SIEMENS

Prüfgerät für Fernschreiber PGFS 020-2, PGFS 020-3

Tester for Teleprinters
Appareil de test pour téléimprimeurs
Comprobador de teleimpresor

Bedienungsanleitung
Operating Instructions
Instructions de service
Instrucciones de manejo

Tester for Teleprinters

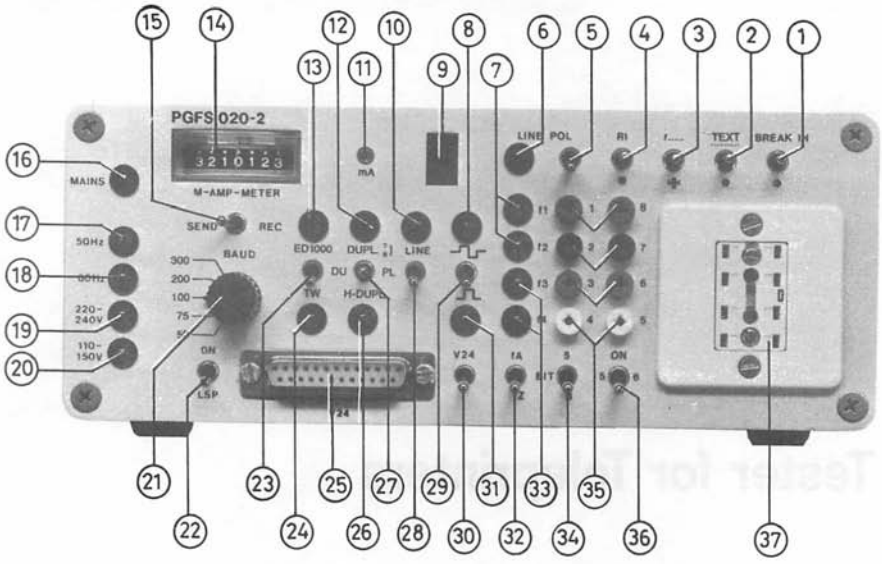
Note:

These Operating Instructions apply to the

tester version PGFS 020-2,
ordering designating V22199-Z-C471
for teleprinters in general and to the

tester version PGFS 020-3,
ordering designation V22199-Z-C574
for teleprinters with V.21 interface.

Operating Instructions



1 BREAK IN operation
2 Text key and switch
3 Pushbutton "who are you" and switch for continuous "r" character
4 Back pulse key
5 Line polarity reversal switch
6 Line polarity "reversed" lamp
7 Transmit frequencies
8 Double current "on" lamp
9 Select pulse display
10 Telex line lamp via (14) TO (37)
11 Line current potentiometer
12 Duplex (four-wire) "on" lamp
13 EDS "on" lamp
14 Line current meter
15 Transmit circuit/receive circuit change-over switch
16 Mains "on" lamp
17 50-cps-mains lamp
18 60-cps-mains lamp
19 220-to-240-volt-mains-lamp
20 110-to-150-volt-mains-lamp
21 Transmission speed rotary switch
22 Loudspeaker "on/off" switch
23 ED 1000/TW change over switch
24 TW (telegraph dial system) "on" lamp
25 V24 interface socket
26 Half-duplex/duplex (two-wire) "on" lamp
27 Half-duplex/duplex change-over switch / Full duplex-transmitter to receiver
28 Line connected switch
29 Double-current switch
30 V24 switch
31 V24 "on" lamp
32 fA/fZ change-over switch
33 Receive frequencies
34 5/8 bit change-over switch
35 Socket (37) testing / connecting sockets
36 Strap 5-6 switch
37 Teleprinter socket

Fig. 1 Operating and Indicating Elements, Connection Sockets

See page E9 for PGFS 020-3 modifications.

CONTENTS

1 OPERATING INSTRUCTIONS

1.1 General

The PGFS 020 Tester is intended for putting into operation and testing teleprinters having different line interfaces and working in different modes of operation. On account of its small size and low weight, the PGFS 020 can be carried along by any service technician.

For its use in countries with different mains voltages and mains frequencies, the tester has been equipped with an electronic automatic indicating system permitting a quick and reliable recognition of the exterior power supply. Prior to putting the teleprinter to be tested into operation, it is possible to find out by connecting the PGFS 020 with the mains whether the mains voltage is 220 to 240 V or 110 to 150 V and the mains frequency 50 or 60 cps.

In order to be able to check the signal conditions on the connecting lines, the PGFS 020 can be looped into the circuit existing between teleprinter and telegraphic connection line. The circuit conditions in the connecting line can be read from the milliampere-meter. The circuit criteria monitoring is also effected when the teleprinter is fed trough the PGFS 020 . When connected to low level equipment, monitoring of the frequencies is carried out with the loud-speaker. The mode of operation selected is indicated by LEDs. The following circuit criteria are indicated:

- High level, 40 mA/60 V („TW/ED 1000" switch at „TW")
- Low-level frequency modulation („TW/ED 1000" switch at „ED 1000")
- Transmit and receive frequency of the teleprinter under test in the ED 1000 mode of operation
- Simulation of the operating conditions („LINE POL" switch)
- Connecting the teleprinter directly with the telegraph line („LINE" switch)
- Condition of the telegraphic current supply to the teleprinter through the meter
  (switch position „SEND" = transmit direction; switch position „REC" = receive direction)
- Half-duplex two-wire connection („H-DUPL. /DUPL." switch at „H-DUPL.")
- Duplex four-wire connection („H-DUPL./DUPL." switch at „DUPL."
- resp. DUPL.$_R^T$])
- V24 low-level interface („V24" switch)
- Double-current connection, 60-0-60 V/20 mA („$\sqcap\!\!\lfloor$" switch).

With the teleprinter being fed with line current from the PGFS 020 , the current is adjusted to the required value (35 to 60 mA) by the potentiometer accessible from the front panel.

The „BAUD" rotary switch serves for selecting the telegraphic speed required from the teleprinter under test (50, 75, 100, 200, 300 Baud).

Prior to testing a connected teleprinter, the necessary 5-channel (CCITT No. 2) or 8-channel (ASC II) code must be chosen with the „BIT" switch. With the switch positioned to 5, the text described in Section 1.3.4, steps „l" and „m", is transmitted by the PGFS 020 to the teleprinter under test. In switch position 8, the text described in paragraph „m" is transmitted to the unit being testet.

As regards the parity check, it is possible to choose between „with or without parity" and „parity odd" or „even". The desired version must be indicated when ordering. Howeyer, the user can modify the version by means of soldering straps on the PCB FREQ + KEN 564 — see Section 2.2.3.2 (2) in this connection — in the PGFS 020 .

In order to facilitate the PGFS 020 transportation, the necessary connecting cables car not permanently attached to the PGFS 020 but can be carried along in the service case.

1.2 Technical Data

Size and Weight

Overall dimensions:	Height:	92 mm
	Width:	265 mm
	Depth:	246 mm
	Weight:	3,55 kg

Electrical Data

AC connection volts:	93,5	110	140	170	190	220	240
Power (Va):	10	12	26	80	10	11	15

Operating Data

Possible connections to line interfaces:	T interface, CCITT system A + B 40 to 60 mA, two-wire and four-wire.
PGFS 020-3 only	Low-level interface ED 1000 with frequencies 500-700 Hz and 2250-3150 Hz and frequencies as per V.21 with 980-1180 and 1650-1850 Hz.
	Double current, 60-0-60 V/20 mA
	V.24-Interface
Modes of operation:	Half-duplex/duplex Point-to-point connections Dialling connections

1.3 Operation

1.3.1 Operating and Indicating Elements

The operating and indicating elements as well as connection sockets necessary for the operation and control of the PGFS 020 can be learnt from Fig. 1.

1.3.2 Mains Connection

Note! Before connecting the unit, place the switch ,,TEXT" in its **mid-position.**

The PGFS 020 is connected to the mains by means of the mains connecting cable supplied together with the tester. The indicator LED ,,MAINS" will light up. Simultaneously, the indicator LEDs ,,220-240 V" or ,,110-150 V" as well as ,,50 Hz" or ,,60 Hz" will signal the voltage and frequency of the mains the tester has been connected to.

A connecting box is located on the rear of the PGFS 020 to allow the teleprinter under test to be fed by the mains. An ON/OFF switch arranged beside the connecting box serves for cutting the mains voltage off the connecting box and, consequently, the teleprinter under test. When carrying out repairs on the teleprinter under test, it will, therefore, not be necessary to pull out the mains plug.

1.3.3 Testing Prior to Putting a Teleprinter into Operation

With the PGFS 020 connected to the mains (see Section 1.3.2), the indicator LEDs „220-240 V" or „110-150 V" and „50 Hz" or „60 Hz" at once indicate the mains voltage and mains frequency supplied.

Unless the existing mains are more closely known, it is recommendable to measure the mains voltage by means of an average mulimeter after this preliminary analysis since there are several variants, in particular in the 110-to-115-volt range (e.g., 110, 115, 127, 150 V). Subsequently and if necessary, the teleprinter to be tested may be correspondingly modified.

1.3.4 Test Connection of a Teleprinter Working in the High-level Mode (Single Current) and Equipped with a Built-in or Separate Subscriber's Unit

a. Connect tester to mains as to Section 1.3.2

b. Position „BAUD" switch to desired baud figure and „BIT" switch to the necessary 5-bit or 8-bit code.

c. Position ,,TW/ED 1000" switch to ,,TW". The ,,TW" indicator LED will light.

d. Position „LINE POL" switch to OFF. The „LINE POL" indicator LED will remain off.

e. Position „5-6" switch to „ON".

f. Position „DUPL./H-DUPL." switch to „H-DUPL.". The „H-DUPL." indicator LED will light.

g. Connect teleprinter to be tested to 8-pole telecommunication socket. The meter will indicate 2 mA or 5 mA, depending on the teleprinter connected.

h. Depress calling key on teleprinter. The meter will display a current increase to 40 mA.

i. Depress „Ri" key. The connected teleprinter starts up, e. g., in case of an T1000, or the „AT" lamp will light, e. g., in case of an T100.

j. Select numbers of subscribers by means of keyboard, e. g. in case of an T1000, or numerical selector, e. g., in case of an T100. The subscribers' numbers are displayed by an indicator element. If no discrepancy shows up during the testing procedure described above, proceed to the change-over to „exchange operation" (step k).

k. Cut in ,,LINE POL" switch. The ,,LINE POL" indicator LED will light. The pointer in the meter (40 mA) will change over to another polarity, and the teleprinter will start up, e.g., in case of an T100 , or the buzzer will sound off, e.g., in case of an T1000 . The teleprinter is now in a position to transmit. The signals on the line are visible as pointer deflections on the meter. Check further functions of teleprinter as to steps l and m while minding that, with the ,,BIT" switch positioned to 5, the text described in steps l and m will be transmitted by the PGFS 020 to the teleprinter under test. In switch position 8, the text described in paragraph m is transmitted to the unit being tested.

l. Depress ,, ✠ " key. ZI-WR-ZL-WHO ARE YOU is transmitted to the teleprinter. The answer-back unit in the teleprinter mus transmit the text it has been key, encoded with.

The character r or 4 can be output as a continuous signal with the pushbutton switch ,, answer-back" set to ,,r". The signal is output until the switch is reset to midposition.

m. Operate ,,TEXT" switch. In position 5 (switch BIT), the test text PRUEFUNG FS + RYRY is transmitted to the connected teleprinter; in position 8 (switch BIT), the following test text is transmitted: PRUEFUNG U*U*U*+. In its lower position, the ,,TEXT" switch acts as touch contact button, and the test text is transmitted only once. The switch locks in its upper position, and the text is sent out continuously.

n. Check „BREAK IN" operation: Place punched tape into tape reader of the teleprinter and cut the latter in. The teleprinter will commence to transmit. Operate „BREAK IN" key. The running transmission is interrupted. The interruption on the connecting line is maintained as long as the „BREAK IN" key is being depressed.

o. Cutting off the teleprinter connected: Position „LINE POL" switch to OFF. The „LINE POL" indicator LED will extinguish.

1.3.5 Test Connection of a Teleprinter Featuring ED 1000

Style of connection: SEUB plug-in unit or AGT.

a. Connect PGFS 020 to the mains as to Section 1.3.2.

b. Position „BAUD" switch to the desired baud figure and „BIT" switch to the necessary 5-bit or 8-bit code.

c. Position ,,TW/ED 1000" switch to ,,ED 1000". The ,,ED 1000" indicator LED will light.

d. Position ,,fA/fZ" switch to ,,fA". The ,,f1" and ,,f3" indicator LED will light.

e. Position „DUPL. /H-DUPL." switch to „H-DUPL.". The „H-DUPL." indicator LED will light.

f. Position „5-6" switch to „ON".

g. Connect teleprinter under test to 8-pole telecommunication socket. The frequency supplied is signaled by indicator LEDs. The „f1" and „f3" indicator LEDs will be lit in quiescent condition.

h. Operate exchange key on teleprinter. The frequency change (call) is indicated by a change-over of the „f3" and „f4" indicator LEDs. The „f3" indicator LED will extinguish and „f4" will light.

I. Position „fA /fZ" switch to „fZ". The teleprinter connected starts up (exchange operation). The „f1" and „f2" indicator LEDs change over. The „f1" indicator LED will extinguish and „f2" will light.

j. Carry out further tests as to Section 1.3.4, steps I and m. Heed instructions in Section 1.3.4, step k.

k. cutting off the teleprinter connected: Position „fA /fZ" switch to „fA". The „f2" and „f4" indicator LEDs will extinguish while „f1" and „f3" will light.

1.3.5.1 Audible monitoring of the frequencies when testing a teleprinter connected to low level equipment (ED 1000).

The frequencies being present when testing a low-level (ED 1000) teleprinter can be rendered audible by means of a loudspeaker. For this purpose, the ,,LSP" switch on the PGFS 020 front panel is to be positioned to ,,on".

The loudspeaker moreover functions
- when testing a teleprinter connected to an existing telegraph line in ED 1000 technology (,,LINE" switch on the PGFS 020 front panel cut in).

Version PGFS 020-3

All the circuit diagrams, wiring diagrams and item lists in this description correspond to those of version PGFS 020-3.

1. Using this device, teleprinter systems with a V21 interface can be tested in addition to the ED 1000 frequencies.

   Frequencies: 980–1180 Hz and 1650–1850 Hz.

   The changeover switch features a center position.

   In this position (V21), frequencies are transmitted to the UUT in accordance with the V21 frequency plan, or frequencies **coming** from the UUT are recognized.

   On the back of the device a switch is provided for inverting the frequency transmitted to the UUT (including ED 1000) without operating the fA – fZ switch.

2. Switch V24 also features a center position.

Center position: V24 "OFF"
Switch down: Send data displayed via measuring instrument.
Switch up: Send data are looped into the receive data.

1.3.6 Test Connection of a High-level (Single Current), Point-to-point Communication Version Teleprinter

Two modes of operation are possible.

1.3.6.1 Two-wire Circuit Teleprinter, Single Current

a. Connect PGFS 020 to the mains as to Section 1.3.2.

b. Position „BAUD" switch to the desired baud figure and „BIT" switch to the necessary 5-bit or 8-bit code.

c. Position „TW/EDS" switch to „TW" The „TW" indicator LED will light.

d. Position „DUPL./H-DUPL." switch to „H-DUPL.". The „H-DUPL." indicator LED will light.

e. Select the right polarity by means of the „LINE POL" switch where polarity-dependent teleprinters are concerned.

The position of the „LINE POL" switch does not have any influence in case of polarity-independent teleprinters.

f. Connect teleprinter under test to 8-pole telecommunication socket. The meter will display e. g. 40 mA.

g. All functions of the teleprinter can now be tested. The characters transmitted are made visible by pointer deflections on the meter.

h. Test receive functions of teleprinter as to Section 1.3.4, steps „l" and „m". Heed instructions in Section1.3.4, step „k".

1.3.6.2 Four-wire Circuit Teleprinter, Single Current

a. Connect PGFS 020 to the mains as to Section 1.3.2.

b. Position ,,BAUD" switch to the desired baud figure and ,,BIT" switch to the necessary 5-bit or 8-bit code.

c. Position ,,TW/ED 1000" switch to ,,TW". The ,,TW" indicator LED will light.

d. Position ,,DUPL./H-DUPL." switch to ,,DUPL.". The ,,DUPL." indicator LED will light.

e. Select the right polarity by means of the ,,LINE POL" switch where polarity-dependent teleprinters are concerned.

f. Connect teleprinter under test to 8-pole telecommunication socket. The meter will display e. g. 40 mA.

g. All functions of the teleprinter can now be tested. The characters transmitted are made visible by pointer deflections on the meter. For this purpose, position "SEND/REC" switch to „SEND".

h. Test receive functions of the teleprinter as to Section 1.3.4, steps ,,l" and ,,m". Heed instructions in Section 1.3.4, step ,,k".

i. Set the ,,DUPL/H-DUPL" switch to ,,DUPL$_{R}^{T}$". The LED indication ,,DUPL" lights up. With this switch setting, the transmission circuit is connected to the reception circuit. All transmitted characters are printed.

1.3.7 Text Connection of an T 1000 Teleprinter with a 60-0-60 V/20 mA Double-current interface and a Subscriber's Unit

a. Connect PGFS 020 to the mains as to Section 1.3.2.

b. Position „BAUD" switch to the desired baud figure and „BIT" switch to the necessary 5-bit or 8-bit code.

c. Cut in „ $\sqcap\!\!\sqcap$ " switch. The „ $\sqcap\!\!\sqcap$ " indicator LED will light.

d. Position „DUPL. /H-DUPL." switch to „DUPL.". The „DUPL." indicator LED will light.

e. Position „LINE POL" switch to OFF. The „LINE POL" indicator LED will not light.

f. Connect teleprinter under test to 8-pole telecommunication socket.

g. Position „SEND/REC" switch first to „SEND" and then to „REC" while observing the meter. The meter will display 20 mA of the same polarity in either case.

h. Position „SEND/REC" switch to „SEND".

i. Operate calling key on teleprinter. The polarity displayed on the meter will be reversed.

j. Position „SEND/REC" switch to „REC".

k. Operate „LINE POL" switch. The „LINE POL" indicator LED will light. The pointer in the meter will go to the opposite polarity, and the teleprinter will start up.

l. All functions of the teleprinter can now be tested. The characters transmitted are made visible by pointer deflections on the meter. Position „SEND/REC" switch to „SEND".

m. Test receive functions of the teleprinter as to Section 1.3.4, steps ,,l" and ,,m". Heed instructions in Section 1.3.4, step ,,k".

n. Cutting off the teleprinter connected: Position „LINE POL" switch to OFF. The „LINE POL" indicator LED will extinguish.

1.3.8 Test Connection of a T 100 Teleprinter with a 60-0-60 V/20 mA Double-current interface

The telegraphic voltages necessary for the following tests must be fed in from the exterior. The telegraphic voltages are fed in trough sockets 5-6-7-8.

a. Cut off ,,5-6" switch (lower position).

b. Apply telegraphic voltages: + TB 60 V to socket 5; MTB to socket 7; -TB 60 V to socket 6.

c. Test functions of the teleprinter as to Section 1.3.7, steps a . . . n.

1.3.9 Test Connection of a Teleprinter with a V24 interface e. g. PT80

a. Connect PGFS 020 to the mains as to Section 1.3.2.

b. Position „BAUD" switch to desired baud figure and „BIT" switch to the necessary 5-bit or 8-bit code.

c. Connect teleprinter under test to the "V24" socket e. g. PT80

d. Cut in ,,V24" switch. The ,,V24" indicator LED will light. The teleprinter will start up, respectively is to be started up by depressing the calling key on the teleprinter.

e. All functions of the teleprinter can now be tested. The characters transmitted are made visible by pointer deflections on the meter (pointer deflection up to 60 mA).

f. Test receive functions of the teleprinter as to Section 1.3.4, steps ,,l" and ,,m". Heed instructions in Section 1.3.4, step ,,k".

Version: PGFS 020-3

In the case of this version, switch V24 (see 30, Fig. 1) has 3 functions V24.

Center position: "OFF"
Switch down: Send data displayed via measuring instrument
Switch up: Send data looped into receive data

1.3.10 Test Connection of a Teleprinter with Pins 5-6-7-8 Connected

The pins 5-6-7-8 of the telecommunication socket have been brought out and connected to test sockets 5-6-7-8. Measurements can be carried out at these test sockets or supplementary functions can be simulated.

1.3.11 Test Connection of a Teleprinter with Pins 1 . . . 8 Connected

Pins 1 . . . 4 of the telecommunication socket have been brought out, just like pins 5 . . . 8, to 2-mm sockets. Thus, pins 1 . . . 8 of the telecommunication socket have been connected in parallel with these sockets. Consequently, a teleprinter under test can be connected, without any telecommunication plug, by means of connecting cables to the PGFS 020-2. Moreover, test instruments such as level meters or voltmeters may be connected to these sockets. When connecting a teleprinter by means of cables, a connection plug must be put into the telecommunication socket in order to disconnect the bridge resistor between connecting points 1 and 4.

1.3.12 Test Connection of a Teleprinter to an Existing Connecting Line

For this test, the PGFS 020 is looped in between the existing telegraph connecting line and the teleprinter to be tested. The connection is to be made by means of all four wires. In this way, it is possible to monitor all high-level interfaces used (half-duplex /full-duplex).

a. Connect PGFS 020 to the mains as to Section 1.3.2.

b. Cut in „LINE" switch. The „LINE" indicator LED will light.

c. Connect teleprinter to be tested to the 8-pole telecommunication socket.

d. Connect line current cable included with PGFS 020 to the screw connector socket located on the PGFS 020 rear and screw in screw connector.

e. Plug 8-pole male connector of the line current cable into the connecting socket of the existing connecting line.

f. Check current conditions in connecting line one the PGFS 020 meter.

2 FUNCTIONAL DESCRIPTON

2.1 General

The PFGS 020 Tester contains the following assemblies:

— GRUND 562 (basic circuit board)
— NEKON 563 (mains recognition)
— FREQ + KEN 564 (frequency recognition and answer-back unit).

The GRUND 562 assembly has been subdivided into two logic diagrams. Logic diagram 1 chiefly contains the change-over relays as well as circuits for

— indicating the select pulses,
— transmitting serial data via V24
— generating the RI pulse
— generating the time pulses for transmitting serial informations,
— controlling the meter.

The logic diagram, part 2, covers the power supply unit that furnishes various operating voltages for the electronic system as well as + 60 V/50 mA for the line current.

The NEKON 563 assy contains the circuits for monitoring and indcating the existing mains voltage and mains frequency. The + 12 V/50 mA required as operating voltage for these assies are generated in a further circuit.

The FREQ + KEN 564 assy contains the circuits for

— the 500 . . . 700 cps and 2,250 . . . 3,150 cps frequency recognition in connection with ED 1000 low-level interfaces,
— the answer-back unit (Text✠)
— full-duplex operation,
— the loudspeaker for EDS signals.

The 500 . . . 700 cps are generated in the FREQ + KEN 564 assy while the 2,250 . . . 3,150 cps are supplied by the teleprinter under test. Text can be sent out by means of the answer-back unit which also serves for triggering the answer-back unit of the teleprinter connected. The circuit for „BREAK IN" is energized when the „BREAK IN" key is depressed.

The joint operation of the assies can be learnt from the two block diagrams.

2.2 Function

2.2.1 GRUND 562 Assy

See logic diagrams GRUND 562, part 1 and part 2, in this connection.

2.2.1.1 Change-over Relays d1 . . . d9

(1) Relay d1

(A/2) Relay d1 serves for making the change-over from TD to ED 1000 operation. When the ,,TW/ED 1000" switch is positioned to ,,TW", the ,,TW" LED is supplied with power and lights.Relay d1 is in deenergized position. From +60 V (A/3), contact 1 of the tele-communication socket (FADO) is fed with line current. Contact FADO. 4 is at the 0-volt level. The current paths are as follows:

1. 60 V R60, IC31, d3.6-5, R11, potentiometer 1 k/2 W, R12, R19, FADO 1.

2. FADO.4, R22, d9.12-11, d1.15-14, d7.15-14, d2.1-4, d3.8-9, 0 V.

R19 and R22 precision resistors for the meter (F/5) that serves for indicating the line current DSS or DSE.

When the ,,TW/ED 1000" switch is positioned to ,,ED 1000", the ,,ED 1000" LED will light and the ,,TW" LED will extinguish. Relay d1 is energized, and the contacts (E, D/4) are changed over. Contacts FADO.1 and 4 are connected through to the transformer Ü1. The current paths are as follows:

3. FADO.1, R19, d9.6-5, d1.6-5, Ü1.

4. FADO.4, R22, d9.12-11, d1.15-16, Ü1.

R54 on the secondary side of Ü1 is the terminal load. Via the connecting point B6, the serial receive and transmit data are led to the FREQ + KEN 564 assy.

(2) Relays d2, d5, d6

(B/1,2) Relays d2, d5, d6 serve for the data output in TD operation. Selecting is done by transistor T1. The serial data are fed into T1 via B7 „SERDAT" and R3, T1 turns conductive, switching relays d2, d5, d6 over to operating condition.

FF32.12-32.6 prevents any bounce when the „Ri" key is depressed. When the FF sweeps over, NAND 32.2 acted upon via FF 32.4 is kept at + 12 V. NAND 32.1 while being retarded approx. 3 μsec by the R33/C4 timing element assumes 0 V. An approx. 3 μsec pulse triggering MONOFLOP 22.2 is picked up from NAND 32.2. The MONOFLOP 22.3 sweep time equals 17,5 msec. Adjusting the sweep time is done with P6.

(3) Relay d3

(C/1,2) Relay d3 serves for reversing the line current polarity. When the „LINE POL" switch is cut in, the „LINE POL" LED is fed with power and will light. Relay d3 is energized and contacts d3.6-7 (C, D/3) and d3.9-10 (E/3) close. The line current polarity is reversed in this way. The current paths are as follows:

5. 60 V, R60, IC31, d3.6-7, d2.4-1, d7.14-15, d1.14-15, d9.11-12, R22, FADO.4.

6. FADO.1, R19, d9.6-5, d1.6-5, R12, potentiometer 1 k/2 W, R11, d3.10-9, 0 V.

(4) Relay d4

(C, D/1, 2) Relay d4 serves for cutting in the duplex operation. For this purpose, the „DUPL./H-DUPL." switch must be positioned to „DUPL.". The „DUPL." LED will light, relay d4 is energized, and contacts d4.6-7, d4.9-10 close (D, E/3). Contact FADO.3 is connected with + 60 V and contact FADO.2 with 0 V. The current paths are as follows:

7. 60 V, R60, IC31, d3.6-5, R15, R16, d4.10-9, d7.11-12, d1.11-12, d9.14-15, FADO.3.

8. FADO.2, d9.9-8, d1.9-8, d7.9-8, d4.6-7, d3.8-9, 0 V.

(5) Relay d7

(D/1, 2) Relay d7 switches over to double current. As soon as the „⊓⊔" switch is cut in, the „⊓⊔" LED will light, and relay d7 is energized. Double current is switched on by the make contacts of d7 (D, E/3,4). Contacts FADO.1-2 are connected with each other, + 60 V are applied to FADO.3 and 0 V to FADO.4. The current paths are as follows:

9. FADO.1, R19, d9.6-5, d1.6-5, d7.6-7, R13, R14, d7.10-9, d1.8-9, d9.8-9, FADO.2.

10. 60 V, R160, IC31, d3.6-5, d5.1-4, d7.13-12, d1.11-12, d9.14-15, FADO.3.

11. FADO.4., R22, d9.12-11, d1.15-14, d7.15-16, R17, R18, d6.4-1, d3.8-9, 0 V.

(6) Relay d8

(E/1, 2) Relay d8 switches over to the „V24 interface" socket. As soon as the „V24" switch is cut in, the „V24" LED will light and relay d8 is energized. Via make contacts d8.7-6, d8.9-10 (E, F/6), the meter is joined to contact V24.2 (also see Sections 2.2.1.3 and 2.2.1.7). The current path is as follows:

12. V24.2, R25, d8.10-9, P1, R24, meter R23, d8.6-7, ground.

(7) Relay d9

(E, F/1,2) Relay d9 switches to „line". As soon as the „LINE" switch has been cut in, the „LINE" LED will light, and relay d9 is energized. Via the make contacts of d9 (E, D/4, 5), contacts FADO.1-2-3-4 are connected through to contacts 1-2-3-4 of the FS-ST. connecting socket.

2.2.1.2 Select Pulse Display

Also see pulse timing diagram, Fig. 2.

In select operation, the serial data coming in through the FADO telecommunication socket (D, E/8) are recognized by the opto-isolator IC31 (B/3). NAND 32.9 is selected via IC31.5. NAND 32.8 is only released when the „LINE POL" (C/1) and „⊓⊔" (E/1) switches are not cut in, that is, when the + 12 V level is applied to NAND

32.8. From NAND 32.10 the data are led to the MONOFLOPS 12.5 and 12.11 as well as to the clock input COUNTER 11.1.

A positive reset pulse is formed via C21 and R59 by means of the leading edge of the pulse picked up from MONOFLOP 12.6; this reset pulse is led to COUNTER 11.15. In this way, the counter is reset to zero.

The MONOFLOP 12.6 sweep time is greater than 125 msec. As a consequence, the monoflop is triggered anew by each select pulse and flips back only when the series of select pulses has ended. MONOFLOP 12.10 has an approx. 5 sec sweep time. During this period of time, the TW 524-IV indicator is brightened up, acted upon via COUNTER 11.3. As soon as MONOFLOP 12.10 flips back again after approx. 5 sec, the indicator is blanked again.

COUNTER 11 contains a 7-segment decoder with driver. The TW 524-IV indicator is driven via dropping resistors R47 . . . R53.

2.2.1.3 Transmitting Serial Data Via Socket V24

(E/1) As soon as the „V24" switch is closed, relay d8 is engergized. Simultaneously, the „V24" LED is fed with power and will light. Contacts d8.6-7 and d8.9-10 (E/6) are closed, and the levels of the incoming serial data are visible on the meter.

(F/2) The serial data are put in through B8 „SEND" and fed, via D10 and R27, into transistor T2. In off condition, T2 is non-conductive, and - 12 V supplied via R29 and R28 are applied to contact 3 of socket V24. As soon as T2 turns condutive owing to the serial data, + 12 V are connected through to contact 3 of V24

2.2.1.4 Back Pulse

(B/7, 8) A pulse of 17.5 msec in length is generated by means of the „Ri" key. This pulse is needed as call acknowledging signal (interruption of the connecting line for 17.5 msec).

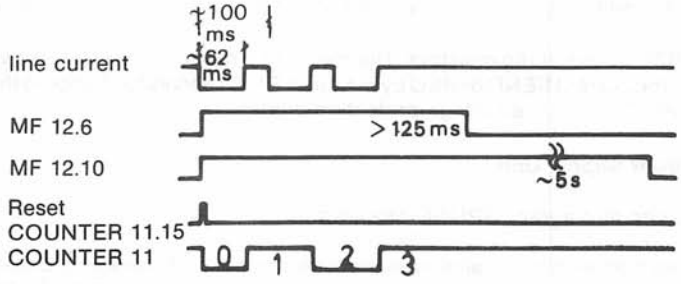


Fig. 2 Pulse Timing Diagram, Select Pulse Display

FF 32.12-32.6 prevents any bounce when the „Ri" key is depressed. When the FF sweeps over, NAND 32.2 acted upon via FF 32.4 ist kept at + 12 V NAND 32.1 while being rearded for approx. 3 μsec by the R33/C4 timing element assumes 0 V. An approx. 3 μsec pulse triggering MONOFLOP 22.2 is picked up from NAND 32.3. The MONOFLOP 22.3 relaxation time equals 17.5 msec.Adjusting the sweep time is done with P6.

The positive 17.5 msec signal is picked up from output MONOFLOP 22.3 and applied via D13 to output B7. At the same time, transistor T1 is driven via R3. T1 turns conductive, and relays d2, d5, and d6 are energized. In this way, the line current is interrupted or, in case of double-current operation, the polarity is reversed.

2.2.1.5 Clock input for transmission of serial information.

(C/5, 6) The clock generator consists of IC 21, C5, R40, R36 . . . R39, R65, P2 . . . P5 and P7. It is designed as an astable multivibrator. The rotary switch "BAUD" connects +12 V to the selected range. The potentiometers P2 . . . P5 and P7 are used for fine adjustment of the various ranges. Any other baud rates up to approximately 600 baud can be achieved by adjustment or replacement of the fixed resistors R36 . . . R39 and R65. The clock frequencies measured at pin B9 (F/5) are 32 times higher than the actual baud rate.

The mark-space ratio of the clock signals at B9 is asymmetrical.

Potentiometer	Baud	f (Hz) at B9
P2	50	1600
P3	75	2400
P4	100	3200
P5	200	6400
P7	300	9600

2.2.1.6 Line Current Meter

(F/6) The meter is changed over to „SEND" (transmit circuit) or „REC" (receive circuit) by means of the measuring range change-over switch. Resistors R19 (D/7) and R22 (E/7) serve as measuring resistors.

As soon as the „V24" switch (E/1) is closed, the meter is connected via the relay d8 contacts and R25 to the „V24" socket contact 2 (see Section 2.2.1.1, relay d8).

R23 and R24 are matching resistors. The measuring range of the meter is calibrated under line current SEND or REC by means of P1. C1 serves for damping the meter. D11 and D12 are overvoltage protection diodes.

2.2.1.7 Power Supply Unit

See logic circuit diagram GRUND 562, part 2.

The connection with the mains is made with the mains connecting cable. The mains voltage is fed via the mains filter and fuse SI5 into transformer T1 and via fuse SI6 into transformer T2. The switching contacts of relay d10 accommodated in the NEKON 563 assy are located in the primary circuit of T1. According to the

available mains voltage, the mains changeover from 220 V a. c. to 110 V a. c. is made by d10. For this purpose, an auxiliary voltage the amplitude of which is proportional to the mains voltage is picked up from the secondary side of T2. The voltage at T2 may amount to between approx. 13.5 V and 35 V. a. c. and is evaluated in the NEKON 563 assy where it controls relay d10 (see Section 2.2.2.2).

+ 60 V/60 mA Operating Voltage

55 V a. c. are picked up from transformer T1.a-b. This voltage is rectified by GI1 and filtered by smoothing and charging capacitor C10. Transistor T3 forms, together with Zener diode D15 and resistor R57, a voltage regulator circuit. C15 acting as smoothing capacitor has been joined up downstream form this circuit. The stabilized + 60 V/60 mA are protected by fuse Si1 M 0.1 A.

+ V/0.2 A Operating Voltage

22 V a. c. are picked up from transformer T1.c-d, rectified by GI2 and filtered by C11. The + 24 V/0.2 A are protected by fuse Si2 M 0.2 A.

+ 12 V/0.5 A Operating Voltage

The 15 V a. c. picked up from transformer T1.e-f are rectified by GI3 and filtered by C12. The voltage regulator T4 supplies stabilized + 12 V/0.5 A that become available at terminal B1.C16 acting as smoothing capacitor has been joined up downstream from T4.

— 12 V/0.2 A Operating Voltage

15 V a. c. are picked up from transformer T1.g-h, rectified by GI4 and filtered by C13. Voltage regulator T5 supplies stabilized - 12 V/0.5 A that become available at terminal B5. C17 serving as smoothing capacitor has been joined up downstream from T5.

+ 5 V/0.4 A Operating Voltage

10 V a. c. are picked up from transformer T1.i-k, rectified by GI5 and filtered by C14. Voltage regulator T6 supplies stabilized + 5 V/0.5 A applied to terminal B4. C18 acting as smoothing capacitor has been joined up downstream from T6.

„MAINS" Light emitting Diode

The „MAINS" LED indicates whenever mains voltage is supplied. As soon as + 5 V are available at the voltage regulator T6 output, the „MAINS" LED is fed with power via R58 and will light.

2.2.2 NEKON 563 Assy

See logic diagram NEKON 563 in this connection.

2.2.2.1 + 12 V/50 mA Operating Voltage Generation

Transformer T2 in the GRUND 562 assy (see logic diagram GRUND 562, part 2) furnishes an auxiliary voltage fed via A1-A2 into rectifier GI1 (A/2). The amplitude of the auxiliary voltage depends on the mains voltage and amounts to approx. 35 V a. c. in case of 220 V a. c. and to approx. 13.5 V a. c. in case of 85 V a. c. The voltage rectified by rectifier GI1 is filtered by the smoothing and charging capacitor C1 and fed into a + 12 V voltage regulator circuit consisting of transistor T1, resistor R1, and Zener diode D2. Resistor R2 and Zener diode D1 form a protection circuit against short downstream from which C2 has been joined up as smoothing capacitor.

The stabilized + 12 V/50 mA serve for supplying power to the components on the NEKON 563 board.

2.2.2.2 Change-over at a 220/110 V AC Mains Voltage

Changing the transformer T1 arranged in the GRUND 562 assy (see logic diagram Grund 562, part 2) over from 220 V a. c. to 110 V a. c. is carried out by relay d10 (B/3) located on the NEKON 563 board. The change-over threshold is at approx. 175 V a. c. The lower cut-in threshold for cutting in the 110 V range is at approx. 85 . . . 90 V.

In off condition, relay d10 is dead, and transformer T1 on the GRUND 562 board remains switched to 220 V. However, if the mains voltage is in the range of between approx. 85 and 175 V, a change-over to 110 V a. c. must be made. The change-over process is as follows:

(D/4) The emitter side transistor T2 is at the + 5.6 V level owing to Zener diode D5. As a consequence, the T2 base bias must equal approx. + 6.2 V so as to interconnect T2. The base voltage is generated by voltage divider R8-P1-R9 which receives the rectified and smoothed voltage from capacitor C1 located in the output of rectifier GI1 (A/2, 3). The change-over threshold can be set to approx. 175 V a. c. by means of P1. Whenever the mains voltage is less than approx. 175 V a. c. transistor T2 is non-conductive, and no current flows through resistor R4 and the „220-240 V" LED connected in parallel.

Transistor T3 is driven via resistor R3 and Z diode D4. With mains voltages below approx. 175 V, this transistor is conductive, causing relay d10 to operate. Through a contact of d10, the primary of transformer T1 in the GRUND 562 assy is changed over to 110 V a. c. (A3 – A5). At the same time, the „110-150 V" LED is driven via transistor T8 and resistor R5 and lights.

Howeyer, as soon as the mains voltage increases to above approx. 175 V a. c., transistor T2 turns conductive. As a consquence, current will flow through resistors R4 and R3 as well as the „220-240 V" LED connected in parallel with R4, and the „220-240 V" LED will commence to light.

At the same moment, the voltage at interlacing point R3-D4-R4 drops to below + 10 V. Z diode D4 and transistor T3, T8 are rendered non-conductive. Relay d10 returns to off position, and the „110-150 V" LED will extinguish. The primary of transformer T1 in the GRUND 562 assy is switched over to 220 V a. c. by relay d10 (A4 – A5).

2.2.2.3 50/60 cps Indication

The mains frequency is monitored by time element MONOFLOP IC11 that can be retriggered (B, C/7).

(A/1) Positive half-waves are picked up from A1 in the input of rectifier Gl1 and fed via diode D6 and resistor R13 into the transistor T4 base. Resistor R14 and capacitor C4 prevent mistriggerings whenever there are interference peaks on the mains voltage. Transistor T4 turns conductive. Via capacitor C8, the trailing pulse edge is coupled to the trigger input of MONOFLOP 11.2 and via diode D7 to the transistor T5 base. T5 becomes conductive, keeping the potential at capacitor C5 at approx. 0 volts while acting via resistor R11.

As soon as the pulse coupled via C8 and determined by the constant time element R12/C8 is terminated, transistor T5 is rendered non-conductive. Capacitor C5 is charged from the + 12 V terminal via R10/P2. At the same moment, the MONOFLOP 11 sweep time starts to run down. If another trigger pulse coming via C8 is coupled prior to the complete run-down of the sweep time, T5 turns conductive again, and C5 discharges. The MONOFLOP 11 sweep time is interrupted in such an instance, and output MONOFLOP 11.3 remains at + 12 V. The sweep time is so adjusted with P2 that MONOFLOP 11 cannot flip back at 60 cps (≙ 16,67 msec).

If approx. + 12 V are applied to the MONOFLOP 11.3 output with the mains frequency equalling 60 cps, diode D8 is blocked (E/5). Capacitor C7 has been charged from the + 12 V terminal via R22. The time constant of time element R22/C7 equals approx. 70 msec. Acted upon via Z diode D9 and resistor R21, transistor T7 is conductive. As a consequence, current will flow through resistors R16 and R15 as well as the „60 Hz" LED connected in parallel with R16, and the „60 Hz" LED will commence to light.

In case of a 50 cps mains frequency, MONOFLOP 11 flips back between any two trigger pulses, and output MONOFLOP 11.3 changes from + 12 V to 0 volt potential. Diode D8 is interconnected, and capacitor C7 discharges via R23 and D8. Thus transistor T7 is rendered non-conductive and T6 conducitive. Power is fed via resistor R17 to the „50 Hz" LED which lights while the „60 Hz" LED is extinguished.

2.2.3 FREQ + KEN 564 Assy

See logic diagram FREQ + KEN 564.

2.2.3.1 Frequency Recognition

In the frequency recognition circuitry, the 500/700 cps and 2,250/3,150 cps frequencies are recognized by filter and amplifier circuits and displayed. The 500/700 cps are generated on the FREQ + KEN 564 board while the 2,250/3,150 cps are fed in through B6 „SENDEFREQ" (E/7).

When testing a high-level version teleprinter and transmitting the programmed text, LEDs „f1 . . . f4" remain cut out.

(E/1) With the ,,TW/ED 1000" switch positioned to ,,TW" or with the ,,LINE" switch cut in, LEDs ,,f1 . . . f4" are cut off, at their anode end, from the + 5 volts.

(1) 500/700 cps Frequency Recognition

(C, D/1, 2) The clock generator consists of IC61 connected as free-running multivibrator. FF62 joined up downstream divides the clock frequency furnished by IC61 in a 1:2 ratio. The 500/700 cps frequency change-over is made by the „fA/fZ" switch (C/1).

Normally, the „fA/fZ" switch is positioned to „fA". No potential is applied to the anode side of diode D1, and IC61 oscillates at 1,000 cps. At the same time, transistor T3 (E/2) driven via resistor R26 is non-conductive. As a consequence, transistor T4 is conductive; current flows via R30 through the „f1" LED which lights.

When the „fA/fZ" switch is positioned to „fZ", + 12 V are applied via resistor R1 (D/7) to the anode of D1. D1 turns conductive and connects P2 und R23 in parallel to P3 and R24. Clock generatur IC61 oscillates at 1,400 cps. The transistor T3 base is connected via resistor R1, „fA/fZ" switch positioned to „fZ", and resistor R26 to + 12 V. T3 turns conductive and, acting via R29, cuts in the „f2" LED. At the same instant, transistor T4 is blocked, and the „f1" LED is cut out as a consequence.

Trimming the clock generator IC61 to 1,000 cps is done by means of potentiometer P3 with the „fA/fZ" switch in position „fA". P2 serves for trimming IC61 to 1,400 cps (switch positioned to „fZ"). When carrying out the aligment, „fA" is first to be trimmed to 1,000 cps (IC61.3) and 500 cps (TP2) since this alignment influences both frequencies (500 and 700 cps).

The 1,000 or 1,400 cps clock frequency picked up from the output of clock-generator IC61.3 is divided by FF62 in a 1:2 ratio. At the same time, the mark-to-space ratio is modified to become exactly 1:1. From output FF62.11, the 500 or 700 cps signals are fed via R41, C15, R39 into OPERATIONAL AMPLIFIER IC41.9 connected as buffer. The transmission level is adjusted with balancing resistor R41. OPERATIONAL AMPLIFIER IC41.6 likwise connected as buffer is driven from the output of IC41.8 via C24 and low-pass filter L5-C18-L4-C19 as well as C20 and R33. Cpacitor C22 serves for harmonic suppression. The 500 or 700 cps frequency signals are picked up from the output of IC41.7 and, loaded with an approx. 600 ohm impedance, put out via R31 and C23. The signals then become available at B6 „SENDEFREQ".

(2) 2,250/3,150 cps Frequency Recognition

The 2,250 or 3,150 cps frequency is furnished by the teleprinter under test. This frequency is fed via B6 „SENDEFREQ" (F/7), C1, and R2 into OPERATIONAL AMPLIFIER IC41.2 where it is amplified. At output IC41.1, the amplified frequency signals are picked up and fed via R6 and C3 into high-pass filter L1 . . . L3/C3 . . . C6. Coupling to the PLL circuit IC11 is brought about by capacitor C7. Capacitor C8 is the frequency-determinant element in the PLL circuit IC11. Potentiometer P1 serves for trimming the frequency. The frequency alignment is to be done in such a way that the „f4" LED will light at 3,150 cps and the „f3" LED at 2,250 cps.

The voltage levels are picked up from outputs IC11.7-6 and fed into OPERATIONAL AMPLIFIER IC41.13-12 connected as comparator. The filter consisting of R13 . . . R15/C11 . . . C13 serves for smoothing the IC11.7-6 output voltage.

The transistor T1 base is driven from output IC41.14 via R19. At 3,150 cps, IC41.14 furnishes a positive voltage level, and transistor T1 is conductive while transistor T2 is blocked. As a consequence, the „f4" LED (3,150 cps) acted upon via T1 and R20 remains cut in and lights. At 2,250 cps, IC41.14 is at zero-volt potential, and T1 is non-conductive. T2 is conductive, and the „f3" LED (2,250 cps) remains cut in while „f4" is extinguished.

2.2.3.2 Answer-back Unit

The answer-back unit serves for the transmission of text and for calling off the answer-back unit of the teleprinter under test.

(1) Text Transmission

(B/8) The necessary 5-channel (CCITT No. 2) or 8-channel (ASC II) code is selected by means of the "BIT" switch located on the PGFS 020 front panel before testing a teleprinter connected. With the switch positioned to 5, the following text stored in the read-only memory IC31 (A, B/5) ist transmitted in 5-bit code by the PGFS 020 to the teleprinter under test: BU WR ZL PRUEFUNG ZWR BU ZI BU FS ZI + BU RY RY. In switch position 8 a text stored in the ROM IC32 (B, D/5) is transmitted in 8 bits from the PGFS 020 to the unit being tested: DEL CR LF PRUEFUNG SP U* U* U* +. Change-over of the 5/8 bit clock generator is done as to Section 2.2.3.2 (2).

(A/1) The text transmission is initiated by actuating the „TEXT" switch. The same has been designed as a three-position tumbler switch. Its intermediate position is the off position. In its lower position, the switch operates as key. After it has been briefly depressed once, the text is sent out once. The switch locks in its upper position, and the text is sent out continuously.

Control Process

See also pulse timing diagram, Fig. 3

(A/1) Whenever the „TEXT" switch is in its upper position (switch) or its lower one (key), + 12 V are applied via R43 to the FF64.6 set input, and the FF is set. FF64.11 changes over to + 12 V. This „1" (+ 12 V) causes a, „1" to appear at output OR51.3. Via NAND 52.11 = „0", the „clear" input 2 of COUNTER 42 is released. At the same moment, parallel-to-series converter IC13.21 is released via the 12 V/5 V level converter IC44.3,2.

(A/2) The + 12 V level from OR51.3 is applied to input NAND 52.9. Since + 12 V furnished via R50 are applied to NAND 52.8 too, output NAND 52.10 changes over to 0 volts. The interlacing circuit INV 53.11, R49, C28, NAND 53.1, 2, 3 produces an approx. 20-μsec-long zero-volt pulse. This pulse acts via R55, C36, and level converter IC44.5, 4 and drives the „data strobe" input of IC13.23; in this way, the parallel-to-series conversion of a character is initiated.

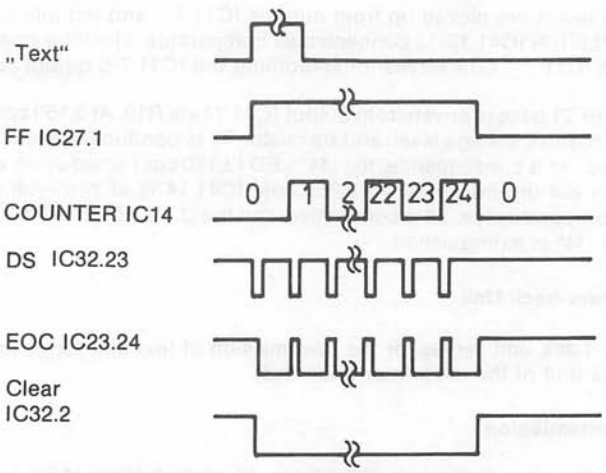


Fig. 3 Pulse Timing Diagram: Text Transmission in 5-bit Code

The clock frequency for the parallel-to-series converter IC13 is fed in through B9 (F/2, 3). This frequency is greater by the factor 32 than the desired baud value (see Section 2.2.1.5). FF62.11, 13 divides the clock frequency by 2, thus reducing the above factor to 16. At the same moment, the mark-to-space ratio is modified to an exact 1:1. The timing pulse is picked up at output FF62.13 and fed via the 12 V/5 V level converter IC44.7, 6 into clock input 40 of the parallel-to-series converter IC13.

(A, B/3) COUNTER IC42 is the character counter. Address inputs 10 . . . 14 of the read-only memory IC31 (for the 5-channel code) and of the read-only memory IC32 (for the 8-channel code) are selected via the 12 V/5 V level converters IC43.2, 4, 6, 12, 10. Outputs 1 . . . 5 of the read-only memories IC31 and IC32 are connected with inputs 2, 4, 6, 10, 12, 14 of IC21 and IC22. The „BIT" switch located on the PGFS 020-2 front panel effects, by means of signals $\overline{5B}$ or $\overline{8B}$, the test generator change-over to 5 bits and 8 bits, respectively (see Section 2.2.3.2 (2)).

Outputs 3, 5, 7, 9, 11 of IC21 and IC22 are connected with data inputs 26 . . . 30 of the parallel-to-series converter IC13. As soon as the first character (start bit, 5 bits, and 2 stop bits) has been sent out completely, e. g., in 5-channel code, the acknowledgement signal EOC = „1" appears at IC13.24. This signal passed on via R51 causes transistor T5 to turn conductive and to apply an „0" signal to COUNTER 42.1; thus, the character counter is stepped forward by one. At the same moment, + 12 V are applied via NAND 52.3 = „1" to input NAND 52.8. With NAND 52.9 = „1" (+ 12 V), and „0" is released at NAND 52.10. The interlacing circuit NAND 53.11, R49, C28, NAND 52.6, 5, 4 joined up downstream again produces a zero-volt signal of 20 μsec in length that is applied to the „data strobe" input IC13.23. The parallel-to-series converter IC13.25 feeds out the next character.

As soon as COUNTER IC42 reaches the count 24, „1" signal is applied via IC42.5, 6 to NAND 53.1, 2. With NAND 63.3 = „0" and, consequently, NAND 52.13 = „0" too,

a „1" is released at NAND 52.11, and COUNTER 42.2 is set to zero. Simultaneously, FF64.4 is reset by means of NAND 63.3 = „0" causing NAND 63.6 = „0" and, consequently, NAND 63.4 = „1". As long as set input FF64.6 is at zero-volt potential, the FF remains reset. However, if set input FF64.6 is kept at + 12-volt potential by the „TEXT" switch, FF64.4 cannot be reset, and the text is sent out continuously.

The serial data output is made at parallel-to-series converter IC13.25. Via R52, D4, T6, and D6, the serial data are led to B7 „SERDAT".

(2) Change-over of the 5/8-bit Text Generator

IC32 contains the text in 8-bit code. The „BIT" change-over switch (B/8) effects the change-over between the 5-bit and 8-bit code at IC13. At the same time, IC21 or IC22 is released by signals 5B and 8B, respectively. These ICs contain change-over gates having tri-state outputs. 0 volts being applied to inputs 1 and 15, gates IC21 and IC22, respectively, are enabled, through-connecting the informations from the text memories IC31 or IC32 to the parallel-to-series converter IC13.

Bits 6, 7, and 8 being present at outputs IC32.6, 7, 9 are directly applied to the corresponding inputs of the parallel-to-series converter IC13.

By means of straps a-b-c-d-e, the working mode of the parallel-to-series converter IC13 may be modified by soldering in diodes or a strap to „b":
Point

Point	Diode	Function
a	D7 unsoldered	without parity; 5 and 8 bits conjointly
a b	D7 soldered in strap unsoldered	with parity; 5 and 8 bits conjointly even parity
b	strap soldered in	odd parity
c	D 11 unsoldered	without parity; only 7 or 8 bits
c	D11 soldered in	with parity; only 7 or 8 bits
d	D8 unsoldered	without parity; only in case of 5 bits
d	D8 soldered in	with parity; only in case of 5 bits
e	D10 unsoldered	8 bits with switch positioned to „8 bits"
e	D10 soldered in	7 bits with switch positioned to „8 bits"

(3) Request for the Answer-back Unit

(B/1) The request for the answer-back unit is made by means of the „✠" (Who are you?) key that is to be operated. FF64.11 acted upon via R45, C26 is set. FF64.13 changes over to + 12 V; as a consequence, OR51.3 is switched to + 12 V too. The control process is the same as described in Section 2.2.3.2 (1) with the following exeption:

The + 12 V level from FF64.13 is applied to OR 51.9 and OR51.12. As a consequence, the counter bits 16 and 8 are set, and the read-only memory IC31 starts

with address „24". The informations WR ZL Zi WER DA (carriage return, new line, figures, WHO ARE YOU) have been programmed into storage position 24 . . . 27. In this way, the anwer-back unit of the connected teleprinter is called off.

As soon as COUNTER 42.9 is stepped to „4", FF64.10 is reset, acted upon via NAND 63.12, 13, 11 and NAND 63.8, 10. The count „4" of the counter corresponds to address „28" of read-only storage IC31 since bits 16 and 8 remain constantly set.

When the "answer-back" switch is switched to "r", OV potential is applied to gate IC72/1, 2 via R69 and the gate output 72/3 switches to + 12 V. As a result of this, the auxiliary flipflop IC71 is reset via the reset input pin 4. Output IC71/1 switches to OV and inhibits gate IC52/5,6 and gate IC 59/9. + 12 V is applied to the gate output IC53/10 and + 5 V is applied to IC31/12 and IC32/12 via the driver and level converter IC43/7–6. This results in recall of the character "r" stored at position 04.

IC52/4 also switches to 12 V and, via IC51/6–4, inhibits the counter IC42 via the reset pin 2. In this way, the counter is kept at 0. At the same time, the + 12 V level is passed on to input 6 of IC64 via diode D13 and sets the flipflop IC64/1. As a result of this, text output is activated with the exception of counter IC42. In this way, "r" is output as a continuous signal.

When the switches return from "r" position to mid-position, + 12 V is applied to IC72/1,2 via R69 and R68. R68/C40 suppress contact bounce. The output IC72/3 switches to OV and removes the continuous set condition from IC71/4. The clock input IC71/3 is switched to + 12 V and the auxiliary flipflop is set with the next start signal to the transceiver IC21/23 via R71–T7 and R70. Output IC71/1 switches to + 12 V and once again enables the gate input IC53/9. At the same time, OV level is applied to IC52/4 and the counter IC42 is anabled via IC51/6. IC64/6 is also switched to OV and, as a result of this, the flipflop switches to "off" condition with the next reset pulse. Text output of (continuous signal "r") is terminated.

(4) Full-duplex Operation

(D/1) Zero-volt potential is applied via diode D5 to R52/D4 by means of the „BREAK IN" button. As a consequence, transistor T6 is blocked; and + 12 V potential is applied via R53 and D6 to B7 SERDAT (≙ no current).

2.2.3.3 Loudspeaker for ED 1000 Signals

The audiofrequency signals are picked up from pins 4 and 1 of the telecommunication socket by the GRUND 562 assy (see logic diagram GRUND 562, part 1) through terminals B10, B11 (F/7) and led to terminals B10, B11 of the FREQ + KEN 564 assy (F/8). See logic diagram FREQ + KEN 564.

The audiofrequency signals are led through C36 and C37 to inputs 2 and 3 of amplifier IC12 where they are amplified. From amplifier output IC12.1, the audiofrequency signals are coupled via C38 to input 6 of the second amplifier IC12 stage. The amplified output signals present at output 7 of IC12 control the loudspeaker while acting through transistor T7 and resistor R67.

The volume can be adjusted by means of R67. The loudspeaker is cut in and out by the „LSP" switch on the PGFS 020 front panel.

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