitting diode indicator and is simply plugged on. It is also possible, however, to check the test points using conventional test instruments.

The following criteria are brought to the clip connector:

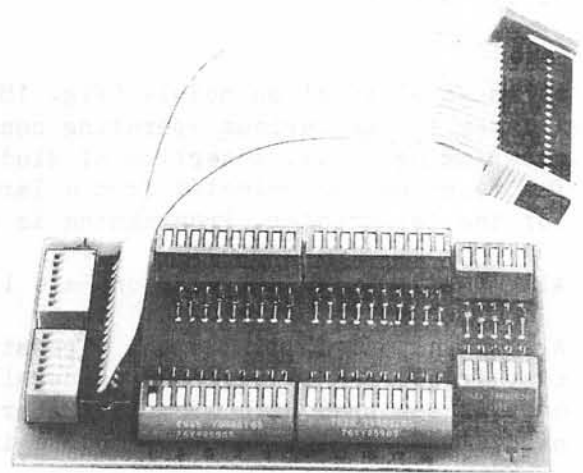
Supply voltages: 0 V
 +5 V
 +12 V
 -12 V
 +40 V

Signalling criteria: Punch pulses for the tape punch, tracks
 1...5, punch pulse for the tape punch,
 feed hole track, tape feed pulse for the
 tape punch, print pulse for the printer.

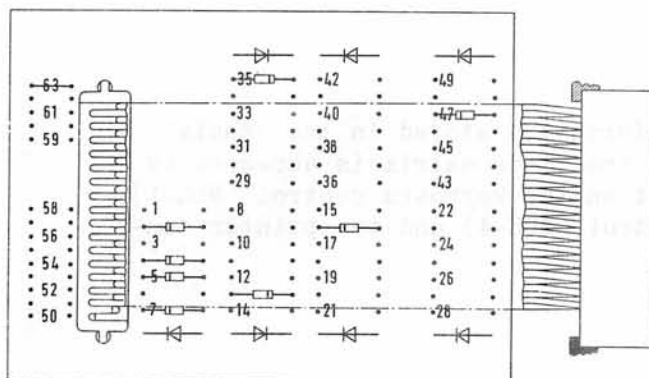
7.3 Special-function module VA



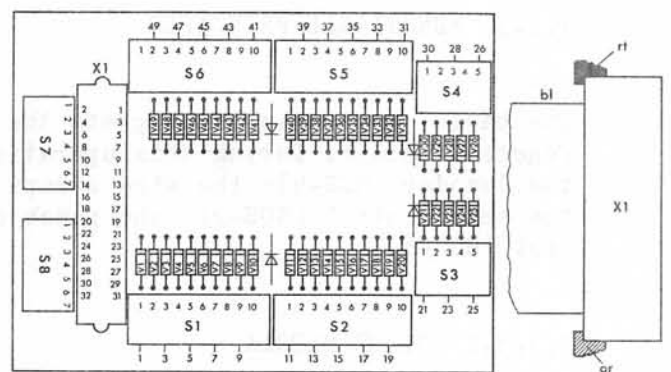
18



18a



19



19a

7.3.1 GENERAL

The special-function module (Fig. 18, 18a) permits adaptation of the teleprinter to the various operating conditions. By means of appropriate programming - i.e. insertion of diodes and wire straps - specific machine functions can be selected from a large number of capabilities provided for the teleprinter. Programming is done already at the works.

All possible machine functions are listed in section 7.3.4.

Allocation of the diodes and wire straps to the machine functions demanded most frequently is such that generally the special-function module must only be equipped with a small number of diodes and wire straps. In many cases, the special-function module is not needed at all.

The special-function module can be modified in the field by simply inserting and removing diodes and wire straps.

7.3.2 CONSTRUCTION (Figure 19, 19a)

The special-function module is a plug-in pc board. It can be equipped with up to 49 diodes, which form a 7 x 7 matrix, and 14 wire straps. The mounting positions are numbered so that the functions allocated to the diodes or wire straps provided can be easily identified with the aid of the table in section 7.3.4.

7.3.3 FUNCTIONAL PRINCIPLE

The basic electronics interprets the information stored in the special-function module. During this operation, the diode matrix is accessed by the decoder (MOS-5); the wire straps act on the keyboard control (MOS-1), the send control (MOS-2), the punch control (MOS-4) and the printer control (MOS-6).

7.3.3.1 DIODE MATRIX

Certain machine commands are selected in the teleprinter by the insertion of diodes in the matrix. Typical machine commands would be "printout", "print suppression", "line feed", "carriage return" etc. Each of the 49 diodes (V1...V49) is assigned a particular machine function (see table in 7.3.4). The decoder (MOS-5) interprets the diode matrix. The function of the decoder is described in basic electronics, section 7.2.3.5.

7.3.3.2 WIRE STRAPS

By inserting wire straps W50 to W58, -12 V or +5 V is applied to the inputs of the MOS modules concerned. These signals are interpreted by the MOS modules, and the functions allocated to the wire straps are initiated.

When wire straps W59 to W62 are inserted, either the decoder outputs (MOS-5) for relays 3 and 4 of the relay module, or the end-of-paper signals from the printer and tape punch can be applied to the relevant relays. Moreover, one of the decoder outputs can be connected with the punch control (MOS-4) via wire strap W63 and, provided an appropriate diode is inserted and the relevant teleprinter signal is present, the tape punch turned off.

7.3.4 LIST OF MACHINE FUNCTIONS

Mounting position V $\hat{=}$ diode W $\hat{=}$ wire strap	Function			Explanations (Explan. generally refer to function when diode/strap inserted)
	Effective on	Diode/strap not inserted	Diode/strap inserted	
V1 V2 V3 V4 V5	any comb. $\left\{ \begin{array}{l} \text{bit 1} \\ \text{bit 2} \\ \text{bit 3} \\ \text{bit 4} \\ \text{bit 5} \end{array} \right.$	Stop pol. Stop pol. Stop pol. Stop pol. Stop pol.	Start pol. Start pol. Start pol. Start pol. Start pol.	By appropriately inserting diodes V1...V5, one code combination can be chosen from the 32 possible combinations, to which specific functions can be allocated by inserting further diodes (V42...V49).
V61)	any comb.	Code recognition on Ltrs. side	Code recognition on Figs. side	By appropriately inserting diodes V6 and V7, the functions allocated to the selected combination are performed on the Ltrs. or Figs. side or both.
V71)	any comb.	Code recognition on Ltrs. and Figs. sides	Code recognition as defined with V6	
V8	Figs. no. 4	Printing	Print suppression	For special code assignments
V9	Figs. no. 4	Column feed	Feed suppression	For special code assignments
V10	Figs. no. 4	No punching or recording and answerback start	Punching or recording, no answerback start	Use answerback start only in connection with "No punching" or "No recording".
V1114)	Comb. 27	Carriage return (CR)	Carriage return/line feed (CR/LF) together within the line	In all operating modes carriage return/line feed (CR/LF) together within the line.
V12	Figs. no. 6	Printing	Print suppression	For special code assignments
V13	Figs. no. 6	Column feed	Feed suppression	For special code assignments

Mounting position V $\hat{=}$ diode W $\hat{=}$ wire strap	Function			
	Effective on	Diode/strap not inserted	Diode/strap inserted	Explanations (Explan. generally refer to function when diode/strap inserted)
V143)	Figs. no. 6	Does not operate contact 3	Operates contact 3	If relay module RET is installed, relay 3 can be operated during transmission or receipt of this combination, to whose potential-free contact 3 a signal or supervisory device, for example; can be connected. The contact can be loaded with up to 60 V/100 mA. It is closed for 135.90 or 67.5 ms, depending on the telegraph speed (50, 75 or 100 bauds). The closing time starts in the middle of the fifth signal element. The connecting wires for the contact can be brought out via the special signal socket (FZD) or the subscriber connecting cable (ASL).
V15	Figs. no. 7	Printing	Print suppression	For special code assignments
V16	Figs. no. 7	Column feed	Feed suppression	For special code assignments
V174)	Figs. no. 7	Does not operate contact 4 or/and punch - no stop	Operates contact 4 or/and punch stop (depending on W60 or W63)	As for V14; however, relay 4 or contact 4. Alternatively or additionally, the punch can be switched off (strap W63).
V18	Figs. no. 8	Printing	Print suppression	For special code assignments
V19	Figs. no. 8	Column feed	Feed suppression	For special code assignments

Mounting position V $\hat{=}$ diode W $\hat{=}$ wire strap	Function			
	Effective on	Diode/strap not inserted	Diode/strap inserted	Explanations (Explan. generally refer to function when diode/strap inserted)
V20	Figs. no. 8	Does not operate contact 2	Operates contact 2	As for V14, but relay 2 or contact 2
V21	Figs. no. 9	Printing	Print suppression	For special code assignments
V22	Figs. no. 9	Column feed	Feed suppression	For special code assignments
V23	Figs. no. 9	Does not operate "bell" or contact 2	Operates "bell" and contact 2	As for V14, but relay 2 or contact 2. "Bell" also operated. Note: If relay module RET is not installed, only the "bell" is operated.
V24	Figs. no. 10	Printing	Print suppression	For special code assignments
V25	Figs. no. 10	Column feed	Feed suppression	For special code assignments
V26	Figs. no. 10	Operates "bell" and contact 2	Does not operate "bell" or contact 2	If the diode is not inserted, relay 2 or contact 2 (see also V14) is only operated if relay module RET is also installed.
V27	Figs. no. 19	Printing	Print suppression	For special code assignments
V28	Figs. no. 19	Column feed	Feed suppression	For special code assignments
V29	Figs. no. 19	Does not operate "bell" or contact 2	Operates "bell" and contact 2	As for V14, but relay 2 or contact 2. "Bell" is also operated. Note: If relay module RET is not installed only "bell" is operated.

Mounting position V $\hat{=}$ diode W $\hat{=}$ wire strap	Function			
	Effective on	Diode/strap not inserted	Diode/strap inserted	Explanations (Explan. generally refer to function when diode/strap inserted)
V30	Comb. 32	Print suppression	Printing	For special code assignments with 54 or 56 printable characters; e.g. for Arab. countries.
V31	Comb. 32	Feed suppression	Character feed	
V32	Comb. 32	Punching or recording	No punching or recording	
V33	4 x Ltrs. no. 3	Does not operate contact 2	Operates contact 2	As for V24, but relay 2 or contact 2.
V34 ²⁾	4 x Ltrs. no. 3	Tape reader - no start	Tape reader - start	When receiving this character sequence, tape reader can be turned on.
V35 ²⁾	4 x Ltrs. no. 3	Tape punch - no start	Tape punch - start	When receiving this character sequence, tape punch can be turned on.
V36	Comb. 27	Carriage return CR	No CR, but printing and column feed	For special code assignments with 54 or 56 printable characters; e.g. for Arab. countries.
V37	Figs. no. 28	Line feed LF	No LF, no punching or recording, but answer-back start when receiving	For special code assignments; e.g. for Arab. countries.
V38 ⁶⁾¹²⁾	Ltrs. no. 28	Line feed LF	At the 1st character: CR 2nd char. and succeeding characters: LF	For special code assignments; e.g. for Arab. countries.

Mounting position V $\hat{=}$ diode W $\hat{=}$ wire strap	Function			Explanations (Explan. generally refer to function when diode/strap inserted)
	Effective on	Diode/strap not inserted	Diode/strap inserted	
V396)12)	Ltrs. no. 28	Line feed LF	CR and LF together	For special code assignments; e.g. for Arab. countries.
V40	Comb. 30	Figures shift (Figs.)	Ltrs. side: Figs. side: operates "bell"	For special code assignments; e.g. for Arab. countries.
V41	Red/black changeover	Send: red printing Receive: black printing	Red/black control externally	In the case of external red/black control and installed relay module RET, the teleprinter can be set to red printing by connecting two leads (by means of a contact or similar). The leads can be brought out via the special signal socket (FZD).
V427)	any comb.	Printing function as per CCITT code table	Printing function as per code table inverted	For special code assignments; see also V1...V7.
V437)	any comb.	Column feed function as per CCITT code table	Feed function as per code table inverted	Note: If the code combination set up by diodes V1...V7 performs the CR or LF function, the printing and column feed functions cannot be inverted; i.e. there is always print and column feed suppression.
V4415)	Comb. 28	Line feed (LF)	Carriage return/line feed (CR/LF) together within the line	In all operating modes carriage return/line feed (CR/LF) together within the line.

Mounting position V $\hat{=}$ diode W $\hat{=}$ wire strap	Function			
	Effective on	Diode/strap not inserted	Diode/strap inserted	Explanations (Explan. generally refer to function when diode/strap inserted)
V454)	any comb.	Does not operate contact 4 or/and punch - no stop	Operates contact 4 or/and punch - stop (depending on W60 or/and W63)	As with V14, but relay 4 or contact 4. Alternatively or additionally, the punch can be turned off (strap W63); see also V1...V7.
V468)	any comb.	Does not operate "bell" or contact 2	Operates "bell" and contact 2	As for V14, but relay 2 or contact 2. Additionally, "bell" is operated. Note: If relay module RET is not installed, only the "bell" is operated. See also V1...V7.
V474)	4 x any comb.	Does not operate contact 4 or/and punch - no stop	Operates contact 4 or/and punch - stop (depending on W60 or/and W63)	As for V14, but relay 4 or contact 4. Alternatively or additionally, the punch can be turned off (strap W63). See also V1...V7.
V482)	4 x any comb.	Reader - no start	Tape reader - start	When receiving this character sequence (see V1...V7), reader can be turned on.
V492)	4 x any comb.	Punch - no start	Punch - start	When receiving this character sequence (see V1...V7) punch can be turned on.
W50	Comb. 27 (Comb. 28)	Unlocking of keyboard (is not counted)	Character (comb. 27) is counted. Comb. 27 and 28 become case-dependent. Keyboard is unblocked by Ltrs. no. 28.	For special code assignments with 54 or 56 printable characters: e.g. for Arab. countries.

Mounting position V $\hat{=}$ diode W $\hat{=}$ wire strap	Function			
	Effective on	Diode/strap not inserted	Diode/strap inserted	Explanations (Explan. generally refer to function when diode/strap inserted)
W51	Reception of a "bell signal"	"Bell signal" not stored	"Bell signal" stored	If the bell signal is stored, the lamp in the "reset bell" button in the manual device controls group is lit upon reception of a bell signal until the bell signal is reset by actuating the reset button. If the teleprinter is equipped with a relay module RET, the associated floating contact stays closed as long as the lamp in the reset button is lit.
W52	Keyboard	Without umlauts	With umlauts (AE, OE, UE)	For keyboard layouts for German-speaking countries. The character sequences AE, OE and UE are transmitted by means of keys Ä, Ö and Ü. Note: When using the umlauts, the code combinations Figs. 6 (F), Figs. 7 (G) and Figs. 8 (H) cannot be generated via the keyboard, i.e. they cannot be assigned special characters.
W53	Character release mode	Release mode in response to external single call pulses	Release mode in response to an external continuous signal	Character release in response to external single call pulses a character is transmitted upon reception of a call pulse. Character release in response to an external continuous signal - characters are transmitted as long as the call pulse is applied.

Mounting position V $\hat{=}$ diode W $\hat{=}$ wire strap	Function			
	Effective on	Diode/strap not inserted	Diode/strap inserted	Explanations (Explan. generally refer to function when diode/strap inserted)
W54	Figs. nos. 6,7,8	Characters are counted	Characters are not counted	For special code assignments; in connection with V13, V16 and V19 - column feed suppression. Note: The "No counting" criterion can, for reasons of circuit design, be selected for these three code combinations jointly only. If not all of these 3 code combinations are assigned either column feed or no column feed, the user must decide whether insertion or non-insertion of the strap is better suited for his purposes.
W55 ¹³⁾	Overprint lock	Not effective after the 69th char.	Effective after the 69th char.	The overprint lock prevents several characters being printed on top of each other at the end of the line by locking the keyboard.
W56 ¹³⁾	Overprint lock	Not effective after the 72nd char.	Effective after the 72nd char.	The overprint lock prevents several characters being printed on top of each other at the end of the line by locking the keyboard.
W57	End-of-line	Column feed suppression	Automatic CR and LF	Automatic CR and LF should only be used in connection with the overprint lock in order that characters CR and LF must be keyed in during keyboard operation. Thus "automatic CR and LF" is only effective when receiving.

Mounting position V $\hat{=}$ diode W $\hat{=}$ wire strap	Function			
	Effective on	Diode/strap not inserted	Diode/strap inserted	Explanations (Explan. generally refer to function when diode/strap inserted)
W58	Keyboard	Automatic Ltrs./Figs. shift effective	Automatic Ltrs./Figs. shift not effective	Automatic Ltrs./Figs. shift must be deactivated for condensed keyboards.
W599)	End of tape	Does not operate contact 4	Operates contact 4	At the end of the paper tape, relay 4 or contact 4 can be operated. As described for V14, the contact can be wired and brought out.
W609)	Contact 4	Selection line interrupted	Relay for contact 4 operated	If when sending or receiving specific code combinations, relay 4 or contact 4 is to operate, not only the appropriate diode but also this wire strap must be inserted, since relay 4 can also operate at the end of the paper tape or magnetic tape.
W6110)	Contact 3	Selection line interrupted	Relay for contact 3 operated	If relay 3 or contact 3 is to operate when code combination Figs. no. 6 is sent or received, not only diode V14 but also this wire strap must be inserted, since relay 3 can also be operated at the end of the teleprinter paper.
W6210)	End of teleprinter paper	Does not operate contact 3	Operates contact 3	Relay 3 or contact 3 can be operated at the end of the teleprinter paper. As described for V14, the contact can be wired and brought out.

Mounting position V $\hat{=}$ diode W $\hat{=}$ wire strap	Function			Explanations (Explan. generally refer to function when diode/strap inserted)
	Effective on	Diode/strap not inserted	Diode/strap inserted	
W63 ¹¹⁾	Figs. no. 7 any comb.	Punch - no stop	Punch - stop	If the punch is to be turned off when sending or receiving specific code combinations, not only the appropriate diode but also this wire strap must be inserted.

Comb. Code combination, as per ITA No. 2

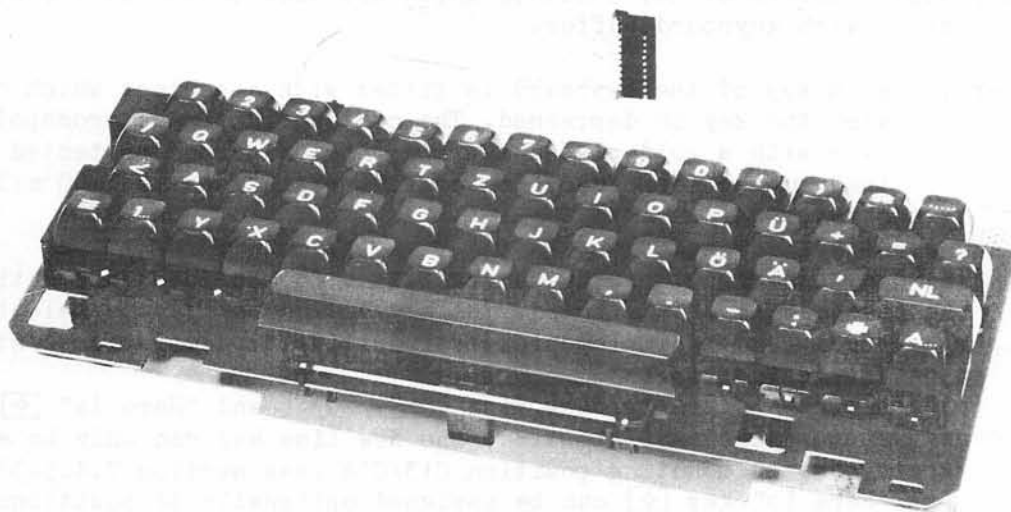
any comb. Freely-selectable code combination
(Nos. 1 to 32 as per ITA No. 2)

Ltrs. no. Function only effective on Letters side

Figs. no. Function only effective on Figures side

- 1) Diode V7 has priority over diode V6
- 2) Function is initiated only when receiving
- 3) Effective only with W61
- 4) Effective only with W60 or/and W63
- 5) Not effective in connection with W52
- 6) Can only be used alternatively
- 7) Does not apply for CR and LF
- 8) Inserted diode has priority
- 9) Can only be used alternatively
- 10) Can only be used alternatively
- 11) Effective only with V17 or/and V45 or/and V47
- 12) Effective only with W50
- 13) Can only be used alternatively
- 14) Use only with V44
- 15) Use only with V11

7.4 Keyboard TA



20

7.4.1 GENERAL





The keyboard design (Fig. 20) was inspired by human engineering considerations. The keyboard comprises up to 60 keys depending on layout. Unassigned key positions are covered up by dummy keys.

7.4.2 CONSTRUCTION

The keyboard consists of key contacts which are used to access the keyboard control with keyboard buffer.

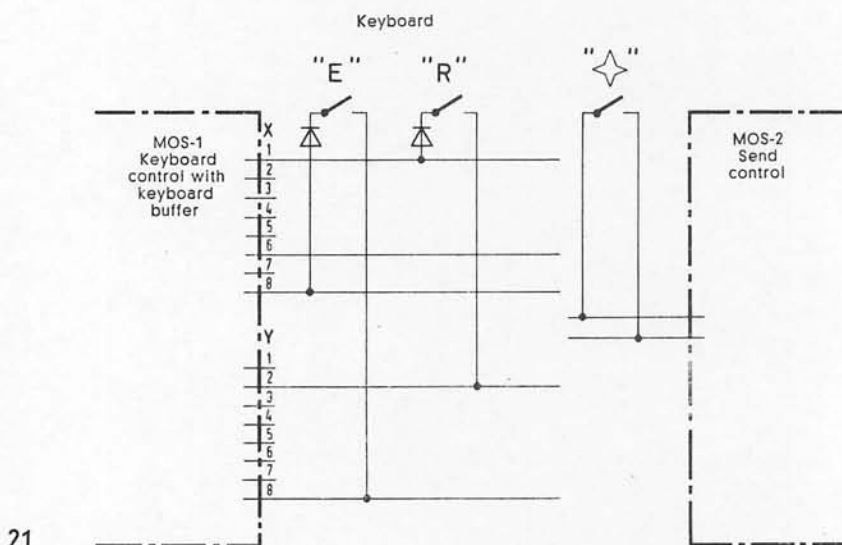
Keyboard: Each key of the keyboard is fitted with a contact which closes when the key is depressed. The contact is of the crosspoint type with a gold-plated surface; it is located protected from dust in the key cover. Its contact resistance is ≤ 60 milliohms.

The assignment of the key positions to the code combinations is made in the keyboard. The key assignment can be selected freely and is implemented by inserting diodes and wire straps of varying lengths.

Exceptions are the New Line  /  and "Here is"  keys. Because of its size, the New Line key can only be assigned to mounting position C13/C14 (see section 7.4.3.3) The "Here is" key  can be assigned optionally to positions 1...9 (Fig. 21).

Keyboard control: The keyboard control with keyboard buffer is implemented in MOS technology. This enables the design of the keyboard to be kept simple (open contact).

Control and buffer are both contained in the basic electronics.



7.4.3 PRINCIPLE OF OPERATION

7.4.3.1 KEYBOARD CONTROL

The keyboard control is integrated in the MOS-1 component. The latter is part of the basic electronics and described in section 7.2.3.1.

7.4.3.2 CHARACTER REPETITION


When the run-out key (....) is depressed, the character entered last is repeated as long as the run-out key is held depressed. If a different character is keyed in while the run-out key is held depressed, the new character is repeated until the run-out key is released.

7.4.3.3 CHARACTER SEQUENCE

To facilitate operation of the teleprinter, the keyboard includes keys which trigger certain character combinations. For example, the umlauts ä, ö, ü in use in German-speaking countries are transmitted as the character combinations ae, oe and ue respectively.

A New Line key can be provided in place of or in addition to the keys for carriage return and line feed. When pressed, this key causes the character sequence CR-CR-LF; CR-LF-CR; or CR-LF to be generated. The NL key can occupy literally any key position on the keyboard. If it is provided with a broader key button, however, it can only be installed in position C13/C14 (middle letters row, to the right).

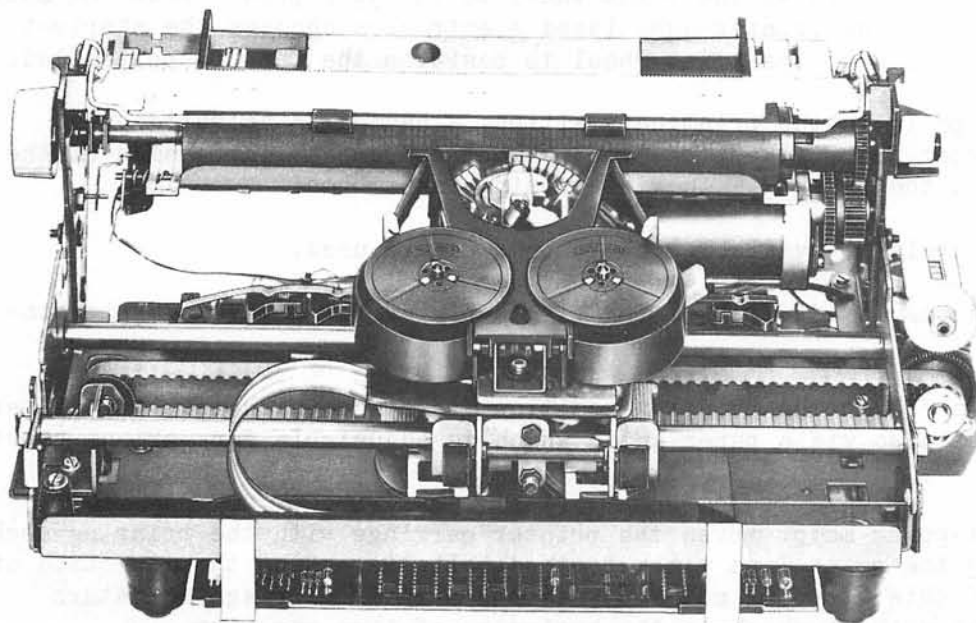
7.4.3.4 "HERE IS" KEY (see also section 7.6)

Pressing the "Here is" key  causes the home answerback unit KG to be tripped. This key may be either included in the keyboard TA or the manual device controls group GB. The answerback request can be inhibited by depression of switch S8 (inhibit answerback request) in the manual device controls group.

7.4.4 EFFECTS OF THE OPERATING MODES ON THE KEYBOARD TA

Functional state of the teleprinter	Standby		Operating condition		
	AC power voltage applied		Local or on-line working enabled		
	Teleprinter hooked up to auto-matically switched network	Teleprinter hooked up to point-to-point dedicated circuit	Idle	Printing	
			no input or output module in operation	an input module other than keyboard in operation	keyboard only in operation; one output module in operation
Effect on: KEYBOARD					
All keys except the letters shift key (A...) and the keys for figures 1 to 0	ineffect.	ineffect.	effective	ineffect.	effective
Letters shift key (A...)	ineffect.	effective	effective	ineffect.	effective
Keys for figures 1 to 0	ineffect.	ineffect.	effective	ineffect.	effective
"Here is" key	ineffect.	ineffect.	effective	ineffect.	effective

7.5 Printer DR



7.5.1 GENERAL

The teleprinter is equipped with a type printer (Figure 22) which ensures the high standard of print quality only obtainable with impact printing.

The printer's mechanical parts have been reduced to a minimum; it prints 15.4 characters/sec.

The type carrier is a print wheel which is a plastic spoked disk. The printing types are fitted to the tips of the spokes.

A stepping motor rotates the print wheel to the appropriate printing position. For this, the printer-associated electronics chooses the shortest angle of rotation of the print wheel to position the tape to be printed.

Once the type is in the printing position, a hammer is actuated by an electro-magnet and strikes the type, which produces an impression of the character on the paper via the intervening ink ribbon.

Normal commercially-available ink ribbons can be used.

The print force is adjustable, for single-ply or for 2-ply to 4-ply stationery.

The paper is fed to the printing position via a rod which regulates paper traction and also via a paper guide which is adjustable for various paper widths.

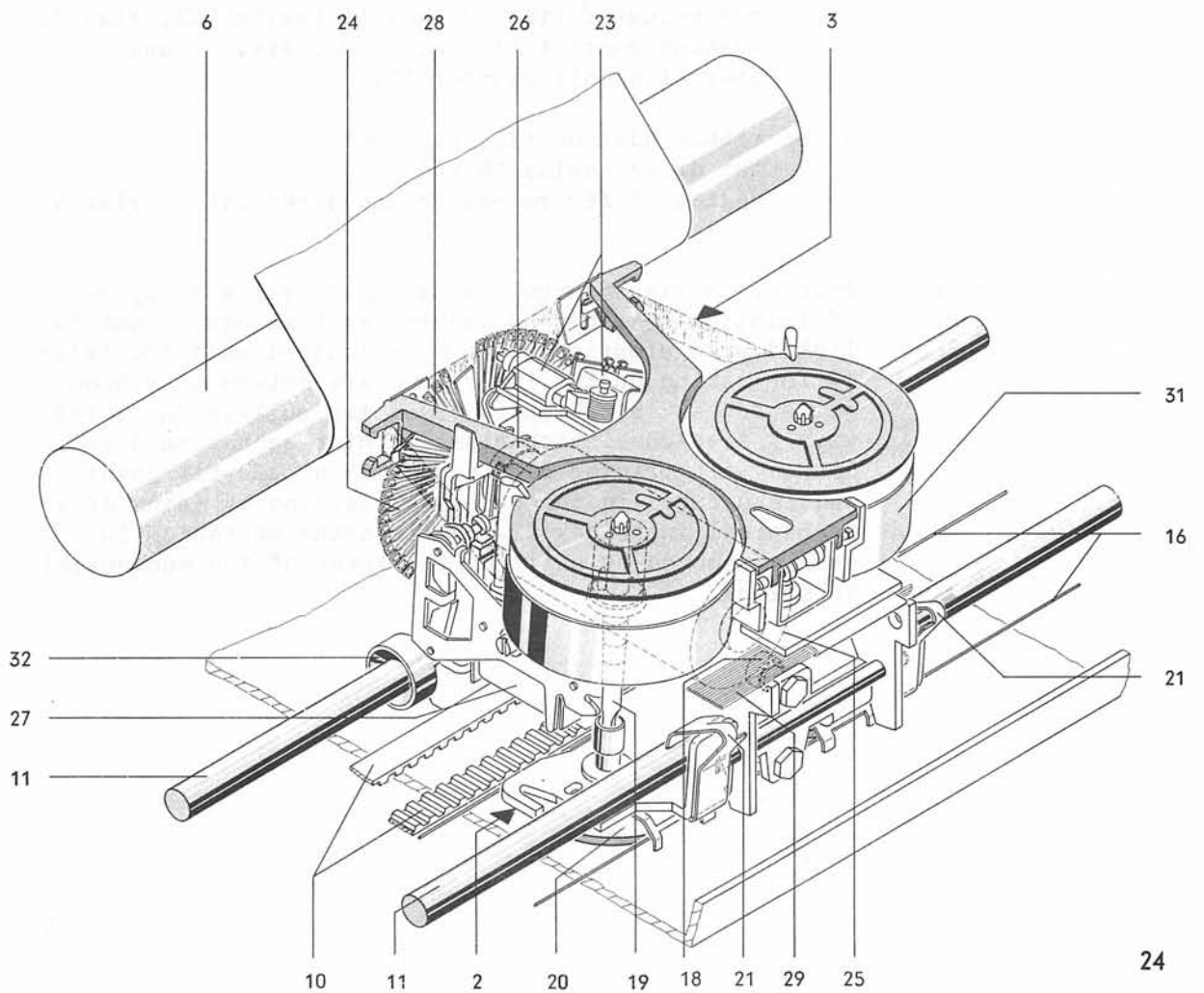
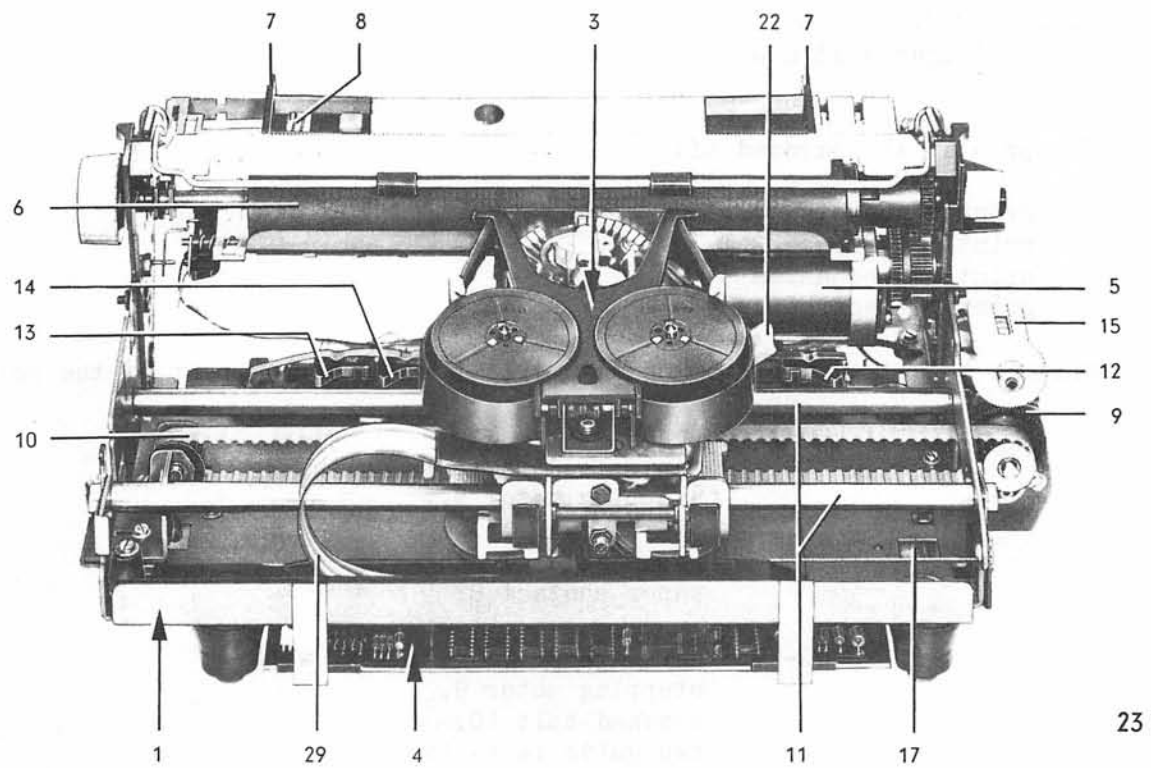
A second stepping motor moves the printer carriage with the printing mechanism along the print line via a toothed belt. Reversing the direction of rotation of this stepping motor causes the printer carriage to return smoothly and without shock to the beginning-of-line position.

Another stepping motor is used for the line feed function. The line spacing can easily be set to single, 1 1/2 or double by means of a switch.

The motion of the printer carriage is used to advance the ink ribbon. A magnet system reverses the ribbon feed direction.

Two further magnet systems position the ink ribbon for printing in red or black, and for making the last characters printed visible.

At telegraph speeds of 75 and 100 bauds, the printer buffer stores the characters received during carriage return.



7.5.2 CONSTRUCTION (Figures 23 and 24)

The printer is composed of:

Printer chassis 1,
printer carriage 2,
printing mechanism 3 and
printer electronics 4.

Printer chassis: Printer chassis 1 is the supporting part of the printer.

It contains:

- The paper feed facility, with
stepping motor 5,
platen 6,
paper guide 7 and
paper contact 8;
- The carriage drive facility, with
stepping motor 9,
toothed belt 10,
two guide rails 11,
end-of-line contact 12 (switch S1, Fig. 8),
beginning-of-line contact 13 (switch S3, Fig. 8),
braking contact 14 (switch S2, Fig. 8) and
operation unit counter 15.
- The ribbon advance facility, with
two drive cables 16 and
magnet 17 for reversing the direction of ribbon
feed.

Printer carriage: Printer carriage 2 runs on two guide rails 11 by means of friction bearings 32 and roller bearings 18 and is linked with stepping motor 9 by toothed belt 10. Axles 19 for taking up the ink ribbon are driven by ribbon drive cables 16, which run over two pulleys 20 fitted with a free-wheel mechanism. Printer mechanism 3 is linked with printer carriage 2 via a push-fit joint 21 and is secured in the printing position by means of a mechanical interlock 22. The printing mechanism is easily removed by shifting the lever of the mechanical interlock.

Printer
mechanism:

Printing mechanism 3 contains:

Printing system 23,
print wheel 24,
stepping motor 25 for positioning the print wheel
photoelectric scanner (not shown) for exact posi-
tioning of the print wheel,
magnet system 27 for two-color print control and
for lowering the ribbon to the character visibil-
ity position,
spool carrier 31 with ribbon lifter 28 and ribbon
reversal contact,
trailing cable 29, which provides the electrical
communication with the printer electronics.

Printer
electronics:

Printer electronics 4, a pc board, is located under the
printer chassis. It carries the power electronics for
the printer. This includes all the control circuits and
amplifiers required for the stepping motors and elec-
tro-magnets. The digital section of the control, the
printer buffer for example, is to be found on the basic
electronics.

7.5.3 PRINCIPLE OF OPERATION

After a character is received, the stepping motor rotates the print wheel to the appropriate printing position; the character is then printed and the printer carriage advanced by one column. As the carriage feed takes place, the print wheel is already being set to the next printing position.

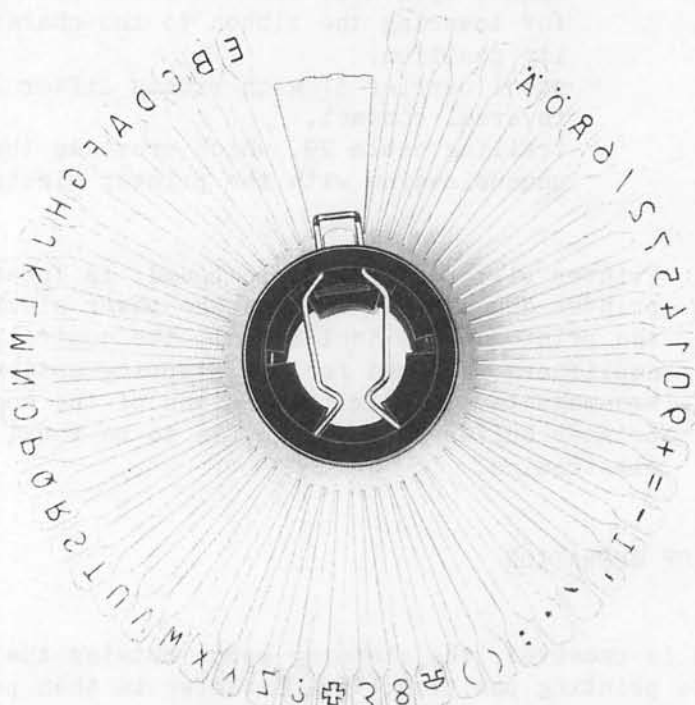
7.5.3.1 PRINT WHEEL POSITIONING

The print wheel (Figure 25) is rotated one pitch with each single step of the stepping motor.

On the basis of the actual position of the print wheel, the printer control on the basic electronics calculates the direction of rotation and the number of pitches by which the print wheel must be rotated to reach the next printing position by the shortest path. Hence, the maximum positioning angle is only 180°.

Special acceleration and deceleration programs are used to accelerate the print wheel from 0 to a rotational speed of 1000 pitches per second within five steps and to decelerate it to 0 again within three steps. If the displacement range is equal to or smaller than seven pitches, the rotational speed is a constant 500 pitches/second.

In conjunction with the photoelectric scanner, the printer control checks the position of the print wheel (actual position) with the position called for by the printer control (address position).



25

The concurrence of the actual with the address position of the print wheel is checked

whenever the character "e" is selected,
whenever a mode is enabled,
whenever there is a space and
in communication pauses.

The check takes place as follows:

The print wheel assumes a defined position on support 26 (Figure 24). The support has a cutout six pitches wide which is scanned by the photoelectric scanner. If the cutout in the support is recognized at the same time as the pulse combination assigned to the character "e" is applied to the stepping motor, the printer control recognizes that the actual and the address positions are in concurrence.

If there is no concurrence, a synchronization run is executed for a maximum of 156 ms. The characters received during the synchronization run are stored in the printer buffer.

Synchronization run:

For coarse adjustment (to six characters precisely), the stepping motor receives a synchronizing signal which it uses to rotate the support together with the print wheel until the photoelectric scanner recognizes the cutout in the support.

For fine adjustment to the right pitch (character "e"), the printer control drives the stepping motor by means of six different pulse sequences. The stepping motor continues to rotate until the photoelectric scanner operates at the same instant as the pulse sequence assigned to the character "e" is recognized.

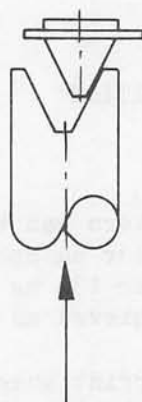
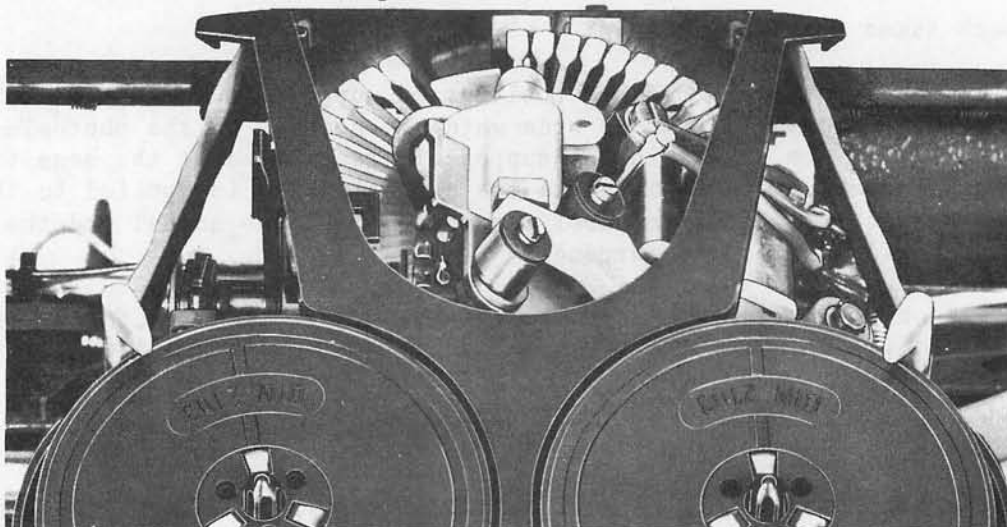
The characters in the printer buffer are now called and printed.

7.5.3.2 CHARACTER VISIBILITY POSITION (Figure 26)

In this position, the last characters can be read also. The character visibility position is assumed whenever an operating mode is enabled and in communication pauses, i.e. whenever 130 ms have elapsed since the last character was printed. This is achieved as follows:

Next to the character "e" on the print wheel there is an open sector four pitches in width. When the print wheel is in the character visibility position, the character "e" is in the printing position. Thus, the open part of the print wheel is situated immediately in front of the last character printed. Simultaneously, the visibility magnet lowers the ink ribbon to give an unobstructed view of the copy area.

ie jede woche vier gute bequeme pelze xy 1234567890
 ie jede woche vier gute bequeme pelze xy 1234567890
 ie jede woche vier gute bequeme pelze xy 1234567890
 ie jede woche vier gute bequeme pelze xy 1234567890
 ie jede woche vier gute bequeme pelze xy 1234567890
 ie jede woche vier gute bequeme pelze xy 1234567890
 ie jede woche vier gute bequeme pelze xy 1234567890
 ie jede woche vier gute bequeme pelze xy 1234567890



7.5.3.3 PRINTING OF CHARACTERS

To print the positioned character, the electro-magnetically-fired print hammer strikes the type against the ink ribbon.

The front of the print hammer has a wedge shaped indentation; this faces a corresponding projection on the type (Figure 27). This arrangement ensures the horizontal positioning of the type is corrected as the printing action is executed.

The printer control lessens the print force for eight small-area characters, e.g. the full stop, by reducing the circuit.

If only single-ply paper is to be used for printing, the reduced print force can be set for all characters by means of a switch on the switch module (section 7.7.3.1). This brings a further reduction in printing noise.

7.5.3.4 PRINTER CARRIAGE DRIVE

A stepping motor moves the printer carriage horizontally a column at a time by means of a toothed belt. Three single steps of the stepping motor correspond to one column space. A column space equals 2.54 mm.

The end-of-line position can be set to the 69th or 72nd character by means of the end-of-line contact (Switch S1, Figure 30). The end-of-line contact is responsible for carriage feed suppression and for automatic carriage return and line feed.

The return of the printer carriage to the beginning-of-line position is achieved by reversing the direction of rotation of the stepping motor. A carriage return program contained in the basic electronics brings the acceleration to about 1200 motor steps/second (~ 1 m/sec). Twelve columns before the beginning-of-line position, a braking contact (Switch S2, Figure 30) operates to decelerate the stepping motor to 250 motor steps/second until the printer carriage comes to a halt.

A beginning-of-line contact and the position of the ring counter in the stepping motor control are used for positioning the printer carriage in the first print column of a line. The beginning-of-line contact (Switch S3, Figure 30) serves for coarse positioning, while the ring counter marks an exactly reproducible beginning-of-line position.

The carriage return time is about 300 ms. At a telegraph speed of 50 bauds, the carriage return is over within the time required for the two control characters CR and LF.

At 75 and 100 bauds, the time required for the two control characters is only 200 ms and 150 ms respectively. As this time is not sufficient for a carriage return, the printer buffer, a 5-character store, stores the characters received during the carriage return.

As the printer prints at a rate of 15.4 characters/second and 13.33 characters/second are received when operating at 100 bauds, the printer empties the printer buffer again after about ten characters have been printed in the new line.

7.5.3.5 LINE FEED

An intermediate gear links a stepping motor (Figure 28) with platen 6. Four steps of the stepping motor feed the paper forward by one line when single-line spacing is set.

The line spacing can be set to single, 1 1/2 or double spacing by means of a switch in the switch module (section 7.7.3.1).

Brief depression (< 250 ms) of a button in the manual device controls module advances the paper by one quarter of a line. Longer actuation of this button (> 250 ms) causes the paper to be fed forward for as long as the button is held depressed. The paper feed is not signalized to the distant station.

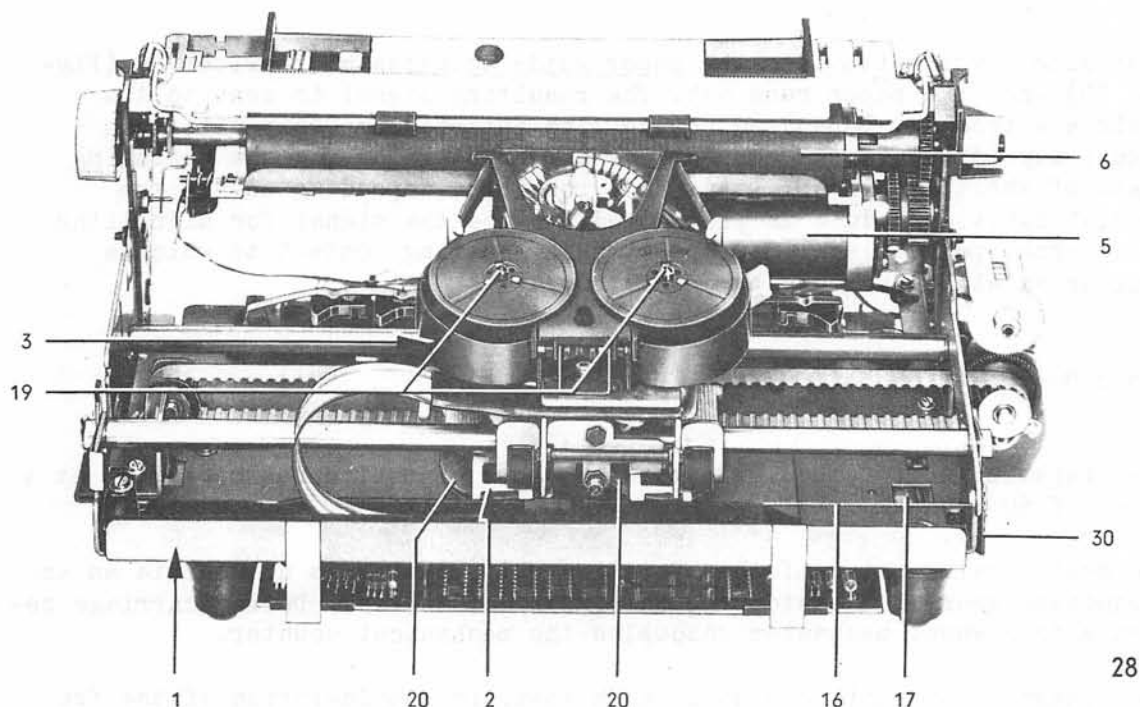
7.5.3.6 RIBBON DRIVE (Figure 28)

The motion of the printer carriage is used for driving the ink ribbon. A magnet system is used to reverse the direction of the ribbon feed.

The two ribbon drive cables 16 which are secured in printer chassis 1 are each led round a cable pulley 20 in the printer carriage and end at armature 30 of magnet system 17. The position of armature 30 makes one of the two cables 16 taut and the other slack. As the carriage feed is taking place, cable pulley 20 executes a rotary motion on the taut cable 16. This motion is transferred via a clutch to ribbon spool axle 19 in printing mechanism 3.

The end-of-ribbon contact operates when the end of the ribbon is reached and reverses magnet system 17. Armature 30 travels to its other position, thus tensioning the cable that was loose.

During the carriage return, cable pulleys 20 are out of engagement by means of a freewheel mechanism.



7.5.3.7 TWO-COLOR PRINT CONTROL; CHARACTER VISIBILITY POSITION

The ink ribbon can assume three positions:

- | | |
|-------------------------------|---|
| Printing in red | - for local working and transmission |
| Printing in black | - for message reception |
| Character visibility position | - i.e. lowering the ribbon below the level of the printed line to reveal the text just printed. |

Two hinged-armature magnets incorporated in the printing mechanism move the ribbon lifter to the desired position. The two magnets are energized by the two-color print control on the printer electronics.

- | | |
|-------------------------------|--------------------------------------|
| Printing in red | - no magnet is energized |
| Printing in black | - magnet SW is energized (Figure 30) |
| Character visibility position | - magnet SB is energized (Figure 30) |

7.5.3.8 PAPER SUPERVISION

A sensing lever built into the paper guide actuates microswitch S4 (Figure 30) when the paper runs out. The resulting signal is sent to the basic electronics. Depending on the line interfacing equipment, this signal may influence the connection, e.g. by terminating the operating state of the teleprinter. It is also possible, depending on how the special function module is programmed, to use the signal for signalling to external points, e.g. for operating a floating contact to which a bell or an alarm lamp can be connected.

7.5.3.9 OPERATION UNIT COUNTER

One operating unit is equivalent to one hour of continuous operation at a speed of 50 bauds.

The mechanical counter of the operation unit counter is driven via an intermediate gear of the stepping motor for column feed. During carriage return a free-wheel mechanism uncouples the mechanical counter.

The transmission ratio chosen is such that, in consideration of the frequency of column feeds in German and English texts, the counter gives an indication which reflects the operating time of the mechanical components.

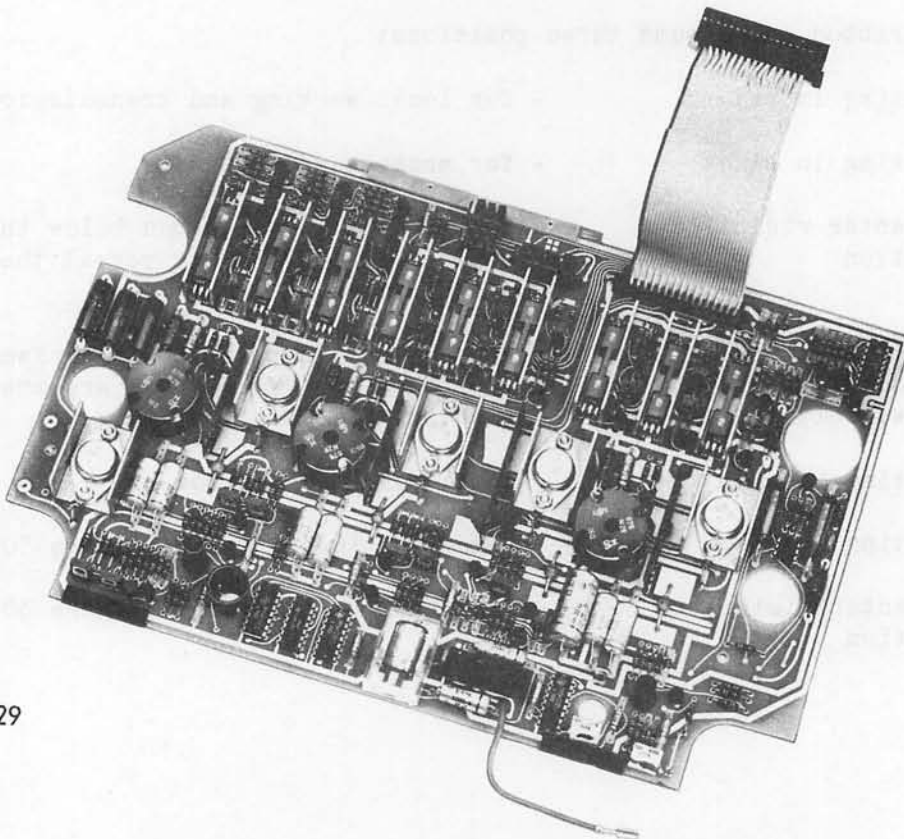
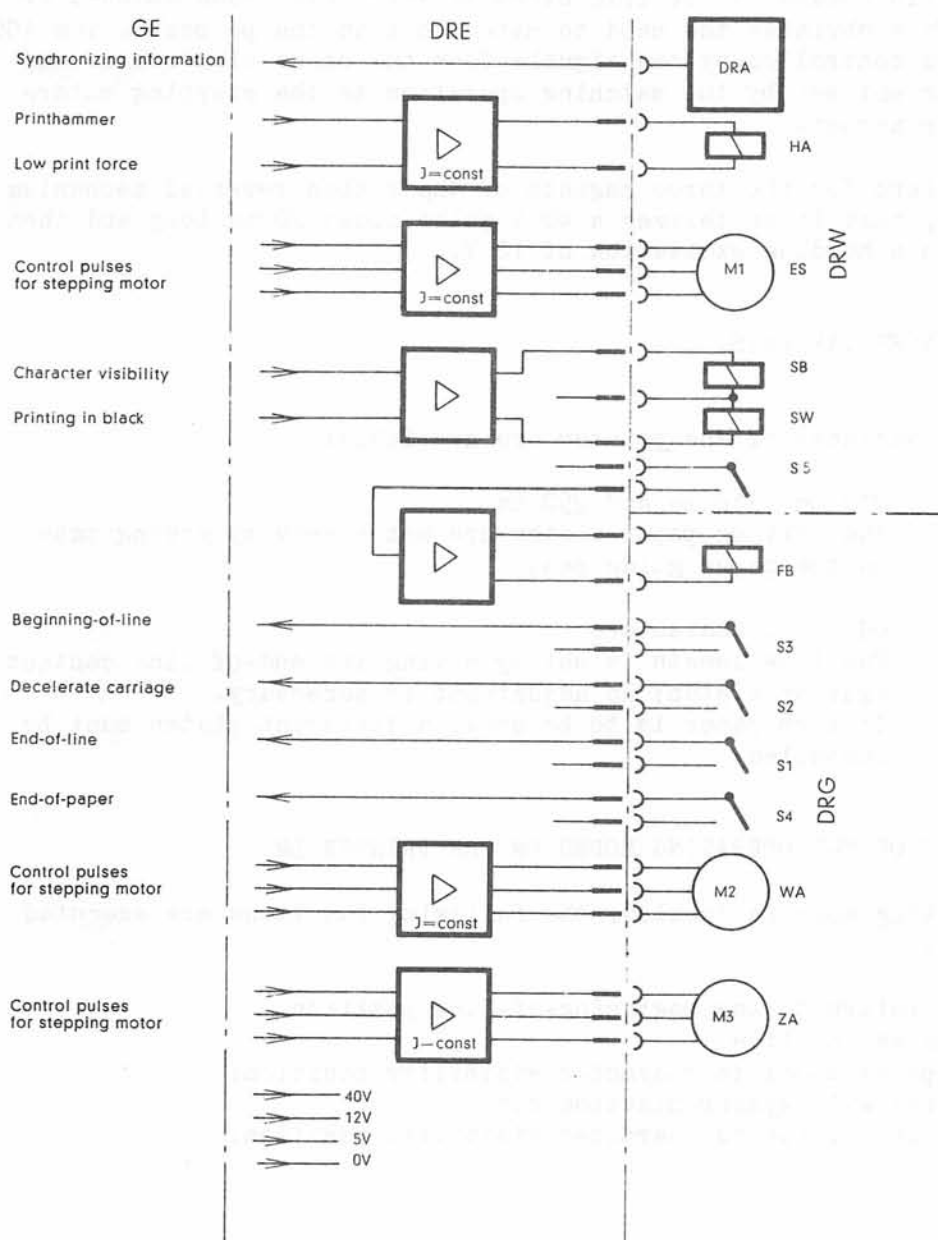


Figure 30

Schematic circuit diagram: Printer

DRA	Printer scanner	S1	Switch for end-of-line
DRE	Printer electronics	S2	carriage deceleration
DRG	Printer chassis	S3	beginning-of-line
DRW	Printer carriage	S4	end-of-paper
		S5	end-of-ribbon contact
ES	Positioning stepping motor	SB	Magnet for character visibility position
FB	Magnet for ribbon drive	SW	Magnet for printing in black
GE	Basic electronics	WA	Motor for carriage motion
HA	Printhead magnet	ZA	Motor for line feed



7.5.3.10 PRINTER ELECTRONICS (Figure 29, 30)

The printer electronics is a pc board which is located on the underside of the printer. It carries the following amplifiers:

- three AGC amplifiers for the stepping motors,
- one AGC amplifier for the printhead magnet and
- three amplifiers for the magnets of the ink ribbon control and for the ribbon drive.

In addition, the synchronizing information for positioning the print wheel, and the signals from switches S1 to S4 are routed to the basic electronics via the printer electronics.

The AGC amplifiers make use of film circuits which have been matched by laser beam. This obviates the need to match them on the pc board. The AGC amplifiers are controlled by the signals from the basic electronics and supply the current set by the matching operation to the stepping motors or printhead magnet.

If the amplifiers for the three magnets of the ribbon reversal mechanism are turned on, they first deliver a 40 V pulse about 20 ms long and then switch back to a holding excitation of 12 V.

7.5.3.11 PRINTER VARIANTS

The following variants of the printer are available:

Paper width:	210 mm, 216 mm and 250 mm The various paper widths are set simply by moving tabs on the paper guide pan.
Line length:	69 or 72 characters The line length is set by moving the end-of-line contact against a stop; no adjustment is necessary.
Option for form paper:	If form paper is to be used, a different platen must be installed.

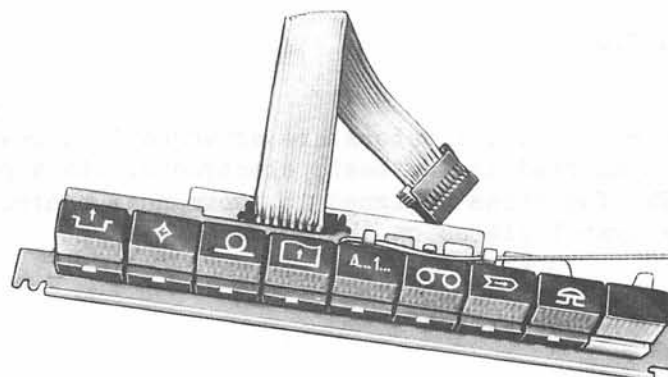
7.5.4 EFFECTS OF THE OPERATING MODES ON THE PRINTER DR

When an operating mode is enabled, the following functions are executed automatically:

- Carriage return to the beginning-of-line position
- Line feed by one line
- Setting print wheel to character visibility position; if required with synchronization run
- Lowering ink ribbon to character visibility position.

Functional state of the Teleprinter	Standby	Operating condition	
	AC power voltage applied	Local or on-line working enabled	
		Idle	Printing
		No input or out- put module in operation	At least one in- put or output module in oper.
Effects on: PRINTER			
Photoelectric scanner	no current	current	current
Printhammer magnet HA	no current	no current	current with each character
Stepping motor M1 for printwheel positioning	no current	current; print- wheel assumes vis- ibility position	current
Magnet SB for visibility posit.	no current	current $\hat{=}$ visibility posit.	no current
Magnet SW for printing in black	no current $\hat{=}$ red	no current	no current $\hat{=}$ red current $\hat{=}$ black
Switch S5 End of ink ribbon	effective; reverses ribbon magnet	effective; reverses ribbon magnet	effective; re- verses ribbon magnet
Magnet FB Ink ribbon drive	current or no current possible	current or no current possible	current or no current possible
Switch S3 Beginning-of- line contact	not effective	effective	effective
Switch S2 Brake contact	not effective	effective	effective
Switch S1 End-of-line contact	not effective	effective	effective
Switch S4 End-of-paper contact	effective; depend- ing on line inter- facing equipment	effective; depend- ing on line inter- facing equipment	effective; de- pending on line interfacing equipment
Stepping motor M2 Carriage drive	no current	current	current
Stepping motor M3 Line feed	no current	current	current
Paper feed local	effective	effective	effective
Letters/figures shift local	ineffectice	effective	effective

7.6 Manual device controls GB



31

7.6.1 GENERAL

The manual device controls module (Figure 31) can accommodate eight controls and one indicator.

Each mounting position on the module is assigned a specific machine function. The customer is free to decide which of the machine functions he requires.

If individual mounting positions remain unassigned, dummy buttons are substituted for the controls and indicators omitted.

7.6.2 CONSTRUCTION

The manual controls and indicators are arranged in a row on a carrier plate and are connected to the basic electronics via a pc board and flat ribbon lead. The functions assigned to the manual controls and indicators are denoted by symbol plates on the buttons.

7.6.3 PRINCIPLE OF OPERATION

Mounting position 1: Button (S1): unlock keyboard
Button with lamp

Symbol: 

Function: Unlocks keyboard


The lamp lights if
the keyboard buffer is full, or
the printer has reached the end-of-line
position.

In both cases further typing on the keyboard is ineffective.

In the first case the keyboard is released again by pressing the unlock button, provided at least one character has been called from the buffer.

In the second case the keyboard is released for further typing by pressing the carriage return on NL key.

Mounting position 2: Button (S2): "Here is"
Button with lamp


Symbol: 

Function: Trips the answerback

Pressing the "Here is" button causes the home answerback unit to be tripped and the answerback code to be transmitted. During the transmission the keyboard and tape reader are blocked.

Upon request, the "Here is" button may also be arranged on the keyboard.

Mounting position 3: Button (S3): Printer ON/OFF
Button with lamp

Symbol: 

Function: Causes the printer to be switched off and the tape punch to be switched on at the same time.


Pressing the button (lamp lights in the button) causes the printer to be switched off and the tape punch to be automatically switched on. It punches all characters received.

The code recognition for "who are you", bell, carriage return, line-feed, space, print and column feed is disabled.

When the button is pressed again or the line or local mode is terminated, the printer is again switched on. The lamp in the button goes out. The tape punch stays on.

If the teleprinter is not fitted with a tape punch or if the punch tape gate is not closed and/or no paper tape is loaded, the button is ineffective.

Mounting position 4: Button (S4): Printer paper feed
Button without lamp

Symbol: 

Function: Feeds the printer paper forward

The printer feeds the paper forward for as long as the button is held depressed. Brief depression (< 250 ms) of the button causes the paper to be fed forward one quarter of a line spacing.


Mounting position 5: Button (S5): Letters/figures shift
Button without lamp

Symbol: 

Function: Letters/figures shift

When this button is actuated, the teleprinter switches from the letters to the figures case or vice versa without sending the case shift character to line.


Mounting position 6: Switch (S6): Data medium ON
Switch without lamp

Symbol: 

Function: Enables recording on data medium

When the switch is depressed the tape punch is activated provided an operating mode is enabled and paper tape is loaded in the tape punch. Every message received by the teleprinter is recorded regardless of whether the appropriate button on the tape punch has been operated.

Mounting position 7: Button (S7): Output inhibition
Button without lamp

Symbol: 


Function: Inhibition of output

While this button is held depressed, all output of information is suppressed, i.e. characters input by the reader or the keyboard are not printed out, punched or transmitted.

In the case of corrected tapes, for examples, this button enables characters which have been over-punched with code combination 29 (5 holes) to be skipped.

The button is ineffective while the answerback is being transmitted.

Mounting position 8: Button (S8): Reset bell
Button with lamp

Symbol: 

Function: Switches off the bell signal


When a bell signal is received, the lamp in the button is lit. When this button is actuated the bell signal is switched off and the lamp goes out.

If the teleprinter comprises a relay module RET, the associated floating contact remains closed for as long as the lamp in the button is lit.

Whether the bell signal is stored or not may be selected by inserting or omitting wire strap W51 in the special functions module.

Alternative feature

Mounting position 8: Switch (S8): Block tripping of answerback unit by
distant station
Switch without lamp

Symbol: 

Function: Prevents tripping of answerback by distant teleprinter.

Pressing the switch inhibits transmission of the answerback code.










Mounting position 9: Indicator - Power check
Lamp either green or red

Symbol: blank

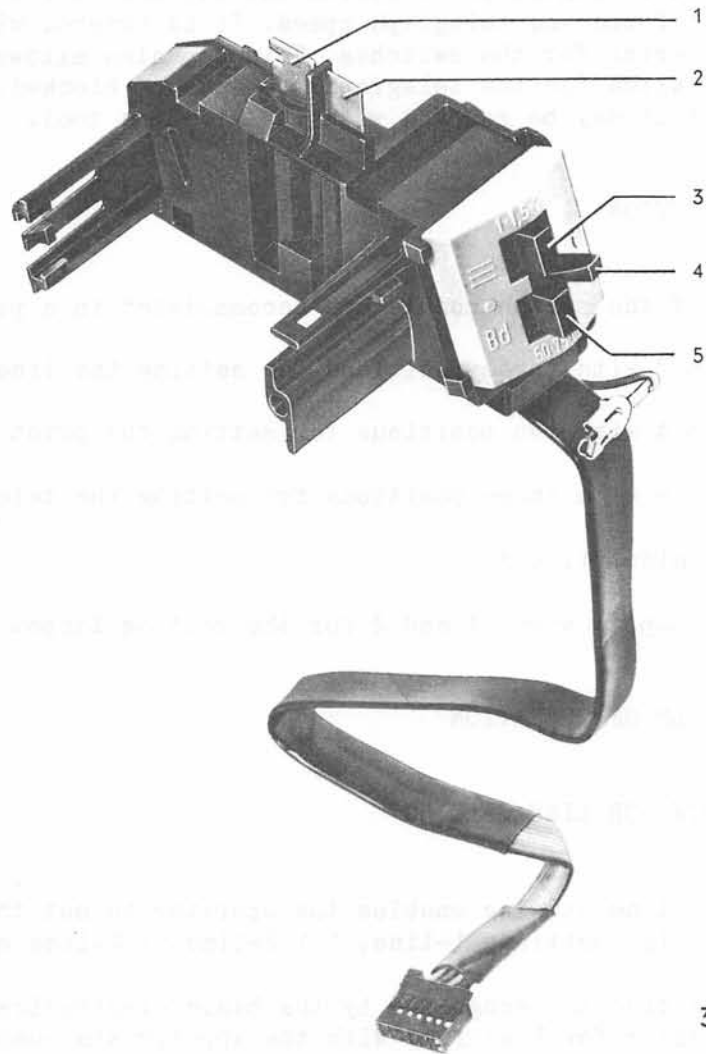
Function: Indicates the ac power voltage

The lighted lamp indicates that the teleprinter is supplied with ac power voltage within the required tolerance ranges.

7.6.4 EFFECTS OF THE OPERATING MODES ON THE MANUAL DEVICE CONTROLS GB

Functional state of the Teleprinter	Standby	Operating condition	
	AC power volt- age applied	Local or on-line working enabled	
		Idle	Printing
		No input or output module in operation	At least one input or output module in operation
Effects on: MANUAL DEVICE CONTROLS			
Button S1  Unlock keyboard	ineffective	effective if keyboard buf- fer was full	effectice if key- board buffer was full and at least one character has been called
Button S2  "Here is"	ineffective	effective	effective
Button S3  Printer ON/OFF	ineffective	effective	effective
Button S4  Printer paper feed	effective	effective	effective
Button S5  Letters/figures shift	ineffective	ineffective	effective when printer is in operation
Switch S6  Data medium ON	effective	effective	effective
Button S7  Output inhibition	ineffective	ineffective	effective only during local work- ing when an input module is in oper.
Button S8  Reset bell	ineffective	effective	effective
Switch S8  Block answerback unit	effective	effective	effective
Lamp "Power check" - unit connected to mains	effective	effective	effective

7.7 Switch module SB



32

7.7.1 GENERAL

The switch module (Figure 32) contains the switches for setting the line-spacing, print force and telegraph speed. It is covered with a cap which bears the lettering for the switches. This cap also allows certain positions of the switch for the telegraph speed to be blocked. The cap is designed so that it may be removed with the aid of a tool.

7.7.2 CONSTRUCTION

The switches of the switch module are accommodated in a plastic cover:

- one switch 3 with three positions for setting the line spacing,
- one switch 4 with two positions for setting the print force,
- one switch 5 with three positions for setting the telegraph speed,
- one lid contact 1, and
- the power supply wires 1 and 2 for the reading lamps.

7.7.3 PRINCIPLE OF OPERATION

7.7.3.1 SWITCH FOR LINE SPACING

The switch for line spacing enables the operator to set the line spacing to three possible positions 1-line, 1 1/2-line or 2-line spacing.

The switch position is recognized by the basic electronics, which drives the stepping motor for line feed with the appropriate number of control pulses.

7.7.3.2 SWITCH FOR PRINT FORCE

The print force can be adjusted by the operator in accordance with the number of plies contained in the teleprinter paper being used.

There are two possible switch positions, the position for the higher print force being necessary when printing with two to four plies.

The higher print force is achieved by means of wider current peak at the start of the control pulse for the print hammer.

7.7.3.3 SWITCH FOR TELEGRAPH SPEED

The telegraph speed can be set to 50, 75 and 100 bauds by means of this switch.

The three telegraph speeds are realized by changing the division ratios of the clock pulse generator.

The switch is set to 50 bauds in the telex version of the telprinter, the positions for 75 and 100 bauds being blocked with a cap.

If required, two other caps can be supplied:

- settable to 75 and 100 bauds, 50 bauds blocked,
- settable to 50, 75 and 100 bauds.

The telegraph speed of 100 bauds for local working is not affected by this switch.

7.7.3.4 LID CONTACT

The lid contact signalizes to the control whether the cover lid is open or closed. The response to the position of the switch is dependent on the version of the signalling unit or matching unit installed in the teleprinter. For example, an open lid may cause an already existing connection to be cleared or an incoming call not to be accepted.

7.7.3.5 POWER SUPPLY FOR THE READING LAMPS

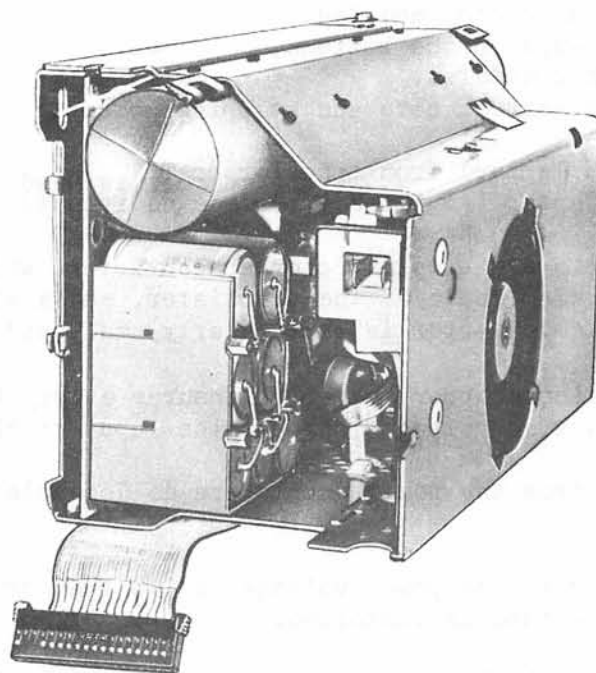
Power is supplied to the reading lamps in the cover lid via two contact plates. This enables the cover of the teleprinter to be removed without having to split a plug connection.

7.7.4 EFFECTS OF THE OPERATING MODES ON THE SWITCH MODULE SB

Functional state of the Teleprinter	Standby	Operating condition	
	AC power voltage applied	Local or on-line working enabled	
		Idle	Printing
		No input or out- put module in operation	At least one input or output module in operation
Effects on: SWITCH MODULE			
Switch for line spacing	effective	effective	effective
Switch for print force	effective	effective	effective
Switch for tele- graph speed	effective	effective	effective
Lid contact	effective independent of line interfacing equipment	effective/in- effective *) depending on line interfac- ing equipment	effective/ineff.*) depending on line interfacing equip- ment

*) When the cover lid or lid contact is open, the lamp flashes in the call button [⓪] in the manual controls for switching-oriented functions. The built-in line interfacing equipment can be so circuited that neither the local nor the line mode can be enabled. If a call comes in, the teleprinter signals "not ready".

7.8 Power supply SV



33

7.8.1 GENERAL

The power supply (Figure 33) generates the necessary operating voltages for the teleprinter from the ac power voltage of 187 V...264 V, or 93.5 V...140 V, 40 Hz...70 Hz. These voltages are as follows:

- +5 V for the integrated modules,
- +12 V for the lamps in the buttons,
- 12 V for the MOS modules,
- +40 V for the electromagnets and stepping motors.

Auxiliary voltage UH derived from transformer T_1 is used for supplying power to the line adapter LAT (line interface equipment).

The power supply employs a blocking chopper converter, which supplies current during the blocking phase of the transistor, and a storage transformer with air gap. This converter is particularly small and light.

The use of the blocking chopper converter ensures a very high level of efficiency and gives a wide voltage range at the input to the power supply.

All output voltages from the power supply are dc decoupled from the ac mains source.

Regardless of whether the ac power voltage is 110 V ac or 220 V ac a medium-lag 2.5 A device fuse is installed.

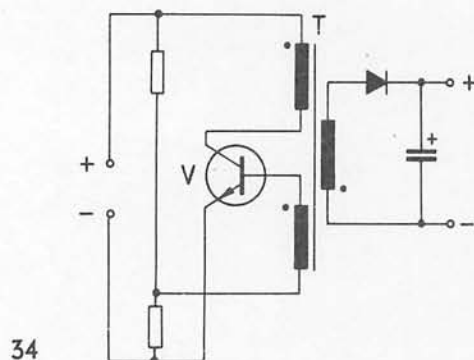
The power supply for 220 V ac power can be replaced by a 24 V dc power supply having the same dimensions.

Principle of the converter (Figure 34)

The converter operates with a storage and isolating transformer T to which a dc voltage is supplied at timed intervals. The storage transformer stores energy for as long as the transistor is conducting. Only when the transistor is blocked does energy reach the output of the power supply.

The stored energy is determined by the inductance and the charging current reached before the transistor is blocked.

The output voltage is dependent on the load. When current is drawn off, the stored energy and hence the output voltage too is decreased. The power supply is therefore protected against overloading in the event of a short circuit at the output.



7.8.2 CONSTRUCTION (Figure 35)

The power supply consists basically of:

Cover,
rectifier module SVG,
load module SVL,
additional power supply board load module SVL,
electrolytic capacitors C1, C2 and
fan.

Cover: The cover contains all the modules and constituent parts of the power supply. It prevents live parts being touched and also serves as screening.

Rectifier
module SVG: The rectifier module contains

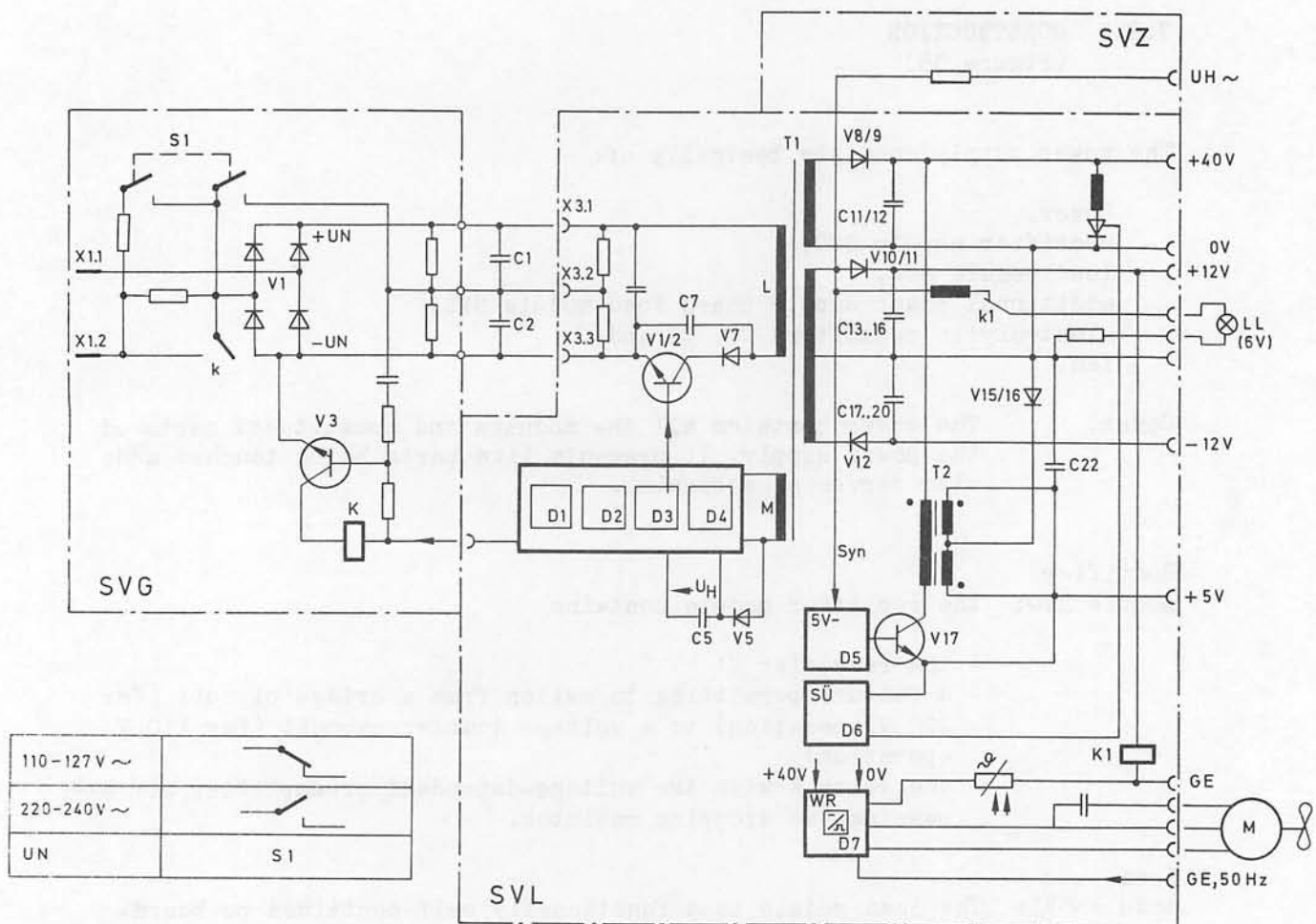
- the rectifier V1
- a feature permitting to switch from a bridge circuit (for 220 V operation) to a voltage doubler circuit (for 110 V operation)
- the relay K with the voltage-dependent preamplifier for bypassing the dropping resistor.

Load
module SVL: The load module is a functionally self-contained pc board. It contains

- the storage and isolating transformer T1
- the preamplifier D1...D4 for the switching transistors V1/2
- the 5 V controller D5, D6 with the switching transistor V17 and the storage transformer T2
- the diodes V8...V16 for rectification and the electrolytic capacitors C11...C20 and C22 for smoothing the output voltages
- the ac-dc converter WR/D7 for generation of the operating voltage for the fan with temperature sensor ϑ
- a choke, a resistor and the relay K1 for the copy lamps LL (6 V).

7.8.3 PRINCIPLE OF OPERATION

The ac power voltage applied to the power supply is rectified on the rectifier module SVG. Electrolytic capacitors C1, C2 smooth the rectified power voltage and store energy. This energy also ensures trouble free operation of the teleprinter in the event of interruptions in the ac power lasting up to 10 ms. A clamping strap on the rectifier module enables switching from rectification by means of a bridge circuit (220 V operation) to rectification by means of a voltage doubler circuit (110 V operation). A dropping resistor limits the rush-in current; shortly after application of the power voltage, relay K bypasses the dropping resistor and the power supply is ready to operate.



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The rectified power voltage is supplied at timed intervals to the storage and isolating transformer T1. This results in a frequency of 30 kHz being generated by the oscillating circuit that consists of the capacitor C7 and the winding L of transformer T1. Voltages of 12 V and 40 V are tapped from the secondary windings of the transformer, they are rectified and smoothed and then applied at the output of the power supply as +12 V, -12 V and +40 V.

The +5 V voltage is generated from the +40 V via storage transformer T2 and switching transistor V17 and is regulated by means of controller D5.

The 5 V ac voltage is also rectified and smoothed, and then applied at the output of the power supply.

In order to keep the +12 V, -12 V and +40 V output voltages in the required tolerance range when the power supply is subject to different loads (standby and operating states of the teleprinter), the energy supplied to the transformer T1 via switching transistors V1/2 is controlled by means of the preamplifier D1...D4. The transformer T1 includes a measuring winding M which forms an image of the output voltages and serves as reference for the comparator circuit in the preamplifier D1...D4. When the power supply is under heavier load, this preamplifier holds the switching transistor V1/2 conducting longer. In consequence, the storage transformer stores more energy.

The copy lamps LL in the cover are powered by a 6 V ac voltage which is derived from the 12 V ac voltage via a choke and a resistor.

The dc-ac converter WR/D7 contained in the load module SVL converts the 40 V dc into ac voltage under frequency control of the basic electronics. This ac voltage is used to power the fan when the teleprinter is operating. It is switched on with every operating mode of the teleprinter. During the standby state of the teleprinter, a temperature sensor switches on the fan when the temperature in the power supply reaches 60 °C \pm 5 °C.

When the temperature in the power supply mounts to 75 °C \pm 5 °C (e.g. when the fan is defective), the power supply is switched off under the control of a temperature sensor. A subsequent drop in temperature causes the power supply to be switched on again.

If the power voltage reaches values outside the acceptable range, the preamplifier switches off the power supply, switching it on again automatically once the out-of-tolerance condition is over.

A voltage arrester is incorporated as a protection against the high voltage peaks which may sometimes occur in power supply networks, during thunderstorms for example.

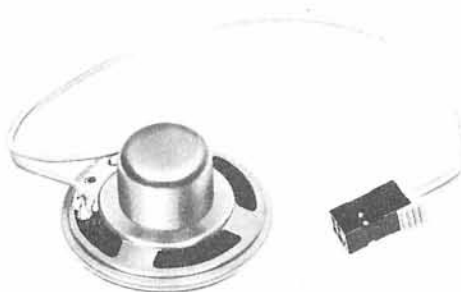
If one of the output voltages is shorted, the power supply is switched off. Subsequently, it switches on automatically about every 4 seconds to check whether the short circuit is still present. If the short circuit still exists, the power supply immediately switches off again.

7.8.4 EFFECTS OF THE OPERATING MODES ON THE POWER SUPPLY SV

Functional state of the Teleprinter	Standby	Operating without/with attachment devices
	ac power voltage applied	Local or line working ON
Effects on: POWER SUPPLY		
Power draw of the power supply	40 W	90/120 W
Copy lamps in the cover of the teleprinter	off	on

7.9 LOUDSPEAKER LR

(Figure 36)



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The purpose of the loudspeaker is to provide an audible signalization of end of line, "bell", and an incoming call.

End of line: During typing operations on the keyboard, a warning signal sounds after the 59th character has been keyed in, producing a column feed.

Bell: The same signal sounds when an agreed code combination is recognized, e.g. combination No. 10 as per CCITT Code No. 2.

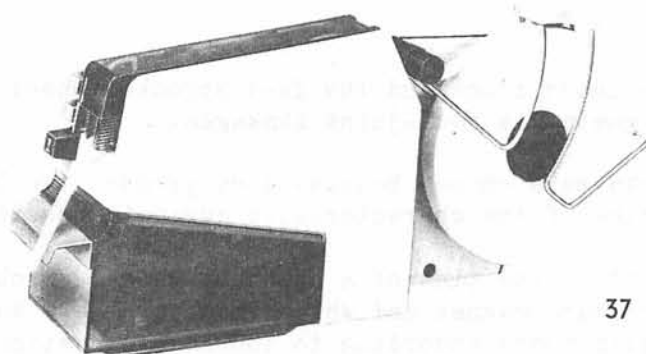
Incoming call: If the teleprinter is called, the loudspeaker sounds at a different pitch.

The module consists of:

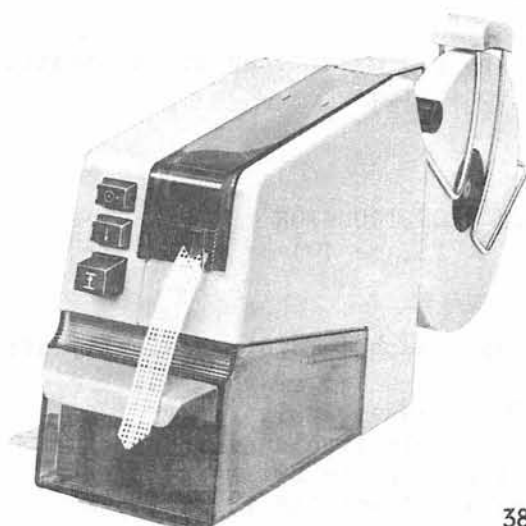
- a loudspeaker (50 ohms, 0.1 W),
- a connecting lead with plug.

The loudspeaker is fixed by a wire clip to the base tray of the teleprinter and is connected to the basic electronics board via the two-wire, plug-ended connecting lead.

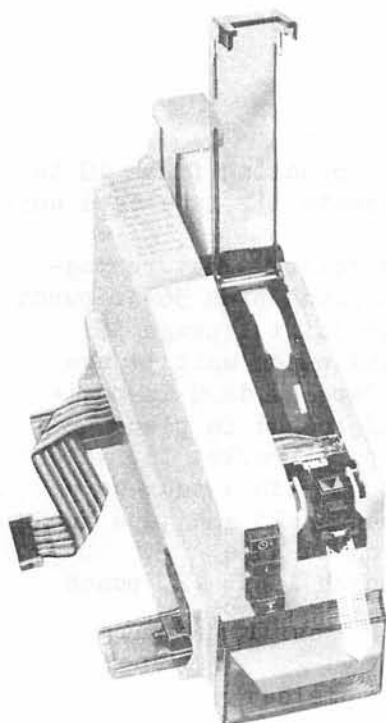
7.10 Tape punch LO



37



38



39

7.10.1 GENERAL

The punch pins of the punch block and the feed sprocket wheel are driven by rotary armature magnets via four-joint linkages.

Rotary armature magnets were chosen because they produce the least noise and because the matching of the characteristic curve is possible.

The tape is fed forward by the pins of a sprocket wheel, which is also driven by a rotary armature magnet and which ensures highly accurate code hole spacing. The requirements according to ISO Recommendation 1154 are satisfied.

The tape punch is equipped with an ON-OFF button, a tape feed button and a tape backspacing button which operates mechanically.

The inserted tape is advanced automatically after the tape gate is closed. This produces a tape leader punched with code combination 29 (letters shift).

The tape punch switches off automatically when it recognizes the end-of-tape condition.

7.10.2 CONSTRUCTION (Figure 40)

The tape punch consists basically of:

- Punch assembly 9,
- punch electronics 4,
- carrier plate 29,
- cover 33 and lid 17,
- tape unwinder 2 and tape guide 8,
- chad waste box 20.

Punch assembly: Punch assembly 9 is composed of mounting frame 10 together with rotary armature magnets 11, tape feed unit 25 and punch unit 14. Mounting frame 10 accommodates rotary armature magnets 11, which are linked with punch pins 36 of punch block 13 (Fig. 40) via the four-joint linkage 35 (Fig. 41). Tape feed unit 25 and punch unit 14 are mounted on mounting frame 10. Tape guide 8 is positioned on mounting frame 10 and locked in place. Tape feed unit 25 contains support bracket 16, which bears a rotary armature magnet 18 with a four-joint linkage 15, as well as tape channel 23 and tape feed facility 18, which is mounted on an axle. Punch unit 14 is composed of punch lever 12, punch block 13, chad chute 28 and chad shaft 27.

Punch

electronics:

Punch electronics 4 consists of 2 pc boards incorporating the switching amplifiers for the rotary armature magnets and the connectors for cables 5, 6 and 35. Cable 5 leads to the punch assembly, cable 6 to the basic electronics and cable 40 to the punch buttons 31, 32 and the microswitches for end of tape and automatic tape feed.

Carrier plate:

Punch assembly 9 is mounted on carrier plate 29. Punch electronics 4 and buttons 30, 31 and 32 are also latched in place in carrier plate 29.

Cover and lid:

Cover 33 with tape unwinder 2 is placed on carrier plate 29 and locked in position. The cover lid 17 is fastened to cover 33.

Tape unwinder and tape guide:

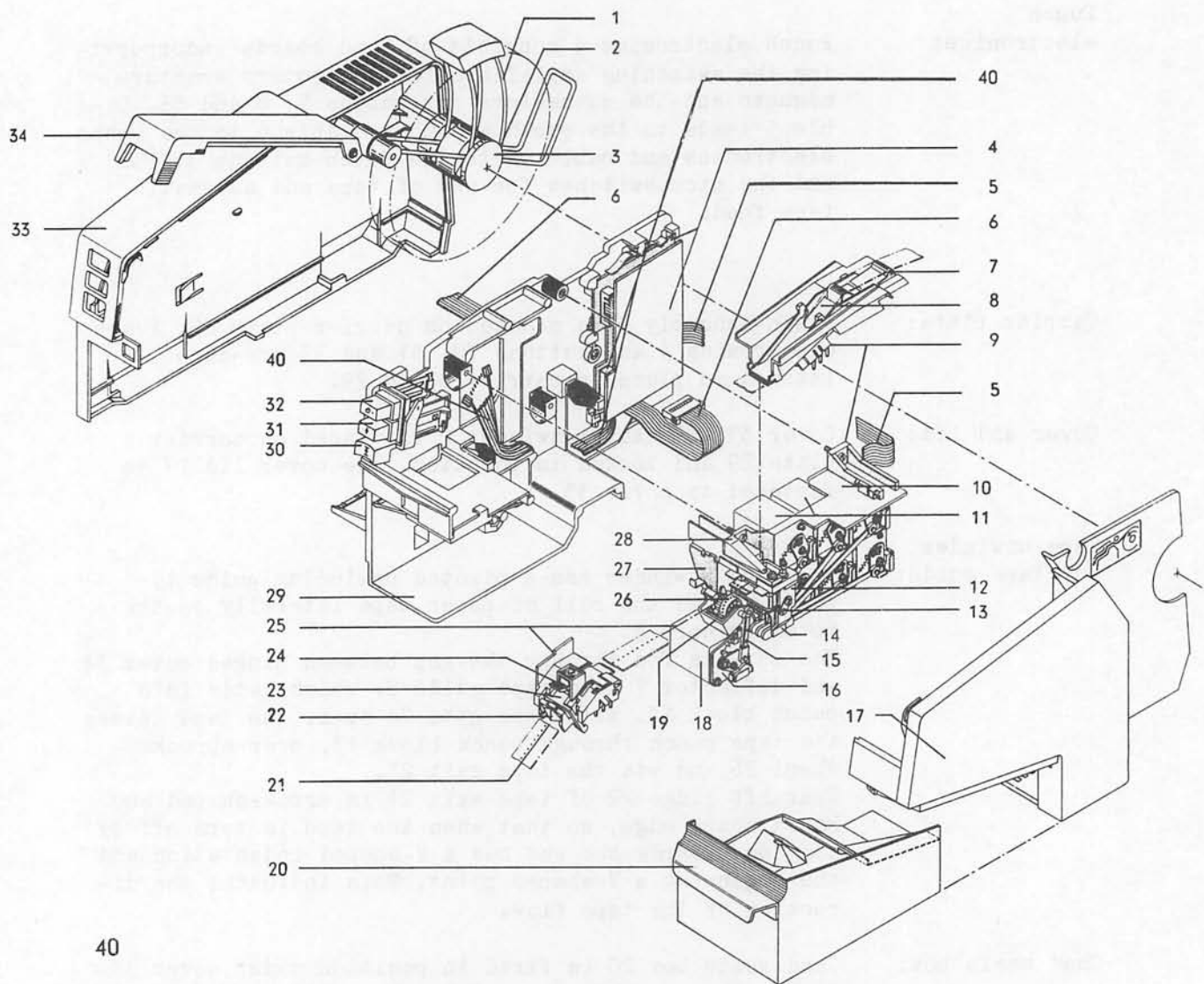
The tape unwinder has a pivoted unwinding guide 1, which guides the roll of paper tape laterally on the rotatory core 3.

The tape is fed through the gap between hinged cover 34 and deflector 7 into tape guide 8, which leads into punch block 13. With tape gate 24 open, the tape leaves the tape punch through punch block 13, over sprocket wheel 26 and via the tape exit 21.

Tear-off ridge 22 of tape exit 21 is arrow-shaped and has a sharp edge, so that when the tape is torn off by tugging upwards the end has a V-shaped indentation and the beginning a V-shaped point. This indicates the direction of the tape flow.

Chad waste box:

Chad waste box 20 is fixed in position under cover 33. It has the capacity to contain the cuttings from a whole roll of tape, even assuming only the code combination 29 (5 code holes) were to be punched throughout.



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7.10.3 PRINCIPLE OF OPERATION

The information supplied by the basic electronics takes the form of TTL signals and controls the rotary armature magnets via the punch electronics (Fig. 42).

When a rotary armature magnet 11 (Fig. 41) is energized, armature 37 rotates away from its preset initial position until it is magnetically latched. The respective four-joint linkage 35 or 15 transfers the armature torque with a relatively large stroke to punch pins 36, or to feed pawl 38 in the case of tape feed unit 25.


Punch pins 36 pierce the tape in a time-staggered sequence. When rotary armature magnets 11 are deenergized, springs 39 pull back armatures 37 to their home position. The elbow leverage effect of the four-joint linkage causes punch pins 36 to be drawn out of the tape with a considerable reserve of force. Sprocket wheel 26 then advances the tape by one character pitch and feed pawl 38 resumes its initial position.


7.10.3.1 AUTOMATIC TAPE FEED-IN


When the tape is inserted properly and the tape gate closed, the tape feeds in automatically. The basic electronics energizes the rotary armature magnets via the punch electronics repeatedly until there is a tape leader the length of 32 character pitches punched with the "Letters" code combination 29 (i.e. 5 holes).

At the end of the automatic tape feed-in the ON-OFF button becomes operative.

7.10.3.2 CONTROL BUTTONS

The tape punch is switched on or off by pressing the ON-OFF button. If the punch is switched on, the lamp in the button  is lit.

While the tape feed button  is held depressed, the tape is fed forward and punched with code combination 29 (5 holes).

Each time the tape backspacing button  is pressed, the tape is moved backwards mechanically by one character pitch. Backspacing should be limited to ten character pitches to avoid pinching the edges of the holes when overpunching the tape.




Schematic circuit diagram (Fig. 42)

①	Punch electronics	S1	ON-OFF button
1...7	Switching amplifiers	S2	Tape feed button
8...14	Rotary armature magnets	S3	End-of-tape switch
H1	Lamp in ON-OFF button	S4	Tape gate switch

7.10.3.3 END OF TAPE

A spring-loaded strip which projects into the tape guide actuates the end-of-tape contact. The contact opens when the tape runs out and the tape punch switches itself off.

7.10.4 EFFECTS OF THE OPERATING MODES ON THE TAPE PUNCH LO

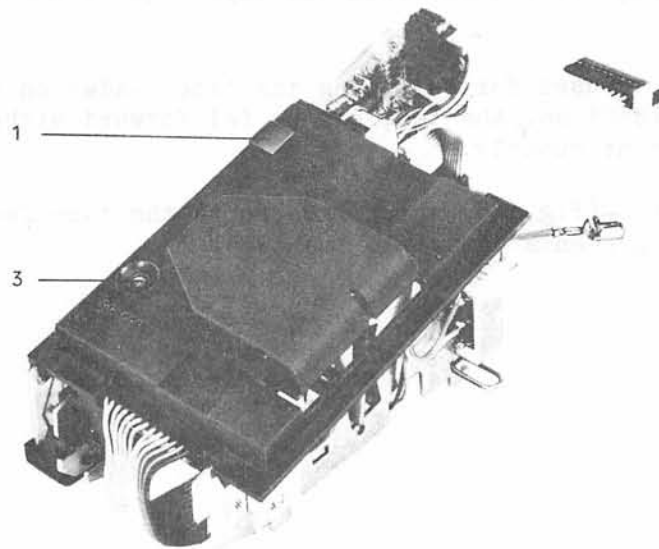
Functional state of the Teleprinter	Standby	Operating condition		
	AC power voltage applied	Local or on-line working enabled		
		"Data carrier ON" button not depressed	"Data carrier ON" button depressed	
		Idle	Printing	Idle
		No input or output module in oper.	At least one input or output module in operation	No input or output module in operation
Effect on: TAPE PUNCH Condition: Paper tape inserted, tape gate closed				
ON-OFF button 	ineffective	effective	ineffective	
Tape feed button 	effective	effective	effective	effective
Tape backspacing button 	effective	effective	effective	effective
Tape gate switch	effective	effective	effective	effective
End-of-tape switch	effective **)	effective	effective	effective

The rotary armature magnets are only energized during the communication phase in response to the control signals from the punch electronics.

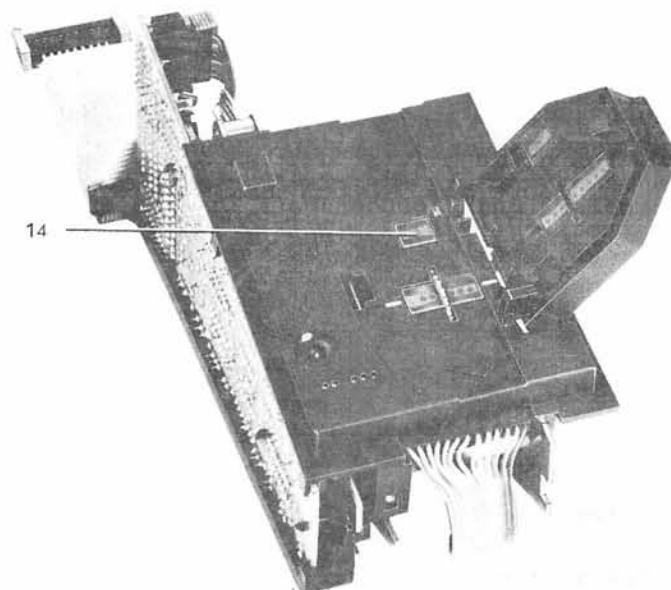
The lamp in the ON-OFF button stays lit for as long as the tape punch is switched on.

**) effective only if button "Data medium ON"  is depressed.

7.11 Tape reader LE



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7.11.1 GENERAL

The information on the punched tape is read photoelectrically whilst the tape is stationary by means of LEDs and phototransistors. A sprocket wheel driven by a stepping motor then feeds the tape forward one character pitch.

The ON-OFF button is used for switching the tape reader on and off. When the reader is switched on, the tape can be fed forward either one character at a time or continuously.

A taut tape switch 2 (Fig. 45) which interrupts the tape feed if the tape becomes too taut, prevents damage to the tape.

Figure 43 - Tape reader

- 1 ON-OFF button
- 3 Indicator lamp for ON-condition

Figure 44

- 14 Feed hole scanning facility

7.11.2 CONSTRUCTION (Figure 45)

The tape reader is composed basically of:

Drive unit,
scanning device and
reader electronics.

Drive unit: The drive unit contains a stepping motor 7, an intermediate gear 8 and a sprocket wheel 9 and is accommodated in the frame 11.

Scanning device: The scanning device is mounted on the frame 11 and locked in position. It contains the diode unit and transistor unit, the plastic base 6 with the tape guide 5 and the hinged tape gate 4, which covers the tape guide channel.

The diode unit containing the LEDs and balancing resistors is accommodated in the tape gate 4.

The transistor unit containing the phototransistors is installed in the plastic base 6.

Reader electronics: The reader electronics 3 is a pc board with the amplifiers for the photoelectric currents and the drives for the stepping motor.

7.11.3 PRINCIPLE OF OPERATION (Figure 46)

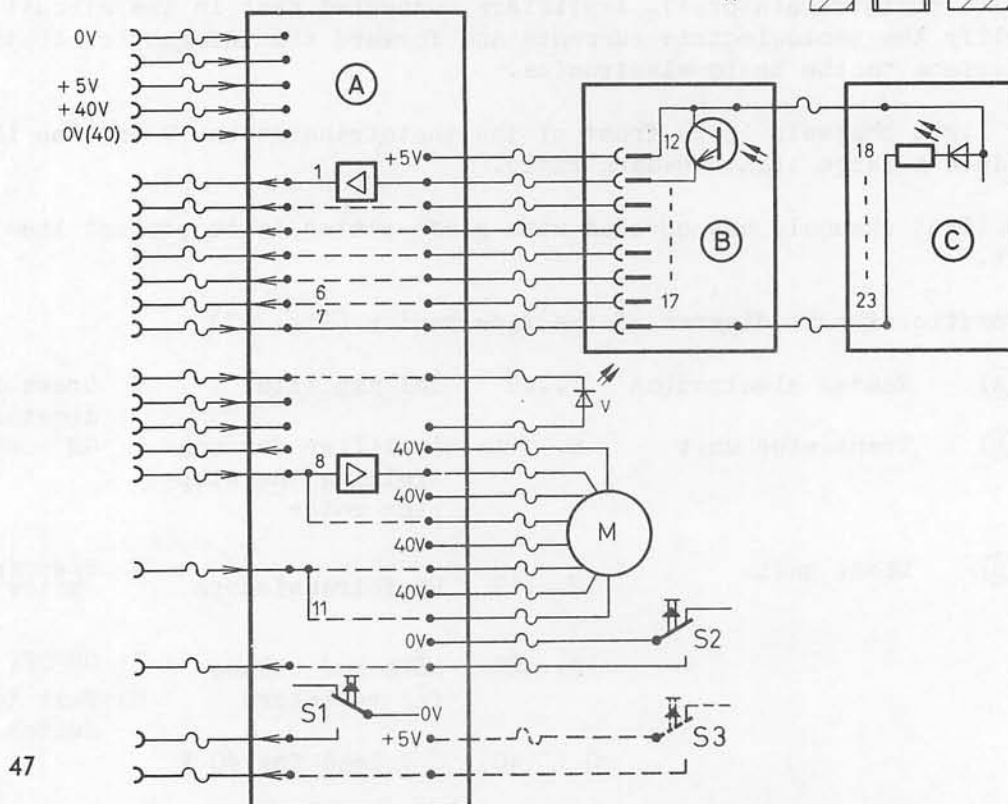
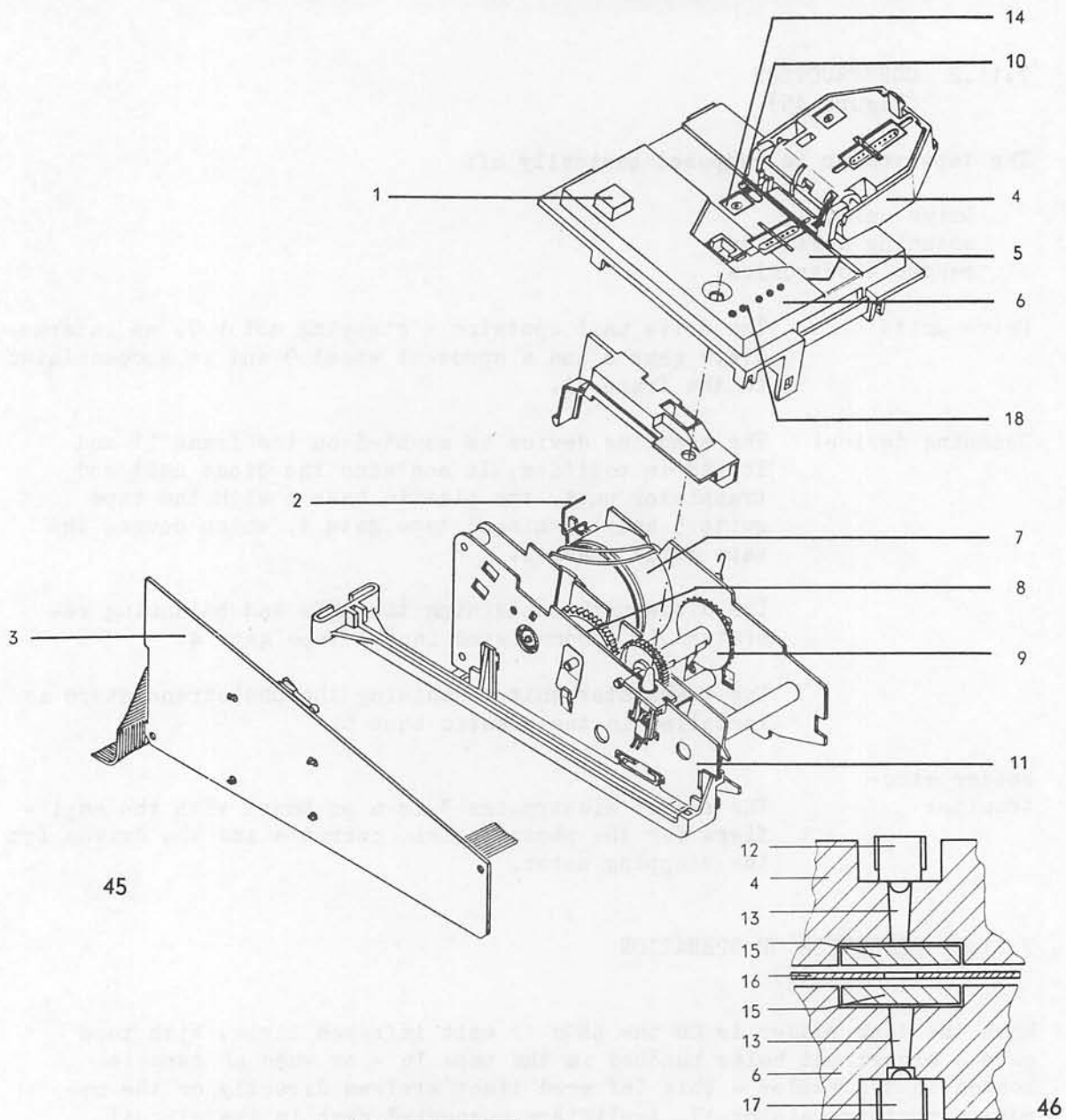
When the tape reader is ON the LEDs 12 emit infrared light. With tape gate 4 closed and holes punched in the tape 16 - or when no tape is loaded in the reader - this infrared light strikes directly on the opposite phototransistor 17. Amplifiers connected next in the circuit amplify the photoelectric currents and forward the information to the interface to the basic electronics.

The light channels 13 in front of the phototransistors 17 and the LEDs 12 produce a large light-to-dark ratio.

The light channels are covered with glass plates 15 to protect them from dirt.

Schematic circuit diagram of the tape reader (Fig. 47)

Ⓐ	Reader electronics	1...6	Red amplifier	V	Green indicator for ON condition
Ⓑ	Transistor unit	8...11	Amplifier for controlling the stepping motor		
Ⓒ	Diode unit	12...17	Phototransistors	M	Stepping motor
		18...23	LEDs and balancing resistors	S1	ON-OFF switch
				S2	Taut tape switch
		0 V (40)	0 V lead for 40 V		



7.11.3.1 FEEDING THE PUNCHED TAPE FORWARD

It takes four steps of the motor for the sprocket wheel to advance the tape by one character pitch. The selected transmission ratio between stepping motor and sprocket wheel gives the tape an exact rest position in relation to the reading point and provides a high tractive force for the tape.

7.11.3.2 SINGLE CHARACTER FEED - CONTINUOUS FEED

Single character feed is tripped by pressing the ON-OFF button briefly (< 250 ms). Pressing the button longer (> 250 ms) produces continuous feed.

A timing stage in the basic electronics of the teleprinter decides whether single or continuous feed is switched on.

Immediately after the ON-OFF button is pressed a character is transferred into the basic electronics. Here the read character is stored and then processed further. The transfer of the character activates the stepping motor and the tape is fed forward by another character. A single character feed is thus completed.

In continuous feed, the process of reading continues until the end-of-tape condition is recognized or a distant subscriber breaks in on the transmission, or until the reader is switched off by pressing the ON-OFF button once more.

7.11.3.3 END-OF-TAPE CONDITION

The end-of-tape condition is recognized via the feed hole scanning facility 14 (Fig. 44). The feed hole scanning facility is located eight character pitches in front of the information scanning facility in the tape-feed direction.

If the reader is set for continuous feed the end-of-tape condition is only recognized if no feed hole is sensed after nine successive light-to-dark changes have occurred. This ensures that the very last character on a tape is also read. When the end-of-tape condition is recognized the reader switches itself off.

The tape contact 10 (Fig. 45) indicates e.g. to a supervisory device whether or not a paper tape has been loaded. This indication is made via a potential-free contact in the relay module.

7.11.3.4 READER INDICATOR 18 (Figure 45)

When reading single characters and when the tape is stationary, the next character to be read is indicated by means of LEDs. A lighted diode indicates a hole punched in the tape.

With the reader in continuous feed, no characters are indicated.


7.11.3.5 CHARACTER RELEASE MODE

See sections 7.2.3.3.2 and 7.2.3.3.3 of the basic electronics.

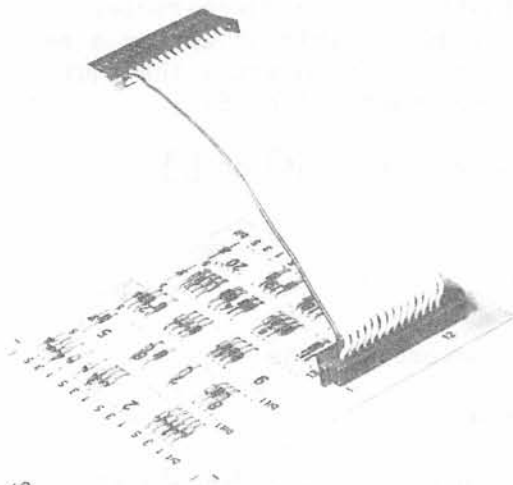
7.11.4 EFFECTS OF THE OPERATING MODES ON THE TAPE READER LE

Functional states of the Teleprinter	Standby	Operating condition		
	AC power voltage applied	Local or on-line working enabled		
		Idle	Printing	
		No input or output unit in operation	At least one input or output unit in operation	
Effect on: TAPE READER			Continuous feed (>250 ms)	Single feed (<250 ms)
Stepping motor	no current	current	current	current
		assumes home position	in home position	in home position
Sprocket wheel	movable in both directions against minor resistance	can move clockwise or anti-clockwise by a max. of 1/2 char. pitch to the home position (a pin of the wheel is then in alignment with the markings on the tape guide)	tape is fed forward towards operator	tape is fed forward towards operator
ON-OFF button	-	effective	effective	effective
Light-emitting diodes	no current	no current	current	current
Taut tape switch			effective	effective
			when tape pull exceeds 1 N tape feed is interrupted	

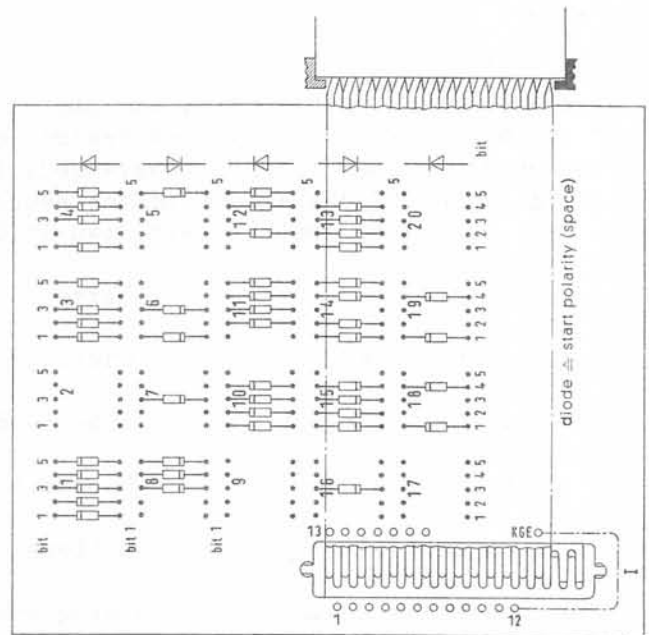
Breaking in by the distant subscriber stops the tape reader. It is then in the idle condition.

While the transmitter blocking  in the manual device controls module is held depressed during local working, no information is transmitted, printed or punched. The tape reader, however, continues reading.

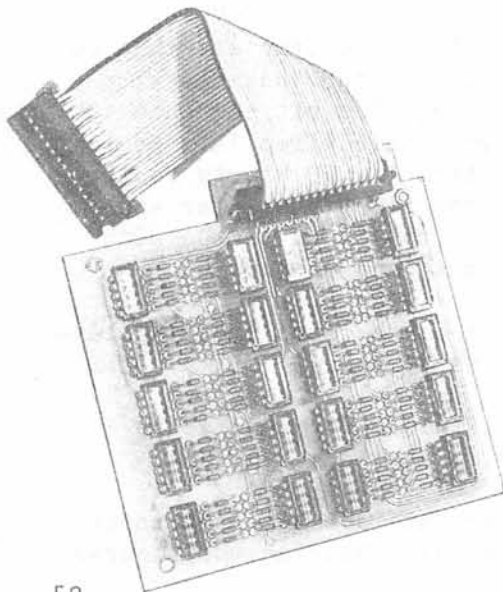
7.12 Answerback module KG



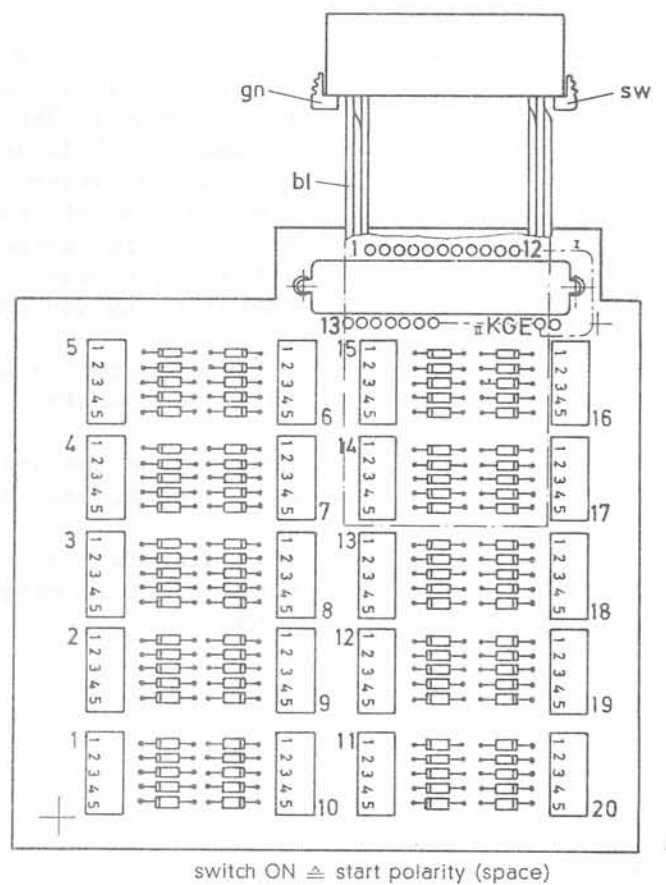
48



49



50



51

7.12.1 GENERAL

The answerback module (Fig. 48) operates electronically and consists of a diode matrix which allows any desired combination of the 20-character answerback sequence to be programmed. It is also possible to employ a reduced number of characters in the sequence. The order in which the characters should be sent is laid down in CCITT Recommendation S6:

1st character	Letters or Figures shift <input type="checkbox"/> or <input type="checkbox"/>
2nd character	Carriage return <input type="checkbox"/>
3rd character	Line feed <input type="checkbox"/>
4th to 19th character	Subscriber's answerback code
20th character	Letters shift <input type="checkbox"/>

The answerback sequence can be programmed even at the subscriber's station without special aids. In order to generate a current pulse within a teleprinter signal, a diode just has to be cut out from the diode matrix.

If an answerback module with miniature switches (Fig. 50) is used, only the miniature switches have to be set for programming; no diodes must be cut out from the diode matrix.

7.12.2 CONSTRUCTION

The answerback module consists of a pluggable pc board containing up to 100 diodes which are sampled by the answerback control.

Diode matrix: The diode matrix comprises 20 columns and 5 rows (Fig. 52) corresponding to the 20 characters that can be programmed. Each character of the answerback code is assigned 5 diodes (Fig. 49). The bit sequence 1...5 of each character is always counted from left to right. The sequence of the characters 1...20 starts in the top left-hand corner with the first character and winds continuously along the rows down to the 20th character in the bottom right-hand corner.

Bit and character sequences can be seen from the lettered components side of the pc board.

Programming the answerback module with miniature switches (Figures 50, 51).

Five miniature switches each are accommodated in one housing, it is closed by a cover bearing the figures 1 to 5.

When the cover has been opened, a slide can be pushed in the direction of the impressed figure to open the associated contact. This corresponds to "diode not inserted". By pushing the slide in the other direction, the contact is closed, which corresponds to "diode inserted".

Answerback control: The diode matrix is sampled by the answerback control via a decoder. The answerback control is contained in the MOS-2, the send control, and forms part of the basic electronics.

Since the answerback module is physically separate from the answerback control, a plug-in supervision feature ensures that the matrix can only be sampled if the answerback module is plugged in.

7.12.3 PRINCIPLE OF OPERATION

7.12.3.1 CHARACTER GENERATION (CIRCUIT SCHEMATIC) (Figures 52, 53)

The columns of the diode matrix are sampled one after another in turn by the answerback control via a decoder. At the same time, one column at a time is applied to 0 V. The rows which are connected with this column by a diode also carry a potential of about 0 V. The remaining rows continue to carry +5 V. This gives rise to the different levels of a teleprinter signal which is present at the output of the answerback module.

7.12.3.2 OPERATION OF THE ANSWERBACK MODULE

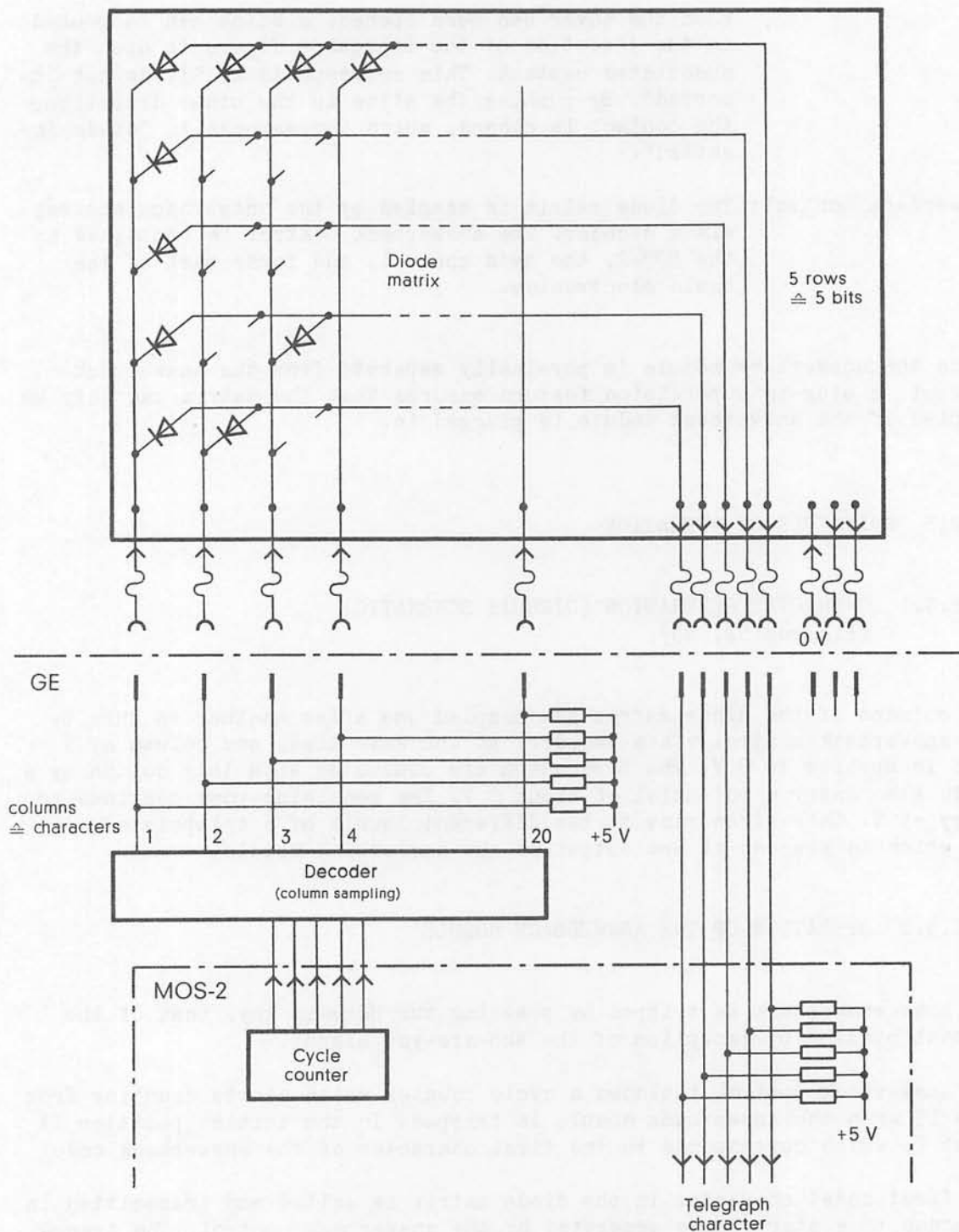
The home answerback is tripped by pressing the Here-is key, that of the distant station by reception of the Who-are-you signal.

The answerback control includes a cycle counter which starts counting from 0 to 19 when the answerback module is tripped. In the initial position it is at 0, which corresponds to the first character of the answerback code.

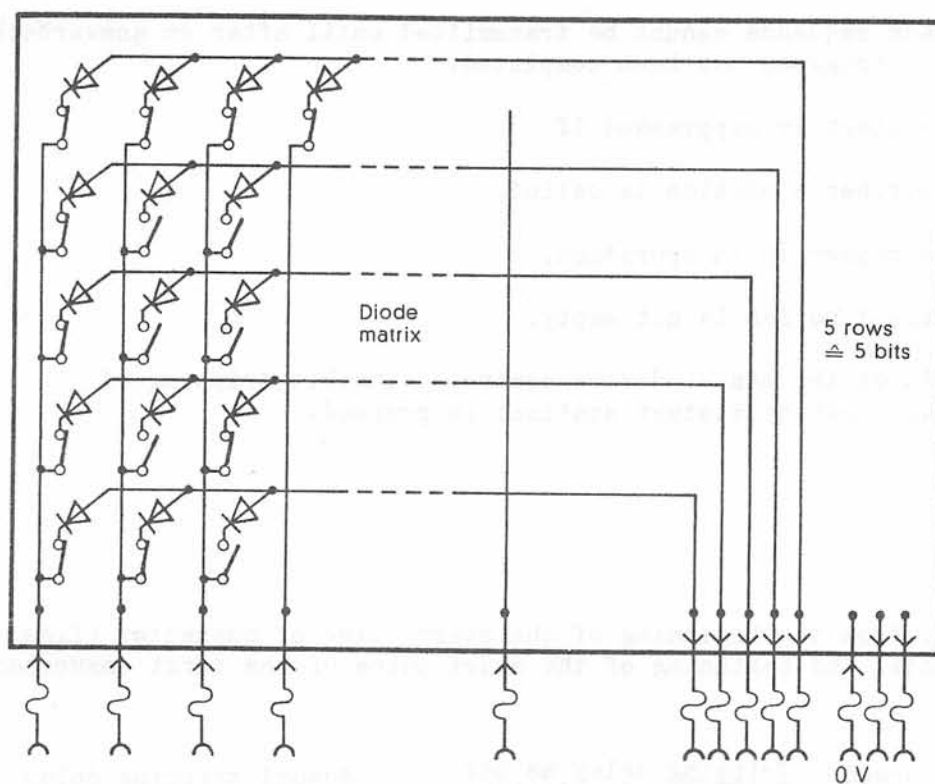
The first coded character in the diode matrix is called and transmitted in response to a start pulse generated by the answerback control. The transmitter module there-upon signals "character transmitted" and the cycle counter advances one column. Upon arrival of a new start pulse the next character is transmitted.

This cycle is repeated until the end of the answerback code is reached.

The answerback code end is signalled after the 20th character. It is also possible to reduce the character sequence by inserting a wire strap. If it is wished to program an answerback code of, say, 12 characters, a wire strap is soldered from point 12 to point KGE (Figs. 49, 51). No wire strap is required when programming an answerback sequence comprising twenty characters.



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After the answerback module has completed its cycle the answerback control is reset, i.e. the cycle counter is restored to 0.

A new answerback sequence cannot be transmitted until after an answerback transmission in progress has been completed.

The answerback start is suppressed if

- the subscriber's station is called,
- the tape reader is in operation,
- the keyboard buffer is not empty,
- switch S8 of the manual device controls (inhibit tripping of answerback unit by distant station) is pressed.

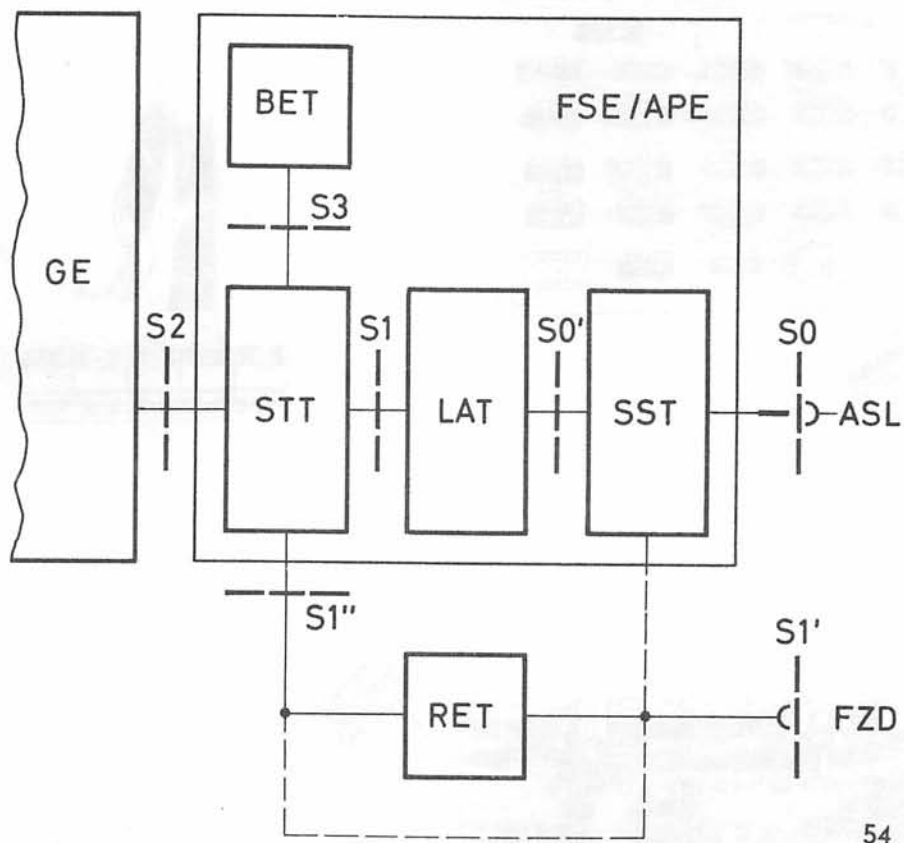
Tripping delay from the beginning of the start pulse of character (figs. side no. 4) until the beginning of the start pulse of the first answerback code character:

Telegraph speed	Tripping delay as per CCITT Recommendation No. S6	Actual tripping delay
50 bauds	150...600 ms	245 ms
75 bauds	100...600 ms	163 ms
100 bauds	75...600 ms	122.5 ms

7.12.4 EFFECTS OF OPERATING MODES ON ANSWERBACK MODULE KG

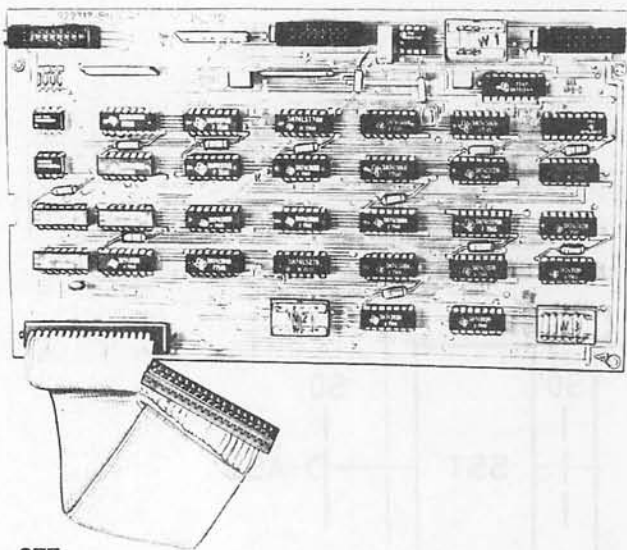
Functional state of the Teleprinter	Standby	Operating condition				
	AC power voltage applied	Local mode ON	Line working ON			
			Idle	Printing		
			No input or output mod- ule in oper- ation	At least one input or output module in operation		
				Dial	Here-is	Who-are you
Effect on: ANSWERBACK MODULE						
	Home position	Home position	Home position	Home pos.	in oper.	in oper.
Tape reader in operation	Home position	Home position	Home position	Home pos.	Home pos.	Home pos.
Keyboard buffer filled	Home position	Home position	Home position	Home pos.	Home pos.	Home pos.

8 Operating principle of the line interfacing equipment

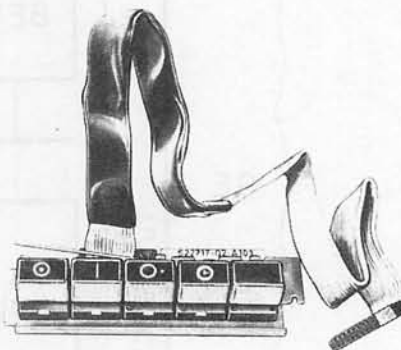


AEL	Interface electronics	
ASL	Subscriber line	
APE	Matching unit	S0, S0'
BET	Manual controls module	S1, S1', S1''
FSE	Signalling unit	S2
FZD	Special signal socket	S3
GE	Basic electronics	
LAT	Line adapter	
RET	Relay module	
SST	Protector	
STT	Control module	

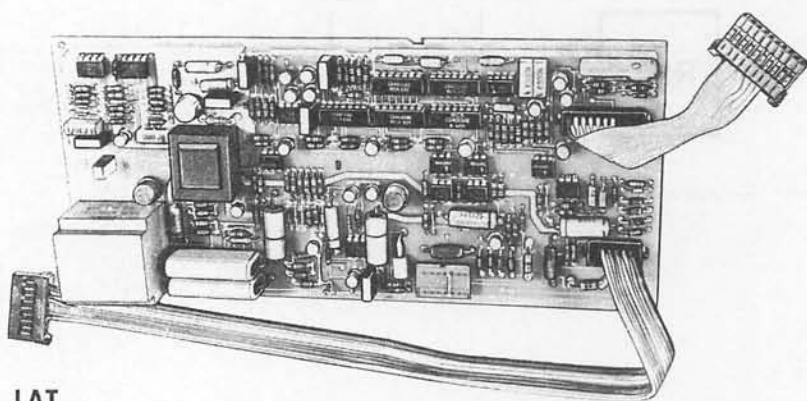
Interfaces



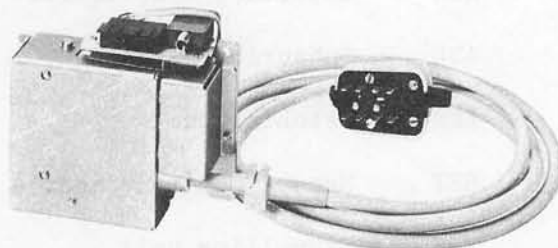
STT



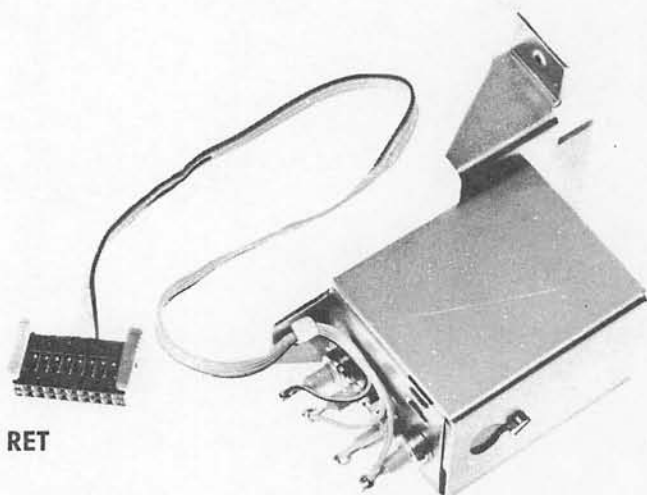
BET



LAT



SST



RET



FZD

8.1 GENERAL

The modules of the line interfacing equipment (Fig. 55) exist in several configurations which form different matching units.

The matching units are required for connecting teleprinters to point-to-point circuits or external transmission equipment.

The modules of the line interfacing system are incorporated in the teleprinter. Like the other modules of the teleprinter, they are provided with a special protection against environmental influences.

The configuration of the line interfacing equipment must generally be agreed with the customer. For this reason it is not possible to give a description of the line interfacing equipment which is universally valid. Nonetheless some essential features of the line interfacing equipment of the teleprinter are the same in all cases. These are described in the following.

8.2 CONSTRUCTION (Figure 54)

8.2.1 MODULES AND ACCESSORY EQUIPMENT

All configurations of the matching units normally consist of the following modules (Fig. 54):

- Manual controls module BET,
- control module STT,
- line adapter LAT or interface electronics AEL
(STT and LAT combined on one pc board) and
- protector SST.

The relay module RET and the special signal socket FZD are available as accessory equipment.

The control module and the manual controls are used for operating functions.

The line adapter and the protector perform the transmission-oriented tasks.

The relay module enables floating signal contacts to be brought out via the special signal socket FZD.

All the modules and accessories mentioned are interconnected by means of plugs and cables.

The necessary operating voltages for the modules of the line interfacing system are supplied via interface S2. These are:

Operating voltage	approx. +12 V;	voltage tolerance	approx. +5 %
"	" approx. -12 V;	"	" approx. +5 %
"	" +5 V;	"	" approx. +5 %
"	" 0 V;	reference potential	for +12 V, -12 V and +5 V.

8.2.2 INTERFACES (Figure 54)

- S0 and S0' Interface S0 is the interface between the teleprinter and the subscriber line. Interface S0' interconnects the line adapter and the protector. The level at these interfaces is specified in compliance with the customer's requirements or by existing transmission equipment.
- S1 Interface S1 connects the control module with the line adapter. The signals at interface S1 are transferred at electrical values conforming to CCITT Recommendation V.28. The operating voltages of +12 V, -12 V and 0 V are supplied to the line adapter.
- S1' Interface S1' is used for connecting external signalling equipment which is controlled by relays in the relay module.
- S1" Interface S1" connects the control module with the relay module. On the special-function lines of interface S1", signals are transmitted at TTL level.
- S2 Interface S2 is the transfer interface between the basic electronics and the modules of the line interfacing equipment. The electrical values of the signals transmitted on the data, control, and status signalling lines and on the timing line conform to the TTL level. The operating voltages of +12 V, -12 V, +5 V and 0 V are also supplied via interface S2.
- S3 Interface S3 is used for connecting the buttons and lamps of the manual controls group to the control module.

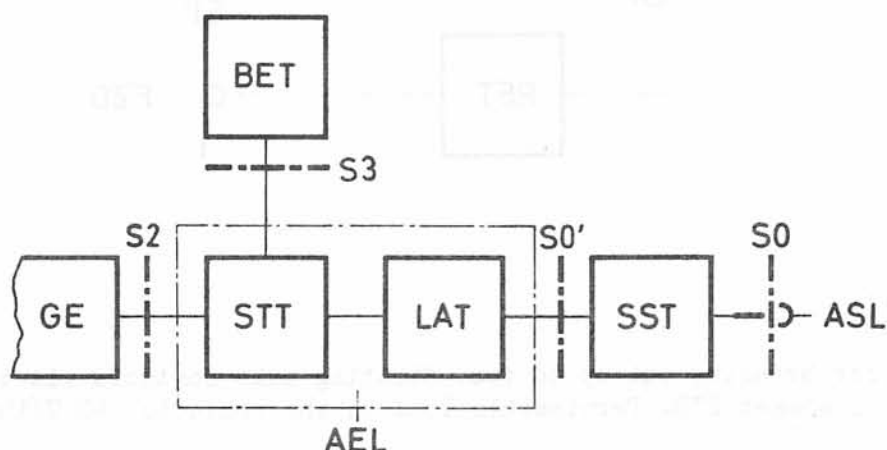
8.2.3 CONFIGURATION OF THE LINE INTERFACING EQUIPMENT

Besides permitting the connection of the signalling circuit and the character call circuit, the line interfacing system of the teleprinter also enables a floating signal contact for external control purposes to be brought out via the relay module.

The transmitted data, received data and call signals are passed over the subscriber line AS the floating contacts via special signal socket FZD.

The equipment comes in the following configurations:

8.2.3.1 LINE INTERFACING SYSTEM MINUS ACCESSORIES (Figure 56)



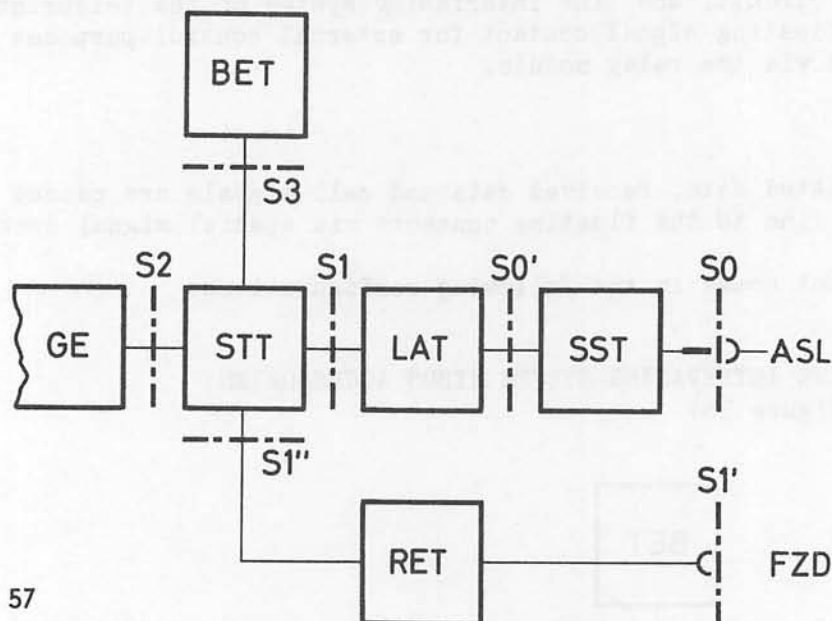
56

When the demands on the logic and the transmission equipment are light, the circuitry of pc boards STT (control module) and LAT (line adapter) can be combined on one module AEL (interface electronics). The V.28 interface S1 is then omitted.

The combined module AEL is installed in place of the SST.

The mounting location for the LAT is left vacant.

8.2.3.2 BRINGING OUT THE FLOATING SIGNAL CONTACTS VIA THE SPECIAL SIGNAL SOCKET (Figure 57)



Interface S1':

This serves for bringing out up to four floating make contacts via the special signal socket FZD. Permissible load on the contacts: 60 V/100 mA.

In character recognition contact make times may be 135, 90 or 67.5 ms matching telegraph speeds of 50, 75 and 100 bauds respectively.

The relay module comprises four relays with floating signal contacts for external control purposes. Among the teleprinter criteria selected on the special-function module and assigned to the relays of the relay module, one criterion, e.g. the data-medium out contact, may be optionally assigned to the subscriber line.

8.3 PRINCIPLE OF OPERATION OF THE MODULES

The functional states of the teleprinter and the basic principle of operation during transmission and reception of telegraph characters are explained in sections 4 and 5 of this description.

8.3.1 CONTROL MODULE BET (Figures 54 and 55)

The manual controls group contains up to five illuminated pushbuttons which permit line and local working to be enabled and terminated. The lamps in the buttons indicate the current functional state.





Depressing the manual control buttons causes signals to be passed via interface S3 to the control module. The lamps in the buttons are switched on and off by means of signals from the control module.

The function and mode of operation of the buttons and lamps depend on the control module configuration being used.

The following table explains the most frequently occurring functions of the buttons and switches and the lamps they contain.

Mounting positions:

1	2	3	4	5
---	---	---	---	---

Mounting position	Symbol	Designation	Function of the button/switch	Function of the lamp
1		Call button with trouble indicator lamp	Enables on-line mode and transmits a 250 ms start polarity pulse in standby conditions and in on-line mode	Lamp flashes if a malfunction is caused by data medium OUT condition or opening of cover lid
2		Local button with local lamp	Enables local mode	Lamp is lit during local working
3		Disconnect button with ready-to-print lamp	Disabling of on-line mode when the latter is set to continuously ON; deactivation of local mode.	Lamp lights in on-line mode. Lamp lights in local mode and with incoming call in the mode with no forced termination of local mode until local mode is manually switched off.
4		Button for continuous on-line mode with lamp for continuous line working	Activation of continuous on-line mode during existing on-line mode, i.e. no automatic termination of on-line mode after a pre-determined period.	Lamp is lit during continuous on-line working
5	Dummy button			

8.3.2 CONTROL MODULE STT (Figure 58)

The control module performs the operational functions of the line interacting system. It basically consists only of digital electronics. The control module interprets the signalling criteria coming from the manual controls or line adapter for enabling line or local mode. It uses these criteria to generate the necessary signals for the ensuing functional sequences. These signals may be passed to the basic electronics, the line adapter or the manual controls group, depending on the particular control function to be executed.

The teleprinter is activated by means of the criteria "line mode" or "local mode", which are transferred to the basic electronics via interface S2. The basic electronics replies after a predetermined time by returning a "ready" signal. Cancellation of these criteria, e.g. when the clearing signal is given or by a "data medium OUT" signal, causes the teleprinter to be turned off again.

In half-duplex and local mode operation, the information offered on the "transmitted data" line (interface S2) in the control module is passed via the "monitoring loop" on to the "received data" line.

The control module contains an electrical timeout switch which automatically turns off the line mode after a predetermined time (e.g. 30 s) has expired since transmission or reception of the last telegraph character.

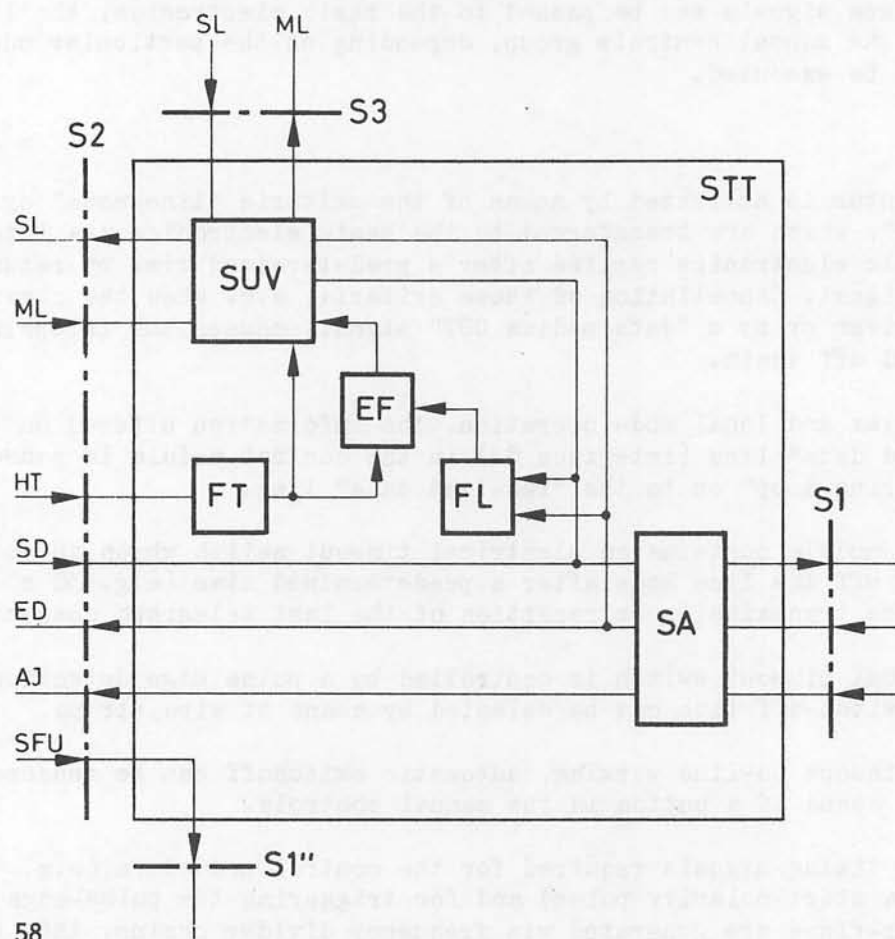
The electrical timeout switch is controlled by a pulse edge detection circuit. The switch-off time can be selected by means of wire straps.

During continuous on-line working, automatic switchoff can be rendered ineffective by means of a button in the manual controls.

The various timing signals required for the control procedure (e.g. transmission of a start-polarity pulse) and for triggering the pulse-edge controlled flip-flops are generated via frequency divider chains, thus keeping the specified times exactly within close tolerances and unchanged over the life of the pc board. As the frequency divider chain is controlled by an auxiliary clock pulse from the basic electronics, no adjustments are necessary in the control module.

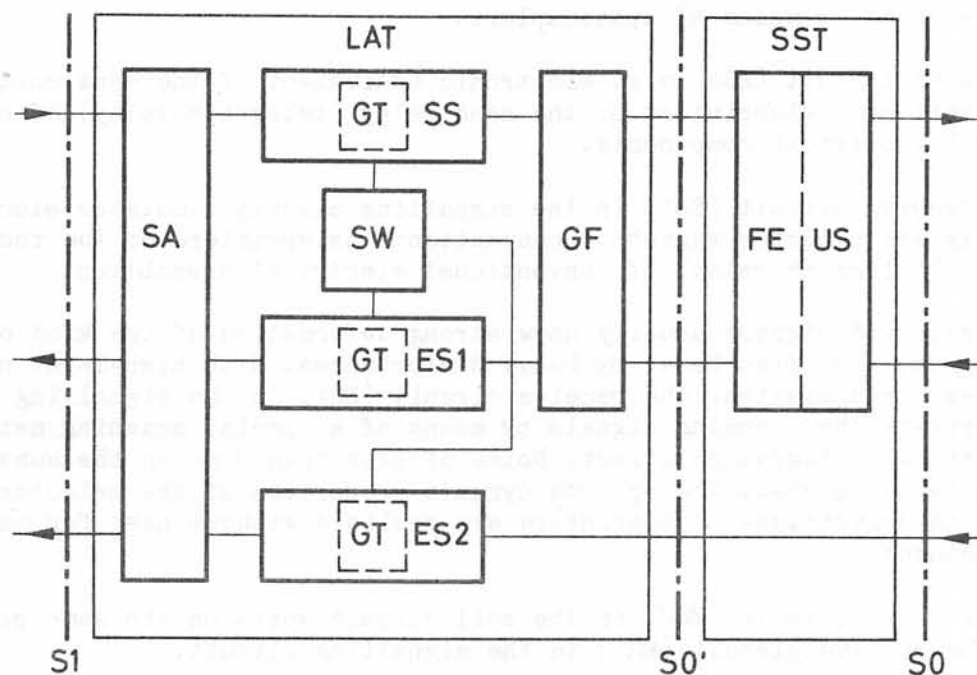
Matching circuits and level converters are provided for matching to interface S1.

Structure of control module STT



AJ	Call pulse	S1...S3	Interfaces
ED	Received data	SD	Transmitted data
EF	Electrical timeout switch	SFU	Special functions
FL	Pulse edge detection circuit	SL	Control line
FT	Frequency divider chain	STT	Control module
HT	Auxiliary clock pulse	SUV	Storage and logical interconnection
ML	Status line		
SA	Interface adapter		

Block diagram showing structure of the line adapter LAT and protector SST



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ES1	Receive circuit in the signalling circuit	SO...S1	Interfaces
ES2	Receive circuit in the call circuit	SA	Interface adapter
FE	RF suppressor	SS	Send circuit
GF	Noise voltage filter	SST	Protector
GT	dc decoupler	SW	Voltage converter
LAT	Line adapter	US	Fine protection against surge voltages

8.3.3 LINE ADAPTER LAT (Figure 59)

The line adapter (Fig. 61) mainly consists of analog electronics. It converts the different levels at interface SO and SO' to the machine-internal voltage level. The line adapter is also where the line circuit is dc decoupled from the machine-internal circuitry. The dc decoupler (GT) prevents mutual interference between teleprinter and subscriber line. It is implemented by means of optocouplers.

The send circuit (SS) is an electronic equivalent of the send contact of conventional teleprinters or the send relay (telegraph relay) of conventional electrical components.

The receive circuit (ES1) in the signalling circuit simulates electronically the selector magnet of conventional teleprinters or the receive relay (telegraph relay) of conventional electrical assemblies.

The received signals usually show strong deformation of one kind or another and are often beset by heavy disturbances. With high-level neutral current transmission, the receive circuit (ES1) in the signalling circuit interprets the incoming signals by means of a special scanning method with additional integration effect. Noise of less than 2 ms on the subscriber line is suppressed. The optimum dynamic properties of the selector magnet used in conventional teleprinters are realized without need for manual adjustments.

The receive circuit (ES2) in the call circuit works on the same principle as the receive circuit (ES1) in the signalling circuit.

The neutral current variants of the line adapter incorporate an electronic overcurrent protector that interrupts the send circuit when the line current exceeds about 100 mA.

After about 100 ms the send circuit is closed. If overcurrent continues to flow, the send circuit is once more interrupted, and so on.

Owing to the wide, adjustment-free receive margin and the accurate and constant conversion of the signal elements, there is generally no need for a range finder and therefore none has been provided.

In line adapters for polar current operation (high level system), the send circuit regulates the current in the send path automatically. A current limiter is included in the receive path.

The send circuit in line adapters for polar current low-level interface ensures a constant send voltage. Noise pulses are generally also suppressed in the receive path in the signalling circuit of these line adapters.

The noise voltage filter (GF) helps to ensure that the required noise voltage values are observed. The inductance of noise voltage filter simultaneously improves the transmission characteristics.

The voltage converter (SW) generates ungrounded auxiliary voltages from the power voltages of +12 V, -12 V and 0 V supplied via interface S2. In the case of an internal power supply, the voltage converter supplies ungrounded keying voltages to the send circuit.

The specification of the interface adapter (SA) with regard to level and signal procedure is such that the teleprinter can interwork with different full-duplex or half-duplex transmission systems just by changing the line adapter.

8.3.4 PROTECTOR SST (Figure 59)

The protector SST comprises the RF suppressor (FE) and generally also a fine protection against surge voltages (US).

The RF suppressor uses filters to reduce the noise voltages attributable to the teleprinter to permissible levels.

The fine protection against surge voltages uses the same filters and also gas-filled overvoltage arresters to limit brief surge voltages not eliminated by the normal coarse protection external to the teleprinter to permissible levels.

8.3.5 RELAY MODULE RET

The relay module contains four relays with one make contact each (permissible load 60 V/100 mA).

The contacts of these relays are brought out on a floating basis, i.e. the external devices connected up to the teleprinter are not powered by the latter's power supply.

The relays are controlled by means of TTL-level signals.

If a signal is sent to an external point via a relay, its contact closes in dependence on the telegraph

- speed (50, 75 or 100 bauds)
for 135.90 or 67.5 ms from the middle of the fifth information element of a received telegraph character.
- for the time the paper, magnetic tape or punched tape supervision feature is operative.


The contacts are brought out via a special signal socket FZD (see 8.2.3.2).

8.4 EFFECTS OF THE OPERATING MODES ON THE MANUAL CONTROLS GROUP BET
IN THE MATCHING UNITS
(Based on a frequently used line interfacing system)

Functional state of the Tele-printer	Standby	Operating condition			
	ac mains voltage applied	Line working		Local working	
	data medium inserted	Idle	Printing	Idle	Printing
	cover lid closed	no input or output module in operation	at least one input or output module in operation	no input or output module in operation	at least one input or output module in operation
Effects on: MANUAL CONTROLS GROUP BET					
Call button <input type="radio"/>	effective	ineffect.	ineffect.	effective	effective
Call lamp	does not light	does not light	does not light	does not light	does not light
Local button <input type="checkbox"/>	effective	ineffect.	ineffect.	ineff.*)	ineff.*)
Local lamp	does not light	does not light	does not light	lights	lights
Disconnect button <input type="radio"/>	ineffective	effect.	effect.	effect.	effect.
Ready-to-print lamp	does not light	lights	lights	does not light	does not light
Button for <input type="radio"/> continuous on-line mode	does not light	effective		effective	
Lamp	does not light	but lights, only when actuated		does not light	

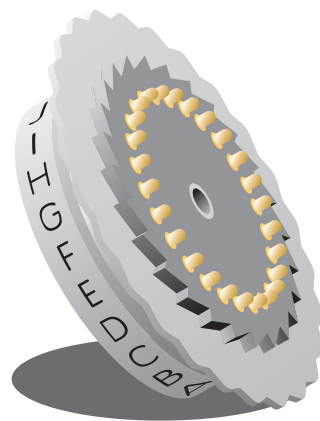
*) Further actuation of the local button ☐ (after the local mode has been enabled) has no bearing on local working.

Trouble condition:

When the cover lid is open or in the event of a 'data medium out' condition (no printer paper or paper or magnetic tape inserted), the lamp in the call button  flashes. Depending upon the line interfacing equipment installed, neither local nor line working can be started. On arrival of a call, the teleprinter returns a 250 ms start polarity pulse (break-in).

Note:

The teleprinter can also be used for operation in switched networks. This, however, is only possible if the line interfacing equipment (signalling unit FSE) that is suited to the existing network criteria is specified. Any questions in this respect may be addressed to the parent company for clarification.



KL/TGA-5841 AROFLEX Teleprinter Model 1000 mil DEEL 5

Teleprinter Model 1000 mil

Replacement Instructions

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This publication uses illustrations and text to demonstrate step-by-step to the service technician the actions necessary for replacing modules in the teleprinter.

It furthermore describes how to retrofit modules and supplementary parts.

All information for the service technician not referring to the replacement of modules is contained in the

Service Instructions Ordering No. A22713-A1000-X1-*-7620

This publication describes how a faulty module can be localized and the fault corrected. It also contains information on placing in service and maintenance of the teleprinter.

In addition the following publications are recommended:

Operating Instructions Ordering No. A22713-A1000-X1-*-7619

Description - General Section Ordering No. A22713-A1000-X1-*-7618

1.1 TECHNICAL INFORMATION

1.1.1 HANDLING OF MODULES INCORPORATING MOS DEVICES

The basic electronics contains MOS devices which are susceptible to damage by electrostatic potential differences at their pins. However, the inputs and outputs of the devices have integrated protective structures which generally prevent damage by electrostatic charge.

Nevertheless, the usual precautions must be taken when handling MOS devices. Before working on these modules, the technician must drain off any electrostatic charge to body by, for instance, touching a metallic part of the teleprinter.

For transportation, these modules must be wrapped in conductive foil or conductive foam rubber. If the original packing for the modules or the maintenance case for the teleprinter is used, this protection is already provided.

1.1.2 MODULE IDENTIFICATION

All modules are provided with designations which must be observed when modules are replaced.

Equipment list

item number e.g. 91415

or

item code

number

e.g. S22751-J102

must tally with number
on replaced module

Revision level e.g. A-1

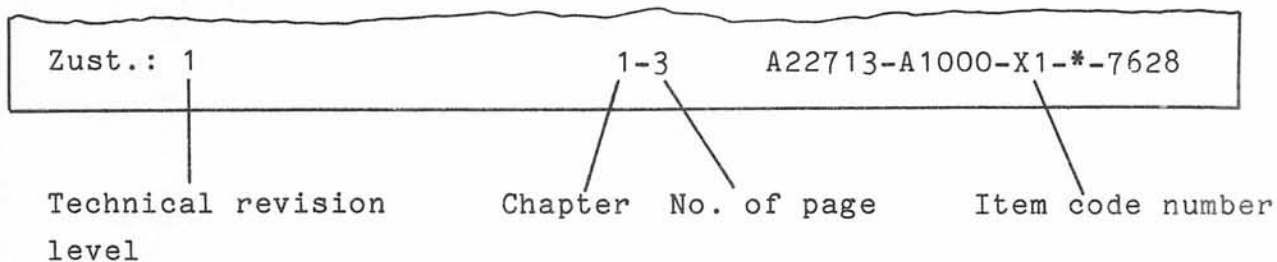
or

equipment

revision level e.g. GS1

need not tally
with number on replaced
module

Foot of page



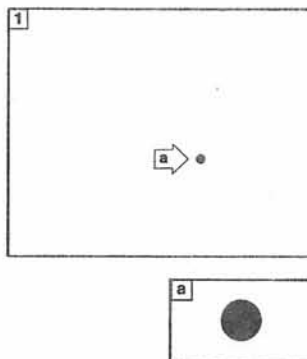
The two or three capital letters following the name of a module represent the abbreviated designation of the module (e.g. protector SST).

Arrows containing small letters



denote details in the illustrations which are picked out in detailed enlargements (small-format illustrations a, b...).

e.g.



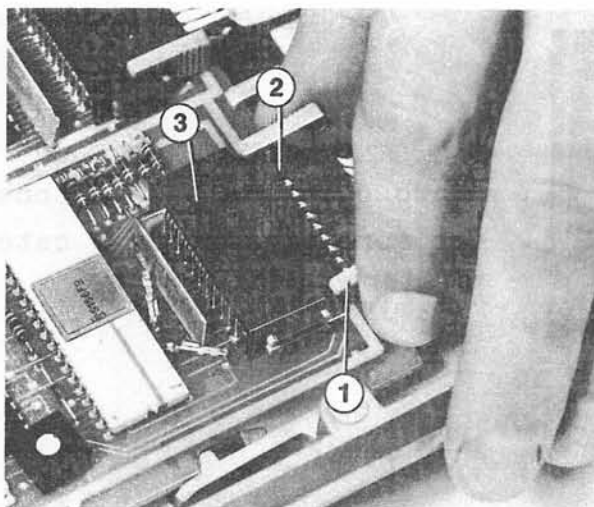
2.1 PREPARATIONS FOR REPLACING MODULES

GENERAL INFORMATION

Before any work is undertaken, withdraw the ac power connector and the signal connector from their sockets, otherwise the modules may be damaged.

Pay particular attention to the notes in section 1.1.1 on handling modules with MOS devices.

When replacing the modules, the connectors must be unplugged. In doing so, note the following:



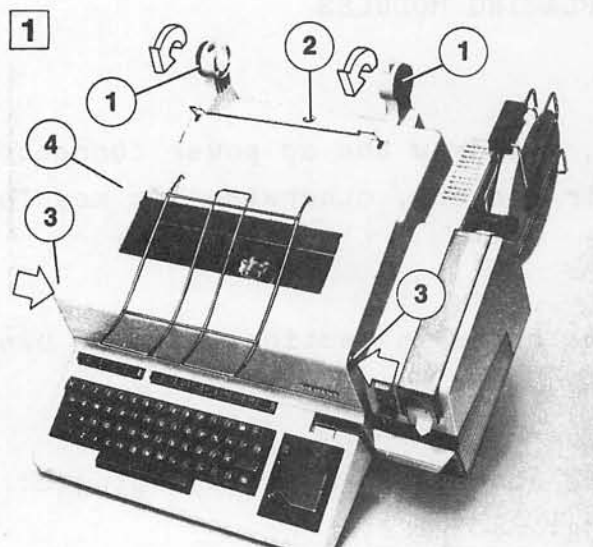
- Take hold of the connector as shown and pull out carefully without jerking.
- On no account pull on the cable itself.
- Color marks 1 on clip connector 2 and blade connector 3 must match and be on the same side.

Before replacement of a module, the cover must be removed and if necessary the carrier plate must be swung up so that the connector on the basic electronics can be unplugged. The completion of these procedures, described in sections 2.2 and 2.3, is taken for granted in all other sections.

The individual sections only describe removal procedures. The modules are replaced by reversing these procedures.

NOTE:

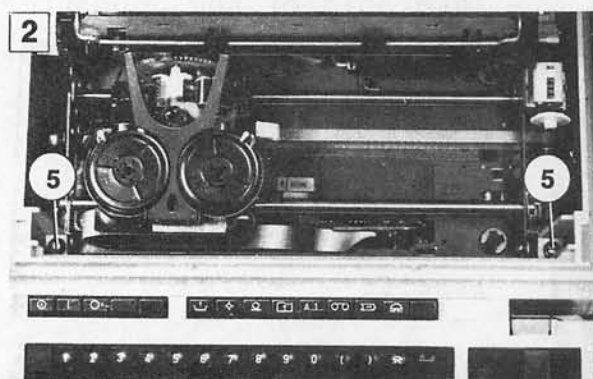
After replacing modules make sure that the connectors and ground cable connector are inserted properly.



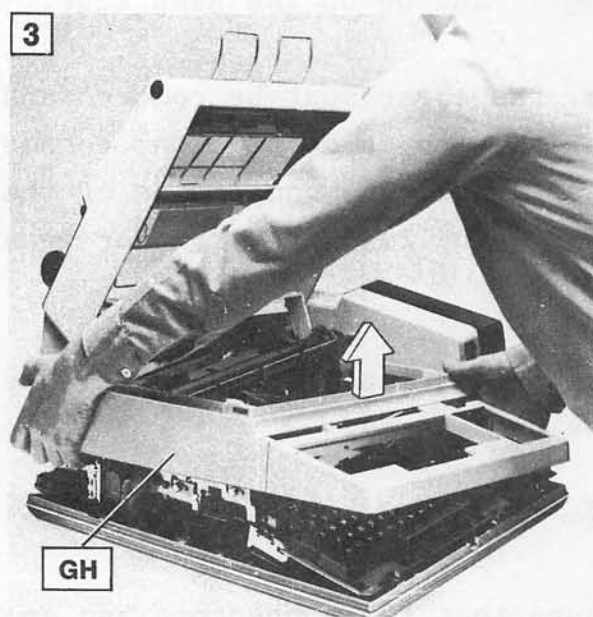
Turn locking disks 1 in the direction shown by the arrow. Remove the paper roll from its holder.

Undo quick-release catch 2:
Press down on screw head while turning it counter-clockwise through 90°.

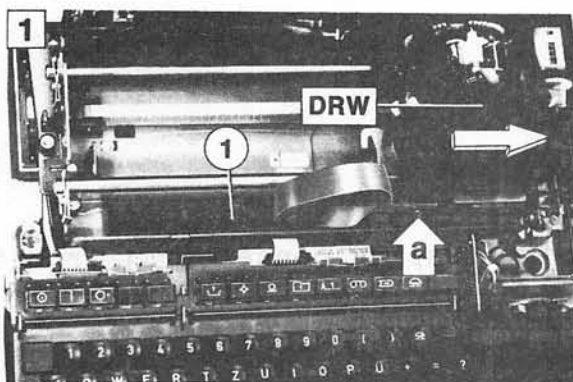
Press buttons 3 and swing top cover 4 upwards until it latches.



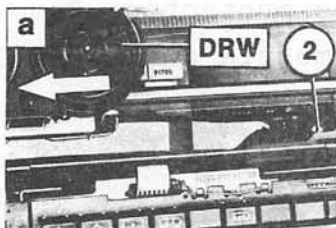
Undo quick-release catches 5 as for quick-release catch 2.



Lift off cover GH.

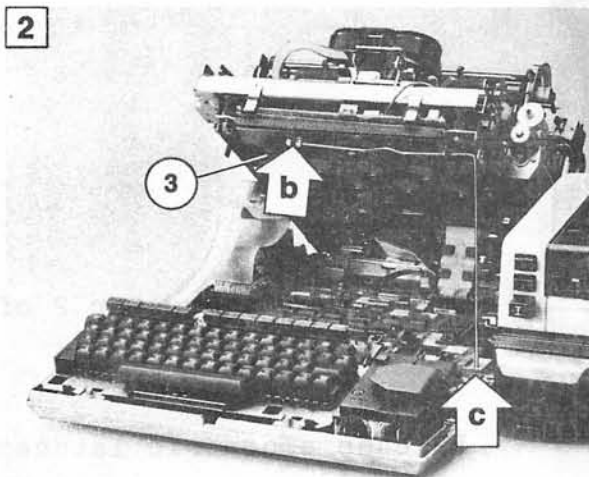


Move printing mechanism DRW so that quick-release catches 1 and 2 are accessible.

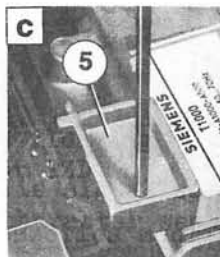
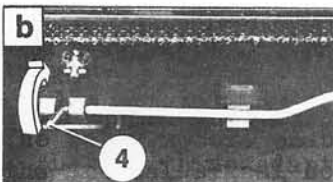


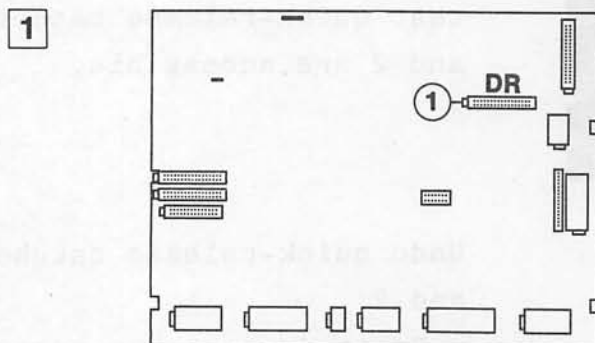
Undo quick-release catches 1 and 2:

Press down on the screw head while turning it counterclockwise through 90°.



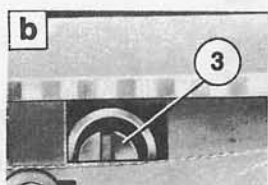
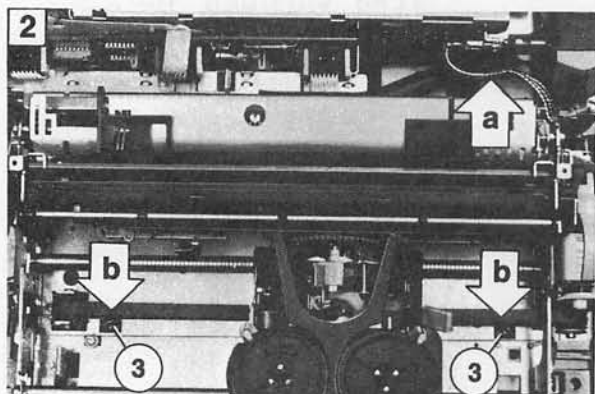
Swing carrier plate 3 upwards to the limit of its travel. Press stay 4 in the direction of the arrow until it swings out and then place end of stay in support tray 5.





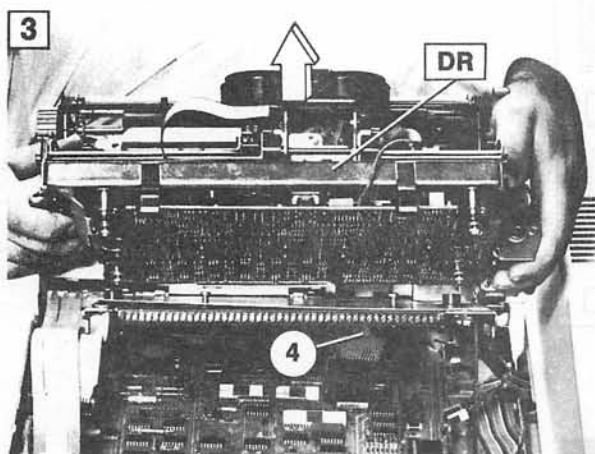
Unplug connector 1 from the basic electronics board

If necessary, unplug connector from the protector. Remove switch module and carefully draw out cable.

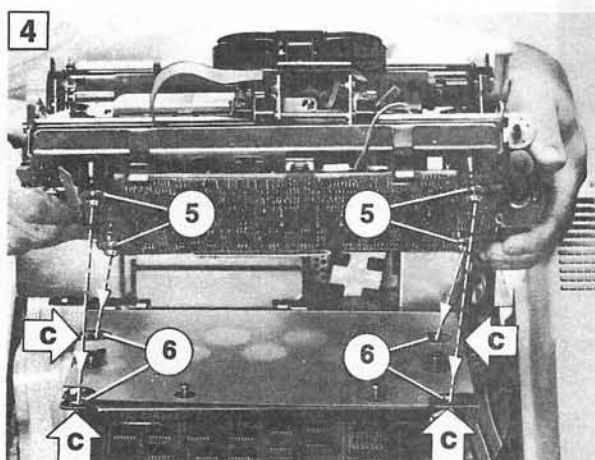


Disconnect connector 2 of the ground cable.

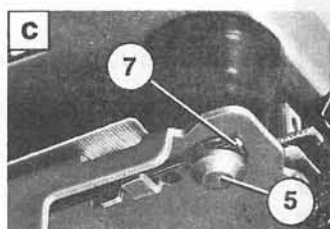
Release eccentric latches 3:
Turn counterclockwise through 90° using a screwdriver.



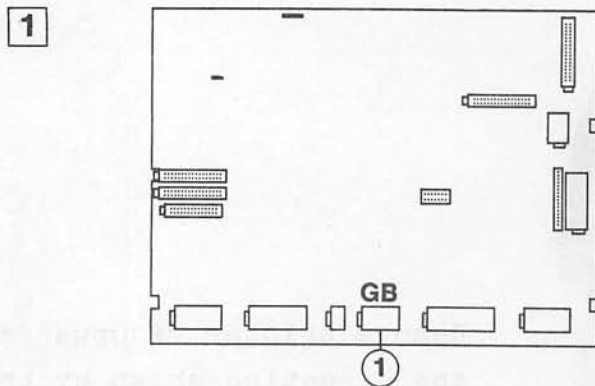
Remove printer DR upwards in the direction shown by the arrow, at the same time feed cable 4 through the carrier plate.



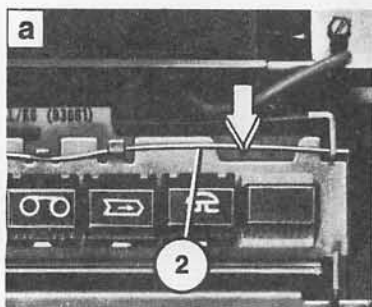
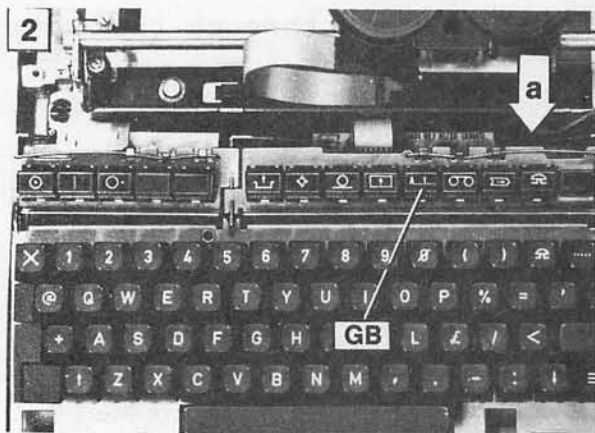
Notes on replacement:
Replace printer, inserting studs 5 in holes 6.



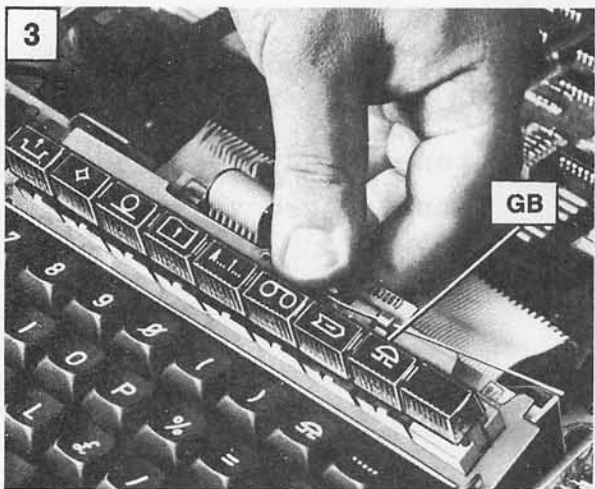
Note that when locking the eccentric latches, wire fastener 7 must engage in the annular groove in stud 5.



Unplug plug 1 from the basic electronics board

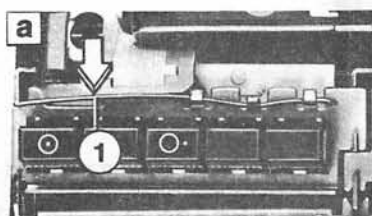


Press wire fastener 2 and ...

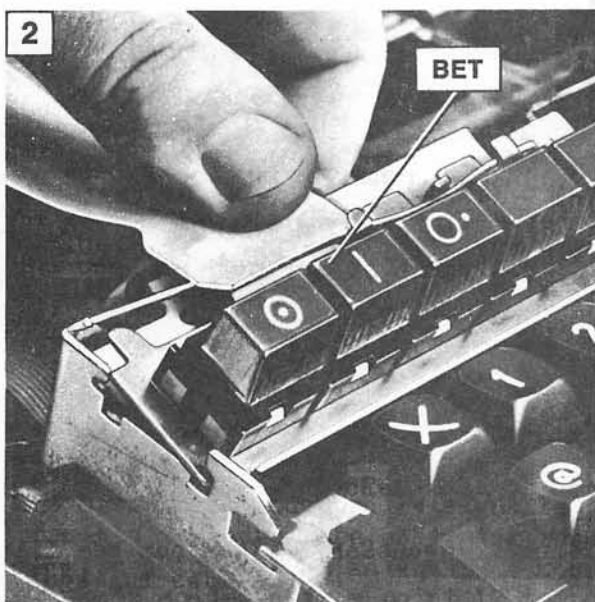


...swing manual device controls GB upwards and out.

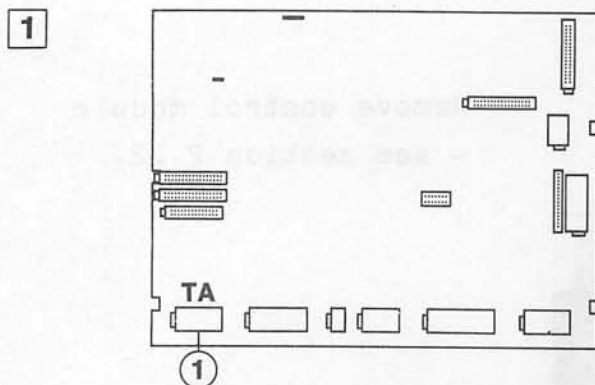
Remove control module
- see section 2.22.



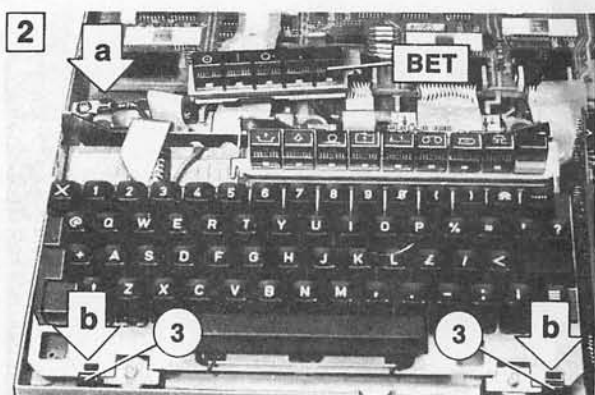
Press wire fastener 1 and...



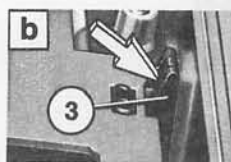
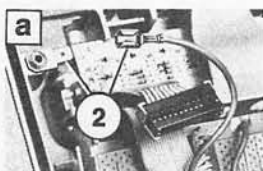
... swing manual communications
controls BET upwards and out.



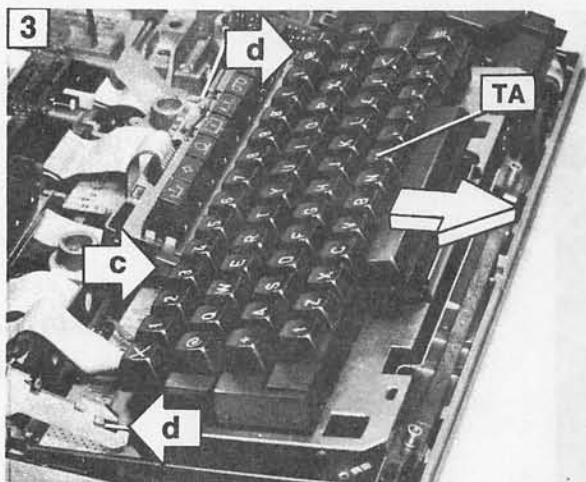
Unplug connector 1 from the basic electronics board.



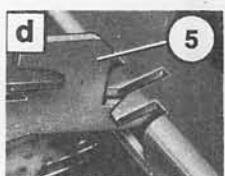
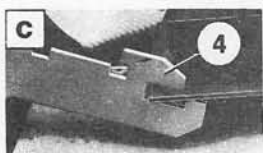
Remove manual communications controls BET (see section 2.6), without withdrawing the connector from the control module.



Unplug ground cable connector. Press in latch noses 3, lift keyboard TA slightly and ...

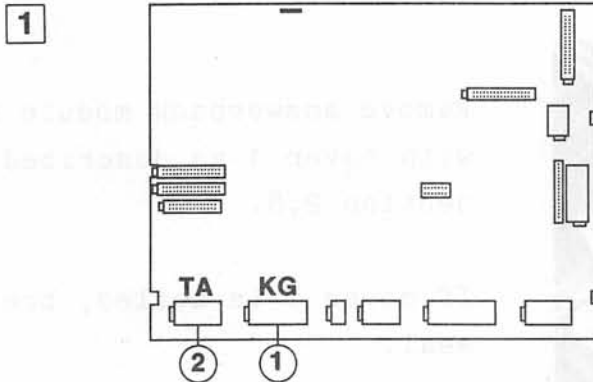


...remove it from supports 4 and 5 by pulling in the direction shown by the arrow.

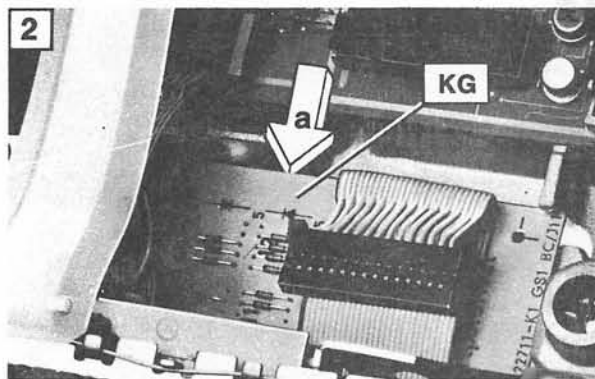


Notes on replacement:

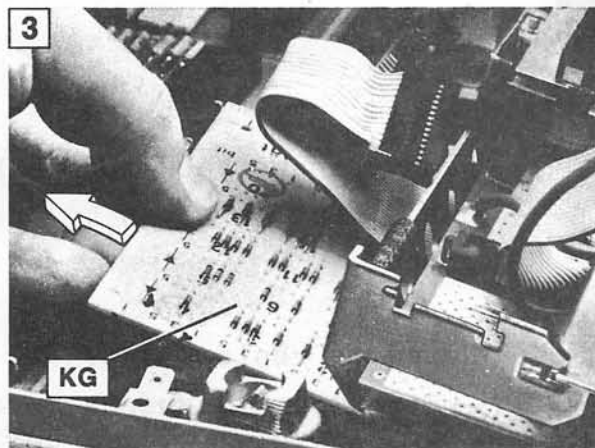
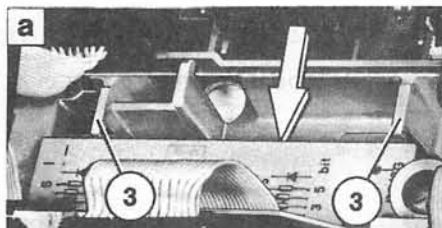
Insert ground cable connector 2



Unplug connectors 1 and 2 from the basic electronics board.

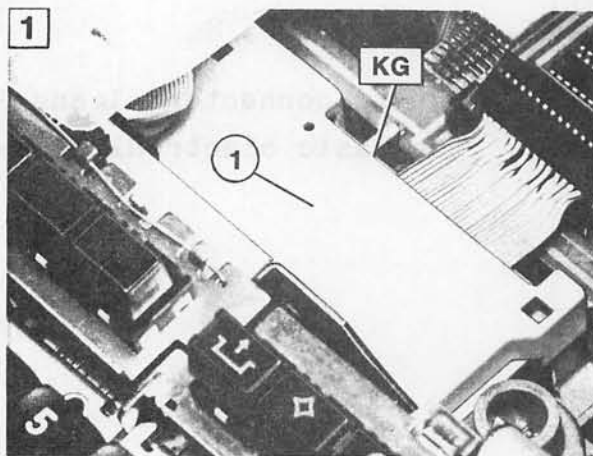


Press answerback module KG out of supports 3 and raise slightly.



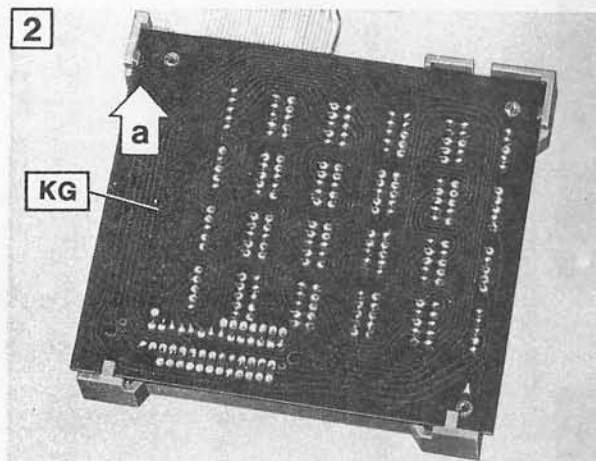
Pull out answerback module KG.

For programming the answerback module KG see Service Instructions.

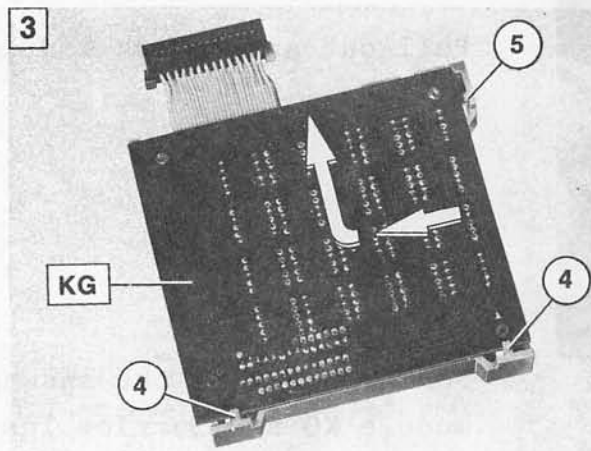
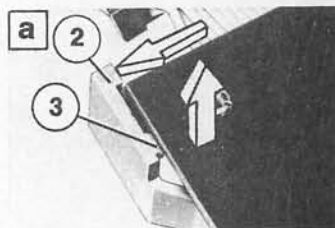


Remove answerback module KG with cover 1 as described in section 2.8.

If cover 1 is sealed, break seal.



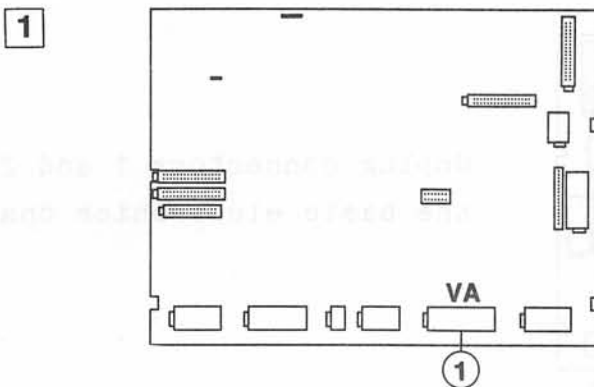
Press retainer 2 on cover outwards until answerback module clears nose 3. Lift answerback module slightly at this point.



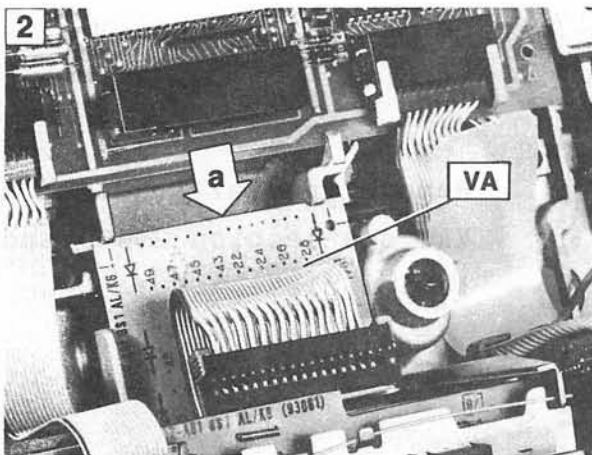
Remove answerback module KG in the direction shown by the arrow.

Notes on replacement:

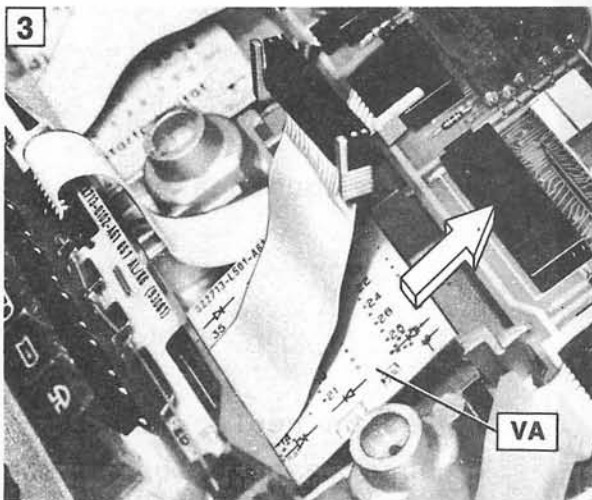
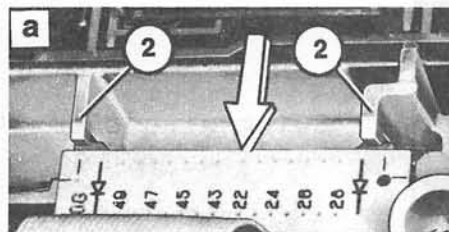
First push answerback module under noses 4, then under nose 5; finally latch under nose 3.



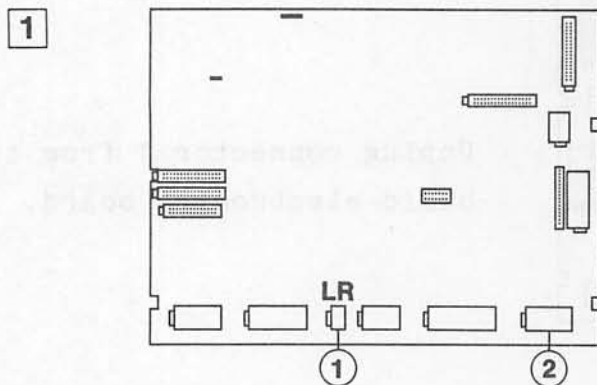
Unplug connector 1 from the basic electronics board.



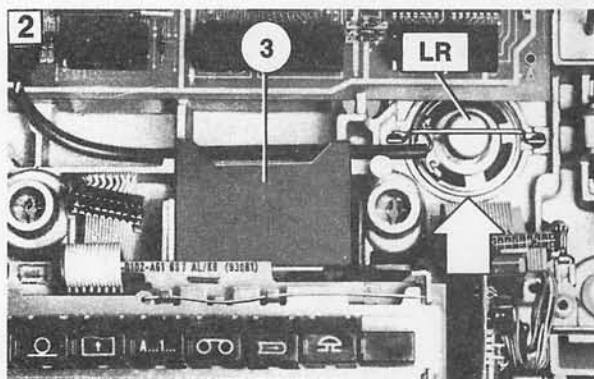
Press special-function module VA from supports 2 and lift slightly.



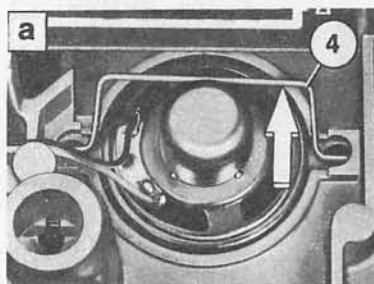
Pull out special-function module VA.



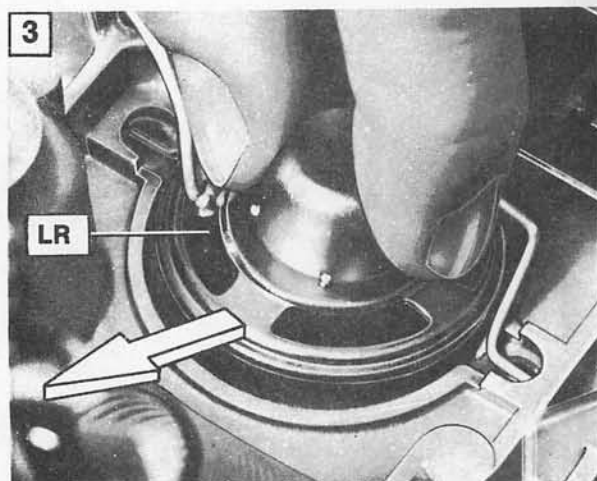
Unplug connectors 1 and 2 from the basic electronics board.



Remove special-function module VA (see section 2.10) and insulation plate 3.



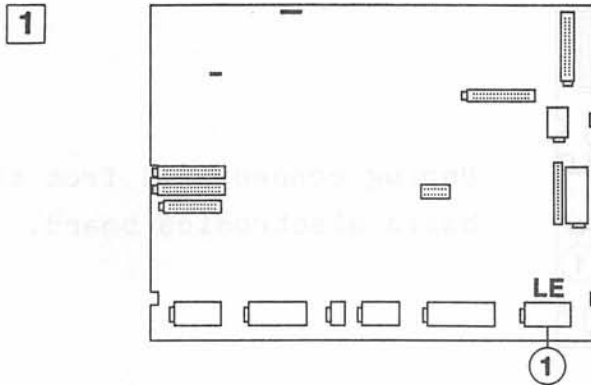
Swing wire clamp 4 backwards.



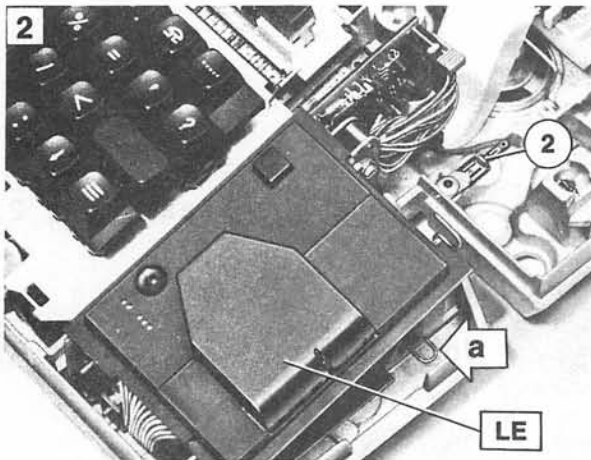
Remove loudspeaker LR.

Notes on replacement:

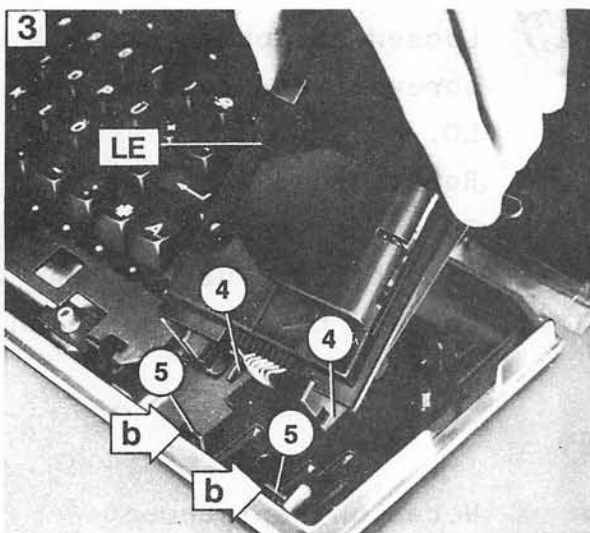
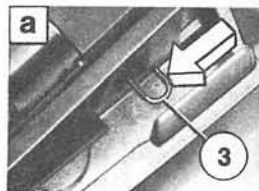
Observe position of the loudspeaker cable (see Fig. 2).



Unplug connector 1 from the basic electronics board and withdraw ground cable connector 2.



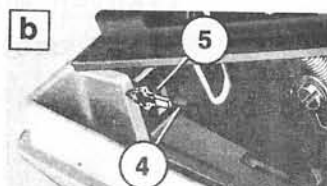
Push retaining clip 3 and ...

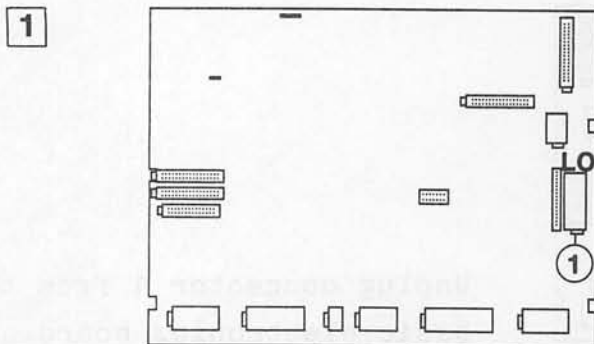


...lift tape reader LE up and out.

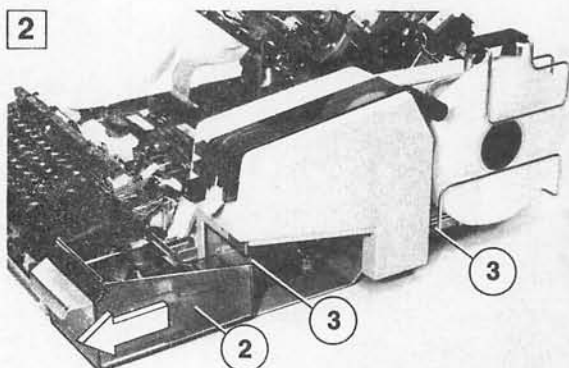
Notes on replacement:

Locate lugs 4 in retaining slots 5 and push tape reader down until it engages.



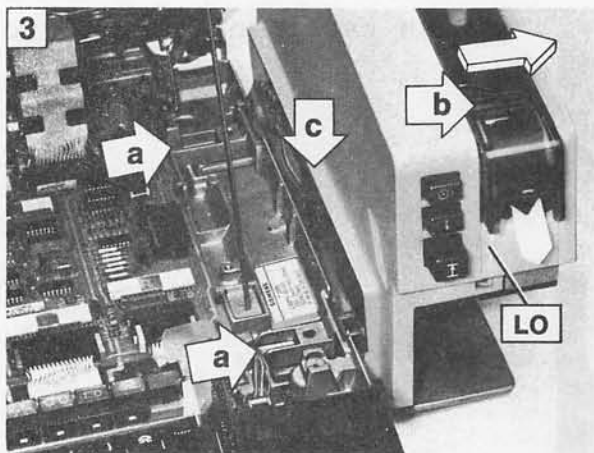


Unplug connector 1 from the basic electronics board.



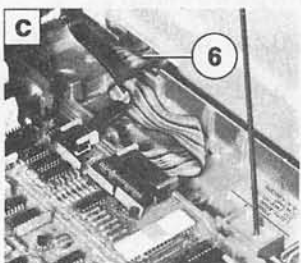
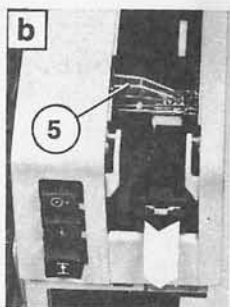
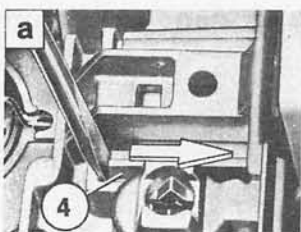
Take out chad waste box 2.

Unscrew mounting screws 3.



Loosen attachment tabs 4 with screwdriver, remove tape punch LO.

Remove chad waste from chute 5. To do so, remove tape punch horizontally. Push in chad waste box and put tape punch on attachment tabs 4.

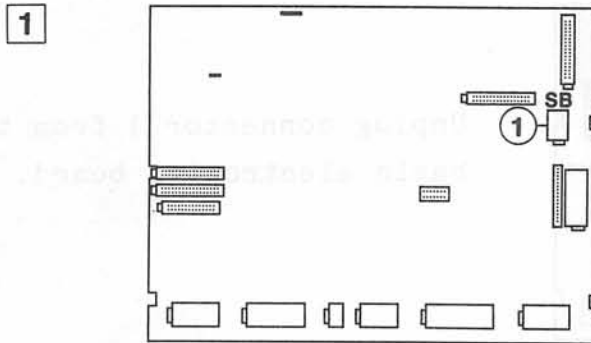


Notes on replacement:

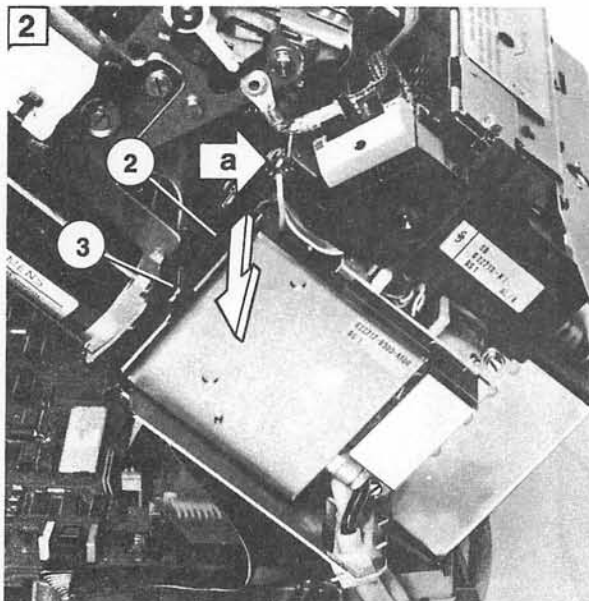
Tighten mounting screws 3.

Place cable 6 in cutout in the base tray of teleprinter.

2.14 SWITCH MODULE SB



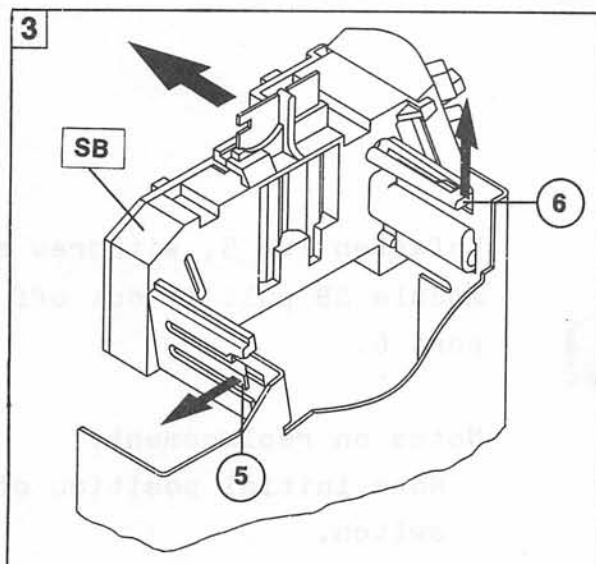
Unplug connector 1 from the basic electronics board.



Pull cable 2 sideways out of tabs 3.



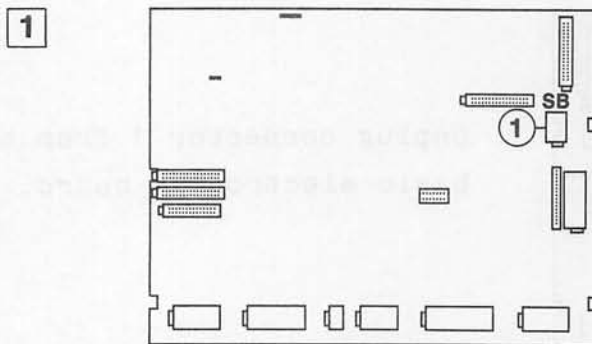
Withdraw ground cable connector 4.



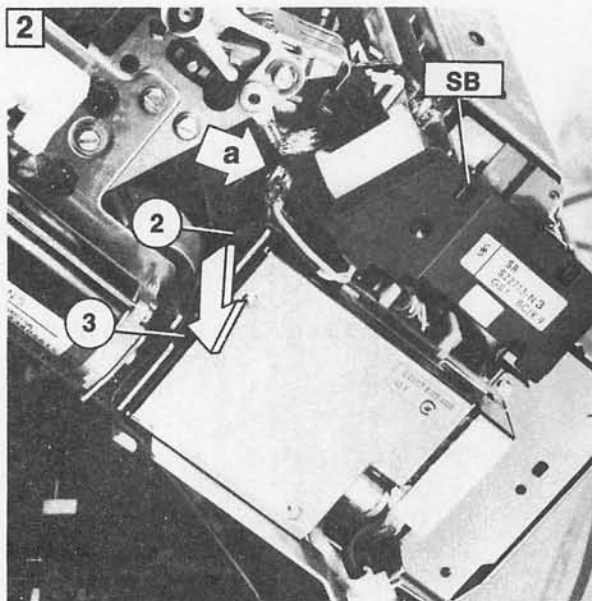
Unfasten hook 5 and lug 6 and pull off switch module SB.

Notes on replacement:

Note initial switch position.



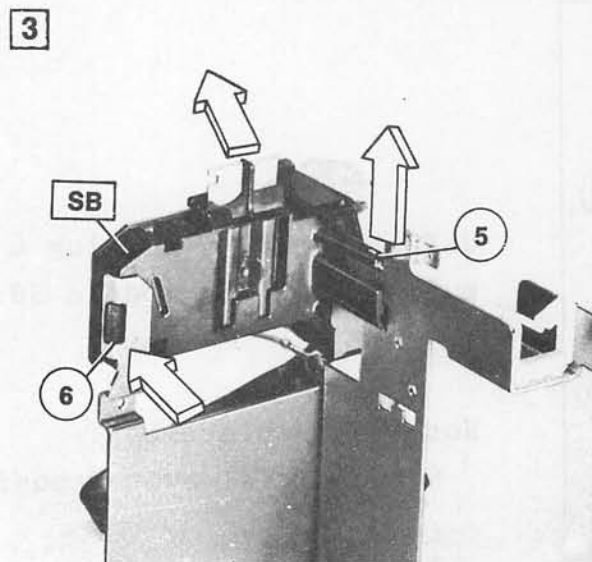
Unplug connector 1 from the basic electronics board.



Pull cable 2 sideways out of tabs 3.



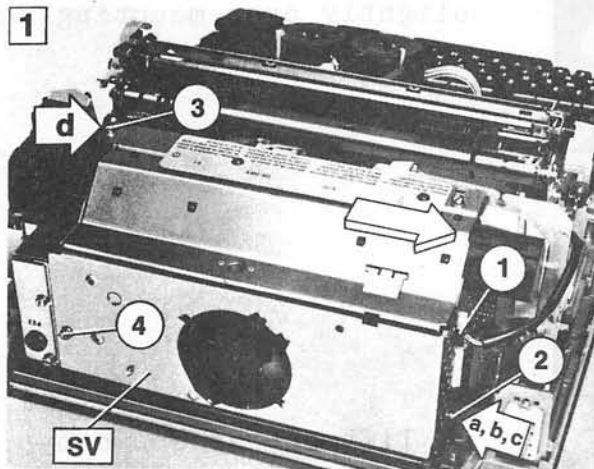
Withdraw ground cable connector 4.



Unfasten lug 5, withdraw switch module SB pull it out off support 6.

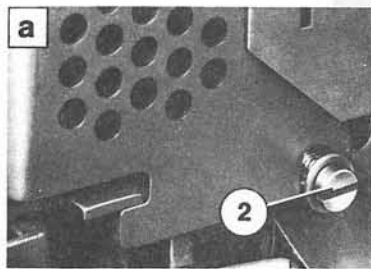
Notes on replacement:

Note initial position of the switch.



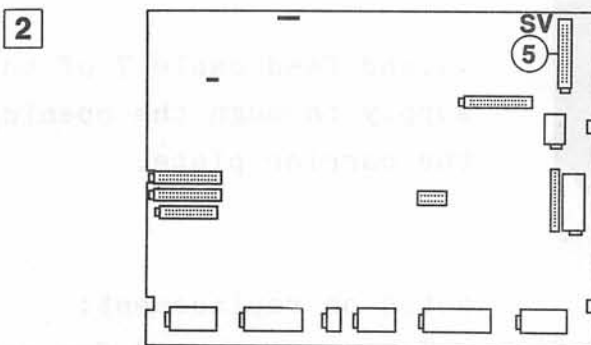
Do not raise carrier plate.

Withdraw connector 1.

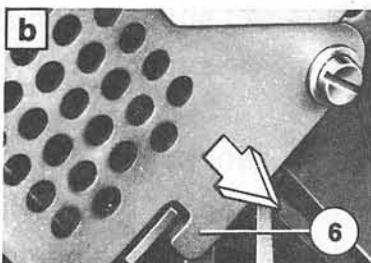


Unscrew mounting screws 2, 3 and 4 by about 4 mm.

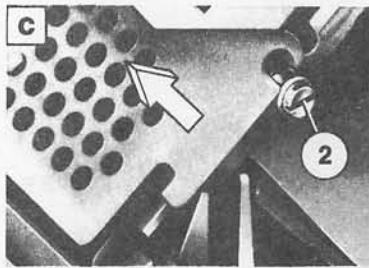
Now raise carrier plate (see section 2.3).



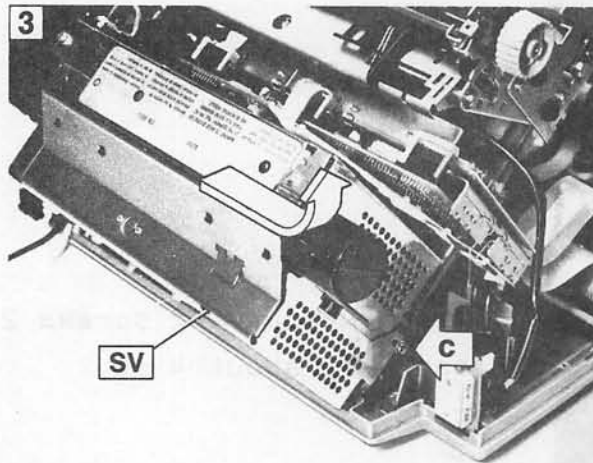
Unplug connector 5 from the basic electronics board.



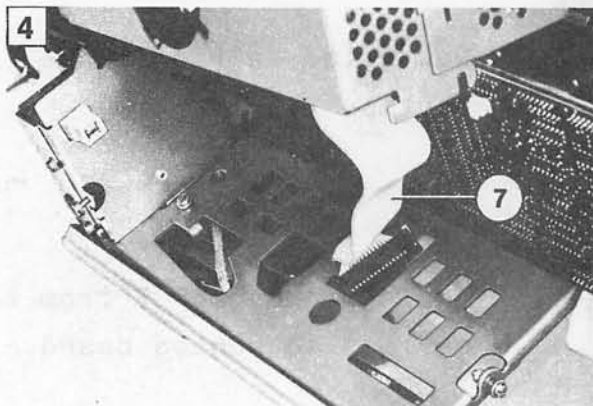
Push power supply module SV in direction of arrow until latching hook 6 disengages.



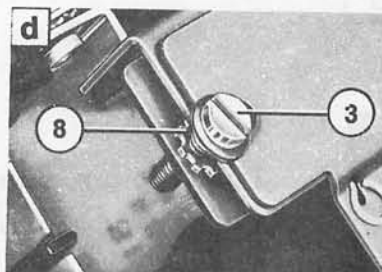
Lift power supply module SV slightly over mounting screw 2...



...lift out as shown by arrow...



...and feed cable 7 of the power supply through the opening in the carrier plate.



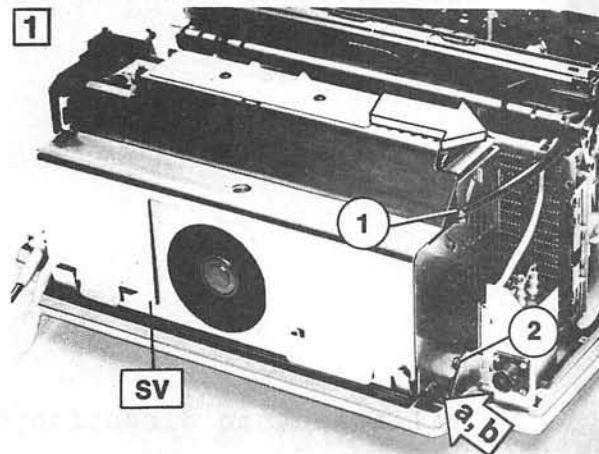
Notes on replacement:

Toothed washer 8 for mounting screw 3 lies between power supply module and the metal support.

NOTE:

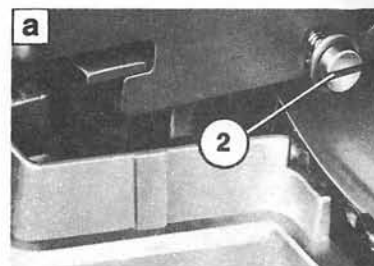
Check that ac power voltage matches the voltage set on the power supply module.

If not see Service Instructions.



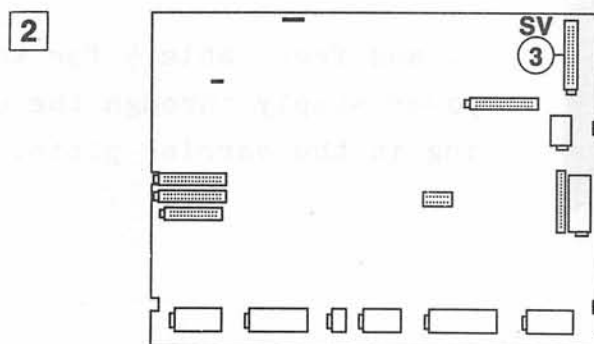
Do not raise carrier plate.

Withdraw connector 1.

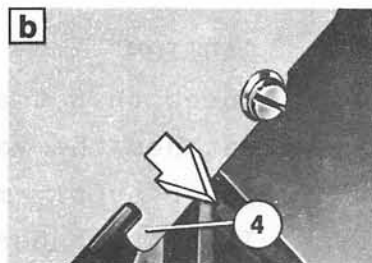


Unscrew mounting screw 2 by about 4 mm.

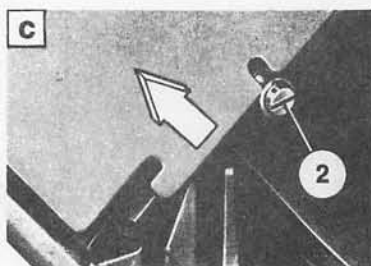
Now raise carrier plate (section 2.3).



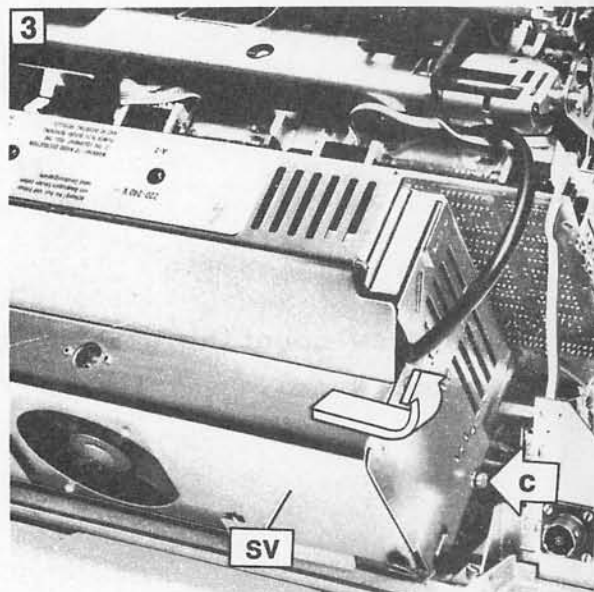
Unplug connector 3 from the basic electronics board.



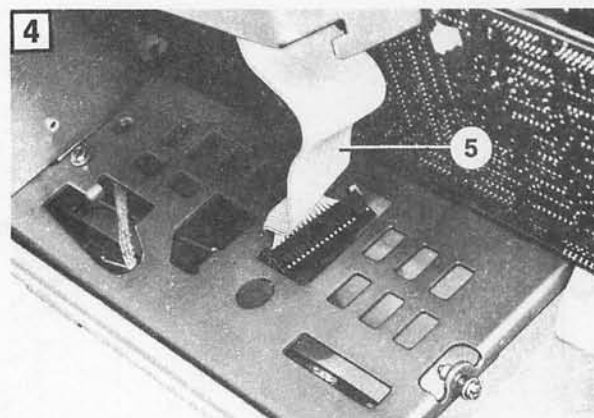
Push power supply module in direction of arrow until latching hook 4 disengages.



Lift power supply module SV slightly over mounting screw 2...



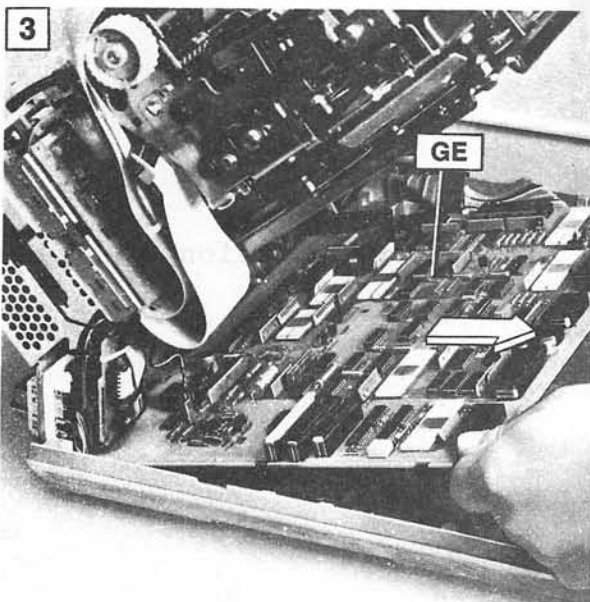
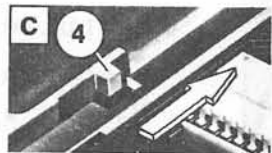
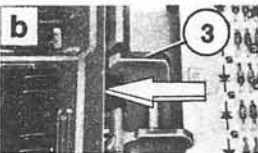
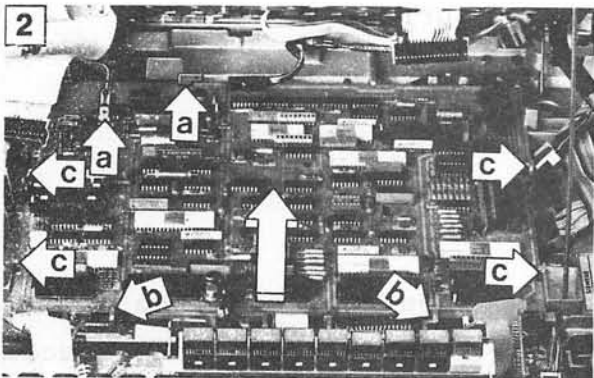
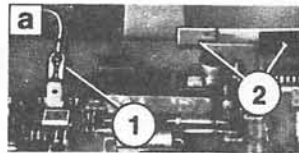
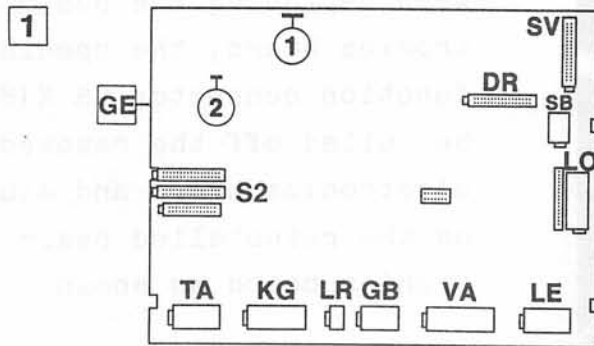
...lift out in direction of the arrow...



...and feed cable 5 for the power supply through the opening in the carrier plate.

CAUTION

Check that the ac power voltage matches the voltage set on the power supply module.
If not see Service Instructions.



CAUTION

When handling modules with MOS devices, please observe the protective measures described in section 1.1.1.

Remove all connectors from the basic electronics board GE. Remove manual communications controls BET, but do not withdraw BET connector (see section 2.6).

Withdraw ground cable connectors 1 and 2.

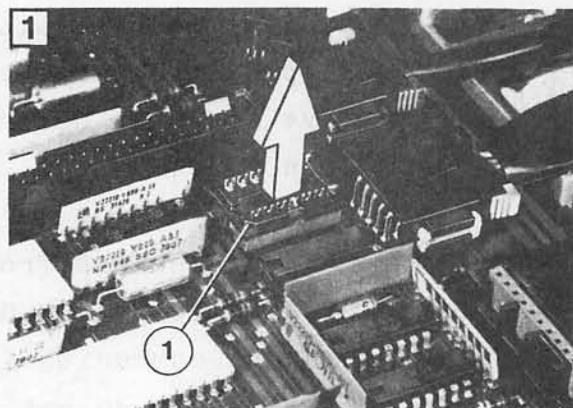
Push basic electronics board GE backwards.

When catches 3 and 4 disengage raise the front of the board.

Remove basic electronics board GE.

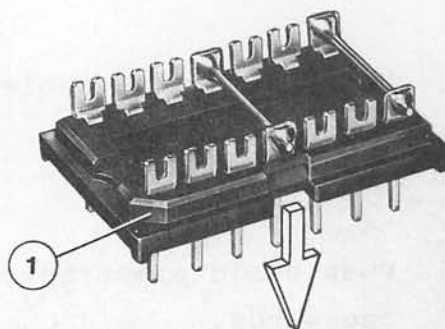
Notes on replacement:

Reinstall basic electronics board in such a way that all catches engage on the board.

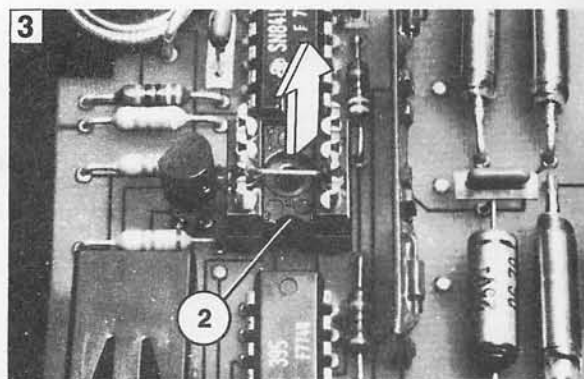


When replacing the basic electronics board, the special-function connector VS X18 must be pulled off the removed basic electronics board and mounted on the reinstalled basic electronics board as shown.

2

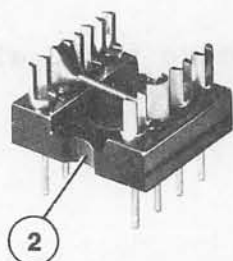


Observe position of sloping surface 1.

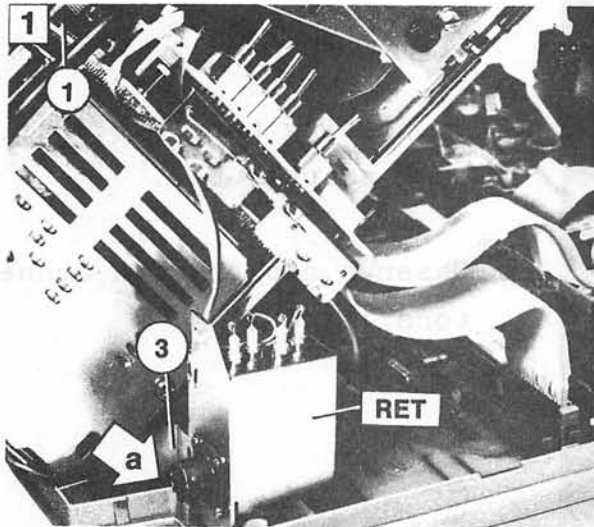


When replacing the basic electronics board, the special-function connector VS X19 must be pulled off the removed basic electronics board and mounted on the reinstalled basic electronics board as shown.

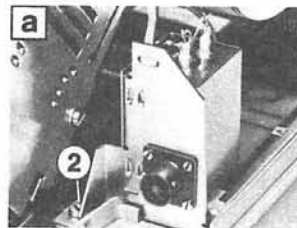
4



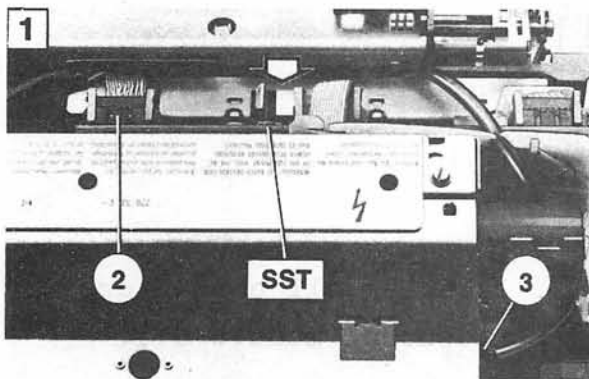
Observe position of recess 2.



Unplug connector 1 from control module STT.

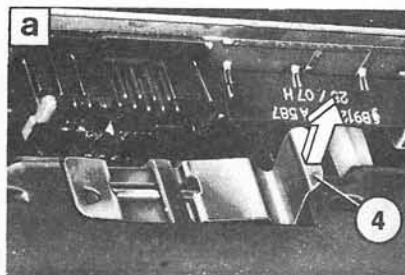


Loosen mounting screw 2, remove bracket 3 with relay module and special signal socket.

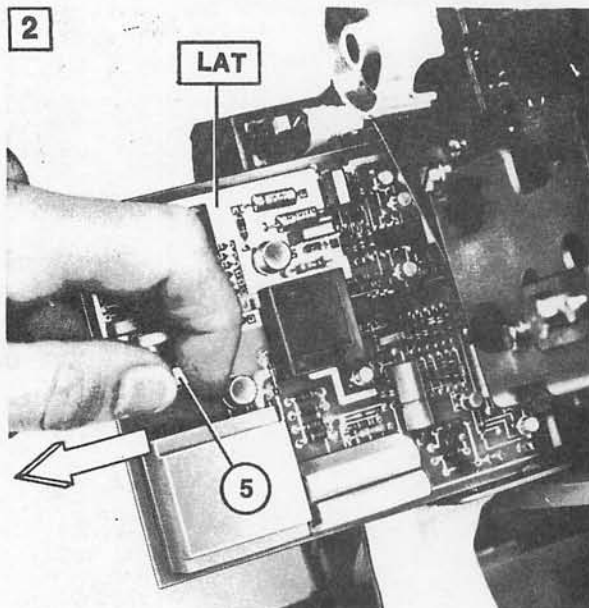


Remove switch module(see section 2.14/2.15)

Unplug connector 1 from protector SST (see section 2.23), connector 2 from control module STT and connector 3 from power supply module SV.



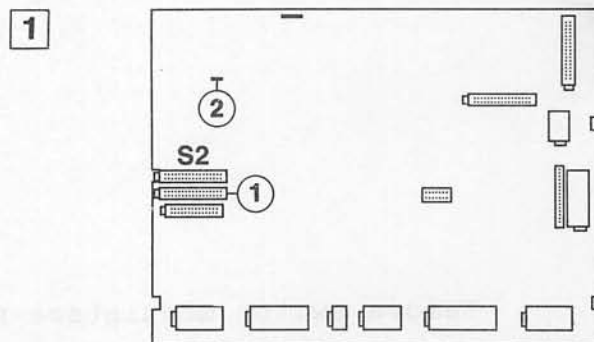
Lift latching spring 4 and...



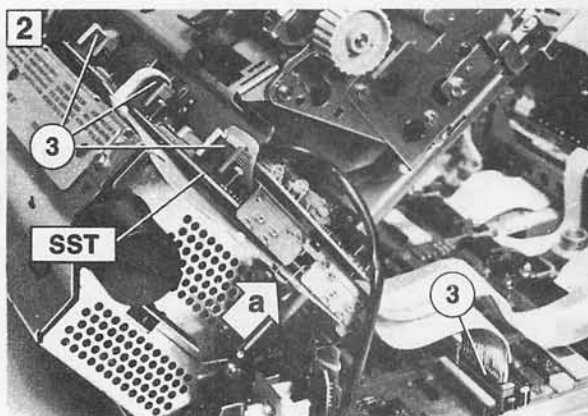
...holding handle 5, pull out line adapter LAT.

Observe cables with connectors 1 and 2.

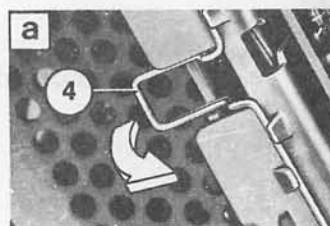
2.22 CONTROL MODULE STT



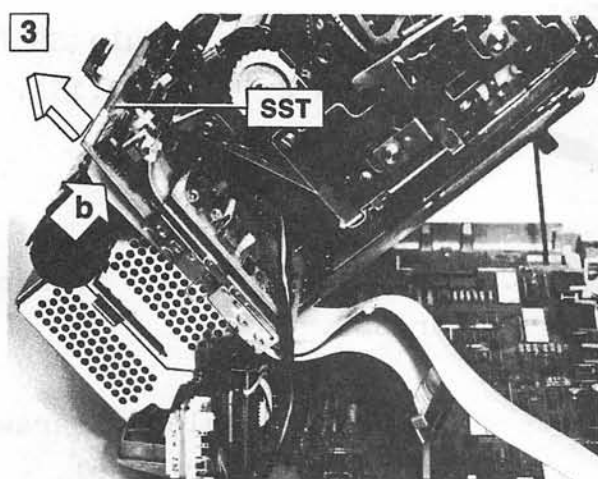
Unplug connector 1 and ground cable connector 2 from the basic electronics board.



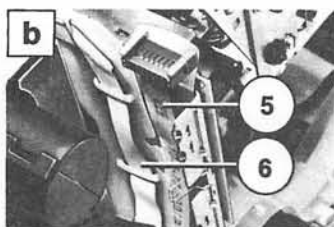
Unplug all connectors 3 from control module STT.



Swing out locking rod 4 and...



...pull out control module SST.

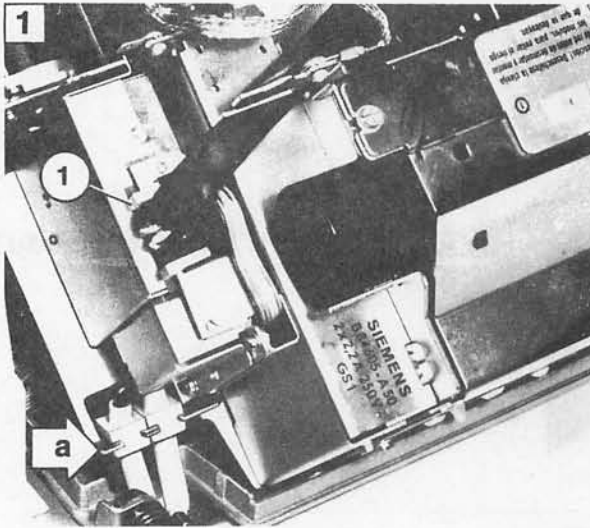


Notes on replacement:

Note the position of cables 5 and 6 with respect to the manual communications controls BET or relay module RET.

CAUTION:

When installing civilian line interfacing equipment, correct clock supply from basic electronics must be ensured (special-function connector).

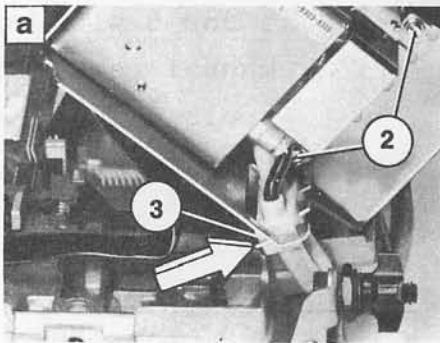


Remove switch module SB (see sections 2.14 and 2.15).

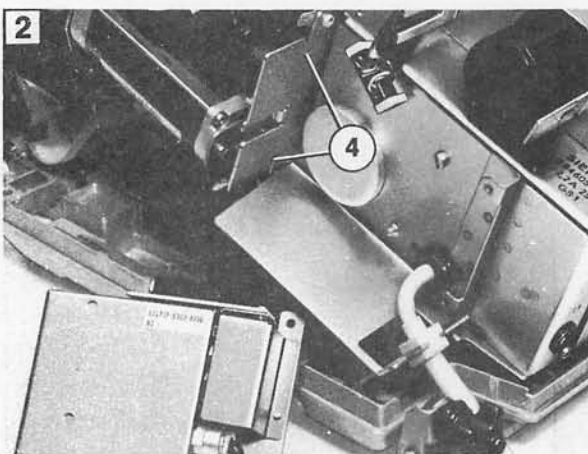
Unplug connector 1 from protector SST.

(with APE 9, also withdraw second connector on printer).

Loosen mounting screws 2.



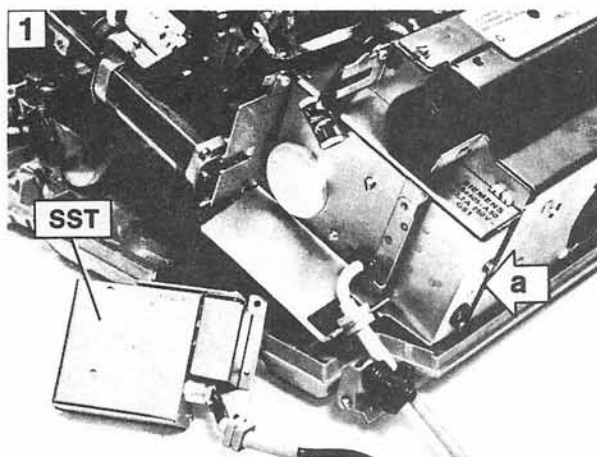
Push strain relief 3 of the communications cable out of its retainer.



Remove protector SST.

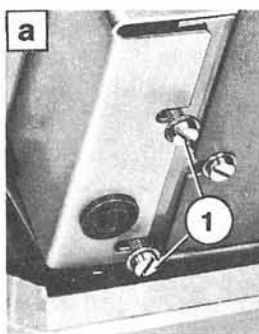
Notes on replacement:

Insert tabs of the SST in openings 4.

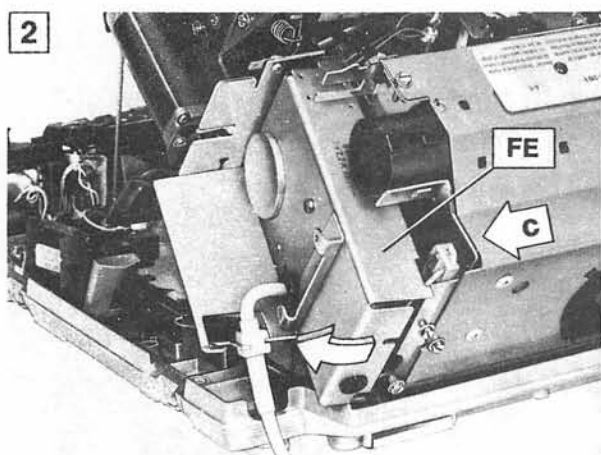


Remove tape punch (see section 2.19)

Remove protector (see section 2.23)

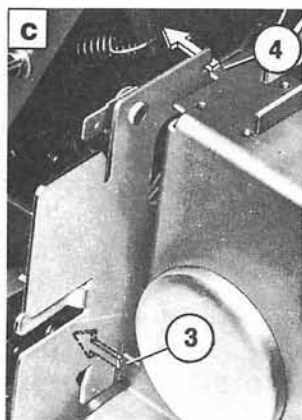
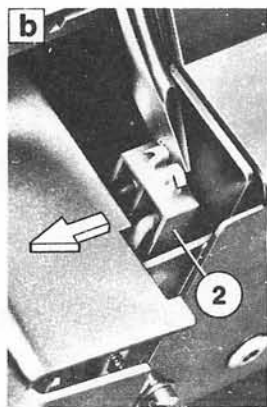


Unscrew mounting screws 1 by about 4 mm.



Swing RF suppressor FE out slightly in the direction of the arrow. Pull out cable to connector 2 carefully.

Remove connector 2.

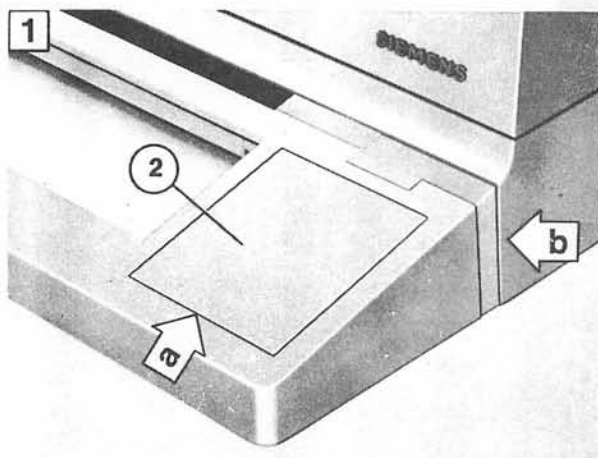


Remove RF suppressor FE with ac power cable. For removing the power cable see Service Instructions.

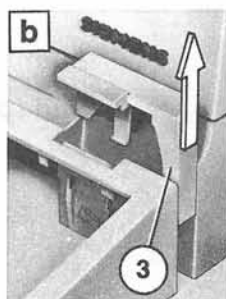
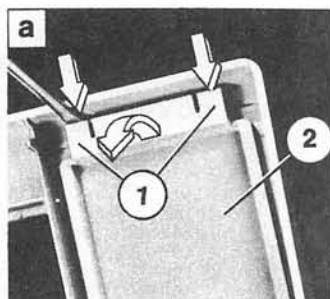
Notes on replacement:

Plug in connector 2 and locate lugs 3 and 4 in slots in support plate.

3.1 TAPE READER LE

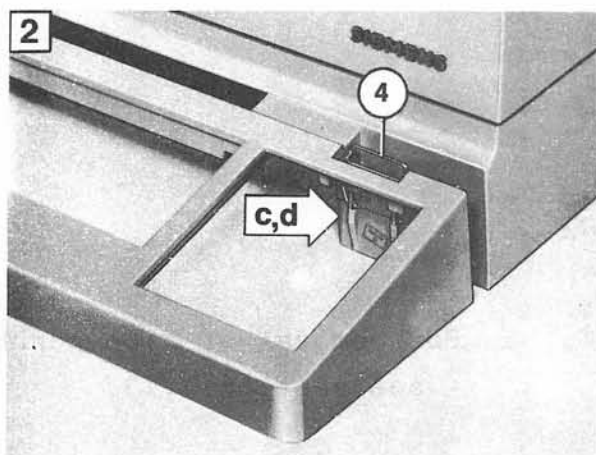


Remove teleprinter cover
- see section 2.2.



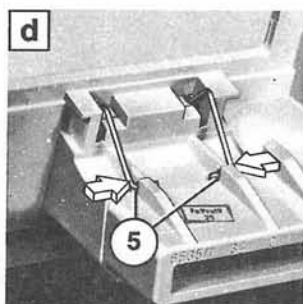
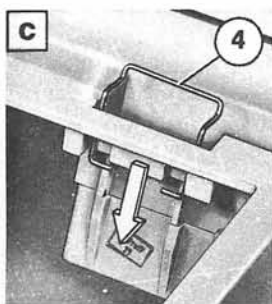
Release catches 1 with a screw-
driver and remove cover plate 2.

Push out cover 3.

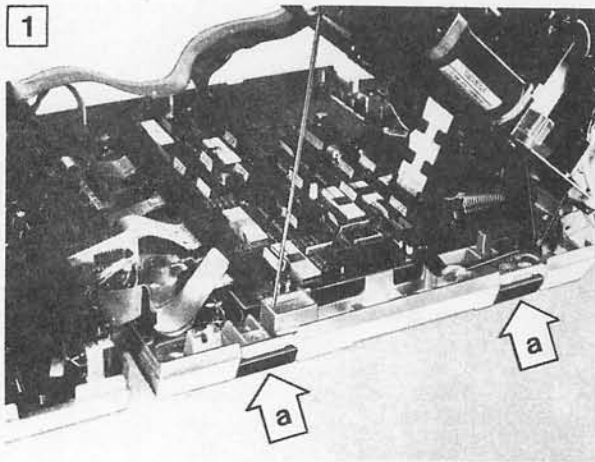


Insert tensioning rod 4 through
the cutout, insert ends into
holes 5.

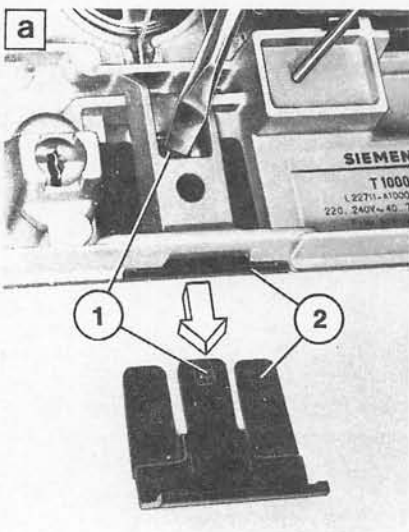
Swing carrier plate upwards
- see section 2.3.



For installation of tape reader
LE see section 2.12.



Remove teleprinter cover and
swing carrier plate upwards
- see sections 2.2 and 2.3.



Push lug 1 of cover 2 downwards
and pull out cover 2.

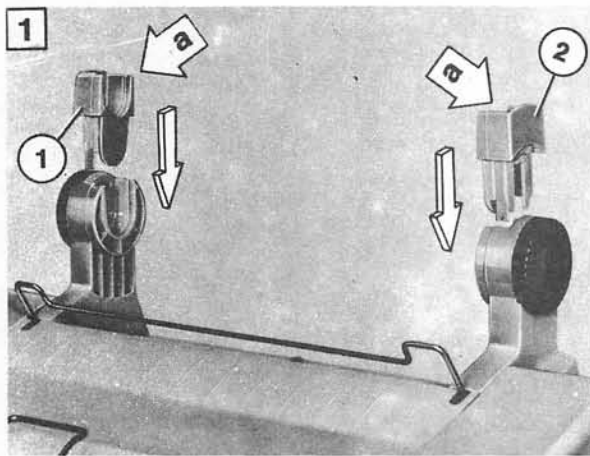
For removal of tape punch
- see section 2.13.

Roll holder for printer paper with a diameter of 170 mm

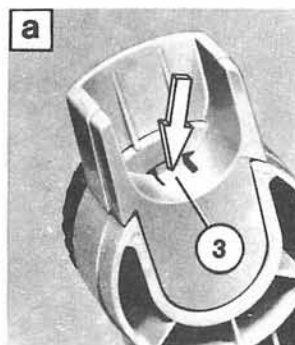
CAUTION:

This roll holder may not be used together with the transport case.

Remove paper roll axle.



Insert roll holders 1 and 2 (the left and right roll holders are different) and...



... engage latches 3.

